MTE Consultants
123 St. George St., London, Ontario N6A 3A1

July 13, 2020

MTE File No.: C45013-200

County of Middlesex
399 Ridout Street North
London, ON N6A 2P1

Attention: Durk Vanderwerff, Director of Planning

RE: Preliminary Stormwater Management Report
For Vacant Land Condominium Development (Light Industrial Sites)
at 10919 Longwood Road, Delaware

Introduction:

It is proposed to develop the property at 10919 Longwood Road, Delaware in the Municipality of Middlesex Center. The development property is 6.64 Ha in size and is located south of Longwoods Road on the east side of Delaware. The property is zoned for light industrial use. It is proposed to development the property into 15 individual lots for light industrial use. The lots will range from 0.30 to 0.46 Ha in size. The lots will be created through a vacant land condominium which will contain a private internal roadway to provide access to the lots and a private stormwater management (SWM) basin which will provide a stormwater outlet for the lots. The private roadway and SWM basin will be common elements within the condo development.

Please refer to the attached Draft Plan of Vacant Land Condominium (DWG-1) which shows the proposed development. This letter report outlines the proposed storm drainage and stormwater management for the development in support of draft plan approval.

Pre-development Conditions:

The pre-development site is farmland. The pre-development drainage patterns are outlined below:

- The southerly 1.8 Ha of development drains to the south onto the adjacent farm.
- The remainder 4.85 Ha of the development drains to multiple low lying areas throughout the property where the runoff infiltrates into the ground.

MTE Consulting completed a detailed geotechnical investigation for the property. The existing soils are a mixture of sand and silt. (Reference: Geotechnical Investigation for Proposed Industrial Subdivision at 10919 Longwoods Road, MTE Consultants Inc., March 27, 2019).

Proposed Post-Development Site:

Please refer to the attached Draft Plan of Vacant Land Condominium (DWG-1) and the Preliminary Grading Plan (DWG-2). It is proposed to drain the development as follows:

- Each lot will be individually serviced with internal storm sewers and/or ditches which will discharge stormwater runoff to the ditching system located within the private roadway corridor.

- The private roadway corridor will contain roadside ditches on both sides of the asphalt road. The ditches will be approximately 0.80m deep with 4:1 side slopes and a 1m wide flat bottom. The ditches will be grassed with a minimum slope of 0.50% and will drain into the north portion of the proposed SWM basin. Culverts will be installed at the intersection and at future driveways.

- The rear of lots 8-15 will drain into a rear yard swale system, located at the south edge of the development. These swales will be grassed with a 0.50% minimum slope and will drain into the south portion of the proposed SWM basin.

- The roadway ditches and rear yard swales will all outlet a private SWM basin which will be located between lots 13 and 14. The SWM basin will be 0.51 Ha in size and will infiltrate stormwater runoff into the ground in order to match and mimic the pre-development condition.

Infiltration Basin Design:

MTE Consulting completed on-site infiltration testing and determined that the factored infiltration rate of the sandy soils at the infiltration basin location is 18mm/hr. The infiltration rate contains a factor of safety of 3. (Reference: Letter Results of In-situ Infiltration Testing, Proposed Industrial Subdivision, 10919 Longwoods Road, Middlesex Centre, MTE Consultants Inc., July 3, 2020). The following details outline the proposed design of the infiltration basin:

- Drainage Area = 6.65 Ha (including the area of the basin itself)
- Bottom Area of Basin = 0.28 Ha
- Top Area of Basin (to top of slope) = 0.43 Ha
- Block Size = 0.51 Ha
- Side slopes = 4:1 max
- Bottom and sides of infiltration basin will be topsoil and grassed
- Factored infiltration rate = 18mm/hr (contains a factor of safety of 3)
- Total infiltration rate for facility 0.28 Ha x 10,000m2/Ha x 18mm/hr /1000 = 50.4m3/hr = 0.014m3/sec
- Estimated maximum ground water table elevation = 233.60
- Proposed bottom of basin = 234.80
- Estimated clearance (bottom of basin to estimated ground water) = 1.20m

Hydraulic Modelling for Infiltration Basin:

The post-development tributary area to the infiltration basin is outlined below:

- Private Light Industrial Lots = 4.96 Ha (maximum impervious area = 60%)
- Private Roadway Corridor with ditches = 1.17 Ha (impervious area = 45%)
- Private SWM Facility = 0.51 Ha (equivalent impervious area = 50%)
- Total Area = 6.65 Ha, Composite Impervious = 58%
- To be conservative, we have used an overall Composite Impervious Ratio of 60%

As noted on the Preliminary Grading Plan (DWG-2), there appear to be areas from Longwood Road which drain onto the development lands. As shown on the plan, we anticipate and recommend the drainage from the road allowance area be conveyed to the east/west such that the road allowance runoff does not drain onto the private development.

We have completed hydraulic models for the inflow/outflow/ponding of the infiltration basin using SWMHYMO-99. The City of London IDF curves were used to model the following storm events:

- 25mm, 4 hour Chicago Storm
- 1:2 year, 4 hour Chicago Storm
- 1:5 year, 4 hour Chicago Storm
- 1:10 year, 4 hour Chicago Storm
- 1:50 year, 4 hour Chicago Storm
- 1:100 year, 4 hour Chicago Storm

To be conservative, we have used a 4 hour storm duration instead of a 3 hour duration.

As noted previously, the pond infiltration rate (outflow rate) was set at 0.014m3/s which contains a factor of safety of 3.

The attached Table 1 outlines the infiltration basin storage volumes and associated draw down times during each storm event. Detailed SWMHYMO-99 output is also attached.

Infiltration Basin Ponding Depths and Surface Outflow:

Please refer to Table 1 for the estimated ponding depths for each storm event. Please also refer to the attached Pond Cross Section (DWG-3).

The bottom of the basin has been set at 234.80.

1:2 year storm estimated ponding elevation is 235.40 (depth = 0.60m). Small amounts of ponding of 0.30m will occur in isolated areas in the adjacent roadside ditches to an elevation 235.40. To be conservative, storage volumes and infiltration for the roadside ditching has not been factored into this analysis.

The 1:100 year storm estimated ponding elevation is 235.95 (depth = 1.15m). The maximum grade around of the SWM basin is 236.40. As such there is 0.45m freeboard. Ponding of 0.85m will also occur in the roadside ditch to elevation 235.95. However, the majority of the ditch (average elevation of 359.90) will only have 0.05m ponding.

An emergency overflow to the south is provided at elevation 236.20, which is 0.25m higher than the facility storage level for the 1:100 year storm event.

The infiltration basin has been designed to infiltration upto the 1:100 year storm event. As such there should be no surface run-off onto adjacent properties, under normal operating conditions.

Quality Control:

As previously outlined, the development will consist of 15 light industrial lots. The development of each lot will be subject to future Site Plan approvals which will require detailed engineering, grading and stormwater management plans be provided for each lot. Each lot will need to provide an OGS unit such that quality control for the development is provided. The OGS units shall be designed for Level 1 protection. Depending on the end use of each lot, lots with less than 250m2 of total asphalt area may be able to use swales and landscape treatment instead of an oil grit separator. This will be determined and assessed on an individual lot basis during the site plan process for each lot.

Construction Staging for Infiltration Basin:

The infiltration basin should be completed at the initial stages of the development. Active sediment and erosion controls shall be implemented to decrease sediment load into the basin during construction. After the overall site is 85% built out (i.e. 85% of the individual lots are completed including asphalt, vegetation and sodding), the pond will be sub-excavated to remove any accumulated silt. After 85% built-out the following will occur:

- MTE Consulting will inspect the pond bottom and take soil samples.
- The basin bottom including the bottom 2m of each side slope will be sub-excavated to 0.30m minimum depth. The excavated material shall be removed from the site and replaced with 0.30m depth of imported clean sand (no silt/clay). The purpose of this operation is to remove any contaminated sand, silt and sediment that has accumulated in the pond during development construction.
- A 150mm depth of sandy topsoil mix shall be installed on top of the new sand layer.
- The native sand and the imported 0.30m of sand should not be compacted and the top layers of both the native sand and the imported sand shall be scarified prior to the installation of the topsoil mix.

Topsoil and Seeding for Infiltration Basin:

Topsoil and seed shall be installed on the basin bottom and the 4:1 side slopes. It is important that the topsoil is very pervious and a 30/70 sand to topsoil mix shall be used for the topsoil layer within the basin. The topsoil layer will have a maximum thickens of 150mm and shall be seeded (not sodded). The seeding mix shall be Native Prairie Meadow Mix.

Initial Monitoring of the Infiltration Basin:

After the overall development is 85% built out and the basin seeding has been established, MTE Consulting will monitor the basin for a 1 year period. The purpose of the monitoring is to ensure the basin is functioning property and within the design parameters. If the basin is not functioning properly MTE will provide recommendations for any remediation work.

On-going Maintenance of Infiltration Basin:

The infiltration basin will be privately owned and operated by the condo board. The condo board shall complete yearly monitoring and maintenance of the infiltration basin.

The condo board shall undertake the following maintenance and shall allow for the associated costs in the condo board reserve fund:

- The grass areas within the pond shall be cut on a regular basis and pond area shall be kept free of garbage and debris.

- Every five (5) years, the basin bottom and bottom 2m of the side slopes shall be fully excavated by 0.30m. The 0.15m thickens of topsoil and 0.15m thickness of sand below the topsoil shall be removed and replaced with new clean sand and topsoil (with no clay/silt content). The replacement of these materials every 5 years will be required in order to keep the infiltration basin functioning.

Conclusions

This letter report outlines the proposed storm drainage and stormwater management for the development in support of the draft plan approval. We anticipated an updated report will be prepared as a condition of draft plan approval.

In summary, the development consists 15 individual lots for light industrial use which will be development through a vacant land condominium. The stormwater drainage for the development will outlet to a stormwater infiltration basin. The infiltration basin is 0.51 Ha in size and has been designed to accommodate the 1:100 post-development flows from the development. The infiltration basin, private roadway and conveyance ditches will be privately owned and maintained by the condominium board.

Level 1 stromwater quality controls will be provided on the individual lots prior to discharge to the internal roadway ditch system. The development of the individual lots will be subject to future site plan approvals which will require detailed engineering, grading and stormwater management plans be provided for each lot.

Please contact us if you have any comments or questions.

Yours Truly,

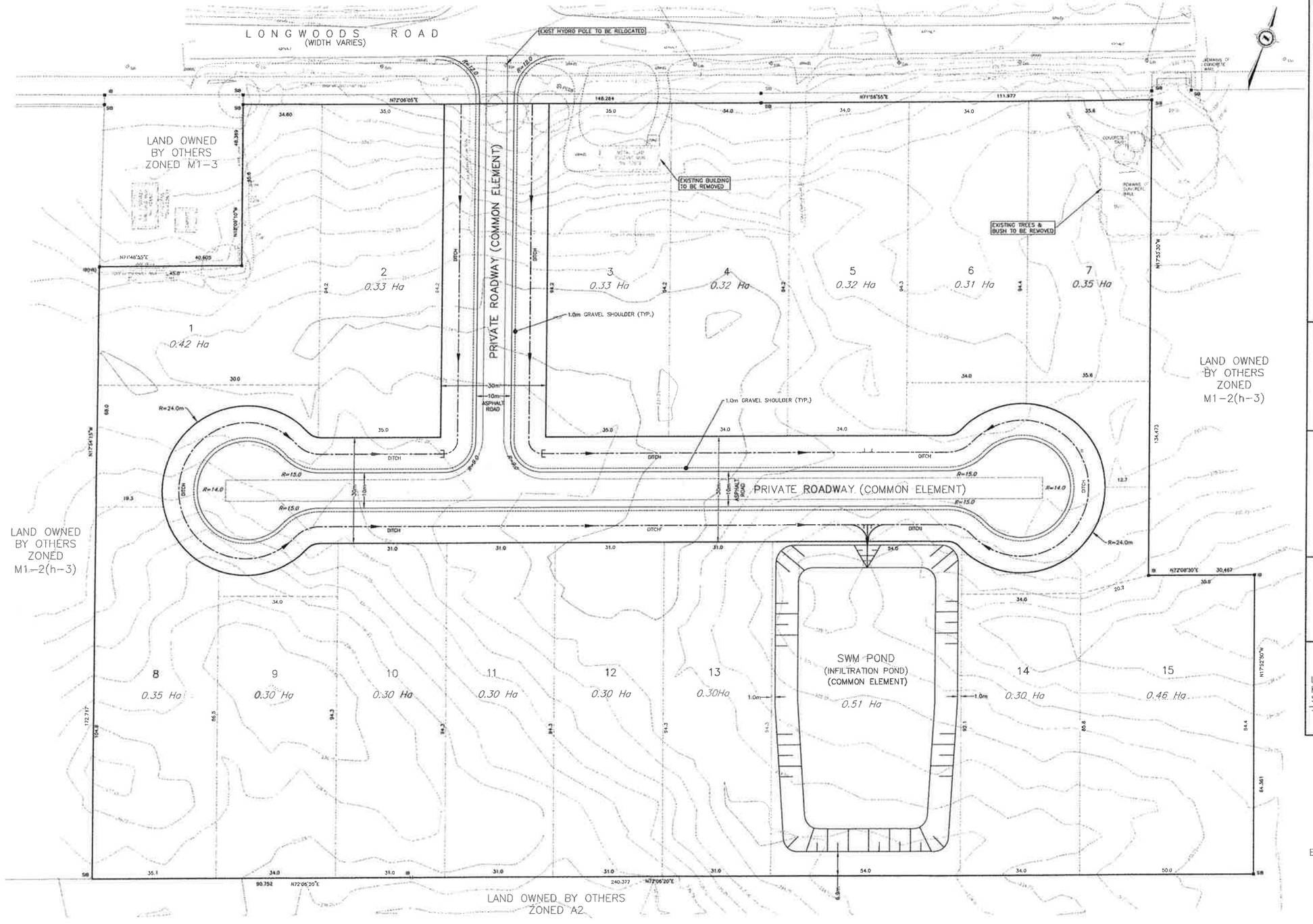
MTE Consultants Inc.

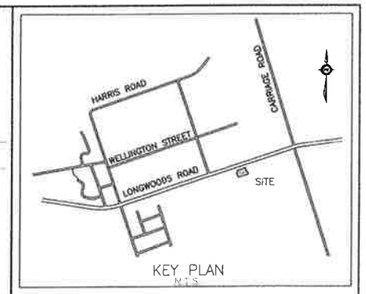
Kyle McIntosh, P. Eng.
Manager, Land Development
519-204-6510 ext. 2203
kmcintosh@mte85.com

M:\45013\200\SWM Report\preliminary stormwater management report.docx

Table 1: Infiltration Basin Calculations						
Design Storm	Runoff volume to infiltration basin (m3)	Infiltration Basin Infiltration Rate (m3/hour)	Infiltration Amount During Storm (m3)	Infiltration Basin Total Storage Required (m3)	Drain down time after storm event (hours)	Infiltration Basin Estimated Ponding Depth (m)
25mm, 4 hours	918	50	202	716	14	0.35
1:2 year, 4 hours	1915	50	202	1713	34	0.6
1:5 year, 4 hours	2006	50	202	1804	36	0.7
1:10 year, 4 hours	2447	50	202	2245	45	0.8
1:50 year, 4 hours	3425	50	202	3223	64	0.95
1:100 year, 4 hours	3853	50	202	3651	72	1.15

P:\2\45013\200\PLANNING\01 DRAWING\45013-200 PLANS.DP1 4_MJS1 RESIDENT





KEY PLAN
N.T.S.

DRAFT PLAN OF VACANT LAND CONDOMINIUM

PART OF

LOT 6, CONCESSION 1

IN THE

MUNICIPALITY OF MIDDLESEX CENTRE

(GEOGRAPHIC TOWNSHIP OF DELAWARE)

COUNTY OF MIDDLESEX

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE THE SUBMISSION OF THIS PLAN IN DRAFT FORM.

Feb 9 2020

GUY RIOPELLE — DATE
10919 LONGWOODS ROAD INC.
I HAVE AUTHORITY TO BIND THE COROPATION

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED, AS SHOWN ON THIS PLAN, AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

Jan/24/20

P.R. LEVAC — DATE
ONTARIO LAND SURVEYOR

REQUIREMENTS of SECTION 51(17) of the PLANNING ACT

	(E) SEE PLAN	
(A) SEE PLAN	(F) SEE PLAN	(I) SAND, SILT & CLAY
(B) SEE PLAN	(F.1) N/A	(J) SEE PLAN
(C) SEE PLAN	(G) SEE PLAN	(K) MUNICIPAL WATER SERVICE ONLY
(D) SEE PLAN	(H) MUNICIPAL WATER	(L) SEE PLAN

SCHEDULE OF LAND USE (IN Ha)

LIGHT INDUSTRIAL	LOTS 1-15	4.96
ROAD CORRIDOR	COMMON ELEMENT	1.17
SWM POND	COMMON ELEMENT	0.51
TOTAL		6.64 Ha

6.0m WIDE FIRE ROUTE
C\L RADIUS = 12m

FIRE ROUTE SIGNS SHALL BE PLACED ON BOTH SIDES OF ROADWAY WITH 30m SPACINGS

EXISTING ZONING OF LANDS = M1-2(h-3)

EXISTING SERVICES	DRAWING & SOURCE	CONSTRUCTION DATE	CONSTRUCTED SERVICES	COMPLETION	DETAILS		No.	REVISIONS	DATE	CONSULTANT
					DESIGN	KAH				
					DRAWN BY	HA				
					CHECKED	KAH				
					APPROVED	KAH				
					DATE	JAN/20				

CONSULTANT OR DIVISION
MTE
Engineers, Scientists, Surveyors

ENGINEER'S STAMP

SCALE
SCALE = 1 : 500
5m 0 10m

TITLE
LOT 6, CONCESSION 1
MUNICIPALITY OF MIDDLESEX CENTRE
DRAFT PLAN OF
VACANT LAND CONDOMINIUM

PROJECT No. 45013-200
SHEET No. 1
PLAN FILE No.

L:\PROJECTS\2020\45013-200 PLANS_UP1 7_MOST RECENT

SWALE/DITCH DRAINAGE TO THE WEST SHALL BE PROVIDED SUCH THAT THE STORM WATER FOR THE ROAD ALLOWANCE DOES NOT DRAIN ONTO THE PRIVATE DEVELOPMENT.

SWALE/DITCH DRAINAGE TO THE EAST SHALL BE PROVIDED SUCH THAT THE STORM WATER FOR THE ROAD ALLOWANCE DOES NOT DRAIN ONTO THE PRIVATE DEVELOPMENT.

LONGWOODS ROAD

EXIST HYDRO POLE TO BE RELOCATED

EXISTING BUILDING TO BE REMOVED

EXISTING TREES & BUSH TO BE REMOVED

PRIVATE ROADWAY

28m-450ø CONC. CULVERT-0.67%

22m-600ø CONC. CULVERT-0.90%

SWM POND (INFILTRATION POND) (COMMON ELEMENT)

SEE DWG 3 FOR SECTION

1:2 YR = 35.40 DEPTH=0.60m

1:10 YR = 35.60 DEPTH=0.80m

1:100 YR = 35.95 DEPTH=1.15m

GENERAL NOTES

1. THIS IS A PRELIMINARY GRADING PLAN TO SUPPORT THE DRAFT PLAN APPLICATION.
2. EACH LOT WILL BE SUBJECT TO SEPARATE SITE PLAN APPROVAL. DURING THE SITE PLAN PROCESS FOR EACH LOT, AN INDIVIDUAL LOT GRADING AND DRAINAGE PLAN WILL BE PERPETRATED FOR EACH LOT
3. IT IS ANTICIPATED THAT EACH LOT WILL CONTAIN INTERNAL STORM SEWERS AND/OR INTERNAL DITCHES THAT WILL OUTLET TO THE PRIVATE ROADWAY DITCH
4. THE GRADING STANDARDS TO BE USED FOR THE INDIVIDUAL LOTS IS 1.0% MINIMUM GRADES FOR ASPHALT AREAS AND 2.0% MINIMUM GRADES FOR GRASS AREAS
5. THE SITE PLAN FOR EACH LOT WILL BE REQUIRED TO ADDRESS SWM QUALITY CONTROL. IF THE TOTAL ASPHALT AREA ON EACH LOT IS MORE THAN 800m2, AN OIL GRIT SEPARATOR WILL BE REQUIRED TO BE PROVIDED ON THE INDIVIDUAL LOT. THE OIL GRIT SEPARATOR SHALL BE DESIGNED FOR LEVEL 1 QUALITY CONTROL. FURTHERMORE, IF THE ASPHALT AREA IS LESS THAN 800m2 BUT THERE IS EQUIPMENT WASHING AREAS OR ANY OIL/FUEL STORAGE PROPOSED AN OIL GRIT SEPARATOR SHALL BE PROVIDED.

LEGEND

- PROPOSED ELEVATION
- MATCH EXISTING ELEVATION
- PROPOSED SWALE & SLOPE
- PROPOSED SLOPE
- PROPOSED BERM (3:1 SLOPE MAXIMUM)
- EXISTING ELEVATION
- EXISTING SWALE & SLOPE
- EXISTING SLOPE
- EXISTING HYDRO POLE
- PROPOSED/EXISTING STREET LIGHT
- EXISTING HYDRO TRANSFORMER ON CONC. PAD
- PROPOSED/EXISTING SIGN
- EXISTING FENCE LINE
- PROPOSED FENCE LINE
- PROPOSED CURB CUT
- PROPOSED CURB TRANSITION (CURB TYPE 3.0m MIN.) (TO SUPER-ELEVATED 6.0m MIN.)
- PROPOSED SUPER-ELEVATED CURB
- PROPOSED BUILDING ENTRANCE
- PROPOSED/EXISTING STORM MANHOLE
- PROPOSED/EXISTING CATCH BASIN
- PROPOSED/EXISTING SANITARY MANHOLE
- PROPOSED CATCH BASIN MANHOLE
- PROPOSED 3-WAY FIRE HYDRANT C\W STORZ CONNECTION, WITH WATER VALVE ON 150 LEAD
- PROPOSED WATER VALVE
- PROPOSED RESTORATION AREA (SEE RESTORATION NOTE)
- PROPOSED OVERLAND FLOW ROUTE

EXISTING SERVICES	DRAWING #, SOURCE	CONSTRUCTION DATE	CONSTRUCTED SERVICES	COMPLETION

DETAILS	
DESIGN	KAH
DRAWN BY	IFA
CHECKED	KAH
APPROVED	KAH
DATE	JULY/20

No	REVISIONS	DATE	CONSULTANT

CONSULTANT OR DIVISION

MTE

Engineers, Scientists, Surveyors

ENGINEER'S STAMP

SCALE

SCALE - 1 : 500

0 10m

TITLE

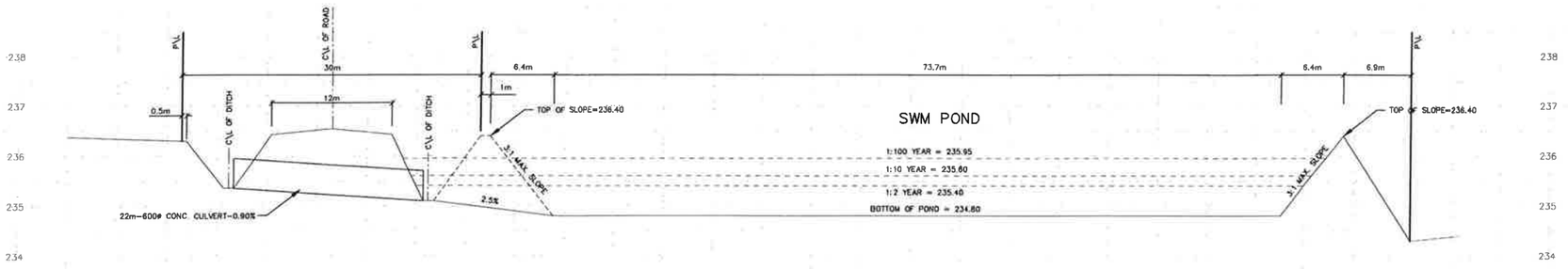
LOT 6, CONCESSION 1
MUNICIPALITY OF MIDDLESEX CENTRE

PRELIMINARY GRADING PLAN

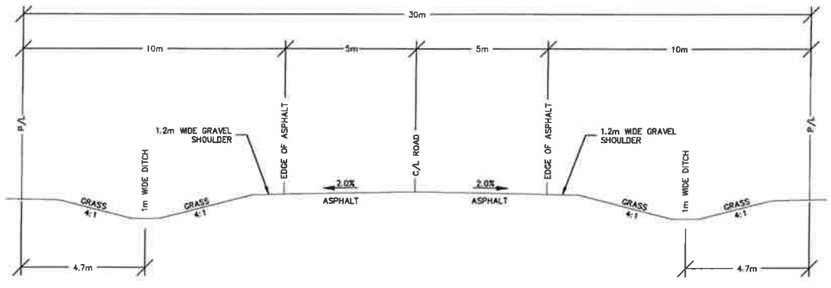
PROJECT No. 45013-200

SHEET No. 2

PLAN FILE No.



SECTION A–A
SWM POND
SCALE: HORIZ=1:250
VERT=1:100



TYPICAL PRIVATE ROAD SECTION
SCALE: HORIZ=1:100 VERT=1:100

EXISTING SERVICES	DRAWING #, SOURCE	CONSTRUCTION DATE	CONSTRUCTED SERVICES	COMPLETION	DETAILS	No.	REVISIONS	DATE	CONSULTANT
					DESIGN KAM				
					DRAWN BY RFA				
					CHECKED KAM				
					APPROVED KAM				
					DATE JULY/20				

CONSULTANT OR DIVISION
MTE
Engineers, Scientists, Surveyors

ENGINEER'S STAMP

SCALE
SCALE – AS SHOWN

TITLE
LOT 6, CONCESSION 1
MUNICIPALITY OF MIDDLESEX CENTRE

DETAILS

PROJECT No. 45013-200
SHEET No. 3
PLAN FILE No.

C:\USERS\USERVERSATION\LUNGMUUS\45013-200 PLANS_DP1 7_MOD1.DGN

C:\USERS\USER\DESKTOP\LONGWOODS\45013-200 PLANS_DP1 2_MAY21.DWG

SWALE/DITCH DRAINAGE TO THE WEST SHALL BE PROVIDED SUCH THAT THE STORM WATER FOR THE ROAD ALLOWANCE DOES NOT DRAIN ONTO THE PRIVATE DEVELOPMENT.

LONGWOODS ROAD

EXIST HYDRO POLE TO BE RELOCATED

SWALE/DITCH DRAINAGE TO THE EAST SHALL BE PROVIDED SUCH THAT THE STORM WATER FOR THE ROAD ALLOWANCE DOES NOT DRAIN ONTO THE PRIVATE DEVELOPMENT.

LIGHT DUTY SILT FENCE ON PROPERTY LINE (TYP.)

EXISTING BUILDING TO BE REMOVED

METAL CLAD BUILDING MUN No. 10913

EXISTING TREES & BUSH TO BE REMOVED

PRIVATE ROADWAY

28m-450ø CONC. CULVERT-0.67%

22m-600ø CONC. CULVERT-0.90%

TOP OF SLOPE

DITCH

SWM POND (INFILTRATION POND) (COMMON ELEMENT)

1:2 YR = 35.40 DEPTH=0.60m

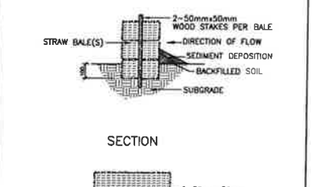
1:10 YR = 35.60 DEPTH=0.80m

1:100 YR = 35.95 DEPTH=1.15m

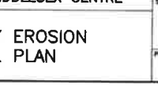
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

SEDIMENT CONTROL MEASURES

1. INSTALL SILT FENCE AROUND PERIMETER OF ENTIRE SITE INSTALL STRAW BALE CHECK DAMS AT ALL CBs IN GRASS AREAS.
2. PROTECT ALL EXPOSED SURFACES AND CONTROL ALL RUNOFF DURING CONSTRUCTION.
3. ALL EROSION CONTROL MEASURES ARE TO BE IN PLACE BEFORE STARTING CONSTRUCTION AND REMAIN IN PLACE UNTIL RESTORATION IS COMPLETE.
4. MAINTAIN EROSION CONTROL MEASURES DURING ALL PHASES OF CONSTRUCTION.
5. ALL COLLECTED SEDIMENT IS TO BE DISPOSED OF AT AN APPROVED LOCATION.
6. PROTECT ALL SITE CATCHBASINS, MANHOLES AND PIPE ENDS FROM SEDIMENT INTRUSION WITH GEOTEXTILE (TERRAFIX 270R).
7. PREVENT WIND BLOWN DUST.
8. STRAW BALES ARE TO BE USED AT ALL CB/CBMH AND IN LOCALIZED AREAS AS DIRECTED BY THE ENGINEER DURING CONSTRUCTION.
9. WHEN ALL RESTORATION IS COMPLETED REMOVE SEDIMENT CONTROL MEASURES AND RESTORE IMPACTED AREAS.
10. ALL SILT FENCING AND DETAILS ARE AT THE MINIMUM TO BE CONSTRUCTED IN ACCORDANCE WITH THE MINISTRY OF NATURAL RESOURCES GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES.
11. ALL OF THE ABOVE NOTES AND ANY SEDIMENT AND EROSION CONTROL MEASURES ARE AT THE MINIMUM TO BE IN ACCORDANCE WITH THE MINISTRY OF NATURAL RESOURCES GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES.



SECTION

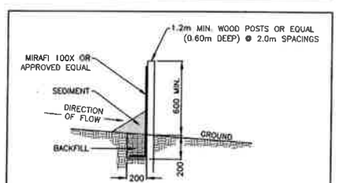


PLAN

STRAW BALE DETAIL
NTS

LEGEND

- PROPOSED SWALE
- TOP / BOTTOM — PROPOSED BERM (3:1 SLOPE MAXIMUM)
- PROPOSED LIGHT DUTY SILT FENCE
- PROPOSED STRAWBALE CHECKDAM



LIGHT DUTY SILT FENCE DETAIL
NTS:

EXISTING SERVICES	DRAWING #, SOURCE	CONSTRUCTION DATE	CONSTRUCTED SERVICES	COMPLETION	DETAILS		No.	REVISIONS	DATE	CONSULTANT
					DESIGN	KAH				
					DRAWN BY	IRA				
					CHECKED	KAH				
					APPROVED	KAH				
					DATE	JULY/20				

CONSULTANT OR DIVISION

MTE
Engineers, Scientists, Surveyors

ENGINEER'S STAMP

SCALE

SCALE = 1 : 500
5 0 10m

TITLE

LOT 6, CONCESSION 1
MUNICIPALITY OF MIDDLESEX CENTRE

PRELIMINARY EROSION CONTROL PLAN

PROJECT No. 45013-200

SHEET No. 4

PLAN FILE No.

```
*******************************************************************************

   SSSSS  W    W  M    M  H    H  Y    Y  M    M    OOO          999     999    *********
   S      W W  W  MM  MM  H    H   Y Y   MM  MM   O   O        9   9   9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9   9   9   9   9   Ver  4.05
       S  W W W  M    M  H    H   Y    M    M  O   O        9999    9999    Sept 2011
   SSSSS   W W   M    M  H    H   Y    M    M   OOO            9       9    *********
                                                           9   9   9   9   # 3057174
        StormWater Management HYdrologic Model              999     999    *********

 ********************************************************************************
 ***************************** SWMHYMO Ver/4.05 *********************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********     based on the principles of HYMO and its successors      *********
 *********                 OTTHYMO-83 and OTTHYMO-89.                  *********
 ********************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
 *********                  Ottawa,  Ontario: (613) 836-3884           *********
 *********                  Gatineau, Quebec: (819) 243-6858           *********
 *********                  E-Mail: swmhymo@jfsa.Com                   *********
 ********************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: MTE Consultants Inc.                          +++++++++
 +++++++++                                          SERIAL#:3057174     +++++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************************
 *********          ++++++ PROGRAM ARRAY DIMENSIONS ++++++             *********
 *********          Maximum value for ID numbers  :     10            *********
 *********          Max. number of rainfall points: 105408            *********
 *********          Max. number of flow points    : 105408            *********
 ********************************************************************************


 **********************   D E T A I L E D   O U T P U T   **********************
 ********************************************************************************
 *         DATE: 2020-06-25      TIME: 20:06:39      RUN COUNTER: 000932         *
 ********************************************************************************
 * Input   filename: Q:\45013\200\SWMHYMO\60%TIM~1\POST.dat                      *
 * Output  filename: Q:\45013\200\SWMHYMO\60%TIM~1\POST.out                     *
 * Summary filename: Q:\45013\200\SWMHYMO\60%TIM~1\POST.sum                     *
 * User comments:                                                               *
 * 1:_____________________________________________________________________      *
 * 2:_____________________________________________________________________      *
 * 3:_____________________________________________________________________      *
 ********************************************************************************

-------------------------------------------------------------------------------
001:0001-----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [10919 LONGWOODS ROAD INDUSTRIAL SUBDIVISION]    Project Numbe
*#  Date        : MARCH 2020
*#  Modeller    : [MFM]
*#  Company     : MTE CONSULTANTS INC.
*#  License #   :
*#*****************************************************************************
-------------------
| START           |  Project dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
-------------------  Rainfall dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
          #  1=25mm.HYT
-------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
-------------------
| READ STORM      |    Filename: 25mm Chicago 4-hr duration
| Ptotal=  24.87 mm|   Comments: 25mm Chicago 4-hr duration
-------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .08   1.326 |   1.17   3.776 |   2.25   5.139 |   3.33   1.856
             .17   1.391 |   1.25   4.485 |   2.33   4.485 |   3.42   1.774
```



```
             .25   1.462 |   1.33   5.546 |   2.42   3.985 |   3.50   1.701
             .33   1.543 |   1.42   7.297 |   2.50   3.589 |   3.58   1.633
             .42   1.633 |   1.50  10.685 |   2.58   3.268 |   3.67   1.572
             .50   1.737 |   1.58  19.538 |   2.67   3.003 |   3.75   1.515
             .58   1.856 |   1.67  71.316 |   2.75   2.780 |   3.83   1.462
             .67   1.994 |   1.75  39.586 |   2.83   2.590 |   3.92   1.414
             .75   2.157 |   1.83  19.538 |   2.92   2.426 |   4.00   1.368
             .83   2.352 |   1.92  12.622 |   3.00   2.283 |   4.08   1.326
             .92   2.590 |   2.00   9.255 |   3.08   2.157 |
            1.00   2.887 |   2.08   7.297 |   3.17   2.045 |
            1.08   3.268 |   2.17   6.026 |   3.25   1.945 |

-------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
*******************************************************************************
*
*         PROPOSED SITE
*
*******************************************************************************
*AREA 201 -> PROPOSED LONGWOODS ROAD INDUSTRIAL SUBDIVISION
*==============================================================================
--------------------
| CALIB STANDHYD     |   Area    (ha)=    6.65
| 01:201    DT= 5.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   50.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        3.99          2.66
     Dep. Storage      (mm)=        2.00          5.00
     Average Slope      (%)=        1.00          2.50
     Length             (m)=       80.00         80.00
     Mannings n            =        .015          .035

     Max.eff.Inten.(mm/hr)=       71.32         11.74
           over      (min)         5.00         10.00
     Storage Coeff.  (min)=        2.79 (ii)     10.03 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=         .28           .11

                                                          *TOTALS*
     PEAK FLOW         (cms)=         .58           .05        .594 (iii)
     TIME TO PEAK      (hrs)=        1.67          1.83       1.667
     RUNOFF VOLUME      (mm)=       22.87          4.72      13.798
     TOTAL RAINFALL     (mm)=       24.87         24.87      24.873
     RUNOFF COEFFICIENT    =         .92           .19        .555
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  74.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
*******************************************************************************
--------------------
| COMPUTE VOLUME   |
| ID:01  (201    ) |                DISCHARGE      TIME
--------------------                   (cms)        (hrs)
           START CONTROLLING AT         .000        1.000
           INFLOW HYD. PEAKS AT         .594        1.667
           STOP  CONTROLLING AT         .017        4.088

           REQUIRED STORAGE VOLUME (ha.m.)=     .0817
           TOTAL HYDROGRAPH VOLUME (ha.m.)=     .0918
           % OF HYDROGRAPH TO STORE       =  89.0146

           NOTE:  Storage was computed to reduce the Inflow
                  peak to      .017  (cms).

-------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
  ** END OF RUN :   1

********************************************************************************
```

```
--------------------
| START            |  Project  dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
--------------------  Rainfall dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 002
    NSTORM=   1
          #  1=2YR.HYT
------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: [10919 LONGWOODS ROAD INDUSTRIAL SUBDIVISION]    Project Numbe
*#  Date        : MARCH 2020
*#  Modeller    : [MFM]
*#  Company     : MTE CONSULTANTS INC.
*#  License #   :
*#**************************************************************************
------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 2YR Chicago 4-hr duration
| Ptotal=  44.77 mm|    Comments: 2YR Chicago 4-hr duration
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	1.904	1.17	6.297	2.25	8.958	3.33	2.787
.17	2.008	1.25	7.670	2.33	7.670	3.42	2.649
.25	2.126	1.33	9.770	2.42	6.698	3.50	2.524
.33	2.259	1.42	13.315	2.50	5.940	3.58	2.410
.42	2.410	1.50	20.302	2.58	5.334	3.67	2.307
.50	2.585	1.58	38.522	2.67	4.840	3.75	2.213
.58	2.787	1.67	131.990	2.75	4.430	3.83	2.126
.67	3.026	1.75	77.410	2.83	4.083	3.92	2.046
.75	3.310	1.83	38.522	2.92	3.788	4.00	1.972
.83	3.656	1.92	24.316	3.00	3.533	4.08	1.904
.92	4.083	2.00	17.342	3.08	3.310		
1.00	4.626	2.08	13.315	3.17	3.115		
1.08	5.334	2.17	10.734	3.25	2.942		

```
------------------------------------------------------------------------------
002:0003----------------------------------------------------------------------
*#**************************************************************************
*
*         PROPOSED SITE
*
*#**************************************************************************
*AREA 201 -> PROPOSED LONGWOODS ROAD INDUSTRIAL SUBDIVISION
*#**************************************************************************
--------------------
| CALIB STANDHYD   |   Area    (ha)=    6.65
| 01:201    DT= 5.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   50.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	3.99	2.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.50	
Length	(m)=	80.00	80.00	
Mannings n	=	.015	.035	
Max.eff.Inten.	(mm/hr)=	131.99	45.94	
over	(min)	5.00	5.00	
Storage Coeff.	(min)=	2.18 (ii)	6.38 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	5.00	
Unit Hyd. peak	(cms)=	.31	.18	
				TOTALS
PEAK FLOW	(cms)=	1.13	.25	1.330 (iii)
TIME TO PEAK	(hrs)=	1.67	1.75	1.667
RUNOFF VOLUME	(mm)=	42.77	14.82	28.792
TOTAL RAINFALL	(mm)=	44.77	44.77	44.766
RUNOFF COEFFICIENT	=	.96	.33	.643


```
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  74.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
002:0004----------------------------------------------------------------------
*#**************************************************************************
--------------------
| COMPUTE VOLUME   |
| ID:01  (201    ) |              DISCHARGE      TIME
--------------------                (cms)        (hrs)
          START CONTROLLING AT       .000         .750
          INFLOW HYD. PEAKS AT      1.330        1.667
          STOP  CONTROLLING AT       .017        4.127

          REQUIRED STORAGE VOLUME (ha.m.)=     .1808
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .1915
          % OF HYDROGRAPH TO STORE       =   94.4373

          NOTE:  Storage was computed to reduce the Inflow
                 peak to      .017  (cms).

------------------------------------------------------------------------------
002:0005----------------------------------------------------------------------
------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
  ** END OF RUN :   2

*#**************************************************************************




--------------------
| START            |  Project  dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
--------------------  Rainfall dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 003
    NSTORM=   1
          #  1=5YR.HYT
------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: [10919 LONGWOODS ROAD INDUSTRIAL SUBDIVISION]    Project Numbe
*#  Date        : MARCH 2020
*#  Modeller    : [MFM]
*#  Company     : MTE CONSULTANTS INC.
*#  License #   :
*#**************************************************************************
------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 5YR Chicago 4-hr duration
| Ptotal=  46.48 mm|    Comments: 5YR Chicago 4-hr duration
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	2.193	1.17	6.775	2.25	9.452	3.33	3.145
.17	2.307	1.25	8.162	2.33	8.162	3.42	2.997
.25	2.435	1.33	10.261	2.42	7.181	3.50	2.863
.33	2.578	1.42	13.772	2.50	6.413	3.58	2.742
.42	2.742	1.50	20.639	2.58	5.795	3.67	2.631
.50	2.928	1.58	38.551	2.67	5.288	3.75	2.529
.58	3.145	1.67	134.791	2.75	4.865	3.83	2.435
.67	3.398	1.75	77.604	2.83	4.506	3.92	2.348
.75	3.698	1.83	38.551	2.92	4.199	4.00	2.268
.83	4.061	1.92	24.575	3.00	3.932	4.08	2.193
.92	4.506	2.00	17.735	3.08	3.698		

1.00	5.068	2.08	13.772	3.17	3.492	
1.08	5.795	2.17	11.219	3.25	3.309	

003:0003

*AREA 201 -> PROPOSED LONGWOODS ROAD INDUSTRIAL SUBDIVISION

CALIB STANDHYD | Area (ha)= 6.65
01:201 DT= 5.00 | Total Imp(%)= 60.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.99	2.66
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.50
Length	(m)=	80.00	80.00
Mannings n	=	.015	.035
Max.eff.Inten.(mm/hr)=		134.79	48.90
over (min)		5.00	5.00
Storage Coeff.	(min)=	2.16 (ii)	6.26 (ii)
Unit Hyd. Tpeak	(min)=	5.00	5.00
Unit Hyd. peak	(cms)=	.31	.19

				TOTALS
PEAK FLOW	(cms)=	1.16	.26	1.371 (iii)
TIME TO PEAK	(hrs)=	1.67	1.75	1.667
RUNOFF VOLUME	(mm)=	44.48	15.84	30.160
TOTAL RAINFALL	(mm)=	46.48	46.48	46.475
RUNOFF COEFFICIENT	=	.96	.34	.649

*** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

003:0004

COMPUTE VOLUME
ID:01 (201)

	DISCHARGE (cms)	TIME (hrs)
START CONTROLLING AT	.000	.667
INFLOW HYD. PEAKS AT	1.371	1.667
STOP CONTROLLING AT	.017	4.136

REQUIRED STORAGE VOLUME (ha.m.)= .1896
TOTAL HYDROGRAPH VOLUME (ha.m.)= .2006
% OF HYDROGRAPH TO STORE = 94.5531

NOTE: Storage was computed to reduce the Inflow
peak to .017 (cms).

003:0005

003:0002

003:0002

** END OF RUN : 3

START | Project dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
Rainfall dir.: Q:\45013\200\SWMHYMO\60%TIM~1\

TZERO = .00 hrs on 0
METOUT= 2 (output = METRIC)
NRUN = 004
NSTORM= 1
# 1=10YR.HYT

004:0002

*# Project Name: [10919 LONGWOODS ROAD INDUSTRIAL SUBDIVISION] Project Numbe
*# Date : MARCH 2020
*# Modeller : [MFM]
*# Company : MTE CONSULTANTS INC.
*# License # :

004:0002

READ STORM | Filename: 10YR Chicago 4-hr duration
Ptotal= 54.60 mm| Comments: 10YR Chicago 4-hr duration

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	2.343	1.17	7.804	2.25	11.115	3.33	3.439
.17	2.473	1.25	9.514	2.33	9.514	3.42	3.267
.25	2.618	1.33	12.124	2.42	8.304	3.50	3.112
.33	2.783	1.42	16.521	2.50	7.361	3.58	2.971
.42	2.971	1.50	25.144	2.58	6.607	3.67	2.843
.50	3.187	1.58	47.356	2.67	5.991	3.75	2.726
.58	3.439	1.67	156.469	2.75	5.481	3.83	2.618
.67	3.735	1.75	93.617	2.83	5.050	3.92	2.519
.75	4.089	1.83	47.356	2.92	4.682	4.00	2.428
.83	4.518	1.92	30.071	3.00	4.365	4.08	2.343
.92	5.050	2.00	21.499	3.08	4.089		
1.00	5.725	2.08	16.521	3.17	3.846		
1.08	6.607	2.17	13.321	3.25	3.631		

004:0003

PROPOSED SITE

*AREA 201 -> PROPOSED LONGWOODS ROAD INDUSTRIAL SUBDIVISION

CALIB STANDHYD | Area (ha)= 6.65
01:201 DT= 5.00 | Total Imp(%)= 60.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.99	2.66
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.50
Length	(m)=	80.00	80.00
Mannings n	=	.015	.035
Max.eff.Inten.(mm/hr)=		156.47	65.88
over (min)		5.00	5.00
Storage Coeff.	(min)=	2.04 (ii)	5.67 (ii)
Unit Hyd. Tpeak	(min)=	5.00	5.00
Unit Hyd. peak	(cms)=	.31	.20

				TOTALS
PEAK FLOW	(cms)=	1.36	.37	1.666 (iii)
TIME TO PEAK	(hrs)=	1.67	1.75	1.667
RUNOFF VOLUME	(mm)=	52.60	20.98	36.791
TOTAL RAINFALL	(mm)=	54.60	54.60	54.596
RUNOFF COEFFICIENT	=	.96	.38	.674

*** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)

```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

004:0004----------------------------------------------------------------------
*=====================================================================
--------------------
| COMPUTE VOLUME   |
| ID:01  (201    ) |                DISCHARGE      TIME
--------------------                  (cms)       (hrs)
          START CONTROLLING AT      .000         .667
          INFLOW HYD. PEAKS AT     1.666        1.667
          STOP  CONTROLLING AT      .017        4.140

          REQUIRED STORAGE VOLUME (ha.m.)=     .2338
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .2447
          % OF HYDROGRAPH TO STORE       =   95.5422

          NOTE:  Storage was computed to reduce the Inflow
                 peak to      .017  (cms).

----------------------------------------------------------------------
004:0005----------------------------------------------------------------------
----------------------------------------------------------------------
004:0002----------------------------------------------------------------------
----------------------------------------------------------------------
004:0002----------------------------------------------------------------------
----------------------------------------------------------------------
004:0002----------------------------------------------------------------------
  ** END OF RUN :   4

**********************************************************************




--------------------
| START            |  Project  dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
--------------------  Rainfall dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
          #  1=25YR.HYT
----------------------------------------------------------------------
005:0002----------------------------------------------------------------------
*#**********************************************************************
*#  Project Name: [10919 LONGWOODS ROAD INDUSTRIAL SUBDIVISION]    Project Numbe
*#  Date        : MARCH 2020
*#  Modeller    : [MFM]
*#  Company     : MTE CONSULTANTS INC.
*#  License #   :
*#**********************************************************************
----------------------------------------------------------------------
005:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 25YR Chicago 4-hr duration
| Ptotal=  64.33 mm|    Comments: 25YR Chicago 4-hr duration
--------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .08   2.569 |   1.17   9.034 |   2.25  13.050 |   3.33   3.836
             .17   2.718 |   1.25  11.103 |   2.33  11.103 |   3.42   3.636
             .25   2.885 |   1.33  14.280 |   2.42   9.637 |   3.50   3.456
             .33   3.075 |   1.42  19.656 |   2.50   8.499 |   3.58   3.292
             .42   3.292 |   1.50  30.223 |   2.58   7.593 |   3.67   3.144
             .50   3.543 |   1.58  57.277 |   2.67   6.856 |   3.75   3.009
             .58   3.836 |   1.67 184.478 |   2.75   6.246 |   3.83   2.885
             .67   4.183 |   1.75 112.342 |   2.83   5.734 |   3.92   2.771
             .75   4.598 |   1.83  57.277 |   2.92   5.298 |   4.00   2.666
             .83   5.104 |   1.92  36.251 |   3.00   4.923 |   4.08   2.569
             .92   5.734 |   2.00  25.756 |   3.08   4.598 |
            1.00   6.537 |   2.08  19.656 |   3.17   4.312 |
```



```
            1.08   7.593 |   2.17  15.741 |   3.25   4.060 |

----------------------------------------------------------------------
005:0003----------------------------------------------------------------------
*=====================================================================
*
*         PROPOSED SITE
*
*=====================================================================
*AREA 201 -> PROPOSED LONGWOODS ROAD INDUSTRIAL SUBDIVISION
*=====================================================================
--------------------
| CALIB STANDHYD   |   Area     (ha)=    6.65
| 01:201    DT= 5.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   50.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        3.99          2.66
     Dep. Storage      (mm)=        2.00          5.00
     Average Slope      (%)=        1.00          2.50
     Length             (m)=       80.00         80.00
     Mannings n            =        .015          .035

     Max.eff.Inten.(mm/hr)=      184.48         89.26
               over (min)          5.00          5.00
     Storage Coeff.  (min)=        1.91 (ii)     5.12 (ii)
     Unit Hyd. Tpeak (min)=        5.00          5.00
     Unit Hyd. peak  (cms)=         .32           .21
                                                          *TOTALS*
     PEAK FLOW       (cms)=        1.62           .51       2.062 (iii)
     TIME TO PEAK    (hrs)=        1.67          1.75        1.667
     RUNOFF VOLUME    (mm)=       62.33         27.63       44.977
     TOTAL RAINFALL   (mm)=       64.33         64.33       64.326
     RUNOFF COEFFICIENT   =         .97           .43         .699
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------
005:0004----------------------------------------------------------------------
*=====================================================================
--------------------
| COMPUTE VOLUME   |
| ID:01  (201    ) |                DISCHARGE      TIME
--------------------                  (cms)       (hrs)
          START CONTROLLING AT      .000         .583
          INFLOW HYD. PEAKS AT     2.062        1.667
          STOP  CONTROLLING AT      .017        4.144

          REQUIRED STORAGE VOLUME (ha.m.)=     .2880
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .2991
          % OF HYDROGRAPH TO STORE       =   96.2738

          NOTE:  Storage was computed to reduce the Inflow
                 peak to      .017  (cms).

----------------------------------------------------------------------
005:0005----------------------------------------------------------------------
----------------------------------------------------------------------
005:0002----------------------------------------------------------------------
----------------------------------------------------------------------
005:0002----------------------------------------------------------------------
----------------------------------------------------------------------
005:0002----------------------------------------------------------------------
----------------------------------------------------------------------
005:0002----------------------------------------------------------------------
  ** END OF RUN :   5

**********************************************************************
```

```
------------------
| START          |  Project dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
------------------  Rainfall dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
    TZERO =   .00 hrs on      0
    METOUT=   2 (output = METRIC)
    NRUN  = 006
    NSTORM=   1
          #  1=50YR.HYT
------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: [10919 LONGWOODS ROAD INDUSTRIAL SUBDIVISION]    Project Numbe
*#  Date        : MARCH 2020
*#  Modeller    : [MFM]
*#  Company     : MTE CONSULTANTS INC.
*#  License #   :
*#**************************************************************************
------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
------------------
| READ STORM     |    Filename: 50YR Chicago 4-hr duration
| Ptotal= 71.91 mm|   Comments: 50YR Chicago 4-hr duration
------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	2.864	1.17	10.121	2.25	14.636	3.33	4.283
.17	3.030	1.25	12.446	2.33	12.446	3.42	4.059
.25	3.218	1.33	16.018	2.42	10.799	3.50	3.856
.33	3.430	1.42	22.060	2.50	9.519	3.58	3.674
.42	3.674	1.50	33.926	2.58	8.501	3.67	3.508
.50	3.955	1.58	64.215	2.67	7.673	3.75	3.356
.58	4.283	1.67	205.106	2.75	6.988	3.83	3.218
.67	4.672	1.75	125.487	2.83	6.413	3.92	3.090
.75	5.137	1.83	64.215	2.92	5.924	4.00	2.973
.83	5.706	1.92	40.686	3.00	5.503	4.08	2.864
.92	6.413	2.00	28.913	3.08	5.137		
1.00	7.315	2.08	22.060	3.17	4.817		
1.08	8.501	2.17	17.661	3.25	4.535		

```
------------------------------------------------------------------------------
006:0003----------------------------------------------------------------------
*==========================================================================
*
*         PROPOSED SITE
*
*==========#################################################################
*AREA 201 -> PROPOSED LONGWOODS ROAD INDUSTRIAL SUBDIVISION
*##########################################################################
---------------------
| CALIB STANDHYD    |   Area    (ha)=    6.65
| 01:201    DT= 5.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   50.00
---------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.99          2.66
     Dep. Storage     (mm)=      2.00          5.00
     Average Slope     (%)=      1.00          2.50
     Length            (m)=     80.00         80.00
     Mannings n             =    .015          .035

     Max.eff.Inten.(mm/hr)=    205.11        108.38
               over (min)          5.00          5.00
     Storage Coeff.  (min)=      1.83 (ii)     4.80 (ii)
     Unit Hyd. Tpeak (min)=      5.00          5.00
     Unit Hyd. peak  (cms)=       .32           .22

                                              *TOTALS*
     PEAK FLOW       (cms)=      1.81           .62          2.368 (iii)
     TIME TO PEAK    (hrs)=      1.67          1.75          1.667
     RUNOFF VOLUME    (mm)=     69.91         33.10         51.505
     TOTAL RAINFALL   (mm)=     71.91         71.91         71.907
     RUNOFF COEFFICIENT   =       .97           .46           .716
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
```



```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  74.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
006:0004----------------------------------------------------------------------
*##########################################################################
------------------
| COMPUTE VOLUME |
| ID:01  (201    ) |              DISCHARGE      TIME
------------------                  (cms)        (hrs)
          START CONTROLLING AT       .000         .500
          INFLOW HYD. PEAKS AT      2.368        1.667
          STOP  CONTROLLING AT       .017        4.148

          REQUIRED STORAGE VOLUME (ha.m.)=      .3311
          TOTAL HYDROGRAPH VOLUME (ha.m.)=      .3425
          % OF HYDROGRAPH TO STORE       =    96.6711

          NOTE:  Storage was computed to reduce the Inflow
                 peak to      .017  (cms).

------------------------------------------------------------------------------
006:0005----------------------------------------------------------------------
------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
  ** END OF RUN :   6

**************************************************************************


------------------
| START          |  Project dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
------------------  Rainfall dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
    TZERO =   .00 hrs on      0
    METOUT=   2 (output = METRIC)
    NRUN  = 007
    NSTORM=   1
          #  1=100YR.HYT
------------------------------------------------------------------------------
007:0002----------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: [10919 LONGWOODS ROAD INDUSTRIAL SUBDIVISION]    Project Numbe
*#  Date        : MARCH 2020
*#  Modeller    : [MFM]
*#  Company     : MTE CONSULTANTS INC.
*#  License #   :
*#**************************************************************************
------------------------------------------------------------------------------
007:0002----------------------------------------------------------------------
------------------
| READ STORM     |    Filename: 100YR Chicago 4-hr duration
| Ptotal= 79.25 mm|   Comments: 100YR Chicago 4-hr duration
------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	3.037	1.17	11.082	2.25	16.149	3.33	4.590
.17	3.218	1.25	13.689	2.33	13.689	3.42	4.344
.25	3.423	1.33	17.705	2.42	11.841	3.50	4.122
.33	3.655	1.42	24.509	2.50	10.408	3.58	3.921
.42	3.921	1.50	37.869	2.58	9.270	3.67	3.740

.50	4.230	1.58	71.789	2.67	8.347	3.75	3.574
.58	4.590	1.67	225.189	2.75	7.584	3.83	3.423
.67	5.018	1.75	139.348	2.83	6.945	3.92	3.284
.75	5.532	1.83	71.789	2.92	6.402	4.00	3.156
.83	6.160	1.92	45.468	3.00	5.936	4.08	3.037
.92	6.945	2.00	32.227	3.08	5.532		
1.00	7.948	2.08	24.509	3.17	5.179		
1.08	9.270	2.17	19.554	3.25	4.867		

007:0003
*
* PROPOSED SITE
*
*AREA 201 -> PROPOSED LONGWOODS ROAD INDUSTRIAL SUBDIVISION
*

CALIB STANDHYD	Area (ha)= 6.65
01:201 DT= 5.00	Total Imp(%)= 60.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.99	2.66
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.50
Length	(m)=	80.00	80.00
Mannings n	=	.015	.035
Max.eff.Inten.	(mm/hr)=	225.19	127.80
over	(min)	5.00	5.00
Storage Coeff.	(min)=	1.76 (ii)	4.55 (ii)
Unit Hyd. Tpeak	(min)=	5.00	5.00
Unit Hyd. peak	(cms)=	.32	.23

				TOTALS
PEAK FLOW	(cms)=	2.00	.74	2.675 (iii)
TIME TO PEAK	(hrs)=	1.67	1.75	1.667
RUNOFF VOLUME	(mm)=	77.25	38.61	57.933
TOTAL RAINFALL	(mm)=	79.25	79.25	79.251
RUNOFF COEFFICIENT	=	.97	.49	.731

*** WARNING: Storage Coefficient is smaller than DT!
Use a smaller DT or a larger area.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

007:0004
*

COMPUTE VOLUME		
ID:01 (201)	DISCHARGE (cms)	TIME (hrs)
START CONTROLLING AT	.000	.500
INFLOW HYD. PEAKS AT	2.675	1.667
STOP CONTROLLING AT	.017	4.150

REQUIRED STORAGE VOLUME (ha.m.)= .3739
TOTAL HYDROGRAPH VOLUME (ha.m.)= .3853
% OF HYDROGRAPH TO STORE = 97.0423

NOTE: Storage was computed to reduce the Inflow
peak to .017 (cms).

007:0005
007:0002
007:0002
007:0002

007:0002
007:0002
007:0002
** END OF RUN : 7

START	Project dir.: Q:\45013\200\SWMHYMO\60%TIM~1\
	Rainfall dir.: Q:\45013\200\SWMHYMO\60%TIM~1\

TZERO = .00 hrs on 0
METOUT= 2 (output = METRIC)
NRUN = 008
NSTORM= 1
# 1=250YR.HYT

008:0002
*#
*# Project Name: [10919 LONGWOODS ROAD INDUSTRIAL SUBDIVISION] Project Numbe
*# Date : MARCH 2020
*# Modeller : [MFM]
*# Company : MTE CONSULTANTS INC.
*# License # :
*#
008:0002

READ STORM	Filename: 250YR Chicago 24-hr duration
Ptotal= 113.56 mm	Comments: 250YR Chicago 24-hr duration

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	.561	6.17	1.474	12.25	3.107	18.33	.909
.17	.566	6.25	1.510	12.33	3.002	18.42	.901
.25	.571	6.33	1.548	12.42	2.904	18.50	.892
.33	.575	6.42	1.587	12.50	2.813	18.58	.884
.42	.580	6.50	1.629	12.58	2.727	18.67	.877
.50	.585	6.58	1.673	12.67	2.646	18.75	.869
.58	.590	6.67	1.720	12.75	2.570	18.83	.861
.67	.595	6.75	1.770	12.83	2.499	18.92	.854
.75	.600	6.83	1.822	12.92	2.431	19.00	.846
.83	.606	6.92	1.878	13.00	2.367	19.08	.839
.92	.611	7.00	1.938	13.08	2.307	19.17	.832
1.00	.617	7.08	2.001	13.17	2.249	19.25	.825
1.08	.622	7.17	2.070	13.25	2.195	19.33	.819
1.17	.628	7.25	2.143	13.33	2.143	19.42	.812
1.25	.634	7.33	2.222	13.42	2.093	19.50	.805
1.33	.640	7.42	2.307	13.50	2.046	19.58	.799
1.42	.646	7.50	2.399	13.58	2.001	19.67	.793
1.50	.652	7.58	2.499	13.67	1.959	19.75	.786
1.58	.658	7.67	2.608	13.75	1.917	19.83	.780
1.67	.665	7.75	2.727	13.83	1.878	19.92	.774
1.75	.671	7.83	2.858	13.92	1.840	20.00	.768
1.83	.678	7.92	3.002	14.00	1.804	20.08	.762
1.92	.685	8.00	3.162	14.08	1.770	20.17	.757
2.00	.692	8.08	3.340	14.17	1.736	20.25	.751
2.08	.699	8.17	3.540	14.25	1.704	20.33	.745
2.17	.706	8.25	3.766	14.33	1.673	20.42	.740
2.25	.714	8.33	4.023	14.42	1.643	20.50	.734
2.33	.721	8.42	4.318	14.50	1.615	20.58	.729
2.42	.729	8.50	4.659	14.58	1.587	20.67	.724
2.50	.737	8.58	5.059	14.67	1.561	20.75	.719
2.58	.745	8.67	5.533	14.75	1.535	20.83	.714
2.67	.754	8.75	6.103	14.83	1.510	20.92	.709
2.75	.762	8.83	6.800	14.92	1.486	21.00	.704
2.83	.771	8.92	7.672	15.00	1.463	21.08	.699
2.92	.780	9.00	8.788	15.08	1.440	21.17	.694
3.00	.789	9.08	10.262	15.17	1.418	21.25	.689

3.08	.799	9.17	12.284	15.25	1.397	21.33	.685
3.17	.809	9.25	15.202	15.33	1.377	21.42	.680
3.25	.819	9.33	19.711	15.42	1.357	21.50	.676
3.33	.829	9.42	27.388	15.50	1.338	21.58	.671
3.42	.839	9.50	42.582	15.58	1.319	21.67	.667
3.50	.850	9.58	81.716	15.67	1.301	21.75	.662
3.58	.861	9.67	265.689	15.75	1.283	21.83	.658
3.67	.873	9.75	161.512	15.83	1.266	21.92	.654
3.75	.884	9.83	81.716	15.92	1.250	22.00	.650
3.83	.896	9.92	51.283	16.00	1.233	22.08	.646
3.92	.909	10.00	36.148	16.08	1.218	22.17	.642
4.00	.922	10.08	27.388	16.17	1.202	22.25	.638
4.08	.935	10.17	21.793	16.25	1.187	22.33	.634
4.17	.948	10.25	17.962	16.33	1.173	22.42	.630
4.25	.962	10.33	15.202	16.42	1.158	22.50	.626
4.33	.977	10.42	13.133	16.50	1.145	22.58	.622
4.42	.992	10.50	11.532	16.58	1.131	22.67	.618
4.50	1.007	10.58	10.262	16.67	1.118	22.75	.615
4.58	1.023	10.67	9.232	16.75	1.105	22.83	.611
4.67	1.040	10.75	8.383	16.83	1.093	22.92	.607
4.75	1.057	10.83	7.672	16.92	1.080	23.00	.604
4.83	1.074	10.92	7.069	17.00	1.068	23.08	.600
4.92	1.093	11.00	6.551	17.08	1.057	23.17	.597
5.00	1.112	11.08	6.103	17.17	1.045	23.25	.593
5.08	1.131	11.17	5.711	17.25	1.034	23.33	.590
5.17	1.152	11.25	5.365	17.33	1.023	23.42	.587
5.25	1.173	11.33	5.059	17.42	1.013	23.50	.583
5.33	1.195	11.42	4.785	17.50	1.002	23.58	.580
5.42	1.218	11.50	4.540	17.58	.992	23.67	.577
5.50	1.241	11.58	4.318	17.67	.982	23.75	.574
5.58	1.266	11.67	4.117	17.75	.972	23.83	.571
5.67	1.292	11.75	3.934	17.83	.962	23.92	.567
5.75	1.319	11.83	3.766	17.92	.953	24.00	.564
5.83	1.347	11.92	3.613	18.00	.944	24.08	.561
5.92	1.377	12.00	3.471	18.08	.935		
6.00	1.408	12.08	3.340	18.17	.926		
6.08	1.440	12.17	3.219	18.25	.917		

```
008:0003------------------------------------------------------------------------
*
*        PROPOSED SITE
*
*===============================================================================
*AREA 201 -> PROPOSED LONGWOODS ROAD INDUSTRIAL SUBDIVISION
*===============================================================================

| CALIB STANDHYD      |   Area    (ha)=    6.65
| 01:201    DT= 5.00  |   Total Imp(%)=   60.00    Dir. Conn.(%)=   50.00

                            IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=      3.99          2.66
    Dep. Storage      (mm)=      2.00          5.00
    Average Slope      (%)=      1.00          2.50
    Length             (m)=     80.00         80.00
    Mannings n            =      .015          .035

    Max.eff.Inten.(mm/hr)=     265.69        192.02
              over (min)       5.00          5.00
    Storage Coeff.  (min)=      1.65 (ii)     4.02 (ii)
    Unit Hyd. Tpeak (min)=      5.00          5.00
    Unit Hyd. peak  (cms)=       .32           .24
                                                        *TOTALS*
    PEAK FLOW       (cms)=      2.37          1.09         3.461 (iii)
    TIME TO PEAK    (hrs)=      9.67          9.67         9.667
    RUNOFF VOLUME    (mm)=    111.56         66.33        88.945
    TOTAL RAINFALL   (mm)=    113.56        113.56       113.558
    RUNOFF COEFFICIENT   =       .98           .58          .783
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  74.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```



```
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
008:0004------------------------------------------------------------------------
*===============================================================================

| COMPUTE VOLUME    |
| ID:01  (201    )  |              DISCHARGE       TIME
                                     (cms)         (hrs)
         START CONTROLLING AT         .000         3.000
         INFLOW HYD. PEAKS AT        3.461         9.667
         STOP  CONTROLLING AT         .017        17.513

         REQUIRED STORAGE VOLUME (ha.m.)=     .5172
         TOTAL HYDROGRAPH VOLUME (ha.m.)=     .5915
         % OF HYDROGRAPH TO STORE       =   87.4426

         NOTE:  Storage was computed to reduce the Inflow
                peak to    .017  (cms).

--------------------------------------------------------------------------------
008:0005------------------------------------------------------------------------
--------------------------------------------------------------------------------
008:0002------------------------------------------------------------------------
--------------------------------------------------------------------------------
008:0002------------------------------------------------------------------------
--------------------------------------------------------------------------------
008:0002------------------------------------------------------------------------
--------------------------------------------------------------------------------
008:0002------------------------------------------------------------------------
--------------------------------------------------------------------------------
008:0002------------------------------------------------------------------------
--------------------------------------------------------------------------------
008:0002------------------------------------------------------------------------
--------------------------------------------------------------------------------
008:0002------------------------------------------------------------------------
    FINISH
--------------------------------------------------------------------------------
********************************************************************************
    WARNINGS / ERRORS / NOTES
    -------------------------
 001:0003 CALIB STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
  Simulation ended on 2020-06-25    at 20:06:41
================================================================================
```