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29 April 2020

19-G-3958

2473903 Ontario Inc.
8144 King Street
Caledon, Ontario L7E 0T8

Attention: **Mr. Firoz Khan**

RE: Proposed Rezoning and Site Plan Application
Functional Servicing and Stormwater Management Brief
8186 King Street, Town of Caledon, Regional Municipality of Peel

Dear Mr Khan:

Greenland Consulting Engineers are pleased to provide the following Functional Servicing and Stormwater Management Brief for the redevelopment of the above-noted site in the Town of Caledon. This report has also been updated to respond to comments received from the Toronto Region Conservation Authority (TRCA) dated July 14, 2017 (CFN 55174.14). The Stormwater Management Brief has been expanded to also address the screening tool required by TRCA to have regard for the wetland feature situated north east of the corner of the property. Since the property is with 120 metres of the wetland, the TRCA has requested that this screening process be followed.

1 SITE LOCATION

The site comprises 1.92 hectares and is located at 8186 King Street in the Town of Caledon. The existing site has gravel and asphalt driveway areas, a residence, and fallow agricultural fields. The site is shown in **Figure 1**.

Figure 1 Site Location

Adjacent land uses include agriculture to the east and north, the existing Banas Stones yard and Alliance Agri-Turf developments to the west. These two developed properties have split drainage with the land fronting onto King Street draining into a SWM facility on the south side of the road.

2 WETLAND WATER BALANCE RISK EVALUATION

Prior to completing the stormwater management and water balance design for the site development, the protocols for a wetland water balance risk evaluation were completed based on the new criteria outlined in the TRCA November 2017 documentation. The two wetland features that are located north of the site have a combined drainage area of 20.24 ha. **Figure 2** shows the entire drainage area to these features based on present day conditions. The drainage area was determined using a digital terrain model compiled from the SCOOP 2013 data.

Figure 2 Wetland Complex Drainage Area

The entire present impervious area that is draining to the wetland features from all other properties comprises 1.65 ha. This constitutes approximately 8.15% of the total drainage area to the wetland features.

The portion of the proposed site that drains to the two wetland features is only 0.71 ha. This is the last remaining area that has been designated for development in the watershed draining to the wetland feature. The remainder of the lands that drain to the wetlands are either designated prime agricultural or greenbelt lands according to the Town of Caledon Official Plan (April 2018, Schedule C). To maintain a low magnitude of hydrologic change, the overall impervious area should be no greater than 10% of the wetland catchment area.

The impervious cover score can be determined as follows:

$S = (IC \times C_{dev})/C$

where IC – proportion of impervious cover

C_{dev} – total development area in wetland catchment

C – total wetland catchment area

$S = 85.4 \times 2.37/20.24 = 10\%$

To stay below the medium threshold condition, the impervious area from this site draining to the wetland has to be less than 0.606 ha.

The remainder of the site drains to an existing ditch system along the west side of the property that drains away from the wetland feature and outlets to King Street. This ditch system also collects drainage from the existing developed site to the west.

3.0 SITE STATISTICS

3.1 Existing Conditions

The existing site is presently zoned Dry Industrial and consists of a combination of gravel and asphalt driveway areas, a residence including an outbuilding, and agricultural fields in fallow or pasture state. **Table 1** provides a breakdown of the land use coverage for the property

TABLE 1: EXISTING SURFACE CONDITIONS

Surface Type	Area 1 Outlet to King Street		Area 2 Outlet to Wetland	
	Area (sq.m.)	Coverage (%)	Area (sq.m.)	Coverage (%)
Grassed	9,500	78.45	7,100	100.0
Building	340	2.81	0	0.0
Asphalt/Gravel	2,270	18.74	0	0.0
Total	12,110	100%	7,100	100.0

3.2 Proposed Condition

The proposal is to retain the existing house as a contractor facility and develop the rear of the property for open storage of crated natural stone products. It is proposed to rezone the property to MS – Serviced Industrial and EPA – Environmental Policy Area. A vegetation buffer zone is proposed in the northeast corner of the property for a part of the Bolton Wetland Complex which is located off the subject property. Currently, the buffer is proposed in a 30m radius from the northeast property corner.

Proposed surface conditions are listed in **Table 2**. Proposed drainage boundaries and runoff coefficients are shown on **Figure 3**.

TABLE 2: PROPOSED SURFACE CONDITIONS

Surface Type	Area A1 Outlet to King Street		Area A2 Outlet to Wetland	
	Area (sq.m.)	Coverage (%)	Area (sq.m.)	Coverage (%)
Landscape	1,615	13.3	1,633	23.0
Building Roof	292	2.4	0	0.0
Asphalt/Gravel	10,203	84.3	5,467	77.0
Total	12,110	100%	7,100	100.0

4.0 STORMWATER MANAGEMENT

Based on review of Figure 3.1 in the Humber River Hydrology (Civica, 2019), the site appears to fall into the area draining to the main branch of the Humber River, indicating that it would not require use of the unit flow equations. The following stormwater management criteria have been proposed for the site:

- Water Quantity: 2 to 100 year post to pre peak flow control for the area of the property draining to the King Street right-of-way
- Water Quality: 80% removal of total suspended solids
- Water Balance: On-site retention of 5 mm of runoff

4.1 Water Quantity

A VO2 model was prepared for the site for both existing and proposed conditions in order to determine the flows to the wetland complex and to King Street. The model also was used to determine the storage required to meet the predevelopment flow conditions once the site is developed. The predominant soil type for the area is found in the Chinguacousy Clay Loam group which is a Hydrologic Group C soil. A CN value of 74 was applied for pervious areas in the model.

Post to pre peak flow control is proposed for the front catchment area which drains to the King Street right-of-way. Proposed conditions were modelled using the CALIB STANDHYD command.

The Atmospheric Environmental Service (AES) storm distributions for the 100-year return period 1-hour, 6-hour and 12-hour duration storms were tested to establish storage requirements that control the design. The 1-hour duration 100-year event resulted in the largest storage volume requirements. Proposed surface ponding areas on site are indicated on **Drawing 19051-SSG**. Flows from the front catchment are proposed to be restricted at the outlet to CMH1 by provision of a 110mm diameter orifice tube.

$Q = 0.8 \times (\pi/4) \times (0.11)^2 \times (2g \times 1.255)^{1/2}$

$= 0.0377\ m^3/sec$

Storage usage and expected peak flows were computed in VO2 for both the front and rear catchments by applying the ROUTE RESERVOIR command with the storage-discharge relationship for each ponding area. The results are summarized in **Table 3** and copies of the output files for the existing and proposed conditions are provided in **Attachment A**.

TABLE 3: PRE/POST DEVELOPMENT FLOWS AND STORAGE REQUIREMENTS

CATCHMENT draining to King Street					
Event (1-hr AES)	Computed Peak Flows (cms)			Storage Requirement (cu.m.)	Approx. Surface Ponding Elevation (m)
	Existing Conditions	Post Dev Contributing to SWM Controls	Proposed Outlet Controlled Flows		
2 year	0.014	0.068	0.033	101	263.43
5 year	0.035	0.159	0.034	186	263.49
10 year	0.051	0.206	0.035	249	263.52
25 year	0.075	0.269	0.036	331	263.55
50 year	0.094	0.319	0.037	394	263.57
100 year	0.114	0.440	0.038	457	263.59
CATCHMENT draining to wetland complex					
Event (1-hr AES)	Computed Peak Flows (cms)			Storage Requirement (cu.m.)	Approx. Surface Ponding Elevation (m)
	Existing Conditions	Post Dev Contributing to SWM Controls	Proposed Outlet Controlled Flows		
2 year	0.010	0.062	0.008	87	262.52
5 year	0.024	0.109	0.014	133	262.60
10 year	0.035	0.141	0.019	166	262.68
25 year	0.052	0.181	0.024	208	262.77
50 year	0.067	0.215	0.029	240	262.80
100 year	0.082	0.246	0.033	272	262.80

While no water quantity criteria were identified for the rear catchment, some peak flow control is proposed in the form of a berm/level spreader (8.0 m weir) and provision of one 150mm diameter outlet pipe at 0.5%. The total available storage at 262.80 m in 272 m^3 of surface storage and 35.5 m^3 of subsurface storage.

orifice tube head at 262.70m $Q = 0.8 \times (\pi/4) \times (0.15)^2 \times (2g \times 0.275)^{1/2} = 0.0328\ m^3/sec$ with

The overflow weir will function only once the full storage has been utilized.

4.2 Shared Ditch Capacity (8144/8186 King Street)

There is a common drainage ditch shared between the subject property (8186 King Street) and the existing development to the west (8144 King Street). Sections of the existing shared drainage ditch are provided on **Drawing 19051-ESC1**.

The capacity of the existing ditch was determined using the Manning's equation with the following parameters and dimensions:

- Manning's n for stone bottom of 0.035;
- Steep side slopes of 1 horizontal to 5 vertical;
- rectangular channel with a 1m bottom width; and,
- longitudinal slope of 0.3%.

The capacity of the existing ditch was determined to be 0.938 cms at a depth of 0.95 m.

The area draining to the ditch under proposed conditions was delineated on **Figure 4**. The inlet time was set to 5 minutes (Std 103 Town of Caledon). The runoff coefficient of the 8144 King Street was assumed to be 0.9 therefore, the uncontrolled flows from this existing site would contribute the following:

Q = 1.25 X 0.9 X 239.35 mm/hr X 0.68 ha/360 (C not to exceed 1.0)

= 239.35 X 0.68/360

= 0.452 m^3/sec

Figure 4 Drainage Areas to Common Ditch

Once added to the controlled flows leaving the subject site, the total flow during a 100 year storm would be 0.452 + 0.038 = 0.490 m^3/sec

There is also a very small drainage pocket on the neighbouring property to the east that a small pipe to convey the flow has been included. This area may be approximately 50 m^2 in surface area. The proposed pipe crosses the property and outlets into the ditch and provides relief for this potential flow. The flow is approximately 1.0 l/sec. (Q = 0.3 X 0.005 X 239.35/360).

There is sufficient capacity in the ditch to convey the 100-year peak flow. This flow would yield a water depth within the channel of approximately 0.62 m.

4.3 Water Balance

The water balance requirement is to capture the first 5 mm of rainfall through infiltration, evapotranspiration, and/or reuse for the entire site to meet TRCA requirements. This volume is proposed to be provided in the following locations:

- A 336 m^2 infiltration gallery located south of CMH1 (25m length x 13.44m width x 0.45m depth x 0.4 void ratio = 60.5 m^3);
- A 3.9 m^3 bioretention area behind existing building (3.7m width x 5.3m length x 0.9m depth x 0.4 void ratio) and approximately 1 m^3. on the surface (3.7m width x 5.3m length x 0.05m depth); and,
- A 38.4 m^3 bioretention area at the rear of the property (4.0 m width X 30 m length X 0.80m depth X 0.4 void ratio).

The infiltration gallery will be connected to the proposed diversion manhole MH2 with a pipe with the invert at 262.06m. The pipe will feed into the top of the gallery with the base of the gallery at 261.55m. The soils report prepared for the neighbouring property indicates that the water table is not in the vicinity of this proposed gallery. No groundwater was encountered to the 258.4m elevation at the extent of boreholes. The report is provided in **Attachment C**.

4.4 Water Quality

Separate water quality measures are proposed for the two portions of the site draining to either the front or the back of the property. An oil-grit separator is proposed for the front portion of the catchment that drains to King Street. Two alternatives were originally considered for this device including:

- Stormceptor – Imbrium Systems – EF-06; and,
- Defender OGS – Hydro International – FD-4HC.
- The Defender OGS FD-4HC is being selected for the site. The manufacturer specifications suggest that the device will meet Enhanced Protection requirements by providing at least 80% TSS removal annually (82.7%). The sizing summary is provided in **Attachment B**.

The Defender OGS FD-4HC will be part of a treatment train to King Street. It will provide the first line of defense to settle out the larger particles before flows enter the infiltration gallery. The infiltration gallery connected to MH2 has been sized for 5 mm of runoff from the contributing site. This effectively means that out of the 113.2 rainfall events that occur statistically every year, the infiltration gallery will capture at least 79.5% of the rainfall. The Canadian Climate Normals for Toronto Pearson Airport from 1981 to 2010 were used to arrive at this determination as shown in **Table 4**. Coupled with the treatment achieved with the OGS Device, the water quality target for flows draining to King Street has been achieved.

TABLE 4: ANNUAL RAINFALL STORM SUMMARY

Rainfall	No of Events	% of Events	% Captured	% Annual Treatment
<5mm	70.6	62.4	5/5=100	62.4
5 to 10	20.1	17.8	5/7.5=66.6	11.8
10 to 25	18.3	16.2	5/17.5=28.5	4.6
>25mm	4.2	3.7	5/25=20	0.7
			Total	79.5

For the rear of the property, a passive system is proposed that will discharge to a rock-lined ditch that connects to an existing drainage system previously constructed by the local farmer. This passive system will consist of a berm/level spreader and vegetated buffer filter strip linked to a bioretention gallery. **Figure 5** shows a schematic of the system proposed.

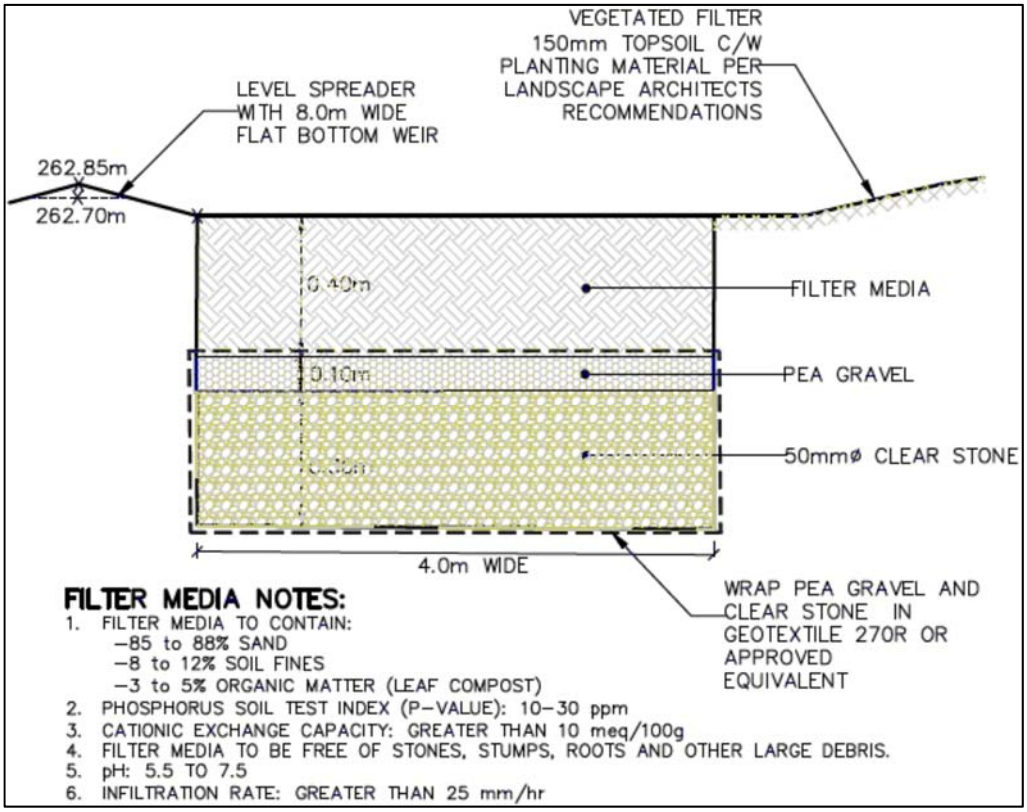

Figure 5 Rear Bioretention Gallery

Similar to the front system, the bioretention gallery contains an infiltration component that will capture the 5 mm event. Therefore, the bioretention gallery captures at least 79.5% of the rainfall events for treatment. Coupled with the vegetated buffer and the bioretention filter the Enhance Protection criteria of 80% removal of annual TSS loadings is achieved.

5.0 EROSION AND SEDIMENT CONTROL

Standard erosion and sediment controls proposed for the site meet either the Town of Caledon standards or the Erosion & Sediment Control Guideline for Urban Construction manual prepared by the Greater Golden Horseshoe Area Conservation Authorities. These include:

- mud mats at the site ingress/egress points;
- peripheral siltation fencing;
- tree protection; and,
- catch-basins/manholes protection.

The staging of construction will be to complete the grading of the gravel areas prior to the construction of the bioretention features. The infiltration gallery can be installed during the construction of the sewer network but should include a plug to remain off-line until the site has been stabilized. The erosion and sediment control measures including siltation-fence, tree-protection, catch-basin protection, and mud mat specifications are shown on **Drawing 19051-ESC1**.

6.0 SANITARY SERVICING

6.1 Existing Sanitary Servicing

The site is currently serviced by an existing septic system located behind the existing residential building. The approximate location of the septic system is shown on the Site Servicing and Grading Plan (**Drawing 19051-SSG**). Drawings provided by the Region of Peel indicate an existing 300mm PVC sanitary sewer is located within the eastbound traffic lane of King Street. This sewer flows east and connects to an existing 300mm PVC easterly flowing sanitary sewer on Tarquini Crescent. Plan and profiles of the existing municipal sewers can be found in **Attachment D**.

6.2 Proposed Sanitary Servicing and Peak Discharge Rates

Sanitary servicing is to be provided consistent with the Region of Peel Public Works Sanitary Sewer Design Criteria (2017). It is proposed to decommission the existing septic system and connect the property to the existing 300mm diameter municipal sanitary sewer on King Street. A new connection is proposed via a 150mm diameter PVC sanitary lateral at minimum 2% slope complete with sampling manhole located at the limit of the road widening. The general arrangement of the proposed sanitary sewer has been indicated on the Site Servicing & Grading Plan (**Drawing 19051-SSG**).

The proposed peak sanitary discharge generated from the development has been calculated in accordance with Region of Peel Design Criteria as follows:

Proposed Sanitary Peak Discharge

Population = 50 persons/hectare

Site Area = 1.92 hectares

Equivalent Population = 50 persons/hectare x 1.92 hectares

= 96 persons

Domestic sewage flow is based upon a unit rate of 302.8 litres/capita/day, therefore:

Domestic Sewage Flow = 96 persons x 302.8 litres/capita/day
= 29,068.8 litres/day
= 0.336 litres/sec

The Harmon Peaking Factor (M) must be applied for Dry Weather Flows:

$M = 1 + 14 / (4 + P^{0.5})$
$= 1 + 14 / (4 + (96/1000)^{0.5})$
$= 4.25$

A maximum Harmon Peaking Factor of 4 shall be used, therefore:

Maximum Dry Weather Flow = 0.336 litres/sec x 4
= 1.344 litres/sec

Infiltration Amount = 0.0002 m^3 /sec/ha x 1.92 ha
= 0.000384 m^3 /sec
= 0.384 litres/sec

Total Prop. Peak Discharge = Commercial Flow + Infiltration Amount
= 1.344 l/sec + 0.384 l/sec
= 1.728 l/sec

The internal 150mm diameter pipe with a minimum fall of 2.0% has a capacity of 22.5 l/sec, and will be more than sufficient to convey the proposed flows to the municipal sewers.

A Connection Demand Table has been included in **Attachment E**, in which a more detailed analysis of water and wastewater demand from the proposed development has been completed.

7.0 WATER SERVICING

7.1 Existing Water Services

The property has an existing 25mm municipal water service. The approximate alignment is shown on the Site Servicing and Grading Plan (**Drawing 19051-SSG**). There is at least one existing well on the property. This well and any other wells found during construction should be decommissioned consistent with applicable standards. Drawings provided by the Region of Peel indicate there is an existing 300mm diameter PVC municipal watermain on King Street. The 300mm diameter watermain connects to the 300mm watermain on Tarquini Crescent. Plan and profiles of the existing municipal watermain can be found in **Attachment D**.

7.2 Proposed Water Services & Peak Water Demands

It is proposed to replace the existing 25mm service with a new fireline/domestic connection per Region of Peel Standard 1-6-4. A new connection to the 300mm diameter municipal watermain on King Street is proposed via a 150mm diameter PVC water service installed via a tap and sleeve. The proposed domestic service size is 25mm, and will branch off the proposed 150mm diameter water service connection immediately before the limit of the road widening. The existing water meter in the building will be retained for reuse. An on-site hydrant (complete with detector check valve in chamber at property line) is proposed for fire protection.

The general arrangement of the fire and domestic water services has been indicated on the Site Servicing & Grading Plan (**Drawing 19051-SSG**).

7.2.1 Domestic Flow

Domestic water demands have been estimated using the Region of Peel Public Works Watermain Design Criteria (2010). For the 96 employees (calculated for proposed peak sanitary flow), average ICI consumption rate of 300 L/day/cap has been used. A max day factor of 1.4 and a peak hour factor of 3.0 has also been applied.

Peak Water Demand

Daily Water Consumption	= 96 persons x 300 litres/capita/day
	= 28,800 litres/day
	= 0.333 litres/sec
Maximum Daily Demand	= Daily Water Consumption x Max Day Factor
	= 28,800 L/day x 1.4
	= 40,320 L/day
	= 0.467 L/s
Peak Hourly Demand	= Daily Water Consumption x Peak Hour Factor
	= 28,800 L/day x 3.0 / 24 hours/day
	= 3,600 L/hour
	= 1.00 L/s

7.2.2 Fire Flow Demands

The fire flow requirements for the building have been estimated using the NFPA Fire Underwriters Survey's Water Supply for Public Fire Protection (1999). The existing 215 sq.m gross floor area, has been used to calculate the fire flow requirement of 4,252 L/min (70.87 L/s). Detailed calculations of the fire flow demand are included in **Attachment F**.

7.2.3 Hydrant Flow Test and Available Pressures

The maximum anticipated water demand from the development will be 71.337 L/s (70.87 L/s + 0.467 L/s), or 1,131 GPM. A hydrant flow test was carried out by FCFP on October 9th, 2019 on the 300mm diameter watermain on King Street/ Tarquini Crescent to confirm that adequate pressures are available to service the proposed change in land-use. The flow test results, which are provided in **Attachment G**, indicate a static pressure of 45 PSI within the watermain.

Furthermore, extrapolation of the flow test data indicates that a residual fire flow pressure of 41.8 PSI (288kPA), can be expected during the fire flow and maximum day demand and is above the Region's minimum operating pressure of 20 PSI. The proposed hydrant connection will have a similar configuration as the existing private hydrant on the adjacent property (which was tested during the October 9th, 2019 flow test), and is therefore expected to have a similar operating pressure.

A Connection Demand Table has been included in **Attachment E**, in which a more detailed analysis of water and wastewater demand from the proposed development has been completed.

8.0 LIGHTING

The present exterior lighting is proposed to be maintained for the proposed development. The existing building has wall mounted exterior lights (locations indicated on the site plan). Town of Caledon standard notes indicate that the minimum level of lighting of 35 lux be maintained at the building main entrance and the accessible parking space. The standard notes are included on the site plan (**Drawing 19051 GEN**).

9.0 NOISE

A noise study was originally prepared by Aercoustics Engineering Ltd. This report recommended the following noise control measures for the proposed development:

- prohibiting the use of the Volvo front loader/forklift within 130m from the neighbouring residential dwelling; and,
- this limit should be demarcated on the site plan.

If you have any questions or comments please do not hesitate to forward them to the undersigned.

Sincerely,

GREENLAND CONSULTING ENGINEERS

Don Moss, M.Eng., P. Eng.
Associate

Attachment A: VO2 Model Output (Digital Files)
Attachment B: OGS Sizing Information
Attachment C: Soils Report
Attachment D: Servicing Plan and Profiles
Attachment E: Single Use Demand Tables
Attachment F: Fire Flow Demand
Attachment G: Hydrant Flow Test
Attachment H: Site Servicing and Grading Plan

Attachment A: VO2 Model Output (Digital Files)

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V    V   I    SSSSS  U   U    A    L
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  L
 V  V    I      SS   U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL

 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM, Version 2.1
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O
 OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 2.3.1\voin.dat

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Summary filename: T:\3958 Banas Stone SWM Analysis\Models\VO2\Banas Stone\Existing Condition.sum

DATE: 8/29/2019 TIME: 11:53:33 AM

USER:

COMMENTS: _____

**** SIMULATION NUMBER: 1 **

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| | VO2\Banas Stone\Storms\2yr-1hr.STM
| Ptotal= 24.38 mm | Comments: 2yr/1hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	.00	.42	75.84	.75	4.98	1.08	.15
.17	10.83	.50	69.69	.83	2.05		
.25	32.50	.58	29.28	.92	.88		
.33	54.17	.67	12.00	1.00	.29		

| CALIB |
| NASHYD (0001) | Area (ha)= .38 Curve Number (CN)= 74.0
|ID= 1 DT= 1.0 min | Ia (mm)= 10.00 # of Linear Res.(N)= 3.00
| | U.H. Tp(hrs)= .17

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	.300	54.17	.583	29.04	.87	.88
.033	.00	.317	54.17	.600	12.00	.88	.88
.050	.00	.333	54.34	.617	12.00	.90	.88
.067	.00	.350	75.84	.633	12.00	.92	.87

.083	.02	.367	75.84	.650	12.00	.93	.29
.100	10.83	.383	75.84	.667	11.89	.95	.29
.117	10.83	.400	75.84	.683	4.98	.97	.29
.133	10.83	.417	75.78	.700	4.98	.98	.29
.150	10.83	.433	69.69	.717	4.98	1.00	.29
.167	10.92	.450	69.69	.733	4.98	1.02	.15
.183	32.50	.467	69.69	.750	4.93	1.03	.15
.200	32.50	.483	69.69	.767	2.05	1.05	.15
.217	32.50	.500	69.20	.783	2.05	1.07	.15
.233	32.50	.517	29.28	.800	2.05	1.08	.15
.250	32.63	.533	29.28	.817	2.05		
.267	54.17	.550	29.28	.833	2.03		
.283	54.17	.567	29.28	.850	.88		

Unit Hyd Qpeak (cms)= .085

PEAK FLOW (cms)= .005 (i)
TIME TO PEAK (hrs)= .683
RUNOFF VOLUME (mm)= 1.994
TOTAL RAINFALL (mm)= 24.379
RUNOFF COEFFICIENT = .082

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (0002)	Area (ha)= 1.54	Curve Number (CN)= 78.0	
ID= 1 DT= 1.0 min	Ia (mm)= 10.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= .31		

Unit Hyd Qpeak (cms)= .190

PEAK FLOW (cms)= .016 (i)
TIME TO PEAK (hrs)= .833
RUNOFF VOLUME (mm)= 2.403

TOTAL RAINFALL (mm)= 24.379

RUNOFF COEFFICIENT = .099

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

****

** SIMULATION NUMBER: 2 **

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| READ STORM | Filename: T:\3958 Banas Stone SWM Analysis\Models\
| | VO2\Banas Stone\Storms\5yr-1hr.STM
| Ptotal= 33.57 mm | Comments: 5yr/1hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	.00	.42	104.43	.75	6.85	1.08	.20
.17	14.92	.50	95.96	.83	2.82		
.25	44.76	.58	40.32	.92	1.21		
.33	74.59	.67	16.53	1.00	.40		

CALIB	
NASHYD (0001)	Area (ha)= .38 Curve Number (CN)= 74.0
ID= 1 DT= 1.0 min	Ia (mm)= 10.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .17

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
.017	.00	.300	74.59	.583	39.99	.87	1.21
.033	.00	.317	74.59	.600	16.53	.88	1.21
.050	.00	.333	74.83	.617	16.53	.90	1.21
.067	.00	.350	104.43	.633	16.53	.92	1.19
.083	.03	.367	104.43	.650	16.53	.93	.40
.100	14.92	.383	104.43	.667	16.38	.95	.40
.117	14.92	.400	104.43	.683	6.85	.97	.40
.133	14.92	.417	104.35	.700	6.85	.98	.40
.150	14.92	.433	95.96	.717	6.85	1.00	.40
.167	15.04	.450	95.96	.733	6.85	1.02	.20
.183	44.76	.467	95.96	.750	6.78	1.03	.20
.200	44.76	.483	95.96	.767	2.82	1.05	.20
.217	44.76	.500	95.29	.783	2.82	1.07	.20
.233	44.76	.517	40.32	.800	2.82	1.08	.19
.250	44.94	.533	40.32	.817	2.82		
.267	74.59	.550	40.32	.833	2.79		
.283	74.59	.567	40.32	.850	1.21		

Unit Hyd Qpeak (cms)= .085

PEAK FLOW (cms)= .013 (i)
TIME TO PEAK (hrs)= .667
RUNOFF VOLUME (mm)= 4.923
TOTAL RAINFALL (mm)= 33.569
RUNOFF COEFFICIENT = .147

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0002)	Area	(ha)=	1.54	Curve Number	(CN)= 78.0
ID= 1 DT= 1.0 min	Ia	(mm)=	10.00	# of Linear Res.	(N)= 3.00
	U.H. Tp	(hrs)=	.31		

```
     Unit Hyd Qpeak   (cms)=    .190

     PEAK FLOW        (cms)=    .039 (i)
     TIME TO PEAK     (hrs)=    .817
     RUNOFF VOLUME     (mm)=   5.834
     TOTAL RAINFALL    (mm)=  33.569
     RUNOFF COEFFICIENT   =    .174

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   3 **
  ****************************


--------------------
|    READ STORM    |    Filename: T:\3958 Banas Stone SWM Analysis\Models\
|                  |              VO2\Banas Stone\Storms\10yr-1hr.STM
| Ptotal= 39.76 mm |    Comments: 10yr/1hr
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .08     .00 |   .42  123.70 |   .75    8.12 |  1.08     .24
                 .17   17.67 |   .50  113.67 |   .83    3.34 |
                 .25   53.01 |   .58   47.76 |   .92    1.43 |
                 .33   88.36 |   .67   19.58 |  1.00     .48 |

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--------------------
| CALIB            |
| NASHYD    (0001) |   Area     (ha)=    .38   Curve Number    (CN)= 74.0
|ID= 1 DT= 1.0 min |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .17
```

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
.017	.00	.300	88.36	.583	47.37	.87	1.43
.033	.00	.317	88.36	.600	19.58	.88	1.43
.050	.00	.333	88.64	.617	19.58	.90	1.43
.067	.00	.350	123.70	.633	19.58	.92	1.41
.083	.04	.367	123.70	.650	19.58	.93	.48
.100	17.67	.383	123.70	.667	19.40	.95	.48
.117	17.67	.400	123.70	.683	8.12	.97	.48
.133	17.67	.417	123.60	.700	8.12	.98	.48
.150	17.67	.433	113.67	.717	8.12	1.00	.47
.167	17.81	.450	113.67	.733	8.12	1.02	.24
.183	53.01	.467	113.67	.750	8.03	1.03	.24
.200	53.01	.483	113.67	.767	3.34	1.05	.24
.217	53.01	.500	112.88	.783	3.34	1.07	.24
.233	53.01	.517	47.76	.800	3.34	1.08	.23
.250	53.22	.533	47.76	.817	3.34		
.267	88.36	.550	47.76	.833	3.30		
.283	88.36	.567	47.76	.850	1.43		

Unit Hyd Qpeak (cms)= .085

PEAK FLOW (cms)= .019 (i)

TIME TO PEAK (hrs)= .667

RUNOFF VOLUME (mm)= 7.443

TOTAL RAINFALL (mm)= 39.764

RUNOFF COEFFICIENT = .187

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| CALIB             |
| NASHYD     (0002) |   Area     (ha)=   1.54   Curve Number    (CN)= 78.0
|ID= 1 DT= 1.0 min |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .31

     Unit Hyd Qpeak  (cms)=    .190

     PEAK FLOW       (cms)=    .058 (i)
     TIME TO PEAK    (hrs)=    .817
     RUNOFF VOLUME    (mm)=   8.736
     TOTAL RAINFALL   (mm)=  39.764
     RUNOFF COEFFICIENT   =    .220

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   4 **
  ****************************


--------------------
|    READ STORM    |    Filename: T:\3958 Banas Stone SWM Analysis\Models\
|                  |              VO2\Banas Stone\Storms\25yr-1hr.STM
| Ptotal= 47.46 mm |    Comments: 25yr/1hr
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .08     .00 |   .42  147.63 |   .75    9.69 |  1.08     .29
                 .17   21.09 |   .50  135.66 |   .83    3.99 |
                 .25   63.27 |   .58   57.00 |   .92    1.71 |
                 .33  105.45 |   .67   23.37 |  1.00     .57 |

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CALIB	
NASHYD (0001)	Area (ha)= .38 Curve Number (CN)= 74.0
ID= 1 DT= 1.0 min	Ia (mm)= 10.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .17

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	.300	105.45	.583	56.53	.87	1.71
.033	.00	.317	105.45	.600	23.37	.88	1.71
.050	.00	.333	105.79	.617	23.37	.90	1.71
.067	.00	.350	147.63	.633	23.37	.92	1.68
.083	.04	.367	147.63	.650	23.37	.93	.57
.100	21.09	.383	147.63	.667	23.15	.95	.57
.117	21.09	.400	147.63	.683	9.69	.97	.57
.133	21.09	.417	147.51	.700	9.69	.98	.57
.150	21.09	.433	135.66	.717	9.69	1.00	.56
.167	21.26	.450	135.66	.733	9.69	1.02	.29
.183	63.27	.467	135.66	.750	9.59	1.03	.29
.200	63.27	.483	135.66	.767	3.99	1.05	.29
.217	63.27	.500	134.72	.783	3.99	1.07	.29
.233	63.27	.517	57.00	.800	3.99	1.08	.28
.250	63.52	.533	57.00	.817	3.99		
.267	105.45	.550	57.00	.833	3.94		
.283	105.45	.567	57.00	.850	1.71		

Unit Hyd Qpeak (cms)= .085

PEAK FLOW (cms)= .028 (i)

TIME TO PEAK (hrs)= .650

RUNOFF VOLUME (mm)= 11.073

TOTAL RAINFALL (mm)= 47.458

RUNOFF COEFFICIENT = .233

```
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0002) |   Area     (ha)=   1.54   Curve Number    (CN)= 78.0
|ID= 1 DT= 1.0 min |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .31

     Unit Hyd Qpeak  (cms)=    .190

     PEAK FLOW       (cms)=    .085 (i)
     TIME TO PEAK    (hrs)=    .800
     RUNOFF VOLUME    (mm)=  12.860
     TOTAL RAINFALL   (mm)=  47.458
     RUNOFF COEFFICIENT   =    .271

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   5 **
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|    READ STORM    |    Filename: T:\3958 Banas Stone SWM Analysis\Models\
|                  |              VO2\Banas Stone\Storms\50yr-1hr.STM
| Ptotal= 53.25 mm |    Comments: 50yr/1hr
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .08     .00 |   .42  165.66 |   .75   10.87 |  1.08     .32
                 .17   23.67 |   .50  152.22 |   .83    4.48 |
                 .25   71.00 |   .58   63.96 |   .92    1.92 |
```

.33	118.33	.67	26.22	1.00	.64		

CALIB	
NASHYD (0001)	Area (ha)= .38 Curve Number (CN)= 74.0
ID= 1 DT= 1.0 min	Ia (mm)= 10.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .17

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	.300	118.33	.583	63.43	.87	1.92
.033	.00	.317	118.33	.600	26.22	.88	1.92
.050	.00	.333	118.71	.617	26.22	.90	1.92
.067	.00	.350	165.66	.633	26.22	.92	1.89
.083	.05	.367	165.66	.650	26.22	.93	.64
.100	23.67	.383	165.66	.667	25.97	.95	.64
.117	23.67	.400	165.66	.683	10.87	.97	.64
.133	23.67	.417	165.53	.700	10.87	.98	.64
.150	23.67	.433	152.22	.717	10.87	1.00	.63
.167	23.86	.450	152.22	.733	10.87	1.02	.32
.183	71.00	.467	152.22	.750	10.76	1.03	.32
.200	71.00	.483	152.22	.767	4.48	1.05	.32
.217	71.00	.500	151.16	.783	4.48	1.07	.32
.233	71.00	.517	63.96	.800	4.48	1.08	.31
.250	71.28	.533	63.96	.817	4.48		
.267	118.33	.550	63.96	.833	4.43		
.283	118.33	.567	63.96	.850	1.92		

Unit Hyd Qpeak (cms)= .085

```
     PEAK FLOW       (cms)=    .036 (i)
     TIME TO PEAK    (hrs)=    .650
     RUNOFF VOLUME    (mm)=  14.119
     TOTAL RAINFALL   (mm)=  53.253
     RUNOFF COEFFICIENT   =    .265

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0002) |   Area     (ha)=   1.54   Curve Number    (CN)= 78.0
|ID= 1 DT= 1.0 min |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .31

     Unit Hyd Qpeak  (cms)=    .190

     PEAK FLOW       (cms)=    .108 (i)
     TIME TO PEAK    (hrs)=    .800
     RUNOFF VOLUME    (mm)=  16.282
     TOTAL RAINFALL   (mm)=  53.253
     RUNOFF COEFFICIENT   =    .306

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   6 **
  ****************************


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|    READ STORM    |    Filename: T:\3958 Banas Stone SWM Analysis\Models\
|                  |              VO2\Banas Stone\Storms\100yr-1hr.STM
| Ptotal= 58.95 mm |    Comments: 100yr/1hr
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	.00	.42	183.37	.75	12.04	1.08	.35
.17	26.20	.50	168.50	.83	4.96		
.25	78.59	.58	70.80	.92	2.12		
.33	130.98	.67	29.03	1.00	.71		

CALIB			
NASHYD (0001)	Area (ha)=	.38	Curve Number (CN)= 74.0
ID= 1 DT= 1.0 min	Ia (mm)=	10.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	.17	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	.300	130.98	.583	70.22	.87	2.12
.033	.00	.317	130.98	.600	29.03	.88	2.12
.050	.00	.333	131.40	.617	29.03	.90	2.12
.067	.00	.350	183.37	.633	29.03	.92	2.09
.083	.05	.367	183.37	.650	29.03	.93	.71
.100	26.20	.383	183.37	.667	28.76	.95	.71
.117	26.20	.400	183.37	.683	12.04	.97	.71
.133	26.20	.417	183.22	.700	12.04	.98	.71
.150	26.20	.433	168.50	.717	12.04	1.00	.70
.167	26.41	.450	168.50	.733	12.04	1.02	.35
.183	78.59	.467	168.50	.750	11.91	1.03	.35
.200	78.59	.483	168.50	.767	4.96	1.05	.35
.217	78.59	.500	167.33	.783	4.96	1.07	.35
.233	78.59	.517	70.80	.800	4.96	1.08	.34
.250	78.90	.533	70.80	.817	4.96		

```
                .267  130.98 |  .550   70.80 |  .833    4.90 |
                .283  130.98 |  .567   70.80 |  .850    2.12 |

     Unit Hyd Qpeak  (cms)=    .085

     PEAK FLOW       (cms)=    .044 (i)
     TIME TO PEAK    (hrs)=    .650
     RUNOFF VOLUME    (mm)=  17.336
     TOTAL RAINFALL   (mm)=  58.947
     RUNOFF COEFFICIENT   =    .294

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0002) |   Area    (ha)=   1.54   Curve Number    (CN)= 78.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .31

     Unit Hyd Qpeak  (cms)=    .190

     PEAK FLOW       (cms)=    .132 (i)
     TIME TO PEAK    (hrs)=    .800
     RUNOFF VOLUME    (mm)=  19.867
     TOTAL RAINFALL   (mm)=  58.947
     RUNOFF COEFFICIENT   =    .337

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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  ** SIMULATION NUMBER:   7 **
  ****************************
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READ STORM	Filename: T:\3958 Banas Stone SWM Analysis\Models\VO2\Banas Stone\Storms\100yr-6hr.STM
Ptotal= 80.31 mm	Comments: 100yr/6

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	.00	2.00	27.30	3.75	11.24	5.50	1.61
.50	1.61	2.25	27.30	4.00	6.42	5.75	1.61
.75	1.61	2.50	73.88	4.25	6.42	6.00	1.61
1.00	1.61	2.75	73.88	4.50	3.21	6.25	1.61
1.25	1.61	3.00	20.88	4.75	3.21		
1.50	9.64	3.25	20.88	5.00	1.61		
1.75	9.64	3.50	11.24	5.25	1.61		

CALIB			
NASHYD (0001)	Area (ha)= .38	Curve Number (CN)= 74.0	
ID= 1 DT= 1.0 min	Ia (mm)= 10.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= .17		

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	1.583	9.64	3.150	20.88	4.72	3.21
.033	.00	1.600	9.64	3.167	20.88	4.73	3.21
.050	.00	1.617	9.64	3.183	20.88	4.75	3.21
.067	.00	1.633	9.64	3.200	20.88	4.77	1.61
.083	.00	1.650	9.64	3.217	20.88	4.78	1.61
.100	.00	1.667	9.64	3.233	20.88	4.80	1.61
.117	.00	1.683	9.64	3.250	20.88	4.82	1.61

.133	.00	1.700	9.64	3.267	11.24	4.83	1.61
.150	.00	1.717	9.64	3.283	11.24	4.85	1.61
.167	.00	1.733	9.64	3.300	11.24	4.87	1.61
.183	.00	1.750	9.64	3.317	11.24	4.88	1.61
.200	.00	1.767	27.30	3.333	11.24	4.90	1.61
.217	.00	1.783	27.30	3.350	11.24	4.92	1.61
.233	.00	1.800	27.30	3.367	11.24	4.93	1.61
.250	.00	1.817	27.30	3.383	11.24	4.95	1.61
.267	1.61	1.833	27.30	3.400	11.24	4.97	1.61
.283	1.61	1.850	27.30	3.417	11.24	4.98	1.61
.300	1.61	1.867	27.30	3.433	11.24	5.00	1.61
.317	1.61	1.883	27.30	3.450	11.24	5.02	1.61
.333	1.61	1.900	27.30	3.467	11.24	5.03	1.61
.350	1.61	1.917	27.30	3.483	11.24	5.05	1.61
.367	1.61	1.933	27.30	3.500	11.24	5.07	1.61
.383	1.61	1.950	27.30	3.517	11.24	5.08	1.61
.400	1.61	1.967	27.30	3.533	11.24	5.10	1.61
.417	1.61	1.983	27.30	3.550	11.24	5.12	1.61
.433	1.61	2.000	27.30	3.567	11.24	5.13	1.61
.450	1.61	2.017	27.30	3.583	11.24	5.15	1.61
.467	1.61	2.033	27.30	3.600	11.24	5.17	1.61
.483	1.61	2.050	27.30	3.617	11.24	5.18	1.61
.500	1.61	2.067	27.30	3.633	11.24	5.20	1.61
.517	1.61	2.083	27.30	3.650	11.24	5.22	1.61
.533	1.61	2.100	27.30	3.667	11.24	5.23	1.61
.550	1.61	2.117	27.30	3.683	11.24	5.25	1.61
.567	1.61	2.133	27.30	3.700	11.24	5.27	1.61
.583	1.61	2.150	27.30	3.717	11.24	5.28	1.61
.600	1.61	2.167	27.30	3.733	11.24	5.30	1.61
.617	1.61	2.183	27.30	3.750	11.24	5.32	1.61
.633	1.61	2.200	27.30	3.767	6.42	5.33	1.61
.650	1.61	2.217	27.30	3.783	6.42	5.35	1.61
.667	1.61	2.233	27.30	3.800	6.42	5.37	1.61
.683	1.61	2.250	27.30	3.817	6.42	5.38	1.61
.700	1.61	2.267	73.88	3.833	6.42	5.40	1.61
.717	1.61	2.283	73.88	3.850	6.42	5.42	1.61

.733	1.61	2.300	73.88	3.867	6.42	5.43	1.61
.750	1.61	2.317	73.88	3.883	6.42	5.45	1.61
.767	1.61	2.333	73.88	3.900	6.42	5.47	1.61
.783	1.61	2.350	73.88	3.917	6.42	5.48	1.61
.800	1.61	2.367	73.88	3.933	6.42	5.50	1.61
.817	1.61	2.383	73.88	3.950	6.42	5.52	1.61
.833	1.61	2.400	73.88	3.967	6.42	5.53	1.61
.850	1.61	2.417	73.88	3.983	6.42	5.55	1.61
.867	1.61	2.433	73.88	4.000	6.42	5.57	1.61
.883	1.61	2.450	73.88	4.017	6.42	5.58	1.61
.900	1.61	2.467	73.88	4.033	6.42	5.60	1.61
.917	1.61	2.483	73.88	4.050	6.42	5.62	1.61
.933	1.61	2.500	73.88	4.067	6.42	5.63	1.61
.950	1.61	2.517	73.88	4.083	6.42	5.65	1.61
.967	1.61	2.533	73.88	4.100	6.42	5.67	1.61
.983	1.61	2.550	73.88	4.117	6.42	5.68	1.61
1.000	1.61	2.567	73.88	4.133	6.42	5.70	1.61
1.017	1.61	2.583	73.88	4.150	6.42	5.72	1.61
1.033	1.61	2.600	73.88	4.167	6.42	5.73	1.61
1.050	1.61	2.617	73.88	4.183	6.42	5.75	1.61
1.067	1.61	2.633	73.88	4.200	6.42	5.77	1.61
1.083	1.61	2.650	73.88	4.217	6.42	5.78	1.61
1.100	1.61	2.667	73.88	4.233	6.42	5.80	1.61
1.117	1.61	2.683	73.88	4.250	6.42	5.82	1.61
1.133	1.61	2.700	73.88	4.267	3.21	5.83	1.61
1.150	1.61	2.717	73.88	4.283	3.21	5.85	1.61
1.167	1.61	2.733	73.88	4.300	3.21	5.87	1.61
1.183	1.61	2.750	73.88	4.317	3.21	5.88	1.61
1.200	1.61	2.767	20.89	4.333	3.21	5.90	1.61
1.217	1.61	2.783	20.88	4.350	3.21	5.92	1.61
1.233	1.61	2.800	20.88	4.367	3.21	5.93	1.61
1.250	1.61	2.817	20.88	4.383	3.21	5.95	1.61
1.267	9.64	2.833	20.88	4.400	3.21	5.97	1.61
1.283	9.64	2.850	20.88	4.417	3.21	5.98	1.61
1.300	9.64	2.867	20.88	4.433	3.21	6.00	1.61
1.317	9.64	2.883	20.88	4.450	3.21	6.02	1.61

1.333	9.64	2.900	20.88	4.467	3.21	6.03	1.61
1.350	9.64	2.917	20.88	4.483	3.21	6.05	1.61
1.367	9.64	2.933	20.88	4.500	3.21	6.07	1.61
1.383	9.64	2.950	20.88	4.517	3.21	6.08	1.61
1.400	9.64	2.967	20.88	4.533	3.21	6.10	1.61
1.417	9.64	2.983	20.88	4.550	3.21	6.12	1.61
1.433	9.64	3.000	20.88	4.567	3.21	6.13	1.61
1.450	9.64	3.017	20.88	4.583	3.21	6.15	1.61
1.467	9.64	3.033	20.88	4.600	3.21	6.17	1.61
1.483	9.64	3.050	20.88	4.617	3.21	6.18	1.61
1.500	9.64	3.067	20.88	4.633	3.21	6.20	1.61
1.517	9.64	3.083	20.88	4.650	3.21	6.22	1.61
1.533	9.64	3.100	20.88	4.667	3.21	6.23	1.61
1.550	9.64	3.117	20.88	4.683	3.21	6.25	1.61
1.567	9.64	3.133	20.88	4.700	3.21		

Unit Hyd Qpeak (cms)= .085

PEAK FLOW (cms)= .034 (i)
TIME TO PEAK (hrs)= 2.800
RUNOFF VOLUME (mm)= 30.982
TOTAL RAINFALL (mm)= 80.310
RUNOFF COEFFICIENT = .386

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
NASHYD (0002)	Area (ha)= 1.54 Curve Number (CN)= 78.0
ID= 1 DT= 1.0 min	Ia (mm)= 10.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .31

Unit Hyd Qpeak (cms)= .190

PEAK FLOW (cms)= .119 (i)

TIME TO PEAK (hrs)= 2.933

RUNOFF VOLUME (mm)= 34.825

TOTAL RAINFALL (mm)= 80.310

RUNOFF COEFFICIENT = .434

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

****

** SIMULATION NUMBER: 8 **

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| READ STORM | Filename: T:\3958 Banas Stone SWM Analysis\Models\
| | VO2\Banas Stone\Storms\100yr-12hr.STM
| Ptotal= 88.54 mm | Comments: 100yr/12hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	.00	3.50	15.05	6.75	6.20	10.00	.89
.50	.89	3.75	15.05	7.00	6.20	10.25	.89
.75	.89	4.00	15.05	7.25	6.20	10.50	.89
1.00	.89	4.25	15.05	7.50	3.54	10.75	.89
1.25	.89	4.50	40.71	7.75	3.54	11.00	.89
1.50	.89	4.75	40.71	8.00	3.54	11.25	.89
1.75	.89	5.00	40.71	8.25	3.54	11.50	.89
2.00	.89	5.25	40.71	8.50	1.77	11.75	.89
2.25	.89	5.50	11.51	8.75	1.77	12.00	.89
2.50	5.31	5.75	11.51	9.00	1.77	12.25	.89
2.75	5.31	6.00	11.51	9.25	1.77		
3.00	5.31	6.25	11.51	9.50	.89		
3.25	5.31	6.50	6.20	9.75	.89		

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| CALIB            |
| NASHYD    (0001) |   Area     (ha)=    .38   Curve Number    (CN)= 74.0
|ID= 1 DT= 1.0 min |   Ia       (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .17

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	3.083	5.31	6.150	11.51	9.22	1.77
.033	.00	3.100	5.31	6.167	11.51	9.23	1.77
.050	.00	3.117	5.31	6.183	11.51	9.25	1.77
.067	.00	3.133	5.31	6.200	11.51	9.27	.89
.083	.00	3.150	5.31	6.217	11.51	9.28	.89
.100	.00	3.167	5.31	6.233	11.51	9.30	.89
.117	.00	3.183	5.31	6.250	11.50	9.32	.89
.133	.00	3.200	5.31	6.267	6.20	9.33	.89
.150	.00	3.217	5.31	6.283	6.20	9.35	.89
.167	.00	3.233	5.31	6.300	6.20	9.37	.89
.183	.00	3.250	5.31	6.317	6.20	9.38	.89
.200	.00	3.267	15.05	6.333	6.20	9.40	.89
.217	.00	3.283	15.05	6.350	6.20	9.42	.89
.233	.00	3.300	15.05	6.367	6.20	9.43	.89
.250	.00	3.317	15.05	6.383	6.20	9.45	.89
.267	.89	3.333	15.05	6.400	6.20	9.47	.89
.283	.89	3.350	15.05	6.417	6.20	9.48	.89
.300	.89	3.367	15.05	6.433	6.20	9.50	.89
.317	.89	3.383	15.05	6.450	6.20	9.52	.89
.333	.89	3.400	15.05	6.467	6.20	9.53	.89
.350	.89	3.417	15.05	6.483	6.20	9.55	.89
.367	.89	3.433	15.05	6.500	6.20	9.57	.89
.383	.89	3.450	15.05	6.517	6.20	9.58	.89
.400	.89	3.467	15.05	6.533	6.20	9.60	.89

.417	.89	3.483	15.05	6.550	6.20	9.62	.89
.433	.89	3.500	15.05	6.567	6.20	9.63	.89
.450	.89	3.517	15.05	6.583	6.20	9.65	.89
.467	.89	3.533	15.05	6.600	6.20	9.67	.89
.483	.89	3.550	15.05	6.617	6.20	9.68	.89
.500	.89	3.567	15.05	6.633	6.20	9.70	.89
.517	.89	3.583	15.05	6.650	6.20	9.72	.89
.533	.89	3.600	15.05	6.667	6.20	9.73	.89
.550	.89	3.617	15.05	6.683	6.20	9.75	.89
.567	.89	3.633	15.05	6.700	6.20	9.77	.89
.583	.89	3.650	15.05	6.717	6.20	9.78	.89
.600	.89	3.667	15.05	6.733	6.20	9.80	.89
.617	.89	3.683	15.05	6.750	6.20	9.82	.89
.633	.89	3.700	15.05	6.767	6.20	9.83	.89
.650	.89	3.717	15.05	6.783	6.20	9.85	.89
.667	.89	3.733	15.05	6.800	6.20	9.87	.89
.683	.89	3.750	15.05	6.817	6.20	9.88	.89
.700	.89	3.767	15.05	6.833	6.20	9.90	.89
.717	.89	3.783	15.05	6.850	6.20	9.92	.89
.733	.89	3.800	15.05	6.867	6.20	9.93	.89
.750	.89	3.817	15.05	6.883	6.20	9.95	.89
.767	.89	3.833	15.05	6.900	6.20	9.97	.89
.783	.89	3.850	15.05	6.917	6.20	9.98	.89
.800	.89	3.867	15.05	6.933	6.20	10.00	.89
.817	.89	3.883	15.05	6.950	6.20	10.02	.89
.833	.89	3.900	15.05	6.967	6.20	10.03	.89
.850	.89	3.917	15.05	6.983	6.20	10.05	.89
.867	.89	3.933	15.05	7.000	6.20	10.07	.89
.883	.89	3.950	15.05	7.017	6.20	10.08	.89
.900	.89	3.967	15.05	7.033	6.20	10.10	.89
.917	.89	3.983	15.05	7.050	6.20	10.12	.89
.933	.89	4.000	15.05	7.067	6.20	10.13	.89
.950	.89	4.017	15.05	7.083	6.20	10.15	.89
.967	.89	4.033	15.05	7.100	6.20	10.17	.89
.983	.89	4.050	15.05	7.117	6.20	10.18	.89
1.000	.89	4.067	15.05	7.133	6.20	10.20	.89

1.017	.89	4.083	15.05	7.150	6.20	10.22	.89
1.033	.89	4.100	15.05	7.167	6.20	10.23	.89
1.050	.89	4.117	15.05	7.183	6.20	10.25	.89
1.067	.89	4.133	15.05	7.200	6.20	10.27	.89
1.083	.89	4.150	15.05	7.217	6.20	10.28	.89
1.100	.89	4.167	15.05	7.233	6.20	10.30	.89
1.117	.89	4.183	15.05	7.250	6.19	10.32	.89
1.133	.89	4.200	15.05	7.267	3.54	10.33	.89
1.150	.89	4.217	15.05	7.283	3.54	10.35	.89
1.167	.89	4.233	15.05	7.300	3.54	10.37	.89
1.183	.89	4.250	15.05	7.317	3.54	10.38	.89
1.200	.89	4.267	40.71	7.333	3.54	10.40	.89
1.217	.89	4.283	40.71	7.350	3.54	10.42	.89
1.233	.89	4.300	40.71	7.367	3.54	10.43	.89
1.250	.89	4.317	40.71	7.383	3.54	10.45	.89
1.267	.89	4.333	40.71	7.400	3.54	10.47	.89
1.283	.89	4.350	40.71	7.417	3.54	10.48	.89
1.300	.89	4.367	40.71	7.433	3.54	10.50	.89
1.317	.89	4.383	40.71	7.450	3.54	10.52	.89
1.333	.89	4.400	40.71	7.467	3.54	10.53	.89
1.350	.89	4.417	40.71	7.483	3.54	10.55	.89
1.367	.89	4.433	40.71	7.500	3.54	10.57	.89
1.383	.89	4.450	40.71	7.517	3.54	10.58	.89
1.400	.89	4.467	40.71	7.533	3.54	10.60	.89
1.417	.89	4.483	40.71	7.550	3.54	10.62	.89
1.433	.89	4.500	40.71	7.567	3.54	10.63	.89
1.450	.89	4.517	40.71	7.583	3.54	10.65	.89
1.467	.89	4.533	40.71	7.600	3.54	10.67	.89
1.483	.89	4.550	40.71	7.617	3.54	10.68	.89
1.500	.89	4.567	40.71	7.633	3.54	10.70	.89
1.517	.89	4.583	40.71	7.650	3.54	10.72	.89
1.533	.89	4.600	40.71	7.667	3.54	10.73	.89
1.550	.89	4.617	40.71	7.683	3.54	10.75	.89
1.567	.89	4.633	40.71	7.700	3.54	10.77	.89
1.583	.89	4.650	40.71	7.717	3.54	10.78	.89
1.600	.89	4.667	40.71	7.733	3.54	10.80	.89

1.617	.89	4.683	40.71	7.750	3.54	10.82	.89
1.633	.89	4.700	40.71	7.767	3.54	10.83	.89
1.650	.89	4.717	40.71	7.783	3.54	10.85	.89
1.667	.89	4.733	40.71	7.800	3.54	10.87	.89
1.683	.89	4.750	40.71	7.817	3.54	10.88	.89
1.700	.89	4.767	40.71	7.833	3.54	10.90	.89
1.717	.89	4.783	40.71	7.850	3.54	10.92	.89
1.733	.89	4.800	40.71	7.867	3.54	10.93	.89
1.750	.89	4.817	40.71	7.883	3.54	10.95	.89
1.767	.89	4.833	40.71	7.900	3.54	10.97	.89
1.783	.89	4.850	40.71	7.917	3.54	10.98	.89
1.800	.89	4.867	40.71	7.933	3.54	11.00	.89
1.817	.89	4.883	40.71	7.950	3.54	11.02	.89
1.833	.89	4.900	40.71	7.967	3.54	11.03	.89
1.850	.89	4.917	40.71	7.983	3.54	11.05	.89
1.867	.89	4.933	40.71	8.000	3.54	11.07	.89
1.883	.89	4.950	40.71	8.017	3.54	11.08	.89
1.900	.89	4.967	40.71	8.033	3.54	11.10	.89
1.917	.89	4.983	40.71	8.050	3.54	11.12	.89
1.933	.89	5.000	40.71	8.067	3.54	11.13	.89
1.950	.89	5.017	40.71	8.083	3.54	11.15	.89
1.967	.89	5.033	40.71	8.100	3.54	11.17	.89
1.983	.89	5.050	40.71	8.117	3.54	11.18	.89
2.000	.89	5.067	40.71	8.133	3.54	11.20	.89
2.017	.89	5.083	40.71	8.150	3.54	11.22	.89
2.033	.89	5.100	40.71	8.167	3.54	11.23	.89
2.050	.89	5.117	40.71	8.183	3.54	11.25	.89
2.067	.89	5.133	40.71	8.200	3.54	11.27	.89
2.083	.89	5.150	40.71	8.217	3.54	11.28	.89
2.100	.89	5.167	40.71	8.233	3.54	11.30	.89
2.117	.89	5.183	40.71	8.250	3.54	11.32	.89
2.133	.89	5.200	40.71	8.267	1.77	11.33	.89
2.150	.89	5.217	40.71	8.283	1.77	11.35	.89
2.167	.89	5.233	40.71	8.300	1.77	11.37	.89
2.183	.89	5.250	40.69	8.317	1.77	11.38	.89
2.200	.89	5.267	11.51	8.333	1.77	11.40	.89

2.217	.89	5.283	11.51	8.350	1.77	11.42	.89
2.233	.89	5.300	11.51	8.367	1.77	11.43	.89
2.250	.89	5.317	11.51	8.383	1.77	11.45	.89
2.267	5.31	5.333	11.51	8.400	1.77	11.47	.89
2.283	5.31	5.350	11.51	8.417	1.77	11.48	.89
2.300	5.31	5.367	11.51	8.433	1.77	11.50	.89
2.317	5.31	5.383	11.51	8.450	1.77	11.52	.89
2.333	5.31	5.400	11.51	8.467	1.77	11.53	.89
2.350	5.31	5.417	11.51	8.483	1.77	11.55	.89
2.367	5.31	5.433	11.51	8.500	1.77	11.57	.89
2.383	5.31	5.450	11.51	8.517	1.77	11.58	.89
2.400	5.31	5.467	11.51	8.533	1.77	11.60	.89
2.417	5.31	5.483	11.51	8.550	1.77	11.62	.89
2.433	5.31	5.500	11.51	8.567	1.77	11.63	.89
2.450	5.31	5.517	11.51	8.583	1.77	11.65	.89
2.467	5.31	5.533	11.51	8.600	1.77	11.67	.89
2.483	5.31	5.550	11.51	8.617	1.77	11.68	.89
2.500	5.31	5.567	11.51	8.633	1.77	11.70	.89
2.517	5.31	5.583	11.51	8.650	1.77	11.72	.89
2.533	5.31	5.600	11.51	8.667	1.77	11.73	.89
2.550	5.31	5.617	11.51	8.683	1.77	11.75	.89
2.567	5.31	5.633	11.51	8.700	1.77	11.77	.89
2.583	5.31	5.650	11.51	8.717	1.77	11.78	.89
2.600	5.31	5.667	11.51	8.733	1.77	11.80	.89
2.617	5.31	5.683	11.51	8.750	1.77	11.82	.89
2.633	5.31	5.700	11.51	8.767	1.77	11.83	.89
2.650	5.31	5.717	11.51	8.783	1.77	11.85	.89
2.667	5.31	5.733	11.51	8.800	1.77	11.87	.89
2.683	5.31	5.750	11.51	8.817	1.77	11.88	.89
2.700	5.31	5.767	11.51	8.833	1.77	11.90	.89
2.717	5.31	5.783	11.51	8.850	1.77	11.92	.89
2.733	5.31	5.800	11.51	8.867	1.77	11.93	.89
2.750	5.31	5.817	11.51	8.883	1.77	11.95	.89
2.767	5.31	5.833	11.51	8.900	1.77	11.97	.89
2.783	5.31	5.850	11.51	8.917	1.77	11.98	.89
2.800	5.31	5.867	11.51	8.933	1.77	12.00	.89

2.817	5.31	5.883	11.51	8.950	1.77	12.02	.89
2.833	5.31	5.900	11.51	8.967	1.77	12.03	.89
2.850	5.31	5.917	11.51	8.983	1.77	12.05	.89
2.867	5.31	5.933	11.51	9.000	1.77	12.07	.89
2.883	5.31	5.950	11.51	9.017	1.77	12.08	.89
2.900	5.31	5.967	11.51	9.033	1.77	12.10	.89
2.917	5.31	5.983	11.51	9.050	1.77	12.12	.89
2.933	5.31	6.000	11.51	9.067	1.77	12.13	.89
2.950	5.31	6.017	11.51	9.083	1.77	12.15	.89
2.967	5.31	6.033	11.51	9.100	1.77	12.17	.89
2.983	5.31	6.050	11.51	9.117	1.77	12.18	.89
3.000	5.31	6.067	11.51	9.133	1.77	12.20	.89
3.017	5.31	6.083	11.51	9.150	1.77	12.22	.89
3.033	5.31	6.100	11.51	9.167	1.77	12.23	.89
3.050	5.31	6.117	11.51	9.183	1.77	12.25	.89
3.067	5.31	6.133	11.51	9.200	1.77		

Unit Hyd Qpeak (cms)= .085

PEAK FLOW (cms)= .023 (i)
TIME TO PEAK (hrs)= 5.283
RUNOFF VOLUME (mm)= 36.762
TOTAL RAINFALL (mm)= 88.539
RUNOFF COEFFICIENT = .415

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0002)	Area	(ha)=	1.54	Curve Number	(CN)= 78.0
ID= 1 DT= 1.0 min	Ia	(mm)=	10.00	# of Linear Res.	(N)= 3.00
	U.H. Tp(hrs)=		.31		

Unit Hyd Qpeak (cms)= .190

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     PEAK FLOW        (cms)=     .095 (i)

     TIME TO PEAK     (hrs)=    5.333

     RUNOFF VOLUME     (mm)=   32.336

     TOTAL RAINFALL    (mm)=   88.539

     RUNOFF COEFFICIENT    =     .365


     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 FINISH

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V    V   I    SSSSS  U   U    A    L
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  L
 V  V    I      SS   U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL

 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM, Version 2.1
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O
 OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 2.3.1\voin.dat

Output filename: T:\3958 Banas Stone SWM Analysis\Models\VO2\Banas Stone - Read Storm\Proposed Condition.out

Summary filename: T:\3958 Banas Stone SWM Analysis\Models\VO2\Banas Stone - Read Storm\Proposed Condition.sum

DATE: 8/29/2019 TIME: 1:59:16 PM

USER:

COMMENTS: _____

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** SIMULATION NUMBER: 1 **

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| READ STORM | Filename: T:\3958 Banas Stone SWM Analysis\Models\VO
| | 2\Banas Stone - Read Storm\Storms\
| | 2yr-1hr.STM
| Ptotal= 24.38 mm | Comments: 2yr/1hr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
.08	.00	.42	75.84	.75	4.98	1.08	.15
.17	10.83	.50	69.69	.83	2.05		
.25	32.50	.58	29.28	.92	.88		
.33	54.17	.67	12.00	1.00	.29		

CALIB	
STANDHYD (0001)	Area (ha)= .58
ID= 1 DT= 1.0 min	Total Imp(%)= 77.00 Dir. Conn.(%)= .10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.45	.13
Dep. Storage	(mm)=	1.00	.70
Average Slope	(%)=	1.80	1.30
Length	(m)=	62.10	95.00
Mannings n	=	.013	.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	.300	54.17	.583	29.04	.87	.88
.033	.00	.317	54.17	.600	12.00	.88	.88
.050	.00	.333	54.34	.617	12.00	.90	.88
.067	.00	.350	75.84	.633	12.00	.92	.87
.083	.02	.367	75.84	.650	12.00	.93	.29
.100	10.83	.383	75.84	.667	11.89	.95	.29
.117	10.83	.400	75.84	.683	4.98	.97	.29
.133	10.83	.417	75.78	.700	4.98	.98	.29
.150	10.83	.433	69.69	.717	4.98	1.00	.29
.167	10.92	.450	69.69	.733	4.98	1.02	.15
.183	32.50	.467	69.69	.750	4.93	1.03	.15
.200	32.50	.483	69.69	.767	2.05	1.05	.15
.217	32.50	.500	69.20	.783	2.05	1.07	.15
.233	32.50	.517	29.28	.800	2.05	1.08	.15
.250	32.63	.533	29.28	.817	2.05		
.267	54.17	.550	29.28	.833	2.03		
.283	54.17	.567	29.28	.850	.88		

Max.Eff.Inten.(mm/hr)=	75.83		174.95	
over (min)	5.00		13.00	
Storage Coeff. (min)=	1.80	(ii)	12.59	(ii)
Unit Hyd. Tpeak (min)=	5.00		13.00	
Unit Hyd. peak (cms)=	.39		.09	
				TOTALS
PEAK FLOW (cms)=	.00		.04	.039 (iii)
TIME TO PEAK (hrs)=	.47		.67	.67
RUNOFF VOLUME (mm)=	23.38		11.90	11.90
TOTAL RAINFALL (mm)=	24.38		24.38	24.38
RUNOFF COEFFICIENT =	.96		.49	.49

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%

YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 70.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0002)	Area (ha)= 1.34
ID= 1 DT= 1.0 min	Total Imp(%)= 86.00 Dir. Conn.(%)= .10

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.15	.19	
Dep. Storage	(mm)=	1.00	.70	
Average Slope	(%)=	1.00	2.50	
Length	(m)=	94.60	214.00	
Mannings n	=	.020	.250	
Max.Eff.Inten.	(mm/hr)=	75.83	358.07	
over	(min)	5.00	15.00	
Storage Coeff.	(min)=	3.57 (ii)	14.41 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	15.00	
Unit Hyd. peak	(cms)=	.28	.08	
				TOTALS
PEAK FLOW	(cms)=	.00	.10	.103 (iii)
TIME TO PEAK	(hrs)=	.50	.68	.68
RUNOFF VOLUME	(mm)=	23.38	14.91	14.92
TOTAL RAINFALL	(mm)=	24.38	24.38	24.38
RUNOFF COEFFICIENT	=	.96	.61	.61

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%

YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 70.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0003)
IN= 2---> OUT= 1

DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	.0000	.0000	.0200	.0063
	.0040	.0004	.0230	.0079
	.0070	.0015	.0250	.0095
	.0120	.0031	.0270	.0112
	.0160	.0043	.0300	.0129

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	.58	.04	.67	11.90
OUTFLOW: ID= 1 (0003)	.58	.01	.98	11.86

PEAK FLOW REDUCTION [Qout/Qin](%)= 36.91
TIME SHIFT OF PEAK FLOW (min)= 19.00
MAXIMUM STORAGE USED (ha.m.)= .0038

RESERVOIR (0004)
IN= 2---> OUT= 1

DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	.0000	.0000	.0570	.0089
	.0530	.0000	.0580	.0187
	.0550	.0006	.0600	.0327
	.0560	.0031	.0610	.0500

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0002)	1.34	.10	.68	14.92
OUTFLOW: ID= 1 (0004)	1.34	.06	.93	14.97

PEAK FLOW REDUCTION [Qout/Qin](%)= 54.35

TIME SHIFT OF PEAK FLOW (min)= 15.00

MAXIMUM STORAGE USED (ha.m.)= .0049

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** SIMULATION NUMBER: 2 **

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READ STORM	Filename: T:\3958 Banas Stone SWM Analysis\Models\VO2\Banas Stone - Read Storm\Storms\5yr-1hr.STM
Ptotal= 33.57 mm	Comments: 5yr/1hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	.00	.42	104.43	.75	6.85	1.08	.20
.17	14.92	.50	95.96	.83	2.82		
.25	44.76	.58	40.32	.92	1.21		
.33	74.59	.67	16.53	1.00	.40		

CALIB	
STANDHYD (0001)	Area (ha)= .58
ID= 1 DT= 1.0 min	Total Imp(%)= 77.00 Dir. Conn.(%)= .10

	IMPERVIOUS	PERVIOUS (i)

Surface Area	(ha)=	.45	.13
Dep. Storage	(mm)=	1.00	.70
Average Slope	(%)=	1.80	1.30
Length	(m)=	62.10	95.00
Mannings n	=	.013	.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	.300	74.59	.583	39.99	.87	1.21
.033	.00	.317	74.59	.600	16.53	.88	1.21
.050	.00	.333	74.83	.617	16.53	.90	1.21
.067	.00	.350	104.43	.633	16.53	.92	1.19
.083	.03	.367	104.43	.650	16.53	.93	.40
.100	14.92	.383	104.43	.667	16.38	.95	.40
.117	14.92	.400	104.43	.683	6.85	.97	.40
.133	14.92	.417	104.35	.700	6.85	.98	.40
.150	14.92	.433	95.96	.717	6.85	1.00	.40
.167	15.04	.450	95.96	.733	6.85	1.02	.20
.183	44.76	.467	95.96	.750	6.78	1.03	.20
.200	44.76	.483	95.96	.767	2.82	1.05	.20
.217	44.76	.500	95.29	.783	2.82	1.07	.20
.233	44.76	.517	40.32	.800	2.82	1.08	.19
.250	44.94	.533	40.32	.817	2.82		
.267	74.59	.550	40.32	.833	2.79		
.283	74.59	.567	40.32	.850	1.21		

Max.Eff.Inten.(mm/hr)=	104.41	291.53
over (min)	5.00	11.00
Storage Coeff. (min)=	1.58 (ii)	10.38 (ii)
Unit Hyd. Tpeak (min)=	5.00	11.00
Unit Hyd. peak (cms)=	.41	.11

TOTALS

PEAK FLOW	(cms)=	.00	.07	.069 (iii)
TIME TO PEAK	(hrs)=	.45	.62	.62
RUNOFF VOLUME	(mm)=	32.57	19.09	19.09
TOTAL RAINFALL	(mm)=	33.57	33.57	33.57
RUNOFF COEFFICIENT	=	.97	.57	.57

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0002)	Area (ha)=	1.34	
ID= 1 DT= 1.0 min	Total Imp(%)=	86.00	Dir. Conn.(%)= .10

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.15	.19	
Dep. Storage	(mm)=	1.00	.70	
Average Slope	(%)=	1.00	2.50	
Length	(m)=	94.60	214.00	
Mannings n	=	.020	.250	
Max.Eff.Inten.(mm/hr)=		104.41	567.86	
over (min)		5.00	13.00	
Storage Coeff.	(min)=	3.15 (ii)	12.16 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	13.00	
Unit Hyd. peak	(cms)=	.30	.09	
				TOTALS
PEAK FLOW	(cms)=	.00	.18	.175 (iii)
TIME TO PEAK	(hrs)=	.48	.65	.65

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     RUNOFF VOLUME     (mm)=       32.57         22.99          23.00

     TOTAL RAINFALL    (mm)=       33.57         33.57          33.57

     RUNOFF COEFFICIENT    =         .97           .68            .69


***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%

               YOU SHOULD CONSIDER SPLITTING THE AREA.


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

            CN*  =  70.0    Ia = Dep. Storage  (Above)

      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

           THAN THE STORAGE COEFFICIENT.

     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.


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| RESERVOIR (0003) |

| IN= 2---> OUT= 1 |

| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE

--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)

                          .0000      .0000    |    .0200      .0063

                          .0040      .0004    |    .0230      .0079

                          .0070      .0015    |    .0250      .0095

                          .0120      .0031    |    .0270      .0112

                          .0160      .0043    |    .0300      .0129


                               AREA     QPEAK     TPEAK       R.V.

                               (ha)     (cms)     (hrs)       (mm)

     INFLOW : ID= 2 (0001)      .58       .07       .62      19.09

     OUTFLOW: ID= 1 (0003)      .58       .02       .95      19.05


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 30.23

                    TIME SHIFT OF PEAK FLOW         (min)= 20.00

                    MAXIMUM  STORAGE   USED       (ha.m.)=  .0068


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| RESERVOIR (0004) |

| IN= 2---> OUT= 1 |

| DT= 1.0 min | OUTFLOW (cms) | STORAGE (ha.m.) | OUTFLOW (cms) | STORAGE (ha.m.)

	.0000	.0000	.0570	.0089
	.0530	.0000	.0580	.0187
	.0550	.0006	.0600	.0327
	.0560	.0031	.0610	.0500

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0002)	1.34	.18	.65	23.00
OUTFLOW: ID= 1 (0004)	1.34	.06	.98	23.09

PEAK FLOW REDUCTION [Qout/Qin](%)= 32.77

TIME SHIFT OF PEAK FLOW (min)= 20.00

MAXIMUM STORAGE USED (ha.m.)= .0136

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** SIMULATION NUMBER: 3 **

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READ STORM	Filename: T:\3958 Banas Stone SWM Analysis\Models\VO 2\Banas Stone - Read Storm\Storms\ 10yr-1hr.STM
Ptotal= 39.76 mm	Comments: 10yr/1hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	.00	.42	123.70	.75	8.12	1.08	.24
.17	17.67	.50	113.67	.83	3.34		
.25	53.01	.58	47.76	.92	1.43		
.33	88.36	.67	19.58	1.00	.48		

CALIB	
STANDHYD (0001)	Area (ha)= .58
ID= 1 DT= 1.0 min	Total Imp(%)= 77.00 Dir. Conn.(%)= .10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.45	.13
Dep. Storage	(mm)=	1.00	.70
Average Slope	(%)=	1.80	1.30
Length	(m)=	62.10	95.00
Mannings n	=	.013	.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	.300	88.36	.583	47.37	.87	1.43
.033	.00	.317	88.36	.600	19.58	.88	1.43
.050	.00	.333	88.64	.617	19.58	.90	1.43
.067	.00	.350	123.70	.633	19.58	.92	1.41
.083	.04	.367	123.70	.650	19.58	.93	.48
.100	17.67	.383	123.70	.667	19.40	.95	.48
.117	17.67	.400	123.70	.683	8.12	.97	.48
.133	17.67	.417	123.60	.700	8.12	.98	.48
.150	17.67	.433	113.67	.717	8.12	1.00	.47
.167	17.81	.450	113.67	.733	8.12	1.02	.24
.183	53.01	.467	113.67	.750	8.03	1.03	.24
.200	53.01	.483	113.67	.767	3.34	1.05	.24
.217	53.01	.500	112.88	.783	3.34	1.07	.24
.233	53.01	.517	47.76	.800	3.34	1.08	.23
.250	53.22	.533	47.76	.817	3.34		

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                .267   88.36 |  .550   47.76 |  .833    3.30 |
                .283   88.36 |  .567   47.76 |  .850    1.43 |

     Max.Eff.Inten.(mm/hr)=     123.68       368.78
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.48 (ii)    9.49 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=        .42          .12
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .00          .09          .092 (iii)
     TIME TO PEAK    (hrs)=        .45          .60           .60
     RUNOFF VOLUME    (mm)=      38.76        24.25         24.26
     TOTAL RAINFALL   (mm)=      39.76        39.76         39.76
     RUNOFF COEFFICIENT   =        .97          .61           .61

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD  (0002) |   Area     (ha)=   1.34
|ID= 1 DT= 1.0 min |   Total Imp(%)=  86.00   Dir. Conn.(%)=    .10
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                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.15          .19
     Dep. Storage     (mm)=       1.00          .70
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      94.60       214.00
     Mannings n          =        .020         .250
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Max.Eff.Inten.(mm/hr)=	123.68	702.47	
over (min)	5.00	12.00	
Storage Coeff. (min)=	2.94 (ii)	11.22 (ii)	
Unit Hyd. Tpeak (min)=	5.00	12.00	
Unit Hyd. peak (cms)=	.31	.10	
			TOTALS
PEAK FLOW (cms)=	.00	.23	.228 (iii)
TIME TO PEAK (hrs)=	.48	.63	.63
RUNOFF VOLUME (mm)=	38.76	28.65	28.66
TOTAL RAINFALL (mm)=	39.76	39.76	39.76
RUNOFF COEFFICIENT =	.97	.72	.72

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0003)
IN= 2---> OUT= 1

DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	.0000	.0000	.0200	.0063
	.0040	.0004	.0230	.0079
	.0070	.0015	.0250	.0095
	.0120	.0031	.0270	.0112
	.0160	.0043	.0300	.0129

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)

INFLOW : ID= 2 (0001)	.58	.09	.60	24.26
OUTFLOW: ID= 1 (0003)	.58	.02	.93	24.22

PEAK FLOW REDUCTION [Qout/Qin](%)= 26.62
TIME SHIFT OF PEAK FLOW (min)= 20.00
MAXIMUM STORAGE USED (ha.m.)= .0091

RESERVOIR (0004)
IN= 2---> OUT= 1

DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	.0000	.0000	.0570	.0089
	.0530	.0000	.0580	.0187
	.0550	.0006	.0600	.0327
	.0560	.0031	.0610	.0500

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0002)	1.34	.23	.63	28.66
OUTFLOW: ID= 1 (0004)	1.34	.06	1.00	28.75

PEAK FLOW REDUCTION [Qout/Qin](%)= 25.55
TIME SHIFT OF PEAK FLOW (min)= 22.00
MAXIMUM STORAGE USED (ha.m.)= .0205

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** SIMULATION NUMBER: 4 **
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READ STORM	Filename: T:\3958 Banas Stone SWM Analysis\Models\VO
	2\Banas Stone - Read Storm\Storms\

| | 25yr-1hr.STM

| Ptotal= 47.46 mm | Comments: 25yr/1hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	.00	.42	147.63	.75	9.69	1.08	.29
.17	21.09	.50	135.66	.83	3.99		
.25	63.27	.58	57.00	.92	1.71		
.33	105.45	.67	23.37	1.00	.57		

CALIB	
STANDHYD (0001)	Area (ha)= .58
ID= 1 DT= 1.0 min	Total Imp(%)= 77.00 Dir. Conn.(%)= .10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.45	.13
Dep. Storage	(mm)=	1.00	.70
Average Slope	(%)=	1.80	1.30
Length	(m)=	62.10	95.00
Mannings n	=	.013	.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	.300	105.45	.583	56.53	.87	1.71
.033	.00	.317	105.45	.600	23.37	.88	1.71
.050	.00	.333	105.79	.617	23.37	.90	1.71
.067	.00	.350	147.63	.633	23.37	.92	1.68
.083	.04	.367	147.63	.650	23.37	.93	.57
.100	21.09	.383	147.63	.667	23.15	.95	.57

.117	21.09	.400	147.63	.683	9.69	.97	.57
.133	21.09	.417	147.51	.700	9.69	.98	.57
.150	21.09	.433	135.66	.717	9.69	1.00	.56
.167	21.26	.450	135.66	.733	9.69	1.02	.29
.183	63.27	.467	135.66	.750	9.59	1.03	.29
.200	63.27	.483	135.66	.767	3.99	1.05	.29
.217	63.27	.500	134.72	.783	3.99	1.07	.29
.233	63.27	.517	57.00	.800	3.99	1.08	.28
.250	63.52	.533	57.00	.817	3.99		
.267	105.45	.550	57.00	.833	3.94		
.283	105.45	.567	57.00	.850	1.71		

Max.Eff.Inten.(mm/hr)=	147.61	467.38	
over (min)	5.00	9.00	
Storage Coeff. (min)=	1.38 (ii)	8.66 (ii)	
Unit Hyd. Tpeak (min)=	5.00	9.00	
Unit Hyd. peak (cms)=	.43	.13	
			TOTALS
PEAK FLOW (cms)=	.00	.12	.122 (iii)
TIME TO PEAK (hrs)=	.45	.58	.58
RUNOFF VOLUME (mm)=	46.46	30.91	30.92
TOTAL RAINFALL (mm)=	47.46	47.46	47.46
RUNOFF COEFFICIENT =	.98	.65	.65

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB

| STANDHYD (0002) | Area (ha)= 1.34

|ID= 1 DT= 1.0 min | Total Imp(%)= 86.00 Dir. Conn.(%)= .10

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.15	.19
Dep. Storage (mm)=	1.00	.70
Average Slope (%)=	1.00	2.50
Length (m)=	94.60	214.00
Mannings n =	.020	.250
Max.Eff.Inten.(mm/hr)=	147.61	871.00
over (min)	5.00	11.00
Storage Coeff. (min)=	2.74 (ii)	10.33 (ii)
Unit Hyd. Tpeak (min)=	5.00	11.00
Unit Hyd. peak (cms)=	.32	.11

			TOTALS
PEAK FLOW (cms)=	.00	.30	.297 (iii)
TIME TO PEAK (hrs)=	.48	.62	.62
RUNOFF VOLUME (mm)=	46.46	35.82	35.83
TOTAL RAINFALL (mm)=	47.46	47.46	47.46
RUNOFF COEFFICIENT =	.98	.75	.75

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| RESERVOIR (0003) |

| IN= 2---> OUT= 1 |

| DT= 1.0 min | OUTFLOW STORAGE | OUTFLOW STORAGE

	(cms)	(ha.m.)		(cms)	(ha.m.)
	.0000	.0000		.0200	.0063
	.0040	.0004		.0230	.0079
	.0070	.0015		.0250	.0095
	.0120	.0031		.0270	.0112
	.0160	.0043		.0300	.0129

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	.58	.12	.58	30.92
OUTFLOW: ID= 1 (0003)	.58	.03	.92	30.88

PEAK FLOW REDUCTION [Qout/Qin](%)= 23.48

TIME SHIFT OF PEAK FLOW (min)= 20.00

MAXIMUM STORAGE USED (ha.m.)= .0122

RESERVOIR (0004)
IN= 2---> OUT= 1

DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)		OUTFLOW (cms)	STORAGE (ha.m.)
	.0000	.0000		.0570	.0089
	.0530	.0000		.0580	.0187
	.0550	.0006		.0600	.0327
	.0560	.0031		.0610	.0500

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0002)	1.34	.30	.62	35.83
OUTFLOW: ID= 1 (0004)	1.34	.06	1.02	35.93

PEAK FLOW REDUCTION [Qout/Qin](%)= 20.04

TIME SHIFT OF PEAK FLOW (min)= 24.00

MAXIMUM STORAGE USED (ha.m.)= .0295

****

**** SIMULATION NUMBER: 5 ****

****

READ STORM	Filename: T:\3958 Banas Stone SWM Analysis\Models\VO2\Banas Stone - Read Storm\Storms\50yr-1hr.STM
Ptotal= 53.25 mm	Comments: 50yr/1hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	.00	.42	165.66	.75	10.87	1.08	.32
.17	23.67	.50	152.22	.83	4.48		
.25	71.00	.58	63.96	.92	1.92		
.33	118.33	.67	26.22	1.00	.64		

CALIB	
STANDHYD (0001)	Area (ha)= .58
ID= 1 DT= 1.0 min	Total Imp(%)= 77.00 Dir. Conn.(%)= .10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.45	.13
Dep. Storage	(mm)=	1.00	.70
Average Slope	(%)=	1.80	1.30
Length	(m)=	62.10	95.00
Mannings n	=	.013	.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	.300	118.33	.583	63.43	.87	1.92
.033	.00	.317	118.33	.600	26.22	.88	1.92
.050	.00	.333	118.71	.617	26.22	.90	1.92
.067	.00	.350	165.66	.633	26.22	.92	1.89
.083	.05	.367	165.66	.650	26.22	.93	.64
.100	23.67	.383	165.66	.667	25.97	.95	.64
.117	23.67	.400	165.66	.683	10.87	.97	.64
.133	23.67	.417	165.53	.700	10.87	.98	.64
.150	23.67	.433	152.22	.717	10.87	1.00	.63
.167	23.86	.450	152.22	.733	10.87	1.02	.32
.183	71.00	.467	152.22	.750	10.76	1.03	.32
.200	71.00	.483	152.22	.767	4.48	1.05	.32
.217	71.00	.500	151.16	.783	4.48	1.07	.32
.233	71.00	.517	63.96	.800	4.48	1.08	.31
.250	71.28	.533	63.96	.817	4.48		
.267	118.33	.550	63.96	.833	4.43		
.283	118.33	.567	63.96	.850	1.92		

Max.Eff.Inten.(mm/hr)=	165.63	542.94		
over (min)	5.00	9.00		
Storage Coeff. (min)=	1.32 (ii)	8.17 (ii)		
Unit Hyd. Tpeak (min)=	5.00	9.00		
Unit Hyd. peak (cms)=	.44	.13		
			TOTALS	
PEAK FLOW (cms)=	.00	.15	.145 (iii)	
TIME TO PEAK (hrs)=	.45	.58	.58	
RUNOFF VOLUME (mm)=	52.25	36.07	36.08	
TOTAL RAINFALL (mm)=	53.25	53.25	53.25	
RUNOFF COEFFICIENT =	.98	.68	.68	

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%

YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 70.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0002)	Area (ha)= 1.34
ID= 1 DT= 1.0 min	Total Imp(%)= 86.00 Dir. Conn.(%)= .10

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.15	.19	
Dep. Storage	(mm)=	1.00	.70	
Average Slope	(%)=	1.00	2.50	
Length	(m)=	94.60	214.00	
Mannings n	=	.020	.250	
Max.Eff.Inten.	(mm/hr)=	165.63	998.41	
over	(min)	5.00	10.00	
Storage Coeff.	(min)=	2.61 (ii)	9.81 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	10.00	
Unit Hyd. peak	(cms)=	.33	.11	
				TOTALS
PEAK FLOW	(cms)=	.00	.35	.353 (iii)
TIME TO PEAK	(hrs)=	.48	.60	.60
RUNOFF VOLUME	(mm)=	52.25	41.30	41.31
TOTAL RAINFALL	(mm)=	53.25	53.25	53.25
RUNOFF COEFFICIENT	=	.98	.78	.78

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%

YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 70.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0003)
IN= 2---> OUT= 1

DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	.0000	.0000	.0200	.0063
	.0040	.0004	.0230	.0079
	.0070	.0015	.0250	.0095
	.0120	.0031	.0270	.0112
	.0160	.0043	.0300	.0129

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	.58	.15	.58	36.08
OUTFLOW: ID= 1 (0003)	.58	.03	.92	36.03

PEAK FLOW REDUCTION [Qout/Qin](%)= 22.63
TIME SHIFT OF PEAK FLOW (min)= 20.00
MAXIMUM STORAGE USED (ha.m.)= .0145

RESERVOIR (0004)
IN= 2---> OUT= 1

DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	.0000	.0000	.0570	.0089
	.0530	.0000	.0580	.0187
	.0550	.0006	.0600	.0327
	.0560	.0031	.0610	.0500

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0002)	1.34	.35	.60	41.31
OUTFLOW: ID= 1 (0004)	1.34	.06	1.02	41.39

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.06

TIME SHIFT OF PEAK FLOW (min)= 25.00

MAXIMUM STORAGE USED (ha.m.)= .0365

**** SIMULATION NUMBER: 6 **

READ STORM	Filename: T:\3958 Banas Stone SWM Analysis\Models\VO2\Banas Stone - Read Storm\Storms\100yr-1hr.STM
Ptotal= 58.95 mm	Comments: 100yr/1hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	.00	.42	183.37	.75	12.04	1.08	.35
.17	26.20	.50	168.50	.83	4.96		
.25	78.59	.58	70.80	.92	2.12		
.33	130.98	.67	29.03	1.00	.71		

CALIB	
STANDHYD (0001)	Area (ha)= .58
ID= 1 DT= 1.0 min	Total Imp(%)= 77.00 Dir. Conn.(%)= .10

	IMPERVIOUS	PERVIOUS (i)

Surface Area	(ha)=	.45	.13
Dep. Storage	(mm)=	1.00	.70
Average Slope	(%)=	1.80	1.30
Length	(m)=	62.10	95.00
Mannings n	=	.013	.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	.300	130.98	.583	70.22	.87	2.12
.033	.00	.317	130.98	.600	29.03	.88	2.12
.050	.00	.333	131.40	.617	29.03	.90	2.12
.067	.00	.350	183.37	.633	29.03	.92	2.09
.083	.05	.367	183.37	.650	29.03	.93	.71
.100	26.20	.383	183.37	.667	28.76	.95	.71
.117	26.20	.400	183.37	.683	12.04	.97	.71
.133	26.20	.417	183.22	.700	12.04	.98	.71
.150	26.20	.433	168.50	.717	12.04	1.00	.70
.167	26.41	.450	168.50	.733	12.04	1.02	.35
.183	78.59	.467	168.50	.750	11.91	1.03	.35
.200	78.59	.483	168.50	.767	4.96	1.05	.35
.217	78.59	.500	167.33	.783	4.96	1.07	.35
.233	78.59	.517	70.80	.800	4.96	1.08	.34
.250	78.90	.533	70.80	.817	4.96		
.267	130.98	.550	70.80	.833	4.90		
.283	130.98	.567	70.80	.850	2.12		

Max.Eff.Inten.(mm/hr)=		183.34	617.89
over (min)		5.00	8.00
Storage Coeff. (min)=		1.26 (ii)	7.78 (ii)
Unit Hyd. Tpeak (min)=		5.00	8.00
Unit Hyd. peak (cms)=		.44	.14

TOTALS

PEAK FLOW (cms)=	.00	.17	.170 (iii)
TIME TO PEAK (hrs)=	.45	.57	.57
RUNOFF VOLUME (mm)=	57.95	41.21	41.23
TOTAL RAINFALL (mm)=	58.95	58.95	58.95
RUNOFF COEFFICIENT =	.98	.70	.70

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB		
STANDHYD (0002)	Area (ha)=	1.34
ID= 1 DT= 1.0 min	Total Imp(%)=	86.00 Dir. Conn.(%)= .10

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.15	.19	
Dep. Storage (mm)=	1.00	.70	
Average Slope (%)=	1.00	2.50	
Length (m)=	94.60	214.00	
Mannings n =	.020	.250	
Max.Eff.Inten.(mm/hr)=	183.34	1123.73	
over (min)	5.00	10.00	
Storage Coeff. (min)=	2.51 (ii)	9.37 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	.34	.12	
			TOTALS
PEAK FLOW (cms)=	.00	.41	.406 (iii)
TIME TO PEAK (hrs)=	.48	.58	.58

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     RUNOFF VOLUME     (mm)=       57.95         46.73          46.74

     TOTAL RAINFALL    (mm)=       58.95         58.95          58.95

     RUNOFF COEFFICIENT    =         .98           .79            .79


***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%

               YOU SHOULD CONSIDER SPLITTING THE AREA.


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

            CN*  =  70.0    Ia = Dep. Storage  (Above)

      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

           THAN THE STORAGE COEFFICIENT.

     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.


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| RESERVOIR (0003) |

| IN= 2---> OUT= 1 |

| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE

--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)

                          .0000      .0000    |    .0200      .0063

                          .0040      .0004    |    .0230      .0079

                          .0070      .0015    |    .0250      .0095

                          .0120      .0031    |    .0270      .0112

                          .0160      .0043    |    .0300      .0129


                               AREA     QPEAK     TPEAK       R.V.

                               (ha)     (cms)     (hrs)       (mm)

     INFLOW : ID= 2 (0001)      .58       .17       .57      41.23

     OUTFLOW: ID= 1 (0003)      .58       .04       .88      41.18


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.76

                    TIME SHIFT OF PEAK FLOW         (min)= 19.00

                    MAXIMUM  STORAGE   USED       (ha.m.)=  .0169


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| RESERVOIR (0004) |

| IN= 2---> OUT= 1 |

| DT= 1.0 min | OUTFLOW | STORAGE | OUTFLOW | STORAGE

| | (cms) | (ha.m.) | (cms) | (ha.m.)

| | .0000 | .0000 | .0570 | .0089

| | .0530 | .0000 | .0580 | .0187

| | .0550 | .0006 | .0600 | .0327

| | .0560 | .0031 | .0610 | .0500

| | AREA | QPEAK | TPEAK | R.V.

| | (ha) | (cms) | (hrs) | (mm)

INFLOW : ID= 2 (0002) | 1.34 | .41 | .58 | 46.74

OUTFLOW: ID= 1 (0004) | 1.34 | .06 | 1.02 | 46.83

PEAK FLOW REDUCTION [Qout/Qin](%)= 14.95

TIME SHIFT OF PEAK FLOW (min)= 26.00

MAXIMUM STORAGE USED (ha.m.)= .0435

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** SIMULATION NUMBER: 7 **

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| READ STORM | Filename: T:\3958 Banas Stone SWM Analysis\Models\VO

| | 2\Banas Stone - Read Storm\Storms\

| | 100yr-6hr.STM

| Ptotal= 80.31 mm | Comments: 100yr/6

| TIME | RAIN | TIME | RAIN | TIME | RAIN | TIME | RAIN

| hrs | mm/hr | hrs | mm/hr | hrs | mm/hr | hrs | mm/hr

| .25 | .00 | 2.00 | 27.30 | 3.75 | 11.24 | 5.50 | 1.61

| .50 | 1.61 | 2.25 | 27.30 | 4.00 | 6.42 | 5.75 | 1.61

| .75 | 1.61 | 2.50 | 73.88 | 4.25 | 6.42 | 6.00 | 1.61

| 1.00 | 1.61 | 2.75 | 73.88 | 4.50 | 3.21 | 6.25 | 1.61

1.25	1.61	3.00	20.88	4.75	3.21
1.50	9.64	3.25	20.88	5.00	1.61
1.75	9.64	3.50	11.24	5.25	1.61

CALIB			
STANDHYD (0001)	Area (ha)=	.58	
ID= 1 DT= 1.0 min	Total Imp(%)=	77.00	Dir. Conn.(%)= .10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.45	.13
Dep. Storage	(mm)=	1.00	.70
Average Slope	(%)=	1.80	1.30
Length	(m)=	62.10	95.00
Mannings n	=	.013	.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.017	.00	1.583	9.64	3.150	20.88	4.72	3.21
.033	.00	1.600	9.64	3.167	20.88	4.73	3.21
.050	.00	1.617	9.64	3.183	20.88	4.75	3.21
.067	.00	1.633	9.64	3.200	20.88	4.77	1.61
.083	.00	1.650	9.64	3.217	20.88	4.78	1.61
.100	.00	1.667	9.64	3.233	20.88	4.80	1.61
.117	.00	1.683	9.64	3.250	20.88	4.82	1.61
.133	.00	1.700	9.64	3.267	11.24	4.83	1.61
.150	.00	1.717	9.64	3.283	11.24	4.85	1.61
.167	.00	1.733	9.64	3.300	11.24	4.87	1.61
.183	.00	1.750	9.64	3.317	11.24	4.88	1.61
.200	.00	1.767	27.30	3.333	11.24	4.90	1.61

.217	.00	1.783	27.30	3.350	11.24	4.92	1.61
.233	.00	1.800	27.30	3.367	11.24	4.93	1.61
.250	.00	1.817	27.30	3.383	11.24	4.95	1.61
.267	1.61	1.833	27.30	3.400	11.24	4.97	1.61
.283	1.61	1.850	27.30	3.417	11.24	4.98	1.61
.300	1.61	1.867	27.30	3.433	11.24	5.00	1.61
.317	1.61	1.883	27.30	3.450	11.24	5.02	1.61
.333	1.61	1.900	27.30	3.467	11.24	5.03	1.61
.350	1.61	1.917	27.30	3.483	11.24	5.05	1.61
.367	1.61	1.933	27.30	3.500	11.24	5.07	1.61
.383	1.61	1.950	27.30	3.517	11.24	5.08	1.61
.400	1.61	1.967	27.30	3.533	11.24	5.10	1.61
.417	1.61	1.983	27.30	3.550	11.24	5.12	1.61
.433	1.61	2.000	27.30	3.567	11.24	5.13	1.61
.450	1.61	2.017	27.30	3.583	11.24	5.15	1.61
.467	1.61	2.033	27.30	3.600	11.24	5.17	1.61
.483	1.61	2.050	27.30	3.617	11.24	5.18	1.61
.500	1.61	2.067	27.30	3.633	11.24	5.20	1.61
.517	1.61	2.083	27.30	3.650	11.24	5.22	1.61
.533	1.61	2.100	27.30	3.667	11.24	5.23	1.61
.550	1.61	2.117	27.30	3.683	11.24	5.25	1.61
.567	1.61	2.133	27.30	3.700	11.24	5.27	1.61
.583	1.61	2.150	27.30	3.717	11.24	5.28	1.61
.600	1.61	2.167	27.30	3.733	11.24	5.30	1.61
.617	1.61	2.183	27.30	3.750	11.24	5.32	1.61
.633	1.61	2.200	27.30	3.767	6.42	5.33	1.61
.650	1.61	2.217	27.30	3.783	6.42	5.35	1.61
.667	1.61	2.233	27.30	3.800	6.42	5.37	1.61
.683	1.61	2.250	27.30	3.817	6.42	5.38	1.61
.700	1.61	2.267	73.88	3.833	6.42	5.40	1.61
.717	1.61	2.283	73.88	3.850	6.42	5.42	1.61
.733	1.61	2.300	73.88	3.867	6.42	5.43	1.61
.750	1.61	2.317	73.88	3.883	6.42	5.45	1.61
.767	1.61	2.333	73.88	3.900	6.42	5.47	1.61
.783	1.61	2.350	73.88	3.917	6.42	5.48	1.61
.800	1.61	2.367	73.88	3.933	6.42	5.50	1.61

.817	1.61	2.383	73.88	3.950	6.42	5.52	1.61
.833	1.61	2.400	73.88	3.967	6.42	5.53	1.61
.850	1.61	2.417	73.88	3.983	6.42	5.55	1.61
.867	1.61	2.433	73.88	4.000	6.42	5.57	1.61
.883	1.61	2.450	73.88	4.017	6.42	5.58	1.61
.900	1.61	2.467	73.88	4.033	6.42	5.60	1.61
.917	1.61	2.483	73.88	4.050	6.42	5.62	1.61
.933	1.61	2.500	73.88	4.067	6.42	5.63	1.61
.950	1.61	2.517	73.88	4.083	6.42	5.65	1.61
.967	1.61	2.533	73.88	4.100	6.42	5.67	1.61
.983	1.61	2.550	73.88	4.117	6.42	5.68	1.61
1.000	1.61	2.567	73.88	4.133	6.42	5.70	1.61
1.017	1.61	2.583	73.88	4.150	6.42	5.72	1.61
1.033	1.61	2.600	73.88	4.167	6.42	5.73	1.61
1.050	1.61	2.617	73.88	4.183	6.42	5.75	1.61
1.067	1.61	2.633	73.88	4.200	6.42	5.77	1.61
1.083	1.61	2.650	73.88	4.217	6.42	5.78	1.61
1.100	1.61	2.667	73.88	4.233	6.42	5.80	1.61
1.117	1.61	2.683	73.88	4.250	6.42	5.82	1.61
1.133	1.61	2.700	73.88	4.267	3.21	5.83	1.61
1.150	1.61	2.717	73.88	4.283	3.21	5.85	1.61
1.167	1.61	2.733	73.88	4.300	3.21	5.87	1.61
1.183	1.61	2.750	73.88	4.317	3.21	5.88	1.61
1.200	1.61	2.767	20.89	4.333	3.21	5.90	1.61
1.217	1.61	2.783	20.88	4.350	3.21	5.92	1.61
1.233	1.61	2.800	20.88	4.367	3.21	5.93	1.61
1.250	1.61	2.817	20.88	4.383	3.21	5.95	1.61
1.267	9.64	2.833	20.88	4.400	3.21	5.97	1.61
1.283	9.64	2.850	20.88	4.417	3.21	5.98	1.61
1.300	9.64	2.867	20.88	4.433	3.21	6.00	1.61
1.317	9.64	2.883	20.88	4.450	3.21	6.02	1.61
1.333	9.64	2.900	20.88	4.467	3.21	6.03	1.61
1.350	9.64	2.917	20.88	4.483	3.21	6.05	1.61
1.367	9.64	2.933	20.88	4.500	3.21	6.07	1.61
1.383	9.64	2.950	20.88	4.517	3.21	6.08	1.61
1.400	9.64	2.967	20.88	4.533	3.21	6.10	1.61

1.417	9.64	2.983	20.88	4.550	3.21	6.12	1.61
1.433	9.64	3.000	20.88	4.567	3.21	6.13	1.61
1.450	9.64	3.017	20.88	4.583	3.21	6.15	1.61
1.467	9.64	3.033	20.88	4.600	3.21	6.17	1.61
1.483	9.64	3.050	20.88	4.617	3.21	6.18	1.61
1.500	9.64	3.067	20.88	4.633	3.21	6.20	1.61
1.517	9.64	3.083	20.88	4.650	3.21	6.22	1.61
1.533	9.64	3.100	20.88	4.667	3.21	6.23	1.61
1.550	9.64	3.117	20.88	4.683	3.21	6.25	1.61
1.567	9.64	3.133	20.88	4.700	3.21		

Max.Eff.Inten.(mm/hr)=	73.88	285.55	
over (min)	5.00	11.00	
Storage Coeff. (min)=	1.82 (ii)	10.69 (ii)	
Unit Hyd. Tpeak (min)=	5.00	11.00	
Unit Hyd. peak (cms)=	.39	.10	
			TOTALS
PEAK FLOW (cms)=	.00	.09	.093 (iii)
TIME TO PEAK (hrs)=	2.50	2.78	2.78
RUNOFF VOLUME (mm)=	79.31	61.05	61.06
TOTAL RAINFALL (mm)=	80.31	80.31	80.31
RUNOFF COEFFICIENT =	.99	.76	.76

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0002)	Area (ha)= 1.34

|ID= 1 DT= 1.0 min | Total Imp(%)= 86.00 Dir. Conn.(%)= .10

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.15	.19	
Dep. Storage	(mm)=	1.00	.70	
Average Slope	(%)=	1.00	2.50	
Length	(m)=	94.60	214.00	
Mannings n	=	.020	.250	
Max.Eff.Inten.	(mm/hr)=	73.88	498.79	
over	(min)	5.00	14.00	
Storage Coeff.	(min)=	3.61 (ii)	13.11 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	14.00	
Unit Hyd. peak	(cms)=	.28	.08	
				TOTALS
PEAK FLOW	(cms)=	.00	.22	.222 (iii)
TIME TO PEAK	(hrs)=	2.68	2.80	2.80
RUNOFF VOLUME	(mm)=	79.31	67.39	67.40
TOTAL RAINFALL	(mm)=	80.31	80.31	80.31
RUNOFF COEFFICIENT	=	.99	.84	.84

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| RESERVOIR (0003) |

| IN= 2---> OUT= 1 |

DT= 1.0 min	OUTFLOW	STORAGE	OUTFLOW	STORAGE
	(cms)	(ha.m.)	(cms)	(ha.m.)

.0000	.0000	.0200	.0063
.0040	.0004	.0230	.0079
.0070	.0015	.0250	.0095
.0120	.0031	.0270	.0112
.0160	.0043	.0300	.0129

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	.58	.09	2.78	61.06
OUTFLOW: ID= 1 (0003)	.58	.03	3.32	61.02

PEAK FLOW REDUCTION [Qout/Qin](%)= 37.06
TIME SHIFT OF PEAK FLOW (min)= 32.00
MAXIMUM STORAGE USED (ha.m.)= .0155

RESERVOIR (0004)
IN= 2---> OUT= 1

DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	.0000	.0000	.0570	.0089
	.0530	.0000	.0580	.0187
	.0550	.0006	.0600	.0327
	.0560	.0031	.0610	.0500

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0002)	1.34	.22	2.80	67.40
OUTFLOW: ID= 1 (0004)	1.34	.06	3.58	67.40

PEAK FLOW REDUCTION [Qout/Qin](%)= 27.12
TIME SHIFT OF PEAK FLOW (min)= 47.00
MAXIMUM STORAGE USED (ha.m.)= .0374

****

** SIMULATION NUMBER: 8 **

****

| READ STORM | Filename: T:\3958 Banas Stone SWM Analysis\Models\VO

| | 2\Banas Stone - Read Storm\Storms\

| | 100yr-12hr.STM

| Ptotal= 88.54 mm | Comments: 100yr/12hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	.00	3.50	15.05	6.75	6.20	10.00	.89
.50	.89	3.75	15.05	7.00	6.20	10.25	.89
.75	.89	4.00	15.05	7.25	6.20	10.50	.89
1.00	.89	4.25	15.05	7.50	3.54	10.75	.89
1.25	.89	4.50	40.71	7.75	3.54	11.00	.89
1.50	.89	4.75	40.71	8.00	3.54	11.25	.89
1.75	.89	5.00	40.71	8.25	3.54	11.50	.89
2.00	.89	5.25	40.71	8.50	1.77	11.75	.89
2.25	.89	5.50	11.51	8.75	1.77	12.00	.89
2.50	5.31	5.75	11.51	9.00	1.77	12.25	.89
2.75	5.31	6.00	11.51	9.25	1.77		
3.00	5.31	6.25	11.51	9.50	.89		
3.25	5.31	6.50	6.20	9.75	.89		

| CALIB |

| STANDHYD (0001) | Area (ha)= .58

|ID= 1 DT= 1.0 min | Total Imp(%)= 77.00 Dir. Conn.(%)= .10

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.45	.13

Dep. Storage	(mm)=	1.00	.70
Average Slope	(%)=	1.80	1.30
Length	(m)=	62.10	95.00
Mannings n	=	.013	.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
.017	.00	3.083	5.31	6.150	11.51	9.22	1.77
.033	.00	3.100	5.31	6.167	11.51	9.23	1.77
.050	.00	3.117	5.31	6.183	11.51	9.25	1.77
.067	.00	3.133	5.31	6.200	11.51	9.27	.89
.083	.00	3.150	5.31	6.217	11.51	9.28	.89
.100	.00	3.167	5.31	6.233	11.51	9.30	.89
.117	.00	3.183	5.31	6.250	11.50	9.32	.89
.133	.00	3.200	5.31	6.267	6.20	9.33	.89
.150	.00	3.217	5.31	6.283	6.20	9.35	.89
.167	.00	3.233	5.31	6.300	6.20	9.37	.89
.183	.00	3.250	5.31	6.317	6.20	9.38	.89
.200	.00	3.267	15.05	6.333	6.20	9.40	.89
.217	.00	3.283	15.05	6.350	6.20	9.42	.89
.233	.00	3.300	15.05	6.367	6.20	9.43	.89
.250	.00	3.317	15.05	6.383	6.20	9.45	.89
.267	.89	3.333	15.05	6.400	6.20	9.47	.89
.283	.89	3.350	15.05	6.417	6.20	9.48	.89
.300	.89	3.367	15.05	6.433	6.20	9.50	.89
.317	.89	3.383	15.05	6.450	6.20	9.52	.89
.333	.89	3.400	15.05	6.467	6.20	9.53	.89
.350	.89	3.417	15.05	6.483	6.20	9.55	.89
.367	.89	3.433	15.05	6.500	6.20	9.57	.89
.383	.89	3.450	15.05	6.517	6.20	9.58	.89
.400	.89	3.467	15.05	6.533	6.20	9.60	.89
.417	.89	3.483	15.05	6.550	6.20	9.62	.89

.433	.89	3.500	15.05	6.567	6.20	9.63	.89
.450	.89	3.517	15.05	6.583	6.20	9.65	.89
.467	.89	3.533	15.05	6.600	6.20	9.67	.89
.483	.89	3.550	15.05	6.617	6.20	9.68	.89
.500	.89	3.567	15.05	6.633	6.20	9.70	.89
.517	.89	3.583	15.05	6.650	6.20	9.72	.89
.533	.89	3.600	15.05	6.667	6.20	9.73	.89
.550	.89	3.617	15.05	6.683	6.20	9.75	.89
.567	.89	3.633	15.05	6.700	6.20	9.77	.89
.583	.89	3.650	15.05	6.717	6.20	9.78	.89
.600	.89	3.667	15.05	6.733	6.20	9.80	.89
.617	.89	3.683	15.05	6.750	6.20	9.82	.89
.633	.89	3.700	15.05	6.767	6.20	9.83	.89
.650	.89	3.717	15.05	6.783	6.20	9.85	.89
.667	.89	3.733	15.05	6.800	6.20	9.87	.89
.683	.89	3.750	15.05	6.817	6.20	9.88	.89
.700	.89	3.767	15.05	6.833	6.20	9.90	.89
.717	.89	3.783	15.05	6.850	6.20	9.92	.89
.733	.89	3.800	15.05	6.867	6.20	9.93	.89
.750	.89	3.817	15.05	6.883	6.20	9.95	.89
.767	.89	3.833	15.05	6.900	6.20	9.97	.89
.783	.89	3.850	15.05	6.917	6.20	9.98	.89
.800	.89	3.867	15.05	6.933	6.20	10.00	.89
.817	.89	3.883	15.05	6.950	6.20	10.02	.89
.833	.89	3.900	15.05	6.967	6.20	10.03	.89
.850	.89	3.917	15.05	6.983	6.20	10.05	.89
.867	.89	3.933	15.05	7.000	6.20	10.07	.89
.883	.89	3.950	15.05	7.017	6.20	10.08	.89
.900	.89	3.967	15.05	7.033	6.20	10.10	.89
.917	.89	3.983	15.05	7.050	6.20	10.12	.89
.933	.89	4.000	15.05	7.067	6.20	10.13	.89
.950	.89	4.017	15.05	7.083	6.20	10.15	.89
.967	.89	4.033	15.05	7.100	6.20	10.17	.89
.983	.89	4.050	15.05	7.117	6.20	10.18	.89
1.000	.89	4.067	15.05	7.133	6.20	10.20	.89
1.017	.89	4.083	15.05	7.150	6.20	10.22	.89

1.033	.89	4.100	15.05	7.167	6.20	10.23	.89
1.050	.89	4.117	15.05	7.183	6.20	10.25	.89
1.067	.89	4.133	15.05	7.200	6.20	10.27	.89
1.083	.89	4.150	15.05	7.217	6.20	10.28	.89
1.100	.89	4.167	15.05	7.233	6.20	10.30	.89
1.117	.89	4.183	15.05	7.250	6.19	10.32	.89
1.133	.89	4.200	15.05	7.267	3.54	10.33	.89
1.150	.89	4.217	15.05	7.283	3.54	10.35	.89
1.167	.89	4.233	15.05	7.300	3.54	10.37	.89
1.183	.89	4.250	15.05	7.317	3.54	10.38	.89
1.200	.89	4.267	40.71	7.333	3.54	10.40	.89
1.217	.89	4.283	40.71	7.350	3.54	10.42	.89
1.233	.89	4.300	40.71	7.367	3.54	10.43	.89
1.250	.89	4.317	40.71	7.383	3.54	10.45	.89
1.267	.89	4.333	40.71	7.400	3.54	10.47	.89
1.283	.89	4.350	40.71	7.417	3.54	10.48	.89
1.300	.89	4.367	40.71	7.433	3.54	10.50	.89
1.317	.89	4.383	40.71	7.450	3.54	10.52	.89
1.333	.89	4.400	40.71	7.467	3.54	10.53	.89
1.350	.89	4.417	40.71	7.483	3.54	10.55	.89
1.367	.89	4.433	40.71	7.500	3.54	10.57	.89
1.383	.89	4.450	40.71	7.517	3.54	10.58	.89
1.400	.89	4.467	40.71	7.533	3.54	10.60	.89
1.417	.89	4.483	40.71	7.550	3.54	10.62	.89
1.433	.89	4.500	40.71	7.567	3.54	10.63	.89
1.450	.89	4.517	40.71	7.583	3.54	10.65	.89
1.467	.89	4.533	40.71	7.600	3.54	10.67	.89
1.483	.89	4.550	40.71	7.617	3.54	10.68	.89
1.500	.89	4.567	40.71	7.633	3.54	10.70	.89
1.517	.89	4.583	40.71	7.650	3.54	10.72	.89
1.533	.89	4.600	40.71	7.667	3.54	10.73	.89
1.550	.89	4.617	40.71	7.683	3.54	10.75	.89
1.567	.89	4.633	40.71	7.700	3.54	10.77	.89
1.583	.89	4.650	40.71	7.717	3.54	10.78	.89
1.600	.89	4.667	40.71	7.733	3.54	10.80	.89
1.617	.89	4.683	40.71	7.750	3.54	10.82	.89

1.633	.89	4.700	40.71	7.767	3.54	10.83	.89
1.650	.89	4.717	40.71	7.783	3.54	10.85	.89
1.667	.89	4.733	40.71	7.800	3.54	10.87	.89
1.683	.89	4.750	40.71	7.817	3.54	10.88	.89
1.700	.89	4.767	40.71	7.833	3.54	10.90	.89
1.717	.89	4.783	40.71	7.850	3.54	10.92	.89
1.733	.89	4.800	40.71	7.867	3.54	10.93	.89
1.750	.89	4.817	40.71	7.883	3.54	10.95	.89
1.767	.89	4.833	40.71	7.900	3.54	10.97	.89
1.783	.89	4.850	40.71	7.917	3.54	10.98	.89
1.800	.89	4.867	40.71	7.933	3.54	11.00	.89
1.817	.89	4.883	40.71	7.950	3.54	11.02	.89
1.833	.89	4.900	40.71	7.967	3.54	11.03	.89
1.850	.89	4.917	40.71	7.983	3.54	11.05	.89
1.867	.89	4.933	40.71	8.000	3.54	11.07	.89
1.883	.89	4.950	40.71	8.017	3.54	11.08	.89
1.900	.89	4.967	40.71	8.033	3.54	11.10	.89
1.917	.89	4.983	40.71	8.050	3.54	11.12	.89
1.933	.89	5.000	40.71	8.067	3.54	11.13	.89
1.950	.89	5.017	40.71	8.083	3.54	11.15	.89
1.967	.89	5.033	40.71	8.100	3.54	11.17	.89
1.983	.89	5.050	40.71	8.117	3.54	11.18	.89
2.000	.89	5.067	40.71	8.133	3.54	11.20	.89
2.017	.89	5.083	40.71	8.150	3.54	11.22	.89
2.033	.89	5.100	40.71	8.167	3.54	11.23	.89
2.050	.89	5.117	40.71	8.183	3.54	11.25	.89
2.067	.89	5.133	40.71	8.200	3.54	11.27	.89
2.083	.89	5.150	40.71	8.217	3.54	11.28	.89
2.100	.89	5.167	40.71	8.233	3.54	11.30	.89
2.117	.89	5.183	40.71	8.250	3.54	11.32	.89
2.133	.89	5.200	40.71	8.267	1.77	11.33	.89
2.150	.89	5.217	40.71	8.283	1.77	11.35	.89
2.167	.89	5.233	40.71	8.300	1.77	11.37	.89
2.183	.89	5.250	40.69	8.317	1.77	11.38	.89
2.200	.89	5.267	11.51	8.333	1.77	11.40	.89
2.217	.89	5.283	11.51	8.350	1.77	11.42	.89

2.233	.89	5.300	11.51	8.367	1.77	11.43	.89
2.250	.89	5.317	11.51	8.383	1.77	11.45	.89
2.267	5.31	5.333	11.51	8.400	1.77	11.47	.89
2.283	5.31	5.350	11.51	8.417	1.77	11.48	.89
2.300	5.31	5.367	11.51	8.433	1.77	11.50	.89
2.317	5.31	5.383	11.51	8.450	1.77	11.52	.89
2.333	5.31	5.400	11.51	8.467	1.77	11.53	.89
2.350	5.31	5.417	11.51	8.483	1.77	11.55	.89
2.367	5.31	5.433	11.51	8.500	1.77	11.57	.89
2.383	5.31	5.450	11.51	8.517	1.77	11.58	.89
2.400	5.31	5.467	11.51	8.533	1.77	11.60	.89
2.417	5.31	5.483	11.51	8.550	1.77	11.62	.89
2.433	5.31	5.500	11.51	8.567	1.77	11.63	.89
2.450	5.31	5.517	11.51	8.583	1.77	11.65	.89
2.467	5.31	5.533	11.51	8.600	1.77	11.67	.89
2.483	5.31	5.550	11.51	8.617	1.77	11.68	.89
2.500	5.31	5.567	11.51	8.633	1.77	11.70	.89
2.517	5.31	5.583	11.51	8.650	1.77	11.72	.89
2.533	5.31	5.600	11.51	8.667	1.77	11.73	.89
2.550	5.31	5.617	11.51	8.683	1.77	11.75	.89
2.567	5.31	5.633	11.51	8.700	1.77	11.77	.89
2.583	5.31	5.650	11.51	8.717	1.77	11.78	.89
2.600	5.31	5.667	11.51	8.733	1.77	11.80	.89
2.617	5.31	5.683	11.51	8.750	1.77	11.82	.89
2.633	5.31	5.700	11.51	8.767	1.77	11.83	.89
2.650	5.31	5.717	11.51	8.783	1.77	11.85	.89
2.667	5.31	5.733	11.51	8.800	1.77	11.87	.89
2.683	5.31	5.750	11.51	8.817	1.77	11.88	.89
2.700	5.31	5.767	11.51	8.833	1.77	11.90	.89
2.717	5.31	5.783	11.51	8.850	1.77	11.92	.89
2.733	5.31	5.800	11.51	8.867	1.77	11.93	.89
2.750	5.31	5.817	11.51	8.883	1.77	11.95	.89
2.767	5.31	5.833	11.51	8.900	1.77	11.97	.89
2.783	5.31	5.850	11.51	8.917	1.77	11.98	.89
2.800	5.31	5.867	11.51	8.933	1.77	12.00	.89
2.817	5.31	5.883	11.51	8.950	1.77	12.02	.89

2.833	5.31	5.900	11.51	8.967	1.77	12.03	.89	
2.850	5.31	5.917	11.51	8.983	1.77	12.05	.89	
2.867	5.31	5.933	11.51	9.000	1.77	12.07	.89	
2.883	5.31	5.950	11.51	9.017	1.77	12.08	.89	
2.900	5.31	5.967	11.51	9.033	1.77	12.10	.89	
2.917	5.31	5.983	11.51	9.050	1.77	12.12	.89	
2.933	5.31	6.000	11.51	9.067	1.77	12.13	.89	
2.950	5.31	6.017	11.51	9.083	1.77	12.15	.89	
2.967	5.31	6.033	11.51	9.100	1.77	12.17	.89	
2.983	5.31	6.050	11.51	9.117	1.77	12.18	.89	
3.000	5.31	6.067	11.51	9.133	1.77	12.20	.89	
3.017	5.31	6.083	11.51	9.150	1.77	12.22	.89	
3.033	5.31	6.100	11.51	9.167	1.77	12.23	.89	
3.050	5.31	6.117	11.51	9.183	1.77	12.25	.89	
3.067	5.31	6.133	11.51	9.200	1.77			

Max.Eff.Inten.(mm/hr)=	40.71	160.92	
over (min)	5.00	14.00	
Storage Coeff. (min)=	2.31 (ii)	13.46 (ii)	
Unit Hyd. Tpeak (min)=	5.00	14.00	
Unit Hyd. peak (cms)=	.35	.08	
			TOTALS
PEAK FLOW (cms)=	.00	.06	.057 (iii)
TIME TO PEAK (hrs)=	4.53	5.27	5.27
RUNOFF VOLUME (mm)=	87.54	68.85	68.86
TOTAL RAINFALL (mm)=	88.54	88.54	88.54
RUNOFF COEFFICIENT =	.99	.78	.78

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0002) |   Area     (ha)=   1.34
|ID= 1 DT= 1.0 min |   Total Imp(%)=  86.00   Dir. Conn.(%)=    .10
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.15          .19
     Dep. Storage     (mm)=       1.00          .70
     Average Slope     (%)=       1.00         2.50
     Length            (m)=      94.60       214.00
     Mannings n           =       .020         .250

     Max.Eff.Inten.(mm/hr)=      40.71       278.08
               over (min)         5.00        17.00
     Storage Coeff.  (min)=       4.58 (ii)   16.58 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.00
     Unit Hyd. peak  (cms)=        .24          .07
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .00          .14          .138 (iii)
     TIME TO PEAK    (hrs)=       4.77         5.27          5.27
     RUNOFF VOLUME    (mm)=      75.94        64.11         64.12
     TOTAL RAINFALL   (mm)=      88.54        88.54         88.54
     RUNOFF COEFFICIENT   =        .86          .72           .72

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
               YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
```

```
--------------------
| RESERVOIR (0003) |
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .0000      .0000    |    .0200      .0063
                           .0040      .0004    |    .0230      .0079
                           .0070      .0015    |    .0250      .0095
                           .0120      .0031    |    .0270      .0112
                           .0160      .0043    |    .0300      .0129

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (0001)         .58       .06      5.27      68.86
     OUTFLOW: ID= 1 (0003)         .58       .03      5.63      68.82

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 52.69
                    TIME SHIFT OF PEAK FLOW          (min)= 22.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  .0129

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0004) |
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .0000      .0000    |    .0570      .0089
                           .0530      .0000    |    .0580      .0187
                           .0550      .0006    |    .0600      .0327
                           .0560      .0031    |    .0610      .0500

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (0002)        1.34       .14      5.27      64.12
     OUTFLOW: ID= 1 (0004)        1.34       .06      5.88      64.19
```

```
                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 42.82

                    TIME SHIFT OF PEAK FLOW          (min)= 37.00

                    MAXIMUM  STORAGE   USED       (ha.m.)=  .0253


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 FINISH

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Attachment B: OGS Sizing Information

Hydro First Defense® - HC

Net Annual Water Quality Worksheet

Hydro International

Rev. 9.2

Project Name:	OGS for Caledon Site	Report Date:	1/24/2020
Street:		City:	Caledon
Province:		Country:	
Designer:		email:	

Paste

Teatment Parameters:

Structure ID:		
TSS Goal:	80	% Removal
TSS Particle Size:	Fine	
Area:	1.21	ha
Percent Impervious:	0%	
Rational C value:	0.90	Calc. Cn
Rainfall Station:	Toronto Pearson Intl AP, ONT	MAP
Peak Storm Flow:	260	L/s

RESULTS SUMMARY

Model	TSS	Volume
FD-3HC	76.5%	98.9%
FD-4HC	**83.4%**	**99.8%**
FD-5HC	87.2%	100.0%
FD-6HC	90.1%	99.9%
FD-8HC	93.8%	99.9%

Model Specification:

Model:	FD-4HC	
Diameter:	1200	mm
No Bypass Flow:	20.00	L/s
Peak Flow Capacity:	510.00	L/s
Sediment Storage:	0.54	m^3
Oil Storage:	723.00	L

Installation Configuration:

Placement:	Online		
Outlet Pipe Size:		mm	*OK*
Inlet Pipe 1 Size:		mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Inlet Pipe 3 Size:		mm	*OK*
Rim Level:		m	Calc Invs.
Outlet Pipe Invert:		m	
Invert Pipe 1:		m	*OK!*
Invert Pipe 2:		m	
Invert Pipe 3:		m	

Net Annual Removal Model: FD-4HC

Intensity[1]	Fraction of Rainfall[1]	FD-4HC Removal Efficiency[2]	Weighted Net Annual Efficiency
(mm/hr)	(%)	(%)	(%)
0.50	0.2%	100.0%	0.2%
1.00	16.3%	93.8%	15.3%
1.50	13.1%	90.3%	11.9%
2.00	13.2%	88.0%	11.7%
2.50	4.5%	86.2%	3.9%
3.00	2.2%	84.7%	1.9%
3.50	8.4%	83.5%	7.0%
4.00	4.8%	82.5%	3.9%
4.50	1.5%	81.6%	1.2%
5.00	5.0%	80.8%	4.0%
6.00	4.4%	79.4%	3.5%
7.00	4.8%	78.3%	3.7%
8.00	3.5%	77.3%	2.7%
9.00	2.2%	76.5%	1.7%
10.00	2.4%	75.7%	1.8%
20.00	8.8%	71.0%	6.3%
30.00	2.7%	68.4%	1.8%
40.00	0.9%	66.6%	0.6%
50.00	0.4%	65.2%	0.3%
100.00	0.5%	0.0%	0.0%
150.00	0.1%	0.0%	0.0%
200.00	0.0%	0.0%	0.0%
Total Net Annual Removal Efficiency:			**83.4%**
Total Annual Runoff Volume Treated:			**99.8%**

1. Rainfall Data: 1960:2013, HLY03, Toronto Pearson Intl AP , ON, 6158733.

2. Based on third party verified data and appoximating the removal of a PSD similar to the STC Fine distribution

3. Rainfall adjusted to 5 min peak intensity based on hourly average.

Attachment C: Soils Report

shaheen & peaker
A Coffey Geotechnics Company

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consulting engineers
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DOCUMENT TRANSMITTAL

Project No.: SP8191	**Date:** October 14, 2008
From:	Alka Sangar, M.Eng. / Shabbir Bandukwala, M.Eng., P.Eng.
Document Title:	Geotechnical Investigation – Proposed Warehouse Building, 8112 King Street, Bolton, ON
Document Date:	October 10, 2008

Distribution	No. of Bound Originals	No. of Bound Copies	No. of Unbound Copies
Mr. Firoz Khan **Banas Stones Inc.** 2, Industrial Road Bolton, Ontario L7E 1K6	1	2	
Mr. Vladimir P. Rudenko **Candevcon Limited** 9358 Goreway Drive Brampton, Ontario L6P 0M7		1	

Message:

(Please always note our *Project No.* in *All* correspondence.)

GEOTECHNICAL INVESTIGATION
PROPOSED WAREHOUSE BUILDING
8112 KING STREET
BOLTON, ONTARIO

Prepared For:

BANAS STONES INC.

Prepared by:

SHAHEEN & PEAKER

Project: SP8191
October 10, 2008

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Table of Contents

1. INTRODUCTION

Shaheen & Peaker was retained by Banas Stones Inc. to undertake a geotechnical investigation for the proposed warehouse building located at 8112 King Street in Bolton, Ontario.

It is understood that the project will consist of a low-rise building with slab-on-grade construction. The proposed finished ground floor will be at Elevation 264.2 m.

The purpose of this investigation was to determine the subsurface conditions at seven borehole locations (BH1 to BH7) and from the findings in the boreholes make engineering recommendations for the following:

1. Foundations
2. Floor slab and permanent drainage
3. Excavations and backfill
4. Earth pressures
5. Earthquake considerations
6. Pavements

This report is provided on the basis of the terms of reference presented above and on the assumption that the design will be in accordance with the applicable codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations of this office can be relied upon.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. The format and contents are guided by client specific needs and economics and do not conform to generalized standards for services. Laboratory testing for most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice.

This report has been prepared for Banas Stones Inc. and its architect and designers. Third party use of this report without Shaheen & Peaker consent is prohibited. The limitation conditions presented in Appendix A form an integral part of the report and they must be considered in conjunction with this report.

2. FIELD AND LABORATORY WORK

A total of seven boreholes (BH1 to BH7) were drilled to a maximum depth of 5.2 m in the proposed building area with solid stem continuous flight augers by a drilling sub-contractor under the direction and supervision of Shaheen & Peaker personnel. Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 624 N and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method. The samples were logged in the field and returned to the Shaheen & Peaker laboratory for detailed examination by the project engineer and for laboratory testing.

As well as visual examination in the laboratory, all soil samples were tested for moisture content and selected samples for unit weights.

Water level observations were made during drilling and in the open boreholes at the completion of the drilling operations.

The ground surface elevations were taken from topographic drawing provided to us by the client.

3. SITE AND SUBSURFACE CONDITIONS

The site is located at 8112 King Street in Bolton, Ontario. Presently, the site is a vacant field. The topography of the site generally appears to be flat.

The boreholes locations are shown on Drawing 1. Notes on sample descriptions and the general features of fill material and glacial till are presented on Drawing 1A. Detailed subsurface conditions are presented on the Borehole Logs, Drawings 2 to 8. The generalized subsurface profiles (cross sections) along boreholes are shown on Drawing 9 and 10. The soil and groundwater conditions are summarized as follows.

3.1 Soil Conditions

Fill: fill material was found in all the boreholes to depths from 2.6 to 4.9 m. The fill material consisted of compact to loose clayey silt to sandy silt with trace gravel, asphalt and brick pieces. Topsoil was present in fill material in varying amounts. Fill material mixed with topsoil was found in boreholes BH3, BH5 and BH7 at different depths.

Native Soils: Underneath the fill, clayey silt till was found in all the boreholes extending to the maximum depth of exploration. These till deposits were generally in very stiff to hard state.

3.2 Groundwater Conditions

At completion of drilling, all boreholes were found dry and open.

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events.

4. FOUNDATIONS

Based on the information provided to us by the client, the proposed finished floor of the building is expected to be at approximate elevation of 264.2 m. In this case the existing grades will be raised by approximately 0.4 to 0.6 m in the building area.

The proposed building can be supported by drilled caissons founded on the undisturbed hard clayey silt till at or below depths varying from 3.3 to 6.0 m below the existing grade or 3.8 to 6.4 m below the finished floor for bearing pressures of 600 kPa at the serviceability limit states (SLS), and for factored geotechnical resistances of 850 kPa at the ultimate limit states (ULS). The bearing values and the corresponding founding elevations at the borehole locations are summarized on Table 1.

Table 1: Bearing Pressure & Founding Levels of Caissons

BH No.	Material	Bearing Capacity at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Depth below Existing Ground (m)	Founding Level At or Below Elevation (m)	Note
BH1	Clayey silt till	600	850	3.3	260.4	
BH2	Clayey silt till	600	850	4.8	258.8	
BH3	Clayey silt till	600	850	4.8	259.0	
BH4	Clayey silt till	600	850	below 6.0*	below 257.8*	
BH5	Clayey silt till	600	850	4.8	259.0	
BH6	Clayey silt till	600	850	4.8	258.8	
BH7	Clayey silt till	600	850	3.3	260.3	

* To be confirmed in the field.

Caissons designed to the specified bearing values are expected to settle less than 25 mm total and 19 mm differential.

In the vicinity of the existing buried utilities, all footings must be lowered to undisturbed native soils, or alternatively the services must be structurally bridged.

Where it is necessary to place footings at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line drawn up from the base of the lower footing. The lower footing must be installed first to help minimize the risk of undermining the upper footing.

It should be noted that the recommended bearing capacities have been calculated by Shaheen & Peaker from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by Shaheen & Peaker to validate the information for use during the construction stage.

5. FLOOR SLAB AND PERMANENT DRAINAGE

It is understood that the proposed finished floor of the building is expected to be at approximate elevation of 264.2 m. In this case the existing grades will be raised by approximately 0.4 to 0.6 m in the building area.

The floor slab can be supported on existing fill as it appears to be compacted, provided the certificate is provided by the contractor to prove that the fill was placed under controlled conditions. Otherwise 1.0 m of the existing fill material should be sub-excavated and reworked to 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

The fill required to raise the grade can consist of inorganic soil, placed in shallow lifts and compacted to 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

A moisture barrier consisting of at least 150 mm of 19 mm crushed stone should be installed under the floor slab.

If the floor slab is more than about 200 mm higher than the exterior grade then perimeter drainage is not considered to be necessary. If the floor is lower then the perimeter drainage system shown on Drawing 11 is recommended.

6. EXCAVATIONS AND BACKFILL

Excavations can be carried out with heavy hydraulic backhoe. Major problems with groundwater are not anticipated for the installation of foundations. It is expected that any seepage, which occurs during wet periods, can be removed by pumping from sumps.

It should be noted that the till is a non-sorted sediment and therefore may contain boulders. Possible large obstructions such as buried concrete pieces and large stones are also anticipated in the fill material. Provisions must be made in the excavation contract for the removal of possible boulders in the till or obstructions in the fill material.

All temporary excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, the on-site fill is classified as Type 3 soil and the very stiff to hard clayey soils above the groundwater table can be classified as Type 1 to Type 2 soils.

A portion of the existing fill mixed with topsoil or containing some topsoil is considered unsuitable for re-use as backfill material. The select inorganic fill and native soils free from topsoil and organics can be used as general construction backfill where it can be compacted with sheep's foot type compactors. Loose lifts of soil, which are to be compacted, should not exceed 200 mm.

Imported granular fill, which can be compacted with hand held equipment, should be used in confined areas.

Underfloor fill should be compacted to at least 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

The excavated soils are not considered to be free draining. Where free draining backfill is required, imported granular fill such as OPSS Granular B should be used.

It should be noted that the excavated soils are subject to moisture content increase during wet weather which would make these materials too wet for adequate compaction. Stockpiles should be compacted at the surface or be covered with tarpaulins to minimize moisture uptake.

7. EARTH PRESSURES

The lateral earth pressures acting on retaining walls or underground structures may be calculated from the following expression:

$$p = K(\gamma h + q)$$

where p = Lateral earth pressure in kPa acting at depth h

K = Earth pressure coefficient equal to 0.4 for vertical walls and horizontal backfill

γ = Unit weight of backfill, a value of 20.5 kN/m^3 may be assumed

h = Depth to point of interest in metres

q = Equivalent value of surcharge on the ground surface in kPa

The above expression assumes that the perimeter drainage system prevents the build up of any hydrostatic pressure behind the wall.

8. EARTHQUAKE CONSIDERATIONS

Based on the borehole information and according to Table 4.1.8.4.A of OBC 2006, the subject site for the proposed building supported by caissons on hard clayey silt till can be classified as "Class C" for seismic site response.

9. ENVIRONMENTAL CONSIDERATIONS

Selected soil samples were subjected to chemical analysis to assess the environmental quality of the soils to assist in determining off-site disposal options. The chemical testing results will be submitted in a separate letter

10. PAVEMENTS

The recommended pavement structures provided in Table 2 are based upon an estimate of the subgrade soil properties determined from visual examination and textural classification of the soil samples. Consequently, the recommended pavement structures should be considered for preliminary design purposes only. A functional design life of eight to ten years has been used to establish the pavement recommendations. This represents the number of years to the first rehabilitation, assuming regular maintenance is carried out. If required, a more refined pavement structure design can be performed based on specific traffic data and design life requirements and will involve specific laboratory tests to determine frost susceptibility and strength characteristics of the subgrade soils, as well as specific data input from the client.

Table 2: Recommended Pavement Structure Thickness

Pavement Layer	Compaction Requirements	Light Duty Parking (Cars)	Heavy Duty Parking (Delivery Trucks)
Asphaltic Concrete	97% Marshall Density	40 mm OPSS HL 3 50 mm OPSS HL 8	40 mm OPSS HL 3 80 mm OPSS HL 8
OPSS Granular A Base (or 20mm Crushed Limestone)	100% SPMDD*	150 mm	150 mm
OPSS Granular B	100% SPMDD	250 mm	300 mm

* Denotes Standard Proctor Maximum Dry Density, ASTM-D698
The subgrade must be compacted to 98% SPMDD for at least the upper 300 mm unless accepted by Shaheen & Peaker.

The long term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure uniform subgrade moisture and density conditions are achieved. In addition, the need for adequate drainage cannot be over-emphasized. The finished pavement surface and underlying subgrade should be free of depressions and should be sloped (preferably at a minimum grade of two percent) to provide effective surface drainage toward catch basins. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas. Subdrains should be installed to intercept excess subsurface moisture and prevent subgrade softening. This is particularly important in heavy-duty pavement areas.

Additional comments on the construction of parking areas and access roadways are as follows:

1. As part of the subgrade preparation, proposed parking areas and access roadways should be stripped of topsoil and other obvious objectionable material. Fill required to raise the grades to design elevations should conform to backfill requirements outlined in previous sections of this report. The subgrade should be properly shaped, crowned then proof-rolled in the full time presence of a representative of this office. Soft or spongy subgrade areas should be sub-excavated and properly replaced with suitable approved backfill compacted to 98% SPMDD.

2. The locations and extent of sub-drainage required within the paved areas should be reviewed by this office in conjunction with the proposed lot grading. Assuming that satisfactory crossfalls in the order of two percent have been provided, subdrains

extending from and between catch basins may be satisfactory. In the event that shallower crossfalls are considered, a more extensive system of sub-drainage may be necessary and should be reviewed by Shaheen & Peaker.

3. The most severe loading conditions on light-duty pavement areas and the subgrade may occur during construction. Consequently, special provisions such as restricted access lanes, half-loads during paving, etc., may be required, especially if construction is carried out during unfavourable weather.

4. It is recommended that Shaheen & Peaker be retained to review the final pavement structure designs and drainage plans prior to construction to ensure that they are consistent with the recommendations of this report.

11. GENERAL COMMENTS

Shaheen & Peaker should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, Shaheen & Peaker will assume no responsibility for interpretation of the recommendations in the report.

The comments given in this report are intended only for the guidance of design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc., would be much greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

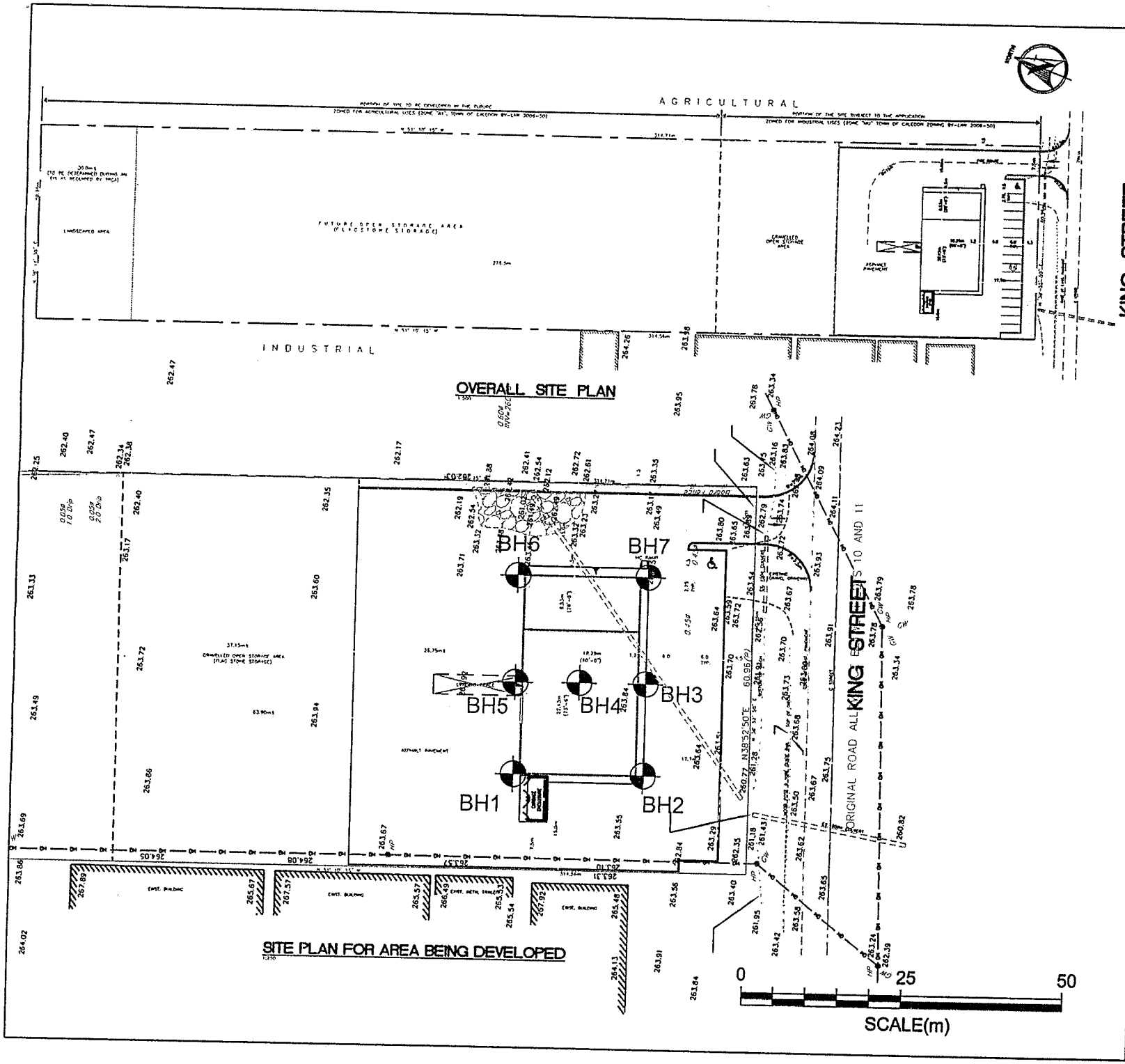
Yours truly,

SHAHEEN & PEAKER

Alka Sangar, M.Eng.

Shabbir Bandukwala, M.Eng., P.Eng.

Drawings



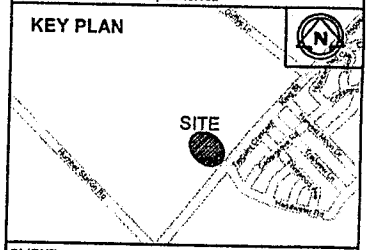
NOTES:

1. The boundaries and soil types have been established only at borehole locations. Between boreholes they are assumed and may be subject to considerable error.
2. Soil samples will be retained in storage for 3 months and then destroyed unless the client advises an extended time period is required.
3. Topsoil quantities should not be established from the information provided at the borehole locations.
4. Borehole elevations should not be used to design building(s) or floor slab(s) or parking lot(s) grades.
5. This drawing forms part of the report (project number as referenced) and should only be used in conjunction with this report.

NO.	DESCRIPTION	DATE
2		
1		

shaheen peaker
A division of Coffey Geotechnics, Inc.
20 Meteor Drive, Toronto, Ontario, M9W 1A4
T: 416.213.1255 F: 416.213.1260
email:info@shaheenpeaker.ca

KEY PLAN



CLIENT: Banas Stones Inc.

PROJECT: Geotechnical Investigation
Banas Stones Inc., King Street,
Bolton, ON

DRAWING TITLE: Borehole Locations Plan

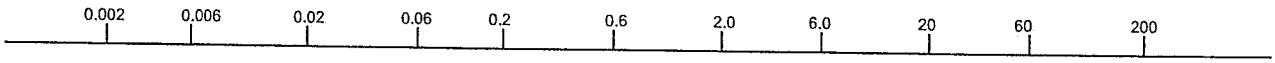
SCALE: AS SHOWN	DATE: Oct. 04, 2008
DRAWN BY: TJ	PROJECT NO.: SP8191
APPROVED BY: NW	DRAWING NO.: 1

Drawing 1A: Notes On Sample Descriptions

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Society for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by Shaheen & Peaker Limited also follow the same system. Different classification systems may be used by others; one such system is the Unified Soil Classification. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Log of Borehole BH1

Project No. SP8191

Drawing No. 2

Project: Geotechnical Investigation / Slope Stability Analysis

Sheet No. 1 of 1

Location: King Street, Bolton, ON

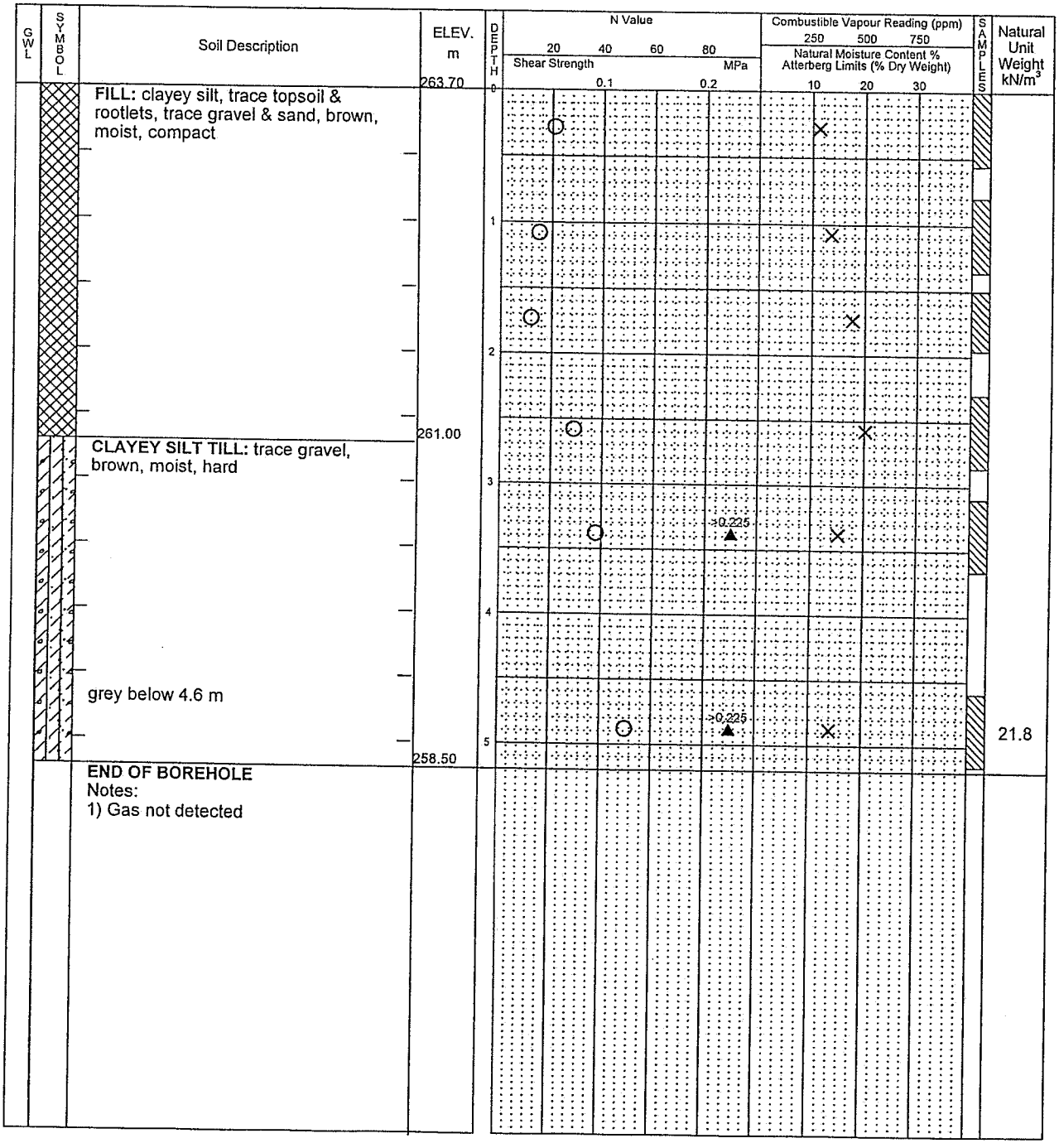
Date Drilled: October 6, 2008

Drill Type: Solid Stem Augers

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test
Sensitivity
Piezometric Water Level

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



S & P Shaheen & Peaker Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	dry	open

Borehole BH1

Log of Borehole BH2

Project No. SP8191

Project: Geotechnical Investigation / Slope Stability Analysis

Location: King Street, Bolton, ON

Drawing No. 3

Sheet No. 1 of 1

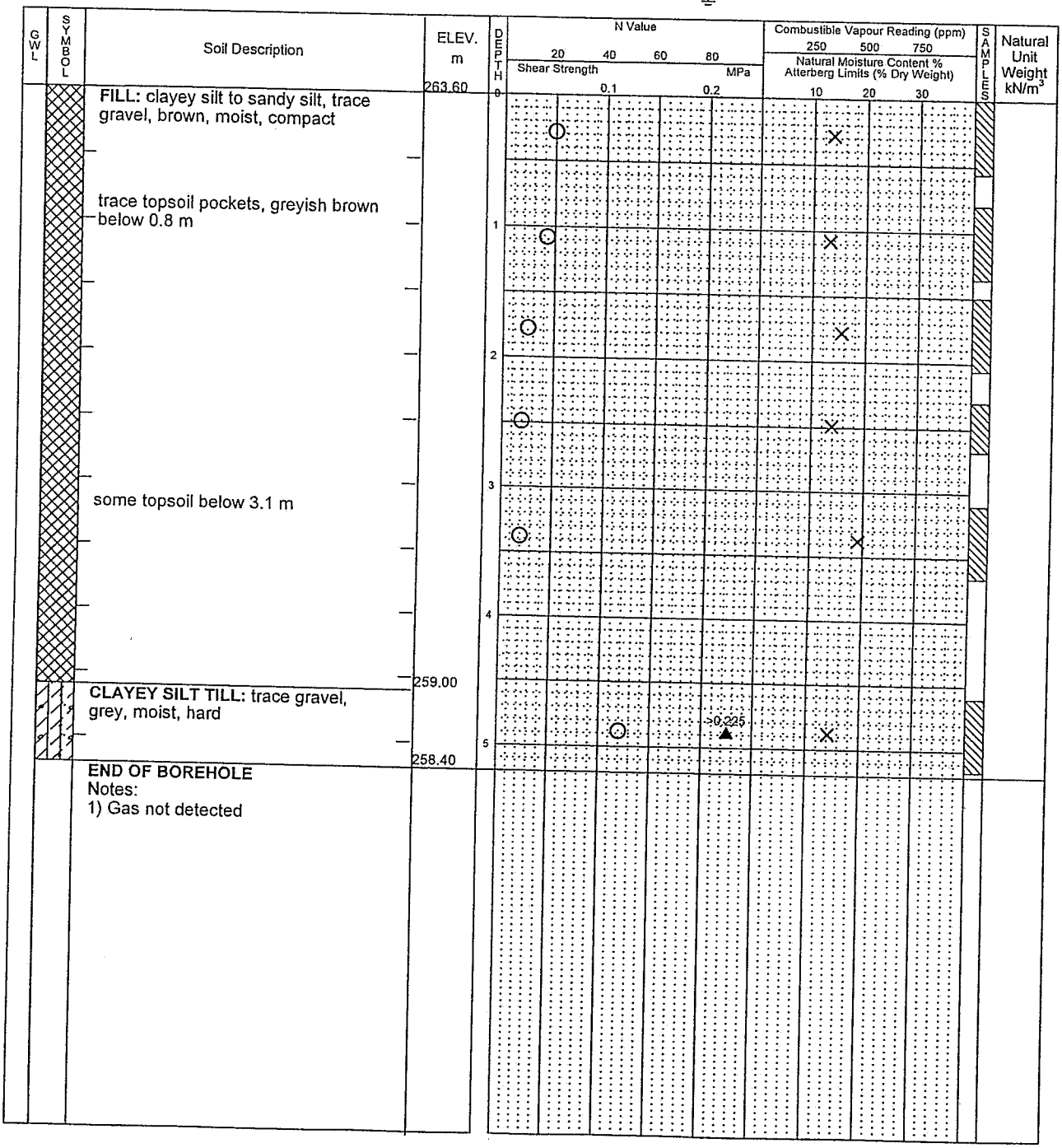
Date Drilled: October 6, 2008

Drill Type: Solid Stem Augers

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test
Sensitivity
Piezometric Water Level

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



S & P

Shaheen & Peaker
Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	dry	open

Borehole BH2

Log of Borehole BH3

Project No. SP8191

Project: Geotechnical Investigation / Slope Stability Analysis

Location: King Street, Bolton, ON

Drawing No. 4

Sheet No. 1 of 1

Date Drilled: October 6, 2008

Drill Type: Solid Stem Augers

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test
Sensitivity
Piezometric Water Level

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength (MPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		FILL: clayey silt to sandy silt, trace gravel, brown, moist, compact	263.80	0				
		very moist below 2.3 m		1				
		mixed with topsoil below 3.1 m		2				
				3				
				4				
		CLAYEY SILT TILL: trace gravel, grey, moist, hard	259.20	5	0.225			20.6
		END OF BOREHOLE Notes: 1) Gas not detected	258.60					

N Value: 20 40 60 80
Shear Strength: 0.1 0.2 MPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

S & P

Shaheen & Peaker
Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	dry	open

Borehole BH3

Log of Borehole BH4

Project No. SP8191

Drawing No. 5

Project: Geotechnical Investigation / Slope Stability Analysis

Sheet No. 1 of 1

Location: King Street, Bolton, ON

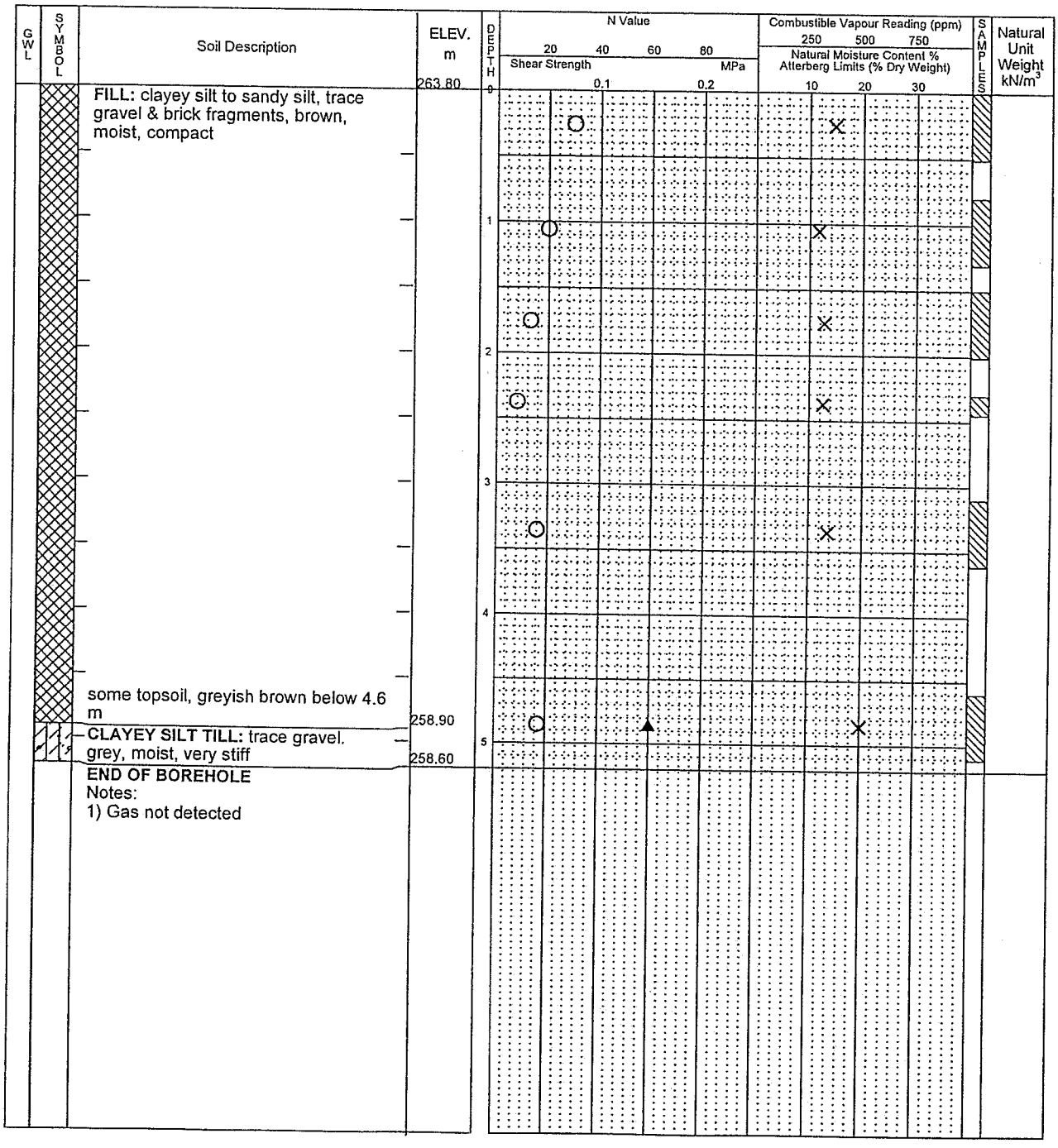
Date Drilled: October 6, 2008

Drill Type: Solid Stem Augers

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test
Sensitivity
Piezometric Water Level

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



S & P Shaheen & Peaker Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	dry	open

Borehole BH4

Log of Borehole BH5

Project No. SP8191

Project: Geotechnical Investigation / Slope Stability Analysis

Location: King Street, Bolton, ON

Drawing No. 6

Sheet No. 1 of 1

Date Drilled: October 6, 2008

Drill Type: Solid Stem Augers

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test
Shelby Tube ■
Field Vane Test ✚
Sensitivity S
Piezometric Water Level ▼

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit ⊢○⊣
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength (MPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		FILL: clayey silt, trace sand & gravel, greyish brown, moist, compact	263.80	0	N Value: 20 40 60 80; Shear Strength: 0.1 0.2 MPa; Combustible Vapour Reading (ppm): 250 500 750; Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30			
		loose below 2.3 m		1				
		mixed with topsoil, grey below 3.1 m		2				
		CLAYEY SILT TILL: trace gravel, greyish brown, moist, hard	260.40	3				
		grey below 4.6 m		4				
		END OF BOREHOLE	258.60	5	>0.225			20.7

Notes:
1) Gas not detected

S & P Shaheen & Peaker Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	dry	open

Borehole BH5

Log of Borehole BH6

Project No. SP8191

Drawing No. 7

Project: Geotechnical Investigation / Slope Stability Analysis

Sheet No. 1 of 1

Location: King Street, Bolton, ON

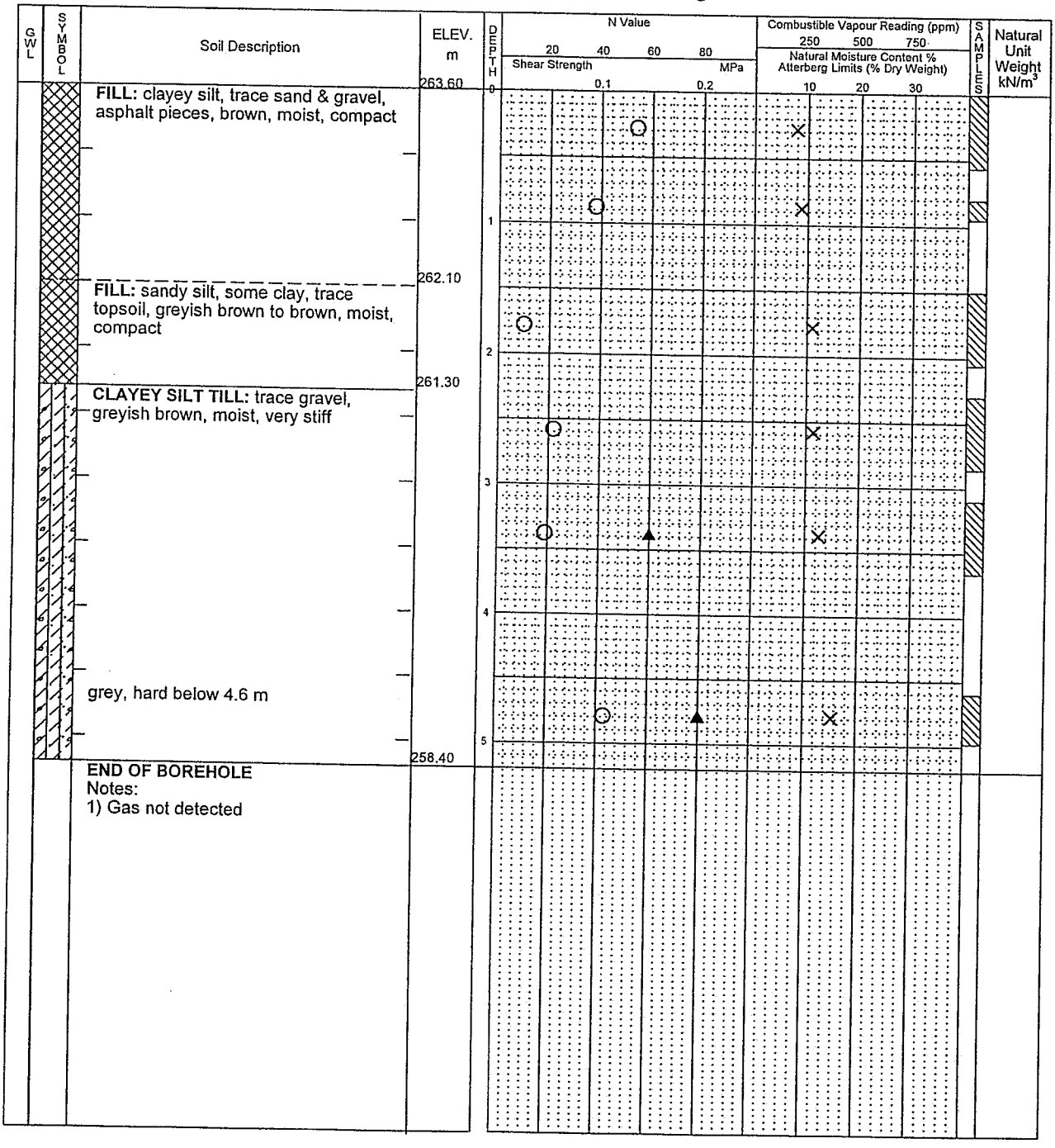
Date Drilled: October 6, 2008

Drill Type: Solid Stem Augers

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test
Sensitivity
Piezometric Water Level

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



S & P Shaheen & Peaker Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	dry	open

Borehole BH6

Log of Borehole BH7

Project No. SP8191

Drawing No. 8

Project: Geotechnical Investigation / Slope Stability Analysis

Sheet No. 1 of 1

Location: King Street, Bolton, ON

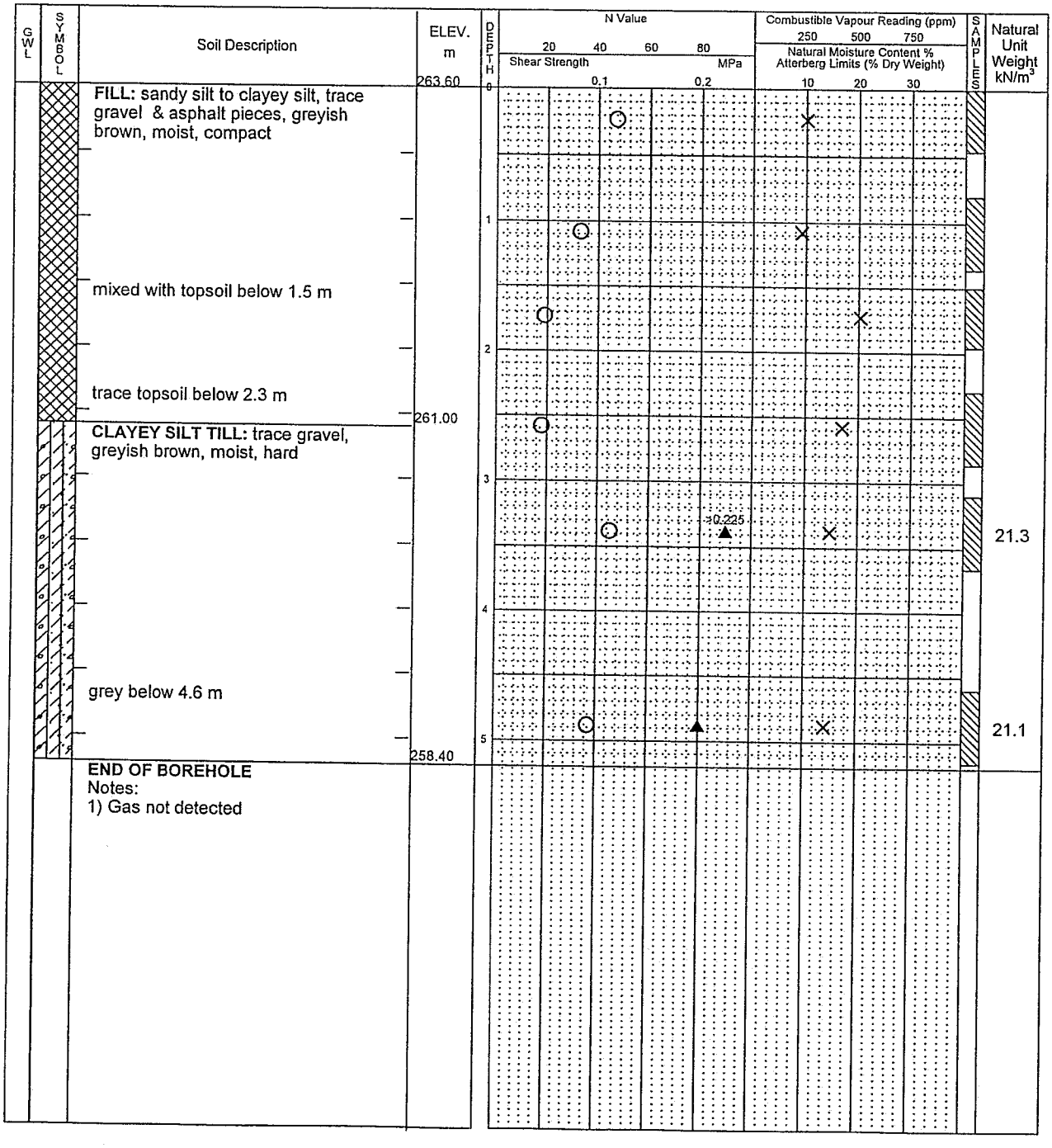
Date Drilled: October 6, 2008

Drill Type: Solid Stem Augers

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test
Shelby Tube ■
Field Vane Test ✚
Sensitivity S
Piezometric Water Level ▼

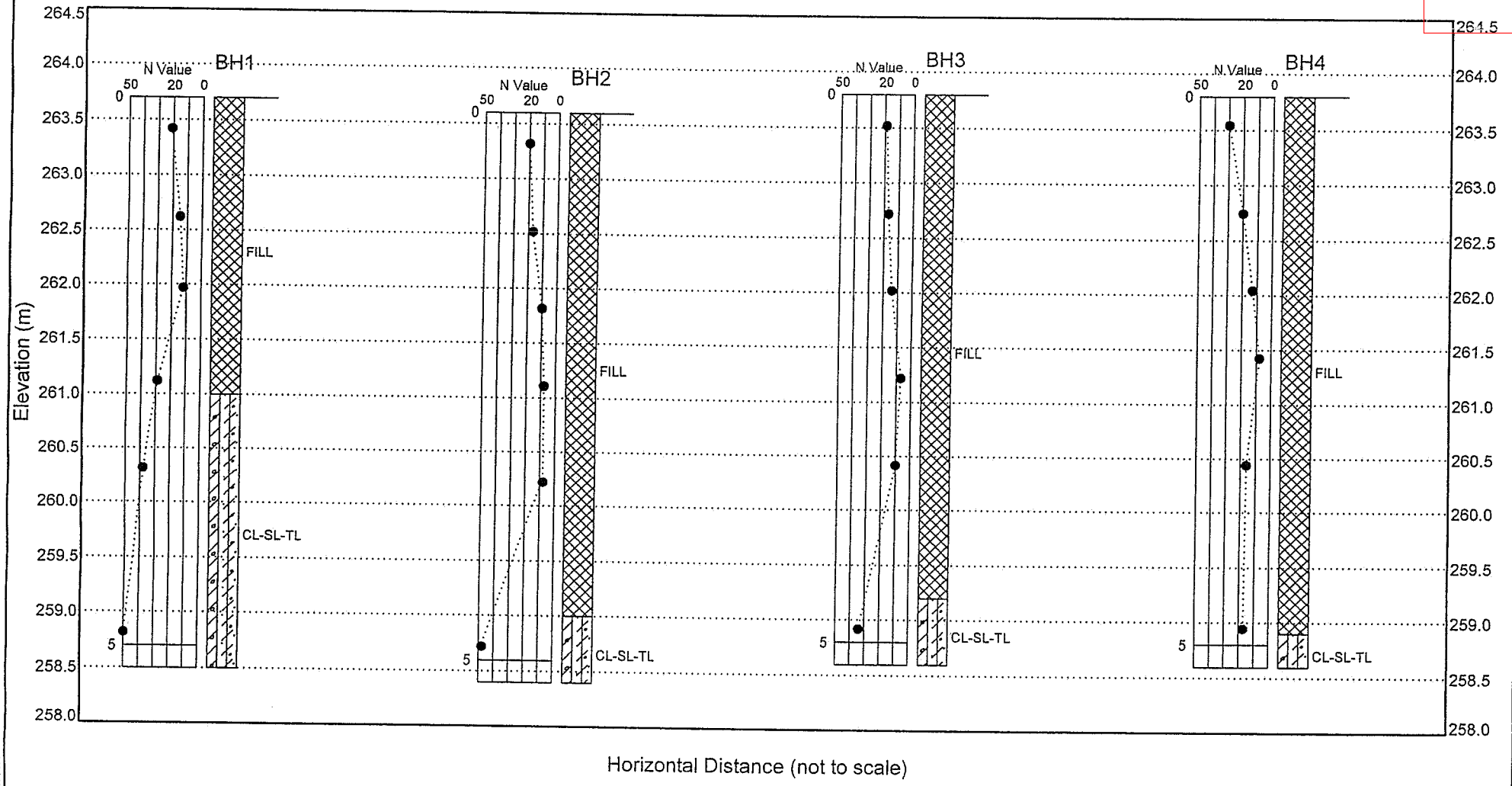
Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit |—○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲



S & P Shaheen & Peaker Consulting Engineers

Time	Water Level (m)	Depth to Cave (m)
At completion	dry	open

Borehole BH7



Borehole	North	East	Elev.	Depth
BH1			263.7	5.2
BH2			263.6	5.2
BH3			263.8	5.2
BH4			263.8	5.2

SUBSURFACE PROFILE

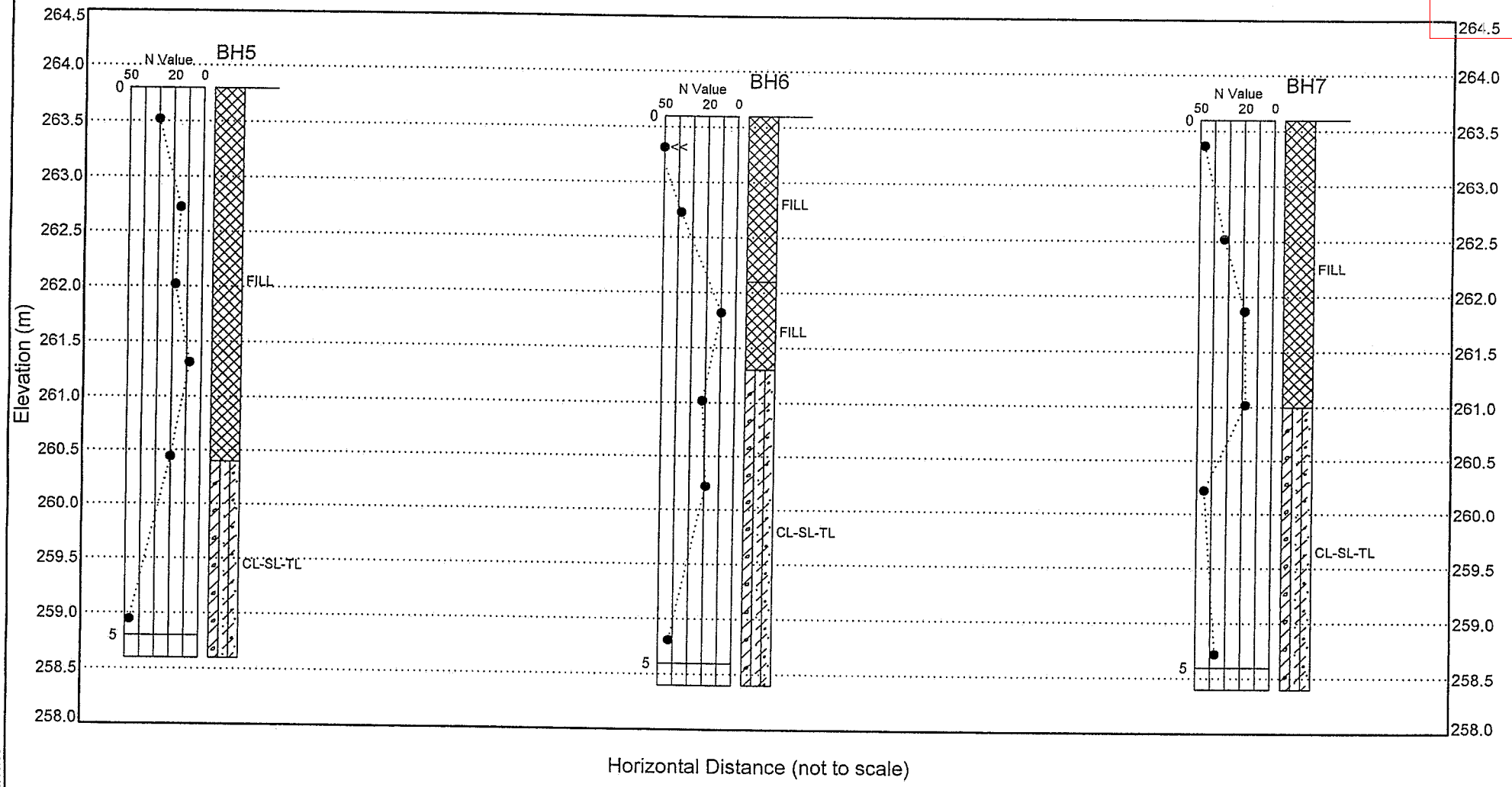
SHAHEEN & PEAKER LTD.

Geotechnical Investigation / Slope Stability Analysis

King Street, Bolton, ON

Project No.	Date	Drawing No.
SP8191	Oct 08	9

FNC_FZ SP8191LOG.GPJ FAGWGN01.GDT 10/10/08



Borehole	North	East	Elev.	Depth
BH5			263.8	5.2
BH6			263.6	5.2
BH7			263.6	5.2

SUBSURFACE PROFILE

SHAHEEN & PEAKER LTD.

Geotechnical Investigation / Slope Stability Analysis

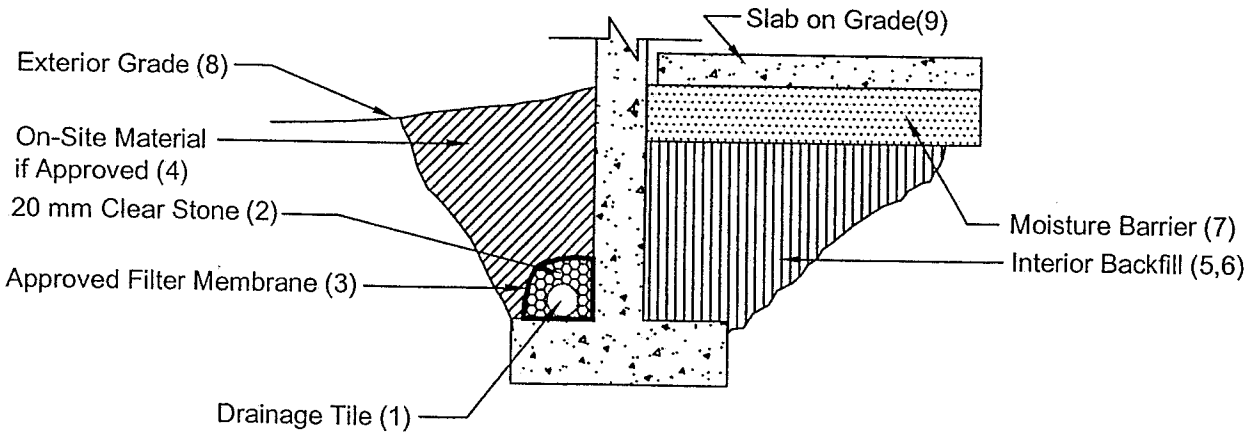
King Street, Bolton, ON

Project No.	Date	Drawing No.
SP8191	Oct 08	10

FNC_FZ_SP8191LOG.GPJ FAGWGN01.GDT 10/10/08

Project: SP8191

Drawing No. 11



EXTERIOR FOOTING

Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. The on-site material, if approved, can be used as backfill.
5. The interior fill may be any clean non-organic soil which can be compacted to the specified density in this confined space.
6. Do not use heavy compaction equipment within 450 mm (18") of the wall. Do not fill or compact within 1.8 m (6') of the wall unless fill is placed on both sides simultaneously.
7. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
8. Exterior grade to slope away from building.
9. Slab on grade should not be structurally connected to the wall or footing.
10. Review the geotechnical report for specific details.

DRAINAGE AND BACKFILL RECOMMENDATIONS
Slab on Grade Construction Without Underfloor Drainage

(not to scale)

APPENDIX A: LIMITATIONS OF REPORT

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to Shaheen & Peaker at the time of preparation. Unless otherwise agreed in writing by Shaheen & Peaker, it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the testhole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the testhole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of testholes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Shaheen & Peaker accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time. Any user of this report specifically denies any right to claims against the Consultant, Sub-Consultants, their officers, agents and employees in excess of the fee paid for professional services.

shaheen & peaker

A Division of Coffey Geotechnics, Inc.

shaheen & peaker
consulting engineers
20 Meteor Drive
Toronto, Ontario, M9W 1A4
T: 416.213.1255
F: 416.213.1260
info@shaheenpeaker.ca

Project: SP8191

October 30, 2008

Candevcon Limited
9358 Goreway Drive
Brampton, Ontario
L6P 0M7
Attention: Mr. Syed

Dear Sir:

Re: Proposed Warehouse Building
8112 King Street, Bolton, Ontario

Further to our telephone discussion this morning, the bearing values at different depths and the corresponding founding elevations at the borehole locations are give below on Table 1.

Table 1: Bearing Pressure & Founding Levels of Caissons

BH No.	Material	Bearing Capacity at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Depth below Existing Ground (m)	Founding Level At or Below Elevation (m)	Note
BH1	Clayey silt till	300	630	2.9	260.8	
		600	850	3.3	260.4	
		750	1050	4.6	259.1	
BH2	Clayey silt till	600	850	4.8	258.8	
BH3	Clayey silt till	600	850	4.8	259.0	
BH4	Clayey silt till	300	450	5.0	258.8	
		600	850	below 6.0*	below 257.8*	
BH5	Clayey silt till	300	450	3.7	260.1	
		600	850	4.8	259.0	
BH6	Clayey silt till	300	450	2.6	261.0	
		600	850	4.8	258.8	
BH7	Clayey silt till	300	450	2.9	261.2	
		600	850	3.3	260.3	

* To be confirmed in the field.

We trust that the information contained in this letter is satisfactory. Should you have any questions, please do not hesitate to contact this office.

Yours truly,

SHAHEEN & PEAKER, A division of Coffey Geotechnics Inc.

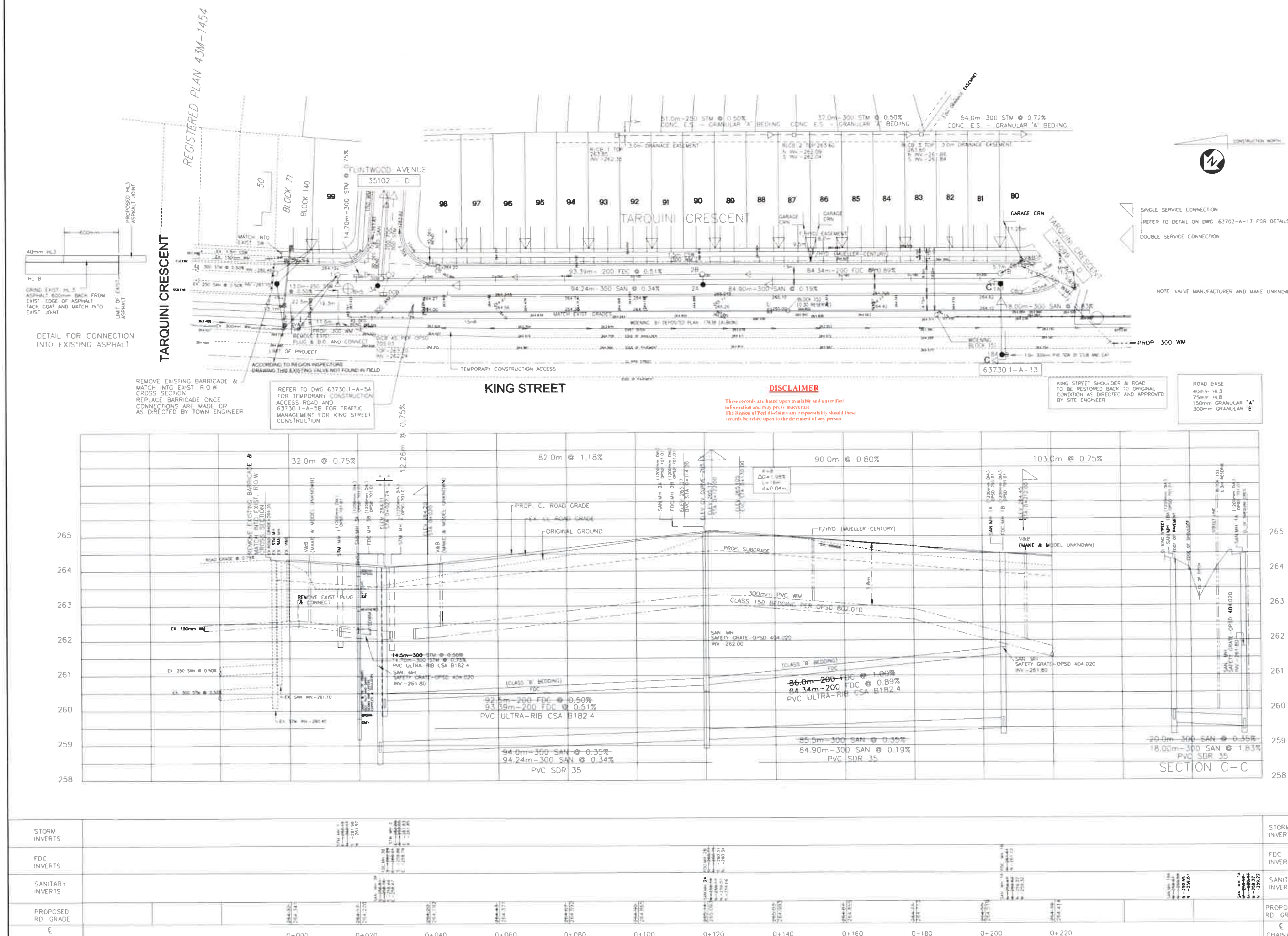
Atka Sangar, M.Eng.

Shabbir Bandukwala, M.Eng., P.Eng.

Attachment D: Servicing Plan and Profiles

TOWN OF CALEDON
PLANNING
RECEIVED

Jun 15, 2020



DISCLAIMER

These records are based upon available and unverified information and may prove inaccurate.
The Region of Peel disclaims any responsibility should these records be relied upon to the detriment of any person.

KEY MAP

GENERAL NOTES

1. STORM SEWERS, SERVICES, AND APPURTENANCES, ROADWAYS, SIDEWALKS, WALKWAYS, STREETLIGHTS, ETC. SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE TOWN OF CALEDON.
2. SANITARY SEWERS, SERVICES, AND APPURTENANCES SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE REGION OF PEEL.
3. ALL WATERMAIN, SERVICES, AND APPURTENANCES SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS OF THE REGION OF PEEL.
4. THE STANDARD SPECIFICATIONS AND DRAWINGS OF THE TOWN OF CALEDON AND THE REGION OF PEEL SHALL BE APPLICABLE TO ALL WORKS UNDER THEIR RESPECTIVE JURISDICTION. IN THE EVENT THAT THE STANDARD SPECIFICATIONS AND DRAWINGS OF THE TOWN OF CALEDON OR THE REGION OF PEEL DO NOT COVER A PARTICULAR ITEM SHOWN OR IMPLIED ON THE PROJECT DRAWINGS TO BE CONSTRUCTED AS PART OF THE WORKS, THE STANDARD SPECIFICATIONS AND DRAWINGS OF THE ONTARIO PROVINCIAL STANDARD SPECIFICATIONS AND DRAWINGS SHALL APPLY.
5. FOR GENERAL NOTES AND CONSTRUCTION DETAILS REFER TO DRAWINGS 63730.1-A-17 TO TO A-21
6. FOR TYPICAL ROAD CROSS-SECTION AND ROAD BASE DETAILS REFER TO DETAIL ON DRAWING 63730.1-A-17 TO A-18
7. BACKFILL AROUND MANHOLES TO BE SAND FILLED AND FLOODED TO ACHIEVE REQUIRED COMPACTION SPECIFICATIONS.
8. ALL WATERMAINS PLACED WITHIN ENGINEERING FILL AREAS SHALL BE INSTALLED WITH RESTRAINING JOINTS TO THE SATISFACTION OF THE REGION OF PEEL.
9. IN LOCATIONS WHERE THERE IS A VERTICAL DIFFERENCE OF THE F.D.C. IN RELATION TO THE SANITARY SEWER, THE LOWER SECTION OF THE TRENCH OF THIS ZONE MUST BE BACKFILLED WITH COMPACTED SAND AND FLOODED PRIOR TO PLACEMENT OF BACKFILL. IN AREAS WHERE GROUNDWATER MOVEMENT IS EXPECTED IN THE SAND FILL MANTLE, A SEEPAGE COLLAR SHOULD BE PROVIDED. ALTERNATELY, IF THE SEWER BEDDING SUBGRADE CONSISTS OF SILTY CLAY TILL WITH NO GROUNDWATER SEEPAGE EVIDENT AT THE TIME OF EXCAVATION, THE LOWER ZONE OF THE VERTICAL TRENCH CAN BE BACKFILLED WITH HIGH PERFORMANCE BEDDING STONE.

NO	BY	DATE	REVISION	CONS. CHECKED	TOWN APPR.
1	[illegible]	[illegible]	FIRST SUBMISSION		
2	[illegible]	[illegible]	SECOND SUBMISSION/ISSUED FOR TENDER		
3	[illegible]	[illegible]	THIRD SUBMISSION		
4	[illegible]	[illegible]	FOURTH SUBMISSION		
5	[illegible]	[illegible]	FIFTH SUBMISSION		
6	[illegible]	[illegible]	AS-CONSTRUCTED		

APPROVED FOR CONSTRUCTION

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY

THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO

DATE: ____________ APPROVED BY: ____________
H. MUNTZ, P.ENG
Town Engineer

BENCH MARK: ELEVATIONS SHOWN HEREON ARE GEODETIC REFERRED TO TOWN OF CALEDON BENCH MARK
No 758057 ELEVATION=251.929m
BENCH MARK LOCATED RED BRICK BUILDING (ELLWOOD MEMORIAL PUBLIC SCHOOL) ON EAST SIDE OF HWY 50 0.8KM SOUTH OF JUNCTION OF HWY 50 AND KING STREET IN THE TOWN OF CALEDON (BOLTON), 55.3M NORTH OF ELLWOOD DRIVE AND 104M EAST OF CENTRELINE OF HWY 50. TABLET IS SET HORIZONTALLY IN WEST FACE OF CONCRETE FOUNDATION OF GYMNASIUM 1.7M NORTH OF SOUTHWEST OF CORNER AND 17CM BELOW BRICK WORK

AS-CONSTRUCTED DRAWINGS PREPARED BY CALDER ENGINEERING LTD (REVISION #6 DATED APRIL 11, 2007)

PROJECT NAME
VINCOS CORPORATION

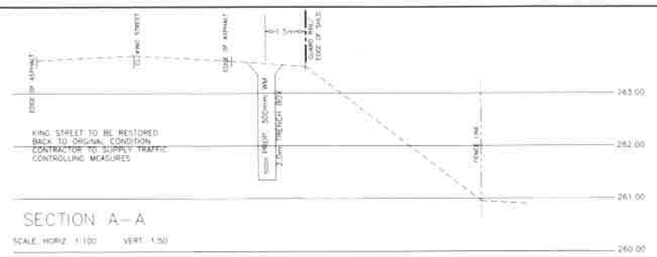
CONSULTANT
Aquafor Beech Limited
14 ABACUS ROAD, BRAMPTON, ONTARIO L6T 5B7 905-794-2361

REGION OF PEEL
T-89038C

THE CORPORATION OF THE
TOWN OF CALEDON

TARQUINI CRESCENT
STA 0+000 to STA 0+220

SCALE HORIZ 1:500	VERT 1:50	PROJECT No 63730.1
DESIGNED BY D HAY	DRAWN BY:	DRAWING No 35098 - D
CHECKED BY	DATE JAN /03	



SECTION A–A

SCALE: HORIZ. 1:100 VERT. 1:50

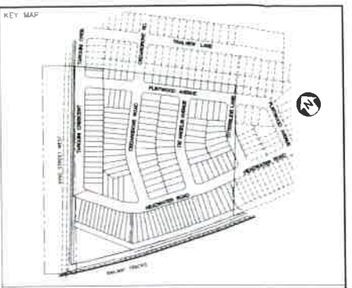
GENERAL NOTES

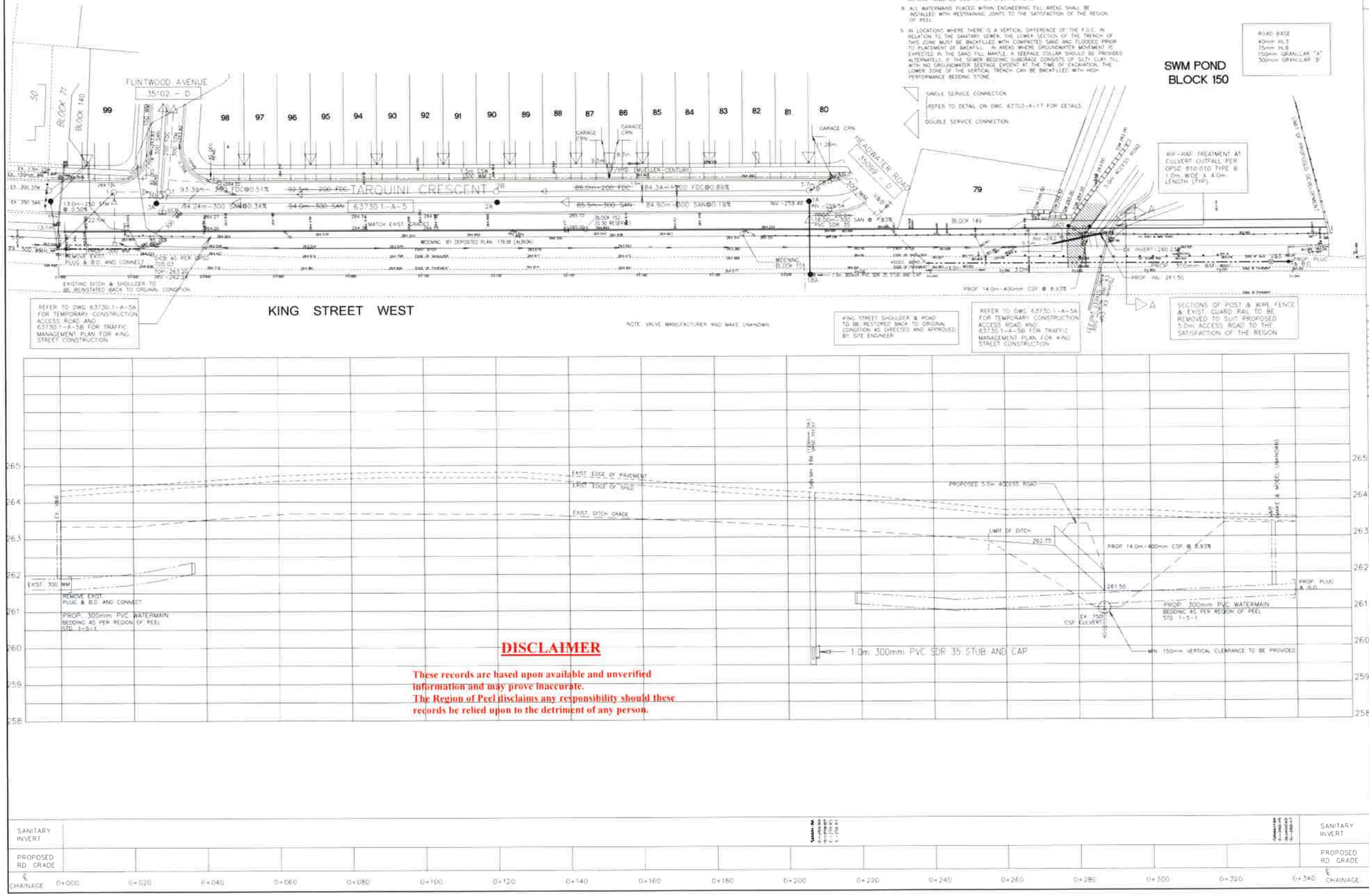
1. STORM SEWERS, SERVICES, AND APPURTENANCES, ROADWAYS, SIDEWALKS, WALKWAYS, STREETLIGHTS, ETC. SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE TOWN OF CALEDON.
2. SANITARY SEWERS, SERVICES, AND APPURTENANCES SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE REGION OF PEEL.
3. ALL WATERMAIN, SERVICES, AND APPURTENANCES SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS OF THE REGION OF PEEL.
4. THE STANDARD SPECIFICATIONS AND DRAWINGS OF THE TOWN OF CALEDON AND THE REGION OF PEEL SHALL BE APPLICABLE TO ALL WORKS UNDER THEIR RESPECTIVE JURISDICTION. IN THE EVENT THAT THE STANDARD SPECIFICATIONS AND DRAWINGS OF THE TOWN OF CALEDON OR THE REGION OF PEEL DO NOT COVER A PARTICULAR ITEM SHOWN OR IMPLIED ON THE PROJECT DRAWINGS TO BE CONSTRUCTED AS PART OF THE WORKS THE STANDARD SPECIFICATIONS AND DRAWINGS OF THE ONTARIO PROVINCIAL STANDARD SPECIFICATIONS AND DRAWINGS SHALL APPLY.
5. FOR GENERAL NOTES AND CONSTRUCTION DETAILS REFER TO DRAWINGS 637301–A–17 TO A–21.
6. FOR TYPICAL ROAD CROSS–SECTION AND ROAD BASE DETAILS REFER TO DETAIL ON DRAWING 637301–A–17 TO A–18.
7. BACKFILL AROUND MANHOLES TO BE SAND FILLED AND FLOODED TO ACHIEVE REQUIRED COMPACTION SPECIFICATIONS.
8. ALL WATERMAINS PLACED WITHIN ENGINEERING FILL AREAS SHALL BE INSTALLED WITH RESTRAINING JOINTS TO THE SATISFACTION OF THE REGION OF PEEL.
9. IN LOCATIONS WHERE THERE IS A VERTICAL DIFFERENCE OF THE F.G.E. IN RELATION TO THE SANITARY SEWER, THE LOWER SECTION OF THE TRENCH OF THIS ZONE MUST BE BACKFILLED WITH COMPACTED SAND AND FLOODED PRIOR TO PLACEMENT OF BACKFILL. IN AREAS WHERE GROUNDWATER MOVEMENT IS EXPECTED IN THE SAND FILL MANTLE, A SEEPAGE COLLAR SHOULD BE PROVIDED ALTERNATELY, IF THE SEWER BEDDING SUBGRADE CONSISTS OF SILTY CLAY TILL WITH NO GROUNDWATER SEEPAGE EVIDENT AT THE TIME OF EXCAVATION, THE LOWER ZONE OF THE VERTICAL TRENCH CAN BE BACKFILLED WITH HIGH PERFORMANCE BEDDING STONE.

SINGLE SERVICE CONNECTION
REFER TO DETAIL ON DWG. 637303–A–17 FOR DETAILS.
DOUBLE SERVICE CONNECTION

ROAD BASE
40mm HL 3
75mm HL8
150mm GRANULAR "A"
500mm GRANULAR "B"

KEY MAP





NO	BY	DATE	REVISION	CONS CHECKED	TOWN APPR'D
1	D.H.	03/05/03	FIRST SUBMISSION	R.J.K	
2	D.H.	04/04/03	SECOND SUBMISSION/ISSUED FOR TENDER	R.J.K	
3	D.H.	04/12/03	THIRD SUBMISSION	R.J.K	
4	D.H.	05/18/05	FOURTH SUBMISSION	R.J.K	
5	D.H.	06/18/05	FIFTH SUBMISSION	R.J.K	
6	A.M.F.	04/11/07	AS–CONSTRUCTED	R.J.K	

APPROVED FOR CONSTRUCTION

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY

THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO

DATE: _____ APPROVED BY: _____
H. MUNTZ, P.ENG
Town Engineer

BENCH MARK

ELEVATIONS SHOWN HEREON ARE GEODETIC REFERRED TO TOWN OF CALEDON BENCH MARK

No 758057 ELEVATION=251.929m

BENCH MARK LOCATED RED BRICK BUILDING (ELLWOOD MEMORIAL PUBLIC SCHOOL) ON EAST SIDE OF HWY 50, 0.89M SOUTH OF JUNCTION OF HWY 50 AND KING STREET IN THE TOWN OF CALEDON (BOLTON), 30.2M NORTH OF ELLWOOD DRIVE AND 10.6M EAST OF CENTRELINE OF HWY 50
TABLET IS SET HORIZONTALLY IN WEST FACE OF CONCRETE FOUNDATION OF STRINGBOARD, 1.7M NORTH OF SOUTHWEST OF CORNER AND 12CM BELOW BRICK WORK

AS–CONSTRUCTED DRAWINGS PREPARED BY CALDER ENGINEERING LTD (REVISION #6 DATED APRIL 11, 2007)

PROJECT NAME
VINCOS CORPORATION

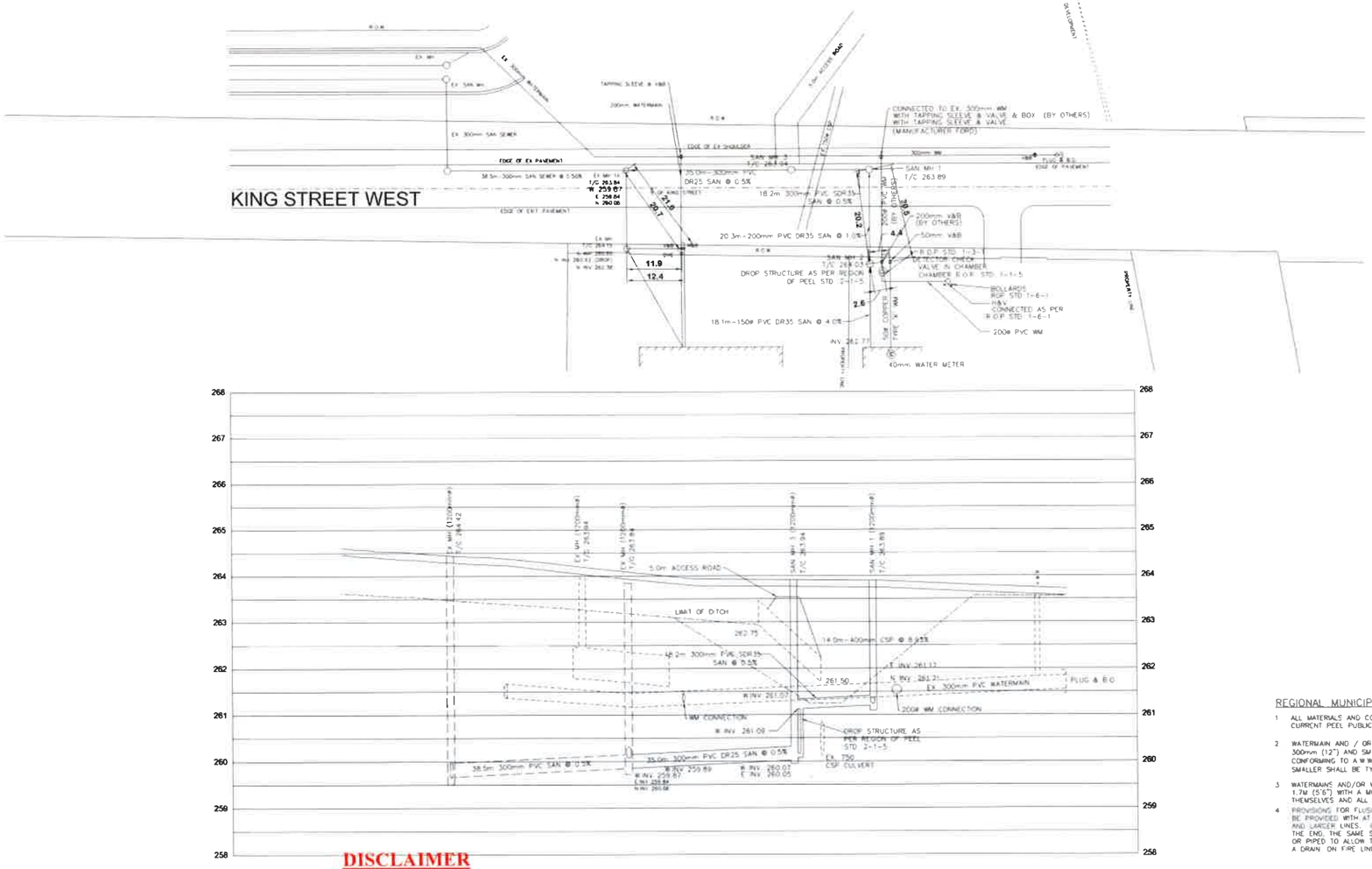
CONSULTANT
Aquafor Beech Limited
14 ABACUS ROAD, BRAMPTON, ONTARIO L6T 5B7 905-794-2367

REGION OF PEEL

THE CORPORATION OF THE
TOWN OF CALEDON

KING STREET – WATERMAIN & SANITARY SEWER EXTENSION
STA 0+000 to STA 0+340

SCALE: HORIZ. 1:500	VERT. 1:50	PROJECT No. 637301
DESIGNED BY: D.HAY	DRAWN BY: D.HAY	DRAWING No. 35105 – D
CHECKED BY:	DATE: JAN./03	



DISCLAIMER

These records are based upon available and unverified information and may prove inaccurate.
The Region of Peel disclaims any responsibility should these records be relied upon to the detriment of any person.

SCALE
H 1:500
V 1:50

LEGEND

- SANITARY SEWER
- MANHOLE
- EXISTING WATER BOX
- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER

BENCHMARK INFO:

REGIONAL MUNICIPALITY OF PEEL BENCH MARK NO 76
ELEVATION 263.51 METRES

NO	BY	REVISION	DATE
8	A	AS CONSTRUCTED	APRIL 30 2014
7	MLS	REVISED AS PER REGION COMMENTS	SEPT 15, 2013
6	MLS	REVISED DUE TO CONFLICT WITH CSP	SEPT 18, 2013
5	AC	REVISED AS PER REGION COMMENTS	AUG 19, 2013
4	MLS	ISSUED FOR CONSTRUCTION	JULY 25, 2013
3	MLS	ISSUED FOR TENDER	JUNE 26, 2013
2	A.C.	REVISED AS PER REGION COMMENTS	MARCH 21, 2013
1	A.C.	ISSUED TO CLIENT FOR REVIEW	FEB 14, 2012

MGM
CONSULTING INC.
Planning, Consulting Engineering & Project Management
610 Bronte Street South
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Milton, Ontario
L9T 0H7
Tel (905) 567-8678
Fax (905) 875-1339
Email mgm@mgm.on.ca
www.mgm.on.ca

REGISTERED PROFESSIONAL ENGINEER
M. L. STAIRS
APRIL 30, 2014
PROVINCE OF ONTARIO

REGIONAL MUNICIPALITY OF PEEL CONSTRUCTION STANDARDS

1. ALL MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO THE CURRENT PEEL PUBLIC WORKS STANDARDS AND SPECIFICATIONS
2. WATERMAIN AND / OR WATER SERVICE MATERIALS UP TO AND INCLUDING 300mm (12") AND SMALLER MUST BE POLYVINYL CHLORIDE (PVC) PIPE, CONFORMING TO A W W A C900 SPECIFICATIONS SIZE 50mm (2") AND SMALLER SHALL BE TYPE 'K' COPPER PIPE
3. WATERMAINS AND/OR WATER SERVICES ARE TO HAVE A MINIMUM COVER 1.7M (5'6") WITH A MINIMUM HORIZONTAL SPACING OF 1.2M (4') FROM THEMSELVES AND ALL OTHER UTILITIES
4. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED WITH AT LEAST A 50MM (2") OUTLET ON 100MM (4") AND LARGER LINES. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE LINE. THEY MUST ALSO BE HOSED OR PIPED TO ALLOW THE WATER TO DRAIN ONTO A PARKING LOT OR DOWN A DRAIN. ON FIRE LINES, FLUSHING OUTLET TO BE 100MM (4") DIAMETER
5. ALL CURB STOPS TO BE 3.0M (10') OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED
6. HYDRANT AND VALVE SET TO REGION STANDARD 1-6-1 DIMENSION A AND B, 0.7M (2') AND 0.9M (3') AND HAVE PUMPER NOZZLE
7. WATERMAINS TO BE INSTALLED TO GRADES AS SHOWN ON APPROVED SITE PLAN. COPY OF GRADE SHEETS MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHERE REQUESTED BY INSPECTOR
8. WATERMAINS MUST HAVE A MINIMUM VERTICAL CLEARANCE OF 0.30M (12") OVER/0.5M (20") UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING
9. ALL PROPOSED WATER PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDANT PRESSURE TESTING AND CHLORINATING FROM EXISTING SYSTEMS
10. ALL LIVE TAPPING AND OPERATION OF REGION WATER VALVES SHALL BE ARRANGED THROUGH THE REGIONAL INSPECTOR AND ASSIGNED OR BY CONTACTING THE OPERATIONS AND MAINTENCE DIVISION

CLIENT
ALLIANCE AGRI-TURF INC.

PROJECT
PROPOSED SANITARY AND WATER SERVICING
8112 KING STREET
BOLTON, ONTARIO

DRAWING TITLE
PROPOSED SERVICING

DRAWN	A G
CHECKED	MLS
SCALE	1:500
DATE	2012-006
PROJECT NUMBER	2012-006
REGION PROJECT NUMBER	C12 304
REFERENCE NUMBER	2012-006-A1
DRAWING NUMBER	51766-D

Attachment E: Single Use Demand Tables

Connection Demand Table

WATER CONNECTION

Connection point [3]			
King Street, North of Tarquini Crecsent			
Pressure zone of connection point		Pressure Zone 5B	
Total equivalent population to be serviced [1]		96 (50 cap/ha)	
Total lands to be serviced		1.92 ha	
Hydrant flow test			
Hydrant flow test location			
King Street (via private hydrant at 8144 King Street)			
	Pressure (kPa)	Flow (in l/s)	Time
Minimum water pressure	296	30.22	10:00 AM
Maximum water pressure	296	52.74	10:00 AM

No.	Water demands		
	Demand type	**Demand**	**Units**
1	Average day flow	0.333	l/s
2	Maximum day flow	0.467	l/s
3	Peak hour flow	1.00	l/s
4	Fire flow [2]	70.87	l/s
Analysis			
5	Maximum day plus fire flow	71.337	l/s

WASTEWATER CONNECTION

Connection point [4]	300mm PVC
Total equivalent population to be serviced [1]	96
Total lands to be serviced	1.92 ha
6 Wastewater sewer effluent (in l/s)	1.728

[1] Please refer to design criteria for population equivencies
[2] Please reference the Fire Underwriters Survey Document
[3] Please specify the connection point ID
[4] Please specify the connection point (wastewater line or manhole ID)
Also, the "total equivalent popopulation to be serviced" and the "total lands to be serviced" should reference the connection point. (The FSR should contain one copy of Site Servicing Plan)

Please include the graphs associated with the hydrant flow test information table
Please provide Professional Engineer's signature and stamp on the demand table
All required calculations must be submitted with the demand table submission.

Attachment F: Fire Flow Demand

WATER SUPPLY FOR PUBLIC FIRE PROTECTION - 1999
FIRE UNDERWRITERS SURVEY

Job No.: 19051
Date: 20/12/2019

8186 KING STREET, BOLTON

1. Required Fire Flow Calculation

F=220C(A)^0.5

F= the required fire flow in litres per minute
C= coefficient related to the type of construction
= 1.5 for wood frame construction (structure essentially all combustible)
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
= 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls)
= 0.6 for fire resistive construction (fully protected frame, floors, roof)
A= the total floor area in square metres in the buidling being considered

F= 4839 l/min

Type of Construction = Non- Combustible
C= 1.5

Total GFA = 215 m²

2. Determine if occupancy type has a low contents fire hazard or high contents fire hazard.

Contents Classification	
1) Non-Combustible	-25%
2) Limited Combustible	-15%
3) Combustible	0%
4) Free Burning	15%
5) Rapid Burning	25%

F= 3675 l/min

Per Appendix A - Occupancy is Considered Low Fire Hazard

1	-25%
0	0%
0	0%
0	0%
0	0%
Total	-25%

3. Automatic Sprinkler Protection Reduction

Sprinkler Reduction Ratings	
1) Sprinkler System Conforms to NFPA 13 and other NFPA Sprinkler Standards	-30%
2) Water supply standard for both the sprinkler system and fire department hose lines	-10%
3) Fully supervised sprinkler system	-5%

F= 0 l/min

Sprinkler Reduction Ratings - Building is not Sprinklered

0	0%
0	0%
0	0%
Total	0%

4. Exposure to adjacent buildings

Separation	Charge
1) 0 to 3.0m	25%
2) 3.1 to 10.0m	20%
3) 10.1 to 20.0m	15%
4) 20.1 to 30.0m	10%
5) 30.1 to 45.0m	5%

The total % shall be the sum of the % of all sides but shall not exceed 75%.

F= 552 l/min

Number of Walls within Exposure Limits

0	0%
0	0%
1	15%
0	0%
0	0%
Total	15%

THEREFORE TOTAL FIRE FLOW REQUIRED = 4252 l/min
or 70.87 l/s

Attachment G: Hydrant Flow Test

FCFP
BE PROTECTED
Sprinkler • Fire Alarm • Security

FLOW TEST RESULTS

Form SD-008 RevDate: April 28, 2015

Date of Test: Oct-9th-2019 **Time:** 10 AM

Location: 62 Tarquini Crescent - Bolton

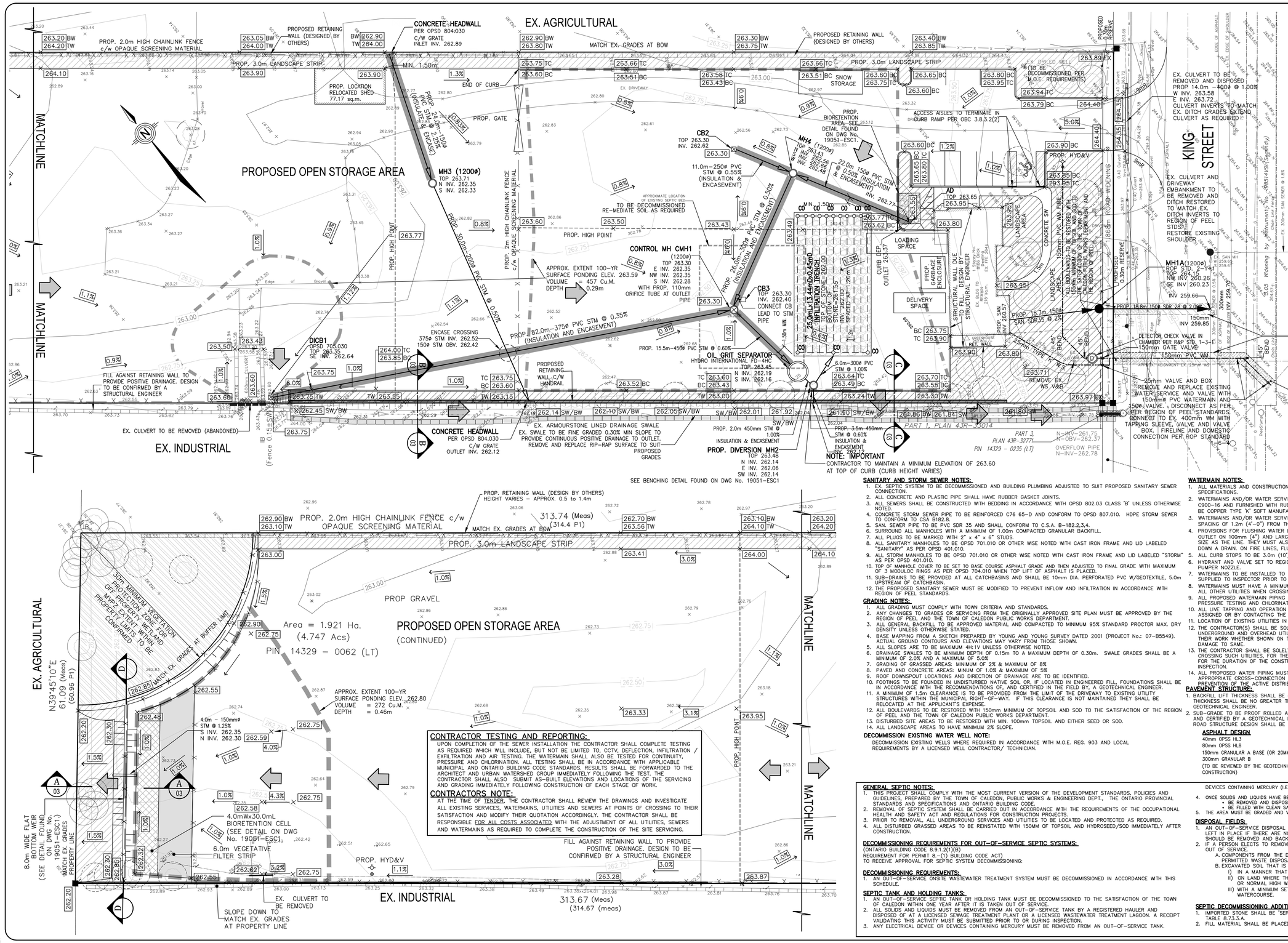
Main Size: 300mm PVC **Static:** 45 **PSI**

Number of Openings	Size of Openings	Pitot PSI	Flow GPM	Residual PSI
1	1.75	29	479	43
2	1.75	22-22	836	43
3				
4				

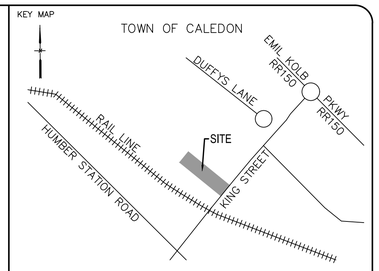
Witnessed By: Dufferin

Attachment H: Site Servicing and Grading Plan

GREENLAND®



KEY MAP



NOTES:
1. VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION.
2. SURVEY PREPARED BY: CALDER ENGINEERING & YOUNG & YOUNG SURVEYING INC. O.L.S. DATED: NOVEMBER 08, 2019.
3. DO NOT SCALE DRAWINGS.
4. REPORT ALL ERRORS, OMISSIONS OR DISCREPANCIES TO URBAN WATERSHED GROUP LIMITED IMMEDIATELY UPON DISCOVERY.
5. USE ONLY LATEST REVISED DRAWINGS OR THOSE THAT ARE MARKED "ISSUED FOR CONSTRUCTION".
6. THE DRAWINGS ARE THE PROPERTY OF URBAN WATERSHED GROUP LIMITED AND MUST BE RETURNED ON COMPLETION OF THE PROJECT. ANY UNAUTHORIZED USE OF THIS PLAN IS PROHIBITED.

LEGAL DESCRIPTION

PART OF LOT 11, CONCESSION 5 (ALBION)

AS IN RO866564

TOWN OF CALEDON, REGIONAL MUNICIPALITY OF PEEL

RETAINING WALL NOTES:
1. ALL RETAINING WALLS OVER 0.60m HIGH TO HAVE FENCE/GUARD RAILS IN ACCORDANCE WITH THE ONTARIO BUILDING CODE AND SHALL BE DESIGNED BY A STRUCTURAL ENGINEER.

SANITARY AND STORM SEWER NOTES:
1. EX. SEPTIC SYSTEM TO BE DECOMMISSIONED AND BUILDING PLUMBING ADJUSTED TO SUIT PROPOSED SANITARY SEWER CONNECTION.
2. ALL CONCRETE AND PLASTIC PIPE SHALL HAVE RUBBER GASKET JOINTS.
3. ALL SEWERS SHALL BE CONSTRUCTED WITH BEDDING IN ACCORDANCE WITH OPSD 802.03 CLASS 'B' UNLESS OTHERWISE NOTED.
4. CONCRETE STORM SEWER PIPE TO BE REINFORCED C76 65-D AND CONFORM TO OPSD 807.010. HDPE STORM SEWER TO CONFORM TO CSA B182.8.
5. SAN. SEWER PIPE TO BE PVC SDR 35 AND SHALL CONFORM TO C.S.A. B-182.2,3,4.
6. SURROUND ALL MANHOLES WITH A MINIMUM OF 1.00m COMPACTED GRANULAR BACKFILL.
7. ALL STORM MANHOLES TO BE EQUIPPED WITH 2" x 4" STUDS.
8. ALL SANITARY MANHOLES TO BE OPSD 701.010 OR OTHER WISE NOTED WITH CAST IRON FRAME AND LID LABELED "SANITARY" AS PER OPSD 401.010.
9. ALL STORM MANHOLES TO BE OPSD 701.010 OR OTHER WISE NOTED WITH CAST IRON FRAME AND LID LABELED "STORM" AS PER OPSD 401.010.
10. TOP OF MANHOLE COVER TO BE SET TO BASE COURSE ASPHALT GRADE AND THEN ADJUSTED TO FINAL GRADE WITH MAXIMUM OF 3 MODULOC RINGS AS PER OPSD 704.010 WHEN TOP LIFT OF ASPHALT IS PLACED.
11. SUB-DRAINS TO BE PROVIDED AT ALL CATCHBASINS AND SHALL BE 10mm DIA. PERFORATED PVC W/GEOTEXTILE, 5.0m UPSTREAM OF CATCHBASIN.
12. THE PROPOSED SANITARY SEWER MUST BE MODIFIED TO PREVENT INFLOW AND INFILTRATION IN ACCORDANCE WITH REGION OF PEEL STANDARDS.

GRADING NOTES:
1. ALL GRADING MUST COMPLY WITH TOWN CRITERIA AND STANDARDS.
2. ANY CHANGES TO GRADES OR SERVICING FROM THE ORIGINALLY APPROVED SITE PLAN MUST BE APPROVED BY THE REGION OF PEEL AND THE TOWN OF CALEDON PUBLIC WORKS DEPARTMENT.
3. ALL GENERAL BACKFILL TO BE APPROVED MATERIAL AND COMPACTED TO MINIMUM 95% STANDARD PROCTOR MAX. DRY DENSITY UNLESS OTHERWISE STATED.
4. BASE MAPPING FROM A SKETCH PREPARED BY YOUNG AND YOUNG SURVEY DATED 2001 (PROJECT No.: 07-B5549). ACTUAL GROUND CONTOURS AND ELEVATIONS MAY VARY FROM THOSE SHOWN.
5. ALL SLOPES ARE TO BE MAXIMUM 4H:1V UNLESS OTHERWISE NOTED.
6. DRAINAGE SWALES TO BE MINIMUM DEPTH OF 0.15m TO A MAXIMUM DEPTH OF 0.30m. SWALE GRADES SHALL BE A MINIMUM OF 2.0% AND A MAXIMUM OF 5.0%.
7. GRADING OF GRASSED AREAS: MINIMUM OF 2% & MAXIMUM OF 8%
8. PAVED AND CONCRETE AREAS: MINUM OF 1.0% & MAXIMUM OF 5%
9. ROOF DOWNSPOUT LOCATIONS AND DIRECTION OF DRAINAGE ARE TO BE IDENTIFIED.
10. FOOTINGS TO BE FOUNDED IN UNDISTURBED NATIVE SOIL OR, IF LOCATED IN ENGINEERED FILL, FOUNDATIONS SHALL BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF, AND CERTIFIED IN THE FIELD BY, A GEOTECHNICAL ENGINEER.
11. A MINIMUM OF 1.5m CLEARANCE IS TO BE PROVIDED FROM THE LIMIT OF THE DRIVEWAY TO EXISTING UTILITY STRUCTURES WITHIN THE MUNICIPAL RIGHT-OF-WAY. IF THIS CLEARANCE IS NOT MAINTAINED THEY SHALL BE RELOCATED AT THE APPLICANT'S EXPENSE.
12. ALL BOULEVARDS TO BE RESTORED WITH 150mm MINIMUM OF TOPSOIL AND SOD TO THE SATISFACTION OF THE REGION OF PEEL AND THE TOWN OF CALEDON PUBLIC WORKS DEPARTMENT.
13. DISTURBED SITE AREAS TO BE RESTORED WITH MIN. 100mm TOPSOIL AND EITHER SEED OR SOD.
14. ALL LANDSCAPE AREAS TO HAVE MINIMUM 2% SLOPE.

DECOMMISSION EXISTING WATER WELL NOTE:
DECOMMISSION EXISTING WELLS WHERE REQUIRED IN ACCORDANCE WITH M.O.E. REG. 903 AND LOCAL REQUIREMENTS BY A LICENSED WELL CONTRACTOR/ TECHNICIAN.

GENERAL SEPTIC NOTES:
1. THIS PROJECT SHALL COMPLY WITH THE MOST CURRENT VERSION OF THE DEVELOPMENT STANDARDS, POLICIES AND GUIDELINES, PREPARED BY THE TOWN OF CALEDON, PUBLIC WORKS & ENGINEERING DEPT., THE ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS AND ONTARIO BUILDING CODE.
2. REMOVAL OF SEPTIC SYSTEM SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
3. PRIOR TO REMOVAL, ALL UNDERGROUND SERVICES AND UTILITIES TO BE LOCATED AND PROTECTED AS REQUIRED.
4. ALL DISTURBED GRASSED AREAS TO BE REINSTATED WITH 150MM OF TOPSOIL AND HYDROSEED/SOD IMMEDIATELY AFTER CONSTRUCTION.

DECOMMISSIONING REQUIREMENTS FOR OUT-OF-SERVICE SEPTIC SYSTEMS:
(ONTARIO BUILDING CODE 8.9.1.2(1)(B)
REQUIREMENT FOR PERMIT 8--(1) (BUILDING CODE ACT)
TO RECEIVE APPROVAL FOR SEPTIC SYSTEM DECOMMISSIONING:

DECOMMISSIONING REQUIREMENTS:
1. AN OUT-OF-SERVICE ONSITE WASTEWATER TREATMENT SYSTEM MUST BE DECOMMISSIONED IN ACCORDANCE WITH THIS SCHEDULE.

SEPTIC TANK AND HOLDING TANKS:
1. AN OUT-OF-SERVICE SEPTIC TANK OR HOLDING TANK MUST BE DECOMMISSIONED TO THE SATISFACTION OF THE TOWN OF CALEDON WITHIN ONE YEAR AFTER IT IS TAKEN OUT OF SERVICE.
2. ALL SOLIDS AND LIQUIDS MUST BE REMOVED FROM AN OUT-OF-SERVICE TANK BY A REGISTERED HAULER AND DISPOSED OF AT A LICENSED SEWAGE TREATMENT PLANT OR A LICENSED WASTEWATER TREATMENT LAGOON. A RECEIPT VALIDATING THIS ACTIVITY MUST BE SUBMITTED PRIOR TO OR DURING INSPECTION.
3. ANY ELECTRICAL DEVICE OR DEVICES CONTAINING MERCURY MUST BE REMOVED FROM AN OUT-OF-SERVICE TANK.
4. ONCE SOLIDS AND LIQUIDS HAVE BEEN REMOVED, AN OUT-OF-SERVICE TANK MUST:
   - BE REMOVED AND DISPOSED OF AT A LICENSED OR PERMITTED WASTE DISPOSAL GROUND; OR
   - BE FILLED WITH CLEAN SAND, GRAVEL OR OTHER MATERIAL ACCEPTABLE TO THE TOWN OF CALEDON.
5. THE AREA MUST BE GRADED AND VEGETATIVE COVER MUST BE ESTABLISHED.

DISPOSAL FIELDS:
1. AN OUT-OF-SERVICE DISPOSAL FIELD (ALSO KNOWN AS TILE FIELDS, TILE BEDS, FILTER MEDIA BEDS, ETC.) MAY BE LEFT IN PLACE IF THERE ARE NO PLANS TO USE THE AREA FOR OTHER PURPOSES. IF PRESENT, INSPECTION PORTS SHOULD BE REMOVED AND BACKFILLED
2. IF A PERSON ELECTS TO REMOVE AN OUT-OF-SERVICE DISPOSAL FIELD WITHIN ONE YEAR AFTER IT HAS BEEN TAKEN OUT OF SERVICE.
   A. COMPONENTS FROM THE DISTRIBUTION NETWORK MUST BE REMOVED AND DISPOSED OF AT A LICENSED OR PERMITTED WASTE DISPOSAL GROUND; AND
   B. EXCAVATED SOIL THAT IS CONTAMINATED MUST BE SPREAD OR STOCKPILED
      I) IN A MANNER THAT PREVENTS SURFACE RUNOFF AND CONTACT WITH HUMANS,
      II) ON LAND WHERE THE DEPTH OF SOIL IS AT LEAST 0.9 METRES (35.4 INCHES) TO THE BEDROCK OR NORMAL HIGH WATER TABLE, AND
      III) WITH A MINIMUM SETBACK OF 30 METRES (98.4 FEET) FROM A SHORELINE OR SURFACE WATERCOURSE.

SEPTIC DECOMMISSIONING ADDITIONAL NOTES:
1. IMPORTED STONE SHALL BE "SEPTIC" STONE AS DETAILED IN 2006 ONTARIO BUILDING CODE, SENTENCE 8.73.3. (5) AND TABLE 8.73.3.A.
2. FILL MATERIAL SHALL BE PLACED IN LAYERS OF 200 TO 300MM DEPTH AND SHALL BE TRACK COMPACTED.

WATERMAIN NOTES:
1. ALL MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO THE CURRENT PEEL PUBLIC WORKS STANDARDS & SPECIFICATIONS.
2. WATERMAINS AND/OR WATER SERVICE MATERIALS 100mm (4") AND UP TO 300mm (12") TO BE P.V.C. DR18 - C900-16 AND FURNISHED WITH RUBBER GASKETED BELL AND SPIGOT JOINTS. SIZES 50mm (2") AND SMALLER (1") TO BE COPPER TYPE 'K' SOFT MANUFACTURED TO A.S.T.M. SPEC. 888-49.
3. WATERMAINS AND/OR WATER SERVICES ARE TO HAVE A MINIMUM COVER OF 1.7m (5'-6") WITH A MINIMUM HORIZONTAL SPACING OF 1.2m (4'-0") FROM THEMSELVES AND ALL OTHER UTILITIES.
4. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED WITH AT LEAST A 50mm (2") OUTLET ON 100mm (4") AND LARGER LINES. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE LINE. THEY MUST ALSO BE HOSED OR PIPED TO ALLOW THE WATER TO DRAIN ONTO A PARKING LOT OR DOWN A DRAIN. ON FIRE LINES, FLUSHING OUTLET TO BE 100mm (4"O) DIAMETER MINIMUM ON A HYDRANT.
5. ALL CURB STOPS TO BE 3.0m (10') OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED.
6. HYDRANT AND VALVE SET TO REGION STANDARDS 1-6-1 DIMENSION A AND B 0.7m (2') AND 0.9m (3') AND TO HAVE PUMPER NOZZLE.
7. WATERMAINS TO BE INSTALLED TO GRADES AS SHOWN ON APPROVED SITE PLAN. COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHERE REQUESTED BY INSPECTOR.
8. WATERMAINS MUST HAVE A MINIMUM VERTICAL CLEARANCE OF 0.30m (12") OVER AND 0.50m (20") UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING.
9. ALL PROPOSED WATERMAIN PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING EXISTING SYSTEM.
10. ALL LIVE TAPPING AND OPERATION OF REGION WATER VALVES SHALL BE ARRANGED THROUGH THE REGIONAL INSPECTOR ASSIGNED OR BY CONTACTING THE OPERATIONS AND MAINTENANCE DIVISION.
11. LOCATION OF EXISTING UTILITIES IN THE FIELD TO BE ESTABLISHED BY THE CONTRACTOR.
12. THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE FOR LOCATES, EXPOSING, SUPPORTING AND PROTECTING OF ALL UNDERGROUND AND OVERHEAD UTILITIES AND STRUCTURES EXISTING AT THE TIME OF CONSTRUCTION IN THE AREA OF THEIR WORK WHETHER SHOWN ON THESE PLANS OR NOT AND FOR ALL REPAIRS AND CONSEQUENCES RESULTING FROM DAMAGE TO SAME.
13. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE TO GIVE 72 HOURS WRITTEN NOTICE TO THE UTILITIES PRIOR TO CROSSING SUCH UTILITIES, FOR THE PURPOSE OF INSPECTION BY THE CONCERNED UTILITY. THIS INSPECTION WILL BE FOR THE DURATION OF THE CONSTRUCTION, WITH THE CONTRACTOR RESPONSIBLE FOR ALL COSTS ARISING FROM SUCH INSPECTION.
14. ALL PROPOSED WATER PIPING MUST BE ISOLATED THROUGH A TEMPORARY CONNECTION THAT SHALL INCLUDE AN APPROPRIATE CROSS-CONNECTION CONTROL DEVICE, CONSISTENT WITH THE DEGREE OF HAZARD, FOR BACKFLOW PREVENTION OF THE ACTIVE DISTRIBUTION SYSTEM, CONFORMING TO REGION OF PEEL STANDARDS 1-7-7 OR 1-7-8.

PAVEMENT STRUCTURE:
1. BACKFILL LIFT THICKNESS SHALL BE NO GREATER THAN 300MM AND COMPACTED TO MIN 98% SPD OR PER BACKFILL LIFT THICKNESS SHALL BE NO GREATER THAN 300MM AND COMPACTED TO MIN 98% SPD OR PER RECOMMENDATIONS BY THE GEOTECHNICAL ENGINEER.
2. SUB-GRADE TO BE PROOF ROLLED AND CERTIFIED BY A GEOTECHNICAL ENGINEER PRIOR TO THE INSTALLATION SUB-GRADE AND CERTIFIED BY A GEOTECHNICAL ENGINEER PRIOR TO THE INSTALLATION OF ANY GRANULAR MATERIALS. THE FOLLOWING ROAD STRUCTURE DESIGN SHALL BE USED AND CONFIRMED BY A GEOTECHNICAL CONSULTANT, UNLESS OTHERWISE SPECIFIED:

ASPHALT DESIGN	GRAVEL SURFACE DESIGN
40mm OPSS HL3	250mm - 20mm CRUSHER RUN LIMESTONE OR EQUIVALENT
80mm OPSS HL8	400mm - 50mm CRUSHER RUN LIMESTONE OR EQUIVALENT
150mm GRANULAR A BASE (OR 20MM CRUSHED LIMESTONE)	(TO BE REVIEWED BY THE GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTION)
300mm GRANULAR B	
(TO BE REVIEWED BY THE GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTION)	

NO.	DESCRIPTION	BY	DATE
1.	ISSUED FOR SITEPLAN APPROVAL		2020/05/08

REVISIONS

BENCHMARK:

BM = 263.51m

REGIONAL MUNICIPALITY OF PEEL BENCHMARK No. 76
ELEVATION 263.51 METRES

LEGEND:

PROPERTY LINE	PROPOSED HYDRANT & VALVE
EX. TREE	PROPOSED VALVE BOX
x263.99 EXISTING SPOT ELEVATION	PROPOSED DETECTOR CHECK VALVE
263.50 EX. MAJOR CONTOUR	PROPOSED SANITARY MANHOLE
262.75 EX. MINOR CONTOUR	PROPOSED OVERLAND FLOW ROUTE
x 191.28 PROPOSED ELEVATION	
x 263.65 PROPOSED SPOT ELEVATION	
PROPOSED SHEET FLOW	CO PROPOSED CLEANOUT
PROPOSED CATCHBASIN	TW TOP OF WALL ELEVATION
PROPOSED STORM MANHOLE	BW BOTTOM OF WALL ELEVATION
AD PROPOSED AREA DRAIN	SW SWALE ELEVATION
	EX. MATCH EXISTING ELEVATION

LICENCE OF PROFESSIONAL ENGINEER J.D. HARTMAN MAY 2020 PROVINCE OF ONTARIO

CONSULTANT:

15955 AIRPORT ROAD, SUITE 304
CALEDON EAST, ONTARIO, L7C 1H9
PHONE: (905) 584-1458 FAX: (905) 584-1461

rban Watershed Group Ltd.

A Member of the GREENLAND Group of Companies
urbanwater@grnland.com

DESIGNED BY:	P. ELLIS	DATE:	JULY 11, 2019
DRAWN BY:	B. KLESS	SURVEYED BY:	CALDER ENG & YOUNG & YOUNG, OLS
CHECKED BY:	J. HARTMAN	DWG. No.	19051-SSG
SCALE:	1: 300		

5 0 5 10 15 20 m

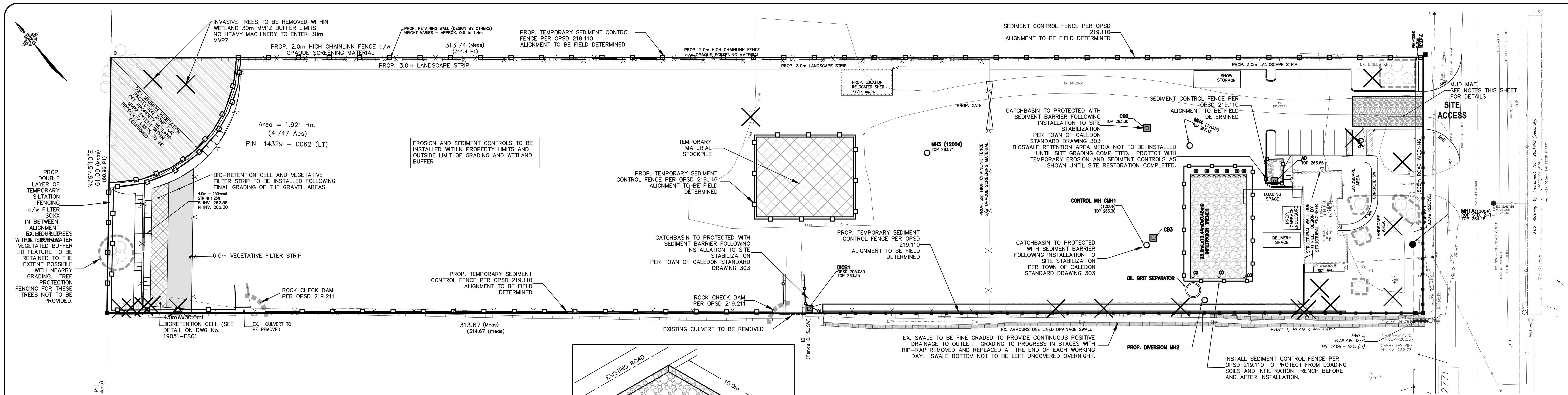
PROJECT NAME:
2473903 ONTARIO INC.

SPA 16-63
C-491480

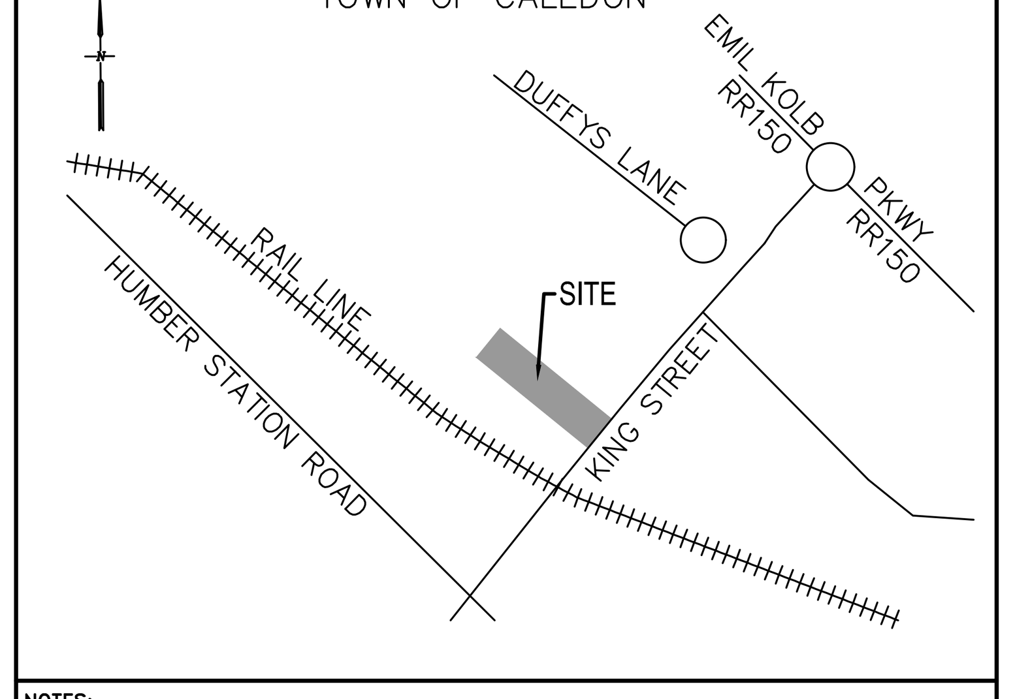
8186 KING STREET, BOLTON
TOWN OF CALEDON, REGION OF PEEL, ONTARIO

DRAWING NAME:
SITE SERVICING & GRADING PLAN

C:\URTAN C DRIVE WORKING AT HOME\19051 - BANKS STONE\19051 - BANKS STONE - 2020-05-08 - R1\19051 - BANKS STONE - 2020-05-08.DWG
Date Plotted: May 08, 2020 - 4:56pm



KEY MAP



NOTES:

1. VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION.
2. SURVEY PREPARED BY: CALDER ENGINEERING & YOUNG & YOUNG SURVEYING INC. O.L.S. DATED: NOVEMBER 08, 2019.
3. DO NOT SCALE DRAWINGS.
4. REPORT ALL ERRORS, OMISSIONS OR DISCREPANCIES TO URBAN WATERSHED GROUP LIMITED IMMEDIATELY UPON DISCOVERY.
5. USE ONLY LATEST REVISED DRAWINGS OR THOSE THAT ARE MARKED "ISSUED FOR CONSTRUCTION".
6. THE DRAWINGS ARE THE PROPERTY OF URBAN WATERSHED GROUP LIMITED AND MUST BE RETURNED ON COMPLETION OF THE PROJECT. ANY UNAUTHORIZED USE OF THIS PLAN IS PROHIBITED.

LEGAL DESCRIPTION

PART OF LOT 11, CONCESSION 5 (ALBION)
AS IN RO866564
TOWN OF CALEDON, REGIONAL MUNICIPALITY OF PEEL

CONTRACTORS NOTE:

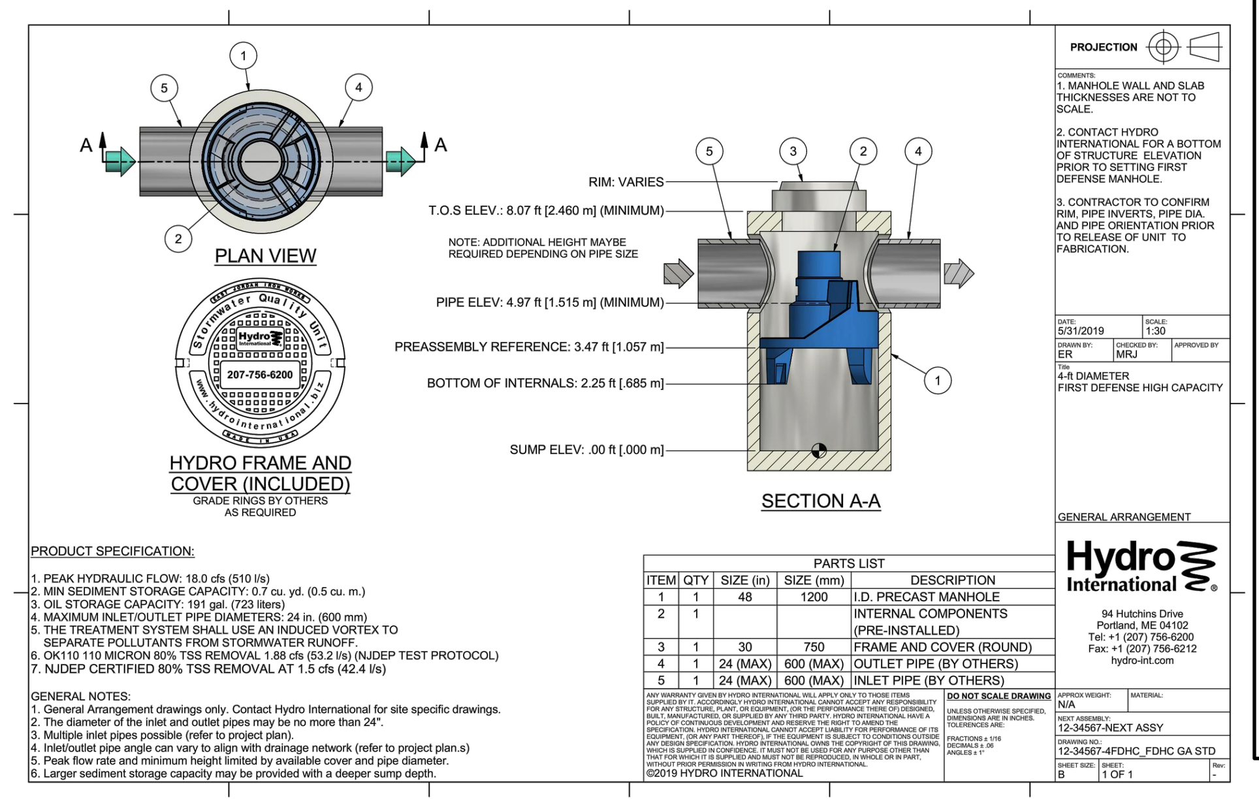
AT THE TIME OF TENDER, THE CONTRACTOR SHALL REVIEW THE DRAWINGS AND INVESTIGATE ALL EXISTING SERVICES, WATERMAINS, UTILITIES AND SEWERS AT POINTS OF CROSSING TO THEIR SATISFACTION AND MODIFY THEIR QUOTATION ACCORDINGLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE ADJUSTMENT OF ALL UTILITIES, SEWERS AND WATERMAINS AS REQUIRED TO COMPLETE THE CONSTRUCTION OF THE SITE SERVICING.

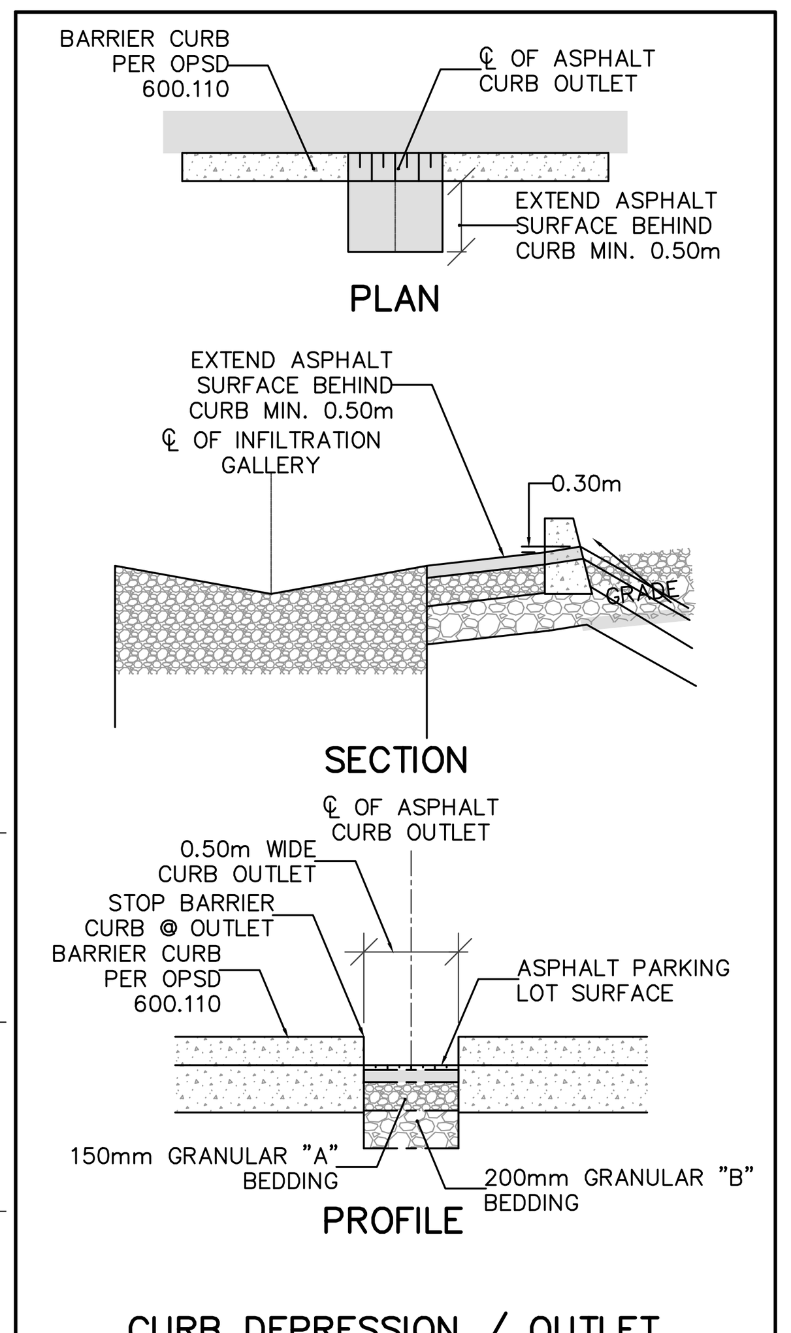
TEMPORARY BULKHEAD NOTE:

TEMPORARY BRICK BULKHEAD TO BE INSTALLED ON THE OUTLET TO WATER REUSE CISTERN FROM DIVERSION MH3 AND REMOVE ONCE SITE HAS BEEN STABILIZED WITH ESTABLISHED SOD AND COMPLETION OF FINAL TOP COAT OF ASPHALT.

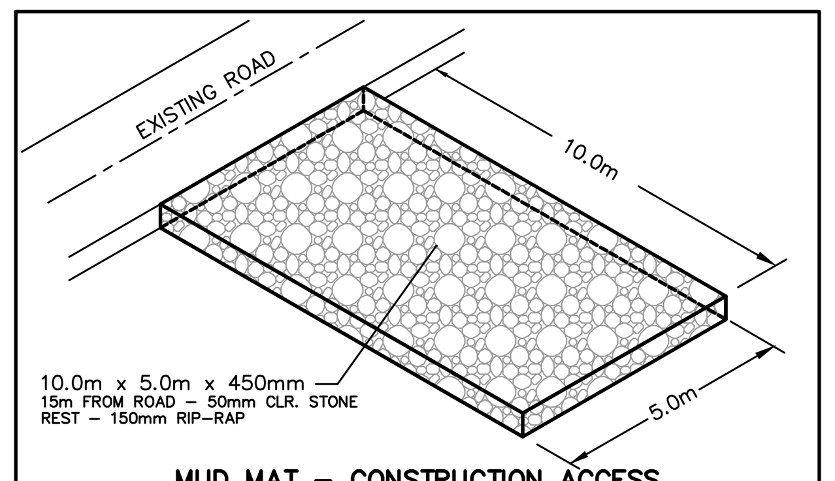
CONTRACTOR TESTING AND REPORTING:

UPON COMPLETION OF THE SEWER INSTALLATION THE CONTRACTOR SHALL COMPLETE TESTING AS REQUIRED WHICH WILL INCLUDE, BUT NOT BE LIMITED TO, CCTV, DEFLECTION, INFILTRATION / EXFILTRATION AND AIR TESTING. THE WATERMAIN SHALL ALSO BE TESTED FOR CONTINUITY, PRESSURE AND CHLORINATION. ALL TESTING SHALL BE IN ACCORDANCE WITH APPLICABLE MUNICIPAL AND ONTARIO BUILDING CODE STANDARDS. RESULTS SHALL BE FORWARDED TO THE ARCHITECT AND URBAN WATERSHED GROUP IMMEDIATELY FOLLOWING THE TEST. THE CONTRACTOR SHALL ALSO SUBMIT AS–BUILT ELEVATIONS AND LOCATIONS OF THE SERVICING AND GRADING IMMEDIATELY FOLLOWING CONSTRUCTION OF EACH STAGE OF WORK.

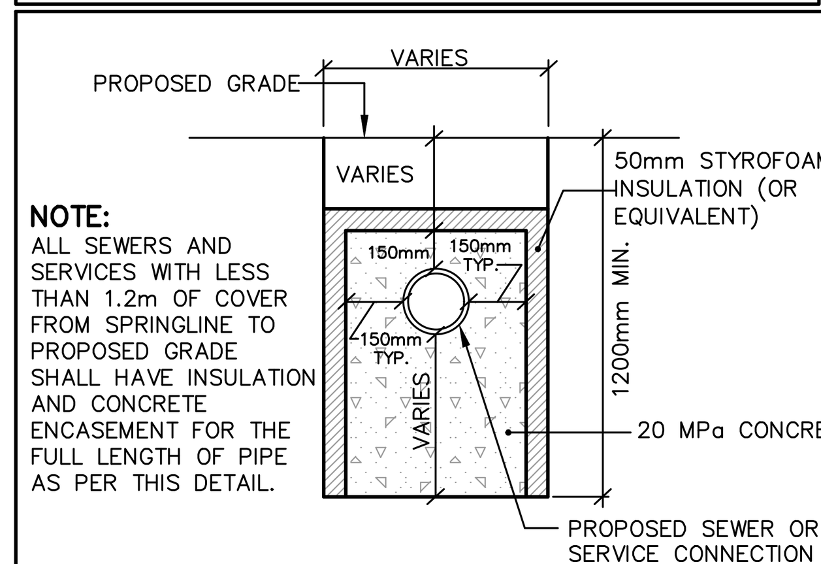




CURB DEPRESSION / OUTLET
SCALE: N.T.S.

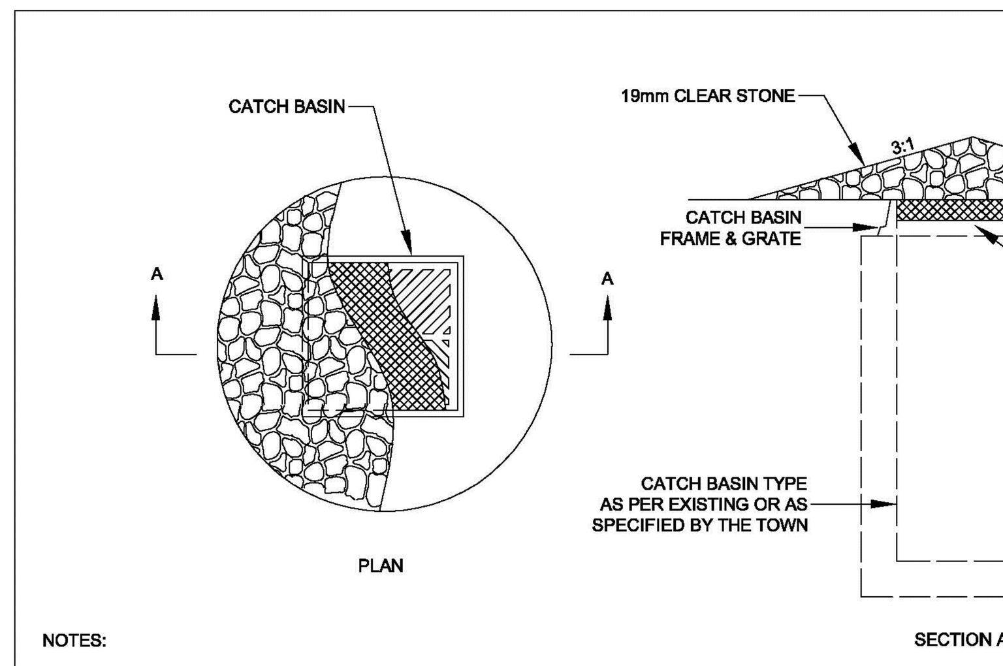


MUD MAT – CONSTRUCTION ACCESS
SCALE: N.T.S.



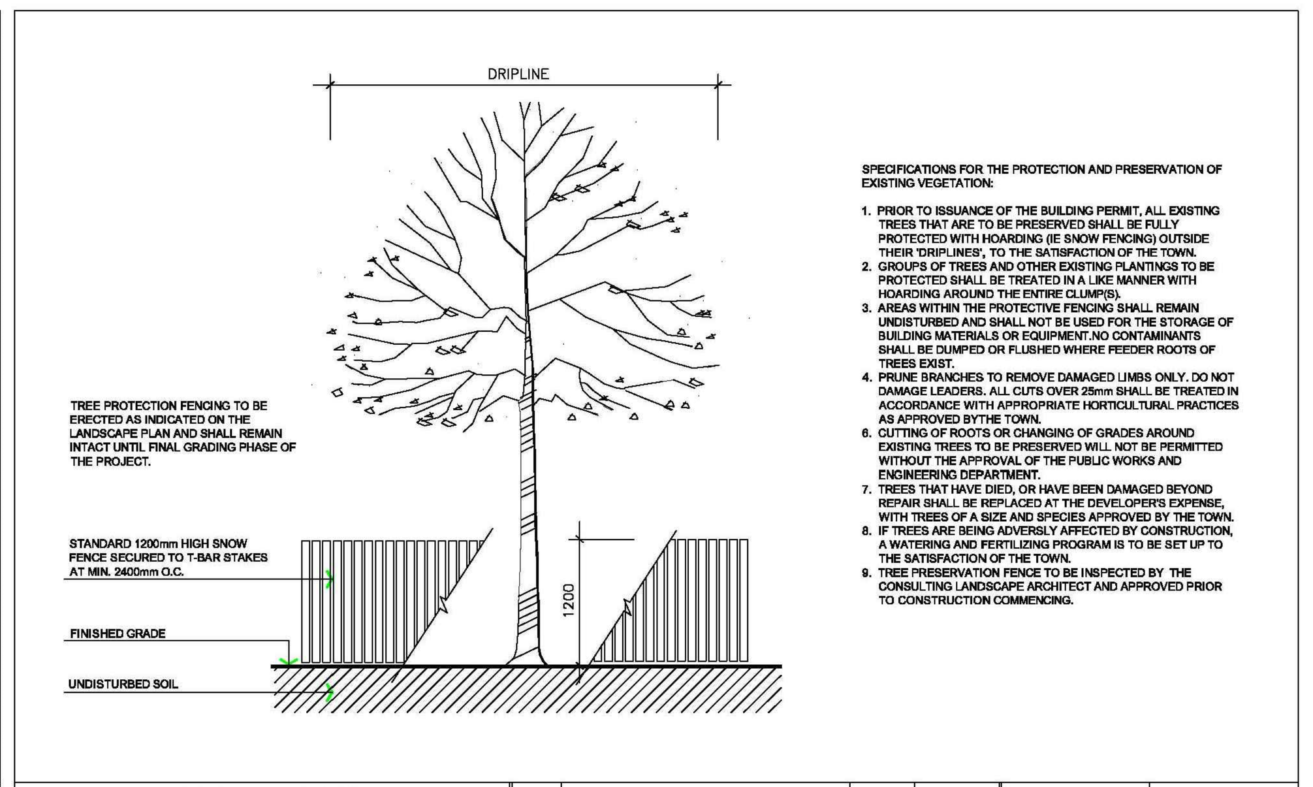
NOTE:
ALL SEWERS AND SERVICES WITH LESS THAN 1.2m OF COVER FROM SPRINGLINE TO PROPOSED GRADE SHALL HAVE INSULATION AND CONCRETE ENCASEMENT FOR THE FULL LENGTH OF PIPE AS PER THIS DETAIL.

INSULATION & CONCRETE ENCASEMENT
SCALE: N.T.S.



NOTES:
1. CATCH BASIN LIFT HOLES TO BE PARGED WITH CONCRETE.
2. WOVEN GEOTEXTILE TO HAVE A MINMUM EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM OPENING SIZE OF 0.25mm.

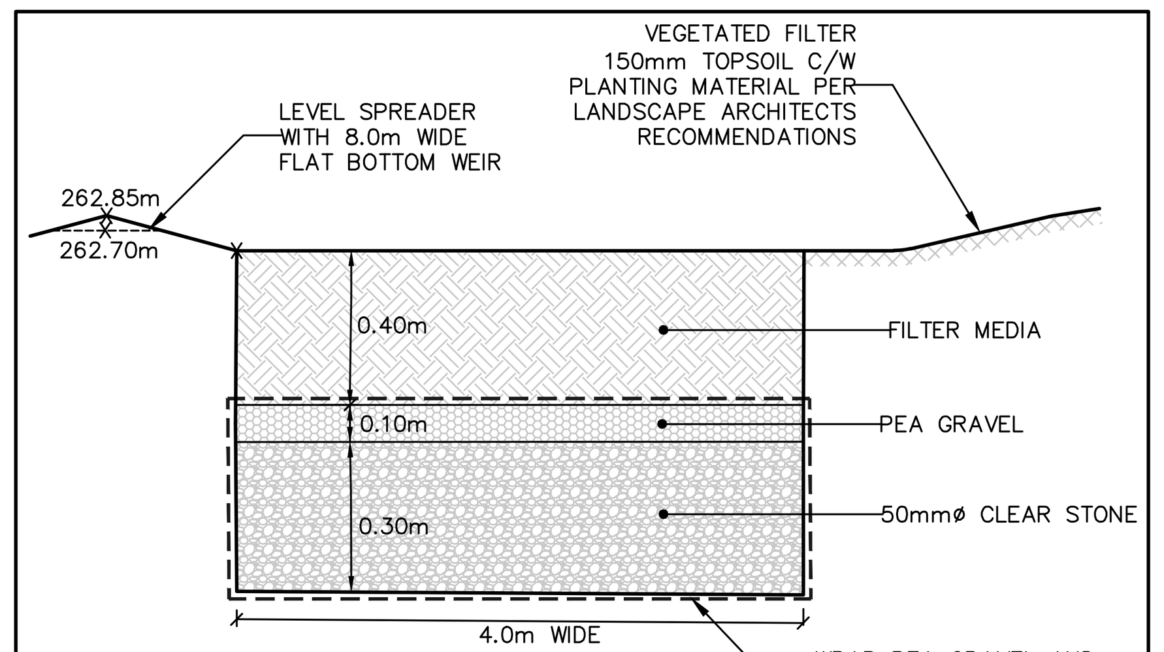
TOWN OF CALEDON					APR'D: C.C.	DATE: APRIL 00
CATCH BASIN SEDIMENT BARRIER	1	STANDARD No. 320.02 NOW 303		JUNE 08	DRAWN: BJM	SCALE: NTS
	NO.	REVISION	APR'D	DATE	STANDARD No. 303	



SPECIFICATIONS FOR THE PROTECTION AND PRESERVATION OF EXISTING VEGETATION:

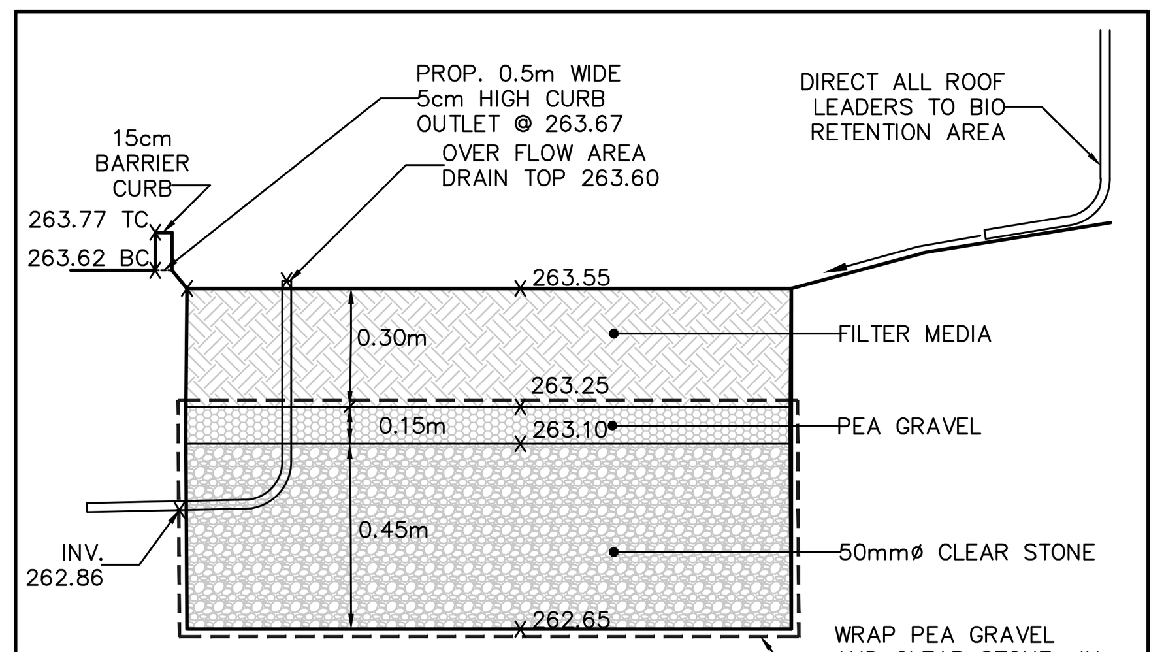
1. PRIOR TO ISSUANCE OF THE BUILDING PERMIT, ALL EXISTING TREES THAT ARE TO BE PRESERVED SHALL BE FULLY PROTECTED WITH HOARDING (IE SNOW FENCING) OUTSIDE THEIR 'DRIPLINES', TO THE SATISFACTION OF THE TOWN.
2. GROUPS OF TREES AND OTHER EXISTING PLANTINGS TO BE PROTECTED SHALL BE TREATED IN A LIKE MANNER WITH HOARDING AROUND THE ENTIRE CLUMP(S).
3. AREAS WITHIN THE PROTECTIVE FENCING SHALL REMAIN UNDISTURBED AND SHALL NOT BE USED FOR THE STORAGE OF BUILDING MATERIALS OR EQUIPMENT.NO CONTAMINANTS SHALL BE DUMPED OR FLUSHED WHERE FEEDER ROOTS OF TREES EXIST.
4. PRUNE BRANCHES TO REMOVE DAMAGED LIMBS ONLY. DO NOT DAMAGE LEADERS. ALL CUTS OVER 25mm SHALL BE TREATED IN ACCORDANCE WITH APPROPRIATE HORTICULTURAL PRACTICES AS APPROVED BYTHE TOWN.
6. CUTTING OF ROOTS OR CHANGING OF GRADES AROUND EXISTING TREES TO BE PRESERVED WILL NOT BE PERMITTED WITHOUT THE APPROVAL OF THE PUBLIC WORKS AND ENGINEERING DEPARTMENT.
7. TREES THAT HAVE DIED, OR HAVE BEEN DAMAGED BEYOND REPAIR SHALL BE REPLACED AT THE DEVELOPER'S EXPENSE, WITH TREES OF A SIZE AND SPECIES APPROVED BY THE TOWN.
8. IF TREES ARE BEING ADVERSLY AFFECTED BY CONSTRUCTION, A WATERING AND FERTILIZING PROGRAM IS TO BE SET UP TO THE SATISFACTION OF THE TOWN.
9. TREE PRESERVATION FENCE TO BE INSPECTED BY THE CONSULTING LANDSCAPE ARCHITECT AND APPROVED PRIOR TO CONSTRUCTION COMMENCING.

TOWN OF CALEDON					APR'D: C.C.	DATE: JUNE 08
TREE PRESERVATION	2	STANDARD No. 1135 NOW 707, NOTES EDIT		JUNE 08	DRAWN: abal	SCALE: NTS
	1	NOTE NO. 9 ADDED		MARCH 08	STANDARD No. 707	
	NO.	REVISION	APR'D	DATE		



FILTER MEDIA NOTES:
1. FILTER MEDIA TO CONTAIN:
 –85 to 88% SAND
 –8 to 12% SOIL FINES
 –3 to 5% ORGANIC MATTER (LEAF COMPOST)
2. PHOSPHORUS SOIL TEST INDEX (P–VALUE): 10–30 ppm
3. CATIONIC EXCHANGE CAPACITY: GREATER THAN 10 meq/100g
4. FILTER MEDIA TO BE FREE OF STONES, STUMPS, ROOTS AND OTHER LARGE DEBRIS.
5. pH: 5.5 TO 7.5
6. INFILTRATION RATE: GREATER THAN 25 mm/hr

BIO–RETENTION CELL
SECTION A–A
SCALE: N.T.S.



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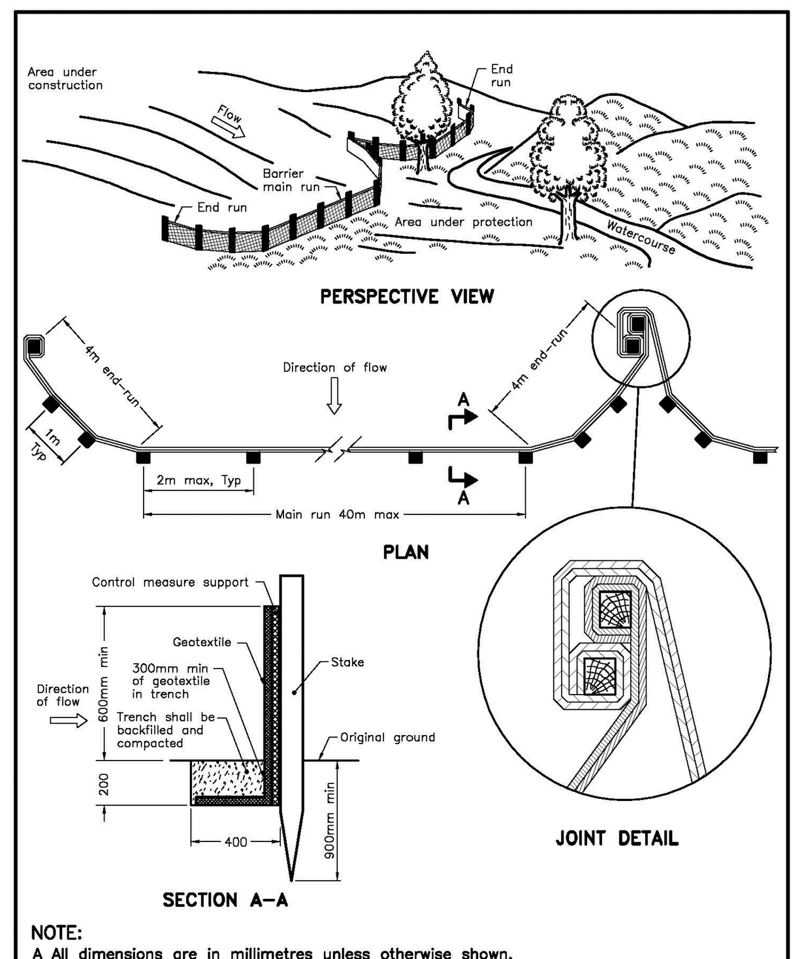
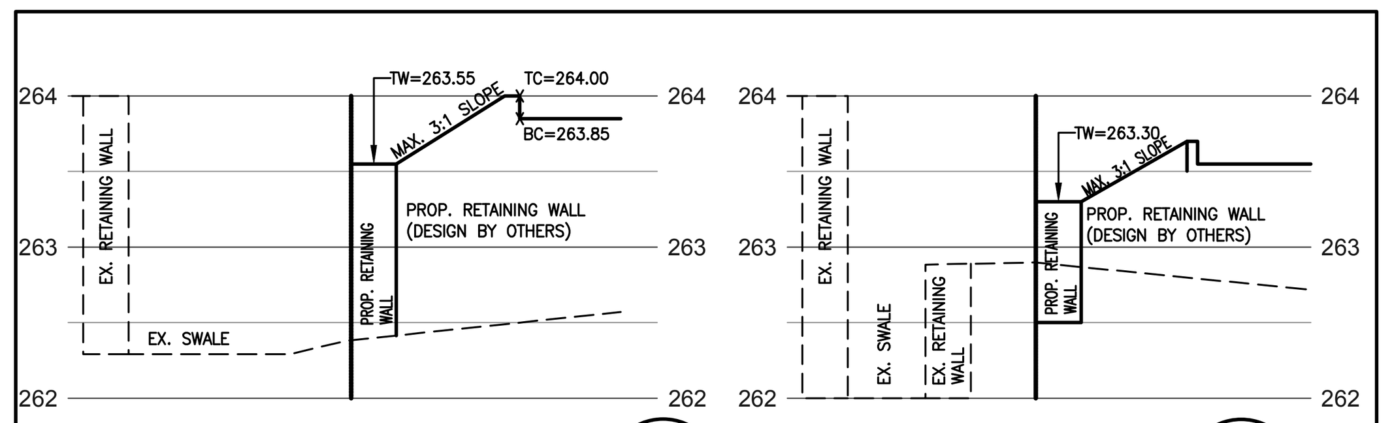
5. pH: 5.5 TO 7.5
6. INFILTRATION RATE: GREATER THAN 25 mm/hr

BIO–RETENTION FACILITY AT HOUSE
(3.7mX5.3mX0.90m (LxWxD)
SCALE: N.T.S.



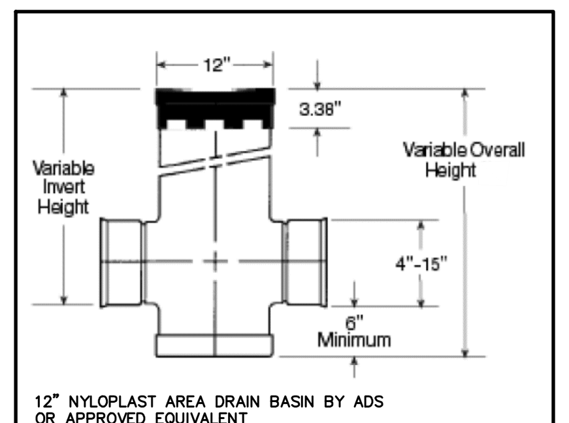
NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2015 — Rev 2
HEAVY–DUTY SILT FENCE BARRIER
OPSD 219.130

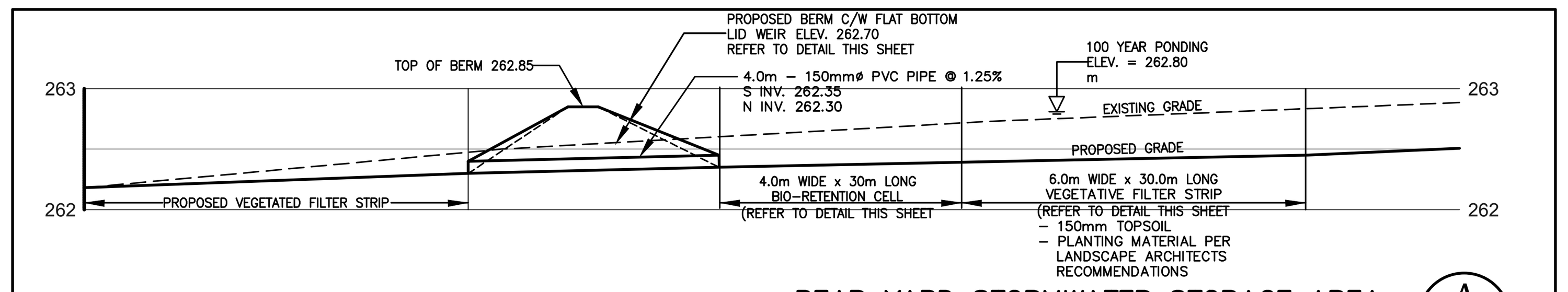


DRAINAGE DITCH (B / 03)
SCALE: H 1/100, V 1/50

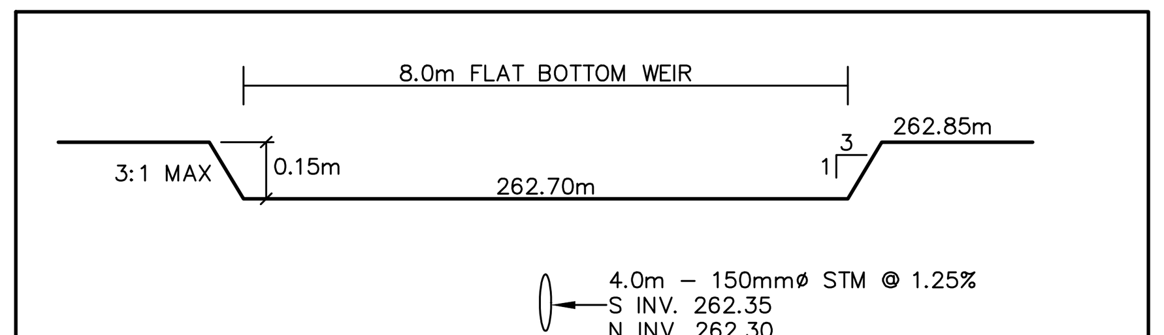
DRAINAGE DITCH (C / 03)
SCALE: H 1/100, V 1/50



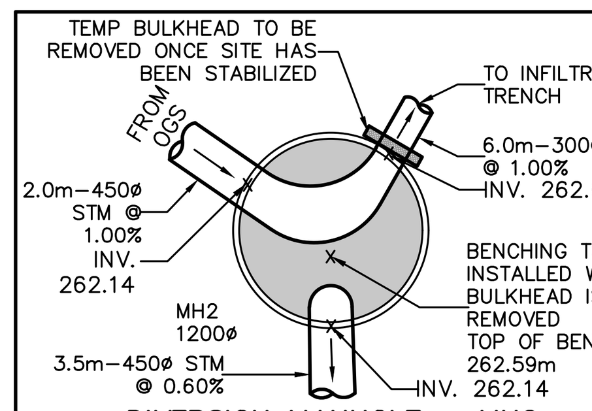
AREA DRAIN
N.T.S.



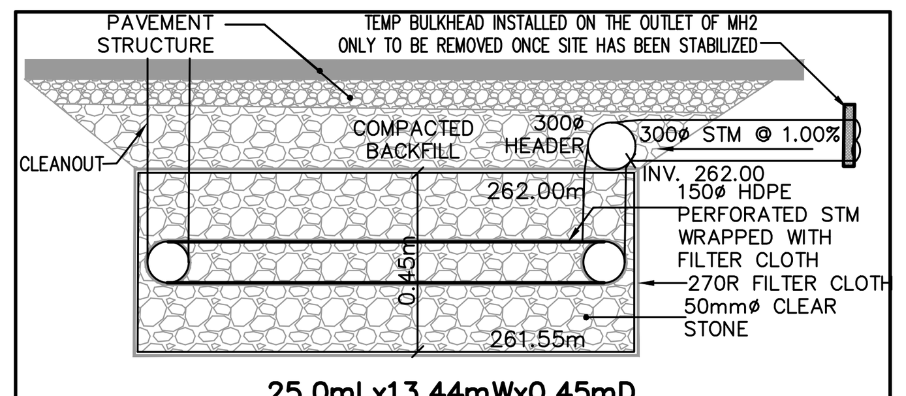
REAR YARD STORMWATER STORAGE AREA (A / 03)
SCALE: H 1/100, V 1/50



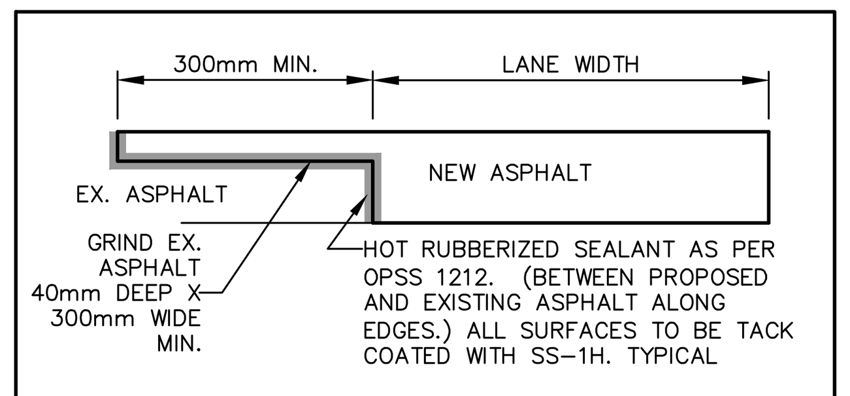
L.I.D. WEIR
SECTION D–D
SCALE: H 1:100, V 1:20



DIVERSION MANHOLE – MH2
SCALE: N.T.S



25.0mLx13.44mWx0.45mD
INFILTRATION TRENCH
SCALE: N.T.S



ASPHALT STEP JOINT
SCALE: N.T.S

SITE MANAGEMENT:

1. EROSION AND SEDIMENT CONTROL (ESC) MEASURES TO BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING THE CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATER. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED AND/OR REPLACED WITHIN 48 HOURS OF INSPECTION.
2. DISTURBED AREAS TO BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORARILY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES.
3. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREAS. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF A DELETERIOUS SUBSTANCE, INCLUDING SEDIMENT, THEN ALTERNATIVE MEASURES MUST BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS. TRCA ENFORCEMENT OFFICER SHOULD BE IMMEDIATELY CONTACTED. ADDITIONAL ESC MEASURES TO BE KEPT ON SITE AND USED AS NECESSARY.
4. AN ENVIRONMENTAL MONITOR TO ATTEND THE SITE TO INSPECT ALL NEW CONTROLS, AS WELL AS ON A REGULAR BASIS, OR FOLLOWING RAIN/SNOWMELT EVENT, TO MONITOR ALL WORKS, AND IN PARTICULAR WORKS RELATED TO EROSION AND SEDIMENT CONTROLS, DEWATERING OR UNWATERING, RESTORATION AND IN–WATER OR NEAR WATER WORKS. SHOULD CONCERNS ARISE ON SITE THE ENVIRONMENTAL MONITOR SHALL CONTACT THE TRCA ENFORCEMENT OFFICER AS WELL AS THE PROPONENT.
5. ALL ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, TO BE CONTROLLED TO PREVENT THE ENTRY OF PETROLEUM PRODUCTS, DEBRIS, RUBBLE, CONCRETE OR OTHER DELETERIOUS SUBSTANCES INTO THE WATER. VEHICULAR REFUELING AND MAINTENANCE TO BE CONDUCTED A MINIMUM OF 30 METRES FROM THE WATER.
6. THE PROPONENT/CONTRACTOR SHALL MONITOR THE WEATHER SEVERAL DAYS IN ADVANCE OF THE ONSET OF THE PROJECT TO ENSURE THAT THE WORKS TO BE CONDUCTED DURING FAVOURABLE WEATHER CONDITIONS. SHOULD AN UNEXPECTED STORM ARISE, THE CONTRACTOR SHALL REMOVE ALL UNFIXED ITEMS FROM THE REGIONAL STORM FLOOD PLAIN THAT WOULD HAVE THE POTENTIAL TO CAUSE A SPILL OR AN OBSTRUCTION TO FLOW, E.G. FUEL TANKS, PORTA–POTTIES, MACHINERY, EQUIPMENT, CONSTRUCTION MATERIALS, ETC.

CONSTRUCTION TIMING:

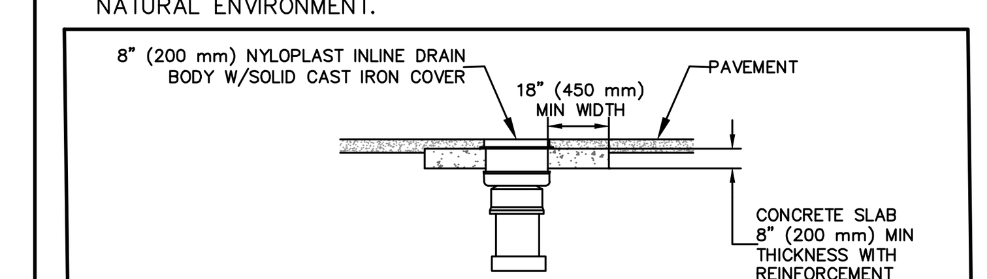
7. IN ORDER TO COMPLY WITH THE MIGRATORY BIRDS CONVENTION ACT, TRCA RECOMMENDS THAT TREE REMOVALS BE COMPLETED BETWEEN AUGUST 1 AND APRIL 1.

ENVIRONMENTAL COMPLIANCE:

8. PLEASE NOTIFY THE TRCA ENFORCEMENT AREA AND TRCA PROJECT MANAGER 48 HOURS PRIOR TO COMMENCING CONSTRUCTION.
9. AN ENVIRONMENTAL MONITOR TO BE ON SITE, AND PROVIDE ADVICE, TO ENSURE THAT ACTIVITIES THAT COULD HAVE A NEGATIVE IMPACT TO THE NATURAL ENVIRONMENT ARE EFFECTIVELY MITIGATED AS CONSTRUCTION PROCEEDS. THE ENVIRONMENTAL MONITOR SHALL NOTIFY THE TRCA ENFORCEMENT OFFICER AND PROJECT MANAGER IF AN ISSUE ARISES.

EROSION AND SEDIMENT CONTROLS:

10. MUD MATS TO BE PROVIDED AT ALL LOCATIONS WHERE CONSTRUCTION VEHICLES EXIT THE SITE. MUD MATS SHALL BE A MIN. OF 3.0m WIDE, 10.0m LONG, AND 0.3m DEEP AND SHALL CONSIST OF 50–100mm CLEAR STONE MATERIAL OR APPROVED EQUIVALENT. CONTRACTOR TO ENSURE ALL VEHICLES LEAVE THE SITE VIA THE MUD MAT(S) AND THAT THE MUD MAT(S) IS MAINTAINED IN A MANNER TO MAXIMIZE EFFECTIVENESS AT ALL TIMES. MUD TRACKING OFF–SITE IS TO BE MONITORED AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO CLEAN THE MUNICIPAL ROADS AS REQUIRED.
11. REMOVE TEMPORARY SEDIMENT CONTROLS FOLLOWING COMPLETION OF CONSTRUCTION AND SITE STABILIZATION AND REINSTATE AFFECTED AREAS TO EXISTING CONDITIONS OR BETTER. REMOVAL OF TEMPORARY SEDIMENT CONTROLS TO BE APPROVED BY THE TOWN STAFF.
12. IT IS INTENDED THAT THE WORKS PROCEED IN A MANNER WHICH MINIMIZES ANY ADVERSE EFFECTS ON THE NATURAL ENVIRONMENT OF THE PROJECT SITE AND DOWNSTREAM.
13. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTRUCT ALL OF THE CONTRACTOR'S STAFF SUCH THAT THE WORK IS CARRIED OUT IN A MANNER CONSISTENT WITH AVOIDING ENVIRONMENTAL DAMAGE.
14. DURING THE COURSE OF ANY SITE WORKS OR OTHER CONSTRUCTION IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ANY MUD OR MATERIAL, WHICH IS TRACKED ONTO THE ROAD, IS REMOVED IMMEDIATELY. SHOULD THE ROADS NOT BE KEPT FREE AND CLEAR OF MUD AND DEBRIS IT SHALL BE CLEANED, WITHOUT NOTICE BY TOWN OR REGION FORCES AT THE CONTRACTOR'S EXPENSE.
15. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT RELEASES TO THE NATURAL ENVIRONMENT.



INFILTRATION TRENCH CLEANOUT
SCALE: N.T.S

NO.	DESCRIPTION	BY	DATE
1.	ISSUED FOR SITEPLAN APPROVAL		2020/05/08

REVISIONS

BENCHMARK: BM = 263.51m
REGIONAL MUNICIPALITY OF PEEL BENCHMARK No. 76
ELEVATION 263.51 METRES

LEGEND:
- PROPERTY LINE
- EX. WALL MOUNTED EXTERIOR LIGHTING TO REMAIN
- EX. TREE
- EX. TREE TO BE REMOVED
- PROPOSED CATCHBASIN
- PROPOSED STORM MANHOLE
- AD PROPOSED AREA DRAIN
- PROPOSED TEMPORARY SEDIMENT CONTROL FENCE PER OPSD 219.110 ALIGNMENT TO BE FIELD DETERMINED
- PROPOSED TEMPORARY TREE PROTECTION FENCING PER TOWN OF CALEDON STANDARD DRAWING 707. ALIGNMENT TO BE FIELD DETERMINED
- CATCHBASIN PROTECTION FENCING PER TOWN OF CALEDON STANDARD DRAWING 303.

LICENSED PROFESSIONAL ENGINEER J.D. HARTMAN 8 MAY 2020 PROVINCE OF ONTARIO

CONSULTANT:
15955 AIRPORT ROAD, SUITE 304
CALEDON EAST, ONTARIO, L7C 1H9
PHONE: (905) 584-1458 FAX: (905) 584-1461
Urban Watershed Group Ltd.
A Member of the GREENLAND Group of Companies
urbanwater@grnland.com

DESIGNED BY:	P. ELLIS	DATE:	JULY 11, 2019
DRAWN BY:	B. KLESS	SURVEYED BY:	CALDER ENG & YOUNG & YOUNG, OLS
CHECKED BY:	J. HARTMAN	DWG. No.	19051-ESC1
SCALE:	NTS		

PROJECT NAME:
2473903 ONTARIO INC.
SPA 16-63
C-491480
8186 KING STREET, BOLTON
TOWN OF CALEDON, REGION OF PEEL, ONTARIO

DRAWING NAME:
DETAILS AND EROSION AND SEDIMENT CONTROL PLAN

C:\BRYAN C DRIVE\WORKING AT HOME\19051 – BANAS STONE\19051 – BANAS STONE – 2020–05–08 – R1\19051 – BANAS STONE 2020–05–08.DWG
Date Plotted: May 08, 2020 – 4:52pm