SERVICING REPORT

CORNERSTONE PRESSURE WASHING
5309 Leyton Street

Community of Wanstead
Town of Plympton-Wyoming

Issued for Site Plan Approval

BLACK CREEK ENGINEERING INC.

Project No. 2040.01
January 28, 2025

INDEX

1.0 INTRODUCTION

It is proposed that a parcel of land comprised of approximately 0.40 hectares be further developed with the construction of a commercial building to be used for storage. The property is located in the community of Wanstead and consists of Lots 46 to 48 and Lot 73 of Registered Plan 5 (Geographic Township of Plympton), as well as an unopened portion of Second Street in the Town of Plympton-Wyoming, County of Lambton.

This servicing report outlines the stormwater management requirements for the property to be developed, the servicing and the layout of the proposed facilities.

2.0 SITE DESCRIPTION

The subject parcel of land is composed of two parcels of land and consists of Lots 46 to 48 and Lot 73 of Registered Plan 5 (Geographic Township of Plympton), as well as an unopened portion of Second Street (roll numbers 340-010-17700 and 340-010-17800). The zoning for the subject property Agricultural – 4, while the zoning for the adjacent properties are a combination of Rural Commercial – 3 and Agricultural – 4.

The topography of the site and surrounding areas was defined using robotic total station survey equipment and generally slopes from north to south. The topographic mapping of the site is illustrated on drawing EC.

Report No. 22 of the Ontario Soil Survey, *the Soils of Lambton County,* identifies the surficial soils in the area of the subject property as Brookston Clay. These soils have slow infiltration rates and slow rates of water transmission.

3.0 PROPOSED DEVELOPMENT

It is proposed that the property be further developed with the construction of a new commercial building to be used for storage.

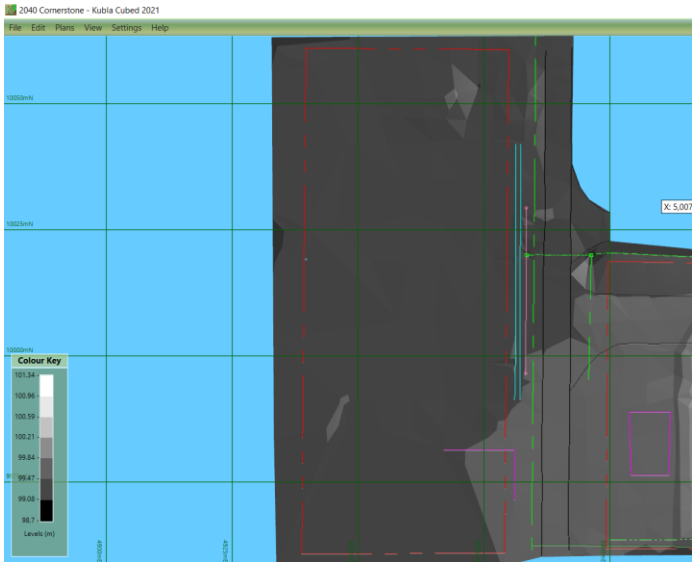
Stormwater works have been proposed to accommodate the run-off from the building and gravel yard including a catch basins and parking lot stormwater retention with a controlled outlet to provide quantity control up to the 100-year storm event.

4.0 STORM WATER MANAGEMENT

4.1 EXISTING DRAINAGE

The east side of the property slopes towards Leyton Street where surface water is collected in catchbasins connected to a branch of the Wanstead Drain constructed circa 1980.

The west side of the property slopes towards the west where surface water runs off into the open field.



The Wanstead Branch Drain (1980) and the Wanstead Relief Drain both outlet to the Wanstead Drain, which flows easterly to the McIllwain Drain and ultimately to Bear Creek.

4.2 DESIGN OBJECTIVES

The design objectives for storm water management include the following:

- Reproduce the pre-development hydrological conditions;
- Confine development and construction activities to the least critical areas;
- Minimize changes to the existing topography, and
- Preserve and utilize the natural drainage system.

4.3 STORM WATER MANAGEMENT MEASURES

Storm water management practices include several different methods to control water quantity and water quality. Several methods considered in this report include the following:

4.3.1 Storm water conveyance controls

Storm water conveyance controls are implemented as part of the storm water conveyance system. Storm water is conveyed from developed areas by either sewers or grassed swales. Storm water conveyance controls involve the use of pervious pipe systems, pervious catch basins (catch basins have a larger sump connected to exfiltration storage media), and grassed swales.

4.3.2 End of pipe storm water management facilities

End of pipe storm water management facilities receive storm water from a conveyance system and discharge the treated water to the receiving system. End of pipe facilities can include wet ponds, wetlands, dry ponds, infiltration basins and/or trenches, filter or buffer strips, or oil/grit separators.

4.4 STORM WATER MANAGEMENT PROPOSALS

Proposals have been developed to minimize the effects of the storm water runoff from the proposed development as follows:

- The discharge from the roof top and gravel yard will be contained within depression storage designed to store the volume up to the 100-year storm event.
- The system will include a catch basin complete with a control device to restrict the outflow to the municipal storm sewer.

4.5 HYDROLOGY

The storm drainage required for the proposed development has been designed using an SCS Curve # of 78 for grassed areas, 98 for gravel areas and 100 for the buildings.

Computer modeling was completed using MIDUSS© design software. The output is included in the appendices of this report. The rainfall intensities were generated using the Ontario Ministry of Transportation IDF Curve Look-up website.

Pre-development and post-development flows were calculated for the 100-year return period for storm events ranging from 1 hour to 24 hours.

The site will contain areas along the perimeter that will discharge from the site uncontrolled. The area that will be contained within the proposed stormwater system is 3,179 sq.m (0.318 ha.).

4.6 PROPOSED DRAINAGE

The design philosophy would generally be that post development flows will be restricted to the pre-development levels through the use of storm water conveyance controls and end of pipe facilities. However, given the limited capacity of the branch to the Wanstead Drain along Leyton Street, the design has been based on discharge to the branch drain at an allowable release rate, which has been determined on a flow rate per hectare basis, with surface water overflow to Leyton Street such that the total post development flow from the site would not exceed the pre-development levels.

4.6.1 Proposed Storm Water Conveyance Controls

No stormwater conveyance controls are being proposed at this time.

4.6.2 Proposed End of Pipe Management Facilities

As per the drainage report for the Wanstead Branch Drain (1980), the tributary area to the drain is 16.35 ha. The section of the drain, from the subject property to the junction with the main drain at Elevator Street, consists of 250mm ø reinforced concrete pipe at a grade of 0.2%. This section of the branch drain would have a capacity of 28.3 L/s, thus the allowable release rate was determined to be 1.73 L/s/Ha. and, based on the controlled area of 0.318 ha., the allowable release rate from the site would be 0.55 L/s.

The gravel yard is to be graded towards a central catch basin to create depression storage, with an overflow towards the existing catch basin along the west side of Leyton Street at the intersection of Co-op Street.

The depression storage has a capacity of 166 m^3 with a maximum storage depth of 300mm at the catch basin.

The outlet structure to the municipal storm drain is to consist of a 600 mm concrete catch basin complete with an inlet control device (ICD) to restrict the flows. To restrict the flow the calculated allowable release rate of 0.55 L/s with a conventional orifice plate would require a 25mm ø orifice plate, which would be susceptible to clogging. To minimize the potential of clogging, an IPEX Tempest© model LMF40 ICD was selected. This model has a rated discharge capacity of 2 L/s, which exceeds the calculated allowable release rate, however this is the smallest model that they manufacture.

Based on the above, the maximum discharge calculated for the site was 1.81 L/s with a maximum stored volume of 115 m^3 for the 100-year storm event. This, of course, assumes an unrestricted outlet from the SWMF. In reality, the storm drain along Leyton Street would be surcharged during a 100-year event, thus the discharge would be much less.

A private storm connection is proposed to connect to the existing 250mm ø concrete storm drain along the west side of Leyton Street. Storm service pipe shall be SDR 28 PVC with a diameter of 100 mm and shall be green in colour.

5.0 SANITARY SEWERS

5.1 EXISTING FACILITIES

No sanitary sewer system exists in the community of Wanstead.

5.2 DESIGN CRITERIA

Various references suggest that a typical factory worker would use 5 to 12.5L of water per hour during the working day, of which, most reference the work of Metcalfe & Eddy.

5.3 PROPOSED SANITARY

It is anticipated that up to fifteen (15) persons would be employed, however, it is assumed that thirteen (13) of the employees would work offsite and would be at the facility for less than an hour per day. The other two (2) employees would be on-site for an eight-hour work day, thus resulting in 29 employee-hours per day.

We would anticipate water usage to be near the middle of the range at 7.5L/employee/hour, which would equate to a total flow of 217.5L per 8-hour working day.

Based on an average of 21 working days per month, the total monthly volume produced would be approximately 4,568L. If a monthly pumping schedule was to be followed, the next larger commercially available size of holding tank of 5,600L would be required, as a minimum.

6.0 WATER SUPPLY

6.1 EXISTING FACILITIES

No water distribution system exists in the community of Wanstead.

6.2 DESIGN CRITERIA

Various references suggest that a typical factory worker would use 5 to 12.5L of water per hour during the working day, of which, most reference the work of Metcalfe & Eddy.

6.3 PROPOSED POTABLE WATER

It is anticipated that up to fifteen (15) persons would be employed, however, it is assumed that thirteen (13) of the employees would work offsite and would be at the facility for less than an hour per day. The other two (2) employees would be on-site for an eight-hour work day.

We would anticipate water usage to be near the middle of the range at 7.5L/employee/hour, thus the peak demand would be the hour when all employees are on-site, which would equate to a peak flow of 112.5L/hr (1.9 L/min).

It is proposed to utilize the existing water well, located near the centre of the property on the west side, as the source for potable water.

7.0 ACCESS

7.1 EXISTING ACCESS

The south half of the property has an existing access off of Leyton Street near the centre of that portion. The travelled portion of Leyton Street consists of tar & chip surface treatment with an approximate width of 5.5m.

7.2 DESIGN CRITERIA

The access and turning movements on the site have been designed using the Transportation Association of Canada (TAC) WB-20 design truck.

7.3 ACCESS

It is anticipated that a maximum of six (6) trucks would access/egress the site during a typical work day, and those vehicles would access from/egress to Wanstead Road via Elevator Street to the south.

A new 9.4m wide access is proposed opposite the access to #5310 Leyton Street and would also be sufficient for the access of emergency vehicles.

8.0 SUMMARY

The measures outlined in this conceptual report will meet the quantitative requirements based on Town of Plympton-Wyoming standards.

It is proposed to address storm runoff quantity by the following:

- roof downspouts to be directed to the internal stormwater system
- construction of depression storage
- restricted outlet

It is proposed to connect the proposed storm system to the existing branch of the Wanstead Drain along Leyton Street.

It is proposed to install a sanitary holding tank for the collection of domestic sewage.

It is proposed to utilize the existing water well on the site for potable water.

A new 9.4m wide access from Leyton Street is proposed for all vehicle traffic including emergency vehicles.

9.0 SITE DEVELOPMENT

It is proposed that measures will be taken during development of the site during construction.

During site servicing construction, straw bales and/or silt fence shall be placed to prevent erosion and the migration of sediment.

Filter fabric shall be placed over the grates to prevent the entry of sediment. Trucks will be closely monitored to prevent mud from being tracked onto the street. Granular and fill material shall not be stockpiled on completed streets. Berms, swales and grassed areas shall be seeded immediately after completion.

10.0 CONSTRUCTION

All construction is to be carried out as per the Town of Plympton-Wyoming standards and the Ontario Provincial Standard Specifications and Drawings.

Report prepared by:

Ken Graham, P.Eng.
Consulting Engineer

APPENDIX ‘A’

HYDROLOGY & HYDRAULIC CALCULATIONS

Ontario IDF CURVE LOOKUP

Active coordinate

42° 56' 44" N, 82° 2' 45" W (42.945833,-82.045833)

Retrieved: Tue, 18 Apr 2023 14:06:16 GMT

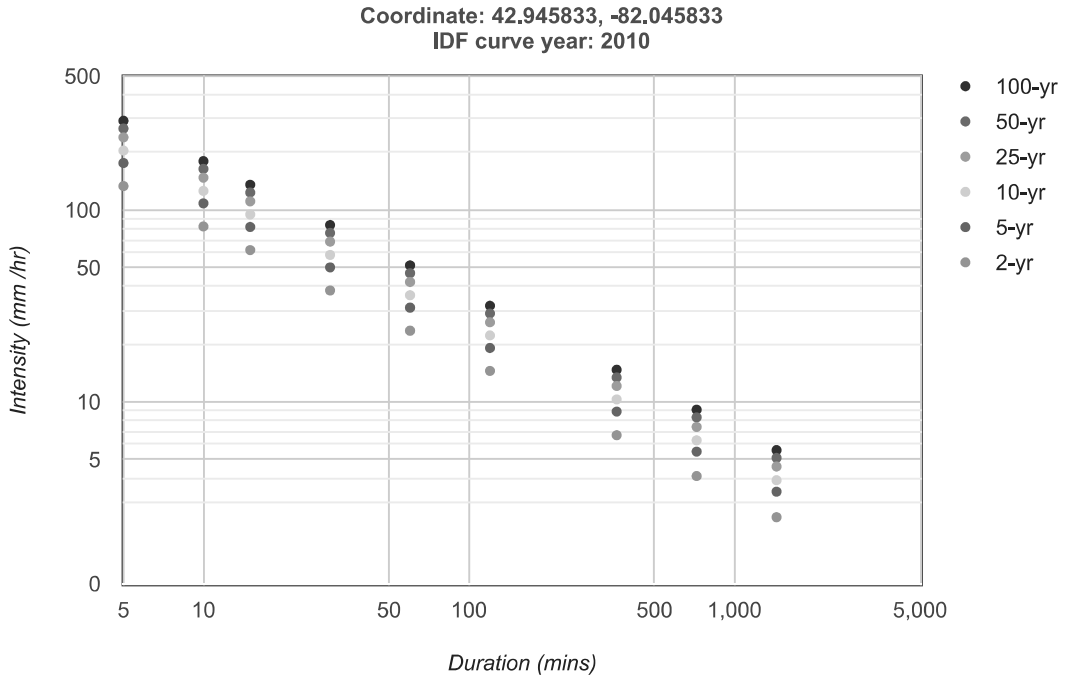
Location summary

These are the locations in the selection.

IDF Curve: 42° 56' 44" N, 82° 2' 45" W (42.945833,-82.045833)

Results

An IDF curve was found.



Coefficient summary

IDF Curve: 42° 56' 44" N, 82° 2' 45" W (42.945833,-82.045833)

Retrieved: Tue, 18 Apr 2023 14:06:16 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	23.5	31.0	36.0	42.2	46.9	51.5
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	133.5	82.2	61.9	38.1	23.5	14.5	6.7	4.1	2.5
5-yr	176.1	108.5	81.7	50.3	31.0	19.1	8.9	5.5	3.4
10-yr	204.5	126.0	94.9	58.4	36.0	22.2	10.3	6.3	3.9
25-yr	239.7	147.7	111.2	68.5	42.2	26.0	12.1	7.4	4.6
50-yr	266.4	164.1	123.6	76.1	46.9	28.9	13.4	8.3	5.1
100-yr	292.5	180.2	135.7	83.6	51.5	31.7	14.7	9.1	5.6

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	11.1	13.7	15.5	19.1	23.5	29.0	40.3	49.6	61.2
5-yr	14.7	18.1	20.4	25.2	31.0	38.2	53.2	65.5	80.7
10-yr	17.0	21.0	23.7	29.2	36.0	44.4	61.7	76.1	93.7
25-yr	20.0	24.6	27.8	34.3	42.2	52.0	72.4	89.2	109.8
50-yr	22.2	27.3	30.9	38.1	46.9	57.8	80.4	99.1	122.1
100-yr	24.4	30.0	33.9	41.8	51.5	63.4	88.3	108.8	134.0

Terms of Use

MIDUSS Watershed Worksheet CORNERSTONE PRESSURE WASHING - 5309 LEYTON STREET - PREDEVELOPMENT CONDITION

Con	Lot	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Area 9	Area 10	Area 11	Area 12	Area 13	Total
Pervious															
															0
	Residential	0.3179													0.318
	Agricultural														0.000
	Landscaped														0.000
	Parkland														0.000
															0.000
															0.000
Impervious															
															0.000
	Building														0.000
	Gravel														0.000
															0.000
	Total	0.3179	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.318
															0.3179
	% Pervious	1.000													
	% Impervious	0.000													

Catchment #	1	2	3	4	5	6	7	8	9	10	11	12	13
% impervious	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Total Area	0.3179	0.0000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Drain length-catchment	*40*												
O/L flow length (m)	40												
Surface Gradient (%)	0.12%												
Drain bottom width													
Drain Sideslope													
Drain depth (m)													
Pipe Diameter													
Pipe / Channel 'n'													
Drain Slope													
Route Length													
Pervious													
Manning 'n'	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15					
SCS Curve # (CN)	80	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!					
Initial abs (mm)													
Impervious													
Manning 'n'	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013					
SCS Curve # (CN)	#DIV/0!	98	98	98	98	98	98	98					
Initial abs (mm)													

MIDUSS Watershed Worksheet CORNERSTONE PRESSURE WASHING - 5309 LEYTON STREET - DEVELOPED CONDITION

Con	Lot	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Area 9	Area 10	Area 11	Area 12	Area 13	Total
Pervious															
															0
	Residential														0.000
	Agricultural														0.000
	Landscaped														0.000
	Parkland														0.000
															0.000
															0.000
Impervious															
															0.000
	Building	0.1236													0.124
	Gravel	0.1943													0.194
															0.000
	Total	0.3179	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.318
															0.3179
	% Pervious	0.000													
	% Impervious	1.000													

Catchment #	1	2	3	4	5	6	7	8	9	10	11	12	13
% impervious	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Total Area	0.3179	0.0000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Drain length-catchment	*40*												
O/L flow length (m)	40												
Surface Gradient (%)	0.12%												
Drain bottom width													
Drain Sideslope													
Drain depth (m)													
Pipe Diameter													
Pipe / Channel 'n'													
Drain Slope													
Route Length													
Pervious													
Manning 'n'	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15					
SCS Curve # (CN)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!					
Initial abs (mm)													
Impervious													
Manning 'n'	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013					
SCS Curve # (CN)	94	98	98	98	98	98	98	98					
Initial abs (mm)													

SWM QUANTITY CONTROL CALCULATIONS - SUMMARY

Cornerstone Pressure Washing – 5309 Leyton Street

	100 Year Storm 1 hour duration	100 Year Storm 2 hour duration	100 Year Storm 3 hour duration	100 Year Storm 6 hour duration	100 Year Storm 12 hour duration	100 Year Storm 24 hour duration
Total Rainfall (mm)	51.5	63.4	71.7	88.3	108.8	134.0
Pre-Development Discharge (L/s)	12	14	15	14	11	7
Total run-off volume (cu.m)	46	69	80	123	173	238
Post-Development Peak Inflow (L/s)	82	50	39	26	17	11
Total run-off volume (cu.m)	119	151	175	226	294	372
Peak Discharge Orifice (L/s)	2	2	2	2	2	2
Peak Discharge Overflow (L/s)	8	12	13	14	12	7
High Water Level (m)	99.95	99.96	99.96	99.96	99.96	99.95
Maximum Stored Volume (cu.m)	99	109	113	115	109	95

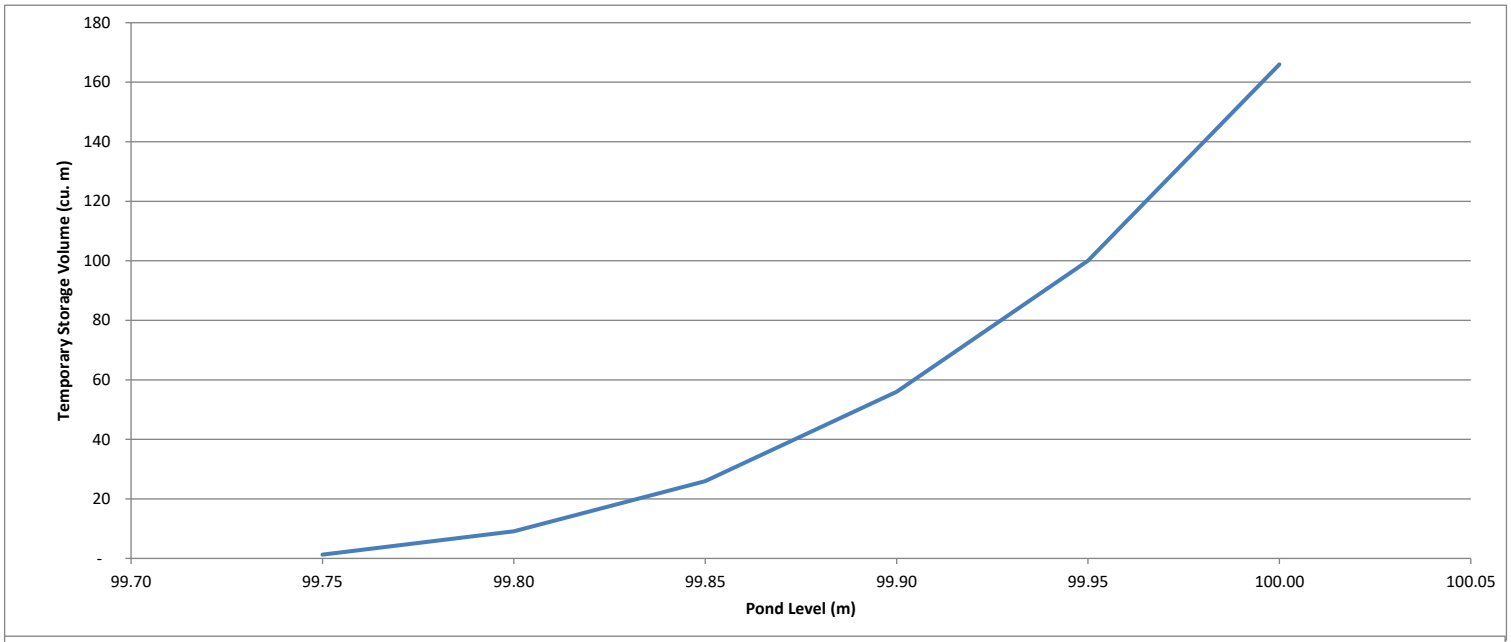
Calculations by K. Graham, P.Eng.

100-year storm IDF parameters
a=51.5
b=-0.699

Chicago Storm Parameters (100 yr)
A=
B=
C=
R=

CORNERSTONE PRESSURE WASHING - 5309 LEYTON STREET - STAGE / STORAGE / DISCHARGE CURVES

Level (m)	Discharge (L/s)	Volume (cu.m)
99.70	0.00	-
99.75	1.72	1
99.80	1.75	9
99.85	1.78	26
99.90	1.80	56
99.95	10.25	100
100.00	34.69	166



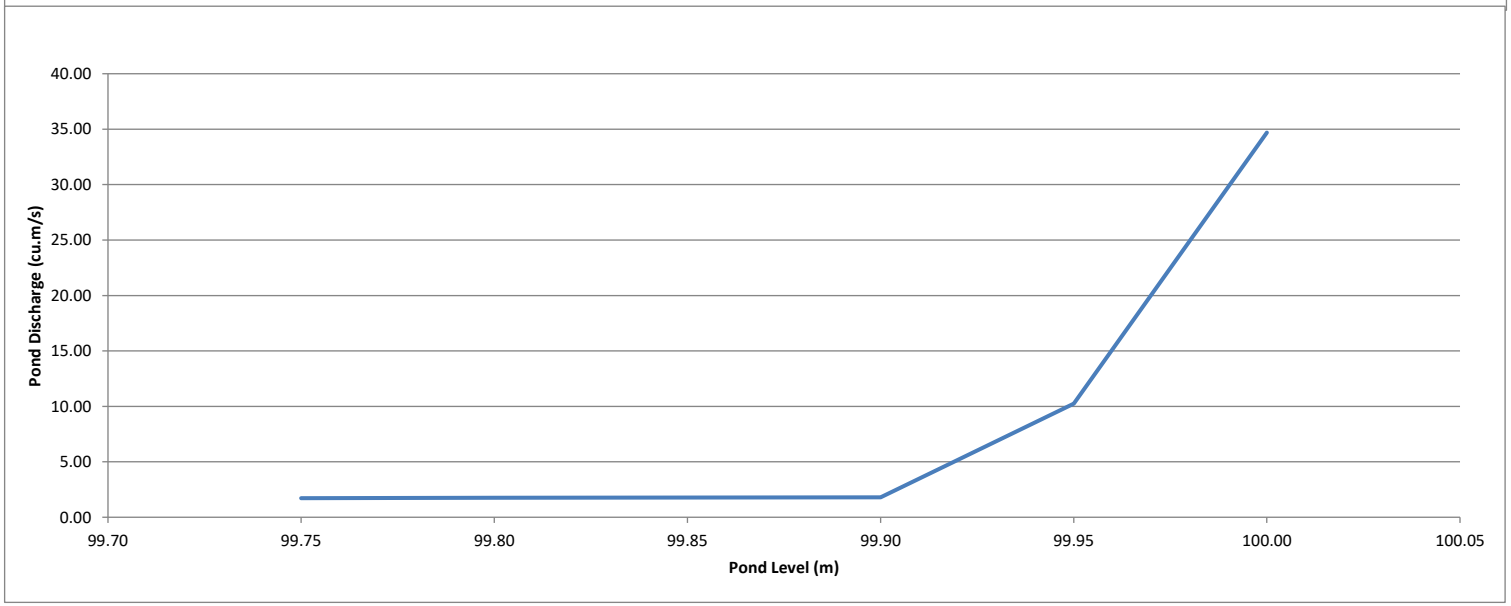


Chart 1: LMF 14 Preset Flow Curves

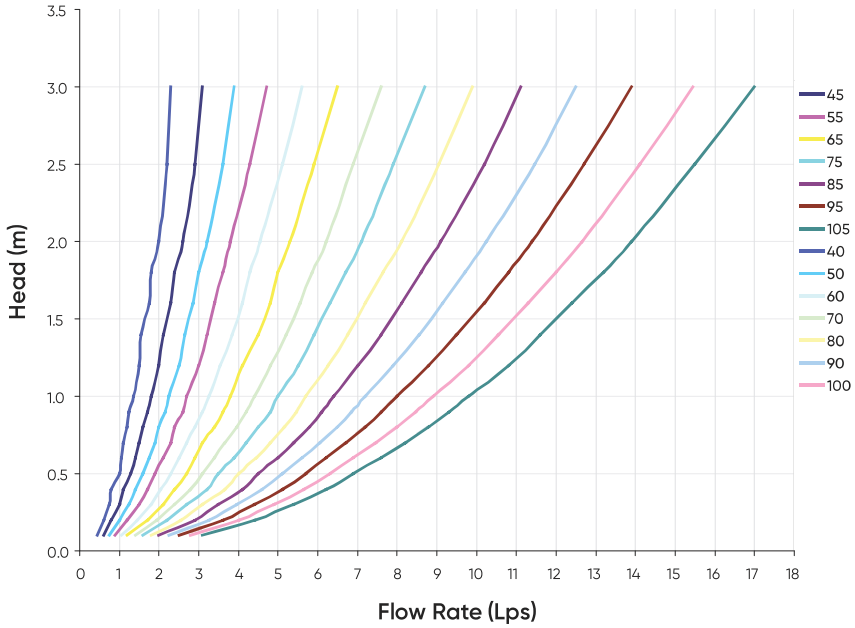
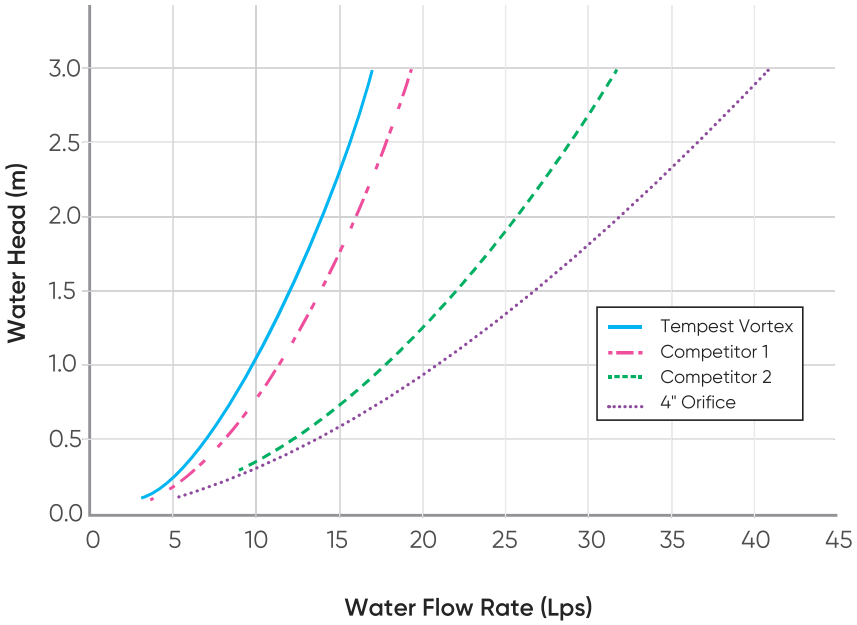
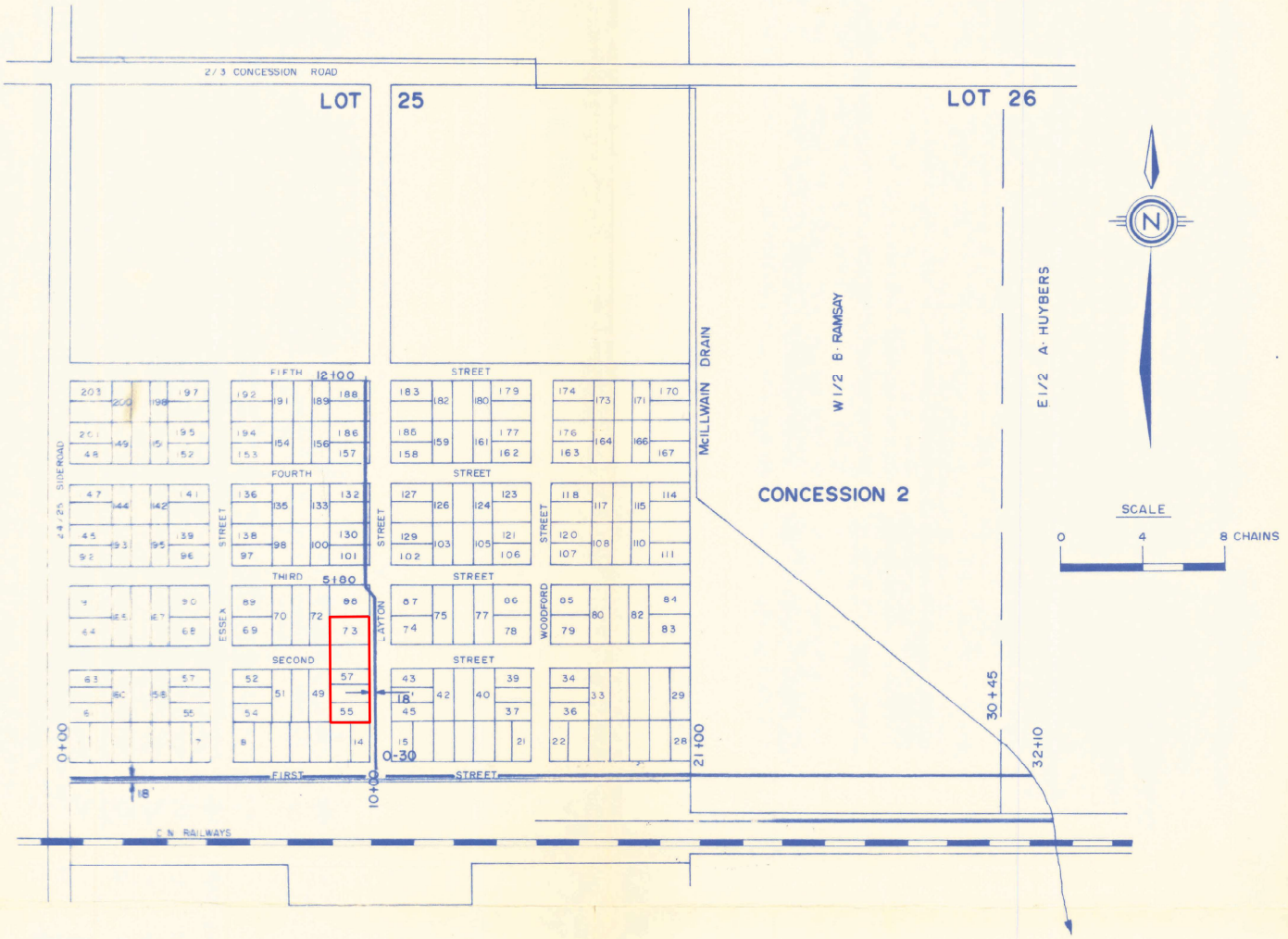
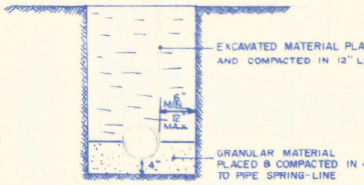


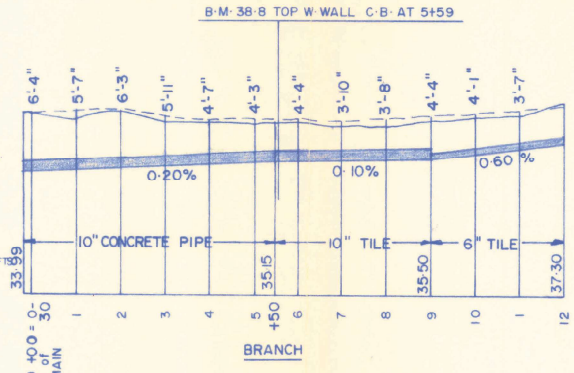
Chart 2: LMF Flow vs. ICD Alternatives







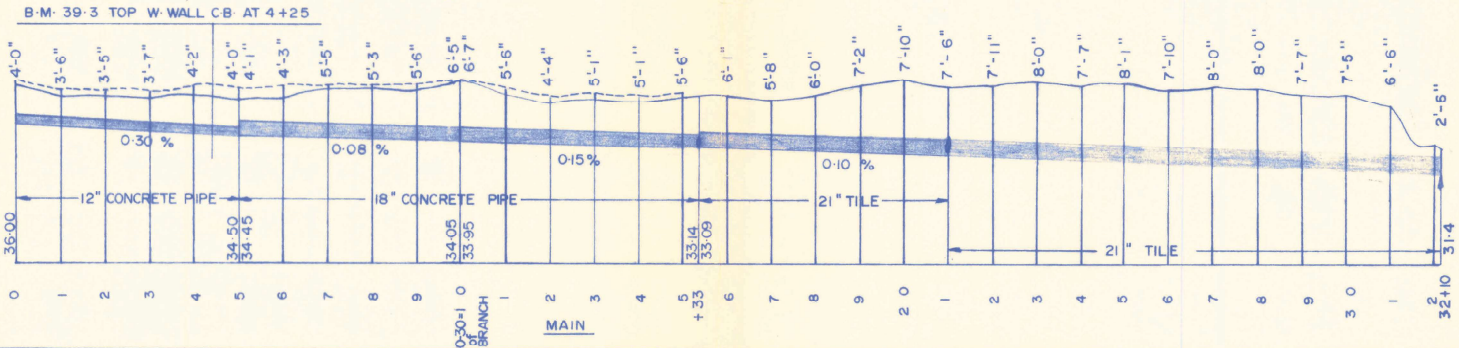
PIPE BEDDING DETAIL



PROFILE SCALES

HORIZONTAL 0 200' 400'

VERTICAL 0 10' 20'



REVISED MARCH 1980

TOWNSHIP OF PLYMPTON

WANSTEAD DRAIN

j.a. monteith associates limited · consulting engineers · petrolia ontario

drawn: G.T.	date: Dec 179	checked:	date: Dec 179	job no: 3122	sheet 1 of 1

APPENDIX ‘B’

MIDUSS DATABASE

Column1
" MIDUSS Output ---------->"
" MIDUSS version Version 2.25 rev. 465"
" MIDUSS created February 5, 2008"
" 10 Units used: ie METRIC"
" Job folder: C:\MIDUSS FILES\Cornerstone\West"
" Output filename: West.out"
" Licensee name: 15193305372"
" Company HP"
" Date & Time last used: 2025-01-28 at 3:20:18 PM"
" 31 TIME PARAMETERS"
" 10.000 Time Step"
" 1440.000 Max. Storm length"
" 6000.000 Max. Hydrograph"
" 32 STORM Huff distribution"
" 2 Huff distribution"
" 108.800 Rainfall depth"
" 720.000 Duration"
" 2.000 Huff quartile"
" Maximum intensity 20.853 mm/hr"
" Total depth 108.800 mm"
" 6 012hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 5309 Leyton"
" 100.000 % Impervious"
" 0.318 Total Area"
" 40.000 Flow length"
" 0.500 Overland Slope"
" 0.000 Pervious Area"
" 40.000 Pervious length"
" 0.500 Pervious slope"
" 0.318 Impervious Area"
" 40.000 Impervious length"
" 0.500 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.000 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.020 Impervious Manning 'n'"
" 94.000 Impervious SCS Curve No."
" 0.851 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 1.621 Impervious Initial abstraction"

```
"              0.017    0.000    0.000    0.000 c.m/sec"
"         Catchment 101        Pervious   Impervious Total Area "
"         Surface Area         0.000      0.318      0.318      hectare"
"         Time of concentration  50.042     9.186      9.186      minutes"
"         Time to Centroid      405.358    329.467    329.468    minutes"
"         Rainfall depth        108.800    108.800    108.800    mm"
"         Rainfall volume       0.00       345.98     345.98     c.m"
"         Rainfall losses       54.459     16.247     16.247     mm"
"         Runoff depth          54.341     92.553     92.553     mm"
"         Runoff volume         0.00       294.32     294.32     c.m"
"         Runoff coefficient    0.000      0.851      0.851      "
"         Maximum flow          0.000      0.017      0.017      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"              0.017    0.017    0.000    0.000"
" 54        POND DESIGN"
"       0.017   Current peak flow    c.m/sec"
"       0.014   Target outflow    c.m/sec"
"       294.3   Hydrograph volume    c.m"
"         7.   Number of stages"
"      99.700   Minimum water level    metre"
"     100.000   Maximum water level    metre"
"      99.700   Starting water level    metre"
"         0   Keep Design Data: 1 = True; 0 = False"
"             Level Discharge    Volume"
"            99.700    0.000    0.000"
"            99.750  0.00172    1.270"
"            99.800  0.00175    9.120"
"            99.850  0.00178   26.000"
"            99.900  0.00180   56.000"
"            99.950  0.01025  100.000"
"           100.000  0.03469  166.000"
"         1.   WEIRS"
"             Crest     Weir     Crest     Left     Right"
"          elevation coefficie   breadth sideslope sideslope"
"            99.900    0.900    0.305    5.000    5.000"
"         1.   ORIFICES"
"           Orifice   Orifice   Orifice Number of"
"            invert coefficie  diameter  orifices"
"            98.150    0.630   0.0250    1.000"
"         Peak outflow              0.014    c.m/sec"
"         Maximum level             99.957    metre"
"         Maximum storage           109.086    c.m"
"         Centroidal lag            8.884   hours"
"              0.017    0.017    0.014    0.000 c.m/sec"
" 40        HYDROGRAPH Next link "
"         5   Next link "
```

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"                0.017     0.014     0.014     0.000"
" 51         PIPE DESIGN"
"       0.014   Current peak flow    c.m/sec"
"       0.013   Manning 'n'"
"       0.200   Diameter    metre"
"       0.120   Gradient   %"
"           Surcharged HGL              0.172    %"
"           Velocity                    0.433    m/sec"
"           Pipe capacity               0.011    c.m/sec"
"           Critical depth              0.000    metre"
" 53         ROUTE    Pipe Route 24"
"      23.50      Pipe Route 24 Reach length   ( metre)"
"       0.000   X-factor <= 0.5"
"      43.654   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.797   Beta weighting factor"
"     200.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"           Peak outflow                0.014    c.m/sec"
"                0.017     0.014     0.014     0.000 c.m/sec"
" 38         START/RE-START TOTALS 101"
"           3   Runoff Totals on EXIT"
"           Total Catchment area                  1.908    hectare"
"           Total Impervious area                 1.908    hectare"
"           Total % impervious                  100.000"
" 19         EXIT"
```