

Frisque Lands (3225 5th Concession Road)
Functional Servicing and Stormwater Management Report
City of Pickering
869547 Ontario Inc.

City File No.(s): SP-2023-04, A13/23, CP-2023-05

Project #E21007

July 2023, Revised June 2025

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1. Introduction

CANDEVCON EAST LIMITED was retained by 869547 Ontario Inc. to provide engineering services for a proposed residential development in City of Pickering. The scope of work includes functional servicing design, functional grading design, and a stormwater management (SWM) scheme.

The subject site is located between Balsam Road to the west and Audley Road to the east, north of the unopened road allowance for 5th Concession Road. The location of the site, which has a total area of 17.9 hectares (ha), is shown on **Figure 1**.

The proposed development will consist of thirteen low density single family residential estate lots. Approximately 7.5ha of this site is proposed for development, with the remaining 10.4ha to be dedicated as open space.

The following documents were reviewed in preparation of this report:

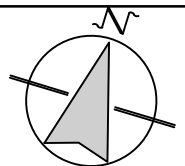
- Frisque Lands Geomorphic Assessment, prepared by Beacon Environmental (2023).
- Frisque Lands Environmental Impact Study, prepared by Beacon Environmental (2023).
- Sewage System Lot Analysis (Drawing SP-1, SP-2, SP-3, SP-4, and SP-5, prepared by Gunnell Engineering Ltd. (2023).
- Carruthers Creek Flood Management & Analysis Municipal Class EA, Hydrology Update Report, Carruthers Creek Watershed, prepared by Cole Engineering (October 2011).
- Geotechnical Investigation, Slope Stability Analysis and Geotechnical Setback Study, Part of Lots 3 and 4, Concession 5, City of Pickering, Ontario, prepared by GeoPro Consulting Limited (January 2023).
- Water Balance Assessment, Frisque Lands, 3225 5th Concession Road, Pickering, Ontario, prepared by R.J. Burnside & Associates Limited (February 2023).

In addition to the following design standards, guidelines, and criteria:

- MOE Stormwater Management Planning and Design Manual (2003).
- City of Pickering Stormwater Management Design Guidelines (July 2019).
- The Regional Municipality of Durham Design Specifications for Regional Services (2022).
- Toronto and Region Conservation Authority Stormwater Management Criteria (August 2012).



SUBJECT LANDS



FRISQUE LANDS
THE CORPORATION OF THE CITY OF PICKERING

KEY PLAN

CEC CANDEVCON EAST LIMITED
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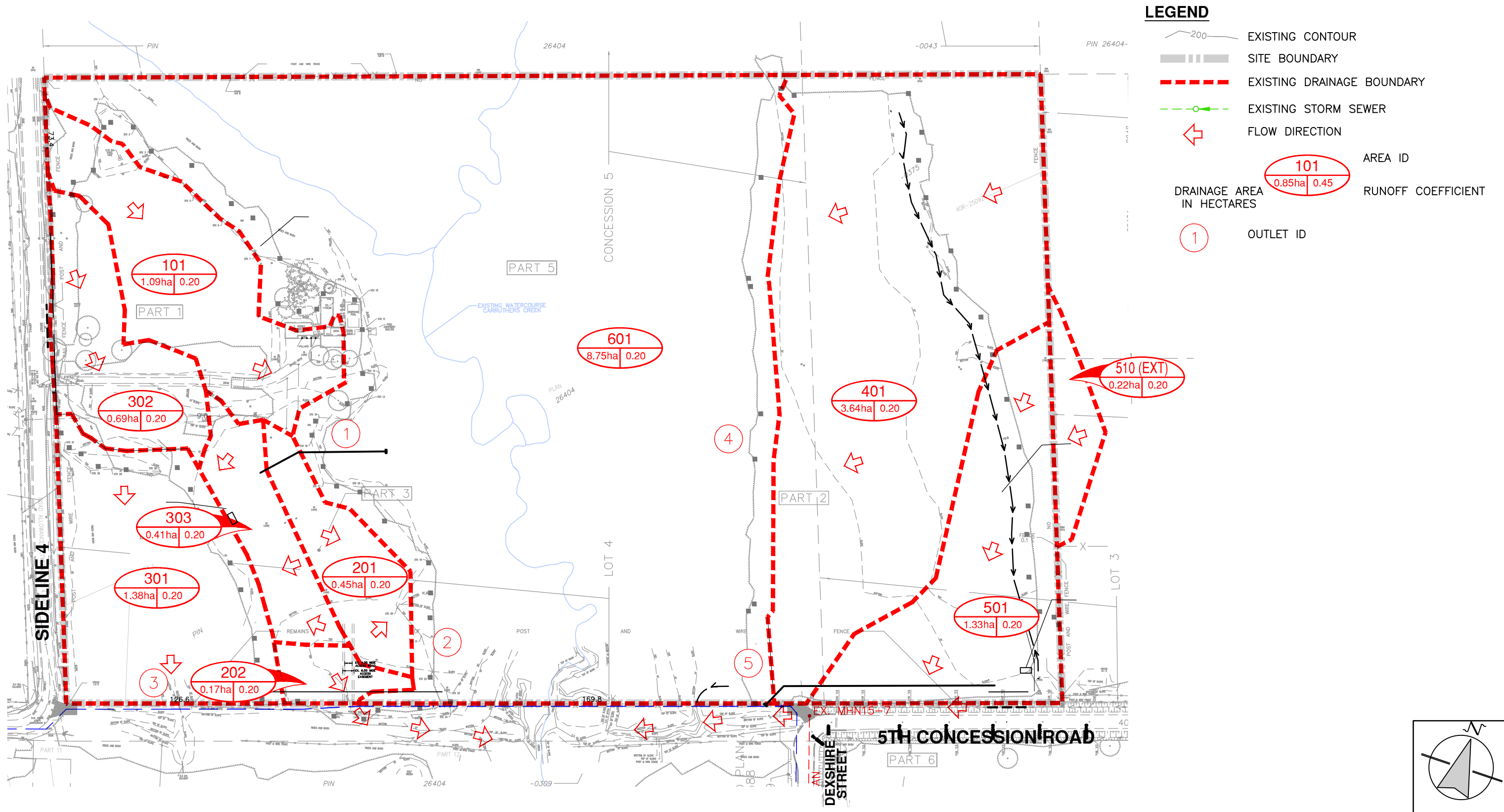
2. Site Topography and Grading

2.1 Pre-Development Conditions

The site currently consists of agricultural land where the residential lots are being proposed, surrounded by forested area. Carruthers Creek crosses through the middle of the property flowing from the north to the south. Based on the topographical survey prepared by J.D. Barnes Limited (March 2012), the majority of the property slopes towards Carruthers Creek. The existing topographic conditions are shown on **Figure 2**.

2.2 Post-Development Conditions

The proposed thirteen lot subdivision will include a 6.5m condominium road, private driveways, and the residences. Preliminary centreline road grades and site grades at key points within the proposed development are provided on **Drawing FSGP**. These target elevations provide guidance for the detailed design stage to ensure that overall grading and major drainage flow routes are feasible.



FRISQUE LANDS

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PRE-DEVELOPMENT DRAINAGE CONDITIONS

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3. Storm Drainage Conditions

3.1 Pre-Development Conditions

As noted in **Section 2.1**, the site currently generally drains from both the west and east sides to Carruthers Creek, which crosses through the middle of the site. The site is not currently connected to any municipal infrastructure and there is no existing storm sewer or stormwater management facilities in the surrounding vicinity.

The pre-development drainage areas have been discretized into five separate outlets, as shown on **Figure 2**. A summary table of the drainage areas has been prepared as **Table 1**.

Pre-development drainage areas have been delineated based on the post-development conditions so that a comparison of the pre-development and post-development flows can be made. To be conservative in establishing pre-development peak flow targets, all drainage areas have been assumed to have runoff coefficient of 0.20, which is equivalent to 100% pervious surfaces.

Table 1: Pre-Development Drainage Areas

Outlet ID	Area ID	Location	Description	Drainage Area (ha)
1	101	West of Creek	Agricultural/House/Driveway	1.09
2	201	West of Creek	Agricultural	0.45
	202	West of Creek	Agricultural	0.17
3	301	West of Creek	Woodlot	1.38
	302	West of Creek	Agricultural/Driveway	0.69
	303	West of Creek	Agricultural	0.41
4	401	East of Creek	Agricultural	3.64
5	501	East of Creek	Agricultural	1.33
	510(EXT)	East of Creek	External Woodlot	0.22
-	601	Carruthers Creek	Natural Heritage System	8.75
Total Site and External Area:				18.13

Drainage from Area 202 flows south to a swale and the east towards the main branch of Carruthers Creek. The flows from Area 201 and Area 202 join together downstream of the southern property limit.

3.2 Post-Development Conditions

3.2.1 Minor System

The minor system for the proposed development will be designed to comply with City of Pickering design standards. Separate east and west storm sewers are proposed to outlet to Carruthers Creek, as shown on **Figure 3**. The storm sewers will convey flows from the front of the lots (including approximately half of the roof area), the driveways, and the roads (Area 102, and Area 501 on **Figure 3**).

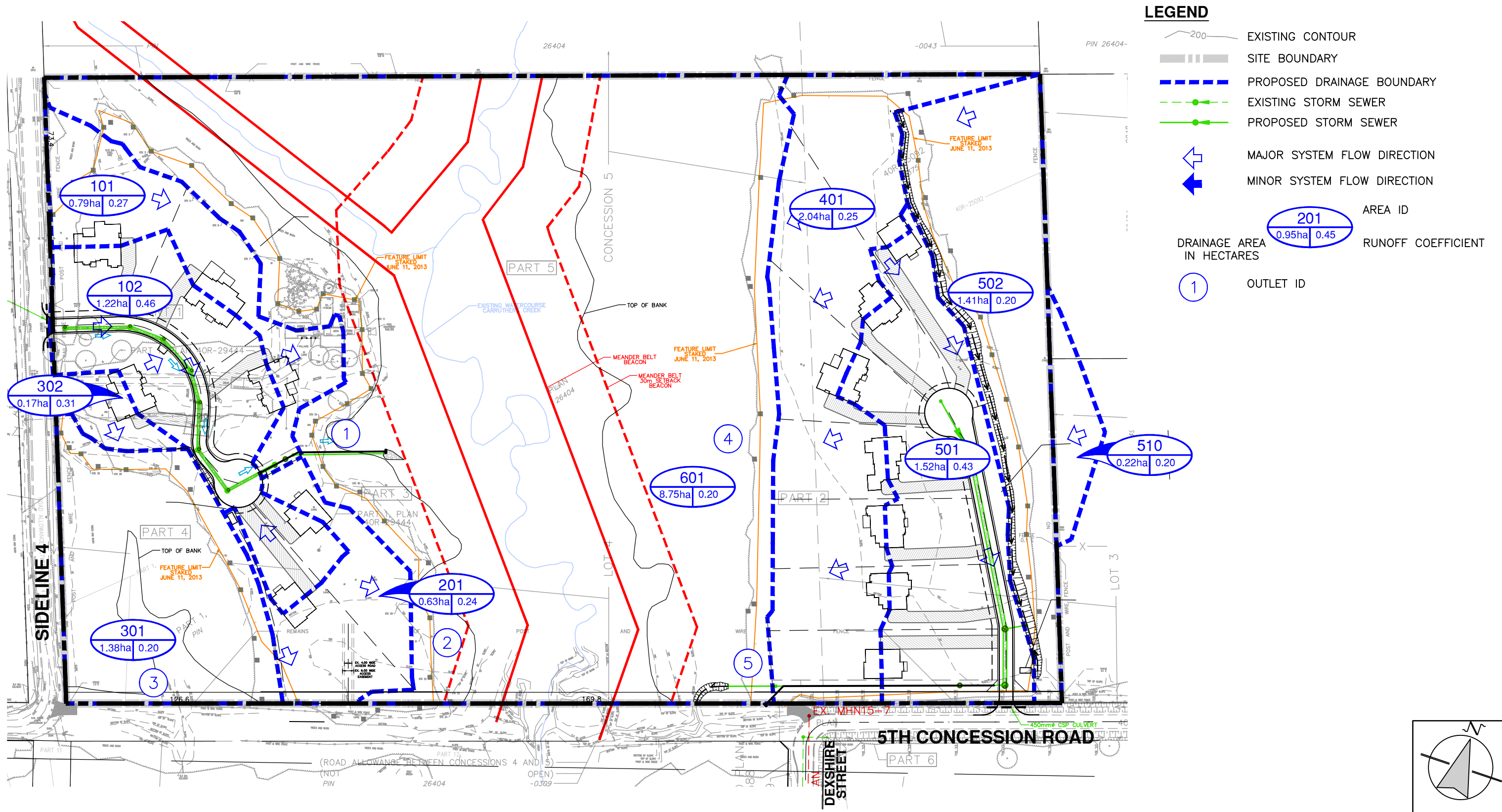
On the east lands, flows from Area 502 and the external area, Area 510 (EXT) on **Figure 3**, will be conveyed by a drainage swale flowing south. The flows will be captured by the storm sewer system on the east lands, ultimately discharging to Carruthers Creek at Outlet 5. Refer to **Appendix B** for the swale conveyance calculations.

Rear roof leaders will be directed to splash pads with flows being conveyed overland as sheet flow towards Carruthers Creek (Area 101, Area 201, and Area 401) draining to Outlet 1, Outlet 2, and Outlet 4, respectively. The roof leaders in Area 302 will be disconnected from the storm sewer. Splash pads will allow flows to be conveyed overland to the woodlot and to Outlet 3 (a small tributary to Carruthers Creek).

The outlet headwall locations were determined as part of the Frisque Lands Geomorphic Assessment completed by Beacon Environmental (July 2023). The preliminary design of the storm sewer systems is shown on **Drawing FSGP**.

Table 2: Post-Development Drainage Areas

Outlet ID	Area ID	Location	Description	Drainage Area (ha)	% Imperv.
1	101	West	Lots 1-3 (Rear)	0.79	10
	102	West	Road, Lot 1-6 (Front)	1.22	34
2	201	West	Road, Lot 4,5 (Rear)	0.63	5
3	301	West	Woodlot	1.38	0
	302	West	Lot 6 (Rear)	0.17	18
4	401	East	Lot 7-13 (Rear)	2.04	8
5	501	East	Road, Lot 7-13 (Front)	1.52	33
	502	East	Open Space/Woodlot	1.41	0
	510(EXT)	East	External Woodlot	0.22	0
-	601	Creek	Natural Heritage System	8.75	0
Total Site and External Area:				18.13	7



FRISQUE LANDS

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POST-DEVELOPMENT DRAINAGE CONDITIONS

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3.2.2 Major System

Major system flows from Area 102 (on the west lands) and Area 501, Area 502, and Area 510 (on the east lands) will be captured and detained onsite. Portions of the storm sewer system will be over-sized to capture and control the major system flows (100-year peak flow) to pre-development levels. Refer to subsequent discussion in **Section 4** for details on the stormwater management strategy. Inlet capacity capture calculations will be provided at the detailed design stage.

Major system flows from the external area, Area 510 (EXT) and Area 502, will be conveyed via the drainage swale as described above in **Section 3.2.1**. Refer to **Appendix B** for the culvert and swale conveyance calculations.

For the remaining drainage areas, major system flows will generally flow overland to Carruthers Creek or the small tributary at Outlet 3. Refer to **Figure 3** and **Drawing FSGP** for overland flow routes.

Should the storm sewer become 100% blocked or an event in excess of the 100-year storm occurs, the major system flows will pond and spill towards Carruthers Creek via the overland flow route as shown on **Drawing FSGP**.

4. Stormwater Management

4.1 Design Criteria

The stormwater management (SWM) criteria for the proposed development are as follows:

- Quantity Control:** - Control post-development peak flows to pre-development levels for all storms, up to and including the 100-year event.
- Quality Control:** - Provide an “Enhanced” level of protection as per Ministry of Environment guidelines (80% total suspended solids removal).
- Erosion Control:** - A minimum 48-hour detention of 25 mm 4-hour storm event runoff.
- Infiltration:** - Provide a post-to-pre water balance through the implementation of low impact development (LID) measures.

4.2 Stormwater Management Design

4.2.1 Quantity Control

As outlined, post-development flows are required to be controlled to pre-development levels for all storm events, up to the 100 year storm event in accordance with the Carruthers Creek hydrologic model. The hydrologic model was obtained from TRCA and three new scenarios were created to analyse the pre-development, post-development (uncontrolled), and post-development (controlled) conditions for the site. The model was simulated utilizing the 24 hour AES storm event for the 2-year through 100-year storm events.

The model scenarios for the site have been truncated to the confluence of the tributary with the main branch at Node 3101. The site is entirely upstream of Node 3101, which therefore serves as the overall comparison node between the model scenarios.

For the pre-development scenario, Catchment 179 and Catchment 180 were discretized to represent the site drainage as shown on **Figure 2**. As per the Hydrology Update Report (Cole Engineering, October 2011) the Airport Equation was used to calculate the time to peak for the discretized catchments. All catchments were modelled as rural pervious drainage areas maintaining the soil curve number from the parent catchment. Refer to **Appendix C** for the model schematic and results for the pre-development scenario.

The post development scenario was set up in a similar manner by discretizing Catchment 179 and Catchment 180 to represent the future site drainage as shown on **Figure 3**. Catchments with an imperviousness greater than 20% were modelled as urban areas with initial abstraction and soil curve numbers consistent with the watershed hydrologic model. Refer to **Appendix D** for the model schematic and results for the post-development (uncontrolled) scenario.

A comparison was made between the pre-development and post-development (uncontrolled) scenarios for the total site flows (Outlet 1 to 5) in **Table 3**. Refer to **Appendix E** for full results including the individual flows at each outlet and a nodal flow comparison at Node 3102 and Node 3101.

Table 3: Peak Flow Comparison – Total Site (Uncontrolled Scenario)

Scenario	Total Site Peak Flow (m ³ /s)					
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Pre-Dev.	0.069	0.111	0.140	0.181	0.216	0.250
Post-Dev. (Uncontrolled)	0.088	0.132	0.165	0.212	0.247	0.284
Change	0.019	0.021	0.025	0.031	0.031	0.034

As shown, the overall post-development flows from the site exceed pre-development levels and quantity controls are required. It is proposed that orifice plates will provide flow restriction in conjunction with onsite storage in order to detain stormwater runoff. Storm runoff will be collected into an oversized storm sewer system to provide underground storage. The third Visual Otthymo scenario, post-development (controlled) conditions, was created with RouteReservoir nodes to represent the underground storage and orifice controls.

For the west lands, it is proposed that there will be a 64mm diameter orifice plate within the control manhole (MH8). The required storage under the 100-year event is 282m³, which is provided by oversized 1200mm diameter storm sewer pipes and the associated manholes. A total of 285m³ of storage is provided by the storm sewer system, which fulfills the required amount. The peak discharge from the west storm sewer is controlled to 0.015m³/s. Refer to **Appendix B** for stage-storage-discharge calculations and **Appendix E** for Visual Otthymo results.

For the east lands, it is proposed that there will be a 134mm diameter orifice plate within the control manhole (MH18). The required storage under the 100-year event is 323m³, which is provided by oversized 1.8m by 1.2m box storm sewer pipes and the associated manholes. A total of 325m³ of storage is provided by the storm sewer system, which fulfills the required amount. The peak discharge from the east storm sewer is controlled to 0.056m³/s. Refer to **Appendix B** for stage-storage-discharge calculations and **Appendix E** for Visual Otthymo results.

A comparison was made between the pre-development and post-development (controlled) scenarios for the total site flows (Outlet 1 to 5) in **Table 4**. There is a modelled 0.001m³/s increase for the 2-year event. This is considered within modelling tolerances and it should also be noted that the low impact development features are not part of quantity control modelling but would be expected to slightly reduce peak flows for smaller storm events. Therefore, it has been deemed that sufficient controls have been provided on a site-level basis.

Table 4: Peak Flow Comparison – Total Site (Controlled Scenario)

Scenario	Total Site Peak Flow (m ³ /s)					
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Pre-Dev.	0.069	0.111	0.140	0.181	0.216	0.250
Post-Dev. (Controlled)	0.070	0.102	0.126	0.158	0.183	0.209
Change	0.001	-0.009	-0.014	-0.023	-0.033	-0.041

A comparison was then made between the pre-development and post-development (controlled) scenarios at Node 3102 in **Table 5**, and Node 3101 in **Table 6**. As shown, the total peak flows at Node 3102 and Node 3101 increase with the proposed controls for the 2-year through 100-year year storm events. This is due to the timing of the peak flows under post-development conditions. Although there is an increase in peak flow, the increases are minor (only 0.2% to 0.3% over pre-development conditions) and the impact at the downstream node(s) are considered negligible. No further SWM quantity controls are provided. Refer to **Appendix E** for a summary of the nodal flows under the three scenarios.

Table 5: Peak Flow Comparison – Node 3102 (Controlled Scenario)

Scenario	Node 3102 Peak Flow (m ³ /s)					
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Pre-Dev.	1.603	2.491	3.145	4.023	4.709	5.424
Post-Dev. (Controlled)	1.607	2.497	3.153	4.033	4.722	5.439
Change	0.004	0.006	0.008	0.010	0.013	0.015

Table 6: Peak Flow Comparison – Node 3101 (Controlled Scenario)

Scenario	Node 3101 Peak Flow (m ³ /s)					
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Pre-Dev.	1.750	2.732	3.458	4.438	5.207	6.009
Post-Dev. (Controlled)	1.754	2.738	3.466	4.448	5.218	6.023
Change	0.004	0.006	0.008	0.010	0.011	0.014

4.2.2 Quality Control

An “Enhanced” level of protection as presented in Table 3.2 of the MOE Stormwater Management Planning and Design Manual (SWMP Manual, March 2003) is required for the proposed development. Quality treatment can be provided by low impact development (LID) measures as part of a treatment train approach along with an oil/grit separator (OGS) incorporated into the storm sewer system.

The OGS units were sized to target a minimum TSS removal rate of 60%. A summary of the proposed OGS units is provided in **Table 7**.

Table 7: Oil Grit Separator Sizing Summary

Parameter	West Catchment	East Catchment
Catchment Area	1.22 ha	1.52 ha
Proposed Unit	EFO6	EFO8
Treatment Rate	61%	64%

Stormceptor units have been third-party tested and have Canada Environmental Technology Verification (ETV) certification. The units were sized using the ETV particle size distribution (PSD). Therefore, the claimed TSS removal rates have been used for the quality control design calculations. Refer to **Appendix F** for the sizing reports.

In a treatment train approach, LID measures can provide additional treatment. The potential LID measures, as subsequently discussed in **Section 4.3**, in series with the OGS unit can achieve the required enhanced treatment level. Refer to **Appendix G** for the supporting LID calculations.

As subsequently discussed in this report, infiltration LID measures providing infiltration of the 5mm event has been proposed. As per Figure 1a from City of Toronto Wet Weather Flow Management Guidelines (November 2006), a 5mm event is equivalent to approximately 48% of average annual rainfall.

Infiltration type LID measures are credited with full treatment of the portion of average annual infiltrated. Therefore, the LID measures provide approximately 48% TSS removal.

The combined treatment train TSS removal rate is based on the equation below:

$$R = A + B - [A * B]$$

Where A is the upstream treatment rate (by the OGS units), B is the downstream treatment rate (by infiltration), and R is the treatment train TSS removal rate. As shown in **Table 8**, the calculated treatment train rate for both the west and east catchments fulfills the quality control requirements.

Table 8: Treatment Train Removal Rates

Treatment	West Catchment	East Catchment
LID 1 Rate (A)	OGS (61%)	OGS (64%)
LID 2 Rate (B)	Infiltration (48%)	Infiltration (48%)
Treatment Train Rate (R)	80%	81%

Through the detailed design stage and pending further testing, should it be determined that LID measures are not feasible, an alternative treatment method could be to install filtration-type treatment device(s) such as a Jellyfish unit to provide the required treatment.

4.2.3 Erosion Control

As requested by TRCA, a geomorphic assessment has been completed by Beacon Environmental to confirm the erosion control criteria of 5mm retention. A continuous simulation hydrologic model was required to be able to assess the potential for erosion under existing and future development conditions. The Visual Otthymo event-based hydrologic model outlined above in **Section 4.2.1**, was utilized and run using a continuous set of rainfall data for Balsam station as provided by TRCA. The pre-development, post-development (uncontrolled), and post-development (controlled) continuous simulation results were then provided to Beacon Environmental for analysis.

The geomorphic assessment concluded that 5mm of retention is sufficient to mitigate potential erosion impacts under future development conditions. Refer to the Frisque Lands Geomorphic Assessment (Beacon Environmental, July 2023) for further information. Refer to **Section 4.3** for information on the proposed LID measures to provide the 5mm of retention required to mitigate potential erosion impacts.

The geomorphic assessment was completed with a prior version of site design and Visual Otthymo model. However, the percent imperviousness in the updated design is marginally lower than the prior version due to the shortened roadways. Therefore, an update to the analysis is not required at this time as it is generally equivalent or slightly conservative under the updated proposed conditions. This can be confirmed through detailed design stage of the site and low impact development features.

4.2.4 Water Balance

A Water Balance Assessment was completed by R.J. Burnside & Associates Limited (February 2023) and concluded that development related impacts to groundwater from reduction in infiltration could be mitigated by disconnected rear roof leaders to splash pads, allowing flows to infiltrate over the rear yard.

Based on achieving the criterion for erosion control (infiltration of 5mm of runoff), the strategy has changed to also include soakaway pits for the rear roof leaders, as discussed in **Section 4.3**. As this LID measure provides additional infiltration over just disconnected rear roof leaders, the water balance calculations can be considered conservative and have not been updated at this time. This can be confirmed through detailed design stage of the site and low impact development features.

4.3 Low Impact Development

Incorporating LID measures that require minimal maintenance can be an effective method in the treatment train approach to stormwater management and can also reduce runoff by promoting infiltration at the source. As previously discussed, LID measures have been considered in order to provide the necessary quality control, erosion control, and infiltration for water balance criteria.

The potential for LID measures across the site has been explored and includes lot-level and end-of-pipe controls. Refer to **Figure 4** for the potential location and the following discussion on of various LID measures including disconnected roof leaders, increased topsoil depth and soil amendments, soakaway pits, infiltration swales, infiltration galleries, bioretention, rain gardens, and rain barrels.

The final design of the LID measures will be completed during the detailed design stage.

4.3.1 Disconnected Roof Leaders to Topsoil Amendments

It is proposed that all front roof leaders be disconnected to splash pads to increase the potential for at source infiltration across the front yard. The roof flows along with the runoff from the driveways will be conveyed overland across the yard towards the proposed road. Increasing the typical topsoil depth of 0.15m to 0.45m across the lawn and providing amendments, in accordance with TRCA specifications, will minimize local runoff while promoting increased infiltration. Soil amendments will be scarified as per Preserving and Restoring Healthy Soils: Best Practices for Urban Construction, June 2012. As per TRCA requirements, the retention volume in the soils has been assumed to be 50% or 2.5mm.

4.3.2 Soakaway Pits/Infiltration Swales

It is proposed to infiltrate clean water from rear roof areas in soakaway pits to promote the infiltration of clean flows at the source. Based on the functional design, soakaway pits have been assumed for each lot; however, at the detailed design stage when there are house siting designs, the feasibility and design of the soakaway pits can be reevaluated. Alternatively, rear yard roof drains can be directed to the surface via splash pads and then collected at the rear yard in a swale. The infiltration gallery can then be installed along the rear lot line under the swale. All flows from the roof areas and rear yards that are captured in the swale can then be infiltrated. Major system flows would continue to sheet drain overland directly to Carruthers Creek.

At the functional level, each soakaway pit has been sized to retain 5mm of runoff from the roof area directed to it. The proposed soakaway pits are 3.0m long, 3.0m wide, and 0.4m deep, providing a total storage volume of 1.4m³. The design of the soakaway pits can be updated as necessary through detailed design.

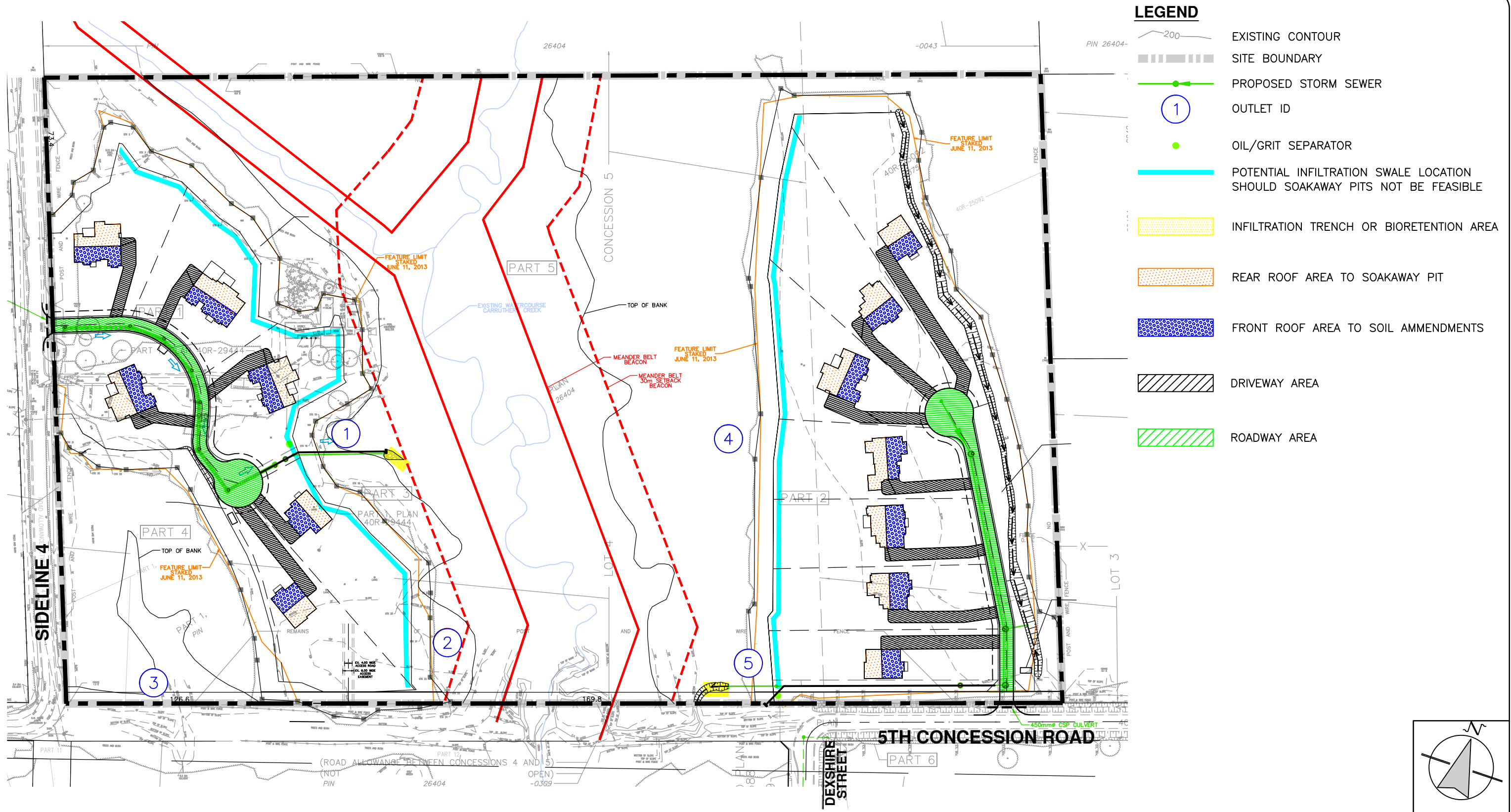
4.3.3 Infiltration/Bioretenction at Storm Outfalls

This LID measure can provide opportunity for the total flow from the site impervious areas to infiltrate or be detained in a sub-surface infiltration gallery or a surface bioretention area located at each of the two storm outfalls. Each infiltration gallery or bioretention area could provide 5mm of detention storage to meet the water balance and erosion control criteria. Infiltration testing and depth to groundwater will need to be assessed at each outfall as part of the detailed design. Preliminary sizing of an infiltration gallery for each outlet has been undertaken as part of this FSSR. Refer to **Appendix G** for conceptual sizing calculations.

4.3.4 Features Implemented by the Homeowner

At the discretion of the homeowner, there is opportunity to install additional LID measures. Some additional measures include permeable pavers, rain gardens, and rain barrels.

Constructing the driveway with permeable pavement can provide opportunity for infiltration and retention of stormwater at the source and minimize runoff from driveway areas. There is opportunity to direct front roof downspouts to raingardens, which can reduce runoff by increasing evaporation, transpiration, and infiltration. Rain barrels can be installed to collect rainwater can from downspouts to be utilized for watering gardens and landscaped areas.



5. Watermain Distribution System

5.1 Existing Watermain Infrastructure

The existing watermain system located adjacent to the subject site consists of a 400mm diameter HDPE DR-11 watermain on 5th Concession Road, along with a 300mm diameter PVC watermain at Dexshire/5th concession, with no existing connections to the subject site.

The existing watermain and preliminary design of the proposed watermain to service the development is shown on **Drawing FSGP**.

The Region of Durham has an existing easement for access to the 400mm HDPE watermain through the western side of the site. This easement will be relinquished and the Region of Durham will be given an easement through Block 12 for access to the 400mm HDPE when the existing easement is converted into lots.

A hydrant flow test was conducted by the Region of Durham, and the results are included in **Appendix I** and used as the basis for the analysis.

5.2 Proposed Watermain Infrastructure

The water distribution network for the development will consist of watermains located within the roadway and through the lots adjacent to the existing watermains. The watermain for the western lots will connect into the existing 400mm diameter watermain connection off of 5th Concession Road right-of-way. The watermain for the eastern lots will connect to the 300mm PVC watermain located near the intersection of Dexshire Road and 5th concession road.

The meter room for the eastern lots will be located on the southeast corner of the property, providing fire protection and domestic water supply to the east residential lots. The meter room for the west lots will be near the cul-de-sac, providing fire protection and domestic water supply to the west residential lots.

The Region of Durham will be given an easement through Block 12 for access to the 400mm HDPE when the existing easement is converted into lots.

5.3 Watermain Analysis

The Region of Durham requires the system to carry the greater of maximum day plus fire flow or maximum hour demand, without having the pressure drop below 140kPa (20psi). Additionally, the Ontario Building Code requires where pressures exceed 550 kPa (80psi), a pressure reducing valve is required. Based on the hydrant flow test results, the pressures are below 80psi and a pressure reducing valve is not required.

The development will consist of 13 lots, for an estimated population of 46 people. The MECP Design Guidelines for Drinking-Water Systems, Table 3-3 provides peaking factors for drinking water systems servicing fewer than 500 people. **Table 9** demonstrates the maximum day and maximum hour demands of the development. Supporting calculations have been included in **Appendix I**.

Table 9: Watermain Demands

Scenario	Peaking Factor	Flow Rate (L/min)
Average Day Demand	-	11.6
Maximum Day Demand	9.5	110.4
Maximum Hour Demand	14.3	165.9

The Region of Durham minimum required fire flow for single family detached dwellings is 4,500L/min.

Using the fire hydrant flow results, and the demands noted above, the system was modelled in EPA Net. To account for the eastern end of the existing system, a second pump was added to the model on the east side of the site. To prepare a baseline of existing conditions, the fire flow test results were conservatively reduced to 90% of flow and applied on both system pumps. It was found that with this scenario, the pressure in the system at the flow test hydrant was 34.20m of head had a percent error of 98.7% to the field result of 34.66m of head. A more accurate model could be prepared with a hydrant flow test on the east side and is recommended during detailed design.

Alternatively, if the Region of Durham has a system model of the area and if it is provided, it can be updated to include the flows from the Site and model a fire scenario. The schematic EPA network has been included in **Appendix I**.

The maximum day demand of 110L/min was split between the western and eastern nodes (55L/min on each side). The fire flow demand of 4,500L/min was then modelled on each side of the development and the results are presented in **Table 10** and **Table 11**.

Table 10: Fire Flow Scenario - West Side (200mm Fire main)

Node ID	Demand (Lpm)	Head (m)	Pressure (psi)	Pressure (kPa)
Junc 1	0	161.05	45.51	313.57
Junc EX-HYDRANT	0	161.05	44.09	303.79
Junc 3	0	161.05	43.38	298.90
Junc 4	0	161.3	38.77	267.10
Junc 5	0	161.41	40.34	277.96
Junc WEST-HYDRANT	4555	152.34	23.77	163.78
Junc EAST-HYDRANT	55	161.32	33.11	228.16

Table 11: Fire Flow Scenario - East Side (200mm Fire main)

Node ID	Demand (Lpm)	Head (m)	Pressure (psi)	Pressure (kPa)
Junc 1	0	161.09	45.57	313.96
Junc EX-HYDRANT	0	161.09	44.15	304.18
Junc 3	0	161.09	43.44	299.29
Junc 4	0	161.09	38.47	265.04
Junc 5	0	161.18	40.02	275.71
Junc WEST-HYDRANT	55	161.09	36.20	249.39
Junc EAST-HYDRANT	4555	153.51	22.02	151.75

It was found that an internal 200mm fire watermain is required to convey the fire flow to meet the system pressure requirements.

6. Sanitary Drainage System

There is no existing sanitary infrastructure or outfall to service the proposed development.

Septic systems will be constructed within the private lots to service the proposed residential units for this development. Septic systems are to be designed and constructed in accordance with the Ontario Building Code, Region of Durham requirements, and all related standards and specifications. Gunnell Engineering Ltd. has been retained for a separate sewage assessment and circulated a memo to the Durham Region Health department dated March 17, 2025, for acceptance.

Preliminary details on the septic bed design as shown in the Sewage System Lot Analysis, Drawings SP-1, SP-2, SP-3, SP-4, and SP-5, prepared by Gunnell Engineering Ltd (June 11, 2025) are included in **Appendix J** for reference. The schematic locations have been included on **Drawing FSGP**.

All of the sewage system layouts are conventional sewage systems (filter beds) that have been sized using a daily design sewage flow of 3,000L/day and include both a primary and reserve areas, in accordance with the Durham Region Health Department Lot Sizing Policy (Oct. 2010).

7. Sediment and Erosion Control

Sediment and erosion control practices during construction may include, but not be limited to, standard devices such as silt fences, mud mats, catchbasin buffers and rock check dams. Refer to **Drawing ERS1** and **Drawing ERS2** for the temporary erosion and sediment controls plans and details for the various stages of construction.

8. Conclusions

This report has demonstrated that the proposed storm servicing, grading and SWM measures conform to the requirements of the City of Pickering, TRCA, and the Ministry of Environment, Conservation and Parks (MECP). The findings of this study are summarized as follows:

- The storm sewer system will be designed to convey the 5-year post-development flows from the proposed development to two proposed outlets to Carruthers Creek.
- Major system flows from the private road and front half of the roofs and front yards will be captured and overcontrolled such that the overall site flows are controlled to pre-development levels.
- Oil grit separator (OGS) units are proposed at each outlet from the site in combination with various LID measures to provide an “Enhanced” level of treatment for quality control criteria.
- A “treatment train” of low impact development (LID) measures are proposed to minimize runoff by maximizing onsite infiltration and retention of stormwater for quality control, erosion control, and water balance criteria.
- The proposed LID measures may include disconnected roof leaders, increased topsoil depth and soil amendments, soakaway pits, infiltration swales, infiltration galleries, bioretention, rain gardens, and rain barrels.
- The watermain distribution system for the proposed development will consist of watermain located within the private roads and will connect into the existing 400mm and 300mm diameter watermain on 5th Concession Road.
- Septic systems will be constructed on each individual lot since there is no existing sanitary sewer in the vicinity of the site.

Sincerely,

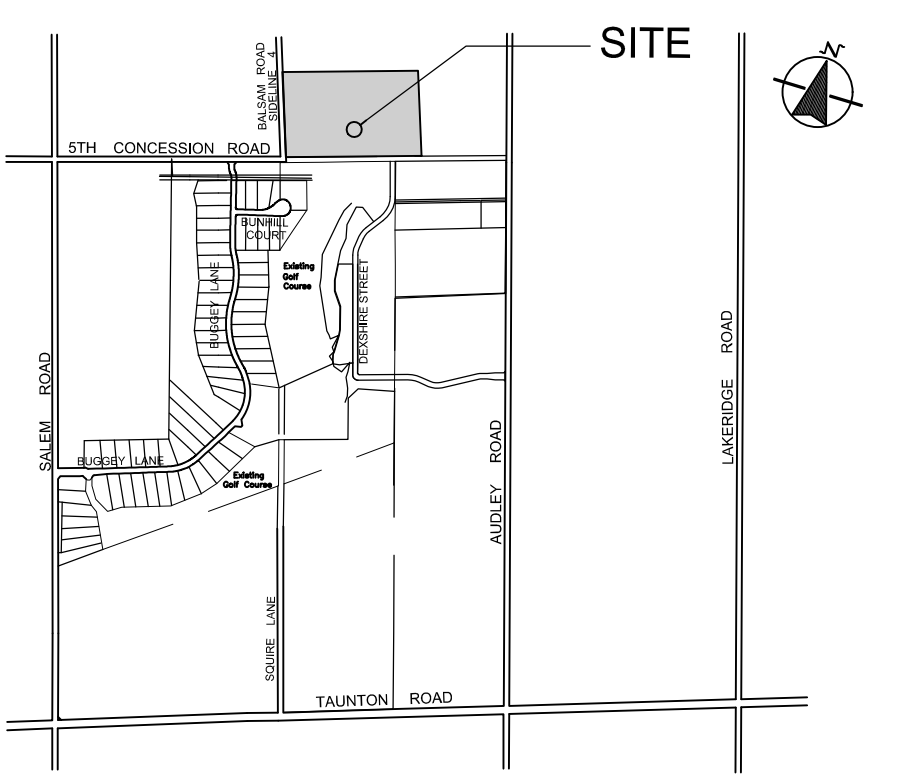
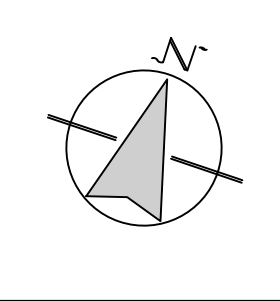
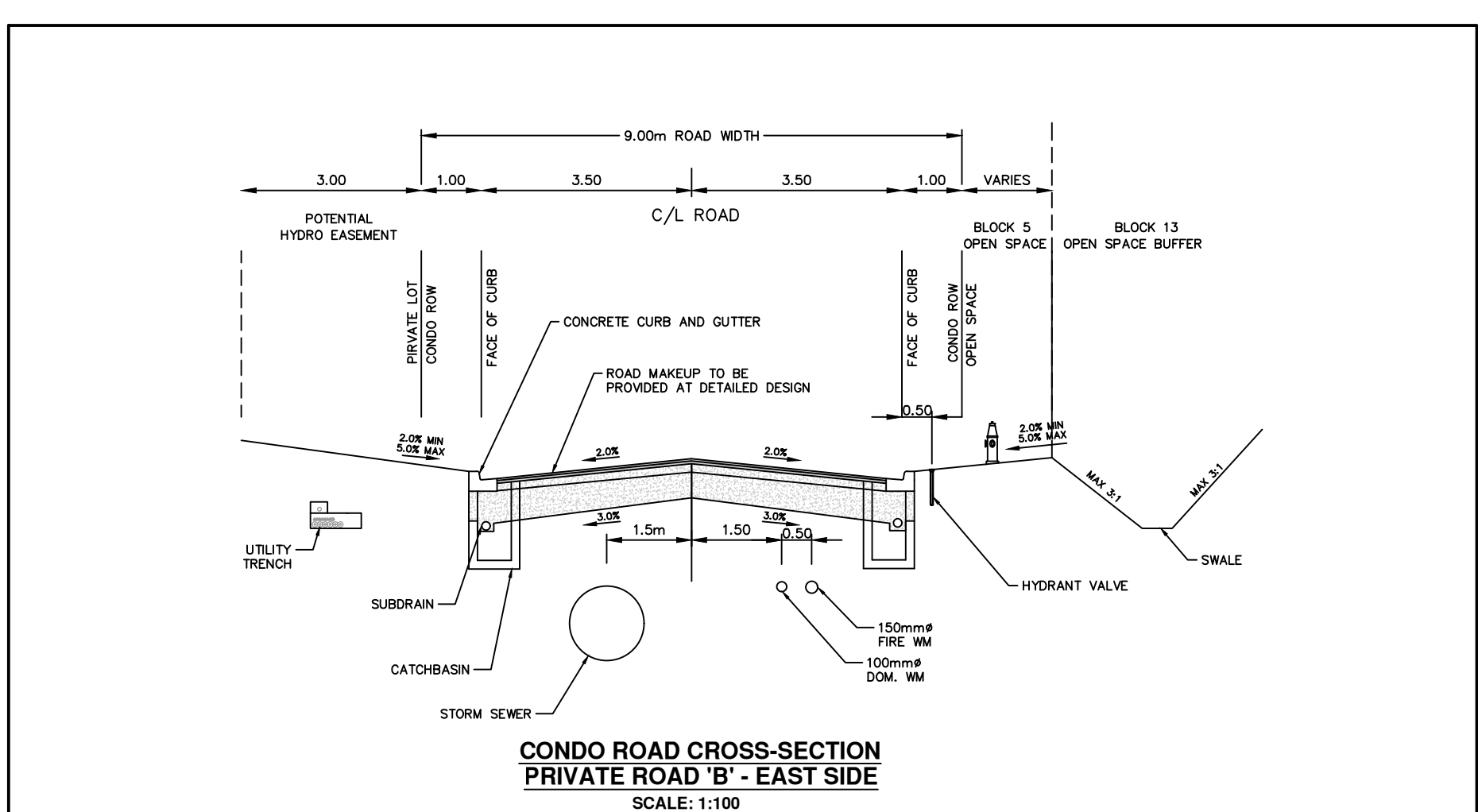
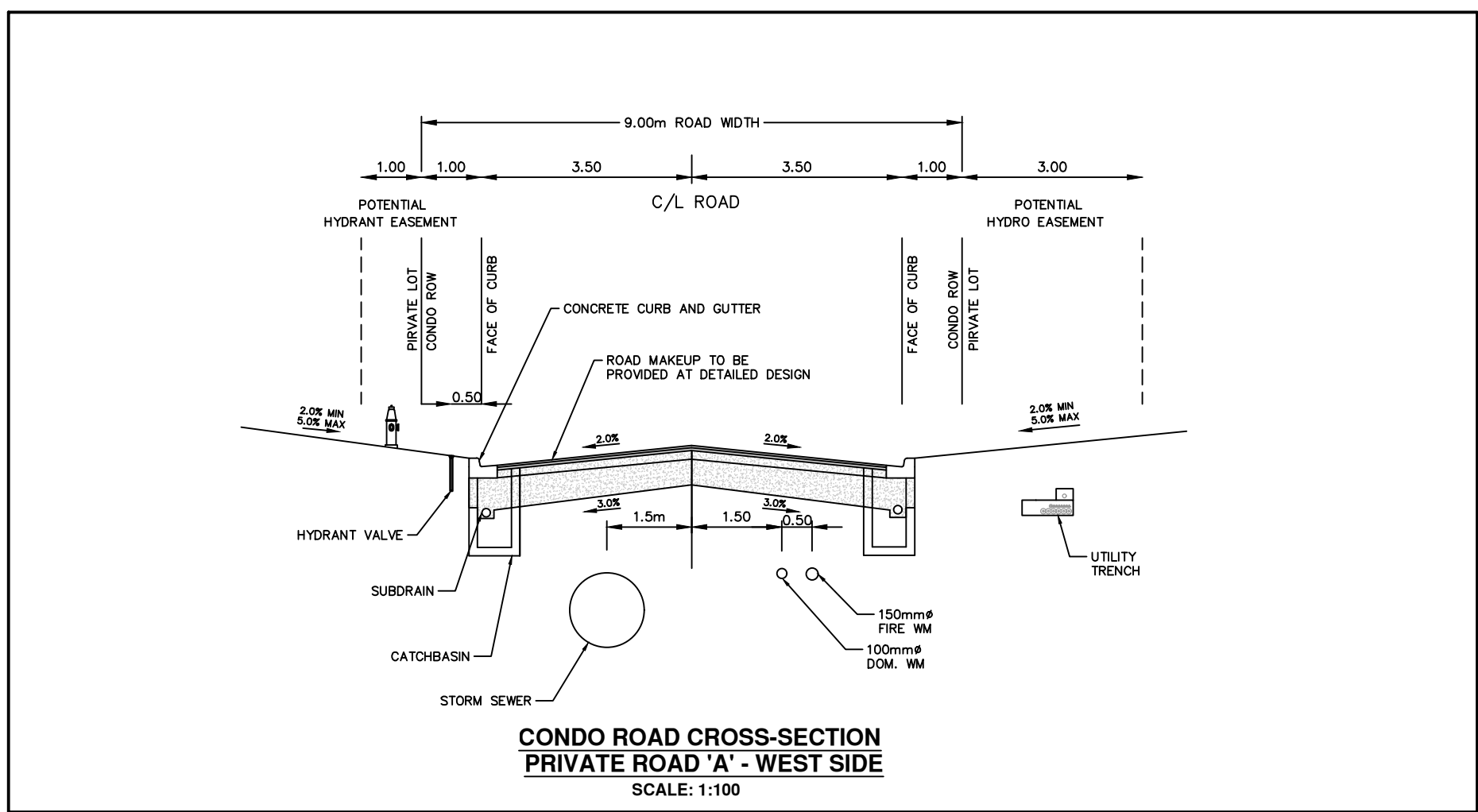
CANDEVCON EAST LIMITED



Michael Bertram, P.Eng.
Water Resources Engineer



Mirko Favit, P.Eng.
Senior Project Manager



- NOTES:**
1. MEASUREMENTS IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SPECIFIED.
 2. SEWAGE SERVICE FOR ALL LOTS TO BE VIA PRIVATE SEPTIC SYSTEMS.
 3. SUMP PUMPS ARE TO BE UTILIZED FOR ALL LOTS AND ARE TO DISCHARGE TO SURFACE GRADE, INCL. SPLASH PADS.

- LEGEND**
- EX. UTILITY POLE
 - EX. HYDRANT
 - EX. WATER VALVE
 - EX. TREE
 - EX. CONTOUR
 - PROPOSED FINISHED GRADE
 - EXISTING GROUND GRADE
 - PROP. 3:1 SLOPE
 - FD FRONT DRAINING LOT
 - SD SPLIT DRAINING LOT
 - BS BACK SPLIT LOT
 - WO WALK OUT LOT
 - EX. WATERMAIN
 - PROP. WATERMAIN
 - PROP. STORM SEWER
 - PROP. BUILDING ENVELOPE
 - PROP. SEPTIC BED/SYSTEM
 - OVERLAND FLOW DIRECTION
 - MEANDER BELT WIDTH
 - MEANDER BELT WIDTH +30m SETBACK
 - LIMIT OF VEGETATION
 - LIMIT OF VEGETATION +10m SETBACK
 - LIMIT OF WETLAND
 - LIMIT OF WETLAND +30m SETBACK
 - LIMIT OF STAKED FEATURE 10m SETBACK

REVISIONS				
No.	BY	DATE	DESCRIPTION	APPROVED

THE CORPORATION OF THE CITY OF PICKERING
DEPARTMENT OF ENGINEERING SERVICES

FRISQUE LANDS

FUNCTIONAL GRADING & SERVICING PLAN

CANDEVCON EAST LIMITED
CONSULTING ENGINEERS & PLANNERS
1600 STELLAR DRIVE, SUITE 402
TEL (289) 315-3680
WHITBY, ONTARIO L1N 9B2
FAX (905) 794-0611



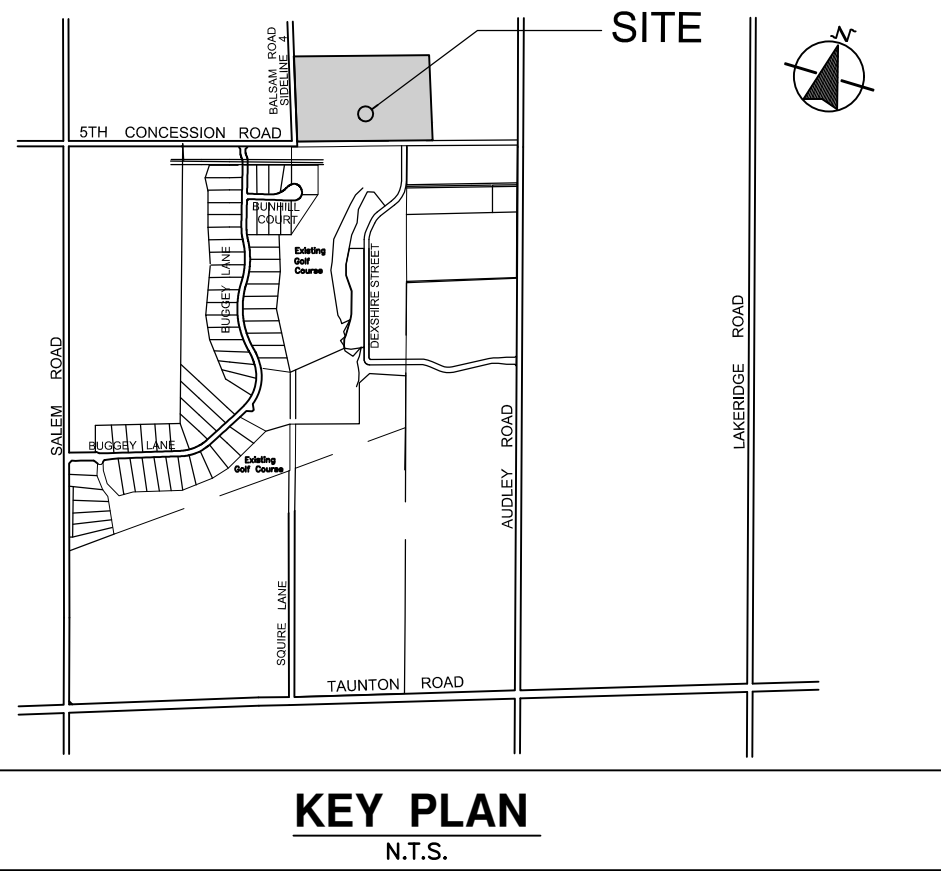
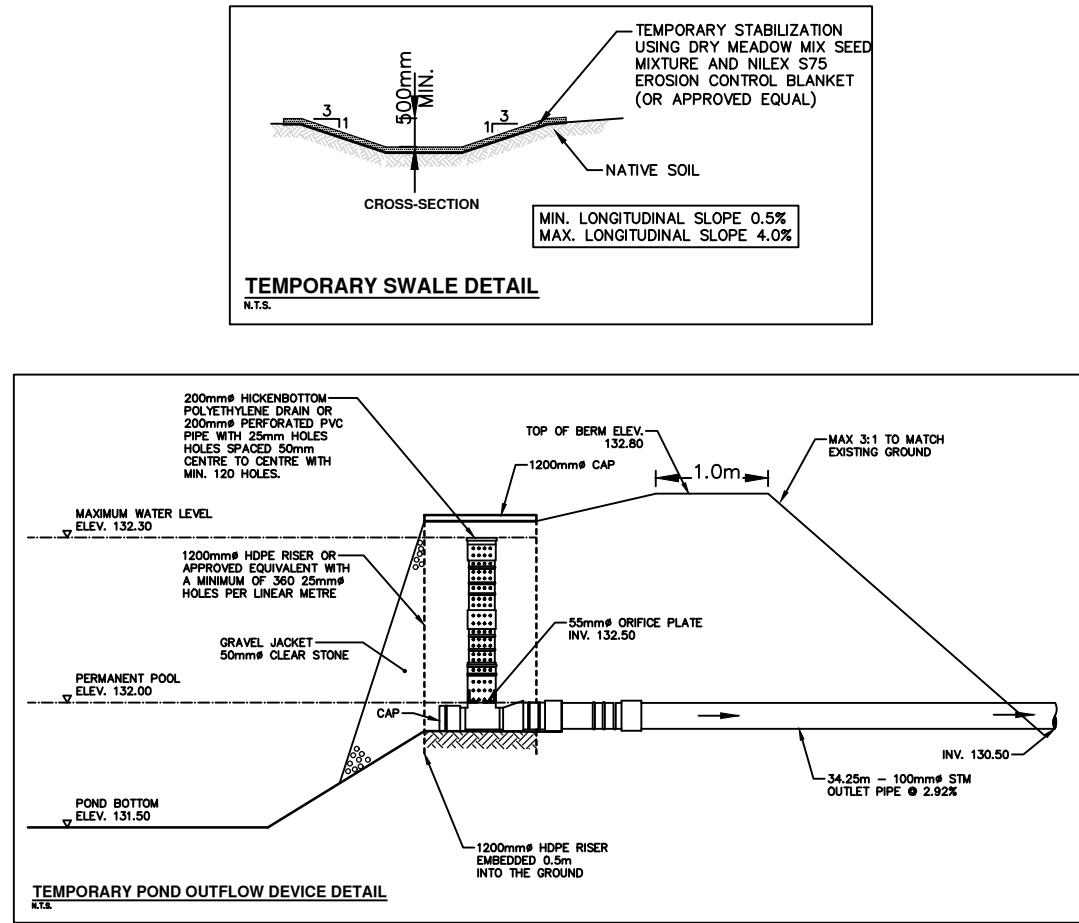
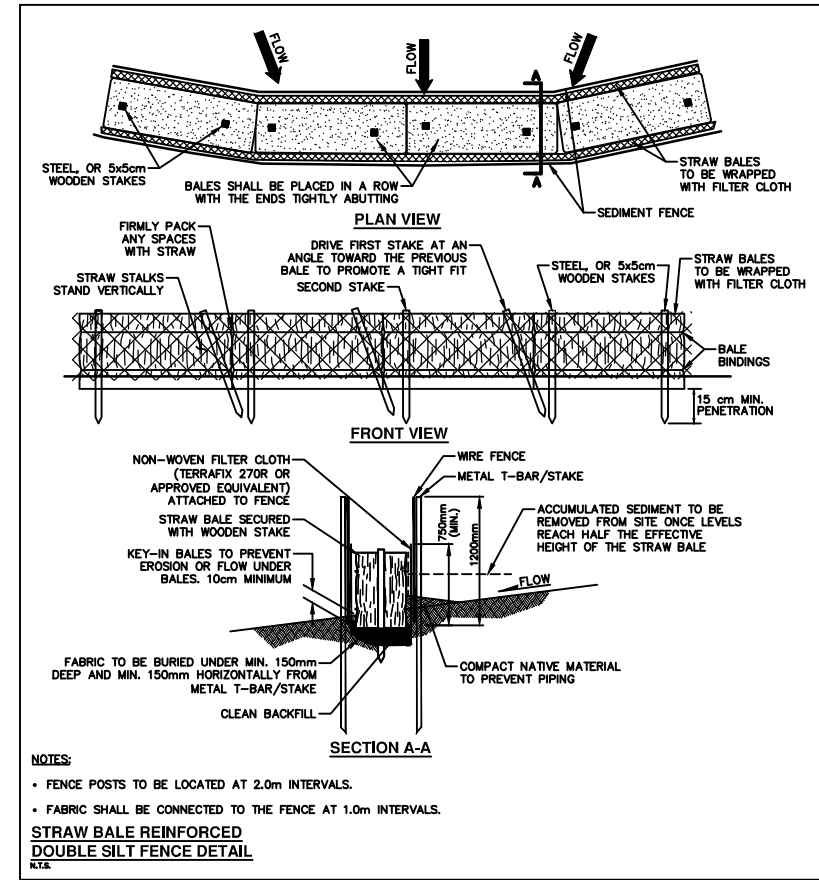
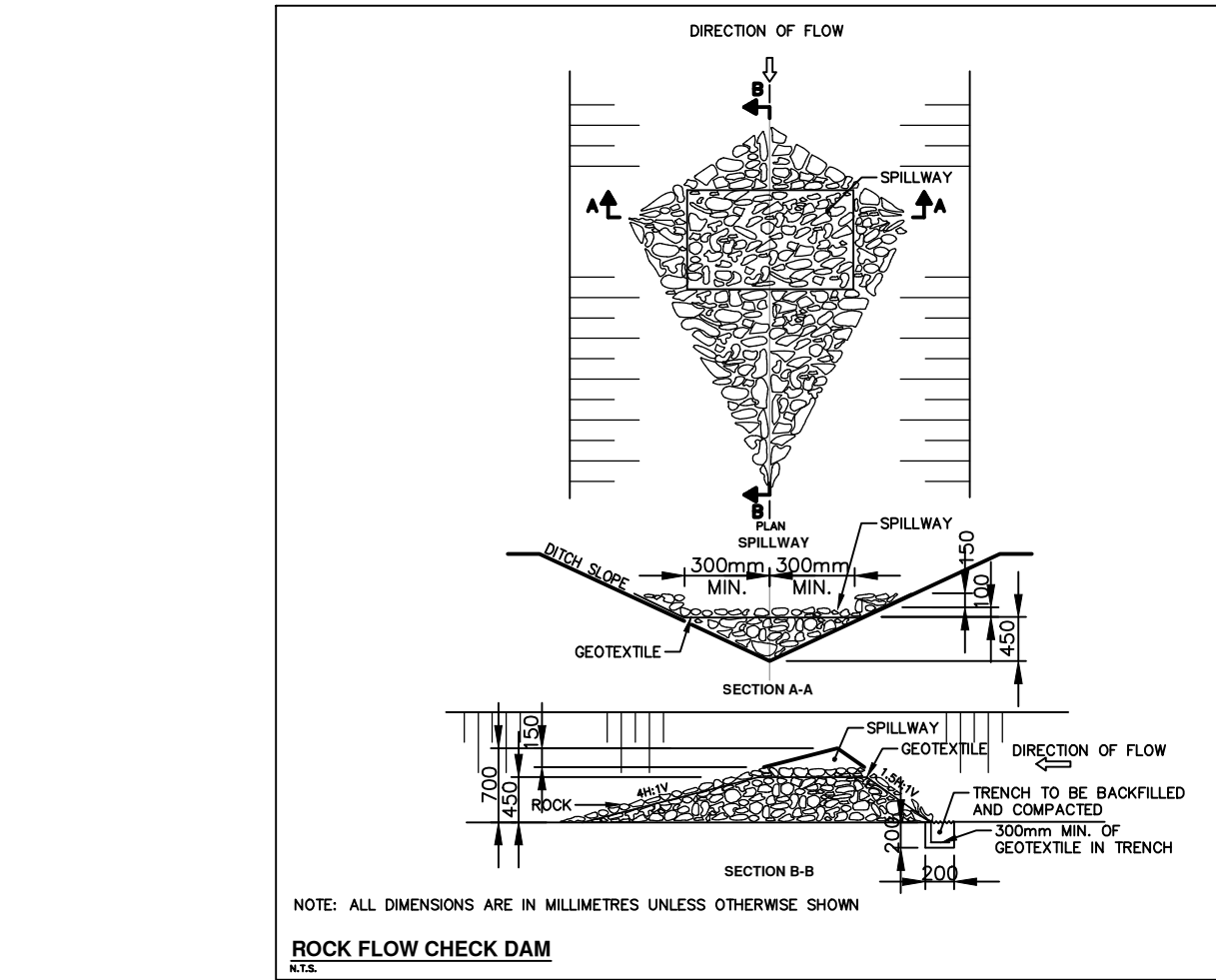
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DRAWN BY : H.L.	E21007
DESIGNED BY : H.L.	DRAWING No.
CHECKED BY : M.F.	FSGP
REVISION DATE: June 16, 2025	

3. PRIOR TO COMMENCEMENT OF ANY ON-SITE WORK/ TOPSOIL STRIPPING, EROSION & SEDIMENT CONTROL (ESC) MEASURES, AS PER APPROVED EROSION & SEDIMENT CONTROL PLAN, MUST BE INSTALLED TO PREVENT SURFACE RUNOFF FROM LEAVING THE SITE "UNTREATED". ALL ESC MEASURES ARE TO BE MAINTAINED UNTIL THE SITE HAS BEEN STABILIZED.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER INSTALLATION, MAINTENANCE AND REMOVAL OF ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES DURING CONSTRUCTION, AS DIRECTED BY THE ENGINEER OR THE CITY OF PICKERING.
3. SEDIMENT CONTROL FENCE TO USE GEOTEXTILE WITH WEAVE DENSITY OF 270R TERRAFIX OR EQUIVALENT.
4. ALL EXPOSED SOILS SHALL BE IMMEDIATELY STABILIZED WITH A SEED AND MULCH APPLICATION AS DIRECTED BY THE ENGINEER OR CITY OF PICKERING.
5. CHECK DAMS ARE TO BE USED IN ANY TEMPORARY DRAINAGE SWALES REQUIRED DURING THE CONSTRUCTION PERIOD.
6. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED AND SHALL BE DETERMINED BY THE ENGINEER OR THE CITY OF PICKERING.
7. ALL SWALES ARE TO BE STABILIZED PRIOR TO USE.
8. INSPECTION OF THE PROPOSED EROSION AND SEDIMENT CONTROL MEASURES WILL OCCUR ON A WEEKLY BASIS, AFTER RAINFALL EVENTS EXCEEDING 10mm OR AFTER RAPID SNOW MELT EVENTS AND DAILY DURING EXTENDED RAIN OR SNOW. IN THESE EVENTS, THE SILT CONTROL FENCE MUST BE INSPECTED FOR RIPS OR TEARS, BROKEN STAKES, BLOW OUTS AND ACCUMULATION OF SEDIMENT. THE SILT CONTROL FENCE MUST BE FIXED AND/OR REPLACED IMMEDIATELY WHEN DAMAGED. ACCUMULATED SEDIMENT MUST BE REMOVED FROM THE SILT CONTROL FENCE WHEN ACCUMULATION REACHES 50% OF THE HEIGHT OF THE FENCE.
9. ROCK CHECK DAMS ARE TO BE CLEARED OF ALL ACCUMULATED SEDIMENT AS SOON AS SEDIMENT HAS ACCUMULATED TO A DEPTH GREATER THAN 50% OF ALL THE UPSTREAM CHECK DAMS.
10. CLEANING AND REPAIRS OF MUD MATS AND ANY OTHER TEMPORARY SEDIMENT CONTROL MEASURES SHALL BE DONE AS NECESSARY THROUGH REGULAR INSPECTION OR AS DIRECTED BY THE ENGINEER OR CITY OF PICKERING. ALL DAMAGED ESC MEASURES SHALL BE REPAIRED AND/OR REPLACED WITHIN 48 HOURS OF THE INSPECTION.
11. MATERIALS TO REPAIR DAMAGED ESC MEASURES MUST BE KEPT ON-SITE AT ALL TIMES.
12. THE ESC STRATEGIES ON THESE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/ AMENDED AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT RELEASES. FAILED ESC MEASURES MUST BE REPAIRED IMMEDIATELY.
13. NO CONSTRUCTION ACTIVITY OR MACHINERY SHALL INTRUDE BEYOND THE SILT CONTROL FENCE OR LIMIT OF DEVELOPMENT. ALL CONSTRUCTION VEHICLES SHALL LEAVE THE SITE AT DESIGNATED LOCATIONS AS SHOWN ON THE PLANS. ALL MATERIALS AND EQUIPMENT SHALL BE STORED ON SITE IN A DESIGNATED AREA. NO MATERIALS OR EQUIPMENT SHALL BE STORED ON THE MUNICIPAL RIGHT OF WAY. NO CONSTRUCTION VEHICLES WILL PARK ON MUNICIPAL ROADS.
14. SERVICING OF CONSTRUCTION EQUIPMENT ON SITE IS PROHIBITED.
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16. DUST CONTROL TO BE REVIEWED DAILY. WATER TRUCK OR CALCIUM CHLORIDE IS TO BE PROVIDED ON-SITE AND HAUL ROADS/ WORKING AREAS ARE TO BE SPRAYED WITH WATER AS REQUIRED TO ENSURE THAT DUST IS CONTROLLED ON-SITE.
17. AT THE END OF CONSTRUCTION PERIOD, ACCUMULATED SEDIMENT TO BE REMOVED OFF SITE PRIOR TO THE REMOVAL OF THE SILT FENCE.
18. ALL LITTER AND DEBRIS SHALL BE MONITORED AND DISPOSED OF DAILY OR AS NECESSARY THROUGH REGULAR INSPECTION.
19. ALL TOPSOIL STOCKPILES SHALL BE SURROUNDED WITH SEDIMENT CONTROL FENCE AND STABILIZED WITH SEED MIX AS PER THIS DRAWING.
20. DISTURBED AREAS ARE TO BE MINIMIZED TO THE EXTENT POSSIBLE AND STABILIZED AS THE WORK PROGRESSES. ANY AREA EXPOSED FOR MORE THAN 30 DAYS WILL BE STABILIZED.

ALL PERMIT HOLDERS SHALL:

1. NOTIFY THE DIRECTOR OR HIS/HER DESIGNATE A MINIMUM OF TWO BUSINESS DAYS PRIOR TO THE COMMENCEMENT OR RECOMMENCEMENT OF ANY LAND DISTURBING ACTIVITY;
2. OBTAIN PERMISSION IN WRITING FROM THE DIRECTOR OR HIS/HER DESIGNATE PRIOR TO MODIFYING ANY ELEMENT OF THE EROSION AND SEDIMENT CONTROL PLAN;
3. INSTALL ALL CONTROL MEASURES AS IDENTIFIED IN THE APPROVED EROSION AND SEDIMENT CONTROL PLAN;
4. MAINTAIN ALL ROAD DRAINAGE SYSTEMS, STORMWATER DRAINAGE SYSTEMS, CONTROL MEASURES AND OTHER FACILITIES IDENTIFIED IN THE EROSION AND SEDIMENT CONTROL PLAN;
5. PROMPTLY REPAIR ANY SILTATION OR EROSION DAMAGE TO ADJOINING SURFACES AND DRAINAGE WAYS RESULTING FROM LAND DEVELOPMENT OR DISTURBING ACTIVITIES;
6. INSPECT THE SEDIMENT CONTROL MEASURES AT LEAST ONCE PER WEEK AND AFTER EACH RAINFALL OF AT LEAST ONE CENTIMETRE AND MAKE NECESSARY REPAIRS;
7. ALLOW CITY OFFICERS OR AGENTS OF THE CITY TO ENTER THE SITE FOR THE PURPOSE OF INSPECTING FOR COMPLIANCE WITH THE EROSION AND SEDIMENT CONTROL PLAN OR FOR PERFORMING ANY WORK NECESSARY TO BRING THE SITE INTO COMPLIANCE WITH THE EROSION AND SEDIMENT CONTROL PLAN;
8. MAINTAIN A COPY OF THE PERMIT ON THE SITE;
9. NOTIFY ALL SUB CONTRACTORS AND SUPPLIERS OF APPROVED ACCESS ROUTES TO THE SITE AND ENSURE THAT ALL ACCESS ROUTES ARE MAINTAINED;
10. MAINTAIN ALL ROADS IN SAME OR BETTER CONDITION THAN EXISTING PRIOR TO THE COMMENCEMENT OF THE WORK AND KEEP ALL ROADS FREE FROM ANY MATERIALS OR EQUIPMENT ARISING FROM THE WORK SET OUT IN THE PERMIT;
11. ENSURE THAT NO CONSTRUCTION MACHINERY IS OPERATED IN CONTRAVENANCE OF BY-LAW NUMBER 3821, AS AMENDED, (NOISE BY-LAW) OR ANY SUCCESSOR THERETO.
12. AN AFTER HOURS CONTACT NUMBER IS TO BE VISIBLY POSTED ON-SITE FOR EMERGENCIES. ALL CONCERNS SHOULD BE DIRECTED TO:
CANDEVECON LIMITED: MIRO FAVT 289-3535-3680
LAND OWNER: JOHN SMITH 905-666-6666

1. UPON THE FAILURE BY THE PERMIT HOLDER TO COMPLETE ALL OR PART OF THE WORKS IN THE TIME STIPULATED IN THE EROSION AND SEDIMENT CONTROL PLAN, THE CITY MAY DRAW THE APPROPRIATE MONIES FROM THE EROSION AND SEDIMENT CONTROL FUND AND USE THE FUNDS TO ARRANGE FOR THE COMPLETION OF THE SAID WORKS, OR ANY PART THEREOF;
2. UPON FAILURE BY THE PERMIT HOLDER TO INSTALL, REPAIR OR MAINTAIN A SPECIFIC PART OF THE EROSION CONTROL REQUESTED BY THE CITY, IN THE TIME STIPULATED IN THE EROSION AND SEDIMENT CONTROL PLAN, THE CITY MAY, AT ITS DISCRETION, ORDER THE PERMIT HOLDER TO PAY THE COST OF ANY PART OF THE WORKS AUTHORIZED IN THE CASE OF ALL OR PART OF THE SECURITIES TO PAY THE COST OF ANY PART OF THE WORKS IT MAY IN ITS OR THEIR ABSOLUTE DISCRETION DEEM NECESSARY.
3. IN THE CASE OF EMERGENCY REPAIRS OR CLEAN-UP, THE CITY MAY UNDERTAKE THE NECESSARY WORKS AT THE EXPENSE OF THE PERMIT HOLDER AND REIMBURSE ITSELF OUT OF SECURITIES POSTED BY THE APPLICANT.



1. ALL MEASUREMENTS IN METRES, PIPE SIZES IN MILLIMETRES, UNLESS OTHERWISE SPECIFIED.

	EXISTING GROUND CONTOUR
	SILT FENCE
	STRAW BALE REINFORCED DOUBLE SILT FENCE
	TEMPORARY SWALE
	CONSTRUCTION ACCESS MUD MAT
	ROCK FLOW CHECK DAM
	SWALE INVERT
	CATCHBASIN BUFFER / SILTSACK
	RISER PIPE LOT DRAIN
	OVERLAND FLOW DIRECTION

TEMPORARY SEDIMENT CONTROL POND DESIGN DETAILS	
DRAINAGE AREA TO POND	= 2.81ha
PERMANENT POOL VOLUME REQUIRED (185m ³ /ha x 3.56ha)	= 520m ³
PERMANENT POOL VOLUME PROVIDED	= 825m ³
ACTIVE STORAGE VOLUME REQUIRED (125m ³ /ha x 3.56ha)	= 351m ³
ACTIVE STORAGE VOLUME PROVIDED	= 630m ³
BOTTOM OF POND ELEVATION	= 131.50m
PERMANENT POOL ELEVATION	= 132.00m
ACTIVE STORAGE ELEVATION	= 132.30m
TOP OF POND ELEVATION	= 132.50m
OUTFLOW RATE REQUIRED FOR MIN. 24hr DETENTION TIME	= 3.7L/s

REVISIONS				
No.	BY	DATE	DESCRIPTION	APPROVED

THE CORPORATION OF THE CITY OF PICKERING
DEPARTMENT OF ENGINEERING SERVICES

FRISQUE LANDS

EROSION AND SEDIMENT CONTROL PLAN



1600 STELLAR DRIVE, SUITE 402
TEL. (289) 315-3680

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TEL. (289) 315-3680

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TEL. (289) 315-3680



SCALE : 1:1000

DRAWN BY : H.L

DESIGNED BY : A.K

CHECKED BY : M.F.

PROJECT No.

E21007

DRAWING No.

ERS1

GENERAL EROSION & SEDIMENTATION CONTROL NOTES:

1. PRIOR TO COMMENCEMENT OF ANY ON-SITE WORK/TOPSOIL STRIPPING, EROSION & SEDIMENT CONTROL (ESC) MEASURES, AS PER APPROVED EROSION & SEDIMENT CONTROL PLAN, MUST BE INSTALLED TO PREVENT SURFACE RUNOFF FROM LEAVING THE SITE "UNTREATED". ALL ESC MEASURES ARE TO BE MAINTAINED UNTIL THE SITE HAS BEEN STABILIZED.
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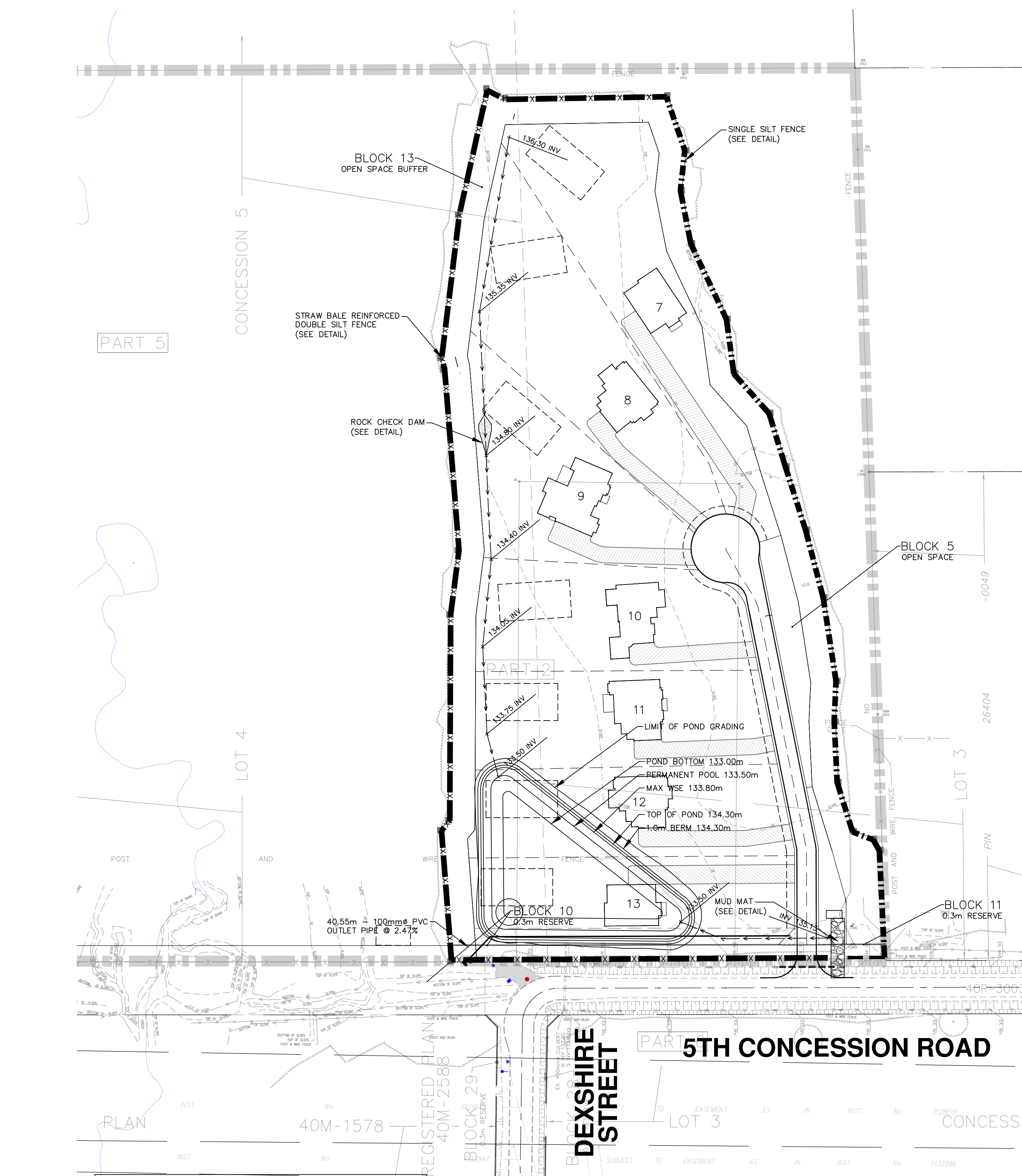
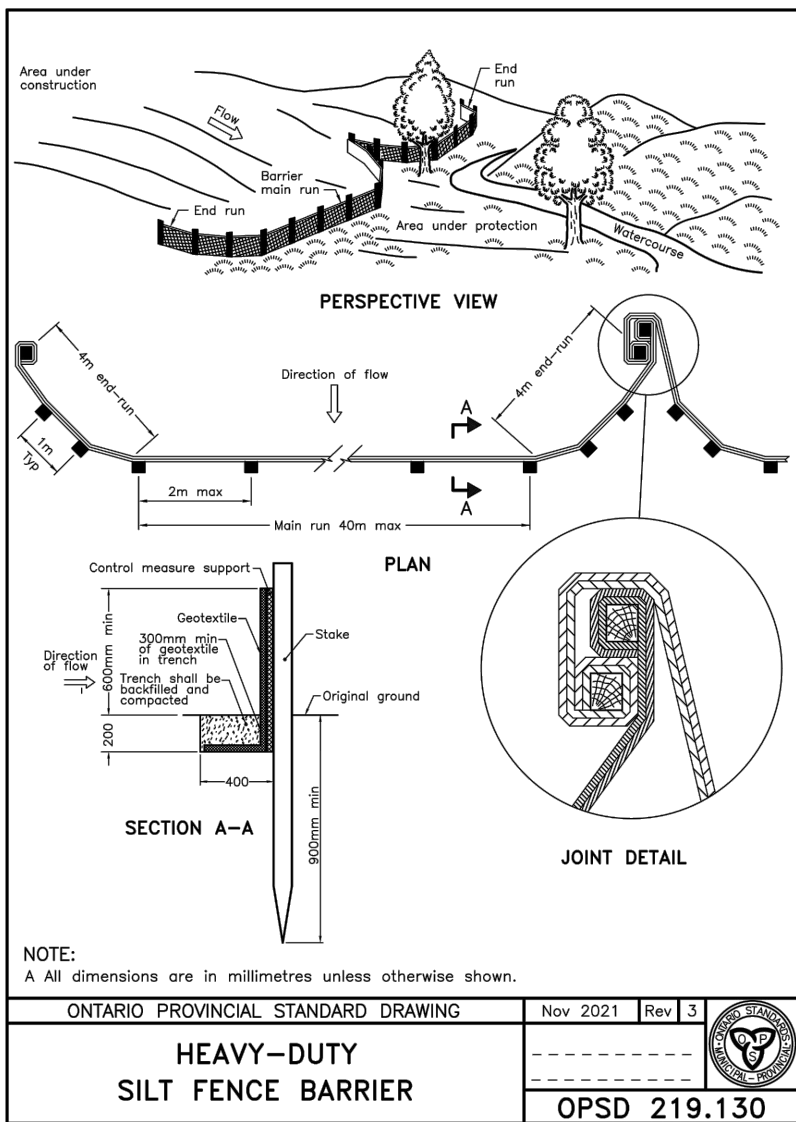
PERMIT CONDITIONS:

ALL PERMIT HOLDERS SHALL:

1. NOTIFY THE DIRECTOR OR HIS/HER DESIGNATE A MINIMUM OF TWO BUSINESS DAYS PRIOR TO THE COMMENCEMENT OR RECOMMENCEMENT OF ANY LAND DISTURBING ACTIVITY;
2. OBTAIN PERMISSION IN WRITING FROM THE DIRECTOR OR HIS/HER DESIGNATE PRIOR TO MODIFYING ANY ELEMENT OF THE EROSION AND SEDIMENT CONTROL PLAN;
3. INSTALL ALL CONTROL MEASURES AS IDENTIFIED IN THE APPROVED EROSION AND SEDIMENT CONTROL PLAN;
4. MAINTAIN ALL ROAD DRAINAGE SYSTEMS, STORMWATER DRAINAGE SYSTEMS, CONTROL MEASURES AND OTHER FACILITIES IDENTIFIED IN THE EROSION AND SEDIMENT CONTROL PLAN;
5. PROMPTLY REPAIR ANY SILTATION OR EROSION DAMAGE TO ADJOINING SURFACES AND DRAINAGE WAYS RESULTING FROM LAND DEVELOPMENT OR DISTURBING ACTIVITIES;
6. INSPECT THE SEDIMENTATION CONTROL MEASURES AT LEAST ONCE PER WEEK AND AFTER EACH RAINFALL OF AT LEAST ONE CENTIMETRE AND MAKE NEEDED REPAIRS;
7. ALLOW CITY OFFICERS OR AGENTS OF THE CITY TO ENTER THE SITE FOR THE PURPOSE OF INSPECTING FOR COMPLIANCE WITH THE EROSION AND SEDIMENT CONTROL PLAN OR FOR PERFORMING ANY WORK NECESSARY TO BRING THE SITE INTO COMPLIANCE WITH THE EROSION AND SEDIMENT CONTROL PLAN;
8. MAINTAIN A COPY OF THE PERMIT ON THE SITE.
9. NOTIFY ALL SUB CONTRACTORS AND SUPPLIERS OF APPROVED ACCESS ROUTES TO THE SITE AND ENSURE COMPLIANCE WITH THESE INSTRUCTIONS;
10. MAINTAIN ALL ROADS IN SAME OR BETTER CONDITION THAN EXISTING PRIOR TO THE COMMENCEMENT OF THE WORK AND KEEP ALL ROADS FREE FROM ANY MATERIALS OR EQUIPMENT ARISING FROM THE WORK SET OUT IN THE PERMIT;
11. ENSURE THAT NO CONSTRUCTION MACHINERY IS OPERATED IN CONTRAVENTION OF BY-LAW NUMBER 3821, AS AMENDED, (NOISE BY-LAW) OR ANY SUCCESSOR THERETO.
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CANDEVCON LIMITED: MIRKO FAVIT 289-315-3680
LAND OWNER: JOHN SMITH 905-666-6666

THE CITY SHALL:

1. UPON THE FAILURE BY THE PERMIT HOLDER TO COMPLETE ALL OR PART OF THE WORKS IN THE TIME STIPULATED IN THE EROSION AND SEDIMENT CONTROL PLAN, THE CITY MAY DRAW THE APPROPRIATE AMOUNT FROM THE SECURITIES POSTED AND USE THE FUNDS TO ARRANGE FOR THE COMPLETION OF THE SAID WORKS, OR ANY PART THEREOF;
2. UPON FAILURE BY THE PERMIT HOLDER TO INSTALL, REPAIR OR MAINTAIN A SPECIFIC PART OF THE WORKS AS REQUESTED BY THE CITY, AND IN THE TIME REQUESTED, THE CITY MAY AT ANY TIME AUTHORIZE THE USE OF ALL OR PART OF THE SECURITIES TO PAY THE COST OF ANY PART OF THE WORKS IT MAY IN ITS OR THEIR ABSOLUTE DISCRETION DEEM NECESSARY.
3. IN THE CASE OF EMERGENCY REPAIRS OR CLEAN-UP, THE CITY MAY UNDERTAKE THE NECESSARY WORKS AT THE EXPENSE OF THE PERMIT HOLDER AND REIMBURSE ITSELF OUT OF SECURITIES POSTED BY THE APPLICANT.



Appendix A

Criteria & Background Information

Subject: 3225 Fifth Concession Road

Applicants: 869547 Ontario Inc.

Agents: Maurizio Rogato – Blackthorn Development Corp.

Distribution: Lino Trombino, Region of Durham Planning Department
Peter Castellan, Region of Durham Works Department
Stephanie Worrn, Toronto and Region Conservation Authority
Nilesh Surti, Manager, Development Review & Urban Design
Dean Jacobs, Manager, Policy & Geomatics
Carl Kolbe, Manager, Building Services & Deputy CBO
Paal Helgesen, Manager, Development Services
Deepak Bhatt, Senior Planner, Sustainability
Felix Chau, Planner I

Note: Due to the COVID-19 protocols, all comments below were collected through email.

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
1.	Proposal	
	- A proposed Draft Plan of Subdivision consisting of 22 lots for detached dwellings fronting onto two new public road terminating in a cul-de-sacs with access off of Fifth Concession - The proposed lots will range between 0.62 of a hectare to 1.627 hectares.	
2.	Type of Application	
	- Zoning By-law Amendment - Draft Plan of Subdivision	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
3.	Discussion	
Lori Reviere-Doersam, Region of Durham (Planning)	- Section 5.2.1 of the Greenbelt Plan provides that an Official Plan Amendment approved prior to December 16, 2004 can shelter subsequent applications without the requirement for Greenbelt Plan conformity for the subsequent applications. Related local approvals can move forward if they are related to the previously obtained approval. - The Regional Official Plan designates the subject lands as a Country Residential Subdivision – Number 33 (CRS), permitting a maximum of 23 units. - Country Residential Subdivisions must be individually serviced with drilled wells and private sewage disposal as per MECP and Regional standards. - Policy 9B.2.19 of the ROP: - not exceed the maximum number of residential units permitted (23); - be designed to be unobtrusive and blend into the Region's landscape; - not detract from the surrounding natural environment or require significant alterations of the existing topography, waterways or vegetation; - not have an adverse cumulative impact on the environment; - contain a range of lot sizes generally from 0.6 to 1 hectare; - be serviced with an internal road system, having a minimum of two access points without direct access onto a Provincial highway or a Type 'A' Arterial Road; - be in conformity with the Provincial Minimum Distance Separation formulae; - not have a negative impact on key natural heritage or hydrologic features (KNHHF); and - be in conformity with the provisions of the area municipal official plan - approval for a CRS must be in accordance with Policy 9B.2.11 and 9B.2.12 of the ROP.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
	• Policy 9B.2.11 and 9B.2.12 ▪ a recent hydrogeological report ▪ lot servicing plan ▪ results of a soil sampling program report ▪ an existing and final grading plan, indicating elevations and lot drainage patterns ▪ required studies can not be more than 3 years old prior to registration ▪ a monitoring program which identifies the amount of development permitted in each phase, as defined by the Region of Durham ▪ the plan of subdivision shall be developed in stages to allow monitoring ▪ further stages of development shall not be permitted if the monitoring results show that soil or groundwater contaminants cannot be mitigated ROPA 175 introduced Policy 5.4.8 to the ROP. This policy allows for a municipal water/sanitary sewer connection outside of the urban area boundary, where, amongst other scenarios, lot creation is permitted by the policies of the plan, subject to conforming to the Region's lot sizing policies. For a property to be considered under this policy, it shall directly abut a municipal watermain or sanitary sewer service within a public right-of-way or easement and the connection shall be technically feasible, to the satisfaction of the Region. This policy allows only for a "connection" of municipal services where the properties are abutting and not an "extension". Required Studies for Resubmission: • Hydrogeological Study – to address the adequacy of the water supply, in terms of water quantity and quality and suitability of the site to accommodate potential private sewage systems and compliance with pertinent provincial and regional policies (this study will be subject to peer review).	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
	• Environmental Impact Study – to address the identification of KNHFF, appropriate buffers, mitigation measures and endangered species (may require contact with MNRF). There is a concern with the current lot layout which shows lots inside the floodplain. The ROP does not permit development and site alteration in a floodplain. Development and site alteration is also not permitted in the vegetation protection zone of a KNHF/KHF. This could impact the lot layout and number of lots permitted. The study should be scoped with the Conservation Authority. • Archaeology Study – as identified by Regional mapping the site is an area of high archaeological potential. • Minimum Distance Separation Calculation – to address any livestock facilities within 1,000 metres of the site. • Phase One Environmental Site Assessment – to address potential site contamination. This is required for all development applications circulated to the Region of Durham. ESA must be consistent with Provincial regulations. The findings of the ESA may warrant either a Phase Two ESA and/or a Record of Site Condition filed with the MECP. The Regional Reliance Letter and Certificate of Insurance (attached) would also be required. • Noise Study – to address potential noise impacts in proximity to an Arterial Road (Fifth Concession Road is a Type “B” Arterial Road). Regional Fee of \$500.00 for Recirculation/Review of Plans/Studies is required.	
Pete Castellan, Region of Durham (Works)	Regional Works has reviewed the proposal for a plan of subdivision at 3225 Fifth Concession Road and we offer the following comments.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
	The development proposal is outside the urban boundary, as such the future residential lots will be serviced by private well and private waste disposal. Regional Works has no objection to this development proposal.	
Lesley Kennedy, Region of Durham (Health)	This subdivision will have to be serviced by both private water and private sewage system. This will require that the proposal adhere to all requirements in the Region of Durham Drilled Well and Lot Sizing Policies (see attached). The applicant has proposed that a number of lots may be able to connect to municipal services. This is not reflected in our comments but if this is confirmed by the Works Department as a possibility, I can provide updated comments. The Health Department will require the following information at the time of application: 1. A hydro-geological report and/or a geo-technical report. The study should consider the quality and quantity of drinking water on the proposed site and on adjacent groundwater conditions. This will require a current study of proposed and adjacent wells to determine quality and quantity. The Ministry of the Environment's Technical Guidelines (D-5-5) must be applied to assess water supplies through the use of individual private wells in order to establish that a sufficient quantity and quality of drinking water is present. The Ministry of the Environment's Technical Guidelines (D-5-4) is to be applied to determine the impact of the proposed sewage systems on the immediate and adjacent groundwater supplies (bacterial and chemical quality), which will determine the maximum number of lots. 2. Positive and supporting comments regarding the above-noted studies from the Region's Peer Reviewer. The peer reviews will be conducted at the applicant's expense.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
	3. A site plan that demonstrates each lot can adhere to the lot sizing requirements outlined in the Lot Sizing Policy. This plan must show the structure footprint, well location, driveway location, the prime and reserve sewage system areas and all required clearance distances. <u>Fees</u> Plan of Subdivision application - \$392.00 per lot creation. Examine Initial Peer Review Fee - \$270.00 Examine follow up Peer Review reports - \$116.00 *Fees increase on April 1st, 2021.	
Stephanie Worrn, Toronto and Region Conservation Authority	The subject site is partially within the TRCA Regulated Area of the Carruthers Creek watershed. The site is regulated with respect to the Carruthers Creek valley corridor which runs through the middle of the site and contains the following natural hazards/features: top of bank/erosion hazard, regulatory storm floodplain, wetland complex, meanderbelt, and dripline of contiguous vegetation. The site is also within the Protected Countryside designation of the Greenbelt Plan and as such a Natural heritage Evaluation would be required to identify the natural heritage and hydrologic features on the site. TRCA Mapping was recently updated in 2019, and is now showing a large wetland on the east portion of the site in what appears to be a previously cleared area. We would ask that any Natural Heritage Evaluation which is performed on the site include an analysis of this area. A TRCA Permit will be required prior to development taking place on the site. Based on a review of the Draft Plan of Subdivision provided as part of the October 7th circulation, TRCA staff would not be supportive of the current lot configuration as the lots are extending entirely within the valley corridor and the associated natural hazards/features. We would recommend that the landowner engage with TRCA staff to work through the Concept Development Application process to identify the development limits on the site and scope any required technical documents/studies.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
	<u>TRCA Living City Policies:</u> The limits of development are guided by the TRCA's Living City Policies (LCP) and are defined for new development as a minimum of 10 meters inland for any new development from the greater of the following: 1. Physical top of bank of the valley feature; 2. Predicted long-term-stable-top-of-slope (LTSTOS) where geotechnical concerns exist (must be confirmed through an appropriate geotechnical slope stability analysis); 3. Limits of flooding on the property during a Regional Storm Event; and/or 4. Limits of vegetation (dripline) which is contiguous with the natural system. For any Planning Act Applications, TRCA staff would require the following for review: 1. Planning Rationale 2. Natural Heritage Evaluation 3. Hydrogeology Study 4. Functional Servicing, Stormwater Management Report and associated drawings 5. Fluvial Geomorphic Slope Stability Study 6. Site Grading Plan 7. Erosion and Sediment Control Plans The applicant should also comply with the TRCA's SWM guidelines, link provided → https://drive.google.com/file/d/0BxjqkzmOuuaaRa3ZxS25wUWF6Q1k/view **Please note, that once the development limits have been determined, TRCA Policies request conveyance of the feature plus buffer into public ownership for the long term preservation.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
Paal Helgesen, Manager, Development Services Engineering Services, City of Pickering	Water Resources Based on our maps, approximately 70% of the site area is regulated by TRCA and CLOCA. The City's criteria require the following: - Quantity control - control post development flows to pre-development/existing levels for all storm events up to the 100-year return period. - Quality control - Enhanced level of protection (80% TSS removal). - Erosion control - minimum 5mm on-site retention/infiltration. - FSSR is required Development Services - Environmental Impact Statement - Functional Grading Plan (FSSR) - Functional Servicing Plan (FSSR) - Geotechnical Report - Tree Inventory/Preservation Plan - Road Widening of 5th Concession Rd may be required along the north side. There are currently no Municipal Services (storm sewer) available. A watermain was extended from Sideline 4 through the unopened road allowance to the east side of Carruthers Creek to facilitate an estate subdivision south of the Fifth Concession Road. Also, Fifth Concession Road was extended west from Audley Road to provide access to the subdivision. There may be an opportunity to provide access to the lands, included as part of this Draft Plan, from Fifth Concession Rd. Cost sharing for the construction of this road and the watermain, may be required. Applicant is advised to contact Greg Gibson, Development Engineering Coordinator, at the Town of Ajax for further details. Fifth Concession Rd on the west side of Carruthers Creek will need to be extended easterly to provide access to the lands north of the unopened road allowance.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
	Transportation A Traffic Impact Study will be required. Applicant is asked to contact Nadeem Zahoor, Transportation Engineer, Engineering Services Department regarding the Terms of Reference for the Study.	
Nadeem Zahoor, Transportation Engineer, City of Pickering	- A Transportation Impact Study (TIS) is required for the proposal to look at the impact to the existing road network. The TIS should be as per the Durham Region TIS Guidelines. - As per the Official Plan, the Concession Road 5 will be a future Arterial B roadway. A road right of way of 36 meters is required at this location. - The roadway design (including the proposed cul-de-sacs) should be as per the City of Pickering design Guidelines. - Further comments will be provided once the detailed plan and the TIS will be received by the City.	
Carl Kolbe – Manager, Building Services & Deputy CBO Building Services, City of Pickering	From Building Services – we would like to ‘meet’ with the designers ahead of time to head off any potential OBC issues.	
City Development, Policy, City of Pickering	Please see attached memo.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
Deepak Bhatt – Senior Planner, Sustainability City Development, Sustainability, City of Pickering	Pre-consultation comments on the development application are as follows: • A Sustainability Development Guideline Report and a Checklist is required and it can be combined with the Planning Justification Report. • The proposed development must satisfy the “Required” elements and achieve a Level 1 rating with at least 19 points. • To assist in preparing the report details the Sustainable Development Guideline reports are available on the City’s website at the following link: https://www.pickering.ca/en/living/sustainabledevelopment.aspx • As the project is at pre-consultation and conceptual planning stage, we suggest the applicant include sustainable elements in the design to minimize energy consumption, greenhouse gas emissions and water consumption.	
Nilesh Surti – Manager, Development Review & Urban Design Felix Chau – Planer I City Development, Planning & Design, City of Pickering	• A Zoning By-law Amendment will be required to facilitate the compliance of the proposed development • A Draft Plan of Subdivision is required • A Planning Rationale Report is required • A concept site plan in colour at 150 dpi in JPEG format will be required • A concept site plan indicating the location of the proposed dwellings and services will be required • A Draft By-law is required	
4.	Technical Reports Required	
	Please see attached Technical Report Check List	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
5.	Fees Requirement	
	For the proposed development the following fees are required: City of Pickering: Note: fees are subject to change effecting March 1, 2021 City Development: • Zoning By-law Amendment (Major) – \$15,785.00 - o Plus Fee per Residential Unit ▪ First 25 units (1-25) - \$400.00 ▪ Next 75 units (26-100) - \$300.00 ▪ Next 100 units (101-200) - \$200.00 ▪ Next 800 units (201-1,000) - \$100.00 • Draft Plan of Subdivision - \$30,750.00 - o Plus Fee per Residential Unit ▪ First 25 units (1-25) - \$500.00 ▪ Next 75 units (26-100) - \$400.00 ▪ Next 100 units (101-200) - \$300.00 ▪ Next 800 units (201-1,000) - \$200.00 - o Plus Fee per Non-Residential Hectare of Land Area - \$160.00 - o Plus Fee per Development Block Hectare of Land Area - \$100.00 External Agencies: Region of Durham Planning & Economic Development Department: • Please contact the Region of Durham to confirm all applicable fees Toronto and Region Conservation Authority: • Please contact the TRCA to confirm all applicable fees	

Copy:

Paul Bigioni, 869547 Ontario Inc.
Maurizio Rogato, Blackthorn Development Corp.
Lino Trombino – Region of Durham
Lori Riviere- Doersam – Region of Durham
Peter Castellan – Region of Durham
Lesley Kennedy – Region of Durham
Stephanie Worron – Toronto and Region Conservation Authority

Nilesh Surti – Manager, Development Review & Urban Design
Dean Jacobs – Manager, Policy & Geomatics
Paal Helgesen – Manager, Development Services
Carl Kolbe – Manager, Building Services & Deputy CBO
Nadeem Zahoor – Transportation Engineer
Felix Chau – Planner I

**Materials and Studies Required for 3225 Fifth Concession Road
(list appears in Section 16.5A of the Pickering Official Plan (POP))**

Plans/Studies/Reports	POP Reference	Required (✓) Not Applicable (N/A)	Comments
Planning Rationale Report	16.5A(i)	✓	
Transportation Study	16.5A(ii)	✓	Report to be signed and stamped by a P.Eng
Shadow Study	16.5A(iii)		
Wind Study	16.5A(iv)		
Heritage Conservation Compliance Statement	16.5A(v)		
Archaeological Assessment	16.5A(vi)	✓	
Functional Servicing Study/ Site Servicing Study	16.5A(vii)	✓	Report to be signed and stamped by a P.Eng
Drainage and Stormwater Management Study	16.5A(viii)	✓	Can be included in the Functional Servicing Study. Report to be signed and stamped by a P.Eng
Flood Plain Impact Engineering Study	16.5A(ix)		
Agricultural Report	16.5A(x)		
Site Suitability Study	16.5A(xi)		
Environmental Report	16.5A(xii)		
Natural Heritage Evaluation	16.5A(xiii)	✓	Environmental Impact Study addressing Key Natural Heritage Feature, buffer and mitigation measures
Hydrological Evaluation	16.5A(xiv)	✓	Report to be signed and stamped by a P.Eng
Hydrogeology and Water Budget Study	16.5A(xv)	✓	Report to be signed and stamped by a P.Eng
Watershed/Sub-watershed Study	16.5A(xvi)		
Aggregate Extraction Impact Study	16.5A(xvii)	✓	
Aggregate Extraction Assessment Study	16.5A(xviii)	✓	
Assessment of Lands within 500 metres of Known Waste Disposal Site	16.5A(xix)		
Phase I Environmental Site Assessment	16.5A(xx)	✓	
Phase II Environmental Site Assessment			
Record of Site Condition			

Plans/Studies/Reports	POP Reference	Required (✓) Not Applicable (N/A)	Comments
Contamination Management Plan (High Aquifer Vulnerability Area)	16.5A(xxi)		
Contamination Management Plan (near Wellhead protection Area)	16.5A(xxii)		
Waste Disposal Community Impact Study	16.5A(xxiii)		
Noise Study	16.5A(xxiv)	✓	
Vibration Study	16.5A(xxv)		
Dust/Odour Control Study	16.5A(xxvi)		
Lighting Study	16.5A(xxvii)		
Retail Impact Study	16.5A(xxviii)		
Sustainable Development Report	16.5A(xxix)	✓	Can be combined with the Planning Rationale Report
Rental Housing Conversion Study	16.5A(xxx)		
Urban Design Brief	16.5A(xxxi)		
Financial Impact Study	16.5A(xxxii)		
Architectural Design Study	16.5A(xxxiii)		
Railway Corridor Safety Study	16.5A(xxxiv)		
Groundwater Impact Study	16.5A(xxxv)		
Water Management Plan	16.5A(xxxvi)		
Other Reports (such as):			
• Parking Standard Analysis/Justification			
• Construction Management			
• Implementation / Phasing Report			
• Tree/Vegetation Inventory Report		✓	
• Geotechnical Report		✓	Report to be signed and stamped by a P.Eng
• Minimum Distance Separation Calculation		✓	
• Fluvial Geomorphic Slope Stability Study		✓	
• Site Grading Plan		✓	Can be included in the Functional Servicing Report
• Erosion and Sediment Control Plans		✓	
• Coloured Plan		✓	

Plans/Studies/Reports	POP Reference	Required (✓) Not Applicable (N/A)	Comments
• Draft By-law		✓	
Digital copies of all studies and drawings		✓	

**3225 Fifth Concession Road
Part of Lots 3 and 4, Concession 5
Proponent: Blackthorn Development Corp.
Pre-submission Consultation
Preliminary Policy Comments**

1. Proposal and Context

The subject property is located on the north side of an unopened road allowance for Fifth Concession Road, on the east side of Sideline 4 (east of Salem Road) and to the west of Audley Road.

According to the applicant, the subject lands are vacant and approximately 17.91 hectares in size. (*Note: The area of the property is shown as 8.216 ha on Geocortex which differs from what the applicant has identified).

- To the south is the City of Pickering municipal boundary with the Town of Ajax and estate residential development and the Deer Creek Golf Club;
- To the east are rural residential properties;
- To the north is Holiday Gardens, a wedding and event venue; and
- To the west is a rural residential property fronting onto Fifth Concession Road.

The proposal is to develop an estate plan of subdivision consisting of 22 lots that was originally submitted in 1987 with a subsequent Regional Official Plan Amendment approved on September 9th, 1997. The Draft Plan of Subdivision was recommended by the Region, subject to site-specific requirements, but the Region never issued Draft Plan Approval. The proponent is seeking to reactivate the previously submitted applications to develop the property as proposed.

2. Durham Regional Official Plan (May 26, 2020 Consolidation)

The Durham Regional Official Plan (DROP) identifies the property as being within the Greenbelt Boundary and designates the subject site as a Country Residential Subdivision (number 33) within the Rural System. In accordance with Schedule E, Table 'E2', Country Residential Subdivisions, the maximum number of residential units permitted is 23.

Policies within the DROP require that Country Residential Subdivisions be individually serviced with drilled wells and private sewage disposal systems (Policy 9B.2.18) and that once a Country Residential Subdivision has been registered, no severance for an additional lot shall be granted (Policy 9B.2.21). Detailed requirements, in addition to Planning Act requirements, addressing such things as: a hydrogeological report, to address existing conditions and the potential impact of the proposed subdivision on the available water, as well as the potential impact of

proposed private sewage disposal systems on the groundwater supply; a lot servicing plan, indicating the proposed location of all structures, including drilled wells and the subsurface sewage disposal system envelopes; a report of the results of a soil sampling program that adequately represents the geology of the subdivision; and an existing and final grading plan, indicating elevations and lot drainage patterns, are enumerated in Policy 9B.2.11.

Also, conditions of draft approval attached to any Country Residential Subdivision shall contain provisions that: all studies submitted to justify the application be reconfirmed prior to registration, and that such studies are not more than 3 years old; a monitoring program which identifies the amount of development to be permitted in each stage, as defined by the Region, shall be in place to determine the cumulative effect of the various stages of development on adjacent wells and the soil and groundwater conditions; the plan of subdivision shall be developed in stages to allow monitoring; and further stages of development shall not be permitted if the monitoring results show that soil or groundwater contaminants cannot be mitigated and/or in the case of an existing municipal water supply, the capacity has been reached (Policy 9B.2.12).

3. Pickering Official Plan (Edition 8)

3.1 Permitted Use

The subject property is designated “Rural Settlements – Country Residential” in the Pickering Official Plan (POP) which establishes different types of Rural Settlements based on development and growth characteristics. In particular, the Country Residential designation is defined as large lot residential subdivisions located mainly on an internal road which does not exceed the maximum approved number of residential lots and no new country residential settlements will be permitted (see Table 10 in the POP).

Further, Schedule IV – 7: Settlement 7: Birchwood Estates, identifies two distinct areas of “Country Residential” separated by an area of “Open Space System-Natural Areas”. The Open Space System – Natural Areas designation in the POP generally limits permissible uses to conservation, environmental protection, restoration, education, passive recreation, and similar uses, subject to the provisions of the Regional Official Plan related to non-agricultural uses, and provided that development or site alteration may only be permitted in key natural heritage and/or key hydrologic features for limited purposes.

The Birchwood Estates Settlement Policies (Policy 13.9) in the POP direct that the existing dwelling on the subject lands be recognized, that development is undertaken in a manner that respects environmental features such as Carruthers Creek and its tributaries; and that the country residential environment of the settlement is maintained once developed.

The proposed 22 estate residential lots, ranging in size from 0.617 ha. up to 1.627 ha., on two separate internal cul-de-sacs with access from the unopened road allowance for Fifth Concession, east of Sideline 4, meets the POP requirements established for permitted uses.

3.2 Transportation System

The subject site proposes access to two internal cul-de-sacs from an unopened road allowance of Fifth Concession Road east of Sideline 4. Fifth Concession Road is identified as a Type B Arterial Road on Schedule II - Transportation System to the POP.

The subject property is within the Durham Transit Rural On Demand area. There is no regularly scheduled transit service adjacent to the subject property.

Is there an opportunity for facilitating and/or implementing passive recreation (i.e. a walking trail) within the proposed natural areas (POP 4.7)?

3.3 Natural Heritage System

3.3.1 The Natural Heritage System

It is an important goal of the City of Pickering to protect, conserve and enhance the City's natural heritage features and functions, as well as ensure the protection of people and property from environmental hazards.

The entire subject property is within the "Natural Heritage System" overlay (Schedule III A) of the Pickering Official Plan. Lands with the highest concentration of the most sensitive and/or key natural heritage and key hydrologic features and functions, are identified on Schedules III B, III C and III D. Policies contained in Chapter 10 of the POP relate to the Natural Heritage System.

In accordance with POP 16.8 (a), submission of an Environmental Report is required as part of this development application. The contents of the Environmental Report are established in POP 16.10.

3.3.1.1 Significant Woodlands

A large portion of the subject site is identified as being within the Significant Woodlands overlay of Schedule III B. Table 18 (POP Chapter 16) identifies a minimum area of influence within 120 metres of any part of the feature. In addition, a vegetation protection zone of 10 metres from the dripline of the woodlands is required, subject to the Environmental Report.

A vegetation protection zone is defined as a buffer area adjacent to a key natural heritage feature or a key hydrologic feature that is intended to protect the feature and its ecological function from adjacent land use impacts.

The Environmental Report must address Significant Woodlands.

3.3.1.2 Shorelines, Significant Valley Lands and Stream Corridors

Two branches of the Carruther's Creek join together and essentially bisect the subject property such that a significant portion of the subject property is identified as being within the Shorelines, Significant Valley Lands and Stream Corridors overlay of Schedule III C.

The Pickering Official Plan establishes policies associated with Shorelines, Significant Valley Lands and Stream Corridors (POP 10.7, 10.12 and 10.22) and in particular that development and site alteration is to be directed away from these areas.

In addition, Table 18 (POP Chapter 16) identifies a minimum area of influence within 120 metres of stable top of bank, and a required vegetation protection zone for all lands within 30 metres of stable top of bank for significant valley lands, subject to the Environmental Report.

Table 18 (POP Chapter 16) identifies a minimum area of influence within 120 metres of any part of the feature and a required vegetation protection zone for all lands within 30 metres of the limits of the floodplain or hazard lands as defined by the relevant Conservation Authority, subject to Section 16.10 if a hydrogeological evaluation is required.

The Environmental Report must address Shorelines, Significant Valley Lands and Stream Corridors.

3.3.1.3 Highly Vulnerable Aquifers

A large portion of the subject site is within an area identified as Highly Vulnerable Aquifers (HVA) (see Schedule III D to the POP). A Contaminant Management Plan is required in support of an application if there are proposed uses on a site that are listed as high risk to groundwater in the DROP (POP 16.14 (b)). The proposed residential use does not appear to qualify as a "high risk" to groundwater. The Regional Municipality of Durham will need to confirm that the proposed residential use is not identified as a high risk land use and as such a Contamination Management Plan would not be required.

*Note: the information contained in this section takes into consideration the recent Council-adopted policies of Official Plan Amendment 36 for Drinking Water Source Protection.

3.3.1.4 Significant Groundwater Recharge Areas

The western portion of the subject site is identified as being within the Significant Groundwater Recharge Area (SGRA) overlay of Schedule III D. In accordance with POP 10.13 (b), *the preparation of a hydrogeology and water budget/balance study, including a mitigation strategy to ensure no loss of water recharge quantity or quality, is required.*

In addition, through the Office of the Risk Management Official at the Region of Durham, a determination must be made as to whether or not the application of road salt within the proposed development would be a moderate or low drinking water threat, and subsequently, whether or not a salt management plan as part of a complete development application would be required (POP 10.13 (g)).

*Note: the information contained in this section takes into consideration the recent Council-adopted policies of Official Plan Amendment 36 for Drinking Water Source Protection.

3.3.1.5 Aggregate Resources

It is noted that a significant portion of the western half of the subject property is within an area identified as Areas of High Potential Mineral Aggregate Resources. As such, any development application within or adjacent to these areas must be accompanied by a study that assesses the potential aggregate reserves on the site and the impact of the proposal on the ability of lands within the area of high potential to be utilized for extraction purposes. In order for development to be permitted the required study must demonstrate that:

- (i) the extraction of the resource would not be feasible; or
- (ii) the proposed land uses would serve a greater long-term public benefit; and
- (iii) issues of public health, public safety and environmental impact are addressed.

In addition, the POP policies require, where appropriate, that the recommendations of the required studies be implemented (POP 10.10).

A study that assesses the potential aggregate reserves on the site, and the impact of the proposal on the ability of lands within the Area of High Potential Mineral Aggregate Resources to be utilized for extraction purposes, is required.

3.4 High Quality Built and Natural Environments and Detailed Design Considerations

The proponent is encouraged to review Chapters 9 and 14 of the Pickering Official Plan which sets out a strategy for addressing community design that focuses on the creation of high quality built and natural environments that evoke a desirable image and sense of place for the City.

4.0 Summary of Comments

The following points identify the key Pickering Official Plan policy requirements for the proposal as outlined in the letter from Blackthorn Development Corporation to the City of Pickering, dated August 27, 2020, including the copy of Draft Plan of Subdivision 18T-87096:

1. The Pickering Official Plan permits the proposed use of 22 estate residential lots;
2. Is there an opportunity for facilitating and/or implementing passive recreation (i.e. a walking trail) within the proposed natural areas? (POP 4.7)
3. In accordance with POP 16.8 (a), submission of an Environmental Report is required as part of this development application. The contents of the Environmental Report are established in POP 16.10. The Environmental Report must address:
 - Significant Woodlands;
 - Shorelines, Significant Valley Lands and Stream Corridors;
 - Highly Vulnerable Aquifers and Significant Groundwater Recharge Areas through the preparation of a hydrogeology and water budget/balance study, including a mitigation strategy to ensure no loss of water recharge quantity or quality, as part of, or independently from, the Environmental Report.
4. A salt management plan may be required depending upon a determination by the Office of the Risk Management Official at the Region of Durham. The contents of same will be determined in conjunction with the Risk Management Official (POP 10.13 (g)).
5. A study that assesses the potential aggregate reserves on the site, and the impact of the proposal on the ability of lands within the Area of High Potential Mineral Aggregate Resources to be utilized for extraction purposes, is required (POP 10.10).

If you wish to discuss the above comments or require clarification, please contact me at extension 2196.

M. Kish

Maurizio Rogato

From: Stephanie Dore <Stephanie.Worron@trca.ca>
Sent: August 25, 2022 2:18 PM
To: Maurizio Rogato
Subject: TRCA Preliminary Comments: 3225 5th Concession Road, Pickering

Good Afternoon Maurizio,

Thank you for your patience while we circulated the July 28th documents to our technical staff for review. I just left you a voicemail to touch base regarding this review, however I have also prepared them for you below:

We understand that you are seeking advice on whether the TRCA would be supportive of using the buffer area from the furthest inland hazard or feature on the subject site to be included within the overall land area that will be assessed for the attenuation calculations associated with the septic systems here. As long as the proposed septic systems, leaching beds, tanks, etc. and the reserve bed areas are located outside of the feature plus buffer, we have no issues with this area being utilized in these calculations. We would also recommend that the private systems conform to *Table 8.2.1.5* found in *Section 8* of the OBC which requires sewage systems to be located a minimum of 3 meters from any property line.

I also wanted to provide the following comments that I received from our technical staff in response to the documents that were provided for review. These should be helpful in informing any forthcoming Planning Act Application submissions with the municipality.

Hydrogeology Comments:

1. With respect to water balance, TRCA requires a 5 mm retention target. Please note that the water level information provided was collected December 2021 and may not reflect the seasonal highs. TRCA requires a 1 m separation from the base of the proposed LID and the seasonally high static water level. In addition, please note that we do not consider septic effluent as contributing to the recharge deficit.
2. With respect to servicing, please utilize anti-seepage collars and trench plugs where open cut excavation occurs below the groundwater table.

Water Resources Comments:

3. Please provide a fluvial geomorphology erosion threshold analysis for review as per Appendix B4 of the TRCA SWM Criteria (2012; link here: <https://sustainabletechnologies.ca/app/uploads/2013/01/SWM-Criteria-2012.pdf>) to determine if the site requires greater than 5mm on-site retention as per the TRCA. Please provide this retention within the stormwater management approach.
4. Please provide a stormwater management report for review and comment to ensure that the following TRCA SWM Criteria (2012; link here: <https://sustainabletechnologies.ca/app/uploads/2013/01/SWM-Criteria-2012.pdf>) is met as follows:
 - a. Water Quantity: please control post-development peak flows to pre-development levels for all storms up to and including the 100 year storm (i.e., 2, 5, 10, 25, 50, and 100 year storms) using the unit flow relationships that have been established for the entire watershed (see Appendix A) using the 24hour AES design storms. Match proposed Regional peak flows to existing conditions.
 - b. Water Quality: please provide 80% Total Suspended Solids (TSS) removal. Please note that TRCA credits 50% TSS removal for an OGS sized for 80% TSS removal for 90% of the annual rainfall. However, an OGS in combination with 5mm on-site retention via a treatment train approach is credited 80% TSS removal.
 - c. Minimum 5mm on-site retention: please provide a minimum 5mm on-site retention above the initial abstraction for all impervious surfaces. Please note that pre-treatment is required prior to infiltration.

5. Please provide a wetland risk evaluation as per the TRCA Wetland Water Balance Risk Evaluation (2017; link here: https://trca.ca/app/uploads/2017/12/WetlandWaterBalanceRiskEvaluation_Nov2017.pdf) for wetlands within and/or immediately downstream of the property limits to determine the requirements for the feature based water balance. If the wetland is medium or high risk, please use the Wetland Water Balance Modelling Guidance Document (August 2020; link here: https://sustainabletechnologies.ca/app/uploads/2021/10/TRCA-Wetland-Modelling-Guidance-Document-August_2020-Final_.pdf) and the Wetland Water Balance Monitoring Protocol (September 2016; link here: <https://sustainabletechnologies.ca/app/uploads/2017/02/TRCA-Wetland-Water-Balance-Monitoring-Protocol.pdf>) for guidance and procedures on how to provide mitigation measures and monitoring for a medium and/or high risk wetland.

I would also like to note that once we have completed a comprehensive review of all documents which will be submitted to the municipality in the future, we will then be able to provide our position on the proposed lot configuration. If you have any questions, please let me know.

Kind Regards,

Stephanie Dore, RPP, MCIP

Senior Planner

Development Planning and Permits | Development and Engineering Services

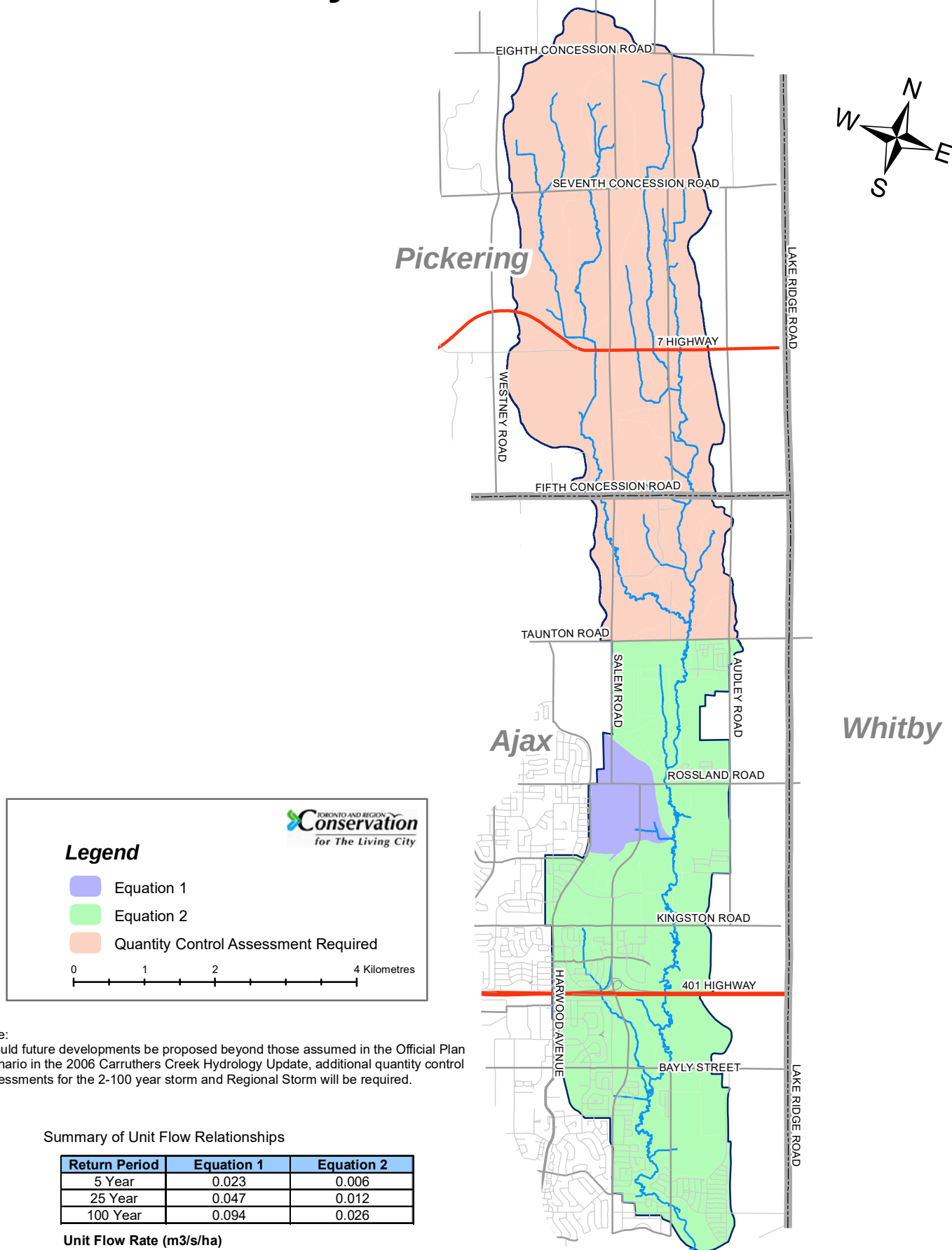
T: [\(437\) 880-2469](tel:4378802469)

E: stephanie.dore@trca.ca

A: [101 Exchange Avenue, Vaughan, ON, L4K 5R6](https://trca.ca) | trca.ca



Carruthers Creek Stormwater Management Quantity Control Release Rates



Appendix B

Stormwater Management Calculations



Project Name	Frisque Lands
Project No.	E21007
Subject	Drainage Areas & Time of Concentration (Pre-Development)

Airport Method:

$$\text{Time of Concentration (min)} = \frac{3.26 (1.1 - C)(L^{0.5})}{S^{0.33}}$$

Drainage Area ID	Area (ha)	Runoff Coefficient	Length (m)	Slope (%)	Time of Conc. (min)	Time of Conc. (hours)	Time to Peak (hours)
101	1.09	0.20	200	2.3%	32	0.53	0.35
201	0.45	0.20	130	1.9%	27	0.45	0.30
202	0.17	0.20	100	5.5%	17	0.28	0.19
301	1.38	0.20	150	1.0%	36	0.60	0.40
302	0.69	0.20	150	1.3%	33	0.54	0.36
303	0.41	0.20	40	5.0%	11	0.18	0.12
401	3.64	0.20	170	2.4%	29	0.48	0.32
501	1.33	0.20	260	1.7%	39	0.66	0.44
510 (EXT)	0.22	0.20	25	2.0%	12	0.19	0.13
601	8.75	0.20	350	3.6%	36	0.60	0.40

TOTAL SITE: 17.91 ha**TOTAL AREA*:** 18.13 ha

* Includes external area (510).



Project Name	Frisque Lands
Project No.	E21007
Subject	Drainage Areas and Visual Otthymo Hydrograph Selection (Post-Development)

Drainage Area ID	Pervious Area (ha)	Impervious Area (ha)	Total Area (ha)	TIMP (% Imperv.)	XIMP	Runoff Coefficient	VO Hydrograph
101	0.71	0.08	0.79	10%	8%	0.27	NasHyd
102	0.77	0.45	1.22	37%	30%	0.46	StandHyd
201	0.60	0.03	0.63	5%	4%	0.23	NasHyd
301	1.38	0.00	1.38	0%	0%	0.20	NasHyd
302	0.14	0.03	0.17	18%	14%	0.32	NasHyd
401	1.88	0.16	2.04	8%	6%	0.25	NasHyd
501	1.02	0.50	1.52	33%	26%	0.43	StandHyd
502	1.41	0.00	1.41	0%	0%	0.20	NasHyd
510(EXT)	0.22	0.00	0.22	0%	0%	0.20	NasHyd
601	8.75	0.00	8.75	0%	0%	0.20	NasHyd
Total (Site)	16.88	1.25	18.13	7%	6%	0.25	-

TOTAL SITE: 17.91 ha

$$\text{Runoff Coefficient} = (\text{TIMP} * 0.7) + 0.2$$

TOTAL AREA*: 18.13 ha

* Includes external area (510).



Project Name	Frisque Lands
Project No.	E21007
Subject	Time of Concentration (Post-Development)

Airport Method:

$$\text{Time of Concentration (min)} = \frac{3.26 (1.1 - C)(L^{0.5})}{S^{0.33}}$$

(NasHyd's)

Drainage Area ID	Area (ha)	Runoff Coefficient	Length (m)	Slope (%)	Time of Conc. (min)	Time of Conc. (hours)	Time to Peak (hours)
101	0.79	0.27	100	2.0%	22	0.36	0.24
201	0.63	0.24	70	2.0%	19	0.31	0.21
301	1.38	0.20	150	1.0%	36	0.60	0.40
302	0.17	0.31	40	2.0%	13	0.22	0.14
401	2.04	0.25	120	5.0%	18	0.30	0.20
502	1.41	0.20	290	1.7%	42	0.70	0.47
510(EXT)	0.22	0.20	25	2.0%	12	0.19	0.13
601	8.75	0.20	350	3.6%	36	0.60	0.40

(Time of Concentration for NasHyd Drainage Areas)



Project Name	Frisque Lands
Project No.	E21007
Subject	Swale Capacity (Area 502+510)

Total Overland Flow to Swale:

Drainage Area (A) =	1.63	ha	(Area 502 + 510)
Runoff Coeff =	0.20		
Runoff Coeff Factor =	1.25	(100-year)	
Factored Runoff Coeff (R) =	0.25		
Tc =	15.00	min	

City of Pickering IDF

A =	2096.425
B =	6.485
C =	0.863

$$I = \frac{A}{(t_c + B)^C}$$

100 Year Intensity (I) =	148.54	mm/hr
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Overland Flow* (Q₁₀₀) =	0.168	m³/s
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$$Q = 2.778AIR$$

* Using Rational Method with minimum time of concentration to be conservative.

Swale Capacity:

$$\text{Manning's Equation: } Q = \frac{1}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

Manning's n =	0.035		
Bottom Width (B) =	0	m	(Triangular Cross Section)
Side Slopes (Z) =	3	:1	
Max Depth (y) =	0.5	m	
Wetted Perimeter (P) =	3.16	m	
Flow Area (A) =	0.75	m ²	
Hydraulic Radius (R) =	0.24	m	
Slope (S) =	0.60%		

Max Capacity (Q) =	0.636	m³/s
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Therefore, there is sufficient capacity.

Average Velocity (V) =	0.848	m/s
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Project Name	Kedron-Minto - Block 67
Project No.	E15046
Subject	Pipe and Manhole Storage - Outlet 1 (West)

PIPE

	Width/Diameter (mm)	Height (mm)	Storage per Metre (m ³ /m)	Length of Pipe (m)	Storage (m ³)
Circular	150	-	0.0	174.5	0
	250	-	0.0		0
	300	-	0.1		0
	375	-	0.1		0
	450	-	0.2		0
	525	-	0.2		0
	600	-	0.3		0
	675	-	0.4		0
	750	-	0.4		0
	825	-	0.5		0
	900	-	0.6		0
	1050	-	0.9		0
	1200	-	1.1		197.4
	1350	-	1.4		0
	1500	-	1.8		0
	1800	900	1.6		0
	1800	1200	2.2		0
	2400	1200	2.9		0
	2400	1500	3.6		0
	2400	1800	4.3		0

Pipe Storage:	197.4 m3
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MANHOLE

Top Storage Elev:	133.45	m
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Manhole ID	Diameter (mm)	Pipe Invert (m)	Storage Height (m)	Volume (m ³)
MH8	2400	130.44	3.01	13.6
MH7	2400	130.58	2.87	13.0
MH6	2400	130.77	2.68	12.1
MH5	2400	130.95	2.5	11.3
MH4	2400	131.08	2.37	10.7
MH3	2400	131.24	2.21	10.0
MH2	2400	131.39	2.06	9.3
MH1	2400	131.79	1.66	7.5

Manhole Storage:	87.5 m3
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Total Storage:	284.9 m3
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Project Name	Kedron-Minto - Block 67
Project No.	E15046
Subject	Pipe and Manhole Storage - Outlet 5 (East)

PIPE

	Width/Diameter (mm)	Height (mm)	Storage per Metre (m ³ /m)	Length of Pipe (m)	Storage (m ³)
Circular	150	-	0.0		0
	250	-	0.0		0
	300	-	0.1		0
	375	-	0.1		0
	450	-	0.2	11.9	1.9
	525	-	0.2		0
	600	-	0.3	32.4	9.2
	675	-	0.4		0
	750	-	0.4		0
	825	-	0.5		0
	900	-	0.6		0
	1050	-	0.9		0
	1200	-	1.1		0
	1350	-	1.4		0
	1500	-	1.8		0
	1800	900	1.6		0
	1800	1200	2.2	125.7	271.5
	2400	1200	2.9		0
	2400	1500	3.6		0
	2400	1800	4.3		0

Pipe Storage:	282.6 m3
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MANHOLE

Top Storage Elev:	135.18	m
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Manhole ID	Diameter (mm)	Pipe Invert (m)	Storage Height (m)	Volume (m ³)
MH18	3000	133.01	2.17	15.3
MH17	3000	133.15	2.03	14.3
MH16	3000	133.58	1.6	11.3
MH15	1200	134.30	0.88	1.0

Manhole Storage:	41.9 m3
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Total Storage:	324.5 m3
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Project Name	Frisque Lands
Project No.	E21007
Subject	Outlet 1 Storage (West) - Discharge Storage Curve For Visual Otthymo

WEST

Orifice			Weir	
$Q=C*A*(2*g*H)^{0.5}$			$Q=2/3*C_d*(2*g)^{0.5}*L*H^{3/2}$	
Orifice #	Orifice 1	Orifice 2	Weir #	Weir 1
Contraction Coeff., C	0.62	0.62	Weir Length (m)	
Orifice Diameter (mm)	64		Discharge Coeff., C_d	0.62
Area of Orifice (m^2), A	0.003	0.000	Weir Coeff., $2/3*C_d*(2*g)^{0.5}$	1.831
Horizontal Orifice (y/n)	n	n	Weir Invert (m)	
Orifice Invert (m)	130.44			

Storage		
Depth Increment	0.05	m
Underground Storage Invert	130.44	m
Underground Storage Obvert	133.45	m
Underground Storage	285	m^3
Surface Storage Invert	133.45	m
Surface Storage Obvert		m
Max Surface Storage Area		m^2

**VISUAL OTTHYMO
ROUTE RESEVOIR >>**

 (Interpolated values
from full table)

Discharge (m^3/s)	Storage (ha. m)
0.0000	0.0000
0.0032	0.0015
0.0047	0.0030
0.0059	0.0045
0.0069	0.0060
0.0077	0.0075
0.0085	0.0090
0.0091	0.0105
0.0099	0.0120
0.0104	0.0135
0.0110	0.0150
0.0115	0.0165
0.0121	0.0180
0.0126	0.0195
0.0130	0.0210
0.0135	0.0225
0.0140	0.0240
0.0144	0.0255
0.0148	0.0270
0.0152	0.0285

Elevation (m)	Depth (m)	U.G. Storage (m^3)	Surface Ponding (m^3)	Total Storage (m^3)	Total Storage (ha. m)	Orifice 1 Head (m)	Orifice 1 Discharge (m^3/s)	Orifice 2 Head (m)	Orifice 2 Discharge (m^3/s)	Weir 1 Head (m)	Weir 1 Q (m^3/s)	Total Discharge (m^3/s)
130.44	0.00	0	0	0	0.0000	0	0.000	0.00	0.000	0.00	0.000	0.000
130.49	0.05	5	0	5	0.0005	0.02	0.001	0.00	0.000	0.00	0.000	0.001
130.54	0.10	10	0	10	0.0010	0.07	0.002	0.00	0.000	0.00	0.000	0.002
130.59	0.15	14	0	14	0.0014	0.12	0.003	0.00	0.000	0.00	0.000	0.003
130.64	0.20	19	0	19	0.0019	0.17	0.004	0.00	0.000	0.00	0.000	0.004
130.69	0.25	24	0	24	0.0024	0.22	0.004	0.00	0.000	0.00	0.000	0.004
130.74	0.30	29	0	29	0.0029	0.27	0.005	0.00	0.000	0.00	0.000	0.005
130.79	0.35	33	0	33	0.0033	0.32	0.005	0.00	0.000	0.00	0.000	0.005
130.84	0.40	38	0	38	0.0038	0.37	0.005	0.00	0.000	0.00	0.000	0.005
130.89	0.45	43	0	43	0.0043	0.42	0.006	0.00	0.000	0.00	0.000	0.006
130.94	0.50	48	0	48	0.0048	0.47	0.006	0.00	0.000	0.00	0.000	0.006
130.99	0.55	52	0	52	0.0052	0.52	0.006	0.00	0.000	0.00	0.000	0.006
131.04	0.60	57	0	57	0.0057	0.57	0.007	0.00	0.000	0.00	0.000	0.007
131.09	0.65	62	0	62	0.0062	0.62	0.007	0.00	0.000	0.00	0.000	0.007
131.14	0.70	67	0	67	0.0067	0.67	0.007	0.00	0.000	0.00	0.000	0.007
131.19	0.75	71	0	71	0.0071	0.72	0.008	0.00	0.000	0.00	0.000	0.008

Project Name	Frisque Lands												
Project No.	E21007												
Subject	Outlet 1 Storage (West) - Discharge Storage Curve For Visual Otthymo												
	131.24	0.80	76	0	76	0.0076	0.77	0.008	0.00	0.000	0.00	0.000	0.008
	131.29	0.85	81	0	81	0.0081	0.82	0.008	0.00	0.000	0.00	0.000	0.008
	131.34	0.90	86	0	86	0.0086	0.87	0.008	0.00	0.000	0.00	0.000	0.008
	131.39	0.95	90	0	90	0.0090	0.92	0.009	0.00	0.000	0.00	0.000	0.009
	131.44	1.00	95	0	95	0.0095	0.97	0.009	0.00	0.000	0.00	0.000	0.009
	131.49	1.05	100	0	100	0.0100	1.02	0.009	0.00	0.000	0.00	0.000	0.009
	131.54	1.10	105	0	105	0.0105	1.07	0.009	0.00	0.000	0.00	0.000	0.009
	131.59	1.15	109	0	109	0.0109	1.12	0.009	0.00	0.000	0.00	0.000	0.009
	131.64	1.20	114	0	114	0.0114	1.17	0.010	0.00	0.000	0.00	0.000	0.010
	131.69	1.25	119	0	119	0.0119	1.22	0.010	0.00	0.000	0.00	0.000	0.010
	131.74	1.30	124	0	124	0.0124	1.27	0.010	0.00	0.000	0.00	0.000	0.010
	131.79	1.35	128	0	128	0.0128	1.32	0.010	0.00	0.000	0.00	0.000	0.010
	131.84	1.40	133	0	133	0.0133	1.37	0.010	0.00	0.000	0.00	0.000	0.010
	131.89	1.45	138	0	138	0.0138	1.42	0.011	0.00	0.000	0.00	0.000	0.011
	131.94	1.50	143	0	143	0.0143	1.47	0.011	0.00	0.000	0.00	0.000	0.011
	131.99	1.55	147	0	147	0.0147	1.52	0.011	0.00	0.000	0.00	0.000	0.011
	132.04	1.60	152	0	152	0.0152	1.57	0.011	0.00	0.000	0.00	0.000	0.011
	132.09	1.65	157	0	157	0.0157	1.62	0.011	0.00	0.000	0.00	0.000	0.011
	132.14	1.70	162	0	162	0.0162	1.67	0.011	0.00	0.000	0.00	0.000	0.011
	132.19	1.75	166	0	166	0.0166	1.72	0.012	0.00	0.000	0.00	0.000	0.012
	132.24	1.80	171	0	171	0.0171	1.77	0.012	0.00	0.000	0.00	0.000	0.012
	132.29	1.85	176	0	176	0.0176	1.82	0.012	0.00	0.000	0.00	0.000	0.012
	132.34	1.90	181	0	181	0.0181	1.87	0.012	0.00	0.000	0.00	0.000	0.012
	132.39	1.95	185	0	185	0.0185	1.92	0.012	0.00	0.000	0.00	0.000	0.012
	132.44	2.00	190	0	190	0.0190	1.97	0.012	0.00	0.000	0.00	0.000	0.012
	132.49	2.05	195	0	195	0.0195	2.02	0.013	0.00	0.000	0.00	0.000	0.013
	132.54	2.10	200	0	200	0.0200	2.07	0.013	0.00	0.000	0.00	0.000	0.013
	132.59	2.15	204	0	204	0.0204	2.12	0.013	0.00	0.000	0.00	0.000	0.013
	132.64	2.20	209	0	209	0.0209	2.17	0.013	0.00	0.000	0.00	0.000	0.013
	132.69	2.25	214	0	214	0.0214	2.22	0.013	0.00	0.000	0.00	0.000	0.013
	132.74	2.30	219	0	219	0.0219	2.27	0.013	0.00	0.000	0.00	0.000	0.013
	132.79	2.35	223	0	223	0.0223	2.32	0.014	0.00	0.000	0.00	0.000	0.014
	132.84	2.40	228	0	228	0.0228	2.37	0.014	0.00	0.000	0.00	0.000	0.014
	132.89	2.45	233	0	233	0.0233	2.42	0.014	0.00	0.000	0.00	0.000	0.014
	132.94	2.50	238	0	238	0.0238	2.47	0.014	0.00	0.000	0.00	0.000	0.014
	132.99	2.55	242	0	242	0.0242	2.52	0.014	0.00	0.000	0.00	0.000	0.014
	133.04	2.60	247	0	247	0.0247	2.57	0.014	0.00	0.000	0.00	0.000	0.014
	133.09	2.65	252	0	252	0.0252	2.62	0.014	0.00	0.000	0.00	0.000	0.014
	133.14	2.70	257	0	257	0.0257	2.67	0.014	0.00	0.000	0.00	0.000	0.014
	133.19	2.75	261	0	261	0.0261	2.72	0.015	0.00	0.000	0.00	0.000	0.015
	133.24	2.80	266	0	266	0.0266	2.77	0.015	0.00	0.000	0.00	0.000	0.015
	133.29	2.85	271	0	271	0.0271	2.82	0.015	0.00	0.000	0.00	0.000	0.015
	133.34	2.90	276	0	276	0.0276	2.87	0.015	0.00	0.000	0.00	0.000	0.015
	133.39	2.95	280	0	280	0.0280	2.92	0.015	0.00	0.000	0.00	0.000	0.015
	133.44	3.00	285	0	285	0.0285	2.97	0.015	0.00	0.000	0.00	0.000	0.015

Project Name	Frisque Lands
Project No.	E21007
Subject	Outlet 5 Storage (East) - Discharge Storage Curve For Visual Otthymo

EAST

Orifice			Weir	
$Q=C*A*(2*g*H)^{0.5}$			$Q=2/3*C_d*(2*g)^{0.5}*L*H^{3/2}$	
Orifice #	Orifice 1	Orifice 2	Weir #	Weir 1
Contraction Coeff., C	0.62	0.62	Weir Length (m)	
Orifice Diameter (mm)	134		Discharge Coeff., C_d	0.62
Area of Orifice (m^2), A	0.014	0.000	Weir Coeff., $2/3*C_d*(2*g)^{0.5}$	1.831
Horizontal Orifice (y/n)	n	n	Weir Invert (m)	
Orifice Invert (m)	133.01			

Storage		
Depth Increment	0.05	m
Underground Storage Invert	133.01	m
Underground Storage Obvert	135.18	m
Underground Storage	325	m^3
Surface Storage Invert	135.18	m
Surface Storage Obvert		m
Max Surface Storage Area		m^2

VISUAL OTTHYMO ROUTE RESEVOIR >>	Discharge (m^3/s)	Storage (ha. m)
(Interpolated values from full table)	0.0000	0.0000
	0.0078	0.0017
	0.0153	0.0034
	0.0201	0.0051
	0.0240	0.0068
	0.0272	0.0086
	0.0302	0.0103
	0.0329	0.0120
	0.0354	0.0137
	0.0377	0.0154
	0.0399	0.0171
	0.0420	0.0188
	0.0439	0.0205
	0.0458	0.0222
	0.0476	0.0239
	0.0494	0.0257
	0.0511	0.0274
	0.0527	0.0291
	0.0543	0.0308
	0.0559	0.0325

Elevation (m)	Depth (m)	U.G. Storage (m^3)	Surface Ponding (m^3)	Total Storage (m^3)	Total Storage (ha. m)	Orifice 1 Head (m)	Orifice 1 Discharge (m^3/s)	Orifice 2 Head (m)	Orifice 2 Discharge (m^3/s)	Weir 1 Head (m)	Weir 1 Q (m^3/s)	Total Discharge (m^3/s)
133.01	0.00	0	0	0	0.0000	0	0.000	0.00	0.000	0.00	0.000	0.000
133.06	0.05	8	0	8	0.0008	0	0.000	0.00	0.000	0.00	0.000	0.000
133.11	0.10	15	0	15	0.0015	0.03	0.007	0.00	0.000	0.00	0.000	0.007
133.16	0.15	23	0	23	0.0023	0.08	0.011	0.00	0.000	0.00	0.000	0.011
133.21	0.20	30	0	30	0.0030	0.13	0.014	0.00	0.000	0.00	0.000	0.014
133.26	0.25	38	0	38	0.0038	0.18	0.016	0.00	0.000	0.00	0.000	0.016
133.31	0.30	45	0	45	0.0045	0.23	0.019	0.00	0.000	0.00	0.000	0.019
133.36	0.35	53	0	53	0.0053	0.28	0.021	0.00	0.000	0.00	0.000	0.021
133.41	0.40	60	0	60	0.0060	0.33	0.022	0.00	0.000	0.00	0.000	0.022
133.46	0.45	68	0	68	0.0068	0.38	0.024	0.00	0.000	0.00	0.000	0.024
133.51	0.50	76	0	76	0.0076	0.43	0.025	0.00	0.000	0.00	0.000	0.025
133.56	0.55	83	0	83	0.0083	0.48	0.027	0.00	0.000	0.00	0.000	0.027
133.61	0.60	91	0	91	0.0091	0.53	0.028	0.00	0.000	0.00	0.000	0.028
133.66	0.65	98	0	98	0.0098	0.58	0.030	0.00	0.000	0.00	0.000	0.030
133.71	0.70	106	0	106	0.0106	0.63	0.031	0.00	0.000	0.00	0.000	0.031
133.76	0.75	113	0	113	0.0113	0.68	0.032	0.00	0.000	0.00	0.000	0.032

Project Name	Frisque Lands												
Project No.	E21007												
Subject	Outlet 5 Storage (East) - Discharge Storage Curve For Visual Otthymo												
	133.81	0.80	121	0	121	0.0121	0.73	0.033	0.00	0.000	0.00	0.000	0.033
	133.86	0.85	128	0	128	0.0128	0.78	0.034	0.00	0.000	0.00	0.000	0.034
	133.91	0.90	136	0	136	0.0136	0.83	0.035	0.00	0.000	0.00	0.000	0.035
	133.96	0.95	144	0	144	0.0144	0.88	0.036	0.00	0.000	0.00	0.000	0.036
	134.01	1.00	151	0	151	0.0151	0.93	0.037	0.00	0.000	0.00	0.000	0.037
	134.06	1.05	159	0	159	0.0159	0.98	0.038	0.00	0.000	0.00	0.000	0.038
	134.11	1.10	166	0	166	0.0166	1.03	0.039	0.00	0.000	0.00	0.000	0.039
	134.16	1.15	174	0	174	0.0174	1.08	0.040	0.00	0.000	0.00	0.000	0.040
	134.21	1.20	181	0	181	0.0181	1.13	0.041	0.00	0.000	0.00	0.000	0.041
	134.26	1.25	189	0	189	0.0189	1.18	0.042	0.00	0.000	0.00	0.000	0.042
	134.31	1.30	197	0	197	0.0197	1.23	0.043	0.00	0.000	0.00	0.000	0.043
	134.36	1.35	204	0	204	0.0204	1.28	0.044	0.00	0.000	0.00	0.000	0.044
	134.41	1.40	212	0	212	0.0212	1.33	0.045	0.00	0.000	0.00	0.000	0.045
	134.46	1.45	219	0	219	0.0219	1.38	0.046	0.00	0.000	0.00	0.000	0.046
	134.51	1.50	227	0	227	0.0227	1.43	0.046	0.00	0.000	0.00	0.000	0.046
	134.56	1.55	234	0	234	0.0234	1.48	0.047	0.00	0.000	0.00	0.000	0.047
	134.61	1.60	242	0	242	0.0242	1.53	0.048	0.00	0.000	0.00	0.000	0.048
	134.66	1.65	249	0	249	0.0249	1.58	0.049	0.00	0.000	0.00	0.000	0.049
	134.71	1.70	257	0	257	0.0257	1.63	0.049	0.00	0.000	0.00	0.000	0.049
	134.76	1.75	265	0	265	0.0265	1.68	0.050	0.00	0.000	0.00	0.000	0.050
	134.81	1.80	272	0	272	0.0272	1.73	0.051	0.00	0.000	0.00	0.000	0.051
	134.86	1.85	280	0	280	0.0280	1.78	0.052	0.00	0.000	0.00	0.000	0.052
	134.91	1.90	287	0	287	0.0287	1.83	0.052	0.00	0.000	0.00	0.000	0.052
	134.96	1.95	295	0	295	0.0295	1.88	0.053	0.00	0.000	0.00	0.000	0.053
	135.01	2.00	302	0	302	0.0302	1.93	0.054	0.00	0.000	0.00	0.000	0.054
	135.06	2.05	310	0	310	0.0310	1.98	0.055	0.00	0.000	0.00	0.000	0.055
	135.11	2.10	317	0	317	0.0317	2.03	0.055	0.00	0.000	0.00	0.000	0.055
	135.16	2.15	325	0	325	0.0325	2.08	0.056	0.00	0.000	0.00	0.000	0.056



 CONSULTING ENGINEERS & PLANNERS 1600 STELLAR DRIVE, SUITE 402 WHITBY, ONTARIO L1N 9B2 PHONE: (289) 315-3680	COMPUTED BY : CHECKED BY : DATE: STATUS:
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H.L.
M.F.
June. 20, 2025
2nd FSSR Submission

STORM SEWER DESIGN SHEET

PROJECT NAME: Frisque Lands

Q = 2.778 AIR
Q=5 YEAR RETURN STORM
A= AREA IN HECTARES(ha)
R=RUNOFF COEFFICIENT
I=RAINFALL INTENSITY (mm/hr)

Coefficient of Friction in pipe, $n = 0.013$
 Time of Concentration (T_c) min = 10
 5 Year Intensity = $1082.901 / (t + 6.007)^{0.837}$
 25 Year Intensity = $1581.718 / ((T_c + 6.007)^{0.848})$
 100 Year Intensity = $2096.425 / (t + 6.485)^{0.863}$

PROJECT No. : E21007
5 YEAR DESIGN STORM

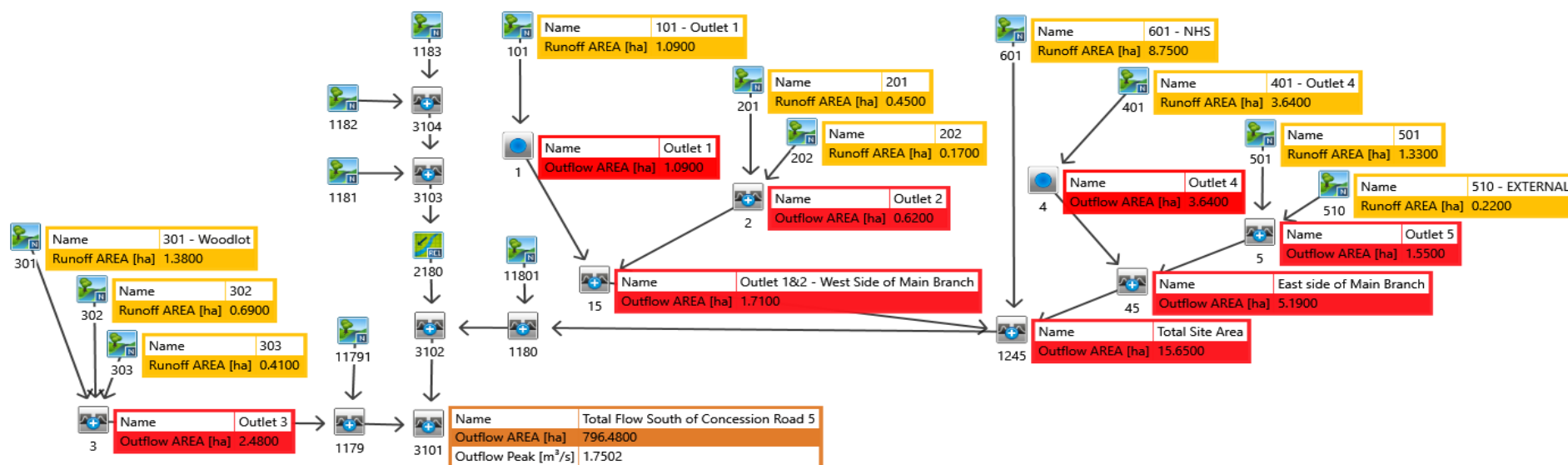
[illegible]

Appendix C

Event-Based Hydrologic Modelling (Pre-Development)

Project Name	Frisque Lands
Project No.	E21007
Subject	Visual Otthymo Model Schematic

PRE-DEVELOPMENT



```
V V I SSSSS U U A L (v 6.2.2019)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL
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000 TTTT TTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T T H H Y M M 000
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\vo2\voin.dat
Output filename: C:\Users\mbertram\AppData\Local\Civica\XH5\3bf9ac1f-e66b-45e5-875b-87a83afa1a0b\c3445eab-5
Summary filename: C:\Users\mbertram\AppData\Local\Civica\XH5\3bf9ac1f-e66b-45e5-875b-87a83afa1a0b\c3445eab-5

DATE: 03-14-2025 TIME: 11:33:59

USER:

COMMENTS: _____

** SIMULATION : 06-100yr24_AES **

READ STORM	Filename: C:\Users\mbertram\AppData\Local\Temp\68d54fc6-554d-4ef9-817f-2aae75b4e887\0130180c
Ptotal= 95.92 mm	Comments: 100y24_AES

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	6.25	8.15	12.50	3.36	18.75	0.48
0.25	0.48	6.50	8.15	12.75	3.36	19.00	0.48
0.50	0.48	6.75	8.15	13.00	3.36	19.25	0.48
0.75	0.48	7.00	8.15	13.25	3.36	19.50	0.48
1.00	0.48	7.25	8.15	13.50	3.36	19.75	0.48
1.25	0.48	7.50	8.15	13.75	3.36	20.00	0.48
1.50	0.48	7.75	8.15	14.00	3.36	20.25	0.48
1.75	0.48	8.00	8.15	14.25	1.92	20.50	0.48
2.00	0.48	8.25	22.06	14.50	1.92	20.75	0.48
2.25	0.48	8.50	22.06	14.75	1.92	21.00	0.48
2.50	0.48	8.75	22.06	15.00	1.92	21.25	0.48
2.75	0.48	9.00	22.06	15.25	1.92	21.50	0.48
3.00	0.48	9.25	22.06	15.50	1.92	21.75	0.48
3.25	0.48	9.50	22.06	15.75	1.92	22.00	0.48
3.50	0.48	9.75	22.06	16.00	1.92	22.25	0.48
3.75	0.48	10.00	22.06	16.25	0.96	22.50	0.48
4.00	0.48	10.25	6.23	16.50	0.96	22.75	0.48
4.25	2.88	10.50	6.23	16.75	0.96	23.00	0.48
4.50	2.88	10.75	6.23	17.00	0.96	23.25	0.48
4.75	2.88	11.00	6.23	17.25	0.96	23.50	0.48
5.00	2.88	11.25	6.23	17.50	0.96	23.75	0.48
5.25	2.88	11.50	6.23	17.75	0.96	24.00	0.48
5.50	2.88	11.75	6.23	18.00	0.96		
5.75	2.88	12.00	6.23	18.25	0.48		
6.00	2.88	12.25	3.36	18.50	0.48		

CALIB	Area (ha)= 118.70	Curve Number (CN)= 74.6
NASHYD (1181)	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
ID= 1 DT= 5.0 min	U.H. Tp(hrs)= 4.55	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.996

PEAK FLOW (cms)= 1.388 (i)
TIME TO PEAK (hrs)= 15.167
RUNOFF VOLUME (mm)= 47.055
TOTAL RAINFALL (mm)= 95.920

RUNOFF COEFFICIENT = 0.491

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

CALIB			
NASHYD (1183)	Area (ha)= 176.21	Curve Number (CN)= 76.1	
ID= 1 DT= 5.0 min	Ia (mm)= 3.90	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 5.98		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48

5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.125

PEAK FLOW (cms)= 1.773 (i)
 TIME TO PEAK (hrs)= 16.833
 RUNOFF VOLUME (mm)= 49.290
 TOTAL RAINFALL (mm)= 95.920
 RUNOFF COEFFICIENT = 0.514

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

CALIB			
NASHYD (1182)	Area (ha)= 281.36	Curve Number (CN)= 76.1	
ID= 1 DT= 5.0 min	Ia (mm)= 4.30	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 9.88		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48

4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.088

PEAK FLOW (cms)= 1.883 (i)
TIME TO PEAK (hrs)= 21.083
RUNOFF VOLUME (mm)= 48.974
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.511

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

ADD HYD (3104)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1	2 = 3				
ID1= 1 (1182):		281.36	1.883	21.08	48.97
+ ID2= 2 (1183):		176.21	1.773	16.83	49.29
ID = 3 (3104):		457.57	3.461	18.58	49.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3103)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1	2 = 3				
ID1= 1 (1181):		118.70	1.388	15.17	47.05
+ ID2= 2 (3104):		457.57	3.461	18.58	49.10
ID = 3 (3103):		576.27	4.642	17.33	48.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN(2180)
IN= 2---> OUT= 1 Routing time step (min)'= 5.00

<----- DATA FOR SECTION (1.1) ----->			
Distance	Elevation	Manning	
0.00	138.00	0.0500	
55.00	131.00	0.0500	
95.00	130.00	0.0500	
150.00	129.00	0.0300	Main Channel
160.00	130.00	0.0300 /0.0500	Main Channel
175.00	133.00	0.0500	
350.00	140.00	0.0500	

<----- TRAVEL TIME TABLE ----->					
DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.47	129.47	.138E+05	6.2	0.84	37.35
0.95	129.95	.551E+05	39.1	1.34	23.53
1.42	130.42	.121E+06	119.1	1.87	16.89
1.89	130.89	.205E+06	248.2	2.28	13.79
2.37	131.37	.305E+06	448.4	2.78	11.34
2.84	131.84	.410E+06	706.0	3.25	9.69
3.32	132.32	.521E+06	1013.8	3.67	8.57
3.79	132.79	.638E+06	1370.8	4.06	7.75
4.26	133.26	.761E+06	1767.1	4.39	7.18
4.74	133.74	.897E+06	2217.5	4.67	6.74
5.21	134.21	.105E+07	2730.9	4.93	6.39
5.68	134.68	.121E+07	3309.3	5.16	6.10

6.16	135.16	.139E+07	3955.8	5.38	5.85
6.63	135.63	.158E+07	4674.0	5.59	5.64
7.11	136.11	.179E+07	5467.2	5.78	5.45
7.58	136.58	.201E+07	6338.9	5.97	5.28
8.05	137.05	.224E+07	7292.2	6.15	5.12
8.53	137.53	.249E+07	8330.6	6.33	4.98
9.00	138.00	.275E+07	9457.1	6.50	4.85

		AREA	QPEAK	TPEAK	R.V.	MAX DEPTH	MAX VEL
		(ha)	(cms)	(hrs)	(mm)	(m)	(m/s)
INFLOW :	ID= 2 (3103)	576.27	4.64	17.33	48.68	0.36	0.84
OUTFLOW:	ID= 1 (2180)	576.27	4.61	18.00	48.68	0.36	0.84

CALIB			
NASHYD (11801)	Area (ha)= 109.93	Curve Number (CN)= 61.4	
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 3.80		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48

4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.105

PEAK FLOW (cms)= 1.015 (i)
TIME TO PEAK (hrs)= 14.417
RUNOFF VOLUME (mm)= 33.343
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0101)	Area (ha)=	1.09	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.35	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48

3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.119

PEAK FLOW (cms)= 0.029 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.336
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

| Junction Command(0001) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2(0101)	1.09	0.03	10.25	33.34
OUTFLOW: ID= 2(0001)	1.09	0.03	10.25	33.34

CALIB			
NASHYD (0201)	Area (ha)= 0.45	Curve Number (CN)= 61.4	
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.30		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48

1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.057

PEAK FLOW (cms)= 0.012 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.329
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

CALIB			
NASHYD (0202)	Area (ha)=	0.17	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.19	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48

0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.034

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.264
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0201):	0.45	0.012	10.25	33.33	
+ ID2= 2 (0202):	0.17	0.005	10.25	33.26	
=====					
ID = 3 (0002):	0.62	0.017	10.25	33.31	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0015)					
1 + 2 = 3					
	AREA	QPEAK	TPEAK	R.V.	
	(ha)	(cms)	(hrs)	(mm)	
ID1= 1 (0001):	1.09	0.029	10.25	33.34	
+ ID2= 2 (0002):	0.62	0.017	10.25	33.31	
=====					
ID = 3 (0015):	1.71	0.046	10.25	33.33	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0601)	Area (ha)=	8.75	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.40	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48

4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.836

PEAK FLOW (cms)= 0.229 (i)
TIME TO PEAK (hrs)= 10.333
RUNOFF VOLUME (mm)= 33.339
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0401)	Area (ha)=	3.64	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.32	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48

3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.434

PEAK FLOW (cms)= 0.098 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.333
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

| Junction Command(0004) |

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2(0401)	3.64	0.10	10.25	33.33
OUTFLOW: ID= 2(0004)	3.64	0.10	10.25	33.33

CALIB			
NASHYD (0501)	Area (ha)= 1.33	Curve Number (CN)= 61.4	
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.44		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48

1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.115

PEAK FLOW (cms)= 0.034 (i)
TIME TO PEAK (hrs)= 10.333
RUNOFF VOLUME (mm)= 33.340
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0510)	Area (ha)=	0.22	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.13	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48

0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.006 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.012
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.344

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

ADD HYD (0005)				
1 + 2 = 3				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0501):	1.33	0.034	10.33	33.34
+ ID2= 2 (0510):	0.22	0.006	10.25	33.01
=====				
ID = 3 (0005):	1.55	0.040	10.25	33.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0045)				
1 + 2 = 3				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0004):	3.64	0.098	10.25	33.33
+ ID2= 2 (0005):	1.55	0.040	10.25	33.29
=====				
ID = 3 (0045):	5.19	0.138	10.25	33.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (1245)				
1 + 2 = 3				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0015):	1.71	0.046	10.25	33.33
+ ID2= 2 (0045):	5.19	0.138	10.25	33.32
=====				
ID = 3 (1245):	6.90	0.185	10.25	33.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (1245)				
3 + 2 = 1				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (1245):	6.90	0.185	10.25	33.32
+ ID2= 2 (0601):	8.75	0.229	10.33	33.34
=====				
ID = 1 (1245):	15.65	0.412	10.25	33.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (1180)				
1 + 2 = 3				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (11801):	109.93	1.015	14.42	33.34
+ ID2= 2 (1245):	15.65	0.412	10.25	33.33
=====				
ID = 3 (1180):	125.58	1.095	14.25	33.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3102)				
1 + 2 = 3				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (1180):	125.58	1.095	14.25	33.34
+ ID2= 2 (2180):	576.27	4.614	18.00	48.68
=====				
ID = 3 (3102):	701.85	5.424	17.17	45.93

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB				
NASHYD (0302)				
ID= 1 DT= 5.0 min	Area (ha)=	0.69	Curve Number (CN)=	61.4
	Ia (mm)=	4.40	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.36		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48

0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.073

PEAK FLOW (cms)= 0.018 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.336
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB
NASHYD (0301)
ID= 1 DT= 5.0 min

Area (ha)= 1.38 Curve Number (CN)= 61.4
Ia (mm)= 4.40 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.40

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48

6.083 2.88 |12.167 6.23 |18.250 0.96 |

Unit Hyd Qpeak (cms)= 0.132

PEAK FLOW (cms)= 0.036 (i)
 TIME TO PEAK (hrs)= 10.333
 RUNOFF VOLUME (mm)= 33.339
 TOTAL RAINFALL (mm)= 95.920
 RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0303)	Area (ha)= 0.41	Curve Number (CN)= 61.4	
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.12		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48

5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.130

PEAK FLOW (cms)= 0.012 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 32.898
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.343

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

ADD HYD (0003)					
1 + 2 = 3					
		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0301):		1.38	0.036	10.33	33.34
+ ID2= 2 (0302):		0.69	0.018	10.25	33.34
ID = 3 (0003):		2.07	0.054	10.33	33.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)					
3 + 2 = 1					
		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0003):		2.07	0.054	10.33	33.34
+ ID2= 2 (0303):		0.41	0.012	10.25	32.90
ID = 1 (0003):		2.48	0.066	10.25	33.26

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (11791)			
ID= 1 DT= 5.0 min	Area (ha)= 92.15	Curve Number (CN)= 54.6	
	Ia (mm)= 4.60	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 4.68		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48

1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.752

PEAK FLOW (cms)= 0.608 (i)
TIME TO PEAK (hrs)= 15.583
RUNOFF VOLUME (mm)= 27.566
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.287

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

ADD HYD (1179)				
1 + 2 = 3				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (11791):	92.15	0.608	15.58	27.57
+ ID2= 2 (0003):	2.48	0.066	10.25	33.26
=====				
ID = 3 (1179):	94.63	0.616	15.58	27.72

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3101)				
1 + 2 = 3				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (1179):	94.63	0.616	15.58	27.72
+ ID2= 2 (3102):	701.85	5.424	17.17	45.93
=====				
ID = 3 (3101):	796.48	6.009	16.92	43.77

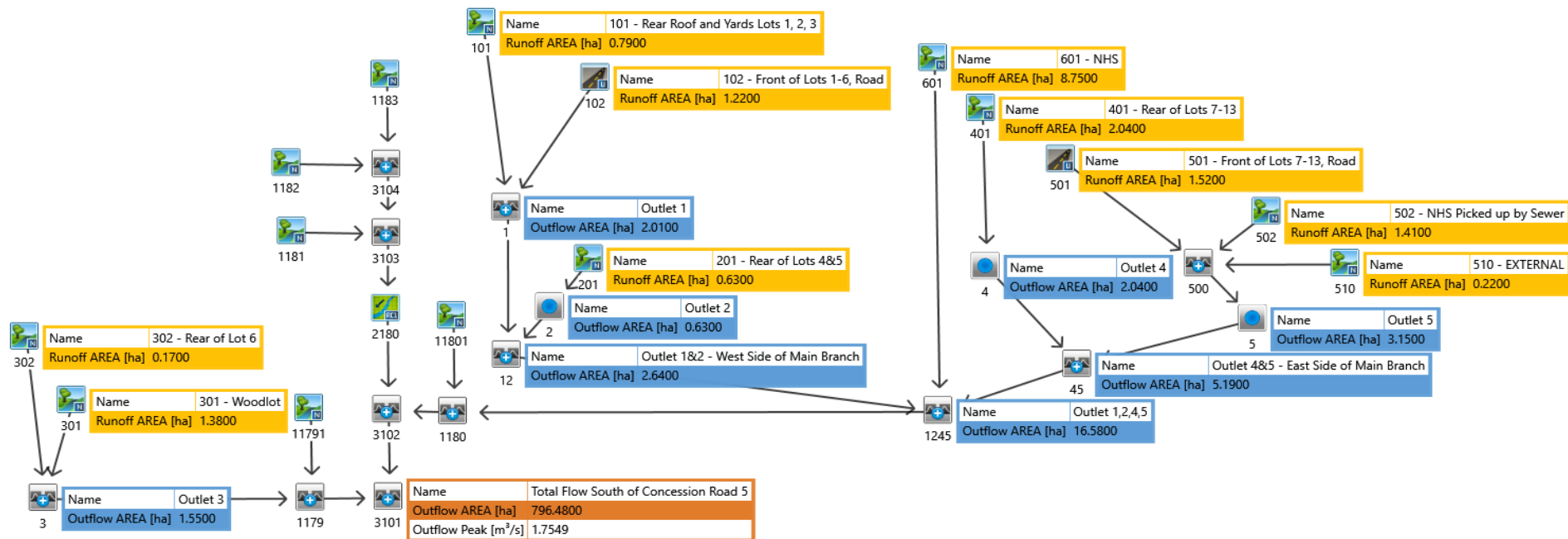
NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Appendix D

Event-Based Hydrologic Modelling (Post-Development Uncontrolled)

Project Name	Frisque Lands
Project No.	E21007
Subject	Visual Otthymo Model Schematic

POST-DEVELOPMENT (UNCONTROLLED)



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V   V   I   SSSSS U   U   A   L   (v 6.2.2019)
V   V   I   SS   U   U   A A   L
V   V   I   SS   U   U   AAAAA L
V   V   I   SS   U   U   A   A L
VV      I   SSSSS UUUUU A   A LLLLL

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    000   TTTTT TTTTT H   H   Y   Y   M   M   000   TM
O   O   T   T   H   H   Y   Y   MM MM O   O
O   O   T   T   H   H   Y   M   M   O   O
    000   T   T   H   H   Y   M   M   000

```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\vo2\voin.dat
 Output filename: C:\Users\mbertram\AppData\Local\Civica\XH5\3bf9ac1f-e66b-45e5-875b-87a83afa1a0b\af6f2034a-5
 Summary filename: C:\Users\mbertram\AppData\Local\Civica\XH5\3bf9ac1f-e66b-45e5-875b-87a83afa1a0b\af6f2034a-5

DATE: 03-14-2025 TIME: 11:37:26

USER:

COMMENTS: _____

 ** SIMULATION : 06-100yr24_AES **

READ STORM	Filename: C:\Users\mbertram\AppData\Local\Temp\0bc79286-197d-41d4-b6d3-cd7d81af6060\0130180c
Ptotal= 95.92 mm	Comments: 100y24_AES

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	6.25	8.15	12.50	3.36	18.75	0.48
0.25	0.48	6.50	8.15	12.75	3.36	19.00	0.48
0.50	0.48	6.75	8.15	13.00	3.36	19.25	0.48
0.75	0.48	7.00	8.15	13.25	3.36	19.50	0.48
1.00	0.48	7.25	8.15	13.50	3.36	19.75	0.48
1.25	0.48	7.50	8.15	13.75	3.36	20.00	0.48
1.50	0.48	7.75	8.15	14.00	3.36	20.25	0.48
1.75	0.48	8.00	8.15	14.25	1.92	20.50	0.48
2.00	0.48	8.25	22.06	14.50	1.92	20.75	0.48
2.25	0.48	8.50	22.06	14.75	1.92	21.00	0.48
2.50	0.48	8.75	22.06	15.00	1.92	21.25	0.48
2.75	0.48	9.00	22.06	15.25	1.92	21.50	0.48
3.00	0.48	9.25	22.06	15.50	1.92	21.75	0.48
3.25	0.48	9.50	22.06	15.75	1.92	22.00	0.48
3.50	0.48	9.75	22.06	16.00	1.92	22.25	0.48
3.75	0.48	10.00	22.06	16.25	0.96	22.50	0.48
4.00	0.48	10.25	6.23	16.50	0.96	22.75	0.48
4.25	2.88	10.50	6.23	16.75	0.96	23.00	0.48
4.50	2.88	10.75	6.23	17.00	0.96	23.25	0.48
4.75	2.88	11.00	6.23	17.25	0.96	23.50	0.48
5.00	2.88	11.25	6.23	17.50	0.96	23.75	0.48
5.25	2.88	11.50	6.23	17.75	0.96	24.00	0.48
5.50	2.88	11.75	6.23	18.00	0.96		
5.75	2.88	12.00	6.23	18.25	0.48		
6.00	2.88	12.25	3.36	18.50	0.48		

CALIB	Area (ha)= 118.70	Curve Number (CN)= 74.6
NASHYD (1181)	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
ID= 1 DT= 5.0 min	U.H. Tp(hrs)= 4.55	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.996

PEAK FLOW (cms)= 1.388 (i)
TIME TO PEAK (hrs)= 15.167
RUNOFF VOLUME (mm)= 47.055
TOTAL RAINFALL (mm)= 95.920

RUNOFF COEFFICIENT = 0.491

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

CALIB			
NASHYD (1183)	Area (ha)= 176.21	Curve Number (CN)= 76.1	
ID= 1 DT= 5.0 min	Ia (mm)= 3.90	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 5.98		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48

5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.125

PEAK FLOW (cms)= 1.773 (i)
 TIME TO PEAK (hrs)= 16.833
 RUNOFF VOLUME (mm)= 49.290
 TOTAL RAINFALL (mm)= 95.920
 RUNOFF COEFFICIENT = 0.514

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

CALIB			
NASHYD (1182)	Area (ha)= 281.36	Curve Number (CN)= 76.1	
ID= 1 DT= 5.0 min	Ia (mm)= 4.30	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 9.88		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48

4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.088

PEAK FLOW (cms)= 1.883 (i)
TIME TO PEAK (hrs)= 21.083
RUNOFF VOLUME (mm)= 48.974
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.511

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

ADD HYD (3104)					
1 + 2 = 3					
		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (1182):		281.36	1.883	21.08	48.97
+ ID2= 2 (1183):		176.21	1.773	16.83	49.29
=====					
ID = 3 (3104):		457.57	3.461	18.58	49.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3103)					
1 + 2 = 3					
		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (1181):		118.70	1.388	15.17	47.05
+ ID2= 2 (3104):		457.57	3.461	18.58	49.10
=====					
ID = 3 (3103):		576.27	4.642	17.33	48.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN(2180)
IN= 2---> OUT= 1 Routing time step (min)'= 5.00

<----- DATA FOR SECTION (1.1) ----->			
Distance	Elevation	Manning	
0.00	138.00	0.0500	
55.00	131.00	0.0500	
95.00	130.00	0.0500	
150.00	129.00	0.0300	Main Channel
160.00	130.00	0.0300 /0.0500	Main Channel
175.00	133.00	0.0500	
350.00	140.00	0.0500	

<----- TRAVEL TIME TABLE ----->					
DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.47	129.47	.138E+05	6.2	0.84	37.35
0.95	129.95	.551E+05	39.1	1.34	23.53
1.42	130.42	.121E+06	119.1	1.87	16.89
1.89	130.89	.205E+06	248.2	2.28	13.79
2.37	131.37	.305E+06	448.4	2.78	11.34
2.84	131.84	.410E+06	706.0	3.25	9.69
3.32	132.32	.521E+06	1013.8	3.67	8.57
3.79	132.79	.638E+06	1370.8	4.06	7.75
4.26	133.26	.761E+06	1767.1	4.39	7.18
4.74	133.74	.897E+06	2217.5	4.67	6.74
5.21	134.21	.105E+07	2730.9	4.93	6.39
5.68	134.68	.121E+07	3309.3	5.16	6.10

6.16	135.16	.139E+07	3955.8	5.38	5.85
6.63	135.63	.158E+07	4674.0	5.59	5.64
7.11	136.11	.179E+07	5467.2	5.78	5.45
7.58	136.58	.201E+07	6338.9	5.97	5.28
8.05	137.05	.224E+07	7292.2	6.15	5.12
8.53	137.53	.249E+07	8330.6	6.33	4.98
9.00	138.00	.275E+07	9457.1	6.50	4.85

		AREA	<---- hydrograph ---->		<-pipe / channel-->
		(ha)	QPEAK	TPEAK	R.V.
			(cms)	(hrs)	(mm)
INFLOW :	ID= 2 (3103)	576.27	4.64	17.33	48.68
OUTFLOW:	ID= 1 (2180)	576.27	4.61	18.00	48.68
					MAX DEPTH
					(m)
					MAX VEL
					(m/s)

CALIB			
NASHYD (11801)	Area (ha)= 109.96	Curve Number (CN)= 61.4	
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 3.80		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48

4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.105

PEAK FLOW (cms)= 1.015 (i)
TIME TO PEAK (hrs)= 14.417
RUNOFF VOLUME (mm)= 33.343
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0101)	Area (ha)=	0.79	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.24	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48

3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.126

PEAK FLOW (cms)= 0.022 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.312
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

CALIB	Area (ha)= 1.22	
STANDHYD (0102)	Total Imp(%)= 37.00	Dir. Conn.(%)= 30.00
ID= 1 DT= 5.0 min		

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.45	0.77
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	1.00	2.00
Length (m)=	90.18	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48

2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Max.Eff.Inten.(mm/hr)= 22.06 12.62
over (min) 5.00 25.00
Storage Coeff. (min)= 4.40 (ii) 20.55 (ii)
Unit Hyd. Tpeak (min)= 5.00 25.00
Unit Hyd. peak (cms)= 0.23 0.05

TOTALS

PEAK FLOW (cms)= 0.02 0.02 0.047 (iii)
TIME TO PEAK (hrs)= 9.50 10.25 10.25
RUNOFF VOLUME (mm)= 94.92 37.25 54.54
TOTAL RAINFALL (mm)= 95.92 95.92 95.92
RUNOFF COEFFICIENT = 0.99 0.39 0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.4 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.

ADD HYD (0001)				
1	2	3		
ID1= 1 (0101):	0.79	0.022	10.25	33.31
+ ID2= 2 (0102):	1.22	0.047	10.25	54.54
=====				
ID = 3 (0001):	2.01	0.069	10.25	46.20

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (0201)
ID= 1 DT= 5.0 min

Area (ha)= 0.63 Curve Number (CN)= 61.4
Ia (mm)= 4.40 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.21

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48

6.083 2.88 |12.167 6.23 |18.250 0.96 |

Unit Hyd Qpeak (cms)= 0.115

PEAK FLOW (cms)= 0.018 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.290
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

| Junction Command(0002) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2(0201)	0.63	0.02	10.25	33.29
OUTFLOW: ID= 2(0002)	0.63	0.02	10.25	33.29

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	2.01	0.069	10.25	46.20
+ ID2= 2 (0002):	0.63	0.018	10.25	33.29
=====				
ID = 3 (0012):	2.64	0.087	10.25	43.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0601)	Area (ha)= 8.75	Curve Number (CN)= 61.4	
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.40		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48

3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.836

PEAK FLOW (cms)= 0.229 (i)
TIME TO PEAK (hrs)= 10.333
RUNOFF VOLUME (mm)= 33.339
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0401)	Area (ha)=	2.04	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.20	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48

2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.390

PEAK FLOW (cms)= 0.058 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.280
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

| Junction Command(0004) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2(0401)	2.04	0.06	10.25	33.28
OUTFLOW: ID= 2(0004)	2.04	0.06	10.25	33.28

CALIB			
NASHYD (0502)	Area (ha)= 1.41	Curve Number (CN)= 61.4	
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.47		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.115

PEAK FLOW (cms)= 0.036 (i)

TIME TO PEAK (hrs)= 10.333

RUNOFF VOLUME (mm)= 33.341

TOTAL RAINFALL (mm)= 95.920

RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0510)	Area (ha)=	0.22	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.13	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48

5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.006 (i)
 TIME TO PEAK (hrs)= 10.250
 RUNOFF VOLUME (mm)= 33.012
 TOTAL RAINFALL (mm)= 95.920
 RUNOFF COEFFICIENT = 0.344

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

CALIB
 STANDHYD (0501)
 ID= 1 DT= 5.0 min

Area (ha)= 1.52
 Total Imp(%)= 33.00 Dir. Conn.(%)= 26.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.50	1.02
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	100.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48

4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Max.Eff.Inten.(mm/hr)= 22.06 12.50
over (min) 5.00 25.00
Storage Coeff. (min)= 4.69 (ii) 20.91 (ii)
Unit Hyd. Tpeak (min)= 5.00 25.00
Unit Hyd. peak (cms)= 0.22 0.05

TOTALS

PEAK FLOW (cms)= 0.02 0.03 0.056 (iii)
TIME TO PEAK (hrs)= 9.50 10.25 10.25
RUNOFF VOLUME (mm)= 94.92 37.11 52.13
TOTAL RAINFALL (mm)= 95.92 95.92 95.92
RUNOFF COEFFICIENT = 0.99 0.39 0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.4 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.

ADD HYD (0500)	AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0501):	1.52	0.056	10.25	52.13
+ ID2= 2 (0502):	1.41	0.036	10.33	33.34
ID = 3 (0500):	2.93	0.092	10.25	43.09

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0500)	AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1	(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0500):	2.93	0.092	10.25	43.09
+ ID2= 2 (0510):	0.22	0.006	10.25	33.01
ID = 1 (0500):	3.15	0.098	10.25	42.38

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Junction Command(0005)

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 1(0500)	3.15	0.10	10.25	42.38
OUTFLOW: ID= 2(0005)	3.15	0.10	10.25	42.38

ADD HYD (0045)	AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3	(ha)	(cms)	(hrs)	(mm)

ID1= 1 (0004):	2.04	0.058	10.25	33.28
+ ID2= 2 (0005):	3.15	0.098	10.25	42.38
=====				
ID = 3 (0045):	5.19	0.156	10.25	38.81

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (1245)				
1 + 2 = 3				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0012):	2.64	0.087	10.25	43.12
+ ID2= 2 (0045):	5.19	0.156	10.25	38.81
=====				
ID = 3 (1245):	7.83	0.243	10.25	40.26

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (1245)				
3 + 2 = 1				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 3 (1245):	7.83	0.243	10.25	40.26
+ ID2= 2 (0601):	8.75	0.229	10.33	33.34
=====				
ID = 1 (1245):	16.58	0.470	10.25	36.61

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (1180)				
1 + 2 = 3				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (11801):	109.96	1.015	14.42	33.34
+ ID2= 2 (1245):	16.58	0.470	10.25	36.61
=====				
ID = 3 (1180):	126.54	1.105	14.25	33.77

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3102)				
1 + 2 = 3				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1180):	126.54	1.105	14.25	33.77
+ ID2= 2 (2180):	576.27	4.614	18.00	48.68
=====				
ID = 3 (3102):	702.81	5.427	17.17	45.99

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0301)	Area (ha)=	1.38	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.40	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48

1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.132

PEAK FLOW (cms)= 0.036 (i)
TIME TO PEAK (hrs)= 10.333
RUNOFF VOLUME (mm)= 33.339
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0302)	Area (ha)=	0.17	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.14	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48

0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.046

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.092
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.345

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

1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0301):	1.38	0.036	10.33	33.34
+ ID2= 2 (0302):	0.17	0.005	10.25	33.09
=====				
ID = 3 (0003):	1.55	0.041	10.25	33.31

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (11791)	Area (ha)=	92.12	Curve Number (CN)= 54.6
ID= 1 DT= 5.0 min	Ia (mm)=	4.60	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	4.68	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48

5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.752

PEAK FLOW (cms)= 0.608 (i)
TIME TO PEAK (hrs)= 15.583
RUNOFF VOLUME (mm)= 27.566
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.287

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

ADD HYD (1179)					
1 + 2 = 3					
		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (11791):		92.12	0.608	15.58	27.57
+ ID2= 2 (0003):		1.55	0.041	10.25	33.31
=====					
ID = 3 (1179):		93.67	0.613	15.58	27.66

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3101)					
1 + 2 = 3					
		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1179):		93.67	0.613	15.58	27.66
+ ID2= 2 (3102):		702.81	5.427	17.17	45.99
=====					
ID = 3 (3101):		796.48	6.010	16.92	43.84

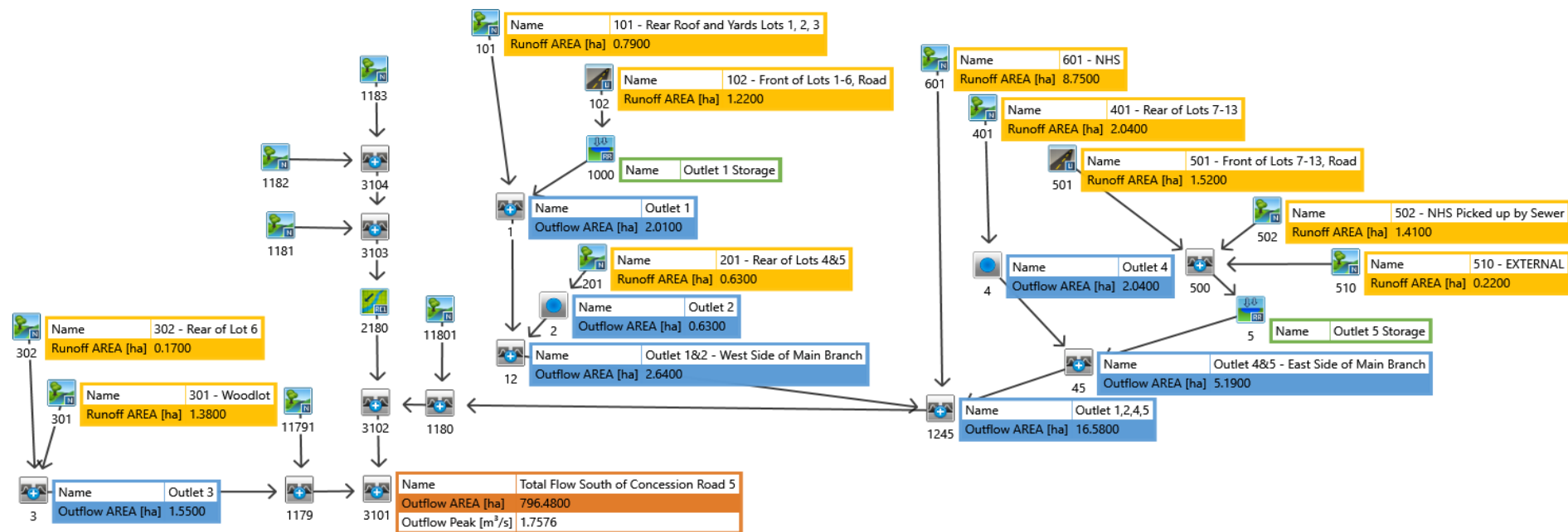
NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Appendix E

Event-Based Hydrologic Modelling (Post-Development Controlled)

Project Name	Frisque Lands
Project No.	E21007
Subject	Visual Otthymo Model Schematic

POST-DEVELOPMENT (CONTROLLED)





Project Name	Frisque Lands
Project No.	E21007
Subject	Visual Otthymo Outlet Flows Comparison

Pre-Development

		Peak Flow (m3/s)					
Event:		2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Outlet 1		0.008	0.013	0.016	0.021	0.025	0.029
Outlet 2		0.005	0.008	0.010	0.012	0.015	0.017
Outlet 3		0.018	0.029	0.037	0.048	0.057	0.066
Outlet 4		0.027	0.043	0.055	0.071	0.084	0.098
Outlet 5		0.011	0.018	0.022	0.029	0.035	0.040
Total:		0.069	0.111	0.140	0.181	0.216	0.250

Post - Uncontrolled

		Peak Flow (m3/s)					
Event:		2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Outlet 1		0.024	0.034	0.042	0.053	0.061	0.069
Outlet 2		0.005	0.008	0.010	0.013	0.015	0.018
Outlet 3		0.011	0.018	0.023	0.030	0.035	0.041
Outlet 4		0.016	0.025	0.032	0.042	0.050	0.058
Outlet 5		0.032	0.047	0.058	0.074	0.086	0.098
Total:		0.088	0.132	0.165	0.212	0.247	0.284
Difference to Pre-Dev.:		0.019	0.021	0.025	0.031	0.031	0.034

Post - Controlled

		Peak Flow (m3/s)					
Event:		2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Outlet 1		0.014	0.019	0.023	0.028	0.032	0.036
Outlet 2		0.005	0.008	0.010	0.013	0.015	0.018
Outlet 3		0.011	0.018	0.023	0.030	0.035	0.041
Outlet 4		0.016	0.025	0.032	0.042	0.050	0.058
Outlet 5		0.024	0.032	0.038	0.045	0.050	0.056
Total:		0.070	0.102	0.126	0.158	0.182	0.209
Difference to Pre-Dev.:		0.001	-0.009	-0.014	-0.023	-0.034	-0.041



Project Name	Frisque Lands
Project No.	E21007
Subject	Visual Otthymo Nodal Flows Comparison

Node: 3102

Peak Flow (m3/s)						
Event:	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Pre-Development:	1.603	2.491	3.145	4.023	4.709	5.424

Post-Uncontrolled:	1.604	2.493	3.147	4.025	4.712	5.427
Difference:	0.001	0.002	0.002	0.002	0.003	0.003
Difference (%):	0.1%	0.1%	0.1%	0.0%	0.1%	0.1%

Post-Controlled:	1.607	2.497	3.153	4.033	4.722	5.439
Difference:	0.004	0.006	0.008	0.010	0.013	0.015
Difference (%):	0.2%	0.2%	0.3%	0.2%	0.3%	0.3%

Node: 3101

Peak Flow (m3/s)						
Event:	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Pre-Development:	1.750	2.732	3.458	4.438	5.207	6.009

Post-Uncontrolled:	1.751	2.733	3.459	4.439	5.208	6.010
Difference:	0.001	0.001	0.001	0.001	0.001	0.001
Difference (%):	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%

Post-Controlled:	1.754	2.738	3.466	4.448	5.218	6.023
Difference:	0.004	0.006	0.008	0.010	0.011	0.014
Difference (%):	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%

```

=====
V   V   I   SSSSS U   U   A   L   (v 6.2.2019)
V   V   I   SS   U   U   A A   L
V   V   I   SS   U   U   AAAAA L
V   V   I   SS   U   U   A   A   L
VV     I   SSSSS UUUUU A   A   LLLLL

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    000   TTTTT TTTTT H   H   Y   Y   M   M   000   TM
O   O   T   T   H   H   Y   Y   MM MM O   O
O   O   T   T   H   H   Y   M   M   O   O
    000   T   T   H   H   Y   M   M   000

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\vo2\voin.dat
 Output filename: C:\Users\mbertram\AppData\Local\Civica\XH5\3bf9ac1f-e66b-45e5-875b-87a83afa1a0b\4b1034b8-7
 Summary filename: C:\Users\mbertram\AppData\Local\Civica\XH5\3bf9ac1f-e66b-45e5-875b-87a83afa1a0b\4b1034b8-7

DATE: 03-28-2025 TIME: 11:03:01

USER:

COMMENTS: _____

 ** SIMULATION : 06-100yr24_AES **

READ STORM	Filename: C:\Users\mbertram\AppData\Local\Temp\ffac0772-dfa1-418f-ae73-1a286d111233\0130180c
Ptotal= 95.92 mm	Comments: 100y24_AES

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	6.25	8.15	12.50	3.36	18.75	0.48
0.25	0.48	6.50	8.15	12.75	3.36	19.00	0.48
0.50	0.48	6.75	8.15	13.00	3.36	19.25	0.48
0.75	0.48	7.00	8.15	13.25	3.36	19.50	0.48
1.00	0.48	7.25	8.15	13.50	3.36	19.75	0.48
1.25	0.48	7.50	8.15	13.75	3.36	20.00	0.48
1.50	0.48	7.75	8.15	14.00	3.36	20.25	0.48
1.75	0.48	8.00	8.15	14.25	1.92	20.50	0.48
2.00	0.48	8.25	22.06	14.50	1.92	20.75	0.48
2.25	0.48	8.50	22.06	14.75	1.92	21.00	0.48
2.50	0.48	8.75	22.06	15.00	1.92	21.25	0.48
2.75	0.48	9.00	22.06	15.25	1.92	21.50	0.48
3.00	0.48	9.25	22.06	15.50	1.92	21.75	0.48
3.25	0.48	9.50	22.06	15.75	1.92	22.00	0.48
3.50	0.48	9.75	22.06	16.00	1.92	22.25	0.48
3.75	0.48	10.00	22.06	16.25	0.96	22.50	0.48
4.00	0.48	10.25	6.23	16.50	0.96	22.75	0.48
4.25	2.88	10.50	6.23	16.75	0.96	23.00	0.48
4.50	2.88	10.75	6.23	17.00	0.96	23.25	0.48
4.75	2.88	11.00	6.23	17.25	0.96	23.50	0.48
5.00	2.88	11.25	6.23	17.50	0.96	23.75	0.48
5.25	2.88	11.50	6.23	17.75	0.96	24.00	0.48
5.50	2.88	11.75	6.23	18.00	0.96		
5.75	2.88	12.00	6.23	18.25	0.48		
6.00	2.88	12.25	3.36	18.50	0.48		

CALIB	Area (ha)= 118.70	Curve Number (CN)= 74.6
NASHYD (1181)	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
ID= 1 DT= 5.0 min	U.H. Tp(hrs)= 4.55	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.996

PEAK FLOW (cms)= 1.388 (i)
TIME TO PEAK (hrs)= 15.167
RUNOFF VOLUME (mm)= 47.055
TOTAL RAINFALL (mm)= 95.920

RUNOFF COEFFICIENT = 0.491

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

CALIB			
NASHYD (1183)	Area (ha)= 176.21	Curve Number (CN)= 76.1	
ID= 1 DT= 5.0 min	Ia (mm)= 3.90	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 5.98		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48

5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.125

PEAK FLOW (cms)= 1.773 (i)
 TIME TO PEAK (hrs)= 16.833
 RUNOFF VOLUME (mm)= 49.290
 TOTAL RAINFALL (mm)= 95.920
 RUNOFF COEFFICIENT = 0.514

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

CALIB			
NASHYD (1182)	Area (ha)= 281.36	Curve Number (CN)= 76.1	
ID= 1 DT= 5.0 min	Ia (mm)= 4.30	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 9.88		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48

4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.088

PEAK FLOW (cms)= 1.883 (i)
TIME TO PEAK (hrs)= 21.083
RUNOFF VOLUME (mm)= 48.974
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.511

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

ADD HYD (3104)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1182):		281.36	1.883	21.08	48.97
+ ID2= 2 (1183):		176.21	1.773	16.83	49.29
=====					
ID = 3 (3104):		457.57	3.461	18.58	49.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3103)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1181):		118.70	1.388	15.17	47.05
+ ID2= 2 (3104):		457.57	3.461	18.58	49.10
=====					
ID = 3 (3103):		576.27	4.642	17.33	48.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN(2180)
IN= 2---> OUT= 1 Routing time step (min)'= 5.00

<----- DATA FOR SECTION (1.1) ----->			
Distance	Elevation	Manning	
0.00	138.00	0.0500	
55.00	131.00	0.0500	
95.00	130.00	0.0500	
150.00	129.00	0.0300	Main Channel
160.00	130.00	0.0300 /0.0500	Main Channel
175.00	133.00	0.0500	
350.00	140.00	0.0500	

<----- TRAVEL TIME TABLE ----->					
DEPTH	ELEV	VOLUME	FLOW RATE	VELOCITY	TRAV.TIME
(m)	(m)	(cu.m.)	(cms)	(m/s)	(min)
0.47	129.47	.138E+05	6.2	0.84	37.35
0.95	129.95	.551E+05	39.1	1.34	23.53
1.42	130.42	.121E+06	119.1	1.87	16.89
1.89	130.89	.205E+06	248.2	2.28	13.79
2.37	131.37	.305E+06	448.4	2.78	11.34
2.84	131.84	.410E+06	706.0	3.25	9.69
3.32	132.32	.521E+06	1013.8	3.67	8.57
3.79	132.79	.638E+06	1370.8	4.06	7.75
4.26	133.26	.761E+06	1767.1	4.39	7.18
4.74	133.74	.897E+06	2217.5	4.67	6.74
5.21	134.21	.105E+07	2730.9	4.93	6.39
5.68	134.68	.121E+07	3309.3	5.16	6.10

6.16	135.16	.139E+07	3955.8	5.38	5.85
6.63	135.63	.158E+07	4674.0	5.59	5.64
7.11	136.11	.179E+07	5467.2	5.78	5.45
7.58	136.58	.201E+07	6338.9	5.97	5.28
8.05	137.05	.224E+07	7292.2	6.15	5.12
8.53	137.53	.249E+07	8330.6	6.33	4.98
9.00	138.00	.275E+07	9457.1	6.50	4.85

		AREA	QPEAK	TPEAK	R.V.	MAX DEPTH	MAX VEL
		(ha)	(cms)	(hrs)	(mm)	(m)	(m/s)
INFLOW :	ID= 2 (3103)	576.27	4.64	17.33	48.68	0.36	0.84
OUTFLOW:	ID= 1 (2180)	576.27	4.61	18.00	48.68	0.36	0.84

CALIB			
NASHYD (11801)	Area (ha)= 109.96	Curve Number (CN)= 61.4	
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 3.80		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48

4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.105

PEAK FLOW (cms)= 1.015 (i)
TIME TO PEAK (hrs)= 14.417
RUNOFF VOLUME (mm)= 33.343
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0101)	Area (ha)=	0.79	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.24	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48

3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.126

PEAK FLOW (cms)= 0.022 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.312
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

CALIB
STANDHYD (0102)
ID= 1 DT= 5.0 min

Area (ha)= 1.22
Total Imp(%)= 37.00 Dir. Conn.(%)= 30.00

IMPERVIOUS PERVIOUS (i)
Surface Area (ha)= 0.45 0.77
Dep. Storage (mm)= 1.00 2.00
Average Slope (%)= 1.00 2.00
Length (m)= 90.18 40.00
Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48

2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Max.Eff.Inten.(mm/hr)=

22.06

12.62

over (min)

5.00

25.00

Storage Coeff. (min)=

4.40 (ii)

20.55 (ii)

Unit Hyd. Tpeak (min)=

5.00

25.00

Unit Hyd. peak (cms)=

0.23

0.05

TOTALS

PEAK FLOW (cms)=

0.02

0.02

0.047 (iii)

TIME TO PEAK (hrs)=

9.50

10.25

10.25

RUNOFF VOLUME (mm)=

94.92

37.25

54.54

TOTAL RAINFALL (mm)=

95.92

95.92

95.92

RUNOFF COEFFICIENT =

0.99

0.39

0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.4 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(1000)

IN= 2---> OUT= 1

DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0110	0.0150
0.0032	0.0015	0.0115	0.0165
0.0047	0.0030	0.0121	0.0180
0.0059	0.0045	0.0126	0.0195
0.0069	0.0060	0.0130	0.0210
0.0077	0.0075	0.0135	0.0225
0.0085	0.0090	0.0140	0.0240

0.0091	0.0105	0.0144	0.0255
0.0099	0.0120	0.0148	0.0270
0.0104	0.0135	0.0152	0.0285

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0102)	1.220	0.047	10.25	54.54
OUTFLOW: ID= 1 (1000)	1.220	0.015	11.67	54.45

PEAK FLOW REDUCTION [Qout/Qin](%)= 32.14
 TIME SHIFT OF PEAK FLOW (min)= 85.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0282

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (1000):	1.22	0.015	11.67	54.45
+ ID2= 2 (0101):	0.79	0.022	10.25	33.31
=====				
ID = 3 (0001):	2.01	0.036	10.25	46.14

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0201)	Area (ha)= 0.63	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.21	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48

3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.115

PEAK FLOW (cms)= 0.018 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.290
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

| Junction Command(0002) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2(0201)	0.63	0.02	10.25	33.29
OUTFLOW: ID= 2(0002)	0.63	0.02	10.25	33.29

ADD HYD (0012)				
1 + 2 = 3				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	2.01	0.036	10.25	46.14
+ ID2= 2 (0002):	0.63	0.018	10.25	33.29
=====				
ID = 3 (0012):	2.64	0.054	10.25	43.07

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB		Area (ha)= 8.75		Curve Number (CN)= 61.4	
NASHYD (0601)		Ia (mm)= 4.40		# of Linear Res.(N)= 3.00	
ID= 1 DT= 5.0 min		U.H. Tp(hrs)= 0.40			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48

0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.836

PEAK FLOW (cms)= 0.229 (i)
TIME TO PEAK (hrs)= 10.333
RUNOFF VOLUME (mm)= 33.339
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0401)	Area (ha)=	2.04	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.20	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.390

PEAK FLOW (cms)= 0.058 (i)
 TIME TO PEAK (hrs)= 10.250
 RUNOFF VOLUME (mm)= 33.280
 TOTAL RAINFALL (mm)= 95.920
 RUNOFF COEFFICIENT = 0.347

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

| Junction Command(0004) |

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW :	ID= 2(0401)	2.04	0.06	10.25	33.28
OUTFLOW:	ID= 2(0004)	2.04	0.06	10.25	33.28

CALIB					
NASHYD (0502)	Area (ha)=	1.41	Curve Number (CN)=	61.4	
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.47			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48

4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.115

PEAK FLOW (cms)= 0.036 (i)
TIME TO PEAK (hrs)= 10.333
RUNOFF VOLUME (mm)= 33.341
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB	Area (ha)=	0.22	Curve Number (CN)=	61.4
NASHYD (0510)	Ia (mm)=	4.40	# of Linear Res.(N)=	3.00
ID= 1 DT= 5.0 min	U.H. Tp(hrs)=	0.13		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48

3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.006 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.012
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.344

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

CALIB	Area (ha)= 1.52	
STANDHYD (0501)	Total Imp(%)= 33.00	Dir. Conn.(%)= 26.00
ID= 1 DT= 5.0 min		

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.50	1.02
Dep. Storage (mm)=	1.00	2.00
Average slope (%)=	1.00	2.00
Length (m)=	100.66	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48

2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Max.Eff.Inten.(mm/hr)= 22.06 12.50
over (min) 5.00 25.00
Storage Coeff. (min)= 4.69 (ii) 20.91 (ii)
Unit Hyd. Tpeak (min)= 5.00 25.00
Unit Hyd. peak (cms)= 0.22 0.05

TOTALS
0.056 (iii)

PEAK FLOW (cms)= 0.02 0.03
TIME TO PEAK (hrs)= 9.50 10.25 10.25
RUNOFF VOLUME (mm)= 94.92 37.11 52.13
TOTAL RAINFALL (mm)= 95.92 95.92 95.92
RUNOFF COEFFICIENT = 0.99 0.39 0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.4 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.

ADD HYD (0500)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0501):		1.52	0.056	10.25	52.13
+ ID2= 2 (0502):		1.41	0.036	10.33	33.34
=====		=====			
ID = 3 (0500):		2.93	0.092	10.25	43.09

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0500)				
3 + 2 = 1				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0500):	2.93	0.092	10.25	43.09
+ ID2= 2 (0510):	0.22	0.006	10.25	33.01
=====				
ID = 1 (0500):	3.15	0.098	10.25	42.38

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0005)				
IN= 2----> OUT= 1				
DT= 5.0 min				
OVERFLOW IS OFF				
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0399	0.0171
	0.0078	0.0017	0.0420	0.0188
	0.0153	0.0034	0.0439	0.0205
	0.0201	0.0051	0.0458	0.0222
	0.0240	0.0068	0.0476	0.0239
	0.0272	0.0086	0.0494	0.0257
	0.0302	0.0103	0.0511	0.0274
	0.0329	0.0120	0.0527	0.0291
	0.0354	0.0137	0.0543	0.0308
	0.0377	0.0154	0.0559	0.0325

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0500)	3.150	0.098	10.25	42.38
OUTFLOW: ID= 1 (0005)	3.150	0.056	10.75	42.37

PEAK FLOW REDUCTION [Qout/Qin](%)= 56.63
TIME SHIFT OF PEAK FLOW (min)= 30.00
MAXIMUM STORAGE USED (ha.m.)= 0.0323

ADD HYD (0045)				
1 + 2 = 3				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0004):	2.04	0.058	10.25	33.28
+ ID2= 2 (0005):	3.15	0.056	10.75	42.37
=====				
ID = 3 (0045):	5.19	0.110	10.25	38.80

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (1245)				
1 + 2 = 3				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0012):	2.64	0.054	10.25	43.07
+ ID2= 2 (0045):	5.19	0.110	10.25	38.80
=====				
ID = 3 (1245):	7.83	0.164	10.25	40.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (1245)				
3 + 2 = 1				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (1245):	7.83	0.164	10.25	40.24
+ ID2= 2 (0601):	8.75	0.229	10.33	33.34
=====				
ID = 1 (1245):	16.58	0.392	10.25	36.60

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (1180)				
1 + 2 = 3				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (11801):	109.96	1.015	14.42	33.34
+ ID2= 2 (1245):	16.58	0.392	10.25	36.60
=====				
ID = 3 (1180):	126.54	1.124	14.25	33.77

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3102)				
1 + 2 = 3				
ID1= 1 (1180):	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
+ ID2= 2 (2180):	126.54	1.124	14.25	33.77
	576.27	4.614	18.00	48.68
=====				
ID = 3 (3102):	702.81	5.438	17.17	45.99

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB				
NASHYD (0301)				
ID= 1 DT= 5.0 min	Area (ha)=	1.38	Curve Number (CN)=	61.4
	Ia (mm)=	4.40	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.40		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48

5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.132

PEAK FLOW (cms)= 0.036 (i)
 TIME TO PEAK (hrs)= 10.333
 RUNOFF VOLUME (mm)= 33.339
 TOTAL RAINFALL (mm)= 95.920
 RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0302)	Area (ha)=	0.17	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.14	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48

4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.046

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.092
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.345

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

ADD HYD (0003)				
1 + 2 = 3				
ID1= 1 (0301):		AREA (ha)	QPEAK (cms)	TPEAK (hrs)
+ ID2= 2 (0302):		1.38	0.036	10.33
		0.17	0.005	10.25
ID = 3 (0003):		1.55	0.041	10.25
				33.31

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (11791)		Area (ha)= 92.12	Curve Number (CN)= 54.6
ID= 1 DT= 5.0 min		Ia (mm)= 4.60	# of Linear Res.(N)= 3.00
		U.H. Tp(hrs)= 4.68	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48

1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.752

PEAK FLOW (cms)= 0.608 (i)
TIME TO PEAK (hrs)= 15.583
RUNOFF VOLUME (mm)= 27.566
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.287

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

ADD HYD (1179)				
1 + 2 = 3				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (11791):	92.12	0.608	15.58	27.57
+ ID2= 2 (0003):	1.55	0.041	10.25	33.31
=====				
ID = 3 (1179):	93.67	0.613	15.58	27.66

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3101)				
1 + 2 = 3				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1179):	93.67	0.613	15.58	27.66
+ ID2= 2 (3102):	702.81	5.438	17.17	45.99
=====				
ID = 3 (3101):	796.48	6.023	16.92	43.84

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Appendix F

Oil Grit Separator Sizing

Stormceptor®EF Sizing Report

Imbrium® Systems

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

03/14/2025

Province:	Ontario	Project Name:	Frisque Lands
City:	Pickering	Project Number:	E21007
Nearest Rainfall Station:	TORONTO CITY	Designer Name:	Michael Bertram
Climate Station Id:	6158355	Designer Company:	Candevcon
Years of Rainfall Data:	20	Designer Email:	mbertram@candevcon.com
		Designer Phone:	289-315-3680
Site Name:	WEST	EOR Name:	
		EOR Company:	
Drainage Area (ha):	1.22	EOR Email:	
Runoff Coefficient 'c':	0.46	EOR Phone:	

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	60.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	18.13
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	255
Estimated Average Annual Sediment Volume (L/yr):	207

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	54
EFO5	57
EFO6	61
EFO8	64
EFO10	67
EFO12	68

Recommended Stormceptor EFO Model: **EFO6**
 Estimated Net Annual Sediment (TSS) Load Reduction (%): **61**
 Water Quality Runoff Volume Capture (%): **> 90**

Stormceptor® EF Sizing Report

THIRD-PARTY TESTING AND VERIFICATION

► **Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

► **Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

► The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

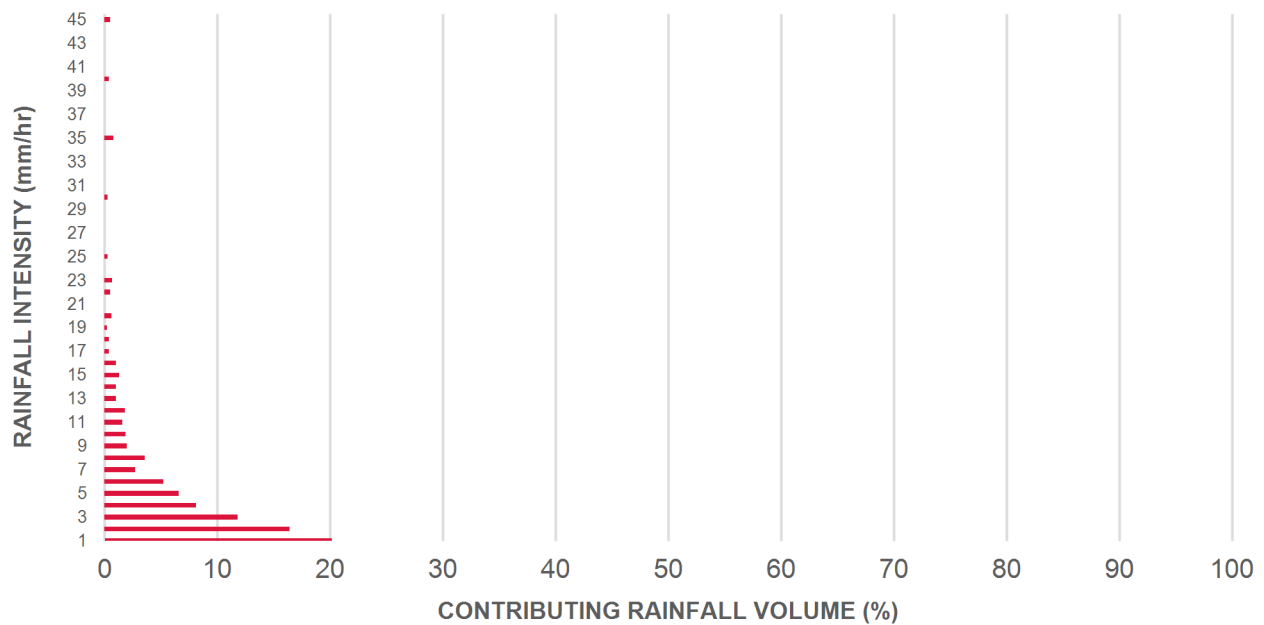
Stormceptor®EF Sizing Report

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.7	8.7	0.78	47.0	18.0	70	6.1	6.1
1.00	20.2	28.9	1.56	94.0	36.0	70	14.2	20.4
2.00	16.4	45.3	3.12	187.0	71.0	66	10.8	31.1
3.00	11.8	57.1	4.68	281.0	107.0	62	7.3	38.5
4.00	8.1	65.2	6.24	374.0	142.0	59	4.8	43.3
5.00	6.6	71.9	7.80	468.0	178.0	57	3.8	47.0
6.00	5.2	77.1	9.36	562.0	214.0	54	2.8	49.8
7.00	2.7	79.8	10.92	655.0	249.0	53	1.4	51.2
8.00	3.6	83.4	12.48	749.0	285.0	52	1.9	53.1
9.00	2.0	85.4	14.04	842.0	320.0	50	1.0	54.1
10.00	1.9	87.3	15.60	936.0	356.0	50	0.9	55.0
11.00	1.6	88.9	17.16	1030.0	392.0	48	0.8	55.8
12.00	1.8	90.7	18.72	1123.0	427.0	47	0.8	56.7
13.00	1.0	91.6	20.28	1217.0	463.0	46	0.4	57.1
14.00	1.0	92.7	21.84	1311.0	498.0	45	0.5	57.6
15.00	1.3	93.9	23.40	1404.0	534.0	44	0.6	58.1
16.00	1.0	95.0	24.96	1498.0	569.0	43	0.4	58.6
17.00	0.4	95.3	26.52	1591.0	605.0	42	0.1	58.7
18.00	0.4	95.7	28.08	1685.0	641.0	42	0.2	58.9
19.00	0.2	95.9	29.64	1779.0	676.0	42	0.1	59.0
20.00	0.6	96.5	31.20	1872.0	712.0	41	0.3	59.2
21.00	0.0	96.5	32.76	1966.0	747.0	41	0.0	59.2
22.00	0.5	97.0	34.32	2059.0	783.0	41	0.2	59.4
23.00	0.7	97.7	35.88	2153.0	819.0	41	0.3	59.7
24.00	0.0	97.7	37.44	2247.0	854.0	41	0.0	59.7
25.00	0.3	98.0	39.00	2340.0	890.0	41	0.1	59.8
30.00	0.3	98.3	46.80	2808.0	1068.0	39	0.1	59.9
35.00	0.8	99.1	54.60	3276.0	1246.0	36	0.3	60.2
40.00	0.4	99.5	62.41	3744.0	1424.0	34	0.1	60.4
45.00	0.5	100.0	70.21	4212.0	1602.0	30	0.2	60.5
Estimated Net Annual Sediment (TSS) Load Reduction =								61 %

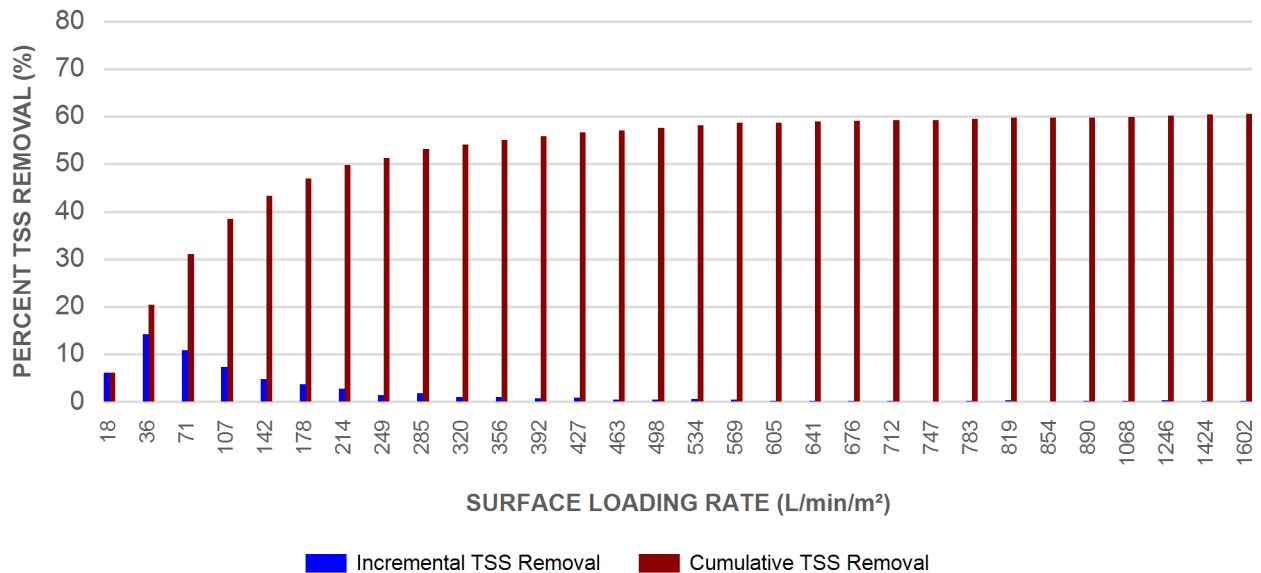
Climate Station ID: 6158355 Years of Rainfall Data: 20

Stormceptor®EF Sizing Report

RAINFALL DATA FROM TORONTO CITY RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Stormceptor® EF Sizing Report

Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

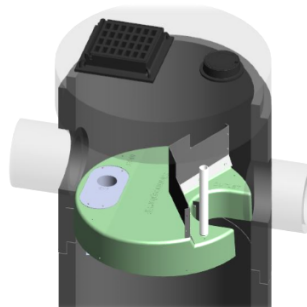
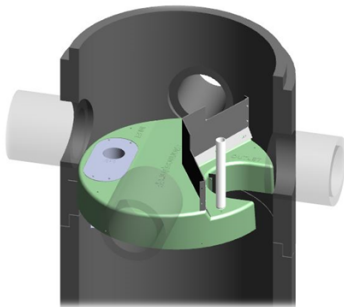
► **Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

DESIGN FLEXIBILITY

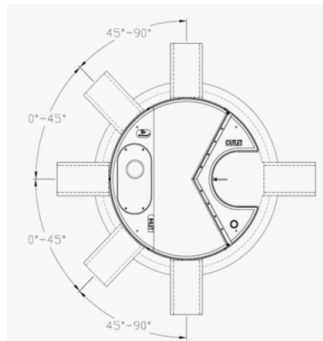
► **Stormceptor® EF and EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

► While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.



Stormceptor® EF Sizing Report



INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1.

For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

Stormceptor®EF Sizing Report

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EFO

SLR (L/min/m ²)	TSS % REMOVAL	SLR (L/min/m ²)	TSS % REMOVAL	SLR (L/min/m ²)	TSS % REMOVAL	SLR (L/min/m ²)	TSS % REMOVAL
1	70	660	42	1320	35	1980	24
30	70	690	42	1350	35	2010	24
60	67	720	41	1380	34	2040	23
90	63	750	41	1410	34	2070	23
120	61	780	41	1440	33	2100	23
150	58	810	41	1470	32	2130	22
180	56	840	41	1500	32	2160	22
210	54	870	41	1530	31	2190	22
240	53	900	41	1560	31	2220	21
270	52	930	40	1590	30	2250	21
300	51	960	40	1620	29	2280	21
330	50	990	40	1650	29	2310	21
360	49	1020	40	1680	28	2340	20
390	48	1050	39	1710	28	2370	20
420	47	1080	39	1740	27	2400	20
450	47	1110	38	1770	27	2430	20
480	46	1140	38	1800	26	2460	19
510	45	1170	37	1830	26	2490	19
540	44	1200	37	1860	26	2520	19
570	43	1230	37	1890	25	2550	19
600	42	1260	36	1920	25	2580	18
630	42	1290	36	1950	24	2600	26

STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m ³ sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m ³ sediment / 420 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m ³ sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m ³ sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m ³ sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m ³ sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

Stormceptor®EF Sizing Report

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m² to 1400 L/min/m², and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m² and 1400 L/min/m² shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m² shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m². No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m².

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m² shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m², and shall be calculated using a simple proportioning formula, with 1400 L/min/m² in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m².

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m².

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators**, with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-

Stormceptor®EF Sizing Report

entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m² to 2600 L/min/m²) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Stormceptor®EF Sizing Report

Imbrium® Systems

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

03/14/2025

Province:	Ontario	Project Name:	Frisque Lands
City:	Pickering	Project Number:	E21007
Nearest Rainfall Station:	TORONTO CITY	Designer Name:	Michael Bertram
Climate Station Id:	6158355	Designer Company:	Candevcon
Years of Rainfall Data:	20	Designer Email:	mbertram@candevcon.com
		Designer Phone:	289-315-3680
Site Name:	EAST	EOR Name:	
		EOR Company:	
Drainage Area (ha):	1.52	EOR Email:	
Runoff Coefficient 'c':	0.43	EOR Phone:	

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	60.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	21.12
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	271
Estimated Average Annual Sediment Volume (L/yr):	220

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	52
EFO5	56
EFO6	59
EFO8	64
EFO10	66
EFO12	68

Recommended Stormceptor EFO Model: **EFO8**
 Estimated Net Annual Sediment (TSS) Load Reduction (%): **64**
 Water Quality Runoff Volume Capture (%): **> 90**

Stormceptor® EF Sizing Report

THIRD-PARTY TESTING AND VERIFICATION

► **Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

► **Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

► The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

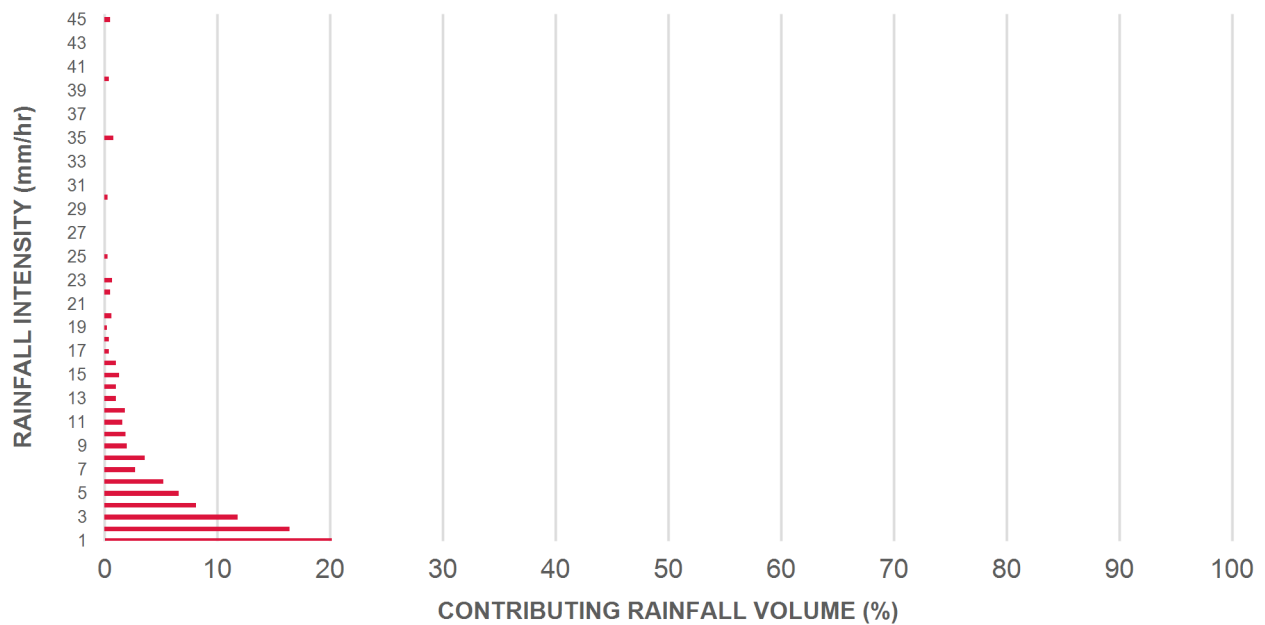
Stormceptor®EF Sizing Report

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.7	8.7	0.91	55.0	12.0	70	6.1	6.1
1.00	20.2	28.9	1.82	109.0	23.0	70	14.2	20.4
2.00	16.4	45.3	3.63	218.0	46.0	70	11.6	31.9
3.00	11.8	57.1	5.45	327.0	70.0	66	7.7	39.6
4.00	8.1	65.2	7.27	436.0	93.0	63	5.1	44.8
5.00	6.6	71.9	9.09	545.0	116.0	62	4.1	48.9
6.00	5.2	77.1	10.90	654.0	139.0	59	3.1	51.9
7.00	2.7	79.8	12.72	763.0	162.0	57	1.5	53.5
8.00	3.6	83.4	14.54	872.0	186.0	56	2.0	55.5
9.00	2.0	85.4	16.35	981.0	209.0	54	1.1	56.6
10.00	1.9	87.3	18.17	1090.0	232.0	53	1.0	57.6
11.00	1.6	88.9	19.99	1199.0	255.0	53	0.8	58.4
12.00	1.8	90.7	21.80	1308.0	278.0	52	0.9	59.3
13.00	1.0	91.6	23.62	1417.0	302.0	51	0.5	59.8
14.00	1.0	92.7	25.44	1526.0	325.0	50	0.5	60.3
15.00	1.3	93.9	27.26	1635.0	348.0	50	0.6	61.0
16.00	1.0	95.0	29.07	1744.0	371.0	49	0.5	61.5
17.00	0.4	95.3	30.89	1853.0	394.0	48	0.2	61.7
18.00	0.4	95.7	32.71	1962.0	418.0	48	0.2	61.8
19.00	0.2	95.9	34.52	2071.0	441.0	47	0.1	61.9
20.00	0.6	96.5	36.34	2180.0	464.0	46	0.3	62.2
21.00	0.0	96.5	38.16	2289.0	487.0	46	0.0	62.2
22.00	0.5	97.0	39.97	2398.0	510.0	45	0.2	62.4
23.00	0.7	97.7	41.79	2507.0	534.0	44	0.3	62.8
24.00	0.0	97.7	43.61	2616.0	557.0	44	0.0	62.8
25.00	0.3	98.0	45.43	2726.0	580.0	43	0.1	62.9
30.00	0.3	98.3	54.51	3271.0	696.0	42	0.1	63.0
35.00	0.8	99.1	63.60	3816.0	812.0	41	0.3	63.3
40.00	0.4	99.5	72.68	4361.0	928.0	40	0.2	63.5
45.00	0.5	100.0	81.77	4906.0	1044.0	39	0.2	63.7
Estimated Net Annual Sediment (TSS) Load Reduction =								64 %

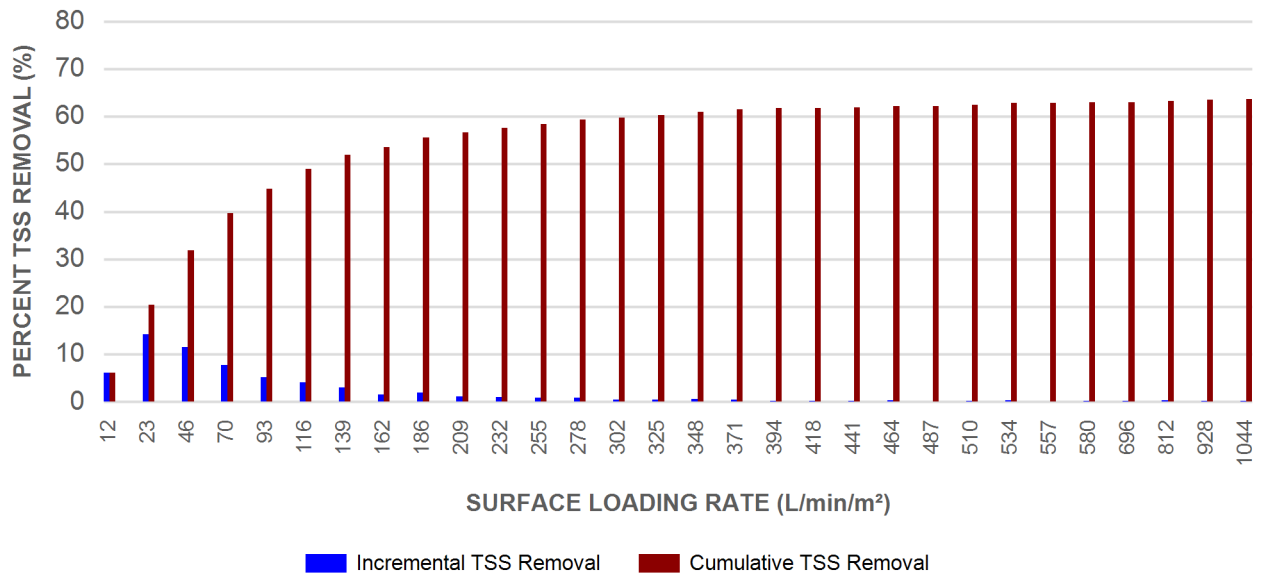
Climate Station ID: 6158355 Years of Rainfall Data: 20

Stormceptor®EF Sizing Report

RAINFALL DATA FROM TORONTO CITY RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Stormceptor® EF Sizing Report

Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

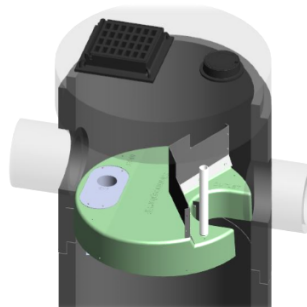
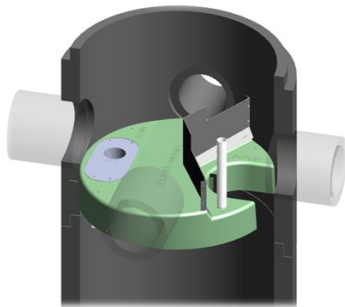
► **Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

DESIGN FLEXIBILITY

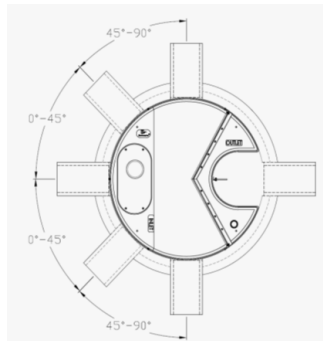
► **Stormceptor® EF and EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

► While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.



Stormceptor® EF Sizing Report



INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1.

For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

Stormceptor® EF Sizing Report

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EFO

SLR (L/min/m ²)	TSS % REMOVAL	SLR (L/min/m ²)	TSS % REMOVAL	SLR (L/min/m ²)	TSS % REMOVAL	SLR (L/min/m ²)	TSS % REMOVAL
1	70	660	42	1320	35	1980	24
30	70	690	42	1350	35	2010	24
60	67	720	41	1380	34	2040	23
90	63	750	41	1410	34	2070	23
120	61	780	41	1440	33	2100	23
150	58	810	41	1470	32	2130	22
180	56	840	41	1500	32	2160	22
210	54	870	41	1530	31	2190	22
240	53	900	41	1560	31	2220	21
270	52	930	40	1590	30	2250	21
300	51	960	40	1620	29	2280	21
330	50	990	40	1650	29	2310	21
360	49	1020	40	1680	28	2340	20
390	48	1050	39	1710	28	2370	20
420	47	1080	39	1740	27	2400	20
450	47	1110	38	1770	27	2430	20
480	46	1140	38	1800	26	2460	19
510	45	1170	37	1830	26	2490	19
540	44	1200	37	1860	26	2520	19
570	43	1230	37	1890	25	2550	19
600	42	1260	36	1920	25	2580	18
630	42	1290	36	1950	24	2600	26

STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m ³ sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m ³ sediment / 420 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m ³ sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m ³ sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m ³ sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m ³ sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

Stormceptor®EF Sizing Report

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m² to 1400 L/min/m², and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m² and 1400 L/min/m² shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m² shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m². No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m².

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m² shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m², and shall be calculated using a simple proportioning formula, with 1400 L/min/m² in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m².

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m².

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators**, with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-

Stormceptor®EF Sizing Report

entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m² to 2600 L/min/m²) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Appendix G

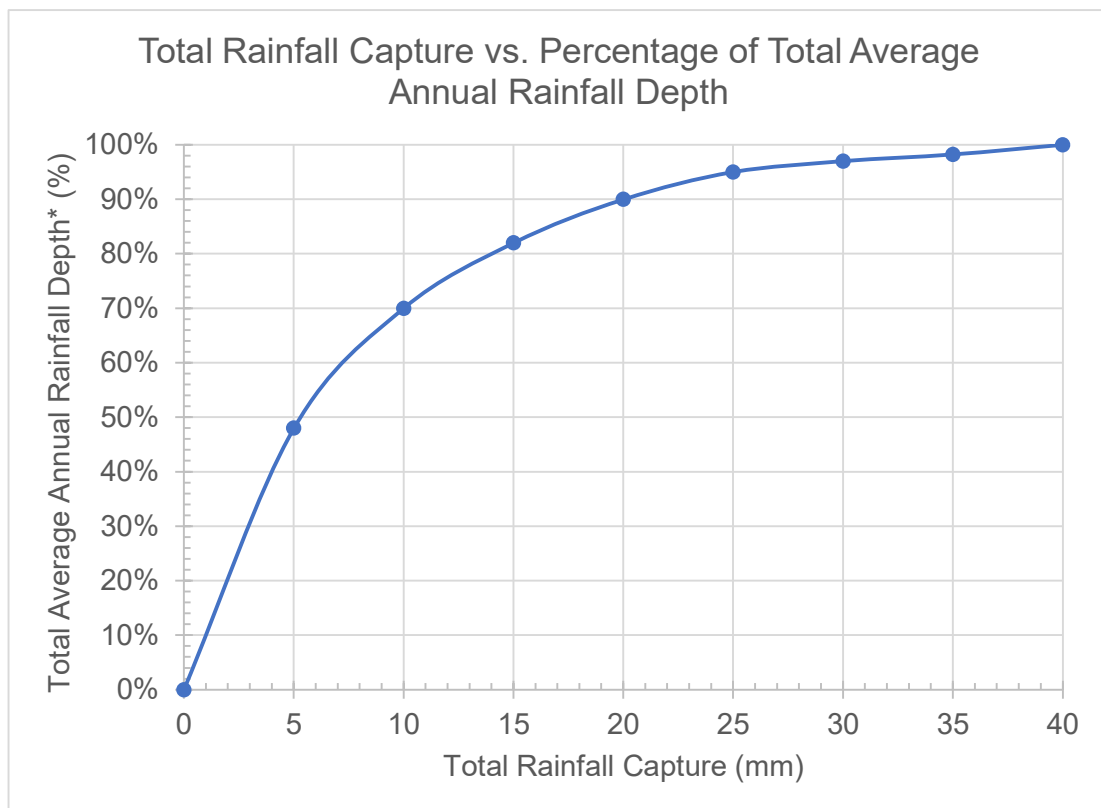
Low Impact Development



Project Name	Frisque Lands
Project No.	E21007
Subject	Average Annual Rainfall Depth

Total Rainfall Capture (mm)	Total Average Annual Rainfall Depth* (%)
0	0%
5	48%
10	70%
15	82%
20	90%
25	95%
30	97%
35	98%
40	100%

* As per Figure 1a from Wet Weather Flow Management Guidelines (City of Toronto, 2006).





Project Name	Frisque Lands
Project No.	E21007
Subject	Infiltration Target

Impervious Area for Retention Volume

Target Depth (mm) = 5

WEST

Area ID	Impervious Area (ha)	Target Vol. (m ³)	LID Measure
101	0.08	4.0	Soakaway Pits
102	0.45	22.5	Soil Ammendments & Bioretention
201	0.03	1.5	Soakaway Pits
302	0.03	1.5	Soakaway Pits
Total	0.59	29.5	

EAST

Area ID	Impervious Area (ha)	Target Vol. (m ³)	LID Measure
401	0.16	8.0	Soakaway Pits
501	0.50	25.0	Soil Ammendments & Bioretention
Total	0.66	33.00	

Project Name	Frisque Lands
Project No.	E21007
Subject	Soakaway Pit Sizing

Equation 4.2: Maximum Allowable Infiltration Trench Depth (MOE SWMP Manual, 2003)

$$d = P T / 1000$$

<u>WEST</u>	<u>EAST</u>
-------------	-------------

* As per the Water Balance Assessment (R.J. Burnside & Associates, February 2023), percolation rates range between 12-35mm/hr (for the west lands) and 12-33mm/hr (for the east lands).

P_{est} = Average Percolation Rate*	23.5	22.5	mm/hr
SF = Safety Factor	2.5	2.5	
P = Design Percolation Rate	9.4	9.0	mm/hr
T = Drawdown Time	48	48	hr
d = Maximum Allowable Depth	0.45	0.43	m

Equation 4.3: Infiltration Trench Bottom Area (MOE SWMP Manual, 2003)

$$A = 1000 V / P n t$$

** Rear roof areas range between 150 to 250m² as per the functional design. A drainage area of 250m² has therefore been assumed for all houses for the conservative sizing of the soakaway pits. The sizing can be confirmed during detailed design if necessary.

A = Drainage Area**	250	250	m ²
r = Runoff Depth	5	5	mm
V = Required Infiltration Volume	1.25	1.25	m ³
P = Design Percolation Rate	9.4	9.0	mm/hr
n = Porosity of the Storage Media	0.4	0.4	
t = Drawdown Time	48	48	hours
A = Required Area	7	7	m ²
L = Length	3.0	3.0	m
W = Width	3.0	3.0	m
d = Depth	0.40	0.40	m
V = Provided Infiltration Storage Volume	1.4	1.4	m ³

Therefore, sufficient storage volume has been provided to infiltrate 5 mm of runoff (minimum).

Project Name	Frisque Lands
Project No.	E21007
Subject	Bioretention Target Volumes

Bioretention Target Volumes

Area ID	WEST	EAST	
	102	501	
A_{roof} = Roof Area to Soil Ammendment	1270	1330	m ²
d_r = Target Depth to Infiltrate	5	5	mm
V_{target} = Target Volume to Infiltrate	6.4	6.7	m ³
d_r = Runoff Depth Infiltrated	2.5	2.5	mm
$V_{\text{infiltrated}}$ = Infiltrated Volume	3.2	3.3	m ³
V_{remainig} = Remaining Volume to Infiltrate	3.2	3.3	m ³
A_{paved} = Driveway and Road Area	3210	4110	m ²
d_r = Target Depth to Infiltrate	5	5	mm
V_{target} = Target Volume to Infiltrate	16.1	20.6	m ³
$V_{\text{bioretention}}$ = Bioretention Target Volume to Infiltrate (Remaining Roof Volume + Road and Driveway Volume)	19.2	23.9	m ³

Project Name	Frisque Lands
Project No.	E21007
Subject	Bioretention Sizing

Equation 4.2: Maximum Allowable Infiltration Trench Depth (MOE SWMP Manual, 2003)

$$d = P T / 1000$$

* As per the Water Balance Assessment (R.J. Burnside & Associates, February 2023), percolation rates range between 12-35mm/hr (for the west lands) and 12-33mm/hr (for the east lands).

	<u>WEST</u>	<u>EAST</u>	
P_{est} = Average Percolation Rate*	23.5	22.5	mm/hr
SF = Safety Factor	2.5	2.5	
P = Design Percolation Rate	9.4	9.0	mm/hr
T = Drawdown Time	72	72	hr
d = Maximum Allowable Depth	0.68	0.65	m

Equation 4.3: Infiltration Trench Bottom Area (MOE SWMP Manual, 2003)

$$A = 1000 V / P n t$$

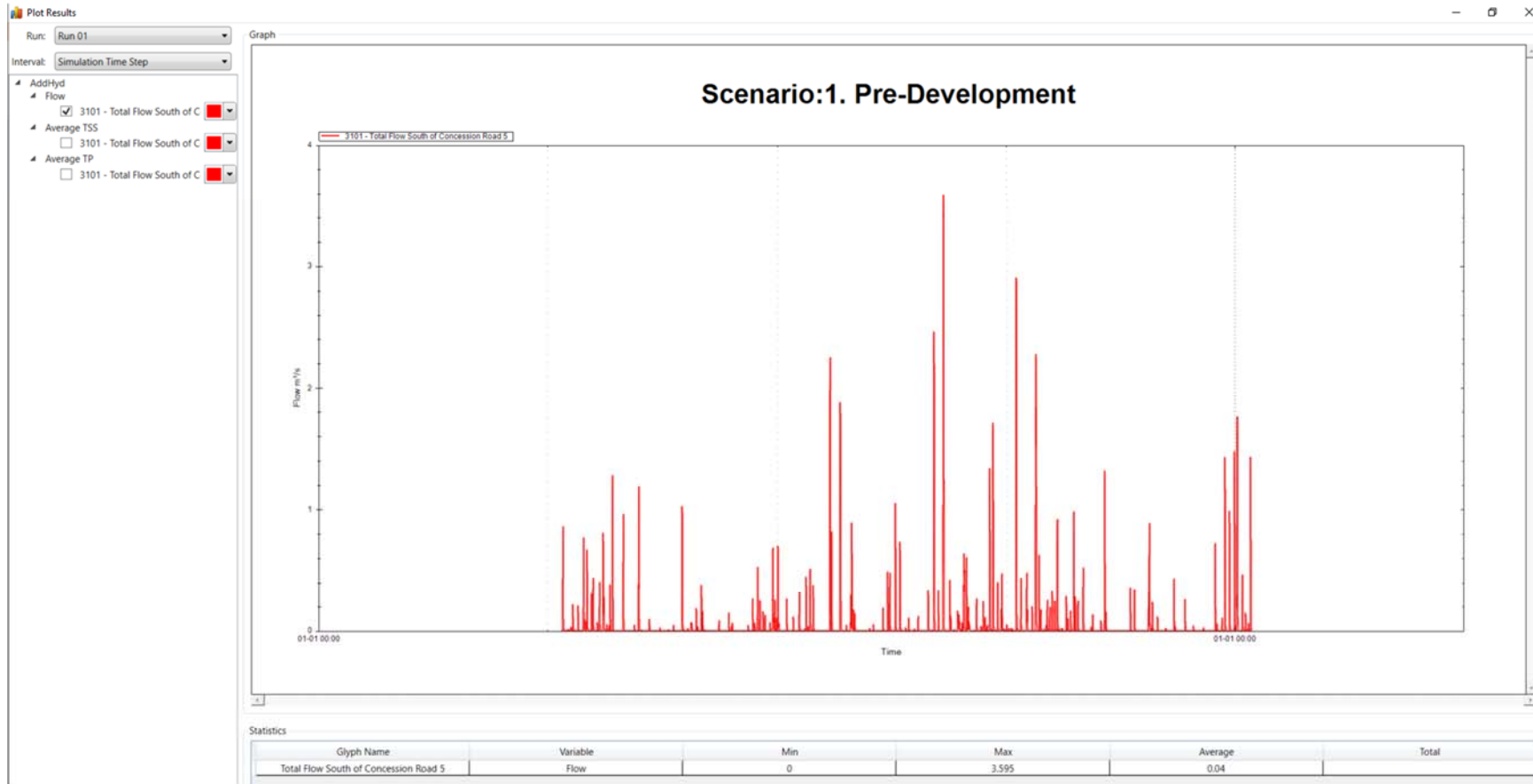
** Calculated on 'Bioretention Target Volume' sheet.

V = Required Infiltration Volume**	19.2	23.9	m ³
P = Design Percolation Rate	9.4	9.0	mm/hr
n = Porosity of the Storage Media	0.4	0.4	
t = Drawdown Time	72	72	hours
A = Required Area	71	92	m ²
L = Length	13.0	13.0	m
W = Width	6.0	7.5	m
d = Depth	0.65	0.65	m
V = Provided Infiltration Storage Volume	20.3	25.4	m ³

Therefore, sufficient storage volume has been provided to infiltrate the target volume.

Appendix H

Continuous Simulation Hydrologic Modelling





Plot Results

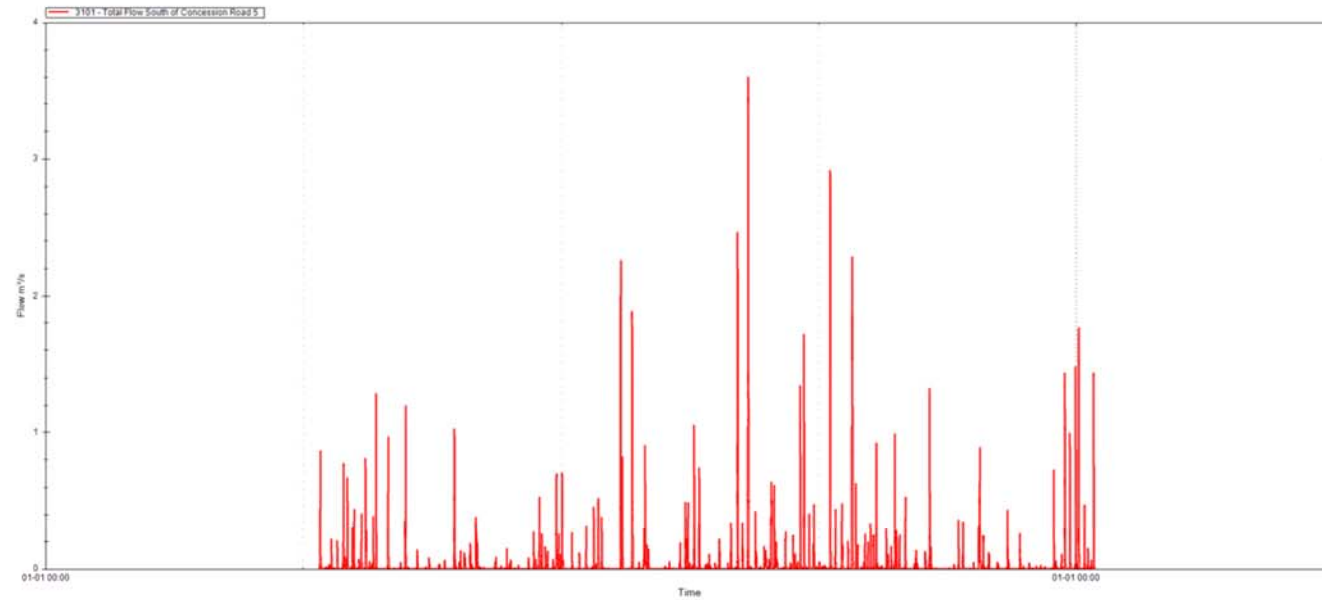
Run: Run 01

Interval: Simulation Time Step

- AddHyd
 - Flow
 - ☒ 3101 - Total Flow South of C
 - Average TSS
 - ☐ 3101 - Total Flow South of C
 - Average TP
 - ☐ 3101 - Total Flow South of C

Graph

Scenario:2. Post Development Uncontrolled



Statistics

Glyph Name	Variable	Min	Max	Average	Total
Total Flow South of Concession Road 5	Flow	0	3.604	0.04	



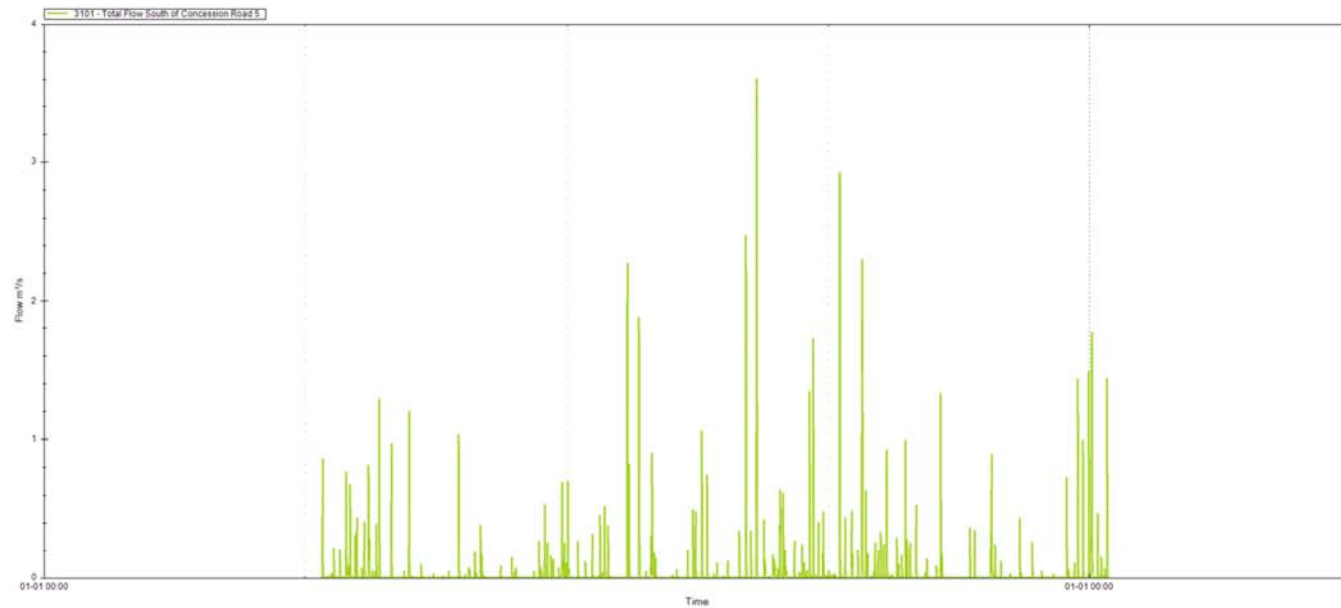
Plot Results

Run: Run 01
Interval: Simulation Time Step

AddHyd
Flow
☒ 3101 - Total Flow South of C
Average TSS
☐ 3101 - Total Flow South of C
Average TP
☐ 3101 - Total Flow South of C

Graph

Scenario:3. Post Development Controlled (Unit Rates)



Statistics

Glyph Name	Variable	Min	Max	Average	Total
Total Flow South of Concession Road 5	Flow	0	3.610	0.04	

Appendix I

Hydrant Flow Test and Watermain Distribution Supporting Calculations

Water demand calculations

Average Day Demand = 364 L/persons/day

-Assumed based on Durham Region Design Specifications for Sanitary Sewers of average residential waste flow of 364 L/person/day

Population:

13 units x 3.5 persons/unit
= 46 persons

Average Day Demand:

364 L/persons/day * 46 persons
= 16,744 L/day / 1440 min/day
= 11.62 L/min

Peaking factors applied based on MeCP Table 3-3:

<https://www.ontario.ca/document/design-guidelines-drinking-water-systems-0>

Table 3-3: Peaking Factors for Drinking-Water Systems Serving Fewer than 500 People

Dwelling units serviced	Equivalent population	Night minimum hour factor	Maximum day factor	Peak hour factor
10	30	0.1	9.5	14.3
50	150	0.1	4.9	7.4
100	300	0.2	3.6	5.4
150	450	0.3	3.0	4.5
167	500	0.4	2.9	4.3

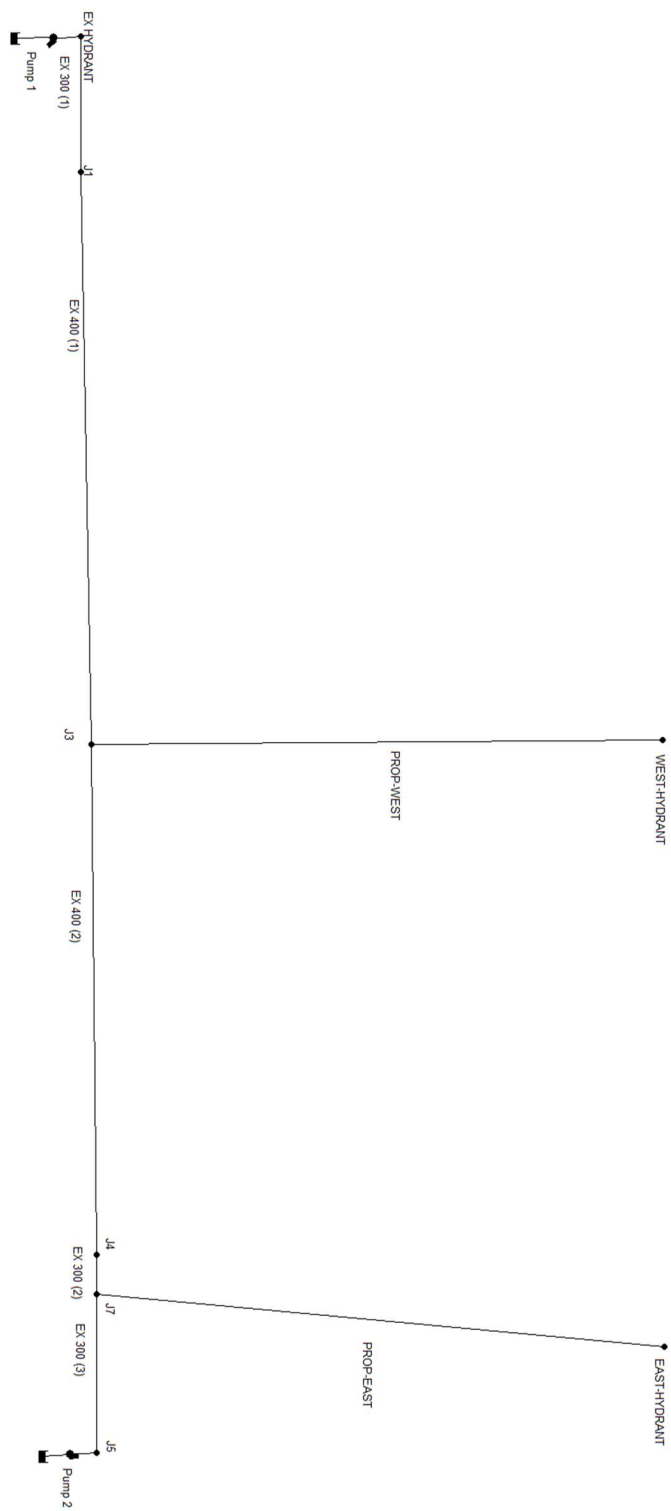
EPANet Pipe Input

Link ID	Length (m)	Diameter (mm)	Roughness
Pipe EX-400(1)	115	400	120
Pipe EX-400(2)	270	400	120
Pipe EX-300(3)	20	300	110
Pipe EX-300(1)	20	300	110
Pipe EX-300(2)	5	300	110
Pipe PROP-WEST	230	200	110
Pipe PROP-EAST	300	200	110

EPANet Node Input

Node ID	Elevation (m)
Junc 1	129
Junc EX-HYDRANT	130
Junc 3	130.5
Junc 4	134
Junc 5	133
Junc WEST-HYDRANT	135.6
Junc EAST-HYDRANT	138
Junc 7	134

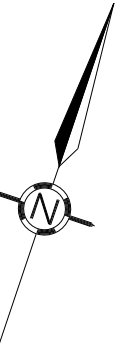
EPANet Schematic Model



Appendix J

Typical Sewage Layouts (Gunnell Engineering Ltd.)

 Gunnell Engineering Ltd.
1110 Stellar Drive, Unit 106
Newmarket, ON L3Y 7B7
bus: 905-868-9400
www.septicdesign.ca



 Primary Filter Bed

 Reserve Filter Bed Area

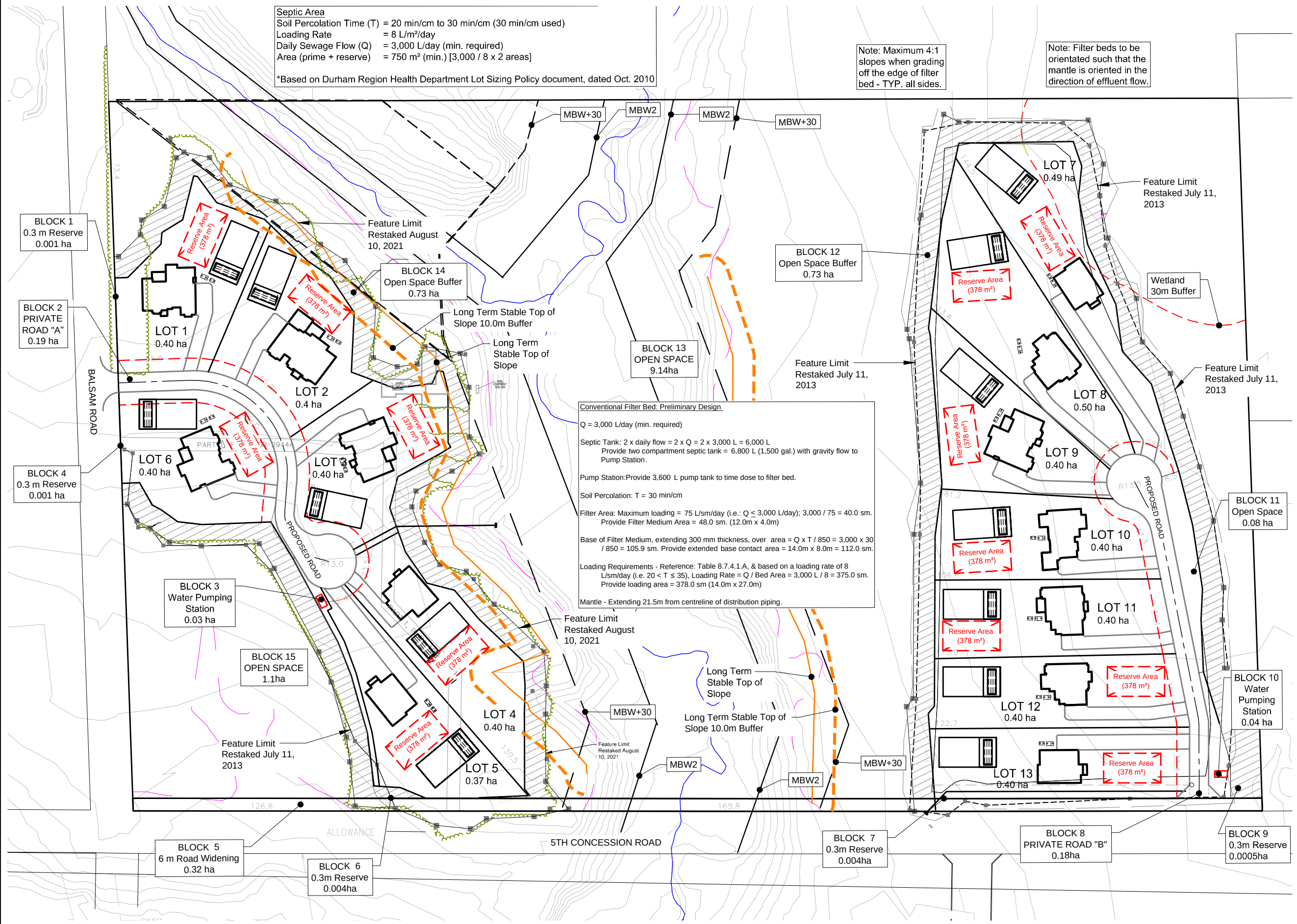
All Distribution Piping is to be a minimum of: - 16.7m from drilled wells - 31.7m from dug wells - 4.7m from property lines - 6.7m from residence
Note: Filter Bed system raised 0.85m above finished grade, therefore increase setbacks by 1.7m.

Rev. No.	Date	Description	CAD
Rev. 3	11-Jun-2025	Updated Setbacks	ZB
Rev. 2	17-Mar-2025	Site Plan Update	DB
Rev. 1	15-Jan-2025	Re-arrange sewage layout	KB

**Proposed Residential
Development
City of Pickering
Region of Durham**

**Overall Subdivision Plan
(13 Lots) - Typical Sewage
Layouts**

Scale: 1:1,750	Designed By: ZS
Date: 13-JULY-2023	Drawn By: ZS
Project No.: D3534	Checked By: EG
	Drawing No.: SP-1



File: Z:\Gunnell Engineering AutoCAD\D3500 - PROJECTS\03534 - 3225 Con 5 Rd - Pickering\CAD\--CD- CONCEPT LAYOUTS (LOT 1,5,7,11)\D3534CD-SF1.dwg
Plotted On: Fri, 13 Jun 2025 - 9:18am

SP-2

File: Z:\Gunnell Engineering AutoCAD\03534 - PROJECTS\03534 - CD- CONCEPT LAYOUTS (LOT 1,5,7,11)\03534CD-SP3.dwg
Plotted On: Fri, 13 Jun 2025 8:18am

DATUM ELEVATIONS: FILTER BED	
Existing Grade = 0.00m (Datum)	
Base Cut (1):	-0.40m
Top of Filter Medium (0.75m filter sand) :	+0.35m
Top of Stone Layer (0.30m stone layer) :	+0.65m
Top of Landscaping (0.20m topsoil):	+0.85m

Note (1): All topsoil to be excavated

All Distribution Piping is to be a minimum of:

- 16.7m from drilled wells
- 31.7m from dug wells
- 4.7m from property lines
- 6.7m from residence

Note: Filter Bed system raised 0.85m above finished grade, therefore increase setbacks by 1.7m.

Septic Area

Soil Percolation Time (T) = 30 min/cm
Loading Rate = 8 L/m²/day
Daily Sewage Flow (Q) = 3,000 L/day (min. required)
Area (prime + reserve) = 750 m² (min.) [3,000 / 8 x 2 areas]

*Based on Durham Region Health Department Lot Sizing Policy document, dated Oct. 2010

Conventional Filter Bed: Preliminary Design

Q = 3,000 L/day (min. required)

Septic Tank: 2 x daily flow = 2 x Q = 2 x 3,000 L = 6,000 L
Provide two compartment septic tank = 6,800 L (1,500 gal.) with gravity flow to Pump Station.

Pump Station: Provide 3,600 L pump tank to time dose to filter bed.

Soil Percolation: T = 30 min/cm

Filter Area: Maximum loading = 75 L/sm/day (i.e.: Q ≤ 3,000 L/day); 3,000 / 75 = 40.0 sm. Provide Filter Medium Area = 48.0 sm. (12.0m x 4.0m)

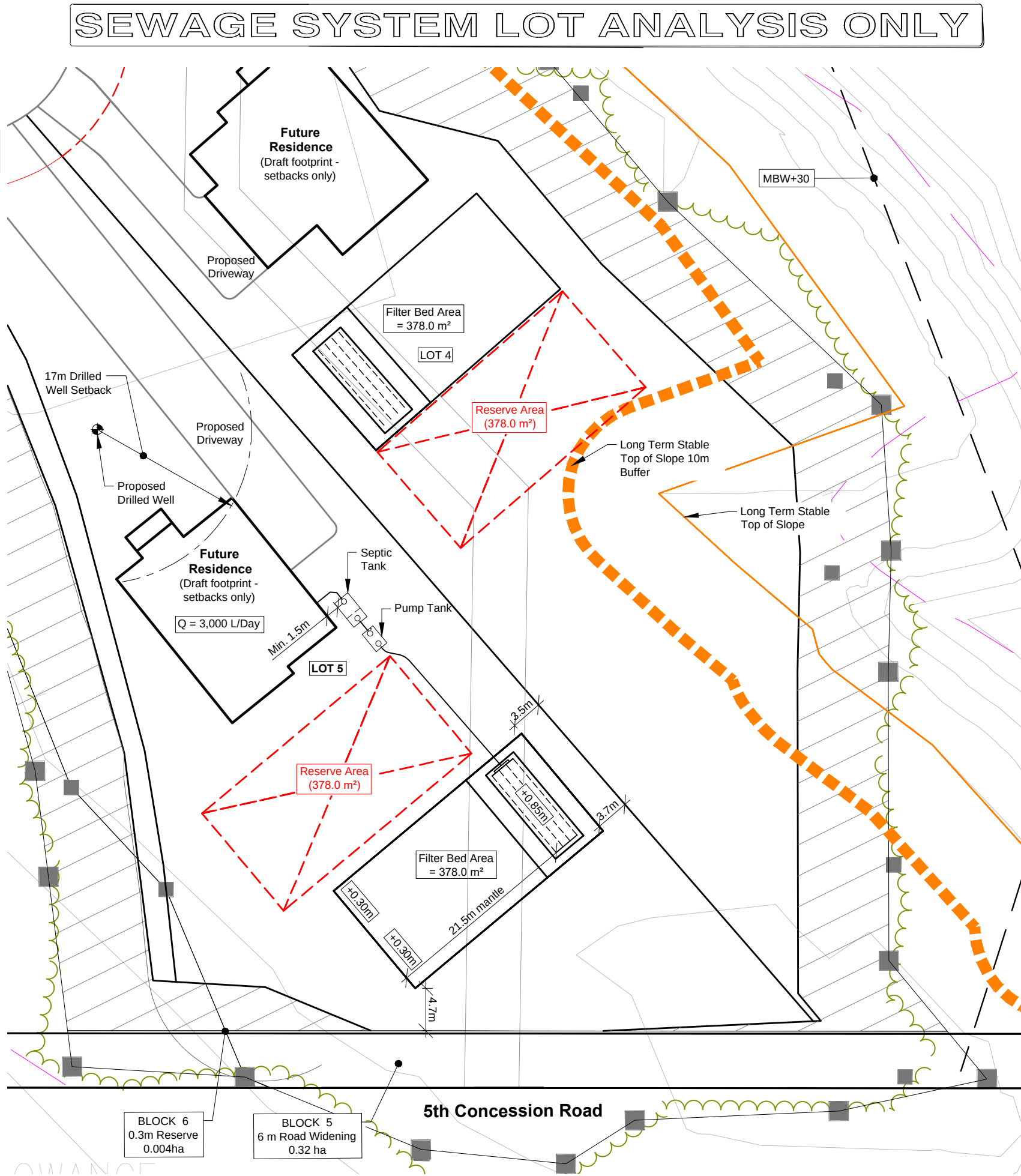
Base of Filter Medium, extending 300 mm thickness, over area = Q x T / 850 = 3,000 x 30 / 850 = 105.9 sm. Provide extended base contact area = 14.0m x 8.0m = 112.0 sm.

Loading Requirements - Reference: Table 8.7.4.1.A, & based on a loading rate of 8 L/sm/day (i.e. 20 < T ≤ 35), Loading Rate = Q / Bed Area = 3,000 L / 8 = 375.0 sm. Provide loading area = 378.0 sm (14.0m x 27.0m)

Mantle - Extending 21.5m from centreline of distribution piping.

Note: Filter beds to be orientated such that the mantle is oriented in the direction of effluent flow.

Note: Maximum 4:1 slopes when grading off the edge of filter bed - TYP. all sides.



Rev. No.	Date	Description	CAD
Rev. 2	11-Jun-2025	Updated Setbacks	ZB
Rev. 1	17-Mar-2025	Site Plan Update	DB

Proposed Residential Development
City of Pickering
Region of Durham

Typical Lot Layout (Lot 5)
Proposed Sewage System

Scale: 1:500	Designed By: ZS
Date: 13-JULY-2023	Drawn By: ZS
Project No.:	Checked By: EG
	Drawing No.:

D3534

SP-3

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Plotted On: Fri, 13 Jun 2025 9:18am

DATUM ELEVATIONS: FILTER BED	
Existing Grade = 0.00m (Datum)	
Base Cut (1):	-0.40m
Top of Filter Medium (0.75m filter sand) :	+0.35m
Top of Stone Layer (0.30m stone layer) :	+0.65m
Top of Landscaping (0.20m topsoil):	+0.85m

Note (1): All topsoil to be excavated

All Distribution Piping is to be a minimum of:

- 16.7m from drilled wells
- 31.7m from dug wells
- 4.7m from property lines
- 6.7m from residence

Note: Filter Bed system raised 0.85m above finished grade, therefore increase setbacks by 1.7m.

Septic Area
Soil Percolation Time (T) = 30 min/cm
Loading Rate = 8 L/m²/day
Daily Sewage Flow (Q) = 3,000 L/day (min. required)
Area (prime + reserve) = 750 m² (min.) [3,000 / 8 x 2 areas]

*Based on Durham Region Health Department Lot Sizing Policy document, dated Oct. 2010

Conventional Filter Bed: Preliminary Design

Q = 3,000 L/day (min. required)

Septic Tank: 2 x daily flow = 2 x Q = 2 x 3,000 L = 6,000 L
Provide two compartment septic tank = 6,800 L (1,500 gal.) with gravity flow to Pump Station.

Pump Station: Provide 3,600 L pump tank to time dose to filter bed.

Soil Percolation: T = 30 min/cm

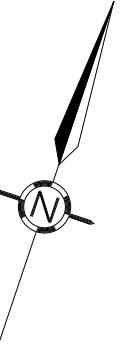
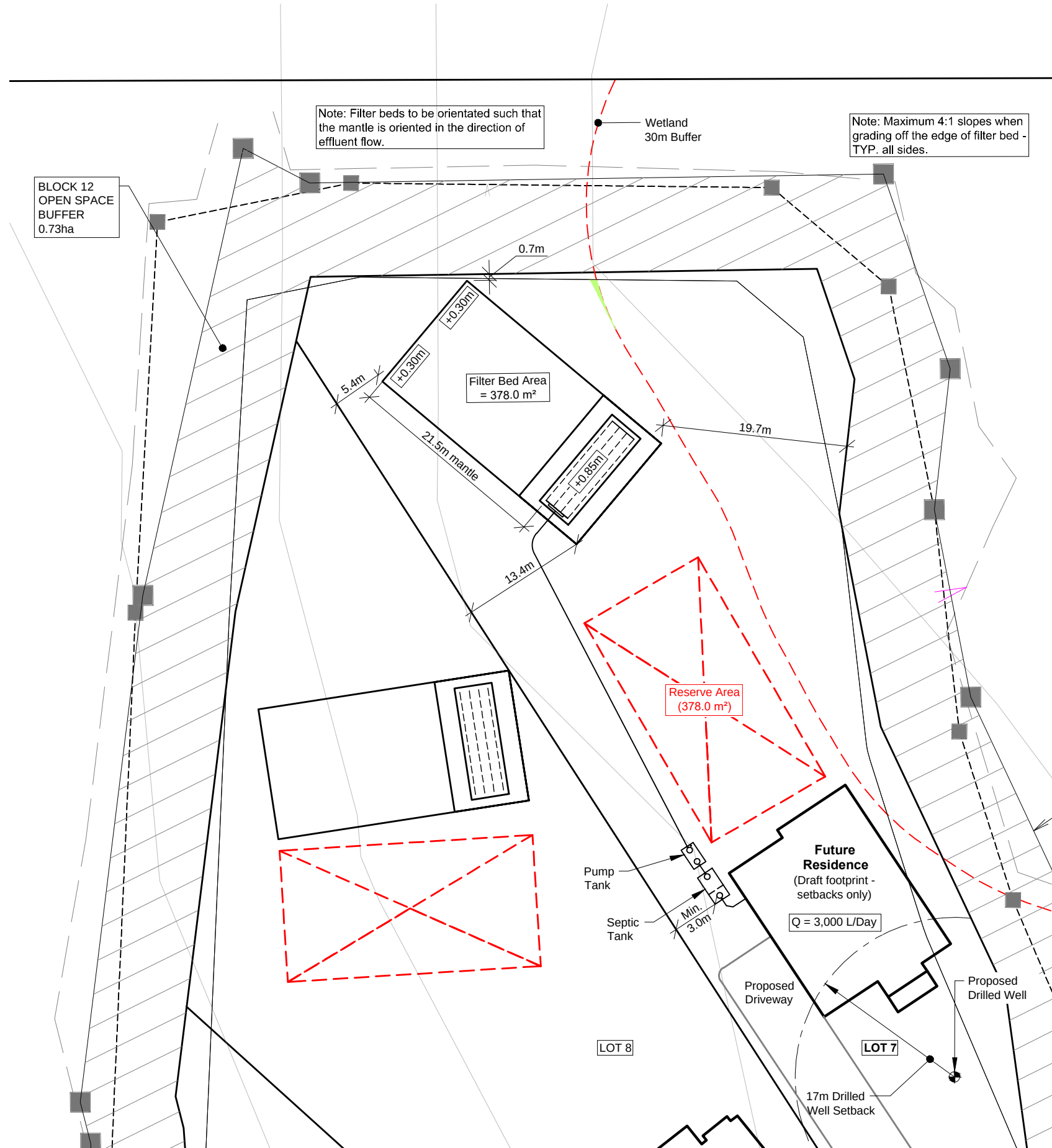
Filter Area: Maximum loading = 75 L/sm/day (i.e.: Q < 3,000 L/day); 3,000 / 75 = 40.0 sm. Provide Filter Medium Area = 48.0 sm. (12.0m x 4.0m)

Base of Filter Medium, extending 300 mm thickness, over area = $Q \times T / 850 = 3,000 \times 30 / 850 = 105.9$ sm. Provide extended base contact area = 14.0m x 8.0m = 112.0 sm.

Loading Requirements - Reference: Table 8.7.4.1.A, & based on a loading rate of 8 L/sm/day (i.e. $20 < T \leq 35$), Loading Rate = $Q / \text{Bed Area} = 3,000 \text{ L} / 8 = 375.0$ sm. Provide loading area = 378.0 sm (14.0m x 27.0m)

Mantle - Extending 21.5m from centreline of distribution piping.

SEWAGE SYSTEM LOT ANALYSIS ONLY



Rev. No.	Date	Description	CAD
Rev. 2	11-Jun-2025	Updated Setbacks	ZB
Rev. 1	17-Mar-2025	Site Plan Update	DB

Proposed Residential Development City of Pickering Region of Durham

Typical Lot Layout (Lot 7) Proposed Sewage System

Scale: 1:500	Designed By: ZS
Date: 13-JULY-2023	Drawn By: ZS
Project No.:	Checked By: EG
	Drawing No.:

D3534

SP-4

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Plotted On: Fri, 13 Jun 2025 8:18am

Conventional Filter Bed: Preliminary Design

Q = 3,000 L/day (min. required)

Septic Tank: 2 x daily flow = 2 x Q = 2 x 3,000 L = 6,000 L
Provide two compartment septic tank = 6,800 L (1,500 gal.) with gravity flow to Pump Station.

Pump Station: Provide 3,600 L pump tank to time dose to filter bed.

Soil Percolation: T = 30 min/cm

Filter Area: Maximum loading = 75 L/sm/day (i.e.: Q ≤ 3,000 L/day); 3,000 / 75 = 40.0 sm. Provide
Filter Medium Area = 48.0 sm. (12.0m x 4.0m)

Base of Filter Medium, extending 300 mm thickness, over area = Q x T / 850 = 3,000 x 30 / 850 =
105.9 sm. Provide extended base contact area = 14.0m x 8.0m = 112.0 sm.

Loading Requirements - Reference: Table 8.7.4.1.A, & based on a loading rate of 8 L/sm/day (i.e.
20 < T ≤ 35), Loading Rate = Q / Bed Area = 3,000 L / 8 = 375.0 sm. Provide loading area =
378.0 sm (14.0m x 27.0m)

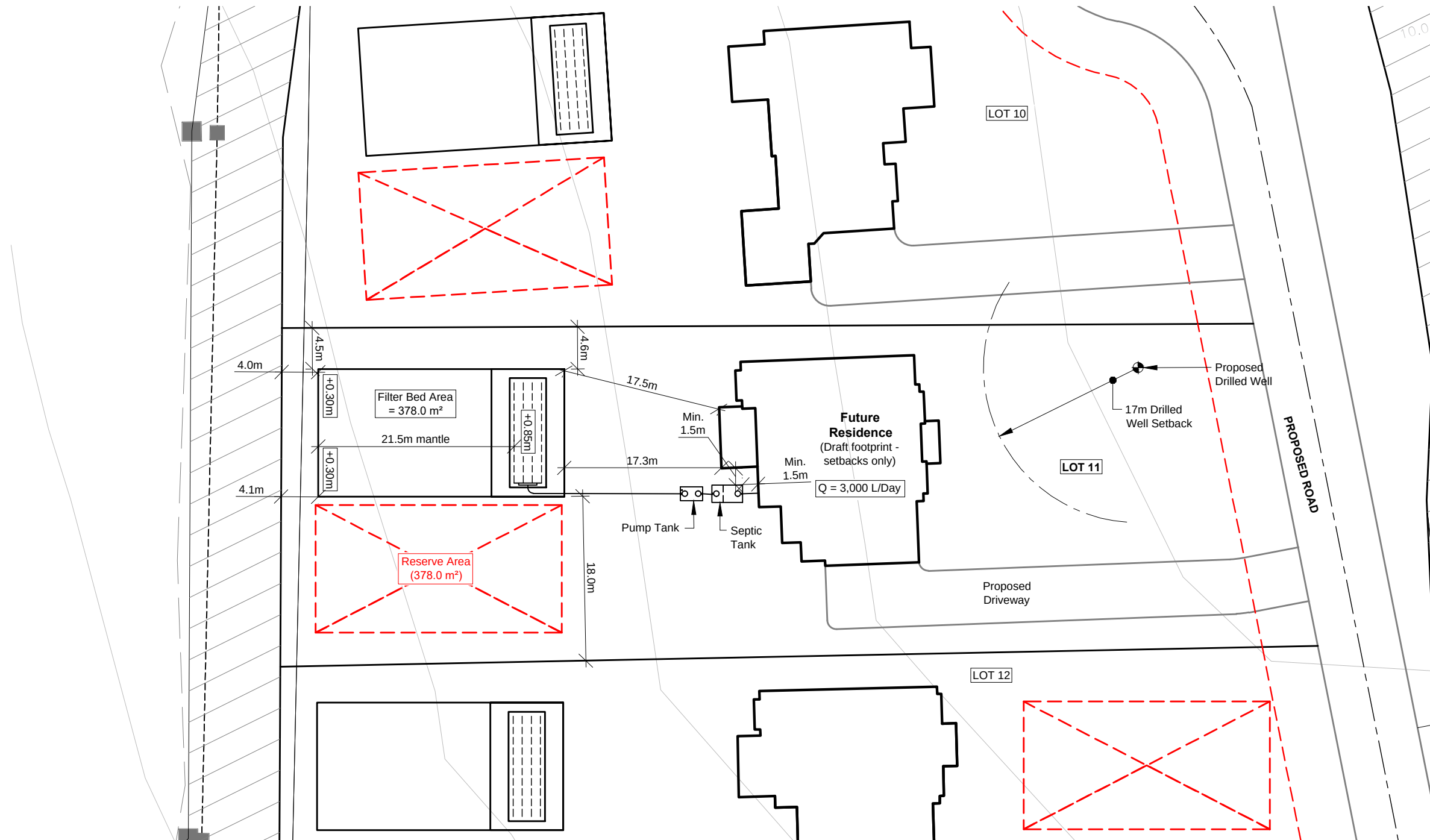
Mantle - Extending 21.5m from centreline of distribution piping.

Septic Area
Soil Percolation Time (T) = 30 min/cm
Loading Rate = 8 L/m²/day
Daily Sewage Flow (Q) = 3,000 L/day (min. required)
Area (prime + reserve) = 750 m² (min.) [3,000 / 8 x 2 areas]

*Based on Durham Region Health Department Lot Sizing Policy document, dated Oct. 2010

Note: Filter beds to be orientated such that
the mantle is oriented in the direction of
effluent flow.

Note: Maximum 4:1 slopes when
grading off the edge of filter bed -
TYP. all sides.



Gunnell Engineering Ltd.
1110 Stellar Drive, Unit 106
Newmarket, ON L3Y 7B7
bus: 905-868-9400
www.septicdesign.ca



DATUM ELEVATIONS: FILTER BED	
Existing Grade = 0.00m (Datum)	
Base Cut (1):	-0.40m
Top of Filter Medium (0.75m filter sand) :	+0.35m
Top of Stone Layer (0.30m stone layer) :	+0.65m
Top of Landscaping (0.20m topsoil):	+0.85m

Note (1): All topsoil to be excavated

All Distribution Piping is
to be a minimum of:
- 16.7m from drilled wells
- 31.7m from dug wells
- 4.7m from property lines
- 6.7m from residence
Note: Filter Bed system
raised 0.85m above finished
grade, therefore increase
setbacks by 1.7m.

Rev. No.	Date	Description	CAD
Rev. 2	11-Jun-2025	Updated Setbacks	ZB
Rev. 1	17-Mar-2025	Site Plan Update	DB

**Proposed Residential
Development
City of Pickering
Region of Durham**

**Typical Lot Layout (Lot 11)
Proposed Sewage System**

Scale: 1:500	Designed By: ZS
Date: 13-JULY-2023	Drawn By: ZS
Project No.:	Checked By: EG
	Drawing No.:

D3534

SP-5