November 22nd, 2022
File No.: LD-00203

VIA EMAIL

The Municipality of Middlesex Centre
10227 Ilderton Road
Ilderton, ON N0M 2A0

Reference: **MN 6, 10, 14 Elmhurst Street, Kilworth**
Sweid Holdings Inc.
Stormwater Servicing Brief

INTRODUCTION

Sweid Holdings Inc. has retained LDS Consultants Inc. (LDS) to develop a strategy to provide stormwater management (SWM) servicing for the proposed development of the properties located at MN 6, 10 and 14 Elmhurst Street, in the community of Kilworth. A site location plan is provided in Figure 1. The subject site comprises the assembly of three oversized single-family lots and is approximately 2.02 hectares in area. The site is bounded by Elmhurst Street to the east, a large single-family residential lot to the north, and single-family lots to the south and west.

Background Information

The SWM strategy presented herein was developed using the following information:

- Geotechnical Investigation, prepared by LDS Consultants Inc., dated November 6, 2022; and
- Middlesex Centre Infrastructure Design Standards, dated January 2018.
- Stormwater Management and Planning and Design Manual, prepared by the MOE, 2003.

EXISTING CONDITION

The site currently consists of three oversized single-family residential lots. These lots are generally comprised of landscaped areas, multiple structures, and trees along the north perimeter of the site. The site drains overland towards the west to the rear of the lots. External flows enter the area across the northwest property limit from a wooded portion of the adjacent oversized lot.

Existing catchment areas are described below. The site was modelled in SWMHYMO to calculate existing peak flows summarized in Table 1, and the catchment areas are illustrated in Figure 2. The hydrologic model documentation is attached in Appendix B.

Catchment 101 – This catchment area comprises landscaped areas, existing residential dwellings, and auxiliary buildings. This catchment drains overland to the west towards the existing residential lots fronting Kilworth Park Drive.

Catchment EX-1 – This area represents a wooded area situated north of the site. This area drains overland towards the south into the subject site.

Table 1 - Existing Runoff Peak Flows

Design Storm Event	2-year	5-year	10-year	25-year	50-year	100-year	250-year
Peak Flow (m^3/s)	0.013	0.029	0.040	0.053	0.064	0.076	0.114

LDS conducted a geotechnical investigation to determine existing soil conditions at the subject site. The predominant soil on site is a sandy loam. For modelling purposes, it will be classified as Hydrologic Soil Group A. Five of the six boreholes were observed as dry, a borehole BH2 having a groundwater level depth of 4.27 meters measured below the existing ground surface.

PROPOSED DEVELOPMENT CONDITION

It is proposed to develop the site as a mixed-use residential development consisting of 15 single-family lots and 45 medium-density residential units. The proposed development will include paved, and some open space landscaped areas. All storm runoff occurring on-site will be conveyed to the internal storm sewer system and be allowed to infiltrate through proposed subsurface infiltration trenches and galleries. The proposed catchments are described below and are illustrated in Figure 3. The proposed condition was modelled using SWMHYMO, and the model results are attached to this letter report.

Catchment 201 – This catchment area comprises rear yards for the single-family lots 12 - 15 on the west side of the subject site. A perforated storm sewer network will convey minor and major flows to a subsurface infiltration trench.

Catchment 202 – This catchment area comprises rear yards for the single-family lots 1 - 9 on the southeast side of the subject site. A perforated storm sewer network will convey minor and major flows to a subsurface infiltration trench.

Catchment 203 – This catchment area consists of the internal street network, the townhouse units, and the front yards for all the single-family. The storm sewer network and overland flow routes (OLFR) will convey minor and major flows to infiltration galleries located in the center of the site.

Catchment EX-1 – This area represents a wooded area north of the site. This area drains overland towards the southeast into the subject site. Minor and major flows will be conveyed by surface grading and a perforated storm sewer system which connects to interceptor subsurface infiltration trenches.

Quantity Control

Quantity control is achieved through surface storage, a perforated storm sewer network and multiple subsurface infiltration trenches and galleries. A summation of all site controls is provided in Table 2.

Table 2 – Proposed and Allocated Stormwater Storage Volumes

Storage Feature	Storage Volume Provided (m^3)
Subsurface Infiltration Trenches and Infiltration Galleries	632
Surface Storage	372
Total Volume	1004

There is no physical outlet for this site. All flow will be contained within the site boundaries to mitigate potential adverse effects on the surrounding environment. Runoff from the rear yards of the single-family lots will flow to subsurface infiltration trenches in the backyards. Runoff from the fronts of the dwelling units will flow to the internal asphalt surface and be conveyed to the internal collection system. This system utilizes perforated pipes underneath the depressed green space to infiltrate the collected stormwater into the infiltration galleries. These infiltration galleries will store and exfiltrate flows to the underlying native sandy soils. When the minor system becomes overwhelmed by large amounts of runoff, major flows will be directed by overland flow routes to the depressed green spaces. These areas will allow stormwater runoff to pond on the surface and infiltrate through the greenspaces ground surface into the subsurface infiltration gallery. The design information of the infiltration galleries and subsurface infiltration trenches is presented in Table 3. The footprint of the infiltration features is depicted in Figure 4, with details illustrated in Figure 5. The SWMHYMO model is included in Appendix B.

Table 3 – Subsurface Infiltration Trenches and Galleries Design Parameters

Catchment	Trench Bottom Area (m^2)	Trench Depth (m)	Void Ratio	Drawdown Time (hrs)	Available Storage Volume (m^3)	Infiltration Rate (mm/hr)	Proposed Number of Galleries
Ex-1	210	0.37	0.4	24	78	39	3
C201	105	0.37	0.4	24	39	39	1
C202	155	0.65	0.4	24	101	69	1
C203	390	1.06	0.4	38.5	414	69	3

As shown by the model results, the infiltration features have been sized, so the total post-development runoff peak flow rates leaving the subject site are zero as the entire volume of the 250-year storm is stored on-site and infiltrated without overflowing the storage system.

Quality Control

An Enhanced Level of water quality protection is proposed. Quality control measures proposed will take the form of infiltration-type SWM facilities, servicing a total drainage area of 3.1ha with an average imperviousness of 41%. An Enhanced Level of water quality control (based on an infiltration SWMP type using an imperviousness of 41%) requires a storage volume of 26.5m^3/ha.

Considering the total post-development drainage area draining to the SWM facility of 3.1ha, this equates to a required storage volume of 82m^3. The subsurface storage volume provided on-site is 682m^3, which exceeds the required volume recommended by the MOE.

Pre-treatment of road runoff for the area's tributary to the C203 infiltration galleries should be provided. Three BMP 24R SNOUT devices are recommended for pre-treatment of the runoff entering the infiltration beds. Also, FlexStorm Catch-It inlet protection for catch basins and mini catch basins tributary to backyard infiltration trenches will provide permanent inlet protection. Appendix C contains sell sheets for the FlexStorm and BMP products mentioned above. These sheets contain information regarding installation and maintenance requirements. Source controls should also be investigated (e.g., sanding/salting practices and public education concerning street/driveway sediments) in areas where an infiltration basin is proposed.

EROSION AND SEDIMENT CONTROL

This section describes the Erosion and Sediment Control Plan implemented before, during and immediately after construction to reduce the possibility of sediment being conveyed from the proposed construction site.

Types of Selected Erosion / Sediment Control Methods

The details and locations of the proposed temporary and longer-term erosion and sediment control measures will be identified at the detailed design stage. The construction drawings, once complete, will form a part of the sediment and erosion control plan. Proposed erosion and sediment control measures include the following:

- The Contractor will install a heavy-duty silt fence and robust siltation barrier along the east and south perimeters.
- The Contractor will install a light-duty silt fence along the north and west site perimeters.
- All disturbed areas where work will not take place for 30 days or more will be stabilized following OPSS 572.
- The Contractor will perform street sweeping to remove soil deposited on adjacent rights-of-way by construction traffic.

The proposed temporary erosion and sediment control measures have been selected based on the site's susceptibility to erosion, the sensitivity of the downstream environment, site slopes, and the total drainage area. The proposed measures should provide adequate erosion and sediment control for the proposed project without additional steps. However, the site will be monitored during construction, and other actions will be added if required.

Installation of Erosion Control Measures

Proposed erosion and sediment control measures are summarized in Table 4.

Table 4 – Erosion and Sediment Control Sequencing

Stage	Erosion and Sediment Control Measures
Pre-Construction	Create a contact list for emergency contingency plan operations.
	Install a silt fence around the proposed work limits, as appropriate.
	Install robust siltation barrier.
	Preparation of a Construction Dewatering Discharge Plan, including discharge location, temporary storage locations and identifying measures to reduce suspended solids or other treatment, if required

Construction	Monitor water quality (turbidity) for construction dewatering discharge water discharged at the surface.
	Regularly inspect erosion and sediment control measures to confirm they are practical and operating as intended.
	Monitor weather reports for significant precipitation events for contingency planning.
	Install filter cloth in on-site catch basins.
	Perform street sweeping as necessary to remove accumulated sediment from the adjacent right-of-way.
	Complete final paving.
	Complete final landscaping and vegetation plantings.
Post-Construction	Remove robust siltation barrier.
	Remove the silt fence from the proposed work limits.
	Remove filter cloth from on-site catch basins.
	Remove the construction fence from the proposed work limits.

The proposed erosion and sediment control measures have been designed according to the site slopes, drainage area, and the risks and consequences of failure. Based on these factors, additional steps will likely not be required.

However, the site will be monitored during construction, and additional measures (i.e., additional rows of silt fence) may be installed at the discretion of the Contract Administrator. Although this is not an exhaustive list, inspections should include checks on siltation barriers to confirm it is properly installed and secured. Including a review for evidence of damage, tears, overtopping or undermining; checking the condition of surface water ponding areas and storm drain inlets; and documenting areas where seeding / sodding / mulching is implemented to re-establish vegetative cover. In addition, due to the high groundwater condition, inspections shall include checking exposed banks for seepage. If seepage is encountered, erosion control blankets shall be installed to mitigate any damage to the banks.

The triggers for installing enhanced erosion and sediment control measures would include breaching the proposed erosion and sediment control measures and re-evaluation based on site conditions during construction. Site conditions and the proposed erosion and sediment control measures will be monitored regularly, as described below.

Inspection Requirements

The effectiveness of the erosion and sediment control measures will need to be monitored during site grading and site servicing work. This will require frequent inspections. Therefore, the following minimum inspection intervals are recommended:

- The Contractor and Contract Administrator shall monitor weather reports daily and record temperatures and rainfall. When rainfall is anticipated, the Contractor and the Contract Administrator shall inspect the erosion control works immediately before and immediately after the rainfall event and snowmelt event (timing for inspections is based on predicted weather forecasts);
- Daily during extended or significant precipitation (i.e., rainfall amounts that exceed 25 millimetres) or during significant snowmelt periods;
- Daily during any construction activity that would potentially yield significant runoff volumes or otherwise impact the quality of the runoff leaving the site;
- Daily while deficiencies are present which fail to contain, filter or otherwise treat runoff or contribute to sediment loading in surface water;
- Weekly during dry periods while construction activity is occurring at the site. The Contractor and the Contract Administrator shall inspect the erosion control measures the day before the last business day of the week (typically Thursday) to allow any work to be completed on damaged erosion control works before the weekend.; and,
- Monthly during inactive periods (> 30 days).

The Contract Administrator will document all inspection activities in weekly erosion and sediment control reports.

The Contractor shall construct and maintain all erosion and sediment control measures. This shall include but not be limited to preserving fencing and removing accumulated sediment. Temporary erosion and sediment control measures will be removed once the areas they serve are restored and stable. Removal of the erosion and sediment control measures will be the builder's responsibility after the sod has been rooted on the site.

Contingency Plan

The contingency plan aims to help minimize the risk or consequence of a failure of the erosion and sediment control works. Failure could result from insufficient measures, maintenance, or severe weather conditions. The contingency plan includes two areas of consideration:

- Procedures that will be followed where a failure has occurred; and
- Contingency measures will be implemented where there is potential for loss.

The Contractor shall be responsible for following the contingency plan and will prepare the following items:

- The Contractor will maintain a contact list for emergencies.
- Workers shall be on call for emergencies for all aspects of the emergency, from design to installation of sediment and erosion control measures. Any associated health and safety issues are the responsibility of the Contractor.
- Sediment and erosion control measures such as erosion control blanket, straw bales and stakes, sandbags, and silt fences shall be available for emergency installation.
- Gas-powered pumps, appropriately sized hoses, filtration hose socks, and filter cloth will be available for emergency dewatering.
- Heavy equipment shall be on standby for emergency works.
- A supplemental contact list for any further required equipment or materials shall be prepared and made available for emergency use.

Monitoring

As noted previously, regular monitoring of the site's erosion and sediment control measures makes up an integral part of the contingency plan by providing an early indication should any environmental control measures (such as sediment and erosion control measures) or practices fail to achieve prescribed standards. Recommended inspection intervals were discussed previously.

If monitoring identifies a high potential for failure, steps will be taken to reduce the risk. These measures may include repairing existing efforts, modifying current measures, and adding new measures.

If unforeseen events cause the strategies set out in the contingency plan to be insufficient or inappropriate to meet the objective of containing sediment within the working limits, the Contractor, either independently or as directed by the Contract Administrator, will respond promptly with all reasonable measures to prevent, counteract, or remedy any effects on aquatic habitat, and human interest (i.e., public safety, property value).

Updates to the Erosion and Sediment Control Plan may be required to reflect changes at the site during various stages of construction. The municipality will be circulated with updated plans to ensure they have the most current techniques available for review and consultation if needed.

Severe Weather Anticipated

In cases where the weather forecast indicates that significant rainfall is expected within 24 hours, the Contractor shall immediately complete the following:

- Inspect existing erosion and sediment control measures to confirm that they are secure and in good working order;
- Review site conditions to identify and protect areas of exposed soil that could be susceptible to surface erosion; and,
- Monitor all measures during the rainfall event and take corrective action where a potential for failure is identified.

The Contract Administrator shall document the status of the above-listed steps.

Responding to Failures

The Contractor will cease all construction-related work and focus on erosion and sediment control to stabilize the site where a failure has occurred or is imminent. The work shall be completed to the satisfaction of the Contract Administrator and any regulatory agencies having jurisdiction.

Any unexpected discharge of silt, sediment, or other deleterious substance shall be reported to the Municipality of Middlesex Centre within 24 hours. The Contractor is responsible for advising the contract administrator and promptly notifying the incident to the Spills Action Centre. Depending on the type of incident, water sampling and quality testing may be warranted to document the extent of the impact. Scoping for the required testing will depend on the incident report.

If significant long-term damage to aquatic habitat or property is suspected, the Owner's Engineer will develop a restoration plan. Consultation with an ecologist and biologist may be required to confirm that the remedial measures are appropriate. Development of the initial restoration plan will begin within 24 hours of discovering sediment discharge and will be implemented as soon as possible following consultation and approval from the MECP, Upper Thames River Conservation Authority (UTRCA), and Municipality of Middlesex Centre. The plan will address the following:

- Removal and disposal of sediment deposited outside of the work limits; and
- Restoration of any areas disturbed through deposition or removal.

Reporting Schedule

The Contract Administrator shall prepare weekly erosion and sediment control monitoring reports/summaries for the duration of site grading and site servicing and submit them to the Municipality of Thames Center by April 1, July 1, and November 1 of each year until all works and services included in the plan are assumed.

The monitoring reports should document the status of the ESC Plan, any repairs, rainfall or pumping that has occurred since the last report, and any risks of failure that may be present.

Additionally, any failure of the erosion and sediment control measures shall be reported as described in the contingency plan.

Construction Dewatering Requirements

Based on the Geotechnical Investigation prepared by LDS, shallow groundwater conditions are observed throughout the site. Therefore, where minor groundwater infiltration occurs within open excavations during construction, conventional sump pumping techniques are expected to be suitable for groundwater control.

Sediment controls should be incorporated into the construction of dewatering discharge outlets. These may be silt bags, constructed sediment traps, or other methods of filtering the discharge water. The Contractor will be responsible for regular maintenance, including sediment removal. Under no circumstances will dewatering effluent be discharged directly to the receiving watercourse without incorporating suitable measures to prevent sediment discharge or cause erosion or scouring at the waterway. Both the Contractor and the Contract Administrator will be responsible for monitoring the water quality leaving the site.

As an introductory guide, the water discharged at the site should have a turbidity level within 8 NTU of the background levels within the watercourse/municipal drain.

For construction dewatering efforts involving a sizeable daily pumping volume, additional sediment control or filtration measures, such as settlement tanks, may be implemented as part of the construction dewatering plan. The discharge and associated sediment controls will depend on the scope of work and the location of the excavation to be dewatered. Thus, the Owner's Engineer should review the dewatering plan in consultation with the Contractor and the Contract Administrator.

For projects requiring positive groundwater control with a removal rate of 50,000 to 400,000 litres per day, a submission to the Environmental Activity and Sector Registry (EASR) will be required. For construction dewatering activities with volumes over 400,000 litres per day, a Category 3 Permit to Take Water (PTTW) would be necessary for groundwater control. EASR submissions and PTTW applications are submitted to and approved by MECP according to Sections 34 and 98 of the Ontario Water Resources Act R.S.O. 1990 and Water Taking and Transfer Regulation O. Reg. 387/04.

The supporting documents to support an EASR submission or PTTW application should include calculations for the zone of influence and identify potential qualitative and quantitative impacts on the shallow groundwater table. Details regarding volume monitoring, water quality analyses and method/location of discharge water will also be required for either submission type. Impacts on local natural features will need to be assessed considering the proposed construction dewatering plan.

CONCLUSION AND RECOMMENDATIONS

The analysis completed by LDS yields the following conclusions:

- Zero peak runoff flows leave the proposed development;
- Sediment transport from the site during construction will be minimized;
- Subsurface infiltration trenches and infiltration galleries, perforated pipe systems and surface storage will provide quantity control for the subject site; and
- Pre-treatment is provided for the central infiltration galleries in the form of three (3) separate SNOUT devices, which receive road runoff. An enhanced level of water quality protection is provided for all water infiltrated on-site.

We trust this letter report to be complete and meet with your acceptance. Should you have any questions concerning the findings presented herein, please do not hesitate to contact the undersigned.

Sincerely,

LDS CONSULTANTS INC.

LICENSED PROFESSIONAL ENGINEER
A. H. GUBBELS
PROVINCE OF ONTARIO

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e: anthony.gubbels@LDSConsultants.ca

APPENDIX A

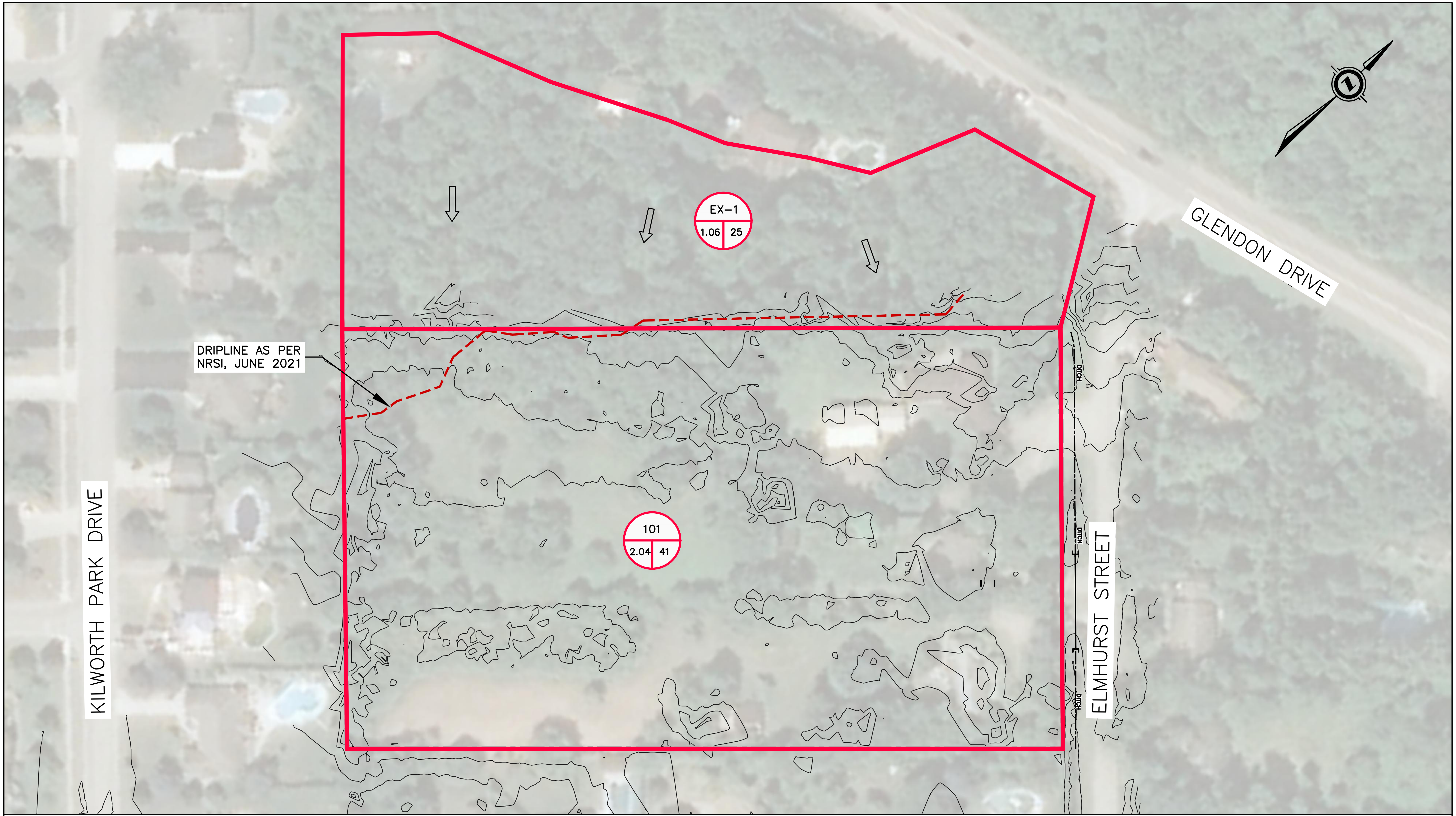
FIGURES

MN 6, 10 & 14 ELMHURST, KILWORTH
SWEID HOLDINGS INC.

SITE LOCATION PLAN

PROJECT: LD-00203 SCALE: N.T.S. FIGURE 1

Z:\1614-00203 – ELMHURST, KILWORTH\DETAIL DESIGN\REPORTS\SWM\2022\ACAD\LD-00203 LOCATION PLAN.DWG
2022-11-22 4:11:19 PM by: LUKE.JESSON



LEGEND:

CATCHMENT ID

AREA (ha)

CURVE NUMBER

🟥 CATCHMENT AREA

⇐ EXISTING OVERLAND FLOW ROUTE

MN 6,10 & 14 ELMHURST, KILWORTH
SWEID HOLDINGS INC.

EXISTING CONDITIONS DRAINAGE AREA PLAN

PROJECT: LD-00203 SCALE: N.T.S. FIGURE 2

Z:\1614-00203 - ELMHURST, KILWORTH\DETAIL DESIGN\REPORTS\SWM\2022\ACAD\LD-00203 SWM FIGURES11.DWG
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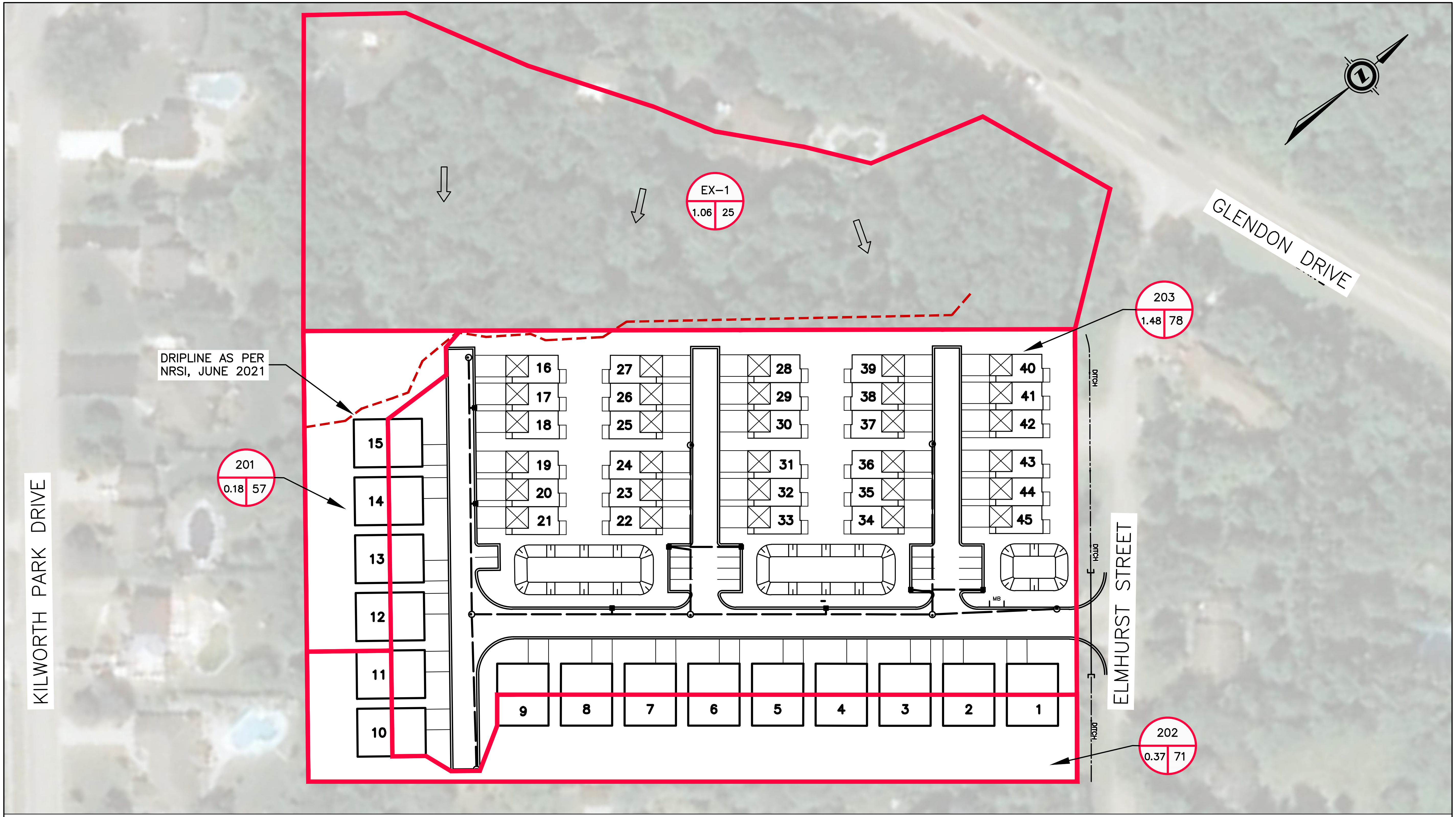

LEGEND:

101	CATCHMENT ID
AREA (ha) 7.6	
82	CURVE NUMBER
🟥	CATCHMENT AREA
⬋	PROPOSED OVERLAND FLOW ROUTE
⇙	EXISITING OVERLAND FLOW ROUTE

LDS

MN 6,10 & 14 ELMHURST, KILWORTH
SWEID HOLDINGS INC.

PROPOSED DRAINAGE AREA PLAN

PROJECT: LD-00203
SCALE: N.T.S.
FIGURE 3

Z:\1614-00203 - ELMHURST, KILWORTH\DETAIL DESIGN\REPORTS\SWM\2022\ACAD\LD-00203 SWM FIGURES11.DWG
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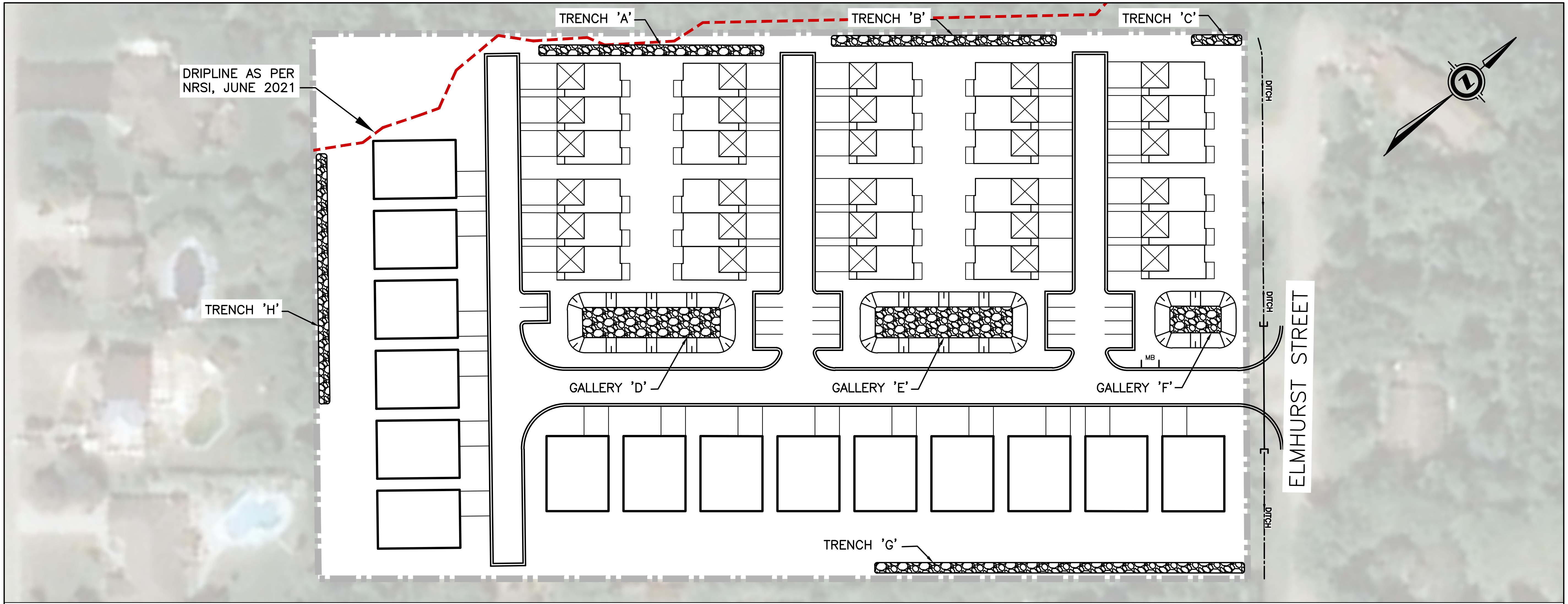


INFILTRATION TRENCH AND GALLERY DIMENSIONS			
TRENCH/GALLERY	LENGTH (m)	WIDTH (m)	DEPTH (m)
A	45.0	2.1	0.4
B	45.0	2.1	0.4
C	10.0	2.1	0.4
D	27.6	6.0	1.1
E	27.5	6.2	1.1
F	10.3	5.3	1.1
G	50.0	2.1	0.4
H	74.0	2.1	0.7

LEGEND:

▨ INFILTRATION GALLERY OR TRENCH FOOTPRINT

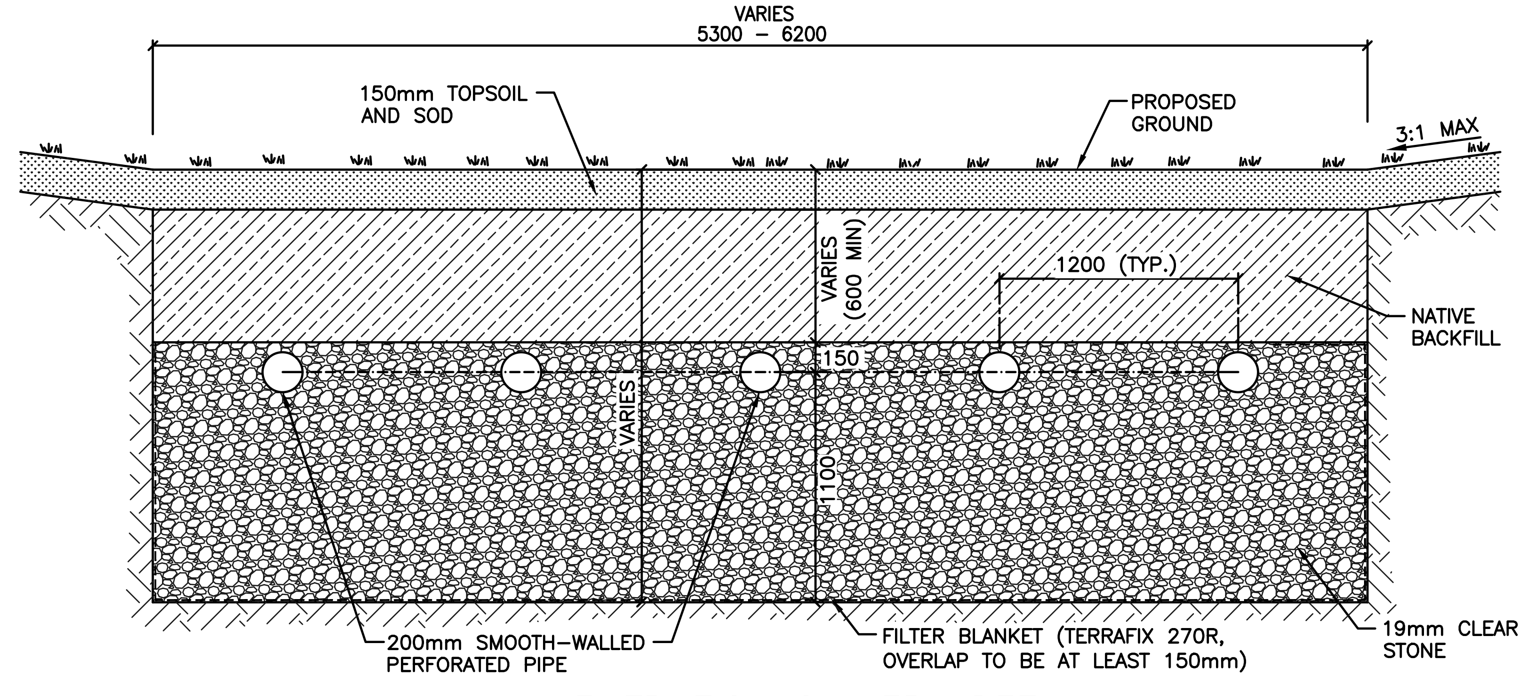
LDS

MN 6,10 & 14 ELMHURST, KILWORTH
SWEID HOLDINGS INC.

INFILTRATION TRENCH & GALLERY PLAN

PROJECT: LD-00203
SCALE: N.T.S.
FIGURE 4

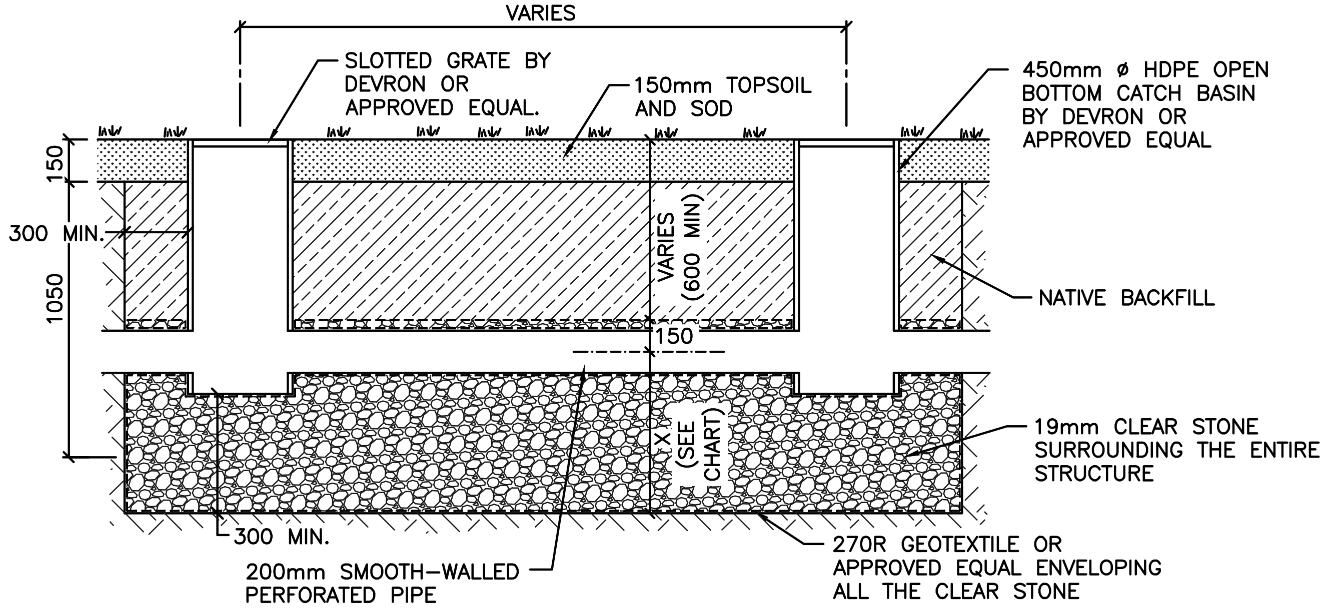
Z:\1614-00203 - ELMHURST, KILWORTH\DETAIL DESIGN\REPORTS\SWM\2022\ACAD\LD-00203 SWM FIGURES11.DWG
2022-11-22 1:37:26 PM by: LUKE.JESSON



INFILTRATION GALLERY DETAIL

N.T.S.

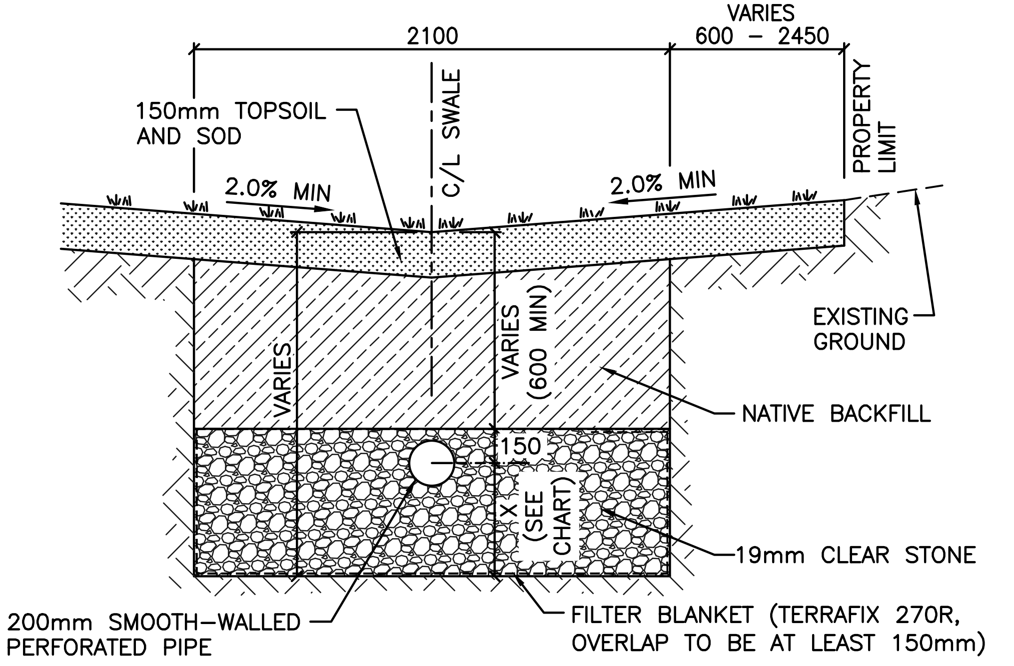
NOTE: ALL DIMENSIONS
IN MILLIMETERS



INFILTRATION GALLERY AND TRENCH DRAIN SECTION DETAIL

N.T.S.

NOTE: ALL DIMENSIONS
IN MILLIMETERS



TRENCH DRAIN DETAIL

N.T.S.

NOTE: ALL DIMENSIONS
IN MILLIMETERS

Z:\1614-00203 – ELMHURST, KILWORTH\DETAIL DESIGN\REPORTS\SWM\2022\ACAD\LD-00203 SWM FIGURES11.DWG
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MN 6,10 & 14 ELMHURST, KILWORTH
SWEID HOLDINGS INC.

INFILTRATION TRENCH & GALLERY DETAILS

PROJECT: LD-00203
SCALE: N.T.S.
FIGURE 5

APPENDIX B

SWMHYMO HYDROLOGIC MODEL

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==============================================================================

  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   Ver  4.05
      S   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   # 4058874
       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                   *********
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 +++++++++ Licensed user: Land Development Solutions                  +++++++++
 +++++++++                London                SERIAL#:4058874       +++++++++
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 *****************************************************************************
 *********            ++++++ 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: 2022-11-08     TIME: 14:11:38     RUN COUNTER: 000248         *
 *****************************************************************************
 * Input   filename: C:\SWMHMY~1\LD-00203\20221108.DAT                        *
 * Output  filename: C:\SWMHMY~1\LD-00203\20221108.out                        *
 * Summary filename: C:\SWMHMY~1\LD-00203\20221108.sum                        *
 * User comments:                                                             *
 * 1:_________________________________________________________________________*
 * 2:_________________________________________________________________________*
 * 3:_________________________________________________________________________*
 *****************************************************************************

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*#  Date        : 08-11-2022
*#  Modeller    : [LJ]
*#  Company     : LDS Consultants Inc.
*#  License #   : 4058874
*#****************************************************************************
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    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   0
------------------------------------------------------------------------------
001:0002----------------------------------------------------------------------
*#****************************************************************************
*#
*#                                            2-year
*#                                           ========
*#
*#****************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 724.690
| Ptotal= 33.31 mm |                          B=   5.500
--------------------                          C=    .800
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    =  5.00 min
                        Time to peak ratio =   .33

             TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
              .08   2.718 |   .83  15.099 |  1.58   7.604 |  2.33   3.537
              .17   2.963 |   .92  35.585 |  1.67   6.700 |  2.42   3.350
              .25   3.263 |  1.00 110.459 |  1.75   5.997 |  2.50   3.184
              .33   3.638 |  1.08  45.982 |  1.83   5.435 |  2.58   3.034
              .42   4.124 |  1.17  25.234 |  1.92   4.976 |  2.67   2.899
              .50   4.778 |  1.25  17.203 |  2.00   4.593 |  2.75   2.777
              .58   5.709 |  1.33  13.032 |  2.08   4.268 |  2.83   2.666
              .67   7.143 |  1.42  10.502 |  2.17   3.990 |  2.92   2.564
              .75   9.644 |  1.50   8.812 |  2.25   3.749 |  3.00   2.470

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001:0003----------------------------------------------------------------------
*#****************************************************************************
*#                            ====================
*#                             EXISTING CONDITIONS
*#                            ====================
*#****************************************************************************
---------------------
| CALIB NASHYD       |   Area    (ha)=    2.04   Curve Number   (CN)=41.00
| 01:C101   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=     .390

     PEAK FLOW       (cms)=     .012 (i)
     TIME TO PEAK    (hrs)=    1.283
     RUNOFF VOLUME    (mm)=    2.034
     TOTAL RAINFALL   (mm)=   33.307
     RUNOFF COEFFICIENT   =     .061

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

------------------------------------------------------------------------------
001:0004----------------------------------------------------------------------
---------------------
| CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
| 02:EX-1   DT= 1.00 |   Ia      (mm)=   8.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .081

     PEAK FLOW       (cms)=     .001 (i)
     TIME TO PEAK    (hrs)=    1.800
```

```
     RUNOFF VOLUME    (mm)=     .813
     TOTAL RAINFALL   (mm)=   33.307
     RUNOFF COEFFICIENT   =     .024

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

------------------------------------------------------------------------------
001:0005----------------------------------------------------------------------
------------------------
| ADD HYD (EXISITING ) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:C101         2.04      .012    1.28   2.03    .000
                    +ID2 02:EX-1         1.06      .001    1.80    .81    .000
                    ==========================================================
                     SUM 03:EXISITING    3.10      .013    1.30   1.62    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0006----------------------------------------------------------------------
*#****************************************************************************
*#                            ====================
*#                             PROSPOSED CONDITIONS
*#                            ====================
*#****************************************************************************
---------------------
| CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
| 01:EX-1   DT= 1.00 |   Ia      (mm)=   8.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .081

     PEAK FLOW       (cms)=     .001 (i)
     TIME TO PEAK    (hrs)=    1.800
     RUNOFF VOLUME    (mm)=     .813
     TOTAL RAINFALL   (mm)=   33.307
     RUNOFF COEFFICIENT   =     .024

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

------------------------------------------------------------------------------
001:0007----------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:02  (EX-1  )  |              DISCHARGE      TIME
--------------------                (cms)        (hrs)
           START CONTROLLING AT     .000         .917
           INFLOW HYD. PEAKS AT     .001        1.800
           STOP  CONTROLLING AT     .000         .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0009
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0009
           % OF HYDROGRAPH TO STORE       =  99.9960

           NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------------
001:0008----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .18
| 02:C201   DT= 1.00 |   Total Imp(%)=   38.00   Dir. Conn.(%)=    1.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .07          .11
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     110.46         9.07
               over (min)       1.00        14.00
     Storage Coeff.  (min)=        .44 (ii)   14.01 (ii)
     Unit Hyd. Tpeak (min)=       1.00        14.00
     Unit Hyd. peak  (cms)=       1.53          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .00          .002 (iii)
     TIME TO PEAK    (hrs)=        .98         1.28         1.250
     RUNOFF VOLUME    (mm)=      31.30         3.26         3.544
     TOTAL RAINFALL   (mm)=      33.31        33.31        33.307
     RUNOFF COEFFICIENT   =        .94          .10          .106

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

------------------------------------------------------------------------------
001:0009----------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:02  (C201  )  |              DISCHARGE      TIME
--------------------                (cms)        (hrs)
           START CONTROLLING AT     .000         .533
           INFLOW HYD. PEAKS AT     .002        1.250
           STOP  CONTROLLING AT     .000         .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0006
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0006
           % OF HYDROGRAPH TO STORE       =  99.9997

           NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------------
001:0010----------------------------------------------------------------------
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .37
| 03:C202   DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=    1.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .17
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     110.46        20.82
               over (min)       1.00        10.00
     Storage Coeff.  (min)=        .44 (ii)   10.17 (ii)
     Unit Hyd. Tpeak (min)=       1.00        10.00
     Unit Hyd. peak  (cms)=       1.53          .11
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .01          .006 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.18         1.167
     RUNOFF VOLUME    (mm)=      31.31         4.55         4.819
     TOTAL RAINFALL   (mm)=      33.31        33.31        33.307
     RUNOFF COEFFICIENT   =        .94          .14          .145
```

```

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

------------------------------------------------------------------------------
001:0011----------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:03  (C202  )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .533
           INFLOW HYD. PEAKS AT     .006       1.167
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0018
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0018
           % OF HYDROGRAPH TO STORE       =  99.9997

           NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------------
001:0012----------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=    1.48
| 04:C203   DT= 1.00 |   Total Imp(%)=   66.00   Dir. Conn.(%)=   52.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .98          .50
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=        .60         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     110.46         6.52
                over (min)       1.00        16.00
     Storage Coeff.  (min)=        .63 (ii)   16.11 (ii)
     Unit Hyd. Tpeak (min)=       1.00        16.00
     Unit Hyd. peak  (cms)=       1.35          .07
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .24          .01           .237 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.32          1.000
     RUNOFF VOLUME    (mm)=      31.31         2.85         17.646
     TOTAL RAINFALL   (mm)=      33.31        33.31         33.307
     RUNOFF COEFFICIENT   =        .94          .09           .530

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

------------------------------------------------------------------------------
001:0013----------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:04  (C203  )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .533
           INFLOW HYD. PEAKS AT     .237       1.000
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0261
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0261
           % OF HYDROGRAPH TO STORE       =  99.9996

           NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------------
001:0014----------------------------------------------------------------------
*#****************************************************************************
*#
*#                                    5-year
*#                                   ========
*#
*#****************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1330.310
| Ptotal= 45.37 mm |                          B=   7.938
--------------------                          C=    .855
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    =  5.00 min
                        Time to peak ratio =   .33

             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .08   3.038 |    .83  21.781 |   1.58  10.023 |   2.33   4.120
              .17   3.356 |    .92  53.191 |   1.67   8.657 |   2.42   3.868
              .25   3.752 |   1.00 149.041 |   1.75   7.613 |   2.50   3.646
              .33   4.257 |   1.08  68.676 |   1.83   6.790 |   2.58   3.449
              .42   4.925 |   1.17  37.777 |   1.92   6.127 |   2.67   3.273
              .50   5.845 |   1.25  25.123 |   2.00   5.581 |   2.75   3.114
              .58   7.190 |   1.33  18.497 |   2.08   5.125 |   2.83   2.971
              .67   9.326 |   1.42  14.506 |   2.17   4.739 |   2.92   2.841
              .75  13.171 |   1.50  11.874 |   2.25   4.407 |   3.00   2.722

------------------------------------------------------------------------------
001:0015----------------------------------------------------------------------
*#****************************************************************************
*#                          =====================
*#                           EXISTING CONDITIONS
*#                          =====================
*#****************************************************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=    2.04   Curve Number   (CN)=41.00
| 01:C101   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=     .390

     PEAK FLOW       (cms)=     .027 (i)
     TIME TO PEAK    (hrs)=    1.283
     RUNOFF VOLUME    (mm)=    4.014
     TOTAL RAINFALL   (mm)=   45.366
     RUNOFF COEFFICIENT   =     .088

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

------------------------------------------------------------------------------
001:0016----------------------------------------------------------------------
----------------------
| CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
| 02:EX-1   DT= 1.00 |   Ia      (mm)=   8.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .081

     PEAK FLOW       (cms)=     .003 (i)
     TIME TO PEAK    (hrs)=    1.733
     RUNOFF VOLUME    (mm)=    1.746
     TOTAL RAINFALL   (mm)=   45.366
     RUNOFF COEFFICIENT   =     .038

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

------------------------------------------------------------------------------
001:0017----------------------------------------------------------------------
------------------------
| ADD HYD (EXISITING ) | ID: NHYD        AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:C101          2.04     .027    1.28   4.01    .000
                    +ID2 02:EX-1          1.06     .003    1.73   1.75    .000
                     ==========================================================
                     SUM 03:EXISITING      3.10     .029    1.30   3.24    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0018----------------------------------------------------------------------
*#****************************************************************************
*#                          =====================
*#                           PROSPOSED CONDITIONS
*#                          =====================
*#****************************************************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
| 01:EX-1   DT= 1.00 |   Ia      (mm)=   8.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .081

     PEAK FLOW       (cms)=     .003 (i)
     TIME TO PEAK    (hrs)=    1.733
     RUNOFF VOLUME    (mm)=    1.746
     TOTAL RAINFALL   (mm)=   45.366
     RUNOFF COEFFICIENT   =     .038

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

------------------------------------------------------------------------------
001:0019----------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:02  (EX-1  )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .850
           INFLOW HYD. PEAKS AT     .003       1.733
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0019
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0019
           % OF HYDROGRAPH TO STORE       =  99.9980

           NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------------
001:0020----------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .18
| 02:C201   DT= 1.00 |   Total Imp(%)=   38.00   Dir. Conn.(%)=    1.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .07          .11
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     149.04        21.07
                over (min)       1.00        10.00
     Storage Coeff.  (min)=        .39 (ii)   10.07 (ii)
     Unit Hyd. Tpeak (min)=       1.00        10.00
     Unit Hyd. peak  (cms)=       1.57          .11
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .00          .00           .004 (iii)
     TIME TO PEAK    (hrs)=        .98         1.20          1.200
     RUNOFF VOLUME    (mm)=      43.36         6.13          6.501
     TOTAL RAINFALL   (mm)=      45.37        45.37         45.366
     RUNOFF COEFFICIENT   =        .96          .14           .143

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

------------------------------------------------------------------------------
001:0021----------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:02  (C201  )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .467
           INFLOW HYD. PEAKS AT     .004       1.200
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0012
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0012
           % OF HYDROGRAPH TO STORE       =  99.9996

           NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------------
001:0022----------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .37
| 03:C202   DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=    1.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .17
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     149.04        41.76
                over (min)       1.00         8.00
     Storage Coeff.  (min)=        .39 (ii)    7.76 (ii)
     Unit Hyd. Tpeak (min)=       1.00         8.00
     Unit Hyd. peak  (cms)=       1.57          .14
```

```
00509>                                                             *TOTALS*
00510>      PEAK FLOW       (cms)=        .00          .01           .013 (iii)
00511>      TIME TO PEAK    (hrs)=       1.00         1.15          1.150
00512>      RUNOFF VOLUME    (mm)=      43.37         8.30          8.653
00513>      TOTAL RAINFALL   (mm)=      45.37        45.37         45.366
00514>      RUNOFF COEFFICIENT   =        .96          .18           .191
00515>
00516>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00517>            CN* =  39.0    Ia = Dep. Storage  (Above)
00518>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00519>            THAN THE STORAGE COEFFICIENT.
00520>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00521>
00522> --------------------------------------------------------------------------------
00523> 001:0023------------------------------------------------------------------------
00524> --------------------
00525> | COMPUTE VOLUME   |
00526> | ID:03  (C202  )  |             DISCHARGE      TIME
00527> --------------------               (cms)       (hrs)
00528>            START CONTROLLING AT     .000        .467
00529>            INFLOW HYD. PEAKS AT     .013       1.150
00530>            STOP  CONTROLLING AT     .000        .000
00531>
00532>            REQUIRED STORAGE VOLUME (ha.m.)=    .0032
00533>            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0032
00534>            % OF HYDROGRAPH TO STORE       =  99.9996
00535>
00536>            NOTE:  Storage was computed to reduce the Inflow
00537>
00538> --------------------------------------------------------------------------------
00539> 001:0024------------------------------------------------------------------------
00540> ----------------------
00541> | CALIB STANDHYD     |   Area    (ha)=    1.48
00542> | 04:C203   DT= 1.00 |   Total Imp(%)=   66.00   Dir. Conn.(%)=   52.00
00543> ----------------------
00544>                               IMPERVIOUS    PERVIOUS (i)
00545>      Surface Area     (ha)=        .98          .50
00546>      Dep. Storage     (mm)=       2.00         5.00
00547>      Average Slope     (%)=        .60         2.00
00548>      Length            (m)=       8.00        25.00
00549>      Mannings n          =       .013         .240
00550>
00551>      Max.eff.Inten.(mm/hr)=     149.04        15.01
00552>                 over (min)       1.00        12.00
00553>      Storage Coeff.  (min)=        .56 (ii)   11.65 (ii)
00554>      Unit Hyd. Tpeak (min)=       1.00        12.00
00555>      Unit Hyd. peak  (cms)=       1.42          .10
00556>                                                             *TOTALS*
00557>      PEAK FLOW       (cms)=        .32          .01           .321 (iii)
00558>      TIME TO PEAK    (hrs)=       1.00         1.25          1.000
00559>      RUNOFF VOLUME    (mm)=      43.37         5.41         25.148
00560>      TOTAL RAINFALL   (mm)=      45.37        45.37         45.366
00561>      RUNOFF COEFFICIENT   =        .96          .12           .554
00562>
00563>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00564>            CN* =  39.0    Ia = Dep. Storage  (Above)
00565>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00566>            THAN THE STORAGE COEFFICIENT.
00567>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00568>
00569> --------------------------------------------------------------------------------
00570> 001:0025------------------------------------------------------------------------
00571> --------------------
00572> | COMPUTE VOLUME   |
00573> | ID:04  (C203  )  |             DISCHARGE      TIME
00574> --------------------               (cms)       (hrs)
00575>            START CONTROLLING AT     .000        .467
00576>            INFLOW HYD. PEAKS AT     .321       1.000
00577>            STOP  CONTROLLING AT     .000        .000
00578>
00579>            REQUIRED STORAGE VOLUME (ha.m.)=    .0372
00580>            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0372
00581>            % OF HYDROGRAPH TO STORE       =  99.9997
00582>
00583>            NOTE:  Storage was computed to reduce the Inflow
00584>
00585> --------------------------------------------------------------------------------
00586> 001:0026------------------------------------------------------------------------
00587> *#******************************************************************************
00588> *#
00589> *#                                         10-year
00590> *#                                        =========
00591> *#
00592> *#******************************************************************************
00593> --------------------
00594> | CHICAGO STORM    |   IDF curve parameters: A=1497.190
00595> | Ptotal= 52.59 mm |                         B=   7.188
00596> --------------------                         C=    .850
00597>                        used in:   INTENSITY =  A / (t + B)^C
00598>
00599>                        Duration of storm  =  3.00 hrs
00600>                        Storm time step    =  5.00 min
00601>                        Time to peak ratio =   .33
00602>
00603>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00604>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00605>                .08   3.544 |    .83  24.635 |   1.58  11.418 |   2.33   4.775
00606>                .17   3.907 |    .92  60.893 |   1.67   9.886 |   2.42   4.490
00607>                .25   4.357 |   1.00 178.745 |   1.75   8.714 |   2.50   4.237
00608>                .33   4.931 |   1.08  79.026 |   1.83   7.789 |   2.58   4.013
00609>                .42   5.686 |   1.17  42.842 |   1.92   7.043 |   2.67   3.812
00610>                .50   6.725 |   1.25  28.407 |   2.00   6.428 |   2.75   3.631
00611>                .58   8.239 |   1.33  20.928 |   2.08   5.913 |   2.83   3.467
00612>                .67  10.636 |   1.42  16.445 |   2.17   5.476 |   2.92   3.318
00613>                .75  14.947 |   1.50  13.493 |   2.25   5.101 |   3.00   3.182
00614>
00615> --------------------------------------------------------------------------------
00616> 001:0027------------------------------------------------------------------------
00617> *#******************************************************************************
00618> *#                            =====================
00619> *#                             EXISTING CONDITIONS
00620> *#                            =====================
00621> *#******************************************************************************
00622> ----------------------
00623> | CALIB NASHYD       |   Area    (ha)=    2.04   Curve Number   (CN)=41.00
00624> | 01:C101   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
00625> ----------------------   U.H. Tp(hrs)=    .200
00626>
00627>      Unit Hyd Qpeak  (cms)=     .390
00628>
00629>      PEAK FLOW       (cms)=     .037 (i)
00630>      TIME TO PEAK    (hrs)=    1.283
00631>      RUNOFF VOLUME    (mm)=    5.482
00632>      TOTAL RAINFALL   (mm)=   52.590
00633>      RUNOFF COEFFICIENT   =     .104
00634>
00635>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
00636>
00637> --------------------------------------------------------------------------------
00638> 001:0028------------------------------------------------------------------------
00639> ----------------------
00640> | CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
00641> | 02:EX-1   DT= 1.00 |   Ia      (mm)=   8.000   # of Linear Res.(N)= 3.00
00642> ----------------------   U.H. Tp(hrs)=    .500
00643>
00644>      Unit Hyd Qpeak  (cms)=     .081
00645>
00646>      PEAK FLOW       (cms)=     .005 (i)
00647>      TIME TO PEAK    (hrs)=    1.717
00648>      RUNOFF VOLUME    (mm)=    2.464
00649>      TOTAL RAINFALL   (mm)=   52.590
00650>      RUNOFF COEFFICIENT   =     .047
00651>
00652>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00653>
00654> --------------------------------------------------------------------------------
00655> 001:0029------------------------------------------------------------------------
00656> ------------------------
00657> | ADD HYD (EXISITING ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00658> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00659>                      ID1 01:C101           2.04      .037    1.28   5.48    .000
00660>                     +ID2 02:EX-1           1.06      .005    1.72   2.46    .000
00661>                      ===========================================================
00662>                      SUM 03:EXISITING      3.10      .040    1.28   4.45    .000
00663>
00664>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00665>
00666> --------------------------------------------------------------------------------
00667> 001:0030------------------------------------------------------------------------
00668> *#******************************************************************************
00669> *#                            =====================
00670> *#                             PROSPOSED CONDITIONS
00671> *#                            =====================
00672> *#******************************************************************************
00673> ----------------------
00674> | CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
00675> | 01:EX-1   DT= 1.00 |   Ia      (mm)=   8.000   # of Linear Res.(N)= 3.00
00676> ----------------------   U.H. Tp(hrs)=    .500
00677>
00678>      Unit Hyd Qpeak  (cms)=     .081
00679>
00680>      PEAK FLOW       (cms)=     .005 (i)
00681>      TIME TO PEAK    (hrs)=    1.717
00682>      RUNOFF VOLUME    (mm)=    2.464
00683>      TOTAL RAINFALL   (mm)=   52.590
00684>      RUNOFF COEFFICIENT   =     .047
00685>
00686>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00687>
00688> --------------------------------------------------------------------------------
00689> 001:0031------------------------------------------------------------------------
00690> --------------------
00691> | COMPUTE VOLUME   |
00692> | ID:02  (EX-1  )  |             DISCHARGE      TIME
00693> --------------------               (cms)       (hrs)
00694>            START CONTROLLING AT     .000        .833
00695>            INFLOW HYD. PEAKS AT     .005       1.717
00696>            STOP  CONTROLLING AT     .000        .000
00697>
00698>            REQUIRED STORAGE VOLUME (ha.m.)=    .0026
00699>            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0026
00700>            % OF HYDROGRAPH TO STORE       =  99.9984
00701>
00702>            NOTE:  Storage was computed to reduce the Inflow
00703>
00704> --------------------------------------------------------------------------------
00705> 001:0032------------------------------------------------------------------------
00706> ----------------------
00707> | CALIB STANDHYD     |   Area    (ha)=     .18
00708> | 02:C201   DT= 1.00 |   Total Imp(%)=   38.00   Dir. Conn.(%)=    1.00
00709> ----------------------
00710>                               IMPERVIOUS    PERVIOUS (i)
00711>      Surface Area     (ha)=        .07          .11
00712>      Dep. Storage     (mm)=       2.00         5.00
00713>      Average Slope     (%)=       2.00         2.00
00714>      Length            (m)=       8.00        25.00
00715>      Mannings n          =       .013         .240
00716>
00717>      Max.eff.Inten.(mm/hr)=     178.75        29.86
00718>                 over (min)       1.00         9.00
00719>      Storage Coeff.  (min)=        .36 (ii)    8.79 (ii)
00720>      Unit Hyd. Tpeak (min)=       1.00         9.00
00721>      Unit Hyd. peak  (cms)=       1.59          .13
00722>                                                             *TOTALS*
00723>      PEAK FLOW       (cms)=        .00          .01           .006 (iii)
00724>      TIME TO PEAK    (hrs)=        .98         1.17          1.167
00725>      RUNOFF VOLUME    (mm)=      50.59         8.20          8.625
00726>      TOTAL RAINFALL   (mm)=      52.59        52.59         52.590
00727>      RUNOFF COEFFICIENT   =        .96          .16           .164
00728>
00729>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00730>            CN* =  39.0    Ia = Dep. Storage  (Above)
00731>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00732>            THAN THE STORAGE COEFFICIENT.
00733>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00734>
00735> --------------------------------------------------------------------------------
00736> 001:0033------------------------------------------------------------------------
00737> --------------------
00738> | COMPUTE VOLUME   |
00739> | ID:02  (C201  )  |             DISCHARGE      TIME
00740> --------------------               (cms)       (hrs)
00741>            START CONTROLLING AT     .000        .433
00742>            INFLOW HYD. PEAKS AT     .006       1.167
00743>            STOP  CONTROLLING AT     .000        .000
00744>
00745>            REQUIRED STORAGE VOLUME (ha.m.)=    .0016
00746>            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0016
00747>            % OF HYDROGRAPH TO STORE       =  99.9996
00748>
00749>            NOTE:  Storage was computed to reduce the Inflow
00750>
00751> --------------------------------------------------------------------------------
00752> 001:0034------------------------------------------------------------------------
00753> ----------------------
00754> | CALIB STANDHYD     |   Area    (ha)=     .37
00755> | 03:C202   DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=    1.00
00756> ----------------------
00757>                               IMPERVIOUS    PERVIOUS (i)
00758>      Surface Area     (ha)=        .20          .17
00759>      Dep. Storage     (mm)=       2.00         5.00
00760>      Average Slope     (%)=       2.00         2.00
00761>      Length            (m)=       8.00        25.00
00762>      Mannings n          =       .013         .240
```

```

     Max.eff.Inten.(mm/hr)=     178.75        59.06
                over (min)        1.00         7.00
     Storage Coeff.  (min)=        .36 (ii)     6.77 (ii)
     Unit Hyd. Tpeak (min)=       1.00         7.00
     Unit Hyd. peak  (cms)=       1.59          .17
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .00          .02          .019 (iii)
     TIME TO PEAK    (hrs)=        .98         1.10         1.100
     RUNOFF VOLUME    (mm)=      50.59        10.96        11.361
     TOTAL RAINFALL   (mm)=      52.59        52.59        52.590
     RUNOFF COEFFICIENT   =        .96          .21          .216

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

--------------------------------------------------------------------------------
001:0035------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:03  (C202  )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .433
           INFLOW HYD. PEAKS AT     .019       1.100
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0042
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0042
           % OF HYDROGRAPH TO STORE       =  99.9997

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
001:0036------------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=    1.48
| 04:C203   DT= 1.00 |   Total Imp(%)=   66.00   Dir. Conn.(%)=   52.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .98          .50
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=        .60         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     178.75        22.69
                over (min)        1.00        10.00
     Storage Coeff.  (min)=        .52 (ii)     9.92 (ii)
     Unit Hyd. Tpeak (min)=       1.00        10.00
     Unit Hyd. peak  (cms)=       1.45          .11
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .38          .02          .387 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.20         1.000
     RUNOFF VOLUME    (mm)=      50.59         7.28        29.801
     TOTAL RAINFALL   (mm)=      52.59        52.59        52.590
     RUNOFF COEFFICIENT   =        .96          .14          .567

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

--------------------------------------------------------------------------------
001:0037------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:04  (C203  )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .433
           INFLOW HYD. PEAKS AT     .387       1.000
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0441
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0441
           % OF HYDROGRAPH TO STORE       =  99.9997

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
001:0038------------------------------------------------------------------------
*#******************************************************************************
*#
*#                                         25-year
*#                                        =========
*#
*#******************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1455.000
| Ptotal= 60.37 mm |                          B=   5.000
--------------------                          C=    .820
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    =  5.00 min
                        Time to peak ratio =   .33

              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   4.464 |    .83  26.338 |   1.58  12.906 |   2.33   5.854
               .17   4.878 |    .92  65.076 |   1.67  11.320 |   2.42   5.536
               .25   5.387 |   1.00 220.223 |   1.75  10.095 |   2.50   5.253
               .33   6.027 |   1.08  85.162 |   1.83   9.119 |   2.58   4.999
               .42   6.858 |   1.17  45.078 |   1.92   8.324 |   2.67   4.771
               .50   7.983 |   1.25  30.164 |   2.00   7.664 |   2.75   4.564
               .58   9.594 |   1.33  22.579 |   2.08   7.106 |   2.83   4.376
               .67  12.097 |   1.42  18.039 |   2.17   6.629 |   2.92   4.204
               .75  16.515 |   1.50  15.035 |   2.25   6.216 |   3.00   4.046

--------------------------------------------------------------------------------
001:0039------------------------------------------------------------------------
*#******************************************************************************
*#                            =====================
*#                             EXISTING CONDITIONS
*#                            =====================
*#******************************************************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=    2.04   Curve Number   (CN)=41.00
| 01:C101   DT= 1.00 |   Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=     .390

     PEAK FLOW       (cms)=     .050 (i)
     TIME TO PEAK    (hrs)=    1.267
     RUNOFF VOLUME    (mm)=    7.285
     TOTAL RAINFALL   (mm)=   60.373
     RUNOFF COEFFICIENT   =     .121

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

--------------------------------------------------------------------------------
001:0040------------------------------------------------------------------------
----------------------
| CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
| 02:EX-1   DT= 1.00 |   Ia       (mm)=   8.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .081

     PEAK FLOW       (cms)=     .006 (i)
     TIME TO PEAK    (hrs)=    1.700
     RUNOFF VOLUME    (mm)=    3.368
     TOTAL RAINFALL   (mm)=   60.373
     RUNOFF COEFFICIENT   =     .056

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

--------------------------------------------------------------------------------
001:0041------------------------------------------------------------------------
------------------------
| ADD HYD (EXISITING ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:C101            2.04     .050    1.27   7.28    .000
                    +ID2 02:EX-1            1.06     .006    1.70   3.37    .000
                     ===========================================================
                     SUM 03:EXISITING       3.10     .053    1.27   5.95    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0042------------------------------------------------------------------------
*#******************************************************************************
*#                             =====================
*#                              PROSPOSED CONDITIONS
*#                             =====================
*#******************************************************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
| 01:EX-1   DT= 1.00 |   Ia       (mm)=   8.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .081

     PEAK FLOW       (cms)=     .006 (i)
     TIME TO PEAK    (hrs)=    1.700
     RUNOFF VOLUME    (mm)=    3.368
     TOTAL RAINFALL   (mm)=   60.373
     RUNOFF COEFFICIENT   =     .056

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

--------------------------------------------------------------------------------
001:0043------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:02  (EX-1  )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .817
           INFLOW HYD. PEAKS AT     .006       1.700
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0036
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0036
           % OF HYDROGRAPH TO STORE       =  99.9988

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
001:0044------------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .18
| 02:C201   DT= 1.00 |   Total Imp(%)=   38.00   Dir. Conn.(%)=    1.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .07          .11
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     220.22        41.71
                over (min)        1.00         8.00
     Storage Coeff.  (min)=        .33 (ii)     7.70 (ii)
     Unit Hyd. Tpeak (min)=       1.00         8.00
     Unit Hyd. peak  (cms)=       1.62          .15
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .00          .01          .009 (iii)
     TIME TO PEAK    (hrs)=        .98         1.12         1.117
     RUNOFF VOLUME    (mm)=      58.37        10.71        11.183
     TOTAL RAINFALL   (mm)=      60.37        60.37        60.373
     RUNOFF COEFFICIENT   =        .97          .18          .185

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

--------------------------------------------------------------------------------
001:0045------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:02  (C201  )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .367
           INFLOW HYD. PEAKS AT     .009       1.117
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0020
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0020
           % OF HYDROGRAPH TO STORE       =  99.9997

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
001:0046------------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .37
| 03:C202   DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=    1.00
----------------------
```

```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .17
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     220.22        86.39
                over (min)       1.00         6.00
     Storage Coeff.  (min)=        .33 (ii)     5.84 (ii)
     Unit Hyd. Tpeak (min)=       1.00         6.00
     Unit Hyd. peak  (cms)=       1.62          .19
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .00          .03           .028 (iii)
     TIME TO PEAK    (hrs)=        .98         1.08          1.083
     RUNOFF VOLUME    (mm)=      58.37        14.14         14.585
     TOTAL RAINFALL   (mm)=      60.37        60.37         60.373
     RUNOFF COEFFICIENT   =        .97          .23           .242

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

--------------------------------------------------------------------------------
001:0047------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:03  (C202  )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .367
           INFLOW HYD. PEAKS AT     .028       1.083
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0054
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0054
           % OF HYDROGRAPH TO STORE       =  99.9996

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
001:0048------------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=    1.48
| 04:C203   DT= 1.00 |   Total Imp(%)=   66.00   Dir. Conn.(%)=   52.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .98          .50
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=        .60         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     220.22        31.62
                over (min)       1.00         9.00
     Storage Coeff.  (min)=        .48 (ii)     8.71 (ii)
     Unit Hyd. Tpeak (min)=       1.00         9.00
     Unit Hyd. peak  (cms)=       1.49          .13
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .47          .03           .479 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.15          1.000
     RUNOFF VOLUME    (mm)=      58.37         9.55         34.937
     TOTAL RAINFALL   (mm)=      60.37        60.37         60.373
     RUNOFF COEFFICIENT   =        .97          .16           .579

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

--------------------------------------------------------------------------------
001:0049------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:04  (C203  )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .367
           INFLOW HYD. PEAKS AT     .479       1.000
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0517
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0517
           % OF HYDROGRAPH TO STORE       =  99.9996

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
001:0050------------------------------------------------------------------------
*#******************************************************************************
*#
*#                                         50-year
*#                                        =========
*#
*#******************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1499.060
| Ptotal= 66.11 mm |                          B=   4.188
--------------------                          C=    .809
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    =  5.00 min
                        Time to peak ratio =   .33

              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   5.048 |    .83  27.983 |   1.58  14.045 |   2.33   6.561
               .17   5.501 |    .92  68.751 |   1.67  12.381 |   2.42   6.216
               .25   6.054 |   1.00 249.214 |   1.75  11.088 |   2.50   5.909
               .33   6.747 |   1.08  90.168 |   1.83  10.056 |   2.58   5.633
               .42   7.643 |   1.17  47.427 |   1.92   9.210 |   2.67   5.384
               .50   8.846 |   1.25  31.940 |   2.00   8.506 |   2.75   5.158
               .58  10.558 |   1.33  24.096 |   2.08   7.909 |   2.83   4.952
               .67  13.195 |   1.42  19.393 |   2.17   7.396 |   2.92   4.763
               .75  17.808 |   1.50  16.269 |   2.25   6.951 |   3.00   4.590

--------------------------------------------------------------------------------
001:0051------------------------------------------------------------------------
*#******************************************************************************
*#                            =====================
*#                             EXISTING CONDITIONS
*#                            =====================
*#******************************************************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=    2.04   Curve Number   (CN)=41.00
| 01:C101   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=     .390

     PEAK FLOW       (cms)=     .060 (i)
     TIME TO PEAK    (hrs)=    1.250
     RUNOFF VOLUME    (mm)=    8.754
     TOTAL RAINFALL   (mm)=   66.112
     RUNOFF COEFFICIENT   =     .132

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

--------------------------------------------------------------------------------
001:0052------------------------------------------------------------------------
----------------------
| CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
| 02:EX-1   DT= 1.00 |   Ia      (mm)=   8.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .081

     PEAK FLOW       (cms)=     .008 (i)
     TIME TO PEAK    (hrs)=    1.700
     RUNOFF VOLUME    (mm)=    4.117
     TOTAL RAINFALL   (mm)=   66.112
     RUNOFF COEFFICIENT   =     .062

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

--------------------------------------------------------------------------------
001:0053------------------------------------------------------------------------
------------------------
| ADD HYD (EXISITING ) | ID: NHYD         AREA     QPEAK   TPEAK  R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:C101           2.04     .060    1.25   8.75    .000
                    +ID2 02:EX-1           1.06     .008    1.70   4.12    .000
                     ===========================================================
                     SUM 03:EXISITING      3.10     .064    1.27   7.17    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0054------------------------------------------------------------------------
*#******************************************************************************
*#                            =====================
*#                             PROSPOSED CONDITIONS
*#                            =====================
*#******************************************************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
| 01:EX-1   DT= 1.00 |   Ia      (mm)=   8.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .081

     PEAK FLOW       (cms)=     .008 (i)
     TIME TO PEAK    (hrs)=    1.700
     RUNOFF VOLUME    (mm)=    4.117
     TOTAL RAINFALL   (mm)=   66.112
     RUNOFF COEFFICIENT   =     .062

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

--------------------------------------------------------------------------------
001:0055------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:02  (EX-1  )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .783
           INFLOW HYD. PEAKS AT     .008       1.700
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0044
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0044
           % OF HYDROGRAPH TO STORE       =  99.9989

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
001:0056------------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .18
| 02:C201   DT= 1.00 |   Total Imp(%)=   38.00   Dir. Conn.(%)=    1.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .07          .11
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     249.21        53.42
                over (min)       1.00         7.00
     Storage Coeff.  (min)=        .32 (ii)     6.99 (ii)
     Unit Hyd. Tpeak (min)=       1.00         7.00
     Unit Hyd. peak  (cms)=       1.63          .16
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .00          .01           .011 (iii)
     TIME TO PEAK    (hrs)=        .98         1.10          1.100
     RUNOFF VOLUME    (mm)=      64.11        12.72         13.236
     TOTAL RAINFALL   (mm)=      66.11        66.11         66.112
     RUNOFF COEFFICIENT   =        .97          .19           .200

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

--------------------------------------------------------------------------------
001:0057------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:02  (C201  )  |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .333
           INFLOW HYD. PEAKS AT     .011       1.100
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0024
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0024
           % OF HYDROGRAPH TO STORE       =  99.9997

           NOTE:  Storage was computed to reduce the Inflow

```

```
 -------------------------------------------------------------------------------
 001:0058-----------------------------------------------------------------------
 ----------------------
 | CALIB STANDHYD     |   Area    (ha)=     .37
 | 03:C202   DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=    1.00
 ----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .17
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     249.21       115.57
                over (min)        1.00         5.00
     Storage Coeff.  (min)=        .32 (ii)     5.22 (ii)
     Unit Hyd. Tpeak (min)=       1.00         5.00
     Unit Hyd. peak  (cms)=       1.63          .22
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .00          .03           .035 (iii)
     TIME TO PEAK    (hrs)=        .98         1.07          1.067
     RUNOFF VOLUME    (mm)=      64.11        16.67         17.148
     TOTAL RAINFALL   (mm)=      66.11        66.11         66.112
     RUNOFF COEFFICIENT   =        .97          .25           .259

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

 -------------------------------------------------------------------------------
 001:0059-----------------------------------------------------------------------
 --------------------
 | COMPUTE VOLUME   |
 | ID:03  (C202  )  |             DISCHARGE      TIME
 --------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .333
           INFLOW HYD. PEAKS AT     .035       1.067
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0063
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0063
           % OF HYDROGRAPH TO STORE       =  99.9997

           NOTE:  Storage was computed to reduce the Inflow

 -------------------------------------------------------------------------------
 001:0060-----------------------------------------------------------------------
 ----------------------
 | CALIB STANDHYD     |   Area    (ha)=    1.48
 | 04:C203   DT= 1.00 |   Total Imp(%)=   66.00   Dir. Conn.(%)=   52.00
 ----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .98          .50
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=        .60         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     249.21        39.93
                over (min)        1.00         8.00
     Storage Coeff.  (min)=        .45 (ii)     7.95 (ii)
     Unit Hyd. Tpeak (min)=       1.00         8.00
     Unit Hyd. peak  (cms)=       1.51          .14
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .53          .04           .545 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.12          1.000
     RUNOFF VOLUME    (mm)=      64.11        11.38         38.802
     TOTAL RAINFALL   (mm)=      66.11        66.11         66.112
     RUNOFF COEFFICIENT   =        .97          .17           .587

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

 -------------------------------------------------------------------------------
 001:0061-----------------------------------------------------------------------
 --------------------
 | COMPUTE VOLUME   |
 | ID:04  (C203  )  |             DISCHARGE      TIME
 --------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .333
           INFLOW HYD. PEAKS AT     .545       1.000
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0574
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0574
           % OF HYDROGRAPH TO STORE       =  99.9996

           NOTE:  Storage was computed to reduce the Inflow

 -------------------------------------------------------------------------------
 001:0062-----------------------------------------------------------------------
 *#*****************************************************************************
 *#
 *#                                         100-year
 *#                                        ==========
 *#
 *#*****************************************************************************
 --------------------
 | CHICAGO STORM    |    IDF curve parameters: A=1499.530
 | Ptotal= 71.79 mm |                          B=   3.297
 --------------------                          C=    .794
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  3.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                 TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                  hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                  .08   5.747 |    .83  29.418 |   1.58  15.260 |   2.33   7.390
                  .17   6.241 |    .92  70.969 |   1.67  13.536 |   2.42   7.017
                  .25   6.842 |   1.00 279.468 |   1.75  12.190 |   2.50   6.684
                  .33   7.590 |   1.08  93.045 |   1.83  11.107 |   2.58   6.384
                  .42   8.550 |   1.17  48.987 |   1.92  10.216 |   2.67   6.113
                  .50   9.830 |   1.25  33.402 |   2.00   9.469 |   2.75   5.867
                  .58  11.634 |   1.33  25.503 |   2.08   8.834 |   2.83   5.641
                  .67  14.380 |   1.42  20.737 |   2.17   8.287 |   2.92   5.435
                  .75  19.119 |   1.50  17.547 |   2.25   7.809 |   3.00   5.244

 -------------------------------------------------------------------------------
 001:0063-----------------------------------------------------------------------
 *#*****************************************************************************
 *#                             =====================
 *#                              EXISTING CONDITIONS
 *#                             =====================
 *#*****************************************************************************
 ----------------------
 | CALIB NASHYD       |   Area    (ha)=    2.04   Curve Number   (CN)=41.00
 | 01:C101   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
 ----------------------   U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=     .390

     PEAK FLOW       (cms)=     .071 (i)
     TIME TO PEAK    (hrs)=    1.250
     RUNOFF VOLUME    (mm)=   10.319
     TOTAL RAINFALL   (mm)=   71.791
     RUNOFF COEFFICIENT   =     .144

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

 -------------------------------------------------------------------------------
 001:0064-----------------------------------------------------------------------
 ----------------------
 | CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
 | 02:EX-1   DT= 1.00 |   Ia      (mm)=   8.000   # of Linear Res.(N)= 3.00
 ----------------------   U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .081

     PEAK FLOW       (cms)=     .009 (i)
     TIME TO PEAK    (hrs)=    1.683
     RUNOFF VOLUME    (mm)=    4.927
     TOTAL RAINFALL   (mm)=   71.791
     RUNOFF COEFFICIENT   =     .069

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

 -------------------------------------------------------------------------------
 001:0065-----------------------------------------------------------------------
 ------------------------
 | ADD HYD (EXISITING ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:C101           2.04      .071    1.25  10.32    .000
                   +ID2 02:EX-1           1.06      .009    1.68   4.93    .000
                    ===========================================================
                    SUM 03:EXISITING      3.10      .076    1.27   8.48    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 001:0066-----------------------------------------------------------------------
 *#*****************************************************************************
 *#                             =====================
 *#                              PROSPOSED CONDITIONS
 *#                             =====================
 *#*****************************************************************************
 ----------------------
 | CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
 | 01:EX-1   DT= 1.00 |   Ia      (mm)=   8.000   # of Linear Res.(N)= 3.00
 ----------------------   U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .081

     PEAK FLOW       (cms)=     .009 (i)
     TIME TO PEAK    (hrs)=    1.683
     RUNOFF VOLUME    (mm)=    4.927
     TOTAL RAINFALL   (mm)=   71.791
     RUNOFF COEFFICIENT   =     .069

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

 -------------------------------------------------------------------------------
 001:0067-----------------------------------------------------------------------
 --------------------
 | COMPUTE VOLUME   |
 | ID:02  (EX-1  )  |             DISCHARGE      TIME
 --------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .767
           INFLOW HYD. PEAKS AT     .009       1.683
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0052
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0052
           % OF HYDROGRAPH TO STORE       =  99.9990

           NOTE:  Storage was computed to reduce the Inflow

 -------------------------------------------------------------------------------
 001:0068-----------------------------------------------------------------------
 ----------------------
 | CALIB STANDHYD     |   Area    (ha)=     .18
 | 02:C201   DT= 1.00 |   Total Imp(%)=   38.00   Dir. Conn.(%)=    1.00
 ----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .07          .11
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     279.47        68.81
                over (min)        1.00         6.00
     Storage Coeff.  (min)=        .30 (ii)     6.33 (ii)
     Unit Hyd. Tpeak (min)=       1.00         6.00
     Unit Hyd. peak  (cms)=       1.64          .18
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .00          .01           .014 (iii)
     TIME TO PEAK    (hrs)=        .98         1.08          1.083
     RUNOFF VOLUME    (mm)=      69.79        14.85         15.399
     TOTAL RAINFALL   (mm)=      71.79        71.79         71.791
     RUNOFF COEFFICIENT   =        .97          .21           .214

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

 -------------------------------------------------------------------------------
 001:0069-----------------------------------------------------------------------
 --------------------
 | COMPUTE VOLUME   |
 | ID:02  (C201  )  |             DISCHARGE      TIME
 --------------------               (cms)       (hrs)
           START CONTROLLING AT     .000        .300
           INFLOW HYD. PEAKS AT     .014       1.083
           STOP  CONTROLLING AT     .000        .000

```

```
          REQUIRED STORAGE VOLUME (ha.m.)=    .0028
          TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0028
          % OF HYDROGRAPH TO STORE       =  99.9997

          NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------------
001:0070----------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .37
| 03:C202   DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=    1.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .17
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     279.47       139.99
                over (min)        1.00         5.00
     Storage Coeff.  (min)=        .30 (ii)    4.84 (ii)
     Unit Hyd. Tpeak (min)=       1.00         5.00
     Unit Hyd. peak  (cms)=       1.64          .23
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .04          .043 (iii)
     TIME TO PEAK    (hrs)=        .98         1.07         1.067
     RUNOFF VOLUME    (mm)=      69.79        19.32        19.828
     TOTAL RAINFALL   (mm)=      71.79        71.79        71.791
     RUNOFF COEFFICIENT   =        .97          .27          .276

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

------------------------------------------------------------------------------
001:0071----------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:03  (C202  )  |              DISCHARGE      TIME
--------------------                (cms)       (hrs)
          START CONTROLLING AT     .000         .300
          INFLOW HYD. PEAKS AT     .043        1.067
          STOP  CONTROLLING AT     .000         .000

          REQUIRED STORAGE VOLUME (ha.m.)=    .0073
          TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0073
          % OF HYDROGRAPH TO STORE       =  99.9996

          NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------------
001:0072----------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=    1.48
| 04:C203   DT= 1.00 |   Total Imp(%)=   66.00   Dir. Conn.(%)=   52.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .98          .50
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=        .60         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     279.47        50.39
                over (min)        1.00         7.00
     Storage Coeff.  (min)=        .43 (ii)    7.27 (ii)
     Unit Hyd. Tpeak (min)=       1.00         7.00
     Unit Hyd. peak  (cms)=       1.53          .16
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .60          .04          .616 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.10         1.000
     RUNOFF VOLUME    (mm)=      69.79        13.32        42.686
     TOTAL RAINFALL   (mm)=      71.79        71.79        71.791
     RUNOFF COEFFICIENT   =        .97          .19          .595

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

------------------------------------------------------------------------------
001:0073----------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:04  (C203  )  |              DISCHARGE      TIME
--------------------                (cms)       (hrs)
          START CONTROLLING AT     .000         .300
          INFLOW HYD. PEAKS AT     .616        1.000
          STOP  CONTROLLING AT     .000         .000

          REQUIRED STORAGE VOLUME (ha.m.)=    .0632
          TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0632
          % OF HYDROGRAPH TO STORE       =  99.9996

          NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------------
001:0074----------------------------------------------------------------------
*#****************************************************************************
*#
*#                                   250-year
*#                                  ==========
*#
*#****************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=3048.220
| Ptotal= 86.60 mm |                          B=  10.030
--------------------                          C=    .888
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    =  5.00 min
                        Time to peak ratio =   .33

              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   5.146 |    .83  43.789 |   1.58  19.207 |   2.33   7.218
               .17   5.748 |    .92 106.492 |   1.67  16.378 |   2.42   6.730
               .25   6.505 |   1.00 274.730 |   1.75  14.228 |   2.50   6.302
               .33   7.486 |   1.08 136.493 |   1.83  12.548 |   2.58   5.925
               .42   8.799 |   1.17  76.628 |   1.92  11.204 |   2.67   5.589
               .50  10.637 |   1.25  50.754 |   2.00  10.107 |   2.75   5.289
               .58  13.366 |   1.33  36.943 |   2.08   9.197 |   2.83   5.020
               .67  17.763 |   1.42  28.579 |   2.17   8.431 |   2.92   4.776
               .75  25.782 |   1.50  23.067 |   2.25   7.779 |   3.00   4.554

------------------------------------------------------------------------------
001:0075----------------------------------------------------------------------
*#****************************************************************************
*#                              ====================
*#                               EXISTING CONDITIONS
*#                              ====================
*#****************************************************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=    2.04   Curve Number   (CN)=41.00
| 01:C101   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=     .390

     PEAK FLOW       (cms)=     .105 (i)
     TIME TO PEAK    (hrs)=    1.267
     RUNOFF VOLUME    (mm)=   14.892
     TOTAL RAINFALL   (mm)=   86.599
     RUNOFF COEFFICIENT   =     .172

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

------------------------------------------------------------------------------
001:0076----------------------------------------------------------------------
----------------------
| CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
| 02:EX-1   DT= 1.00 |   Ia      (mm)=   8.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .081

     PEAK FLOW       (cms)=     .015 (i)
     TIME TO PEAK    (hrs)=    1.700
     RUNOFF VOLUME    (mm)=    7.349
     TOTAL RAINFALL   (mm)=   86.599
     RUNOFF COEFFICIENT   =     .085

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

------------------------------------------------------------------------------
001:0077----------------------------------------------------------------------
------------------------
| ADD HYD (EXISITING ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:C101          2.04      .105    1.27  14.89    .000
                    +ID2 02:EX-1          1.06      .015    1.70   7.35    .000
                     =========================================================
                     SUM 03:EXISITING     3.10      .114    1.28  12.31    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0078----------------------------------------------------------------------
*#****************************************************************************
*#                              ====================
*#                               PROSPOSED CONDITIONS
*#                              ====================
*#****************************************************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=    1.06   Curve Number   (CN)=25.00
| 01:EX-1   DT= 1.00 |   Ia      (mm)=   8.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .081

     PEAK FLOW       (cms)=     .015 (i)
     TIME TO PEAK    (hrs)=    1.700
     RUNOFF VOLUME    (mm)=    7.349
     TOTAL RAINFALL   (mm)=   86.599
     RUNOFF COEFFICIENT   =     .085

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

------------------------------------------------------------------------------
001:0079----------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:02  (EX-1  )  |              DISCHARGE      TIME
--------------------                (cms)       (hrs)
          START CONTROLLING AT     .000         .717
          INFLOW HYD. PEAKS AT     .015        1.700
          STOP  CONTROLLING AT     .000         .000

          REQUIRED STORAGE VOLUME (ha.m.)=    .0078
          TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0078
          % OF HYDROGRAPH TO STORE       =  99.9993

          NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------------
001:0080----------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .18
| 02:C201   DT= 1.00 |   Total Imp(%)=   38.00   Dir. Conn.(%)=    1.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .07          .11
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     274.73        82.13
                over (min)        1.00         6.00
     Storage Coeff.  (min)=        .30 (ii)    5.92 (ii)
     Unit Hyd. Tpeak (min)=       1.00         6.00
     Unit Hyd. peak  (cms)=       1.64          .19
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .02          .019 (iii)
     TIME TO PEAK    (hrs)=        .98         1.10         1.083
     RUNOFF VOLUME    (mm)=      84.60        20.97        21.604
     TOTAL RAINFALL   (mm)=      86.60        86.60        86.599
     RUNOFF COEFFICIENT   =        .98          .24          .249

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

------------------------------------------------------------------------------
001:0081----------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
```

```
| ID:02  (C201  )  |             DISCHARGE      TIME
--------------------              (cms)       (hrs)
           START CONTROLLING AT     .000        .317
           INFLOW HYD. PEAKS AT     .019       1.083
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0039
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0039
           % OF HYDROGRAPH TO STORE       =  99.9997

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
001:0082------------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .37
| 03:C202   DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=    1.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .17
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     274.73       159.19
                over (min)        1.00         5.00
     Storage Coeff.  (min)=        .30 (ii)    4.62 (ii)
     Unit Hyd. Tpeak (min)=       1.00         5.00
     Unit Hyd. peak  (cms)=       1.64          .24
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .00          .05           .055 (iii)
     TIME TO PEAK    (hrs)=        .98         1.07          1.067
     RUNOFF VOLUME    (mm)=      84.60        26.84         27.421
     TOTAL RAINFALL   (mm)=      86.60        86.60         86.599
     RUNOFF COEFFICIENT   =        .98          .31           .317

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

--------------------------------------------------------------------------------
001:0083------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:03  (C202  )  |             DISCHARGE      TIME
--------------------              (cms)       (hrs)
           START CONTROLLING AT     .000        .317
           INFLOW HYD. PEAKS AT     .055       1.067
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0101
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0101
           % OF HYDROGRAPH TO STORE       =  99.9997

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
001:0084------------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=    1.48
| 04:C203   DT= 1.00 |   Total Imp(%)=   66.00   Dir. Conn.(%)=   52.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .98          .50
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=        .60         2.00
     Length            (m)=       8.00        25.00
     Mannings n           =       .013         .240

     Max.eff.Inten.(mm/hr)=     274.73        62.54
                over (min)        1.00         7.00
     Storage Coeff.  (min)=        .44 (ii)    6.70 (ii)
     Unit Hyd. Tpeak (min)=       1.00         7.00
     Unit Hyd. peak  (cms)=       1.53          .17
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .59          .06           .614 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.13          1.000
     RUNOFF VOLUME    (mm)=      84.60        18.93         53.077
     TOTAL RAINFALL   (mm)=      86.60        86.60         86.599
     RUNOFF COEFFICIENT   =        .98          .22           .613

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  39.0    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.

--------------------------------------------------------------------------------
001:0085------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:04  (C203  )  |             DISCHARGE      TIME
--------------------              (cms)       (hrs)
           START CONTROLLING AT     .000        .317
           INFLOW HYD. PEAKS AT     .614       1.000
           STOP  CONTROLLING AT     .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=    .0786
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0786
           % OF HYDROGRAPH TO STORE       =  99.9996

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
001:0086------------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2022-11-08     at 14:11:41
================================================================================
```

APPENDIX C

WATER QUALITY PRODUCT SELL SHEETS

FlexStorm Catch-It™
Inlet Filters

FlexStorm Catch-It inlet filters are the temporary and reusable solution for storm sewer inlet protection They comply with ASTM D8057 and are the preferred choice for storm water runoff control. FlexStorm Catch-It inlet filters are configured to fit any drainage structure, are equipped with a high-efficiency filter bag and allow builders to keep their job sites SWPPP compliant during construction.

Applications

- Residential developments
- Commercial developments
- Roadway construction

Features

- Configured to fit any storm drainage structure
- Geotextile bag is easily replaced
- Bypass feature allows streets to drain if bag is full
- Installs quickly, easy maintenance

Benefits

- Prevents hazardous road conditions by eliminating ponding at curb inlets
- Prevents pollution of rivers, lakes and ponds
- Reduces job site flooding
- Significantly reduces clean-up costs

ADS™

FlexStorm Catch-It Inlet Filters Specification

Material and Performance

The filter is comprised of a corrosion resistant steel frame and a replaceable geotextile filter bag attached to the frame with a stainless steel locking band. The filter bag hangs suspended below the grate that shall allow full water flow into the drainage structure if the bag is completely filled with sediment. The standard woven "FX" filter bags are rated for 200 gpm/sqft with a removal efficiency of 82% when filtering a USDA Sandy Loam sediment load. The filters are certified to meet ASTM D8057.

Installation

1. Remove the grate from the inlet.
2. Clean debris from the ledges of the inlet.
3. Place the inlet filter onto the load bearing ledges of the structure.
4. Replace the grate and confirm it is not elevated more than ⅛" (3 mm).

Frequency of Inspections

Inspection should occur every three months and following rain events greater than ½" (13 mm). Sites with greater runoff conditions may need to be inspected more frequently.

Maintenance Guidelines

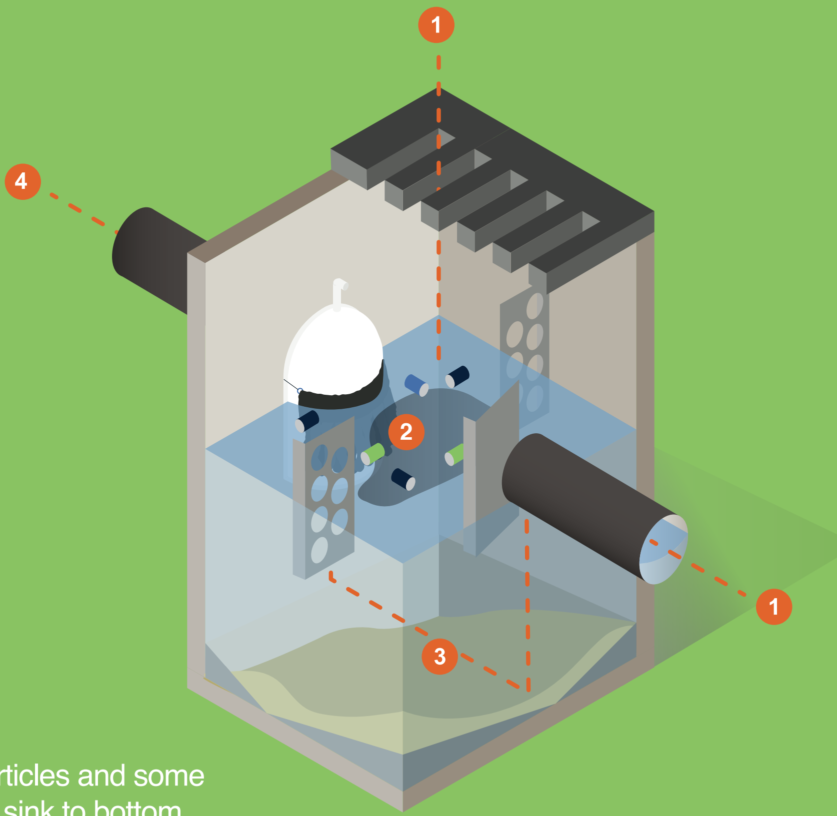
1. Empty the filter bag manually or by industrial vacuum taking care not to damage the geotextile bag when more than half filled or during scheduled inspection period.
2. Remove compacted silt from sediment bag and flush with medium spray.
3. Inspect and replace bag if torn or punctured.

Filter Bag Replacement

1. Remove the bag by loosening or cutting off clamping band.
2. Take the new, correctly sized sediment bag and secure hose clamping band to the frame channel as previously removed.
3. Ensure bag is secure and there is no slack around perimeter.

The Quality Stormwater Management System

Helping you do more water quality improvement with less budget.



1. Stormwater and trash enter through grate or pipe.
2. Oil and floatable debris on surface cannot exit pipe.
3. Gross particles and some sediment sink to bottom.
4. Cleaner water exits from under SNOUT®.

Make the most of your stormwater dollars with the SNOUT® system.

We have stormwater quality experts on staff to help you with our wide range of products, including the SNOUT®, Bio-Skirt®, Stainless Steel TrashScreen™, and our new Turbo Plate® to reduce turbulence and and increase sediment capture.

Whether it is for highway or municipal drainage, governmental, educational, or residential facilities, we have the experience for your stormwater quality improvement needs.

Best Management Products
The Stormwater Quality Experts
20TH ANNIVERSARY

Made in the USA with over 80,000 SNOUT®s installed since 1999.

For more information on how our system can solve your stormwater quality issues, contact us at *(800) 504-8008* or visit us at *bmpinc.com*

Products for a better environment.

Best Management Products
The Stormwater Quality Experts

More than 80,000 SNOUTs® installed. Made in the USA since 1999.

For more information on how our systems can solve any stormwater situation, contact us at **800.504.8008** or visit us at **bmpinc.com**

Best
Management
Products
The Storm Water Quality Experts

Design and Maintenance Considerations for SNOUT® Stormwater Quality Systems

Background:

The SNOUT system from Best Management Products, Inc. (BMP, Inc.) is based on a vented hood that can reduce floatable trash and debris, free oils, and other solids from stormwater discharges. In its most basic application, a SNOUT hood is installed over the outlet pipe of a catch basin or other stormwater quality structure with a deep sump (see Installation Drawing). The SNOUT forms a baffle that traps floatable debris and free oils on the surface, while permitting heavier solids to sink to the bottom of the sump. The clarified intermediate layer is forced out of the structure through the open bottom of the SNOUT by displacement from incoming flow. The resultant discharge contains considerably less unsightly trash and other gross pollutants, and can also offer reductions of free-oils and finer solids.

As with any structural stormwater quality design, maintenance considerations will have a dramatic impact on SNOUT system performance over the life of the facility. The most important factor to consider when designing structures with a SNOUT is the depth of the sump. Sump is defined as the depth from the invert of the outlet pipe to the bottom of the structure. *Simply put, the deeper the sump, the more effective the unit will be both in terms of pollutant removals and reducing frequency of maintenance.* More volume in a structure means more quiescence, thus allowing the pollutants a better chance to separate out. Secondly, more volume means fewer cycles between maintenance, because the structure has a greater capacity. Of equal importance to good performance is putting SNOUTs in multiple structures. The closer one captures pollution to where it enters the infrastructure (e.g. at the inlet), the less mixing of runoff there is, and the easier it will be to separate out pollutants. Putting SNOUTs and deep sumps in all inlets that can be easily maintained develops a powerful structural treatment train with a great deal of effective storage volume, where even finer particles may have chance to settle out.

Design Notes:

- The SNOUT size is ALWAYS greater than the nominal pipe size. The SNOUT should cover the pipe OD and optimally the grouted area around the pipe (e.g. for a 12” pipe, an 18” SNOUT is the correct choice).
- As a rule of thumb, BMP, Inc. recommends *minimum* sump depths based on outlet pipe inside diameters of 2.5 to 3 times the outlet pipe size.
- For best performance, the inlet pipe and outlet pipe should have inverts close to the same elevation (a six inch or less deviation is optimal).
- Special note for smaller pipes: A minimum sump depth of 36 inches for all

pipe sizes 12 inches ID or less, and 48 inches for pipe 15-18 inches ID is required if collection of finer solids is desired.
- The plan dimension of the structure should be up to 6 to 7 times the flow area of the outlet pipe. Increasing area beyond that has a minimal impact on performance. However, the structure wall where the SNOUT is mounted must accommodate the size of the SNOUT (either the correct diameter or enough width).
- To optimize pollutant removals establish a "treatment train" with SNOUTs placed in as many inlets where it is feasible to do so (this protocol applies to most commercial, institutional or municipal applications and any application with direct discharge to surface waters).
- At a minimum, SNOUTs should be used in every third structure for less critical applications (less critical areas might include flow over grassy surfaces, very low traffic areas in private, non-commercial or non-institutional settings, single family residential sites).
- Use Bio-Skirts® for increased hydrocarbon reduction. Bio-Skirts are highly recommended for fueling or vehicle service stations, convenience stores, restaurants, loading docks, marinas, beaches, schools or high traffic applications. Each Bio-Skirt can retain about one gallon of oils.
- Use the Stainless TrashScreen for "Full Trash Capture" requirements.
- Use BMP Turbo Plates™ for increased sediment capture.
- The "R" series SNOUTs (12R, 18R, 24R, 30R, 30R/96, 42RTB/60, 52RTB/72, 52RTB/84 and 72RTB/96) are available for round manhole type structures of up to 96" ID; the "F" series SNOUTs (LP318F, 12F, 18F, 24F, 30F, 36F, 48F, 72F and 96F) are available for flat walled structures; the "NP" series SNOUTs (NP1218R, NP1524R, NP1830R, and NP2430R) are available for smaller diameter structures up to 30" ID.

Example Structure Sizing Calculation:

A SNOUT equipped structure with a 15 inch ID outlet pipe (1.23 sqft. flow area) will offer best performance with a minimum plan area of 7.4 sqft. and 48 inch sump. Thus, a readily available 48 inch diameter manhole-type structure, or a rectangular structure of 2 feet x 4 feet will offer sufficient size when combined with a sump depth of 48 inches or greater.

Maintenance Recommendations:

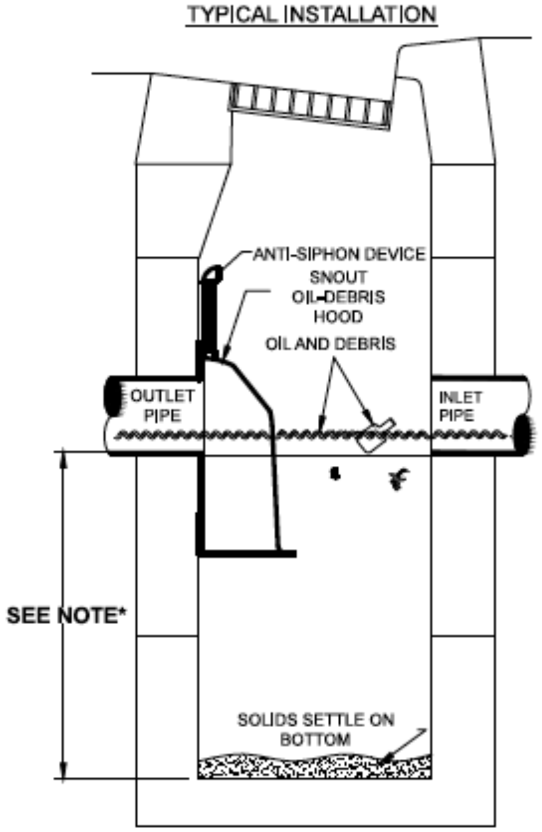
- Monthly monitoring for the first year of a new installation after the site has been stabilized is a recommended practice.
- Measurements should be taken after each rain event of .5 inches or more, or monthly, as determined by local weather conditions.
- Checking sediment depth and noting the surface pollutants in the structure will be helpful in planning maintenance.
- The pollutants collected in SNOUT equipped structures will consist of floatable debris and oils on the surface of the captured water, and grit and sediment on the bottom of the structure.
- It is best to schedule maintenance based on the solids collected in the sump.
- Optimally, the structure should be cleaned when the sump is half full (e.g. when 2 feet of material collects in a 4 foot sump, clean it out).
- Structures should also be cleaned if a spill or other incident causes a larger

than normal accumulation of pollutants in a structure.

- Maintenance is best done with a vacuum truck.
- If Bio-Skirts are being used in the structure to enhance hydrocarbon capture, they should be checked on a monthly basis for the first year, and serviced or replaced when more than 2/3 of the boom is submerged, indicating a nearly saturated state. Assuming a typical pollutant-loading environment exists, Bio-Skirts should be serviced* annually or replaced as necessary.
- In the case of an oil spill, the structure should be checked and serviced and Bio-Skirts (if present) replaced or serviced immediately.
- All collected wastes must be handled and disposed of according to local environmental requirements.
- To maintain the SNOUT hoods, an annual inspection of the anti-siphon vent and access hatch are recommended. A simple flushing of the vent, or a gentle rodding with a flexible wire are all that’s typically needed to maintain the anti-siphon properties. Opening and closing the access hatch once a year ensures a lifetime of trouble-free service.

*To extend the service life of a Bio-Skirt, the unit may be “wrung out” to remove oils and washed in an industrial washing machine with warm water. The Bio-Skirt may then be re-deployed if the material maintains it’s structural integrity. A maintained Bio-Skirt can last for several years. Each Bio-Skirt can hold about on gallon of oils.

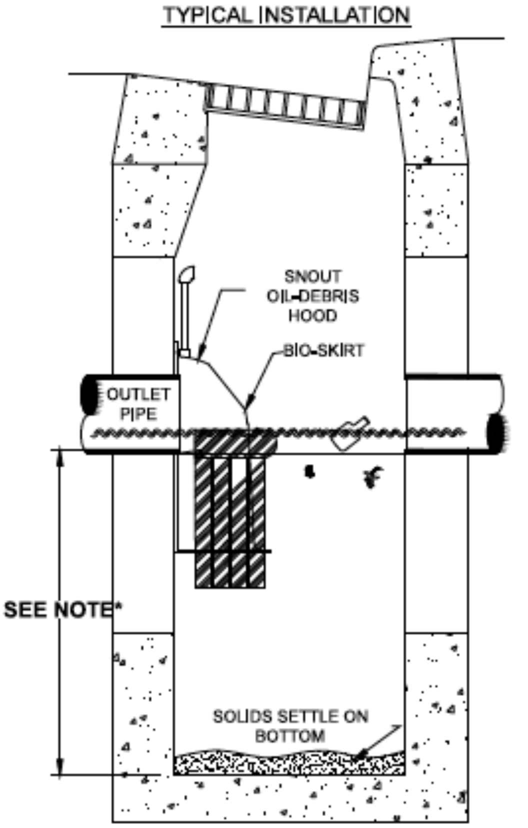
SNOUT INSTALLATION:



TYPICAL INSTALLATION

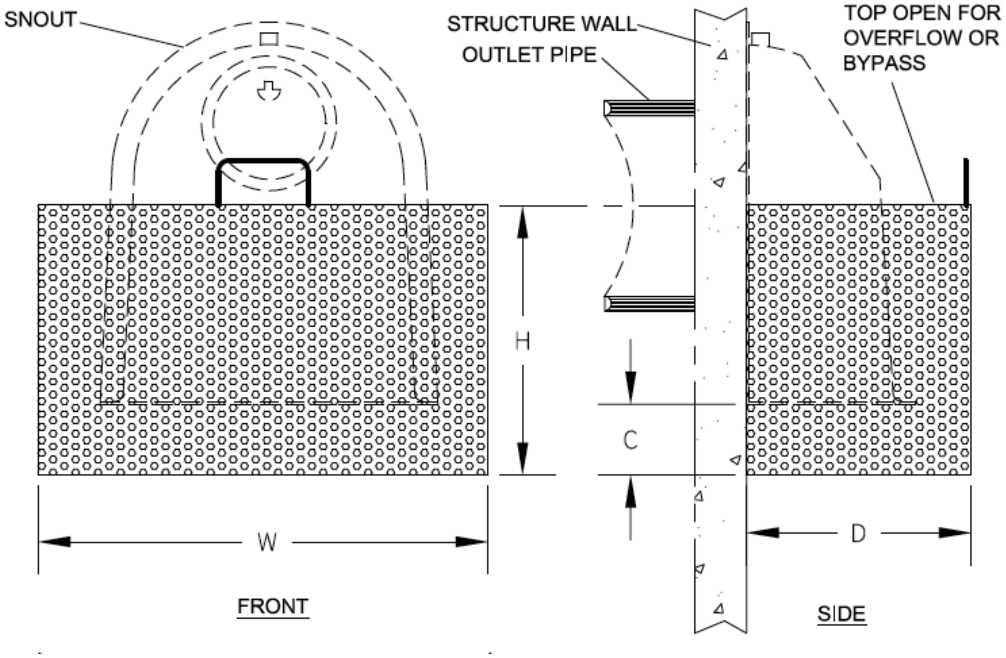
***NOTE-** SUMP DEPTH OF 36" MIN. FOR UP TO 12" ID PIPE. OUTLET. FOR PIPES 15" ID AND ABOVE SUMP DEPTH OF 2.5 TO 3 TIMES PIPE ID RECOMMENDED (E.G. 5' DEEP for 24" PIPE)

BIO-SKIRT INSTALLATION:



***NOTE-** ATTACH BIO-SKIRT STRUTURE WALL SUCH THAT IT IS APPROXIMATELY AT SAME ELEVATION AS STATIC WATER LEVEL

STAINLESS TRASHSCREEN INSTALLATION:

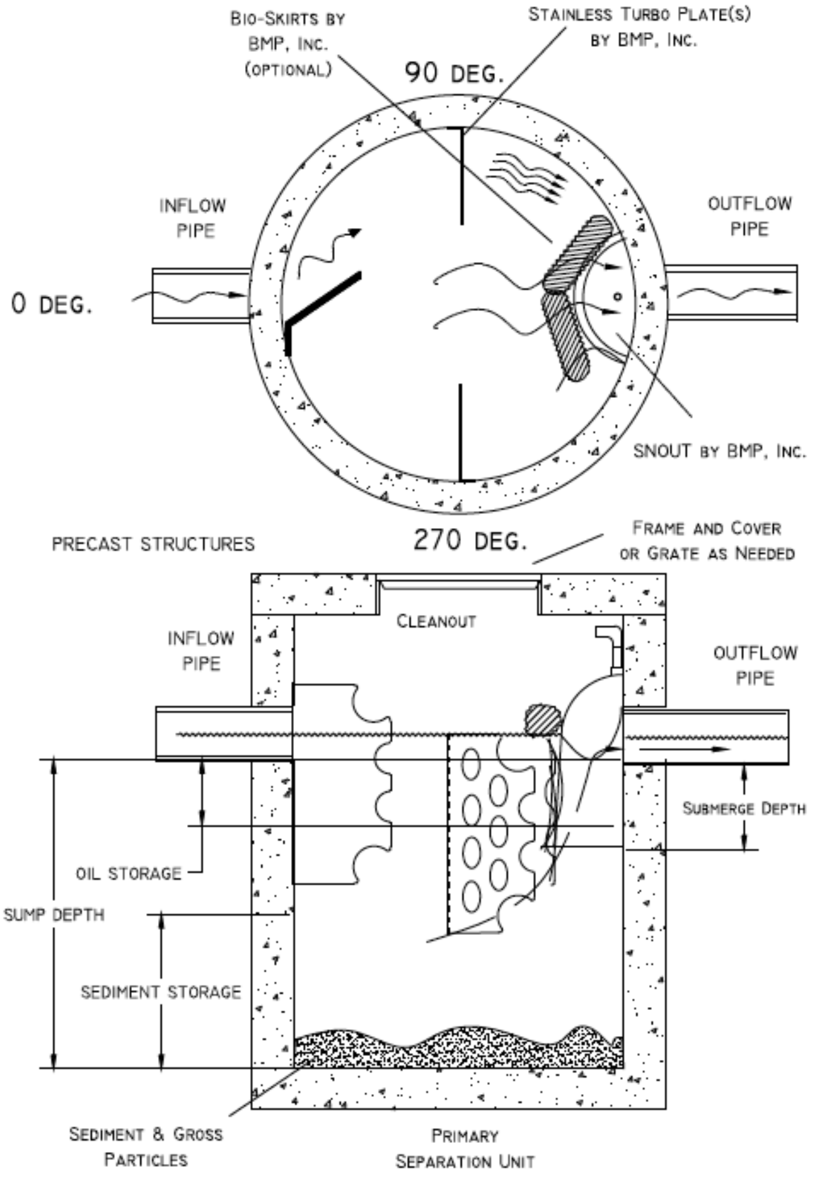


FRONT

SIDE

TURBO PLATE INSTALLATION:

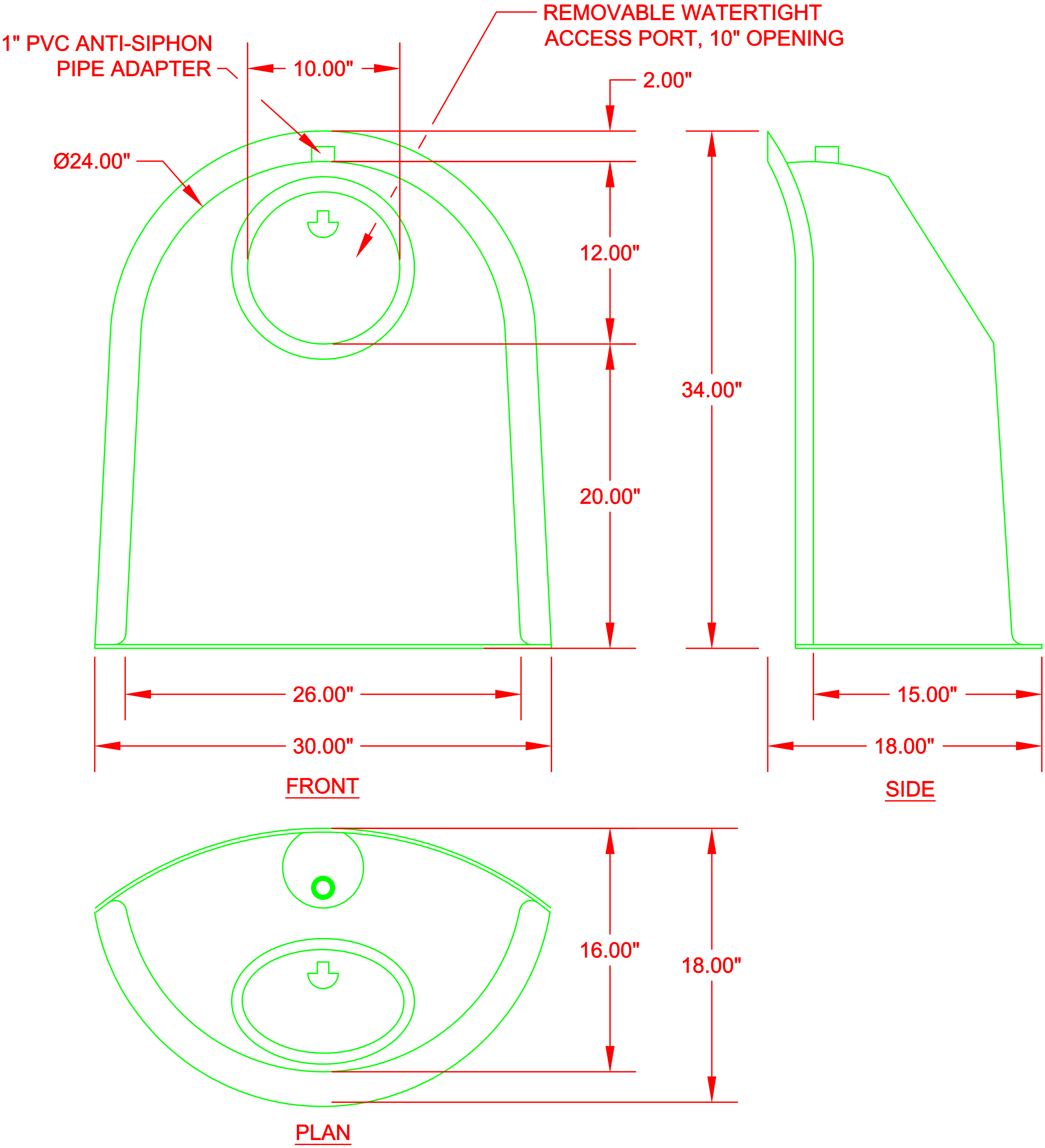
SNOUT TURBO PLATE-OIL-GRIT SEPARATOR



Contact Information: Please contact T. J. Mullen at 800-504-8008, tjm@bmpinc.com or Matt White at 888-434-0277, mwhite@bmpinc.com for design assistance.

Website: www.bmpinc.com

The SNOUT, Bio-Skirt and TrashScreen are protected by: US Patents 6126817, 7857966, 7951294 and 8512556. More US patents are pending and BMP holds Canadian patents for much of the technology patented in the US. Canadian Patents numbers include 2285146, 2688012, 2690156 and 2740678. The SNOUT®, Bio-Skirt® Turbo Plate ™ and Stainless TrashScreen™ are trademarks of Best Management Products,



U.S.PATENT #6126817 ADDITIONAL PATENTS PENDING

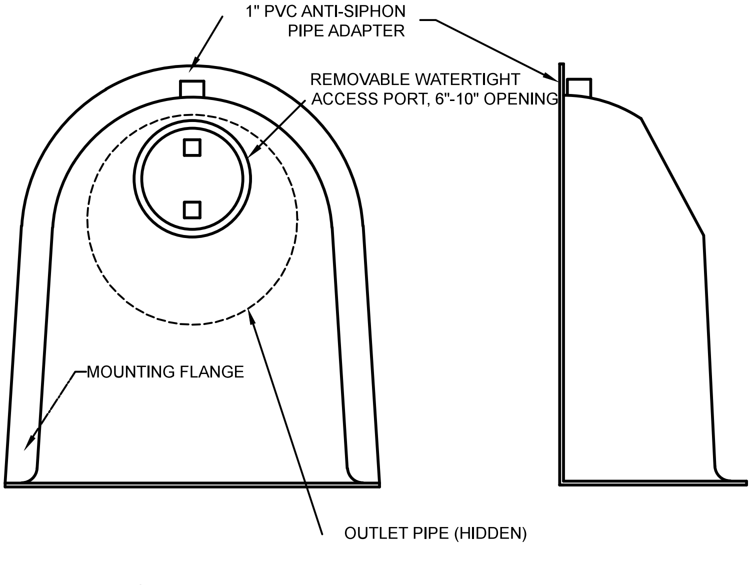
DESIGNED TO FIT
48"-60" DIAM.
STRUCTURES

BMP, INC.

53 MT. ARCHER ROAD, LYME, CT. 06371
(800) 504-8008 FAX: (860)434-3195

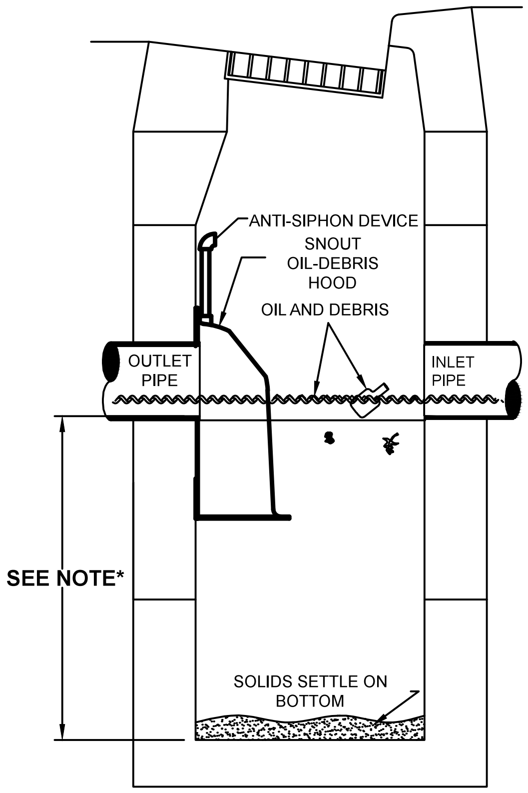
DESCRIPTION	DATE	SCALE
24R SNOUT OIL & DEBRIS STOP	09/13/99	NONE
	DRAWING NUMBER 24R	

CONFIGURATION DETAIL



SNOUT OIL-WATER-DEBRIS SEPARATOR

TYPICAL INSTALLATION



***NOTE-** SUMP DEPTH OF 36" MIN. FOR UP TO 12" ID PIPE. OUTLET. FOR PIPES 15" ID AND ABOVE SUMP DEPTH OF 2.5 TO 3 TIMES PIPE ID RECOMMENDED (E.G. 5' DEEP for 24" PIPE)

NOTES:

1. ALL HOODS AND TRAPS FOR CATCH BASINS AND WATER QUALITY STRUCTURES SHALL BE AS MANUFACTURED BY:
   BEST MANAGEMENT PRODUCTS, INC.
   9 MATHEWS DRIVE, UNIT A1-A2.
   EAST HADDAM, CT 06423
   TOLL FREE: (800) 504-8008 OR (888) 434-0277, FAX: (877) 434-3197
   WEB SITE: www.bmpinc.com
   OR PRE-APPROVED EQUAL

2. ALL HOODS SHALL BE CONSTRUCTED OF A GLASS REINFORCED RESIN COMPOSITE WITH ISO GEL COAT EXTERIOR FINISH WITH A MINIMUM 0.125" LAMINATE THICKNESS.

3. ALL HOODS SHALL BE EQUIPPED WITH A WATERTIGHT ACCESS PORT, A MOUNTING FLANGE, AND AN ANTI-SIPHON VENT PIPE AND ELBOW AS DRAWN. (SEE CONFIGURATION DETAIL)

4. THE SIZE AND POSITION OF THE HOOD SHALL BE DETERMINED BY OUTLET PIPE SIZE AS PER MANUFACTURER'S RECOMMENDATION (SNOUT SIZE ALWAYS LARGER THAN PIPE SIZE).

5. THE BOTTOM OF THE HOOD SHALL EXTEND DOWNWARD A MINIMUM DISTANCE EQUAL TO 1/2 THE OUTLET PIPE DIAMETER WITH A MINIMUM DISTANCE OF 6" FOR PIPES <12" I.D.

6. THE ANTI-SIPHON VENT SHALL EXTEND ABOVE HOOD BY MINIMUM OF 3" AND A MAXIMUM OF 12" ACCORDING TO STRUCTURE CONFIGURATION.

7. THE SURFACE OF THE STRUCTURE WHERE THE HOOD IS MOUNTED SHALL BE FINISHED SMOOTH AND FREE OF LOOSE MATERIAL AND PIPE SHALL BE FINISHED FLUSH TO WALL.

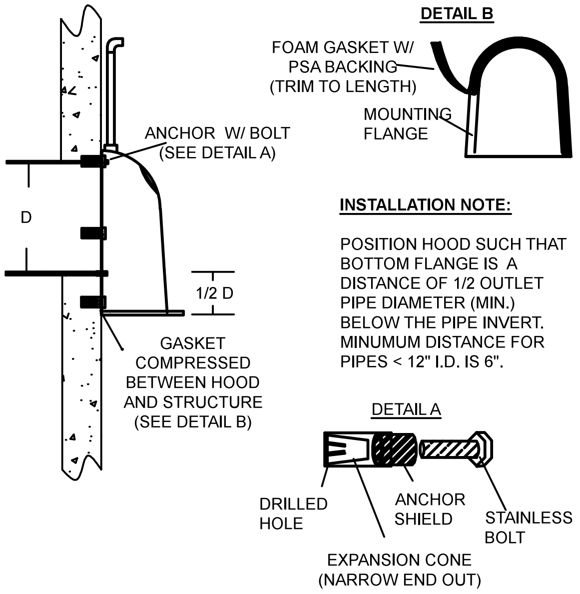
8. ALL STRUCTURE JOINTS SHALL BE WATERTIGHT.

9. THE HOOD SHALL BE SECURELY ATTACHED TO STRUCTURE WALL WITH $\frac{3}{8}$" STAINLESS STEEL BOLTS AND OIL-RESISTANT GASKET AS SUPPLIED BY MANUFACTURER. (SEE INSTALLATION DETAIL)

10. INSTALLATION INSTRUCTIONS SHALL BE FURNISHED WITH MANUFACTURER SUPPLIED INSTALLATION KIT.
    INSTALLATION KIT SHALL INCLUDE:
    A. INSTALLATION INSTRUCTIONS
    B. PVC ANTI-SIPHON VENT PIPE AND ADAPTER
    C. OIL-RESISTANT CRUSHED CELL FOAM GASKET WITH PSA BACKING
    D. 3/8" STAINLESS STEEL BOLTS
    E. ANCHOR SHIELDS

US Patent # 6126817, 7951294, 7857966, 8512556
Canada Patent # 2285146, 2690156, 2690156 others pending

INSTALLATION DETAIL



INSTALLATION NOTE:

POSITION HOOD SUCH THAT BOTTOM FLANGE IS A DISTANCE OF 1/2 OUTLET PIPE DIAMETER (MIN.) BELOW THE PIPE INVERT. MINUMUM DISTANCE FOR PIPES < 12" I.D. IS 6".

HOOD SPECIFICATION FOR CATCH BASINS AND WATER QUALITY STRUCTURES

DESCRIPTION	DATE	SCALE
OIL- DEBRIS HOOD SPECIFICATION AND INSTALLATION (TYPICAL)	09/08/18	NONE
	DRAWING NUMBER SP-SN	

LDS CONSULTANTS INC.

2323 Trafalgar Street
London, Ontario N5V 0E1

www.LDSconsultants.ca