Van Harten
SURVEYING INC.
LAND SURVEYORS and ENGINEERS

July 3, 2018
25600-18

Taylor McDaniel
66 Wellington Road 7, Unit 1
PO Box 1156
Elora, ON
N0B 1S0

Dear Sir:

Re: **Functional Servicing and**
Stormwater Management Report
Proposed Condominium Development
6552 Beatty Line
Part of Lot 18, Concession 14
Geographic Township of Nichol
Township of Centre Wellington

1.0 Introduction

Van Harten Surveying Inc. was retained by Taylor McDaniel to prepare a functional servicing and stormwater management design and report for the above mentioned property located on the southwest corner of Beatty Line and Farley Road. This work is being done in support of Rezoning, Lot Line Adjustment and Draft Plan of Condominium applications.

This report will summarize the proposed plan as it pertains to site servicing including sanitary, storm, and water supply. This will be done in accordance with the accepted engineering practices and criteria as noted by the local approval agencies, as well as the municipal servicing standards.

2.0 Site and Project Description

The project will involve combining the properties known as 6552, 6554, 6556 and 6558 Beatty Road into one property for the purpose of creating one overall condominium plan. Each of these properties currently contain single family dwellings, each individually serviced from Beatty Line. The properties are vegetated with grass and are lightly treed. The properties currently drain towards Beatty Line with a total topographic relief of approximately 4.0m. Water, sanitary and storm servicing is available to the site from Beatty Line. Servicing for these utilities currently exists along Farley Road, however it is noted that it is the preference of the township to avoid servicing the site through Farley Road wherever possible.

Adjacent to the site to the east is a new subdivision currently under construction. At this time it is understood the majority of road and servicing construction to the individual properties within the subdivision is complete, and several homes are either under construction or fully constructed. To the south of the subject property are more single family dwellings on large properties, similar in size and condition to the lots to be re-developed.

Referring to the Grading and Servicing Plans attached as Appendix A, the proposal is to construct 16 semi-detached houses (32 dwelling units), one fully detached dwelling, and a four storey apartment building containing 71 dwelling units. Construction of the apartment building will also necessitate the construction of a parking lot with parking for approximately 94 vehicles. A common element roadway will also be constructed with attachments to Beatty Line and Farley Road to access the proposed dwellings.

Following development, it is proposed to extend private sanitary and water servicing through a common element roadway to service the proposed semi-detached and fully detached condominium units. Connection of these services will be to Beatty Line. Servicing for the apartment building will be achieved through an existing sanitary stub located under Farley Road near the intersection of Farley Road and Beatty Line, and a new water service to be constructed at Beatty Line.

Stormwater Management on site will be self-contained and controlled for quantity and quality. Minor stormwater events will be directed underground to connections at Beatty Line where they ultimately outlet to a wetland on the east side of Beatty Line. Major storms will drain as per existing conditions, generally overland towards Beatty Line.

3.0 Water Supply

It is understood that each of the existing dwellings as part of the proposed development have a private connection to the water supply located under Beatty Line. As indicated on the Preliminary Grading and Servicing Plan found in Appendix A, all existing water services directed towards the subject property are to be decommissioned in accordance with township standards.

It is proposed to provide water to the proposed condominium development by installing a 150 mm watermain with a connection to the existing 300 mm watermain found under Beatty Line. In order to continually provide a flow of water, it is typically preferred to loop the water system. As water servicing under Farley Road currently exists, it would be preferable to provide a connection to the existing watermain on Farley Road as well, as indicated on the attached plan.

Fire protection on site will be provided by a new private fire hydrant to be installed near the common parking area and Unit 11. Fire hydrants are available near the entrance to the site from both Farley Road and Beatty Line, which will provide the additional required fire protection on site.

Individual units within the condominium plan will be serviced through the proposed watermain to be located in the common elements. In accordance with township and Ontario Building Code (OBC) standards, each unit will be provided with individual 25 mm water services. Each unit will be privately metered.

Available water pressure to service this development should be verified by the township prior to commencement of this development. It is recommended to perform hydrant flow tests during the detailed design stage to determine available water pressures and flows within the existing system.

Water demand to the condominium units in accordance with MOECC design standards and in reference to township servicing standards is approximately 450 L/day per capita. Assuming 35 single family dwelling units and an average of 2.5 occupants per dwelling, a total water demand of 39,375 L/day is calculated. Peaking factors, in accordance with MOECC design standards, are 3.6 as a maximum day factor, and 5.4 for the peak hour factor. Fire flows will be over and above the calculated peak flows.

The water system for the proposed apartment building will be connected to the municipal water supply under Beatty Line. Demand flows for the apartment will be calculated similar to the above, however we will rely on more detailed design from a mechanical consultant where more details regarding fire protection and water pressures at the top floor will be provided.

4.0 Sanitary Servicing

It is understood that each of the existing dwellings as part of the proposed development have a private connection to the sanitary sewer located under Beatty Line. As indicated on the Preliminary Grading and Servicing Plan found in Appendix A, all existing sanitary services directed towards the subject property are to be decommissioned in accordance with township standards.

Sanitary servicing to the site will be achieved with a connection to the existing 250 mm sanitary sewer located under Beatty Line with a 200 mm sewer main. Individual condominium units will be connected to this main with typical 100 mm PVC sanitary laterals. Preliminary calculations based on known pipe depths and existing grading would indicate that a gravity connection to the main under Beatty Line is feasible.

Sanitary sewer demand for the proposed condominium units has been calculated based on Township of Centre Wellington municipal servicing standards with per capita flows of 450 L/day per capita and a population of 87.5. Therefore, daily flows of approximately 39,375 L/day are to be expected, with peak flows calculated to be approximately 2.33 L/sec, combining the peaking factor as per Harmon Formula and assumed extraneous flows. Although this is a relatively low demand, the available capacity of the Beatty Line sewer should be verified.

Sanitary servicing to the proposed apartment building will be achieved through an existing 150 mm sanitary stub noted on as-built plan and profile drawings of Farley Road near the intersection of Beatty Line. It is assumed sanitary demand to the apartment building will not exceed the capacity of the existing 150 mm service. Actual demand and available capacity will be verified when mechanical designs of the proposed building are made available.

5.0 Stormwater Management

It is assumed all existing dwellings within the development are not serviced with storm connections to Beatty Line. Storm servicing is generally unavailable near the frontage of these dwellings. Therefore, no alteration to existing storm servicing is required to facilitate the proposed development.

An existing stormwater outlet for the property is understood to be near the corner of Beatty Line and Farley Road, or the northeast corner of the subject property. Here, a double inlet catchbasin manhole is constructed with an underground connection to a 1,800 by 900 mm box culvert running diagonally northwest to southeast under Beatty Line. The outlet of this culvert is understood to be into an existing wetland on the opposite side of Beatty Line from the subject property. As this is currently the only suitable underground connection available to the subject property, the minor storm outlet from the site will be to this manhole. Major storms will drain overland to Beatty Line and ultimately outlet to this same wetland.

Preliminary stormwater modelling has been completed using MIDUSS with design storms provided by the Township of Centre Wellington. As noted above, the storm system for the entire site will be directed through an existing catchbasin manhole located at the northeast corner of the site, which is assumed to be the general location of the existing stormwater outlet. Peak flows will be attenuated using parking lot storage, underground storage in superpipes located under the common element and a small dry pond to be located between Unit 8 and Beatty Line. Preliminary feasibility calculations using MIDUSS based on the enclosed grading and servicing plan are attached as Appendix B.

A summary of the peak flow rates and required storage volumes based on preliminary modelling using MIDUSS are listed below:

	Peak Flow Rate (m^3/sec)		
Return Period	Existing	Proposed Controlled	Total Storage Volume Required (m^3)
5-year	**0.152**	**0.146**	**214.4**
100-year	**0.488**	**0.339**	**546.1**

6.0 Conclusions

The completed servicing and grading design is specific to the subject property and cannot be applied to different properties. It has been determined that municipal servicing exists and is generally suitable for this property, and overland stormwater conveyance is available, where required. It is noted that some further investigation to the available capacity of the existing infrastructure on Beatty Line and Farley Road may be warranted prior to commencement of this development.

LAND SURVEYORS and ENGINEERS

I trust that this report and design has been completed within our terms of reference and is suitable for your present requirements. Please contact our office if you have any questions or require further consultation.

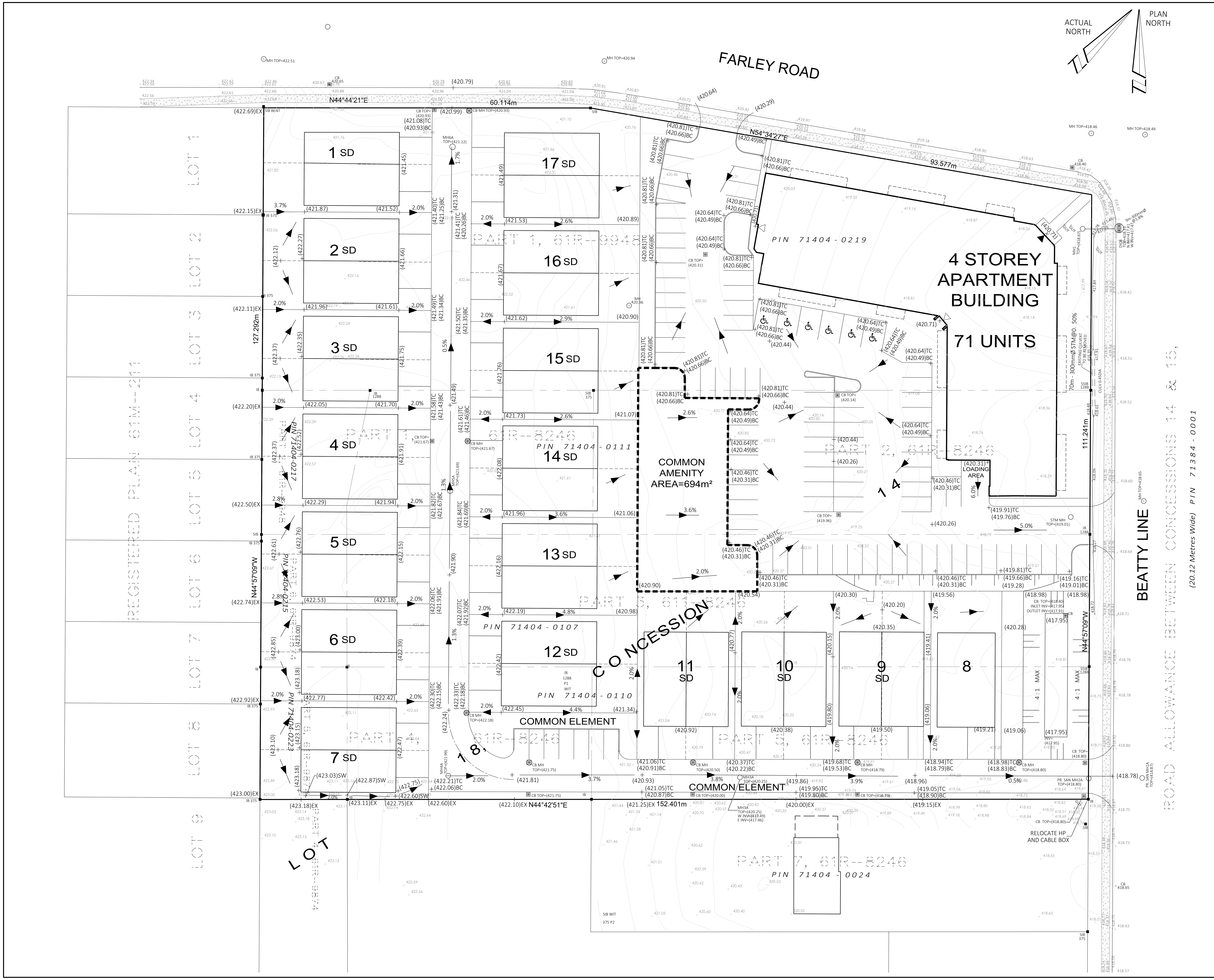
Van Harten Surveying Inc.

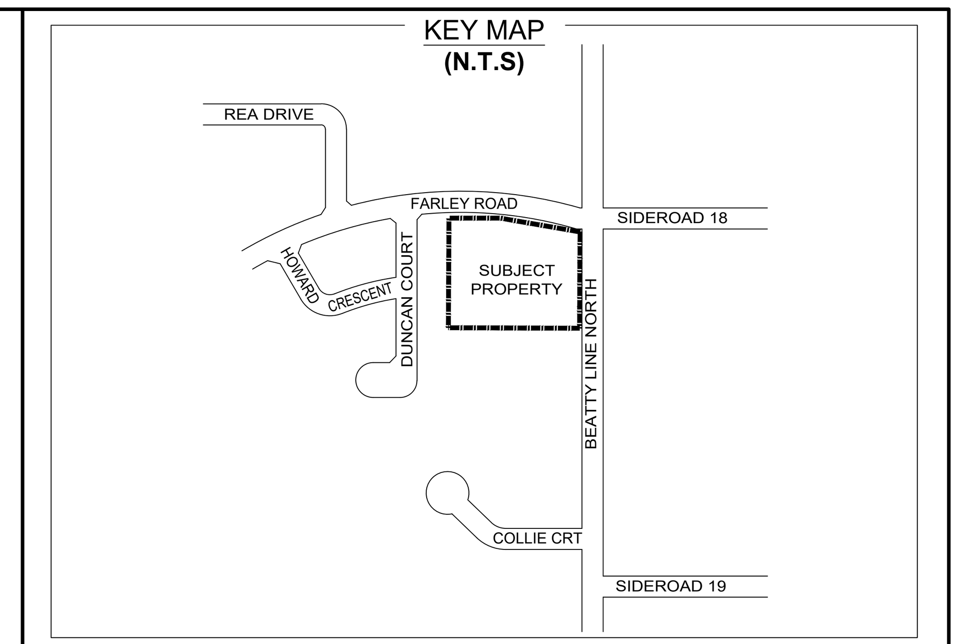
LICENSED PROFESSIONAL ENGINEER
M. A. M. VAUGHAN
100735983
JUL 23-18
PROVINCE OF ONTARIO

Mike Vaughan, P. Eng.

Encl. Appendix A – Preliminary Site, Grading and Servicing Plans
Encl. Appendix B – MIDUSS Calculations

Appendix A
Preliminary Site, Grading and Servicing Plans





LEGEND:

	DENOTES SURVEY MONUMENT SET
	DENOTES SURVEY MONUMENT FOUND
SIB	DENOTES .025 x .025 x 1.20 STANDARD IRON BAR
IB	DENOTES .015 x .015 x 0.60 IRON BAR
SSIB	DENOTES .025 x .025 x 0.60 SHORT STANDARD IRON BAR
RP	DENOTES .015 DIA. X 0.07 ROUND IRON BAR WITH STAMPED WASHER
WIT	DENOTES WITNESS
CC	DENOTES CUT CROSS
1155 or VH	DENOTES VAN HARTEN SURVEYING INC., O.L.S.'s
375	DENOTES BLACK, SHOEMAKER et. al., O.L.S.'s

TOP OF FOUNDATION	TF=206.33	HYDRO POLE	HP
FINISHED FLOOR ELEVATION	FF=206.33	LIGHT STANDARD	LS
UNDERSIDE OF FOOTINGELEVATION	USF=206.33	HYDRO METER	HM
BASEMENT FLOOR ELEVATION	BF=206.33	CATCHBASIN	CB
GARAGE SLAB ELEVATION	GS=206.33	MANHOLE	MH
EXISTING ELEVATION		FIRE HYDRANT	FH
PROPOSED ELEVATION	x(206.55)	WATER VALVE	WV
SURFACE DRAINAGE		GAS METER	GM
OVERHEAD HYDRO	— OH — OH — OH —	DECIDUOUS TREE	
FENCELINE	— X — X —	CONIFEROUS TREE	
CENTRELINE OF ROAD			
SANITARY SEWER	— SAN —		
WATERMAIN	— W — W —		
STORM SEWER	— STM —		

CONCRETE

GRAVEL

WATER

BENCHMARK:

ELEVATIONS ARE BASED ON GPS OBSERVATIONS TO PERMANENT REFERENCE STATIONS IN THE NAD83 (CSRS-2010) COORDINATE SYSTEM AND HAVE BEEN CORRECTED TO ORTHOMETRIC ELEVATIONS ON THE CGVD28 DATUM (1978 ADJUSTMENT) WITH GEOID MODEL HTv2.0, AS SUPPLIED BY NATURAL RESOURCES CANADA.

SITE BM1:

SITE BM2:

TOPOGRAPHIC SURVEY DATE:

THIS TOPOGRAPHIC SURVEY WAS COMPLETED MARCH 5, 2018

CAUTION:

- THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED FOR TRANSACTION OR MORTGAGE PURPOSES.
- THIS SKETCH IS PROTECTED BY COPYRIGHT. ©

METRIC:

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

DRAWING REVISION SCHEDULE

NO.	REVISION	BY	DATE
1	PRELIMINARY SUBMISSION	MAMV	JUN 28-18

GRADING AND SERVICING PLAN FOR:

PART OF LOT 18
CONCESSION 14
GEOGRAPHIC TOWNSHIP OF NICHOL
TOWNSHIP OF CENTRE WELLINGTON
COUNTY OF WELLINGTON

GRADING PLAN

SHEET 1 OF 2

LICENSED PROFESSIONAL ENGINEER
M.A.M. VAUGHAN
100135983
JUN 28-18
PROVINCE OF ONTARIO

PREPARED FOR: TAYLOR McDANIEL

PROJECT No. 25600-18

DRAWING SCALE 1 : 300

NOT FOR CONSTRUCTION

Van Harten SURVEYING INC.
LAND SURVEYORS and ENGINEERS

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www.vanharten.com info@vanharten.com

DRAWN BY: AFV | DESIGN BY: MAMV | CHECKED BY:

Jun 28,2018-4:13pm
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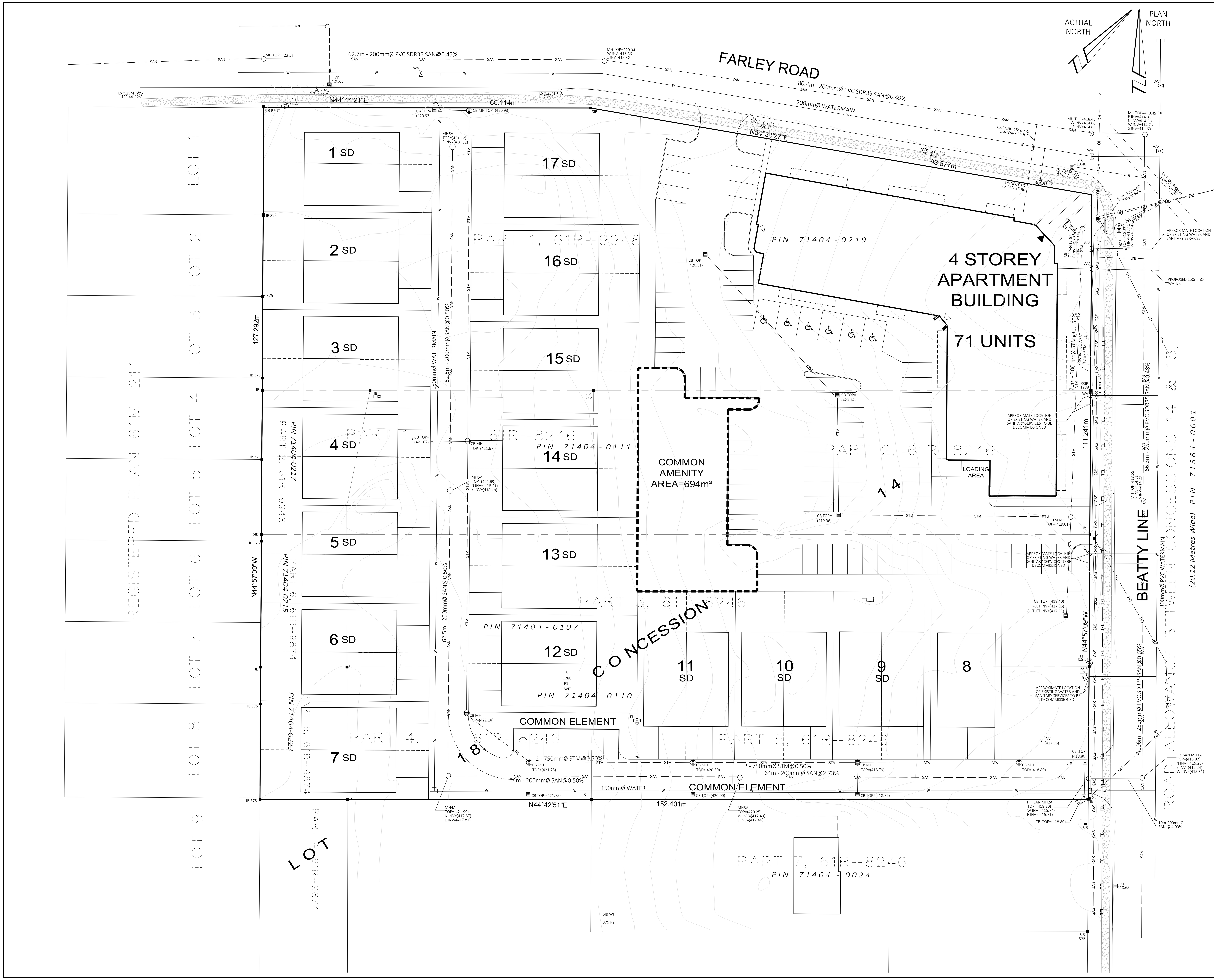

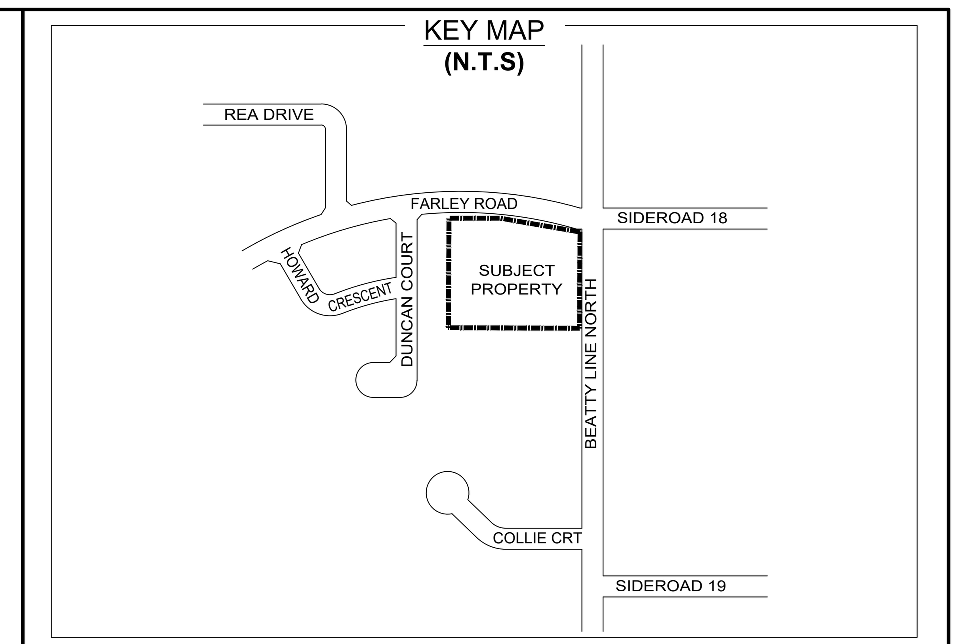

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EXISTING ELEVATION	
PROPOSED ELEVATION	x(206.55)
SURFACE DRAINAGE	
OVERHEAD HYDRO	OH
FENCELINE	X
CENTRELINE OF ROAD	
SANITARY SEWER	SAN
WATERMAIN	W
STORM SEWER	STM

HYDRO POLE	HP
LIGHT STANDARD	LS
HYDRO METER	HM
CATCHBASIN	CB
MANHOLE	MH
FIRE HYDRANT	FH
WATER VALVE	WV
GAS METER	GM
DECIDUOUS TREE	
CONIFEROUS TREE	

CONCRETE GRAVEL

WATER

BENCHMARK:

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DRAWING REVISION SCHEDULE

NO.	REVISION	BY	DATE
1	PRELIMINARY SUBMISSION	MAMV	JUN 28-18

GRADING AND SERVICING PLAN FOR:

PART OF LOT 18
CONCESSION 14
GEOGRAPHIC TOWNSHIP OF NICHOL
TOWNSHIP OF CENTRE WELLINGTON
COUNTY OF WELLINGTON

SERVICING PLAN

SHEET 2 OF 2

LICENSED PROFESSIONAL ENGINEER
M.A.M. VAUGHAN
100135983
JUN 28-18
PROVINCE OF ONTARIO

PREPARED FOR: TAYLOR McDANIEL

PROJECT No. 25600-18

DRAWING SCALE 1 : 300

NOT FOR CONSTRUCTION

Van Harten SURVEYING INC.
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DRAWN BY: AFV | DESIGN BY: MAMV | CHECKED BY:

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Appendix B
MIDUSS Calculations

R.P. Magahay, B.A. J.E. Buisman, B.Sc., O.L.S. R.M. Mak, B.Sc., O.L.S. J.M. Laws, B.Sc., O.L.S. J.M. Duffy, P.Eng.

5-Year Storm – Existing Conditions

```
"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                             Version 2.25  rev. 465"
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"    1500.000   Max. Hydrograph"
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"           1   1=rainfall; 2=hydrograph"
"           1   1=rain; 2=imperv; 3=perv"
"            FERGUS 5YR STORM.stm"
"            5 YRS STORM - FERGUS SHAND DAM"
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"       1.864   Total Area"
"     152.000   Flow length"
"       2.000   Overland Slope"
"       1.771   Pervious Area"
"     152.000   Pervious length"
"       2.000   Pervious slope"
"       0.093   Impervious Area"
"     152.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      25.000   Pervious Max.infiltration"
"       5.000   Pervious Min.infiltration"
"       0.250   Pervious Lag constant (hours)"
"       5.000   Pervious Depression storage"
"       0.015   Impervious Manning 'n'"
"       0.000   Impervious Max.infiltration"
"       0.000   Impervious Min.infiltration"
"       0.050   Impervious Lag constant (hours)"
"       1.500   Impervious Depression storage"
"                    0.152     0.000     0.000     0.000 c.m/sec"
"            Catchment 1           Pervious   Impervious Total Area "
"            Surface Area          1.771      0.093      1.864      hectare"
"            Time of concentration 30.223     5.470      28.100     minutes"
"            Time to Centroid      121.040    93.101     118.644    minutes"
"            Rainfall depth        48.106     48.106     48.106     mm"
"            Rainfall volume       851.86     44.83      896.69     c.m"
"            Rainfall losses       22.143     1.831      21.128     mm"
"            Runoff depth          25.963     46.275     26.978     mm"
"            Runoff volume         459.75     43.13      502.88     c.m"
```

```
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"           4   Add Runoff "
"                   0.152     0.152     0.000     0.000"
" 38         START/RE-START TOTALS 1"
"           3   Runoff Totals on EXIT"
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"            Total Impervious area                      0.093    hectare"
"            Total % impervious                         5.000"
" 19         EXIT"
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100-Year Storm – Existing Conditions

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"               Company                                                        "
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"    1500.000   Max. Hydrograph"
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"       1.864   Total Area"
"     152.000   Flow length"
"       2.000   Overland Slope"
"       1.771   Pervious Area"
"     152.000   Pervious length"
"       2.000   Pervious slope"
"       0.093   Impervious Area"
"     152.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      25.000   Pervious Max.infiltration"
"       5.000   Pervious Min.infiltration"
"       0.250   Pervious Lag constant (hours)"
"       5.000   Pervious Depression storage"
"       0.015   Impervious Manning 'n'"
"       0.000   Impervious Max.infiltration"
"       0.000   Impervious Min.infiltration"
"       0.050   Impervious Lag constant (hours)"
"       1.500   Impervious Depression storage"
"                    0.488     0.000     0.000     0.000 c.m/sec"
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"            Surface Area           1.771      0.093      1.864      hectare"
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"            Time to Centroid       112.697    89.411     111.203    minutes"
"            Rainfall depth         93.224     93.224     93.224     mm"
"            Rainfall volume        1650.55    86.87      1737.42    c.m"
"            Rainfall losses        23.402     2.286      22.347     mm"
"            Runoff depth           69.822     90.939     70.878     mm"
"            Runoff volume          1236.21    84.74      1320.95    c.m"
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"                    0.488     0.488     0.000     0.000"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                     1.864    hectare"
"             Total Impervious area                    0.093    hectare"
"             Total % impervious                       5.000"
" 19          EXIT"
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5-Year Storm – Design Conditions

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"           1   1=rainfall; 2=hydrograph"
"           1   1=rain; 2=imperv; 3=perv"
"           FERGUS 5YR STORM.stm"
"           5 YRS STORM - FERGUS SHAND DAM"
"           New storm defined"
"           Total depth                 48.106    mm"
"           Maximum intensity          119.480    mm/hr"
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"        2.000   Overland Slope"
"        0.173   Pervious Area"
"       44.000   Pervious length"
"        2.000   Pervious slope"
"        0.312   Impervious Area"
"       44.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       25.000   Pervious Max.infiltration"
"        5.000   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                   0.089     0.000     0.000     0.000 c.m/sec"
"              Catchment 101          Pervious   Impervious Total Area "
"              Surface Area           0.173      0.312      0.485      hectare"
"              Time of concentration  14.365     2.600      5.418      minutes"
"              Time to Centroid       101.719    89.050     92.085     minutes"
"              Rainfall depth         48.106     48.106     48.106     mm"
"              Rainfall volume        83.29      150.02     233.31     c.m"
"              Rainfall losses        22.169     2.386      9.449      mm"
"              Runoff depth           25.937     45.720     38.657     mm"
"              Runoff volume          44.91      142.58     187.49     c.m"
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"             Runoff coefficient     0.539      0.950      0.804      "
"             Maximum flow           0.024      0.084      0.089      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.089     0.089     0.000     0.000"
" 54          POND DESIGN"
"        0.089   Current peak flow    c.m/sec"
"        0.038   Target outflow    c.m/sec"
"        187.5   Hydrograph volume    c.m"
"          21.   Number of stages"
"      418.050   Minimum water level    metre"
"      420.250   Maximum water level    metre"
"      418.050   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                418.050     0.000     0.000"
"                418.160   0.00438    0.5161"
"                418.270   0.01529     2.871"
"                418.380   0.02090     7.776"
"                418.490   0.02529    15.675"
"                418.600   0.02903    26.466"
"                418.710   0.03234    39.000"
"                418.820   0.03534    52.636"
"                418.930   0.03810    66.928"
"                419.040   0.04068    81.518"
"                419.150   0.04310    96.058"
"                419.260   0.04539   110.212"
"                419.370   0.04758   123.593"
"                419.480   0.04967   135.735"
"                419.590   0.05167   145.839"
"                419.700   0.05360   152.890"
"                419.810   0.05546   157.043"
"                420.000   0.05853   159.043"
"                420.100   0.06009   159.156"
"                420.140   0.07912   159.201"
"                420.250    0.1961   159.326"
"           1.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
"              elevation coefficie   breadth sideslope sideslope"
"                420.100     0.900     1.500     0.000     0.000"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                418.050     0.630    0.1400     1.000"
"           1.   SUPERPIPES_1"
"           1.   Type 1 is Pipe"
"             Downstream      Pipe      Pipe      Pipe      Pipe Number of"
"                 Invert    Length     Width    Height   Grade %     Pipes"
"                418.050    90.000     1.500     1.500     0.500     1.000"
"             Peak outflow                 0.036    c.m/sec"
"             Maximum level              418.864    metre"
"             Maximum storage             58.339    c.m"
"             Centroidal lag               1.805   hours"
"                  0.089     0.089     0.036     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                    0.089     0.036     0.036     0.000"
" 33          CATCHMENT 102"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          102   C102 - SOUTH PORTION - SEMI-DETACHED DWELLINGS"
"       58.500   % Impervious"
```

```
"        0.395   Total Area"
"       31.500   Flow length"
"        2.600   Overland Slope"
"        0.164   Pervious Area"
"       31.500   Pervious length"
"        2.600   Pervious slope"
"        0.231   Impervious Area"
"       31.500   Impervious length"
"        2.600   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       25.000   Pervious Max.infiltration"
"        5.000   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                     0.075     0.036     0.036     0.000 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area "
"             Surface Area           0.164      0.231      0.395      hectare"
"             Time of concentration  10.865     1.966      4.511      minutes"
"             Time to Centroid       97.451     88.066     90.751     minutes"
"             Rainfall depth         48.106     48.106     48.106     mm"
"             Rainfall volume        78.86      111.16     190.02     c.m"
"             Rainfall losses        22.187     2.206      10.498     mm"
"             Runoff depth           25.919     45.900     37.608     mm"
"             Runoff volume          42.49      106.06     148.55     c.m"
"             Runoff coefficient     0.539      0.954      0.782      "
"             Maximum flow           0.026      0.064      0.075      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.075     0.107     0.036     0.000"
" 54          POND DESIGN"
"        0.107   Current peak flow    c.m/sec"
"        0.057   Target outflow    c.m/sec"
"        336.2   Hydrograph volume    c.m"
"          22.   Number of stages"
"      417.800   Minimum water level    metre"
"      418.900   Maximum water level    metre"
"      417.800   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                417.800     0.000     0.000"
"                417.852   0.00137     3.802"
"                417.905   0.00522     8.273"
"                417.957   0.01046    13.261"
"                418.009   0.02343    18.864"
"                418.062   0.03028    25.226"
"                418.114   0.03575    32.124"
"                418.167   0.04057    39.839"
"                418.219   0.04480    48.106"
"                418.271   0.04867    57.078"
"                418.324   0.05231    66.967"
"                418.376   0.05566    77.418"
"                418.429   0.05887    88.846"
"                418.481   0.06186   100.848"
"                418.533   0.06472   113.645"
"                418.586   0.06750   127.529"
"                418.638   0.07012   141.988"
"                418.690   0.07265   157.298"
"                418.743   0.09014   173.798"
```

```
"                 418.795    0.1320   190.879"
"                 418.848    0.1960   192.560"
"                 418.900    0.2805   192.560"
"            1.   WEIRS"
"                   Crest      Weir     Crest      Left     Right"
"               elevation coefficie   breadth sideslope sideslope"
"                 418.700     0.900     1.000     3.000     3.000"
"            1.   ORIFICES"
"                 Orifice   Orifice   Orifice Number of"
"                  invert coefficie  diameter  orifices"
"                 417.800     0.630    0.1950     1.000"
"            1.   LAYERS"
"                  Bottom    Aspect    Bottom       Top   Average"
"                    area     ratio elevation elevation sideslope"
"                  67.676     7.774   417.800   418.800     4.000"
"              Peak outflow                 0.057    c.m/sec"
"              Maximum level              418.400    metre"
"              Maximum storage             82.683    c.m"
"              Centroidal lag               2.022   hours"
"                   0.075     0.107     0.057     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    34"
"            6   Combine "
"           34   Node #"
"                 LEAVING SITE"
"              Maximum flow                 0.057    c.m/sec"
"              Hydrograph volume          336.259    c.m"
"                      0.075     0.107     0.057     0.057"
" 40           HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                      0.075     0.000     0.057     0.057"
" 33           CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          201   C201 - NORTH PORTION OF APARTMENT PARKING LOT"
"       67.800   % Impervious"
"        0.240   Total Area"
"       28.000   Flow length"
"        2.000   Overland Slope"
"        0.077   Pervious Area"
"       28.000   Pervious length"
"        2.000   Pervious slope"
"        0.163   Impervious Area"
"       28.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       25.000   Pervious Max.infiltration"
"        5.000   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                      0.049     0.000     0.057     0.057 c.m/sec"
"              Catchment 201          Pervious   Impervious Total Area "
"              Surface Area           0.077      0.163      0.240      hectare"
"              Time of concentration  10.953     1.982      3.880      minutes"
"              Time to Centroid       97.554     88.094     90.095     minutes"
"              Rainfall depth         48.106     48.106     48.106     mm"
"              Rainfall volume        37.18      78.28      115.45     c.m"
"              Rainfall losses        22.183     2.215      8.645      mm"
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"             Runoff depth           25.922     45.891     39.461     mm"
"             Runoff volume          20.03      74.67      94.71      c.m"
"             Runoff coefficient     0.539      0.954      0.820      "
"             Maximum flow           0.012      0.045      0.049      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.049     0.049     0.057     0.057"
" 54          POND DESIGN"
"        0.049   Current peak flow    c.m/sec"
"        0.020   Target outflow    c.m/sec"
"         94.7   Hydrograph volume    c.m"
"          21.   Number of stages"
"      420.310   Minimum water level    metre"
"      420.660   Maximum water level    metre"
"      420.310   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                420.310     0.000     0.000"
"                420.327   0.01914   0.00897"
"                420.345   0.01925   0.07829"
"                420.362   0.01936    0.2567"
"                420.380   0.01948    0.6263"
"                420.397   0.01959     1.202"
"                420.415   0.01970     2.114"
"                420.432   0.01981     3.315"
"                420.450   0.01993     5.010"
"                420.467   0.02003     7.066"
"                420.485   0.02014     9.781"
"                420.503   0.02026    13.121"
"                420.520   0.02036    16.902"
"                420.538   0.02047    21.634"
"                420.555   0.02058    26.842"
"                420.573   0.02068    33.206"
"                420.590   0.02079    40.069"
"                420.608   0.02090    48.307"
"                420.625   0.02257    57.054"
"                420.643   0.03241    67.407"
"                420.660   0.05313    78.265"
"           1.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
"              elevation coefficie   breadth sideslope sideslope"
"                420.610     0.900     0.000    50.000    50.000"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                418.810     0.630    0.0850     1.000"
"           1.   LAYERS"
"                 Bottom    Aspect    Bottom       Top   Average"
"                   area     ratio elevation elevation sideslope"
"                  0.000     4.130   420.310   420.660    37.000"
"             Peak outflow                 0.020    c.m/sec"
"             Maximum level              420.540    metre"
"             Maximum storage             22.101    c.m"
"             Centroidal lag               1.638   hours"
"                  0.049     0.049     0.020     0.057 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.049     0.020     0.020     0.057"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          202   C202 - CENTRAL PARKING LOT AND APARTMENT BUILDING"
```

```
"       91.500   % Impervious"
"        0.279   Total Area"
"       24.000   Flow length"
"        2.000   Overland Slope"
"        0.024   Pervious Area"
"       24.000   Pervious length"
"        2.000   Pervious slope"
"        0.255   Impervious Area"
"       24.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       25.000   Pervious Max.infiltration"
"        5.000   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                     0.073     0.020     0.020     0.057 c.m/sec"
"            Catchment 202          Pervious   Impervious Total Area "
"            Surface Area           0.024      0.255      0.279      hectare"
"            Time of concentration  9.985      1.807      2.211      minutes"
"            Time to Centroid       96.336     87.799     88.221     minutes"
"            Rainfall depth         48.106     48.106     48.106     mm"
"            Rainfall volume        11.41      122.81     134.22     c.m"
"            Rainfall losses        22.406     2.184      3.903      mm"
"            Runoff depth           25.700     45.922     44.203     mm"
"            Runoff volume          6.09       117.23     123.33     c.m"
"            Runoff coefficient     0.534      0.955      0.919      "
"            Maximum flow           0.004      0.072      0.073      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                     0.073     0.093     0.020     0.057"
" 54         POND DESIGN"
"        0.093   Current peak flow    c.m/sec"
"        0.057   Target outflow    c.m/sec"
"        218.6   Hydrograph volume    c.m"
"          21.   Number of stages"
"      420.140   Minimum water level    metre"
"      420.490   Maximum water level    metre"
"      420.140   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               420.140     0.000     0.000"
"               420.158   0.04431   0.00803"
"               420.175   0.04458   0.05914"
"               420.193   0.04485    0.2056"
"               420.210   0.04511    0.4737"
"               420.228   0.04538    0.9415"
"               420.245   0.04564     1.599"
"               420.263   0.04591     2.572"
"               420.280   0.04616     3.792"
"               420.298   0.04643     5.452"
"               420.315   0.04668     7.408"
"               420.332   0.04693     9.783"
"               420.350   0.04719    12.801"
"               420.367   0.04744    16.168"
"               420.385   0.04770    20.329"
"               420.402   0.04794    24.861"
"               420.420   0.04820    30.347"
"               420.438   0.04845    36.575"
```

```
"               420.455   0.06061    43.198"
"               420.473    0.1347    51.038"
"               420.490    0.2914    59.260"
"          1.   WEIRS"
"                 Crest      Weir     Crest      Left     Right"
"             elevation coefficie   breadth sideslope sideslope"
"               420.440     0.900     0.000   380.000   380.000"
"          1.   ORIFICES"
"               Orifice   Orifice   Orifice Number of"
"                invert coefficie  diameter  orifices"
"               418.640     0.630    0.1300     1.000"
"          1.   LAYERS"
"                Bottom    Aspect    Bottom       Top   Average"
"                  area     ratio elevation elevation sideslope"
"                 0.000     3.516   420.140   420.490    32.200"
"            Peak outflow                 0.048    c.m/sec"
"            Maximum level              420.412    metre"
"            Maximum storage             27.806    c.m"
"            Centroidal lag               1.619   hours"
"                 0.073     0.093     0.048     0.057 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                    0.073     0.048     0.048     0.057"
" 33         CATCHMENT 203"
"           1   Triangular SCS"
"           1   Equal length"
"           2   Horton equation"
"         203   C203 - SOUTH PARKING LOT AND REAR OF SOUTH SEMIS"
"      60.500   % Impervious"
"       0.321   Total Area"
"      26.000   Flow length"
"       2.000   Overland Slope"
"       0.127   Pervious Area"
"      26.000   Pervious length"
"       2.000   Pervious slope"
"       0.194   Impervious Area"
"      26.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      25.000   Pervious Max.infiltration"
"       5.000   Pervious Min.infiltration"
"       0.250   Pervious Lag constant (hours)"
"       5.000   Pervious Depression storage"
"       0.015   Impervious Manning 'n'"
"       0.000   Impervious Max.infiltration"
"       0.000   Impervious Min.infiltration"
"       0.050   Impervious Lag constant (hours)"
"       1.500   Impervious Depression storage"
"                    0.062     0.048     0.048     0.057 c.m/sec"
"            Catchment 203         Pervious   Impervious Total Area "
"            Surface Area          0.127      0.194      0.321      hectare"
"            Time of concentration  10.476     1.896      4.203      minutes"
"            Time to Centroid      96.981     87.944     90.374     minutes"
"            Rainfall depth        48.106     48.106     48.106     mm"
"            Rainfall volume       61.00      93.42      154.42     c.m"
"            Rainfall losses       22.240     2.182      10.105     mm"
"            Runoff depth          25.866     45.924     38.001     mm"
"            Runoff volume         32.80      89.19      121.98     c.m"
"            Runoff coefficient    0.538      0.955      0.790      "
"            Maximum flow          0.021      0.054      0.062      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.062     0.110     0.048     0.057"
```

```
" 54          POND DESIGN"
"        0.110   Current peak flow    c.m/sec"
"        0.079   Target outflow    c.m/sec"
"        343.3   Hydrograph volume    c.m"
"          23.   Number of stages"
"      419.960   Minimum water level    metre"
"      420.360   Maximum water level    metre"
"      419.960   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                419.960     0.000     0.000"
"                419.979   0.07337   0.01123"
"                419.998   0.07387   0.08958"
"                420.017   0.07436    0.3026"
"                420.036   0.07485    0.7175"
"                420.055   0.07533     1.400"
"                420.074   0.07581     2.421"
"                420.093   0.07629     3.842"
"                420.112   0.07676     5.737"
"                420.131   0.07724     8.170"
"                420.151   0.07773    11.383"
"                420.169   0.07817    14.914"
"                420.189   0.07866    19.616"
"                420.208   0.07912    24.918"
"                420.227   0.07958    31.089"
"                420.246   0.08003    38.214"
"                420.265   0.08194    46.353"
"                420.284    0.1106    55.556"
"                420.303    0.1875    65.921"
"                420.322    0.3256    70.033"
"                420.341    0.5364    70.033"
"                420.360    0.8288    70.033"
"                420.379     1.212    70.033"
"           1.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
"              elevation coefficie   breadth sideslope sideslope"
"                420.260     0.900     2.000   180.000   180.000"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                418.460     0.630    0.1680     1.000"
"           1.   LAYERS"
"                 Bottom    Aspect    Bottom       Top   Average"
"                   area     ratio elevation elevation sideslope"
"                  0.000     1.890   419.960   420.310    35.000"
"             Peak outflow                  0.079    c.m/sec"
"             Maximum level               420.203    metre"
"             Maximum storage              23.501    c.m"
"             Centroidal lag                1.562   hours"
"                  0.062     0.110     0.079     0.057 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.062     0.079     0.079     0.057"
" 33          CATCHMENT 301"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          301   C301 - UNCONTROLLED PORTION "
"       46.400   % Impervious"
"        0.144   Total Area"
"        6.000   Flow length"
"       10.000   Overland Slope"
"        0.077   Pervious Area"
```

```
"        6.000   Pervious length"
"       10.000   Pervious slope"
"        0.067   Impervious Area"
"        6.000   Impervious length"
"       10.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       25.000   Pervious Max.infiltration"
"        5.000   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                        0.035     0.079     0.079     0.057 c.m/sec"
"            Catchment 301          Pervious   Impervious Total Area "
"            Surface Area           0.077      0.067      0.144      hectare"
"            Time of concentration  2.682      0.485      1.391      minutes"
"            Time to Centroid       87.394     86.476     86.854     minutes"
"            Rainfall depth         48.106     48.106     48.106     mm"
"            Rainfall volume        37.13      32.14      69.27      c.m"
"            Rainfall losses        22.622     6.142      14.975     mm"
"            Runoff depth           25.484     41.964     33.131     mm"
"            Runoff volume          19.67      28.04      47.71      c.m"
"            Runoff coefficient     0.530      0.872      0.689      "
"            Maximum flow           0.018      0.019      0.035      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                        0.035     0.111     0.079     0.057"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                        0.035     0.111     0.111     0.057"
" 40         HYDROGRAPH   Combine    34"
"           6   Combine "
"          34   Node #"
"               LEAVING SITE"
"
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100-Year Storm – Design Conditions

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"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                               Version 2.25  rev. 465"
"               MIDUSS created                          Tuesday, February 05, 2008"
"          10   Units used:                                            ie METRIC"
"               Job folder:                        Q:\18-256\25600-18 (Beatty Line)"
"               Output filename:                               100-yr DESIGN7.out"
"               Licensee name:                                       Mike.Vaughan"
"               Company                                                          "
"               Date & Time last used:                        5/24/2018 at 4:30:06 PM"
" 31         TIME PARAMETERS"
"       5.000   Time Step"
"     180.000   Max. Storm length"
"    1500.000   Max. Hydrograph"
" 47         FILEI_O Read/Open FERGUS 100YR STORM.stm"
"           1   1=read/open; 2=write/save"
"           1   1=rainfall; 2=hydrograph"
"           1   1=rain; 2=imperv; 3=perv"
"            FERGUS 100YR STORM.stm"
"            Fergus Shand Dam using Environment Canada IDF curve data"
"            New storm defined"
"            Total depth                  93.224    mm"
"            Maximum intensity           211.620    mm/hr"
"            Duration                    180.000   minutes"
"                 0.000     0.000     0.000     0.000 c.m/sec"
"           6   100hyd   Hydrograph extension used in this file"
" 33         CATCHMENT 101"
"           1   Triangular SCS"
"           1   Equal length"
"           2   Horton equation"
"         101   C101 - WEST PORTION - SEMI-DETACHED HOUSES"
"      64.300   % Impervious"
"       0.485   Total Area"
"      44.000   Flow length"
"       2.000   Overland Slope"
"       0.173   Pervious Area"
"      44.000   Pervious length"
"       2.000   Pervious slope"
"       0.312   Impervious Area"
"      44.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      25.000   Pervious Max.infiltration"
"       5.000   Pervious Min.infiltration"
"       0.250   Pervious Lag constant (hours)"
"       5.000   Pervious Depression storage"
"       0.015   Impervious Manning 'n'"
"       0.000   Impervious Max.infiltration"
"       0.000   Impervious Min.infiltration"
"       0.050   Impervious Lag constant (hours)"
"       1.500   Impervious Depression storage"
"                    0.200     0.000     0.000     0.000 c.m/sec"
"            Catchment 101          Pervious   Impervious Total Area "
"            Surface Area           0.173      0.312      0.485      hectare"
"            Time of concentration  11.308     2.068      4.840      minutes"
"            Time to Centroid       97.719     86.237     89.681     minutes"
"            Rainfall depth         93.224     93.224     93.224     mm"
"            Rainfall volume        161.41     290.72     452.14     c.m"
"            Rainfall losses        23.500     2.877      10.239     mm"
"            Runoff depth           69.725     90.347     82.985     mm"
"            Runoff volume          120.72     281.75     402.48     c.m"
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"             Runoff coefficient     0.748      0.969      0.890      "
"             Maximum flow           0.068      0.158      0.200      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.200     0.200     0.000     0.000"
" 54          POND DESIGN"
"        0.200   Current peak flow    c.m/sec"
"        0.038   Target outflow    c.m/sec"
"        402.5   Hydrograph volume    c.m"
"          21.   Number of stages"
"      418.050   Minimum water level    metre"
"      420.250   Maximum water level    metre"
"      418.050   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                418.050     0.000     0.000"
"                418.160   0.00438    0.5161"
"                418.270   0.01529     2.871"
"                418.380   0.02090     7.776"
"                418.490   0.02529    15.675"
"                418.600   0.02903    26.466"
"                418.710   0.03234    39.000"
"                418.820   0.03534    52.636"
"                418.930   0.03810    66.928"
"                419.040   0.04068    81.518"
"                419.150   0.04310    96.058"
"                419.260   0.04539   110.212"
"                419.370   0.04758   123.593"
"                419.480   0.04967   135.735"
"                419.590   0.05167   145.839"
"                419.700   0.05360   152.890"
"                419.810   0.05546   157.043"
"                420.000   0.05853   159.043"
"                420.100   0.06009   159.156"
"                420.140   0.07912   159.201"
"                420.250    0.1961   159.326"
"           1.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
"              elevation coefficie   breadth sideslope sideslope"
"                420.100     0.900     1.500     0.000     0.000"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                418.050     0.630    0.1400     1.000"
"           1.   SUPERPIPES_1"
"           1.   Type 1 is Pipe"
"             Downstream      Pipe      Pipe      Pipe      Pipe Number of"
"                 Invert    Length     Width    Height   Grade %     Pipes"
"                418.050    90.000     1.500     1.500     0.500     1.000"
"             Peak outflow                0.116    c.m/sec"
"             Maximum level             420.191    metre"
"             Maximum storage           159.259    c.m"
"             Centroidal lag              2.013   hours"
"                  0.200     0.200     0.116     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                    0.200     0.116     0.116     0.000"
" 33          CATCHMENT 102"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          102   C102 - SOUTH PORTION - SEMI-DETACHED DWELLINGS"
"       58.500   % Impervious"
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"        0.395   Total Area"
"       31.500   Flow length"
"        2.600   Overland Slope"
"        0.164   Pervious Area"
"       31.500   Pervious length"
"        2.600   Pervious slope"
"        0.231   Impervious Area"
"       31.500   Impervious length"
"        2.600   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       25.000   Pervious Max.infiltration"
"        5.000   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                     0.169     0.116     0.116     0.000 c.m/sec"
"            Catchment 102          Pervious   Impervious Total Area "
"            Surface Area           0.164      0.231      0.395      hectare"
"            Time of concentration  8.553      1.564      4.033      minutes"
"            Time to Centroid       94.404     85.510     88.652     minutes"
"            Rainfall depth         93.224     93.224     93.224     mm"
"            Rainfall volume        152.82     215.42     368.24     c.m"
"            Rainfall losses        23.568     2.751      11.390     mm"
"            Runoff depth           69.656     90.473     81.834     mm"
"            Runoff volume          114.18     209.06     323.25     c.m"
"            Runoff coefficient     0.747      0.970      0.878      "
"            Maximum flow           0.071      0.121      0.169      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                     0.169     0.213     0.116     0.000"
" 54         POND DESIGN"
"        0.213   Current peak flow    c.m/sec"
"        0.057   Target outflow    c.m/sec"
"        725.2   Hydrograph volume    c.m"
"          22.   Number of stages"
"      417.800   Minimum water level    metre"
"      418.900   Maximum water level    metre"
"      417.800   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                417.800     0.000     0.000"
"                417.852   0.00137     3.802"
"                417.905   0.00522     8.273"
"                417.957   0.01046    13.261"
"                418.009   0.02343    18.864"
"                418.062   0.03028    25.226"
"                418.114   0.03575    32.124"
"                418.167   0.04057    39.839"
"                418.219   0.04480    48.106"
"                418.271   0.04867    57.078"
"                418.324   0.05231    66.967"
"                418.376   0.05566    77.418"
"                418.429   0.05887    88.846"
"                418.481   0.06186   100.848"
"                418.533   0.06472   113.645"
"                418.586   0.06750   127.529"
"                418.638   0.07012   141.988"
"                418.690   0.07265   157.298"
"                418.743   0.09014   173.798"
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"                418.795    0.1320   190.879"
"                418.848    0.1960   192.560"
"                418.900    0.2805   192.560"
"           1.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
"              elevation coefficie   breadth sideslope sideslope"
"                418.700     0.900     1.000     3.000     3.000"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                417.800     0.630    0.1950     1.000"
"           1.   LAYERS"
"                 Bottom    Aspect    Bottom       Top   Average"
"                   area     ratio elevation elevation sideslope"
"                 67.676     7.774   417.800   418.800     4.000"
"             Peak outflow                 0.147    c.m/sec"
"             Maximum level              418.841    metre"
"             Maximum storage            192.329    c.m"
"             Centroidal lag               2.234   hours"
"                  0.169     0.213     0.147     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    34"
"            6   Combine "
"           34   Node #"
"                LEAVING SITE"
"             Maximum flow                 0.147    c.m/sec"
"             Hydrograph volume          720.501    c.m"
"                     0.169     0.213     0.147     0.147"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.169     0.000     0.147     0.147"
" 33          CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          201   C201 - NORTH PORTION OF APARTMENT PARKING LOT"
"       67.800   % Impervious"
"        0.240   Total Area"
"       28.000   Flow length"
"        2.000   Overland Slope"
"        0.077   Pervious Area"
"       28.000   Pervious length"
"        2.000   Pervious slope"
"        0.163   Impervious Area"
"       28.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       25.000   Pervious Max.infiltration"
"        5.000   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                     0.105     0.000     0.147     0.147 c.m/sec"
"             Catchment 201         Pervious   Impervious Total Area "
"             Surface Area          0.077      0.163      0.240      hectare"
"             Time of concentration 8.622      1.577      3.463      minutes"
"             Time to Centroid      94.482     85.526     87.924     minutes"
"             Rainfall depth        93.224     93.224     93.224     mm"
"             Rainfall volume       72.04      151.69     223.74     c.m"
"             Rainfall losses       23.554     2.749      9.448      mm"
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"             Runoff depth           69.670     90.476     83.776     mm"
"             Runoff volume          53.84      147.22     201.06     c.m"
"             Runoff coefficient     0.747      0.971      0.899      "
"             Maximum flow           0.034      0.085      0.105      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.105     0.105     0.147     0.147"
" 54          POND DESIGN"
"        0.105   Current peak flow    c.m/sec"
"        0.020   Target outflow    c.m/sec"
"        201.1   Hydrograph volume    c.m"
"          21.   Number of stages"
"      420.310   Minimum water level    metre"
"      420.660   Maximum water level    metre"
"      420.310   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                420.310     0.000     0.000"
"                420.327   0.01914   0.00897"
"                420.345   0.01925   0.07829"
"                420.362   0.01936    0.2567"
"                420.380   0.01948    0.6263"
"                420.397   0.01959     1.202"
"                420.415   0.01970     2.114"
"                420.432   0.01981     3.315"
"                420.450   0.01993     5.010"
"                420.467   0.02003     7.066"
"                420.485   0.02014     9.781"
"                420.503   0.02026    13.121"
"                420.520   0.02036    16.902"
"                420.538   0.02047    21.634"
"                420.555   0.02058    26.842"
"                420.573   0.02068    33.206"
"                420.590   0.02079    40.069"
"                420.608   0.02090    48.307"
"                420.625   0.02257    57.054"
"                420.643   0.03241    67.407"
"                420.660   0.05313    78.265"
"           1.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
"              elevation coefficie   breadth sideslope sideslope"
"                420.610     0.900     0.000    50.000    50.000"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                418.810     0.630    0.0850     1.000"
"           1.   LAYERS"
"                 Bottom    Aspect    Bottom       Top   Average"
"                   area     ratio elevation elevation sideslope"
"                  0.000     4.130   420.310   420.660    37.000"
"             Peak outflow                 0.047    c.m/sec"
"             Maximum level              420.655    metre"
"             Maximum storage             75.191    c.m"
"             Centroidal lag               1.868   hours"
"                  0.105     0.105     0.047     0.147 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                    0.105     0.047     0.047     0.147"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          202   C202 - CENTRAL PARKING LOT AND APARTMENT BUILDING"
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```
"       91.500   % Impervious"
"        0.279   Total Area"
"       24.000   Flow length"
"        2.000   Overland Slope"
"        0.024   Pervious Area"
"       24.000   Pervious length"
"        2.000   Pervious slope"
"        0.255   Impervious Area"
"       24.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       25.000   Pervious Max.infiltration"
"        5.000   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                     0.140     0.047     0.047     0.147 c.m/sec"
"            Catchment 202          Pervious   Impervious Total Area "
"            Surface Area           0.024      0.255      0.279      hectare"
"            Time of concentration  7.860      1.438      1.865      minutes"
"            Time to Centroid       93.649     85.372     85.923     minutes"
"            Rainfall depth         93.224     93.224     93.224     mm"
"            Rainfall volume        22.11      237.99     260.10     c.m"
"            Rainfall losses        23.813     2.854      4.636      mm"
"            Runoff depth           69.411     90.370     88.588     mm"
"            Runoff volume          16.46      230.70     247.16     c.m"
"            Runoff coefficient     0.745      0.969      0.950      "
"            Maximum flow           0.012      0.134      0.140      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                     0.140     0.160     0.047     0.147"
" 54         POND DESIGN"
"        0.160   Current peak flow    c.m/sec"
"        0.057   Target outflow    c.m/sec"
"        447.8   Hydrograph volume    c.m"
"          21.   Number of stages"
"      420.140   Minimum water level    metre"
"      420.490   Maximum water level    metre"
"      420.140   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                420.140     0.000     0.000"
"                420.158   0.04431   0.00803"
"                420.175   0.04458   0.05914"
"                420.193   0.04485    0.2056"
"                420.210   0.04511    0.4737"
"                420.228   0.04538    0.9415"
"                420.245   0.04564     1.599"
"                420.263   0.04591     2.572"
"                420.280   0.04616     3.792"
"                420.298   0.04643     5.452"
"                420.315   0.04668     7.408"
"                420.332   0.04693     9.783"
"                420.350   0.04719    12.801"
"                420.367   0.04744    16.168"
"                420.385   0.04770    20.329"
"                420.402   0.04794    24.861"
"                420.420   0.04820    30.347"
"                420.438   0.04845    36.575"
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"               420.455   0.06061    43.198"
"               420.473    0.1347    51.038"
"               420.490    0.2914    59.260"
"          1.   WEIRS"
"                 Crest      Weir     Crest      Left     Right"
"             elevation coefficie   breadth sideslope sideslope"
"               420.440     0.900     0.000   380.000   380.000"
"          1.   ORIFICES"
"               Orifice   Orifice   Orifice Number of"
"                invert coefficie  diameter  orifices"
"               418.640     0.630    0.1300     1.000"
"          1.   LAYERS"
"                Bottom    Aspect    Bottom       Top   Average"
"                  area     ratio elevation elevation sideslope"
"                 0.000     3.516   420.140   420.490    32.200"
"            Peak outflow                 0.136    c.m/sec"
"            Maximum level              420.473    metre"
"            Maximum storage             51.111    c.m"
"            Centroidal lag               1.732   hours"
"                 0.140     0.160     0.136     0.147 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                    0.140     0.136     0.136     0.147"
" 33         CATCHMENT 203"
"           1   Triangular SCS"
"           1   Equal length"
"           2   Horton equation"
"         203   C203 - SOUTH PARKING LOT AND REAR OF SOUTH SEMIS"
"      60.500   % Impervious"
"       0.321   Total Area"
"      26.000   Flow length"
"       2.000   Overland Slope"
"       0.127   Pervious Area"
"      26.000   Pervious length"
"       2.000   Pervious slope"
"       0.194   Impervious Area"
"      26.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      25.000   Pervious Max.infiltration"
"       5.000   Pervious Min.infiltration"
"       0.250   Pervious Lag constant (hours)"
"       5.000   Pervious Depression storage"
"       0.015   Impervious Manning 'n'"
"       0.000   Impervious Max.infiltration"
"       0.000   Impervious Min.infiltration"
"       0.050   Impervious Lag constant (hours)"
"       1.500   Impervious Depression storage"
"                    0.142     0.136     0.136     0.147 c.m/sec"
"            Catchment 203          Pervious   Impervious Total Area "
"            Surface Area           0.127      0.194      0.321      hectare"
"            Time of concentration  8.247      1.508      3.760      minutes"
"            Time to Centroid       94.109     85.443     88.339     minutes"
"            Rainfall depth         93.224     93.224     93.224     mm"
"            Rainfall volume        118.20     181.05     299.25     c.m"
"            Rainfall losses        23.710     2.790      11.054     mm"
"            Runoff depth           69.515     90.434     82.171     mm"
"            Runoff volume          88.14      175.63     263.77     c.m"
"            Runoff coefficient     0.746      0.970      0.881      "
"            Maximum flow           0.061      0.102      0.142      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.142     0.278     0.136     0.147"
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" 54          POND DESIGN"
"        0.278   Current peak flow    c.m/sec"
"        0.079   Target outflow    c.m/sec"
"        708.7   Hydrograph volume    c.m"
"          23.   Number of stages"
"      419.960   Minimum water level    metre"
"      420.360   Maximum water level    metre"
"      419.960   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                419.960     0.000     0.000"
"                419.979   0.07337   0.01123"
"                419.998   0.07387   0.08958"
"                420.017   0.07436    0.3026"
"                420.036   0.07485    0.7175"
"                420.055   0.07533     1.400"
"                420.074   0.07581     2.421"
"                420.093   0.07629     3.842"
"                420.112   0.07676     5.737"
"                420.131   0.07724     8.170"
"                420.151   0.07773    11.383"
"                420.169   0.07817    14.914"
"                420.189   0.07866    19.616"
"                420.208   0.07912    24.918"
"                420.227   0.07958    31.089"
"                420.246   0.08003    38.214"
"                420.265   0.08194    46.353"
"                420.284    0.1106    55.556"
"                420.303    0.1875    65.921"
"                420.322    0.3256    70.033"
"                420.341    0.5364    70.033"
"                420.360    0.8288    70.033"
"                420.379     1.212    70.033"
"           1.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
"              elevation coefficie   breadth sideslope sideslope"
"                420.260     0.900     2.000   180.000   180.000"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                418.460     0.630    0.1680     1.000"
"           1.   LAYERS"
"                 Bottom    Aspect    Bottom       Top   Average"
"                   area     ratio elevation elevation sideslope"
"                  0.000     1.890   419.960   420.310    35.000"
"             Peak outflow                  0.232    c.m/sec"
"             Maximum level               420.314    metre"
"             Maximum storage              68.216    c.m"
"             Centroidal lag                1.750   hours"
"                  0.142     0.278     0.232     0.147 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.142     0.232     0.232     0.147"
" 33          CATCHMENT 301"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          301   C301 - UNCONTROLLED PORTION "
"       46.400   % Impervious"
"        0.144   Total Area"
"        6.000   Flow length"
"       10.000   Overland Slope"
"        0.077   Pervious Area"
```

```
"        6.000   Pervious length"
"       10.000   Pervious slope"
"        0.067   Impervious Area"
"        6.000   Impervious length"
"       10.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       25.000   Pervious Max.infiltration"
"        5.000   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                     0.071     0.232     0.232     0.147 c.m/sec"
"            Catchment 301          Pervious   Impervious Total Area "
"            Surface Area           0.077      0.067      0.144      hectare"
"            Time of concentration  2.111      0.386      1.245      minutes"
"            Time to Centroid       86.550     84.127     85.334     minutes"
"            Rainfall depth         93.224     93.224     93.224     mm"
"            Rainfall volume        71.95      62.29      134.24     c.m"
"            Rainfall losses        24.458     13.192     19.231     mm"
"            Runoff depth           68.766     80.032     73.993     mm"
"            Runoff volume          53.08      53.47      106.55     c.m"
"            Runoff coefficient     0.738      0.858      0.794      "
"            Maximum flow           0.038      0.033      0.071      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                     0.071     0.265     0.232     0.147"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                     0.071     0.265     0.265     0.147"
" 40         HYDROGRAPH   Combine    34"
"           6   Combine "
"          34   Node #"
"               LEAVING SITE"
"            Maximum flow                 0.339    c.m/sec"
"            Hydrograph volume         1557.532    c.m"
"                     0.071     0.265     0.265     0.339"
" 40         HYDROGRAPH   Confluence    34"
"           7   Confluence "
"          34   Node #"
"               LEAVING SITE"
"            Maximum flow                 0.339    c.m/sec"
"            Hydrograph volume         1557.532    c.m"
"                     0.071     0.339     0.265     0.000"
" 38         START/RE-START TOTALS 34"
"           3   Runoff Totals on EXIT"
"            Total Catchment area                        1.864    hectare"
"            Total Impervious area                       1.222    hectare"
"            Total % impervious                         65.556"
" 19         EXIT"
```