Preliminary Servicing & Stormwater Management Report

Alta Subdivision Phase II
Town of The Blue Mountains

Tabera Ltd.

Prepared By:

C.F. Crozier & Associates Inc.
110 Pine Street
Collingwood, Ontario
L9Y 2N9

January 2008

CFCA File No. 119-2528

TABLE OF CONTENTS

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

C.F. Crozier & Associates Inc. (Crozier) was retained by Tabera Ltd. (Tabera) to complete a preliminary servicing and stormwater management report for the proposed Alta Phase II Subdivision. The 29.8 ha (73.6 acre) site is legally described as Part of Lots 23 and 24, Concession 4, Town of The Blue Mountains (formerly Township of Collingwood), County of Grey. The property is bounded by Hidden Lake Road to the north and Craigleith Provincial Park to the east. Alta Phase I development lands are located to the south and privately owned lands are situated to the west of the subject lands. A Site Location Plan is provided as Figure 1.

The development will consist of 64 single family residential units. The Draft Plan illustrated in Figure 2 presents the road network and lot fabric for the Phase II development lands. The Draft Plan also consists of a stormwater management block and open space blocks for drainage and trail network purposes. In addition, the open space blocks contain both the Nipissing Ridge, which is situated along the north easterly limits of the development lands, and the Niagara Escarpment located to the west.

This report has been prepared to support the Plan of Subdivision Application and Zoning By-Law Amendment. The subject lands are intended to be rezoned to Low Density Recreational Residential.

The following technical information presented in this report provides a preliminary design on the servicing and stormwater management requirements for the site to assist the review agencies; Town of the Blue Mountains (TBM), Grey Sauble Conservation Authority (GSCA) and Niagara Escarpment Commission (NEC) in their review of the planning applications. Contained within this report is a background discussion (Section 2.0); a description of the existing and proposed site conditions (Section 3.0); the proposed stormwater management strategy (Section 4.0); evaluation of the external drainage corridor (Section 5.0); sanitary sewage, water distribution, road standard and utilities (Section 6.0, 7.0, 8.0 and 9.0, respectively) and the conclusions & recommendations (Section 10.0).

2.0 BACKGROUND

The proposed development lies within Subwatersheds 21 and 22 as defined in the *Craigleith Camperdown Subwatershed Study* (GSCA, 1993). The Craigleith Camperdown Subwatershed Study (CCSS) was prepared to identify opportunities and constraints for developments within the subwatersheds identified in the report. Specific areas of concern that were evaluated are flooding, stream channel erosion, groundwater recharge, water quality treatment and environmental resources. The CCSS establishes the framework of the proposed stormwater management strategy set forth in this preliminary report.

Upon consultation discussions with the TBM, it was agreed that the analysis contained herein should include an evaluation of the drainage corridor downstream of the subject lands to the outlet at Georgian Bay.

The subject lands are situated along the servicing boundary for the Camperdown Service Area and the Craigleith Service Area. The Alta Phase II lands were originally situated within the Camperdown Service Area per the *Comprehensive Environmental Study Report for the Lora Bay, Clarksburg, Thornbury and Camperdown Service Areas, Phase 2 Report* (MacViro, 2002). This report stated that the Alta Phase II lands could be temporarily serviced within the Craigleith Service Area via a temporary pump station pumping to the existing pump station constructed in Alta Phase I on Oak Court. Ultimately the development lands would be serviced within the Camperdown Service Area once services were available along Hidden Lake Road.

Prior to construction of the Camperdown external services contract, further investigation of the Wards Road and Hidden Lake Road area was completed to determine the practicality of servicing these lands into the Camperdown Service Area. This re-investigation was warranted because of the excessive depth of the sanitary sewers and pump station located at Delphi Point to provide for a gravity sanitary conveyance system from the Wards Road and Hidden Lake Road service area to the Delphi Pump Station. The major concern was the associated construction costs with the sanitary sewers depth and the relationship to the bedrock and groundwater elevations.

As a result of the re-evaluation of servicing for the Wards Road and Hidden Lake Road areas, an *Addendum to the Comprehensive ESR* (MacViro, 2005) was issued. The Addendum report recommended Hidden Lake/Wards Road and Alta Phase II be transferred to the Craigleith Service Area.

The Town of The Blue Mountains also proceeded with the *Combined EA Master Plan for Craigleith, Castle Glen and Osler* (MacViro, 2006), which established the servicing requirements for the development lands associated with Craigleith, Castle Glen and Osler. The preferred servicing strategy for Alta Phase II was established in the Master Plan EA.

3.0 Site Description

3.1 Existing Conditions

The Alta Phase II lands are bounded by existing single-family residences and Hidden Lake Road to the north, Craigleith Provincial Park to the east, existing Alta Phase I subdivision to the southeast, and undeveloped vacant lands to the west. It should be noted that the entire Alta Phase II property is approximately 30 ha and extends southwest across the face of the Niagara Escarpment, while the actual Phase II development area covers approximately 20 ha of the northern portion of the holdings.

The subject lands generally fall from south to north, with gradients ranging from 2% within the flatlands to approximately 30% across the Escarpment face and Nipissing Ridge lands. The site is physiographically distinguished by five areas: the Escarpment face located at the southwest portion of the development lands; an intermediate plateau on which proposed Street 'C' and Lots 49 – 60 are located; an intermediate ridge located immediately east of Street 'C'; and the "flatlands" on which the balance of the development will occur. The Nipissing Ridge is also located north and east of the "flatlands" which abuts Hidden Lake Road and Craigleith Provincial Park. Refer to Figure 2 for the proposed development layout, site topography and existing configuration of adjacent lands.

Existing access to the subject lands is provided by a single farm lane off of Hidden Lake Road which traverses the face of the Nipissing Ridge. The laneway provides access to five existing barn/agricultural structures currently located on-site. These structures were used in the past during agricultural operations across the "flatlands". These lands are currently idle and not actively used for agricultural operations.

The soils on site are classified as Dunedin clay and Kemble silty clay, according to the Soil Survey of Grey County (1953). These soils are classified as Hydrologic Soil Groups D and C, respectively, per the *Ministry of Transportation Drainage Management Manual* (1997). The existing drainage patterns and conditions are discussed in detail in Section 4.1.

3.2 Proposed Conditions

Alta Phase II will include 64 single family lots designated as low density recreational residential, similar to the Phase I development. The Plan of Subdivision will also include open space blocks, trail linkages and a stormwater management area. The development will be fully serviced with sanitary sewer, watermain and storm sewer. Access to the development will be provided via Alta Road (ie. extension of Alta Road north from the Phase I development) and Hidden Lake Road.

A series of public roads with mountable curb and gutter and storm sewer are proposed. The road will be contained within a 20.0-metre public right-of-way, which will also contain the sanitary sewer, watermain and utilities, consistent with the TBM standard.

4.0 Stormwater Management & Site Drainage

The management of stormwater and site drainage for the proposed development of Alta Phase II must comply with the policies and standards of the various agencies including the Town of The Blue Mountains, Grey Sauble Conservation Authority and Ministry of Environment.

The stormwater management criteria that will be met with the development of Alta Phase II are as follows:

- Water Quantity Control
    - "Post to pre" control for storms up to and including the 100 year storm event.
- Water Quality Control
    - "Enhanced Protection" given Georgian Bay as the ultimate receiver.
- Erosion Control
    - Use of source control and extended detention.
- Development Standard
    - Urban cross section complete with 5-year storm sewer;
    - Lot grading at 2% optimum; and
    - Minor and major drainage system to convey frequent and infrequent rainfall/runoff events respectively.

4.1 Existing Drainage Conditions

As indicated in Section 2.0, the property is located within Subwatersheds 21 and 22 as identified in the CCSS and illustrated on Figure 3, Regional Subwatershed Map. Field reconnaissance conducted by Crozier staff in 2007 suggests that the western portions of Subwatershed 21 and eastern portions of Subwatershed 22 drain to Georgian Bay via separate outlets. Consequently, we have identified and delineated a new subwatershed that bisects Subwatersheds 21 and 22, which is referred to as Subwatershed 21A in this report. Figure 3 illustrates both the original GSCA (1993) and above-noted revised subwatershed boundaries.

Generally, drainage from the subject lands (and the upgradient Niagara Escarpment) shed in a northerly direction toward Hidden Lake Road, concentrating at three (3) locations. These are identified and described in this report as Outlets 'A', 'B', and 'C'. The drainage areas which contribute to these outlets are delineated on Figure 4 and discretized to facilitate hydrologic modeling. The following discussion describes the existing drainage conditions associated with each outlet.

Outlet 'A'

The contributing area to Outlet 'A' is approximately 13.2 ha and extends from the tablelands of the Escarpment to Hidden Lake Road. The contributing area has been discretized into five sub-catchments, as illustrated on Figure 4.

Sub-catchments EXT-1, EXT-2, and EXT-3 contribute drainage from the Escarpment face, which reaches the proposed development lands as sheet flow and within incised channels. A series of man-made ditches located on the "flatlands" of the site direct the drainage towards Hidden Lake Road. Sub-catchment INT-4 also contributes drainage from the toe of the escarpment slope via sheet flow and incised channels to the above-noted interceptor ditches. These interceptor ditches were constructed during historic agricultural operations and extend across sub-catchment INT-1 to the existing 825 mm Ø culvert beneath Hidden Lake Road. It should be noted that a portion of sub-catchment INT-1 consists of sheet flow drainage from the "flatlands" located on the south side of Hidden Lake Road. The existing 825 mm Ø culvert conveys runoff across Hidden Lake Road towards a low lying and poorly drained area before reaching Highway 26 and Georgian Bay. A detailed description of the drainage corridor north of Hidden Lake Road is described in Section 5.0 (External Drainage Corridor Analysis).

Outlet 'B'

The contributing area to Outlet 'B' is approximately 11.2 ha. Similar to Outlet 'A', the drainage area extends from the tablelands of the Escarpment to Hidden Lake Road, and consists of four sub-catchments for hydrologic modeling purposes. Sub-catchments EXT-4 and INT-5 contribute sheet flow from various portions of the Escarpment face to a man-made agricultural ditch extending from the upstream limit of sub-catchment INT-2 across the "flatlands" to an existing 900 mm Ø culvert beneath Hidden Lake Road. The downstream-most area contributing to Outlet 'B' is sub-catchment UNC-3 which consists of both sheet flow and concentrated flow from the face of the Nipissing Ridge.

The existing farm laneway that extends from Hidden Lake Road to the top of the Nipissing Ridge acts as a drainage divide between the areas contributing to Outlets 'B' and 'C'. Interceptor ditches exist along each side of the laneway which direct the intercepted sheet flow to the Hidden Lake Road drainage corridor. The west interceptor ditch ultimately directs drainage to Outlet 'B', the existing 900 mm Ø culvert beneath Hidden Lake Road. The east ditch directs drainage to Outlet 'C'.

Outlet 'C'

The contributing area to Outlet 'C' is approximately 14.0 ha. The drainage area also extends to the tablelands of the Escarpment, similar to the areas contributing to Outlets 'A' and 'B'. Sub-catchments EXT-5 and INT-6 drain the Escarpment face via sheet flow and incised channels across sub-catchment INT-3 ("flatlands") and UNC-4 (Nipissing Ridge). Drainage from these sub-catchments ultimately reaches Watercourse 21A at the 90-degree bend of Hidden Lake Road.

Watercourse 21A was identified by Crozier as a drainage feature independent of Watercourse 21 as originally identified in the CCSS. Originally, the CCSS suggested that Watercourse 21A combines with Watercourse 21. Based on a review of watershed topography and field reconnaissance, it was confirmed that Watercourse 21A drains directly to Georgian Bay along the east roadside ditch of Hidden Lake Road and through the Craigleith Provincial Park north of the highway.

Also evident from the field reconnaissance and watershed topography is the proximity of Watercourse 21A to a tributary of Watercourse 21 in the vicinity of the 90-degree bend at Hidden Lake Road. Given the topography in this area and geometry of Watercourse 21A, spill flow conditions may occur towards Watercourse 21 during large storm events. However the hydrologic and hydraulic analysis contained herein has not reduced peak flows on Watercourse 21A, as a conservative approach.

4.2 Proposed Drainage Conditions

The minor and major drainage systems will follow the alignment of the roadways, collecting both internal and external drainage and directing it north toward a proposed stormwater management facility. Where possible, external drainage entering the site will be intercepted and diverted into existing watercourses and ditches around the perimeter of the site. The post-development drainage plan and preliminary site grading plan are provided as Figures 5 and 6, respectively.

As illustrated in Figure 5, the drainage areas contributing to each of the outlets will change upon development in order to safely manage drainage from both the development area and surrounding lands. For instance, the drainage area contributing to Outlet 'A' reduced from 13.2 ha to 4.5 ha as a result of a series of interceptor ditches and conveyance of runoff across the development lands. The post-development drainage plan will result in an overall reduction of contributing area of over 50% at Outlet 'A', when compared to existing conditions. This in turn will improve downstream drainage capacity issues.

In contrast, the area contributing to Outlet 'B' will increase from 11.2 ha to 23.4 ha. This is primarily a result of regrading the site and controlling the runoff by way of the stormwater management facility. The stormwater facility will drain to the existing 900 mm Ø cross-culvert, respecting its capacity and pre-development peak flow rates. The stormwater quantity and quality control requirements and preliminary configuration of the proposed stormwater management facility are described in Sections 4.3 and 4.4, respectively.

The drainage area contributing to Outlet 'C' will decrease from 14.0 ha to 10.9 ha, as a result of the development. Drainage from sub-catchments EXT-4 and EXT-5 will be intercepted via interceptor ditches along the southwest limit of the development lands and directed to Watercourse 21A. Similarly, sub-catchment INT-5 will convey a nominal drainage area, consisting only of Escarpment slope, directly to Watercourse 21A. The balance of the area contributing to Outlet 'C' in post-development conditions consists of the Nipissing Ridge, located at the northeast corner of the subject lands.

As explained above, a series of interceptor ditches are proposed to manage both external and internal runoff and directing it to the appropriate outlets. The proposed locations, alignments and cross-sectional configurations of these ditches have been incorporated into the development and are illustrated on Figure 6.

In order to meet the stormwater management requirements of the agencies, the subject development will incorporate an extended detention wet pond to provide the necessary water quality, quantity and erosion control. Runoff from the site and portions of external areas will be conveyed to the proposed stormwater wet pond via overland flow and storm sewer. The outfall from the stormwater wet pond will discharge treated runoff to an engineered conveyance channel proposed along the existing farm laneway. This channel will convey treated stormwater north to the existing 900 mm Ø CSP culvert at Hidden Lake Road, also referred to as Outlet 'B'. The preliminary grading of the pond block is shown on Figure 7.

4.3 STORMWATER QUANTITY CONTROL REQUIREMENTS

Hydrologic modeling was prepared for Watershed 21A and 22, in which Alta Phase II is located. In order to examine the effects of the proposed land use change on hydrologic conditions, three points of interest (i.e. Outlets 'A', 'B' and 'C') were examined in detail.

Hydrologic modeling was prepared for the entire area contributing to the aforementioned outlet locations along Hidden Lake Road, for both existing and post-development site conditions. The purpose of the modeling was to determine the detention storage volumes required on-site to ensure post-development peak flow rates do not exceed pre-development levels (i.e. quantity control) at each of the outlet locations.

The stormwater management hydrologic computer program SWMHYMO (Sabourin, 1998) was used to model pre and post-development drainage conditions. The principal hydrologic parameters used in the preliminary modeling were developed using MTO design charts and procedures. Rainfall data was taken from the MTO IDF tables for basins west of and including Collingwood using the 4-hour Chicago rainfall distribution. Hydrologic models were prepared for design storm events including the 2, 10 and 100-year return periods, as well the 25-mm event. The full range of design storms will be analyzed upon detailed design.

The hydrologic parameters and the SWMHYMO model input and output files are found in Appendix A and B, respectively. The SWMHYMO model schematics for pre and post-development conditions are reflected on Figure 8.

For the purposes of evaluating water quantity and quality control requirements, the hydrologic model was established to produce peak flows at the three aforementioned outlet locations based on the pre and post-development drainage plans provided as Figures 4 and 5, respectively. The hydrologic model was then extended to facilitate the external drainage corridor analysis, which is described in Section 5.0.

<u>Modeling Results</u>

Based on the modeling, the pre-development and post-development peak flow rates generated from the property are summarized in Table 1. It is evident that left un-attenuated, post-development peak flows at Outlet 'B' would increase substantially. In contrast, post-development peak flows at Outlets 'A' and 'C' are reduced when compared to existing conditions due to the reduced drainage areas contributing to these two outlets in post-development conditions.

TABLE 1: PRE & POST-DEVELOPMENT (UNCONTROLLED) PEAK FLOW RATES (m^3/s) AT OUTLETS 'A', 'B' AND 'C'

Return Period *Years*	Outlet A			Outlet B			Outlet C		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
	13.20 ha	*4.50 ha*	*Post-Pre*	*11.20 ha*	*23.40 ha*	*Post-Pre*	*14.00 ha*	*10.90 ha*	*Post-Pre*
2	0.294	0.109	*-0.185*	0.215	0.525	*0.310*	0.277	0.269	*-0.008*
10	0.783	0.277	*-0.506*	0.580	1.232	*0.652*	0.745	0.671	*-0.074*
100	1.602	0.558	*-1.044*	1.212	2.437	*1.225*	1.549	1.340	*-0.209*

The ROUTE RESERVOIR routine was used to determine the volume of detention storage required to attenuate the post-development peak flows discharging to Outlet 'B' to below pre-development levels. Results from the modeling conclude that approximately 3,600 m^3 of active storage is required to attenuate the peak flow from the 100-year event to below pre-development levels. The detention storage requirements for the storm events analyzed are summarized in Table 2.

TABLE 2: COMPARISON OF PRE AND POST-DEVELOPMENT (CONTROLLED) PEAK FLOW RATES AT OUTLET 'B' AND SWM FACILITY ACTIVE STORAGE REQUIREMENTS

Return Period *(Years)*	Pre-Development Peak Flow *(m^3/s)*	Active Storage Required *(m^3)*	Post-Development Peak Flow *(m^3/s)*	Difference [Post – Pre] *(m^3/s)*
2	0.215	1,000	0.210	*-0.005*
10	0.580	2,000	0.567	*-0.013*
100	1.212	3,600	1.209	*-0.003*

Based on the preliminary grading of the pond block illustrated on Figure 7, the active storage available is approximately 3,800 m^3 within an active flood depth of 1.4 m. The detailed design will update the hydrologic modeling based on the final development plans.

4.4 WATER QUALITY & EROSION CONTROL

It will be necessary to implement SWM practices to address the water quality and the erosion control requirements of the regulatory agencies. Since Georgian Bay is the ultimate receiver of drainage from the subject lands, the development will incorporate measures to provide "enhanced protection".

Based on a conservative estimate of total site imperviousness of 19%, the water quality storage volume for a stormwater wet pond is 76 m^3/ha (MOE, 2003). This is comprised of 36 m^3/ha permanent pool volume and 40 m^3/ha extended detention. There will be no future development within the external lands and therefore the impervious level of the external lands is negligible. The water quality storage requirements have been developed based on the internal development area of approximately 20 ha contributing to the SWM facility. The water quality storage requirements are as follows:

- Permanent Pool 720 m^3
- Extended Detention 800 m^3

Erosion control will be achieved by incorporating extended detention into the operation of the SWM facility. Sizing was based on providing between 24 and 48 hours extended detention of the runoff produced following a short duration (4 hour) 25 mm storm event. Applying this criterion at this preliminary juncture yields an extended detention volume of approximately 1,300 m^3, which can be achieved in the first 0.5 m of the active storage above the permanent pool elevation.

The operating regime of the proposed wet pond is represented in Table 3 per the preliminary grading design.

TABLE 3: SUMMARY OF STORMWATER WET POND OPERATING CHARACTERISTICS

Pond Level	Elevation *(m)*	Volume *(m^3)*	
		Required	**Provided**
Pond Base	213.5	n/a	n/a
Permanent Pool	214.5	720	1,140 (dead storage)
Extended Detention	215.0	1,300	1,300
100-Yr HWL	215.9	3,600	3,800
Top of Berm	216.3	n/a	4,800

The outlet control structure will be located at the north end of the proposed SWM facility and will discharge to a proposed engineered conveyance channel. The channel will extend approximately 200 m north along the west side of the existing farm laneway and discharge into the existing 900 mm CSP culvert crossing at Hidden Lake Road (Outlet 'B'). Outlet 'B' is the nearest suitable location to discharge stormwater from the subject development, as determined through field reconnaissance and existing topography.

Extended detention within the proposed SWM facility will be achieved by way of a small diameter orifice, which will be specified during detailed design. All flows above the 25 mm event, up to and including the 100 year storm event, will be safely conveyed through the outlet control chamber facility. Storm events in excess of the 100-year event will be safely conveyed downstream via an emergency spillway.

It should be noted that all details with respect to the operation of the SWM facility including specific inverts, detailed grading, inlet locations, sediment forebays, and control structures will be specified during the next stage of the project, that being the detailed engineering design. Likewise, permits/instruments such as a Certificate of Approval (MOE) and GSCA approval will have to be secured prior to construction.

5.0 EXTERNAL DRAINAGE CORRIDOR ANALYSIS

As indicated in the background discussion (Section 2.0), the TBM have requested that the drainage corridor downstream of the subject development be evaluated to determine the conditions of the existing corridor, identify deficiencies and recommend upgrades. This analysis has been requested as part of a larger initiative taken by the TBM to complete a comprehensive drainage corridor evaluation where developments are proposed within the Town. Given the location of the Alta Phase II lands within Subwatersheds 21A and 22 (as discussed in Section 4.0), the external drainage corridor analysis presented herein is limited to these subwatersheds.

The objectives of the external drainage corridor analysis are to evaluate the conditions of existing hydraulic structures within the respective subwatersheds and to determine their hydraulic capacities in order to:

- Demonstrate that there are no negative impacts to the external conveyance corridor as a result of the proposed development of the subject lands;
- Determine if the existing structures have sufficient capacity to meet the requirements stipulated in the Ministry of Transportation's Directive B-100; and,
- Provide recommendations for upgrades and/or maintenance to existing structures.

As discussed in Section 4.3, water quantity control has been incorporated into the overall stormwater management plan of Alta Phase II to ensure that post-development peak flow rates are below pre-development levels at the various outlet locations. Therefore, the downstream drainage corridor analysis presented herein is limited to the post-development drainage conditions scenario upon full build-out of Alta Phase II.

Overall, the drainage analysis involved a review of background information, field reconnaissance, supplementary topographic and structure survey, extension of hydrologic modeling, and detailed hydraulic calculations. A detailed description and summary of results for each of the elements of the analysis are described for the respective study subwatersheds below.

5.1 SUBWATERSHED 22

As explained in Section 4.0, field reconnaissance conducted by Crozier staff lead to a revised delineation of Subwatershed 22 across the subject lands and further downstream. The external drainage corridor analysis is based on the updated subwatershed delineation and peak flows generated from the current hydrologic modeling. Refer to Figure 9 for a delineation of Subwatershed 22 and its various sub-catchments. When compared to Figure 5 (Post-Development Drainage Plan), it is important to note that additional sub-catchments were introduced around the subject development to account for the entire lands contributing to the outlet of Subwatershed 22 at Georgian Bay. These additional sub-catchments were appended to the previously described SWMHYMO hydrologic model in order to provide peak flow estimates at selected points of interest.

Under post-development conditions, the area contributing to the outlet of Subwatershed 22 is 70 ha, which includes the subject lands, the Escarpment face, the Nipissing Ridge, and the Hidden Lake area. Existing single-family residential lots and a condominium development are located below the Nipissing Ridge between Hidden Lake Road and James Street. This area also includes Hidden Lake. The Georgian Trail and Highway 26 traverse the north portion of Subwatershed 22 which terminates at the shoreline of Georgian Bay.

Drainage from upstream external and internal lands will be directed to Outlets 'A' and 'B' within Subwatershed 22. A small portion of the Alta Phase II and upstream external lands will contribute to Outlet 'C' which is located within Subwatershed 21A (see Section 5.2).

Outlet 'A' consists of an 825 mm Ø CSP culvert and Outlet 'B' consists of a 900 mm Ø culvert, both of which convey runoff beneath Hidden Lake Road. The runoff is then conveyed across private properties within defined watercourses before dissipating into an existing low lying area between the base of the Nipissing Ridge and the Georgian Trail. This low area is poorly drained and measures approximately 130 metres long by 30 metres wide, on average. Immediately east of this low area is Hidden Lake, which accepts overflow from the low area during periods of elevated runoff. The low lying area ultimately drains north beneath Georgian Trail and Highway 26 via a series of culverts before reaching the outlet of Subwatershed 22 at Georgian Bay.

Hydrologic Modeling & Results

The SWMHYMO hydrologic model was used to establish peak flows throughout Subwatershed 22. The model produced peak flows at three points of interest, namely Outlet 'A', Outlet 'B' and the subwatershed outlet at Georgian Bay. The natural detention storage of the existing low lying area upstream of the Georgian Trail was accounted for in the hydrologic modeling. A stage-storage-discharge relationship was developed based on available background information and incorporated into the hydrologic modeling as a ROUTE RESERVOIR routine to account for the natural attenuation.

The additional hydrologic parameters and the SWMHYMO model input and output files are found in Appendix A and B, respectively. Results from the hydrologic modeling for the 2-year and 100-year storm events are summarized in Table 4, and the results from the remainder of the storm events are contained in the model output files.

TABLE 4: SUMMARY OF SUBWATERSHED 22 POST-DEVELOPMENT PEAK FLOWS (m^3/s)

Return Period *(Years)*	**Outlet 'A'** *[4.5 ha]*	**Outlet 'B'** *[23.4 ha]*	**Subwatershed 22 Outlet** *[69.8 ha]*
2	0.109	0.210	0.211
100	0.558	1.209	0.507

It is evident from Table 4 that the natural attenuation provided in the low lying area adjacent to the Georgian Trail significantly reduces the peak flows within the subwatershed. The peak flows listed above were used in conjunction with the hydraulic calculations described below to evaluate the hydraulic condition and capacity of the culverts downstream of subject lands to the outlet at Georgian Bay.

Hydraulic Modeling & Results

The major drainage corridors within Subwatershed 22 were described above. The location and size of the main hydraulic structures located along the drainage corridors are identified on Figure 10. Each of the culverts were surveyed to determine its size, extent and relationship to adjacent ground elevation. Photographs of each of the structures were also taken to document the existing conditions and recommend maintenance or improvements.

The hydraulic capacity of each of the structures was computed using the CulvertMaster computer model and compared to the peak flows generated using SWMHYMO as presented in Table 4. Input data into the CulvertMaster model includes the size of the hydraulic structure, type of material, upstream and downstream invert elevation, tailwater elevation and maximum headwater elevation.

In order to determine the tailwater conditions, the FlowMaster model was used to compute depth of flow at natural channel sections immediately downstream of each hydraulic structure. The resulting normal depth was then input into the CulvertMaster model as the tailwater elevation in order to establish whether the culvert will operate as inlet or outlet control under a given peak flow condition.

Results from the hydraulic calculations are presented in Appendix C and summarized on the culvert data sheets found in Appendix D. The summary sheets include culvert identification and location, characteristic hydraulic rating curves, return period capacity, photographs and key dimensions. A summary of the results from the hydraulic analysis of structures within Subwatershed 22 is listed in Table 5.

TABLE 5: SUMMARY OF HYDRAULIC STRUCTURE CHARACTERISTICS WITHIN SUBWATERSHED 22

Culvert ID	Culvert Location	Culvert Size / Type	Maximum Capacity *(m^3/s)*	100-Year Peak Flow* *(m^3/s)*	Return Period Capacity
1	Hidden Lake Road	825 mm CSP	1.2	0.55	> 100 Year
2	Private Driveway (Hidden Lake Road)	3 x 300 Conc.	0.6	0.55	> 100 Year
3	Private Driveway (Hidden Lake Road)	825 mm CSP	0.9	0.55	> 100 Year
4	Hidden Lake Road	900 mm CSP	1.9	1.20	> 100 Year
5	Georgian Trail	825 mm CSP	1.3	0.51	> 100 Year
6	Rear Yard	750 mm CSP	0.7	0.51	> 100 Year
7	Private Driveway (Highway 26)	825 mm CSP	1.2	0.51	> 100 Year
8	Highway 26	1500 x 900 mm CSPA	2.8	0.51	> 100 Year

* Based on Post-Development conditions and implementation of SWM Facility within Alta Phase II.

It is evident from Table 5 that the hydraulic capacities of all structures located along the major drainage corridor within Subwatershed 22 exceed the 100-year peak flows at their respective locations. This exceeds the recommended culvert capacity requirements of MTO per Directive B-100. Replacement of these culverts with larger sizes is not warranted.

We have also evaluated the culverts based on the factors that may influence their hydraulic capacity such as sediment build-up within the structure, blocked inlet and outlet from excessive vegetation or debris/sediment deposits, and damaged structures. Based on field reconnaissance conducted by Crozier staff, all culverts noted above were found to be in good operating condition with the exception of Culvert No. 1, where significant sediment deposits were observed at the downstream end of the culvert. We recommend immediate cleanout of this culvert to ensure its hydraulic capacity is not compromised.

5.2 SUBWATERSHED 21A

As explained in Section 4.0, field reconnaissance conducted by Crozier staff identified drainage patterns within Subwatershed 21, which differed from that reported in the CCSS. In order to address the observed drainage patterns, a new subwatershed was delineated and is referred to as Subwatershed 21A in this report. Drainage from a portion of Subwatershed 21A was described in detail in Section 4.1, however given the subwatershed-scale scope of this supplementary analysis, additional sub-catchments were delineated to account for the entire drainage area contributing to its outlet at Georgian Bay. Refer to Figure 9 for the post-development subwatershed plan considering the entire Subwatershed 21A drainage area. Similar to that of Subwatershed 22, the additional sub-catchments were appended to the previously described SWMHYMO hydrologic model in order to provide peak flow estimates at selected points of interest from the subject lands to the outlet at Georgian Bay.

Upon development of Alta Phase II and as illustrated on Figure 9, the area contributing to the outlet of Subwatershed 21A is approximately 43 ha, which includes the site and external lands. Existing residential homes fronting Hidden Lake Road and the Craigleith Provincial Park are located within the subwatershed.

Drainage from the tablelands of the Escarpment emanates as sheet flow toward Watercourse 21A, which is an incised watercourse as it traverses north across the Escarpment face. Watercourse 21A accepts additional drainage as it passes across the subject lands and the Nipissing Ridge. At the base of Nipissing Ridge the watercourse follows a 90-degree bend at Hidden Lake Road (Outlet 'C') and flows north along the east side of Hidden Lake Road beneath six (6) driveway culverts (all 1100 mm x 700 mm CSPA) before reaching the Georgian Trail. Watercourse 21A then passes beneath Georgian Trail via a pair of 750 mm Ø CSP culverts and Highway 26 via a 1650 mm by 1020 mm CSPA culvert before discharging to Georgian Bay at the north limit of Craigleith Provincial Park.

As noted in Section 4.1, the possibility of spill flow conditions exists from Watercourse 21A to Watercourse 21 via a broad draw extending from the forested area near the 90-degree bend at Hidden Lake Road to Watercourse 21. It is speculated that prior to the construction of the sewage leaching bed for Craigleith Provincial Park, this may have been the original drainage route of Watercourse 21A. (Watercourse 21 conveys drainage beneath the Georgian Trail via a 1600 mm by 900 mm CSPA culvert and beneath Highway 26 via a 1.25 m by 2.45 m concrete box culvert).

Hydrologic Modeling & Results

Similar to that of Subwatershed 22, the SWMHYMO hydrologic models prepared for the subject development were extended to account for the entire drainage area contributing to the outlet of Subwatershed 21A. Additional sub-catchments were appended to the post-development drainage plan, as reflected on Figure 9, resulting in a total subwatershed area of approximately 43 ha.

The hydrologic model produced peak flows at two points of interest, namely Outlet 'C' and the subwatershed outlet at Georgian Bay. The peak flow established at the subwatershed outlet was utilized to evaluate the hydraulics of the existing culverts beneath Georgian Trail and Highway 26. The culverts within Craigleith Provincial Park were not analyzed as they are located near the outlet of the subwatershed and on lands not owned by the municipality.

The additional hydrologic parameters and the SWMHYMO model input and output files are found in Appendix A and B, respectively. Results from the hydrologic modeling for the 2-year and 100-year storm events are summarized in Table 6, and the results from the remainder of the storm events are contained in the model output files.

TABLE 6: SUMMARY OF SUBWATERSHED 21A POST-DEVELOPMENT PEAK FLOWS (m^3/s)

Return Period *(Years)*	**Outlet 'C'** *[35.7 ha]*	**Subwatershed 21A Outlet** *[42.7 ha]*
2	0.76	0.81
100	3.91	4.19

Although the contributing drainage area to the outlet of Subwatershed 21A is smaller than that of Subwatershed 22, it produces higher peak flows since there are no significant natural storage areas within the watershed, to dampen the peak flow, unlike Subwatershed 22. The peak flows listed above were used in conjunction with the hydraulic calculations described below to evaluate the hydraulic condition and capacity of the culverts downstream of the subject lands to the outlet at Georgian Bay.

Hydraulic Modeling & Results

The major drainage corridors within Subwatershed 21A were described above. The location and size of the main hydraulic structures located along the aforementioned drainage corridors are identified on Figure 10. Similar to the exercise described for Subwatershed 22, each of the identified culverts were surveyed to determine their size, extent and relationship with adjacent ground elevation.

The hydraulic capacity of each of the structures was computed using the methodology described in Section 5.1 for Subwatershed 22. Results from the hydraulic calculations are provided in Appendix C and are summarized on culvert data sheets found in Appendix D. These summary sheets include culvert identification and location, characteristic hydraulic rating curves, return period capacity, photographs and key dimensions. A summary of the results from the hydraulic analysis of structures within Subwatershed 21A are listed in Table 7.

TABLE 7: SUMMARY OF HYDRAULIC STRUCTURE CHARACTERISTICS WITHIN SUBWATERSHED 21A

Culvert ID	Culvert Location	Culvert Size / Type	Maximum Capacity *(m^3/s)*	100-Year Peak Flow *(m^3/s)*	Return Period Capacity
9	All Private Driveways (East side of Hidden Lake Road)	1100 x 700 mm CSPA (typ.)	0.5	3.9	< 2 Year
10	Georgian Trail	2 x 750 mm CSP	1.2	4.2	< 5 Year
11	Highway 26	1650 x 1020 mm CSPA	2.7	4.2	< 25 Year

Note: Return Period Capacity based on conservative peak flows without considering potential spill flow analysis to Watercourse 21.

It is evident from Table 7 that the hydraulic capacities of all structures located along the drainage corridor of Subwatershed 21A are below the 100-year peak flows at the respective locations. Culvert No. 9 represents a series of six driveway culverts along the east side of the Hidden Lake Road right-of-way which are all similar in shape and hydraulic characteristics. In general, these driveway culverts have capacities less than the 2-year storm event. Although it is preferable that the driveway culverts convey flows of at least the 2-year event, replacement or improvement of these culverts is at the discretion of the Town. Improvements such as the construction of headwalls and annual maintenance should be considered to optimize their hydraulic capacities.

Culvert No. 10 conveys runoff beneath Highway 26 and has greater capacity than the other structures, however its capacity is less than the 25-year return period capacity as required by the MTO Drainage Directive B-100.

Based on the above hydraulic analysis, the entire Watercourse 21A drainage corridor downstream of the subject lands is deficient despite the slightly reduced peak flows within the corridor as a result of the proposed Alta Phase II development. It should also be noted that the drainage corridor is deficient in a pre-development state. Replacement of the existing culverts may be considered as a remedial measure. However, given the number of culverts and extent of reconstruction to upgrade this drainage corridor, it may be prudent to re-establish the original Subwatershed 21 boundaries by redirecting runoff from Subwatershed 21A to Watercourse 21, via the previously described spill flow route. Based on the 1.25 m by 2.45 m concrete box culvert beneath Highway 26 relative to its existing drainage area of approximately 40 ha, the use of Watercourse 21 to convey drainage from the additional Subwatershed 21A lands may resolve the existing capacity issues along the

Watercourse 21A drainage corridor. Furthermore, the feasibility of this remedial strategy would have to be investigated from a technical perspective and the Town would have to enter into negotiations with the Ministry of Natural Resources, who own the Craigleith Provincial Park. This drainage investigation should be completed during the detailed design of Hidden Lake Road to potentially reduce the construction costs associated with upgrading this drainage corridor.

Finally, all culverts within the public right-of-ways along Watercourse 21A were observed to be in good operating condition with respect to inlet/outlet condition and sediment accumulation. However, annual inspection and maintenance of these structures should be considered to optimize their hydraulic capacities.

6.0 SANITARY SEWAGE SYSTEM

*The Combined EA Master Plan for Craigleith, Castle Glen and Osler (*MacViro, 2006*) and Addendum to the Phase 2 Comprehensive ESR* (MacViro, 2005), the framework for the sanitary servicing for Alta Phase II.

The above mentioned reports recommended the Hidden Lake area, consisting of Alta Phase II, Ward's Road, and Hidden Lake Road be serviced in the Craigleith Service Area. It is understood there is an uncommitted reserve capacity within the Craigleith Waste Water Treatment Plant to accommodate the 64 residential lots of Alta Phase II.

The Hidden Lake area, including Alta Phase II will be serviced via a proposed pumping station situated at the intersection of Hidden Lake Road and Highway 26. The pump station will pump sewage easterly along the Georgian Trail to Arrowhead Road via a 150 mm forcemain. From Arrowhead Road, the forcemain will convey the sewage southerly to the existing pump station situated at the intersection of Arrowhead Road and Margaret Drive.

Presently, the Margaret Drive pump station receives sewage from Alta Phase 1, Alpine Flatlands Phase I and II, Arrowhead Crescent and Alpine Ski Club. The sewage is pumped to a 200 mm Ø gravity sewer located further south and east on Sleepy Hollow Road. The Margaret Drive pump station will be decommissioned in the future upon completion of a trunk gravity sewer through the Georgian Woodlands Phase IV lands. Said sewer will connect to the existing 450 mm Ø sanitary sewer located on Old Lakeshore Road. This trunk sewer conveys sewage to the Craigleith Pump Station, which ultimately pumps sewage to the Craigleith Waste Water Treatment Plant.

In summary, the external sanitary servicing upgrades that are required for Alta Phase II consist of:

- 1100 m – 200 mm Ø gravity sewer along Hidden Lake Road
- Permanent Pump Station located at the intersection of Hidden Lake Road and Highway 26.
- 1320 m – 150 mm Ø forcemain (size to be confirmed) along the Georgian Trail and Arrowhead Road.

It is understood that these external upgrades are considered 2009 capital works projects by the Town of The Blue Mountains.

The above external sanitary sewer works are represented on Figure 11.

6.1 Proposed Internal Servicing Strategy

The development will be serviced by a local collector sewer (minimum diameter of 200 mm) that will follow the alignment of the internal roadway system. The sanitary sewers will drain to the low point of the development, located near the SWM block. The sanitary sewer will then outlet to Hidden Lake Road along the alignment of the existing farm laneway and connect to the proposed gravity sanitary sewer on Hidden Lake Road and be conveyed to the proposed pump station at the intersection of Highway 26 and Hidden Lake Road. Refer to Figure 12 for the internal sanitary sewage conveyance system. Each lot will have individual 125 mm Ø service laterals connected to the local sewer.

7.0 Potable Water Supply

Water supply for the subject development is supplied by the Thornbury Water Filtration Plant, which also services areas within Thornbury, Clarksburg, Camperdown, Lora Bay and Craigleith. The Thornbury Water Filtration Plant (TWFP) is owned by the Town of The Blue Mountains. During the preparation of the Craigleith EA in 2005, the total water supply available from the TWFP was 9,953 m^3/day. The Town of The Blue Mountains currently has an agreement with the Town of Collingwood for a staged supply of water, up to a maximum of 8000 m^3/day by the year 2010. It should also be noted the Town of Collingwood has expressed their willingness to update the agreement, which would allow a supply of 15,000 m^3/day upon completion of a planned expansion of the Raymond A. Baker Water Filtration Plant in Collingwood. The two water supply points is the preferred long term water supply option, which provides security of supply and minimizes capital costs for upgrading the TBM water supply infrastructure.

Two scenarios of water supply from Collingwood and Thornbury were identified in the Craigleith EA to meet the ultimate water demand projections and are noted below:

1) *8,000 m^3/day from Collingwood as per current agreement; 31,378 m^3/day from Thornbury. A total of 15,674 m^3/day would be supplied from Thornbury to the East area of the water system.*

2) *Approximately 15,000 m^3/day from Collingwood and 24,378m^3/day from Thornbury. A total of 8,674 m^3/day would be supplied from Thornbury to the East area of the water system.*

To meet the ultimate water demand projections as noted in the Craigleith EA, additional water supply is required from the TWFP for both options noted above.

Based on discussions with the Town of The Blue Mountains, it is understood that suitable water supply is available for the development of the 64 units in Alta Phase II at the present time.

7.1 Proposed Internal Servicing Strategy

The internal watermain distribution system will follow the proposed internal roadway system and provide individual service connections for each lot. Two connection points will be provided to the existing water system at Alta Road and Hidden Lake Road. An existing 200 mm Ø currently exists on Alta Road and this 200 mm Ø watermain will be continued along the proposed alignment of Alta Road and connect to the existing watermain on Hidden Lake Road. A 150 mm Ø watermain is located along Hidden Lake Road and services the existing residents fronting Hidden Lake Road.

Streets B and C will have a minimum 150 mm Ø watermain installed and looped back to the 200 mm Ø main on Alta Road. This sizing will be subject to completing a distribution analysis during the detailed design process to verify maximum day demands and fire flow requirements are meet. Refer to Figure 13 for the proposed Water Distribution system.

8.0 Road Standard

Access to the site will be via Hidden Lake Road and Alta Road.

The subject development will be serviced by 20.0-metre public roads with an urban cross section (i.e. curb & gutter, storm sewers). All internal roadways will be constructed as per municipal standards and the recommendations of the geotechnical reports completed for the development prior to detailed design. Utilities and infrastructure will be contained within the public road allowances and any necessary servicing easements to service the lands in an economical fashion.

During the construction of Alta Road within Phase I from Hemlock Court to the temporary turning circle, a 2.0m wide trail was constructed within the boulevard. It is proposed to continue the 2.0m wide trail along Alta Road to Hidden Lake Road per the typical road standard used in Phase I.

During the detailed design the boulevard grading and proposed road sections for Street C will require a comprehensive design and grading exercise based on the requirement to install multiple cross culverts to convey the external drainage and the proximity of the intermediate ridge along the north/east limits of the road allowance. Since this road is single loaded, alternative grading within the boulevard on the north and east side of the road may be feasible to allow for the proposed vertical alignment of the road to blend into the existing topography.

9.0 Utilities

The subject development will be serviced with natural gas, telephone, hydro and cable TV. All such utilities are available along the adjacent public roadways. Therefore, this development can be serviced from existing utility plants. Further discussions with the utility companies will occur during detailed design to coordinate the servicing and utility designs

10.0 CONCLUSIONS & RECOMMENDATIONS

Based on the foregoing, we conclude that the proposed Alta Phase II development in the Town of The Blue Mountains can be adequately serviced.

1. Access to the site will be by way of two public roadways, Hidden Lake Road and Alta Road.
2. The subdivision will be fully serviced by way of municipal water and sewer.
3. The construction of an external pump station, 1100 m of gravity sewer and 1320 m of forcemain will be required to service the development.
4. The domestic water supply will be provided by a looped system with connections to the existing watermains on the adjacent public streets
5. Utilities including power, gas, telephone and cable services are available.
6. Stormwater management controls will be implemented for the development to treat runoff for water quality and quantity purposes as well as erosion control. A stormwater management facility will treat runoff for the site prior to discharging from the site.
7. The external drainage will be safely conveyed through the development via drainage channels to either the SWM facility and or the pre-development drainage outlets.
8. The development will not aggravate drainage conditions downstream as demonstrated through the external drainage corridor analysis.
9. Upgrades to the drainage corridor along Watercourse 21A should be considered.

Therefore, we recommend approval of the Plan of Subdivision Application and Zoning By-Law Amendment of the subject lands from the perspective of engineering servicing requirements.

Respectfully Submitted,

C.F. CROZIER & ASSOCIATES INC.

Ian McCutcheon, C.E.T.

C.F. CROZIER & ASSOCIATES INC.

Christopher F. Crozier, P.Eng.

J:\119 - Tabera Ltd\2528\Reports\01302008 FSR.doc

APPENDIX A

Hydrologic Parameters

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	D.A.	Int 1-Pre
Project No.:	119-2528	Area	1.4 ha
File:	Hyd Parameters		
Design by:	K. Simmons		
Date:	22-May-07		

Int 1-Pre

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Kemble	C	Silty Clay	1.4	100	1.4	73	102.2	0.0		0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			1.4		1.4		102.2	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0	0.0		0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

XImp **0** %

TImp **0** %

Composite Curve Number (for previous areas) **73.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	1.4	14.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area 1.4 ha

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	3.16	158	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	158	m
Elevation Drop	5	m
Sw	3.16	%

Runoff Coefficient Determination

Land Use	Kemble C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	1.4	0.7		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.22	0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			0.7			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km²)

Time of Concentration	16.3 min	0.27 hours
Time to Peak	10.9 min	0.18 hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km²)

Time of Concentration	15.0 min	0.25 hours
Time to Peak	10.1 min	0.17 hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II
Project No.:	119-2528
File:	Hyd Parameters
Design by:	K. Simmons
Date:	22-May-07

D.A. **Int 2-Pre**
Area **5.8 ha**

Int 2-Pre

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Kemble	C	Silty Clay	5.8	100	5.8	73	423.4			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			5.8		5.8		423.4	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp **0** %

Timp **0** %

Composite Curve Number (for previous areas) **73.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	5.8	58.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area **5.8** **ha**

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	2.83	265	.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	265	m
Elevation Drop	7.5	m
Sw	2.83	%

Runoff Coefficient Determination

Land Use	Kemble C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	5.8	3.0		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated		0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious		0.0	0.0									
Total			3.0			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km²)

Time of Concentration	**21.8** min	**0.36** hours
Time to Peak	**14.6** min	**0.24** hours

$$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km²)

Time of Concentration	**15.0** min	**0.25** hours
Time to Peak	**10.1** min	**0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC

HYDROLOGIC PARAMETERS

Project:	Alta Phase II
Project No.:	119-2528
File:	Hyd Parameters
Design by:	K. Simmons
Date:	22-May-07

D.A. **Int 3-Pre**
Area **4.9 ha**

Int 3-Pre

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition		Woodland			Meadow		
			Area(ha)	*Percent*	*Area*	*CN*	*CN*A*	*Area*	*CN*	*CN*A*
Kemble	C	Silty Clay	4.9	100	4.9	73	357.7	0.0		0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			4.9		4.9		357.7	0.0		0

Wetlands			Lawn			Cultivated			Impervious	
Area	*CN*	*CN*A*	*Area*	*CN*	*CN*A*	*Area*	*CN*	*CN*A*	*Land Use*	*Area (ha)*
0.0		0	0.0		0	0.0	62	0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp **0** %

Timp **0** %

Composite Curve Number (for previous areas) **73.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	4.9	49.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area **4.9** ha

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	3.96	414	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	366	m
Elevation Drop	14.5	m
Sw	3.96	%

Runoff Coefficient Determination

Land Use	Kemble C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.62	4.9	2.5		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.22	0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			2.5			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration **23.0** min **0.38** hours
Time to Peak **15.4** min **0.26** hours

$$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration **15.0** min **0.25** hours
Time to Peak **10.1** min **0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II
Project No.:	119-2528
File:	Hyd Parameters
Design by:	K. Simmons
Date:	22-May-07

D.A. **Int 4-Pre**
Area **2.0 ha**

Int 4-Pre

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition		Woodland			Meadow		
			Area(ha)	Percent	Area	CN	CN*A	Area	CN	CN*A
Dunedin	D	Clay	2.0	100	2.0	79	158			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			2.0		2.0		158	0.0		0

Wetlands			Lawn			Cultivated			Impervious	
Area	CN	CN*A	Area	CN	CN*A	Area	CN	CN*A	Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

XImp 0 %

TImp 0 %

Composite Curve Number (for previous areas) **79.0**

Total Property Area 2.0 ha

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	2.0	20.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	11.98	96	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	96	m
Elevation Drop	11.5	m
Sw	11.98	%

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	2.0	1.0		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			1.0			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration	8.2 min	0.14 hours	$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{0.33}}$
Time to Peak	5.5 min	0.09 hours	

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration	15.0 min	0.25 hours	$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$
Time to Peak	10.1 min	0.17 hours	

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II
Project No.:	119-2528
File:	Hyd Parameters
Design by:	K. Simmons
Date:	22-May-07

D.A. **Int 5-Pre**
Area **0.9 ha**

Int 5-Pre

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition		Woodland			Meadow		
			Area(ha)	*Percent*	*Area*	*CN*	*CN*A*	*Area*	*CN*	*CN*A*
Dunedin	D	Clay	0.9	100	0.9	79	71.1			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			0.9		0.9		71.1	0.0		0

Wetlands			Lawn			Cultivated			Impervious	
Area	*CN*	*CN*A*	*Area*	*CN*	*CN*A*	*Area*	*CN*	*CN*A*	*Land Use*	*Area (ha)*
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp <u>0</u> %

TImp <u>0</u> %

<u>Composite Curve Number</u>
<u>(for previous areas)</u> **<u>79.0</u>**

Total Property Area **0.9** **ha**

Land Use	*Initial Abstraction (mm)*	*Area (ha)*	*IA*A*
Wetlands	16	0.0	0.0
Woodland	10	0.9	9.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	14.37	87	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	87	m
Elevation Drop	12.5	m
Sw	14.37	%

Runoff Coefficient Determination

Land Use	Dunedin			0			0			0		
	C(-)	*Area*	*CA*	*C(-)*	*Area*	*CA*	*C(-)*	*Area*	*CA*	*C(-)*	*Area*	*CA*
Woodland	0.52	0.9	0.5		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			0.5			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

<u>Time of Concentration</u>	<u>7.3</u>	min	<u>0.12</u>	hours
<u>Time to Peak</u>	<u>4.9</u>	min	<u>0.08</u>	hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{\ 0.33}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

<u>Time of Concentration</u>	<u>15.0</u>	min	<u>0.25</u>	hours
<u>Time to Peak</u>	<u>10.1</u>	min	<u>0.17</u>	hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	D.A.	Int 6-Pre
Project No.:	119-2528	Area	0.7 ha
File:	Hyd Parameters		
Design by:	K. Simmons		
Date:	22-May-07		

Int 6-Pre

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Dunedin	D	Clay	0.7	100	0.7	79	55.3			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			0.7		0.7		55.3	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

XImp **0** %

TImp **0** %

Composite Curve Number (for previous areas) **79.0**

Total Property Area 0.7 ha

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	0.7	7.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	11.88	101	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	101 m
Elevation Drop	12 m
Sw	11.88 %

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	0.7	0.4		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			0.4			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km²)

Time of Concentration	**8.4** min	**0.14** hours
Time to Peak	**5.6** min	**0.09** hours

$$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km²)

Time of Concentration	**15.0** min	**0.25** hours
Time to Peak	**10.1** min	**0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	D.A.	Unc-3 Pre
Project No.:	119-2528	Area	1.9 ha
File:	Hyd Parameters		
Design by:	K. Simmons		
Date:	22-May-07		

Unc-3 Pre

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition		Woodland			Meadow		
			Area(ha)	*Percent*	*Area*	*CN*	*CN*A*	*Area*	*CN*	*CN*A*
Kemble	C	Silty Clay	1.9	100	1.9	73	138.7			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			1.9		1.9		138.7	0.0		0

Wetlands			Lawn			Cultivated			Impervious	
Area	*CN*	*CN*A*	*Area*	*CN*	*CN*A*	*Area*	*CN*	*CN*A*	*Land Use*	*Area (ha)*
0.0		0			0	0.0		0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

XImp **0** %

TImp **0** %

Composite Curve Number (for previous areas) **73.0**

Land Use	*Initial Abstraction (mm)*	*Area (ha)*	*IA*A*
Wetlands	16	0.0	0.0
Woodland	10	1.9	19.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area	1.9	ha
Average Lot Size		ha
Number of Houses		
Building footprint		m^2
Pavement Width		m
Sidewalks		m^2
Length ROW		m
Driveway		m^2

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	2.00	112	0.4
Impervious	2	2	500	0.013

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	112	m
Elevation Drop	25	m
Sw	22.32	%

Runoff Coefficient Determination

Land Use	Kemble			0			0			0		
	C(-)	*Area*	*CA*	*C(-)*	*Area*	*CA*	*C(-)*	*Area*	*CA*	*C(-)*	*Area*	*CA*
Woodland	0.52	1.9	1.0		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Impervious		0.0	0.0									
Total			1.0			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration **7.2** min **0.12** hours

Time to Peak **4.8** min **0.08** hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration **15.0** min **0.25** hours

Time to Peak **10.1** min **0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	**D.A.**	**Unc-4 Pre**
Project No.:	119-2528	**Area**	**3.2 ha**
File:	Hyd Parameters		
Design by:	K. Simmons		
Date:	22-May-07		

Unc-4 Pre

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Kemble	C	Silty Clay	3.2	100	3.2	73	233.6			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			3.2		3.2		233.6	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0			0	0.0		0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp **0** %

Timp **0** %

Composite Curve Number (for previous areas) **73.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	3.2	32.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area	3.2	ha
Average Lot Size		ha
Number of Houses		
Building footprint		m^2
Pavement Width		m
Sidewalks		m^2
Length ROW		m
Driveway		m^2

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	2.00	176	0.4
Impervious	2	2	500	0.013

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	176	m
Elevation Drop	31	m
Sw	17.61	%

Runoff Coefficient Determination

Land Use	Kemble C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	3.2	1.7		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn	0.35	0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Impervious		0.0	0.0									
Total			1.7			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration	**9.7** min	**0.16** hours
Time to Peak	**6.5** min	**0.11** hours

$$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration	**15.0** min	**0.25** hours
Time to Peak	**10.1** min	**0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II
Project No.:	119-2528
File:	Hyd Parameters
Design by:	K. Simmons
Date:	22-May-07

D.A. Ext-1
Area 3.5 ha

Ext-1

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Dunedin	D	Clay	3.5	100	3.5	79	276.5			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			3.5		3.5		276.5	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp 0 %

Timp 0 %

Composite Curve Number (for previous areas) 79.0

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	3.5	35.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area 3.5 ha

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	36.00	457	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	457 m
Elevation Drop	164.5 m
Sw	36.00 %

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	3.5	1.8		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			1.8			0.0			0.0			0.0

Composite Runoff Coefficient 0.520

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration 12.4 min 0.21 hours
Time to Peak 8.3 min 0.14 hours

$$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration 15.0 min 0.25 hours
Time to Peak 10.1 min 0.17 hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	D.A.	Ext-2
Project No.:	119-2528	Area	4.1 ha
File:	Hyd Parameters		
Design by:	K. Simmons		
Date:	22-May-07		

Ext-2

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition		Woodland			Meadow		
			Area(ha)	Percent	Area	CN	CN*A	Area	CN	CN*A
Dunedin	D	Clay	4.1	100	4.1	79	323.9			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			4.1		4.1		323.9	0.0		0

Wetlands			Lawn			Cultivated			Impervious	
Area	CN	CN*A	Area	CN	CN*A	Area	CN	CN*A	Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

XImp 0 %

TImp 0 %

Composite Curve Number (for previous areas) 79.0

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	4.1	41.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area 4.1 ha

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	36.53	438	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	438	m
Elevation Drop	160	m
Sw	36.53	%

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Dunedin Area	Dunedin CA	0 C(-)	0 Area	0 CA	0 C(-)	0 Area	0 CA	0 C(-)	0 Area	0 CA
Woodland	0.52	4.1	2.1		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			2.1			0.0			0.0			0.0

Composite Runoff Coefficient 0.520

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration	12.1	min	0.20	hours
Time to Peak	8.1	min	0.13	hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration	15.0	min	0.25	hours
Time to Peak	10.1	min	0.17	hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	D.A.	Ext-3
Project No.:	119-2528	Area	2.2 ha
File:	Hyd Parameters		
Design by:	K. Simmons		
Date:	22-May-07		

Ext-3

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Dunedin	D	Clay	2.2	100	2.2	79	173.8			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			2.2		2.2		173.8	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp **0** %

Timp **0** %

Composite Curve Number (for previous areas) **79.0**

Total Property Area 2.2 ha

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	2.2	22.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	36.28	530	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	441	m
Elevation Drop	160	m
Sw	36.28	%

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	2.2	1.1		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			1.1			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration **12.1** min **0.20** hours

Time to Peak **8.1** min **0.14** hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration **15.0** min **0.25** hours

Time to Peak **10.1** min **0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II
Project No.:	119-2528
File:	Hyd Parameters
Design by:	K. Simmons
Date:	22-May-07

D.A. **Ext-4**
Area **2.6 ha**

Ext-4

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Dunedin	D	Clay	2.6	100	2.6	79	205.4			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			2.6		2.6		205.4	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

XImp **0** %

TImp **0** %

Composite Curve Number (for previous areas) **79.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	2.6	26.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area 2.6 ha

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	36.36	440	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	440 m
Elevation Drop	160 m
Sw	36.36 %

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	2.6	1.4		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			1.4			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration **12.1** min **0.20** hours
Time to Peak **8.1** min **0.14** hours

$$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration **15.0** min **0.25** hours
Time to Peak **10.1** min **0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project: Alta Phase II
Project No.: 119-2528
File: Hyd Parameters
Design by: K. Simmons
Date: 22-May-07

D.A. **Ext-5**
Area **5.2 ha**

Ext-5

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Dunedin	D	Clay	5.2	100	5.2	79	410.8			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			5.2		5.2		410.8	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp **0** %

Timp **0** %

Composite Curve Number (for previous areas) **79.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	5.2	52.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area 5.2 ha

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	39.10	399	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path 399 m
Elevation Drop 156 m
Sw 39.10 %

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	5.2	2.7		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			2.7			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km²)

Time of Concentration **11.3** min **0.19** hours
Time to Peak **7.5** min **0.13** hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km²)

Time of Concentration **15.0** min **0.25** hours
Time to Peak **10.1** min **0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project: Alta Phase II
Project No.: 119-2528
File: Hyd Parameters
Design by: K. Simmons
Date: 22-May-07

D.A. **Ext-6**
Area **6.0 ha**

Ext-6

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Soil Area Composition Percent	Woodland Area	Woodland CN	Woodland CN*A	Meadow Area	Meadow CN	Meadow CN*A
Dunedin	D	Clay	6.0	100	6.0	79	474			0
			0.0	0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			6.0		6.0		474	0.0		0

Wetlands Area	Wetlands CN	Wetlands CN*A	Lawn Area	Lawn CN	Lawn CN*A	Cultivated Area	Cultivated CN	Cultivated CN*A	Impervious Land Use	Impervious Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp **0** %

Timp **0** %

Composite Curve Number (for previous areas) **79.0**

Total Property Area 6.0 ha

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	6.0	60.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	5.45	457	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path 550 m
Elevation Drop 30 m
Sw 5.45 %

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Dunedin Area	Dunedin CA	0 C(-)	0 Area	0 CA	0 C(-)	0 Area	0 CA	0 C(-)	0 Area	0 CA
Woodland	0.52	6.0	3.1		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			3.1			0.0			0.0			0.0

Composite Runoff Coefficient 0.520

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration **25.3** min **0.42** hours
Time to Peak **17.0** min **0.28** hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.21

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration **18.7** min **0.31** hours
Time to Peak **12.5** min **0.21** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	D.A.	Ext-7
Project No.:	119-2528	Area	6.0 ha
File:	Hyd Parameters		
Design by:	K. Simmons		
Date:	22-May-07		

Ext-7

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Dunedin	D	Clay	6.0	100	6.0	79	474			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			6.0		6.0		474	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp **0** %

Timp **0** %

Composite Curve Number (for previous areas) **79.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	6.0	60.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area 6.0 ha

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	30.00	457	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	450 m
Elevation Drop	135 m
Sw	30.00 %

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	6.0	3.1		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			3.1			0.0			0.0			0.0

Composite Runoff Coefficient 0.520

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km²)

Time of Concentration **13.1** min **0.22** hours

Time to Peak **8.7** min **0.15** hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km²)

Time of Concentration **15.0** min **0.25** hours

Time to Peak **10.1** min **0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	D.A.	Ext-8
Project No.:	119-2528	Area	12.8 ha
File:	Hyd Parameters		
Design by:	K. Simmons		
Date:	22-May-07		

Ext-8

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Dunedin	D	Clay	12.8	100	12.8	79	1011.2			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			12.8		12.8		1011.2	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp 0 %

Timp 0 %

Composite Curve Number (for previous areas) 79.0

Total Property Area 12.8 ha

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	12.8	128.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	8.75	457	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path 800 m
Elevation Drop 70 m
Sw 8.75 %

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	12.8	6.7		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			6.7			0.0			0.0			0.0

Composite Runoff Coefficient 0.520

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration 26.1 min 0.44 hours
Time to Peak 17.5 min 0.29 hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.26

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration 22.9 min 0.38 hours
Time to Peak 15.3 min 0.26 hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT CONSULTANTS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II
Project No.:	119-2528
File:	Hyd Parameters
Design by:	K. Simmons
Date:	22-May-07

D.A. **Ext-9**
Area **7.0 ha**

Ext-9

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition: Area(ha)	Soil Area Composition: Percent	Woodland: Area	Woodland: CN	Woodland: CN*A	Meadow: Area	Meadow: CN	Meadow: CN*A
Granby	B	Sand	7	66.6666667	6.79	60	407.4			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			7.0		6.8		407.4	0.0		0

Wetlands: Area	Wetlands: CN	Wetlands: CN*A	Lawn: Area	Lawn: CN	Lawn: CN*A	Cultivated: Area	Cultivated: CN	Cultivated: CN*A	Impervious: Land Use	Impervious: Area (ha)
0.0		0	0.0		0			0	Roadway	0.21
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0.21

XImp **3** %

TImp **3** %

Composite Curve Number (for previous areas) **60.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	6.8	67.9
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.2	0.4

9.76

Total Property Area **7.0** **ha**

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	4.29	457	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	350 m
Elevation Drop	15 m
Sw	4.29 %

Runoff Coefficient Determination

Land Use	Granby C(-)	Granby Area	Granby CA	0 C(-)	0 Area	0 CA	0 C(-)	0 Area	0 CA	0 C(-)	0 Area	0 CA
Woodland	0.25	6.8	1.7		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.2	0.2									
Total			1.9			0.0			0.0			0.0

Composite Runoff Coefficient 0.271

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km²)

Time of Concentration **31.3** min **0.52** hours
Time to Peak **21.0** min **0.35** hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{\ 0.33}}$$

TIME TO PEAK	
Appropriate Method	AIRPORT METHOD
Tp	0.35

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km²)

Time of Concentration **15.0** min **0.25** hours
Time to Peak **10.1** min **0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II
Project No.:	119-2528
File:	Hyd Parameters
Design by:	K. Simmons
Date:	22-May-07

D.A. **Ext-10 A**
Area **27.9 ha**

Ext-10 A

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition		Woodland			Meadow		
			Area(ha)	*Percent*	*Area*	*CN*	*CN*A*	*Area*	*CN*	*CN*A*
Brighton	A	Sand	9.3	33.3333333	9.3	36	334.8			0
Granby	B	Sand	18.6	66.6666667	11.5	60	690			0
				0			0			0
				0			0			0
				0			0			0
Totals			27.9		20.8		1024.8	0.0		0

Wetlands			Lawn			Cultivated			Impervious	
Area	*CN*	*CN*A*	*Area*	*CN*	*CN*A*	*Area*	*CN*	*CN*A*	*Land Use*	*Area (ha)*
3.6	50	180	0.0		0			0	Roadway	0
	50	0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
3.6		180	0.0		0	0.0		0		3.5

Ximp **0** %

Timp **0** %

Composite Curve Number (for previous areas) **49.4**

Land Use	*Initial Abstraction (mm)*	*Area (ha)*	*IA*A*
Wetlands	16	3.6	57.6
Woodland	10	20.8	208.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	3.5	7.0

9.77060932

Total Property Area **27.9** **ha**

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10.8852459	7.27	457	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	550	m
Elevation Drop	40	m
Sw	7.27	%

Runoff Coefficient Determination

Land Use	Brighton			Granby			0			0		
	C(-)	*Area*	*CA*	*C(-)*	*Area*	*CA*	*C(-)*	*Area*	*CA*	*C(-)*	*Area*	*CA*
Woodland	0.08	9.3	0.7	0.25	0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		11.5	0.0		0.0	0.0		0	0.0
Wetlands	0.1	3.6	0.2		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95		0.0	0.95	3.50	3.3						
Total			0.9			3.3			0.0			0.0

Composite Runoff Coefficient 0.152

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration	**37.6** min	**0.63** hours	$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{0.33}}$
Time to Peak	**25.2** min	**0.42** hours	

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration	**15.1** min	**0.25** hours	$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$
Time to Peak	**10.1** min	**0.17** hours	

TIME TO PEAK	
Appropriate Method	AIRPORT METHOD
Tp	0.42

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II
Project No.:	119-2528
File:	Hyd Parameters
Design by:	K. Simmons
Date:	22-May-07

D.A. **Ext-10 B**
Area **4.9 ha**

Ext-10 B

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Brighton	A	Sand	4.9	100	4.9	36	176.4			0
				0	0.0	60	0			0
				0			0			0
				0			0			0
				0			0			0
Totals			4.9		4.9		176.4	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
	50	0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		

XImp **0** %

TImp **0** %

Composite Curve Number (for previous areas) **36.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	4.9	49.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

10

Total Property Area 4.9 ha

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	6.67	457	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	75 m
Elevation Drop	5 m
Sw	6.67 %

Runoff Coefficient Determination

Land Use	Brighton C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.08	4.9	0.4	0.25	0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands	0.1	0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95		0.0	0.95	3.50	3.3						
Total			0.4			3.3			0.0			0.0

Composite Runoff Coefficient 0.759

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration	5.2 min	0.09 hours
Time to Peak	3.5 min	0.06 hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration	15.0 min	0.25 hours
Time to Peak	10.1 min	0.17 hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project: Alta Phase II
Project No.: 119-2528
File: Hyd Parameters
Design by: K. Simmons
Date: 22-May-07

D.A. **Ext-11**
Area **3.9 ha**

Ext-11

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Kemble	C	Silty Clay	3.9	100	3.9	73	284.7			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			3.9		3.9		284.7	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp **0** %

Timp **0** %

Composite Curve Number (for previous areas) **73.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	3.9	39.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area **3.9** **ha**

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	13.04	457	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path 230 m
Elevation Drop 30 m
Sw 13.04 %

Runoff Coefficient Determination

Land Use	Kemble C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	3.9	2.0		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			2.0			0.0			0.0			0.0

Composite Runoff Coefficient 0.520

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km²)

Time of Concentration **12.3** min **0.20** hours
Time to Peak **8.2** min **0.14** hours

$$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km²)

Time of Concentration **15.0** min **0.25** hours
Time to Peak **10.1** min **0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II
Project No.:	119-2528
File:	Hyd Parameters
Design by:	K. Simmons
Date:	22-May-07

D.A. **Ext-12**
Area **5.2 ha**

Ext-12

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Dunedin	D	Clay	5.2	100	5.2	79	410.8			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			5.2		5.2		410.8	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp **0** %

Timp **0** %

Composite Curve Number (for previous areas) **79.0**

Total Property Area 5.2 ha

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	5.2	52.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	35.11	457	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	470 m
Elevation Drop	165 m
Sw	35.11 %

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	5.2	2.7		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			2.7			0.0			0.0			0.0

Composite Runoff Coefficient 0.520

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration	12.7 min	0.21 hours
Time to Peak	8.5 min	0.14 hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration	15.0 min	0.25 hours
Time to Peak	10.1 min	0.17 hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project: Alta Phase II
Project No.: 119-2528
File: Hyd Parameters
Design by: K. Simmons
Date: 22-May-07

D.A. **INT-1 Post**
Area **9.9 ha**

INT-1 Post

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Soil Area Composition Percent	Woodland Area	Woodland CN	Woodland CN*A	Meadow Area	Meadow CN	Meadow CN*A
Kemble	C	Silty Clay	9.9	100			0			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			9.9		0.0		0	0.0		0

Wetlands Area	Wetlands CN	Wetlands CN*A	Lawn Area	Lawn CN	Lawn CN*A	Cultivated Area	Cultivated CN	Cultivated CN*A	Impervious Land Use	Impervious Area (ha)
0.0		0	6.2	79	489.266908	0.0		0	Roadway	1.014
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0.853
		0			0			0	Building	1.84
		0			0			0		
0.0		0	6.2		489.3	0.0		0		3.71

Ximp **19** %

Timp **37** %

Composite Curve Number (for previous areas) **79.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	0.0	0.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	6.2	31.0
Impervious	2	3.7	7.4

Total Property Area	**10.1**	**ha**
Average Lot Size	0.135	ha
Number of Houses	46	
Building footprint	400	m^2
Pavement Width	10	m
Sidewalks		m^2
Length ROW	1014	m
Driveway	185	m^2

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	4.84358508	2.00	65	0.15
Impervious	2	2	500	0.013

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	500	m
Elevation Drop	9.5	m
Sw	1.90	%

Runoff Coefficient Determination

Land Use	C(-)	0 Area	CA	C(-)	Kemble Area	CA	C(-)	0 Area	CA	C(-)	0 Area	CA
Woodland		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Impervious		3.7	0.0									
Total			0.0			0.0			0.0			0.0

Composite Runoff Coefficient 0.00

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration	**64.9**	min	**1.08**	hours
Time to Peak	**43.5**	min	**0.72**	hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

TIME TO PEAK	
Appropriate Method	AIRPORT METHOD
Tp	0.72

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration	**19.9**	min	**0.33**	hours
Time to Peak	**13.4**	min	**0.22**	hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

CF CROZIER & ASSOCIATES INC

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	
Project No.:	119-2528	
File:	Hyd Parameters	
Design by:	K. Simmons	
Date:	22-May-07	

D.A. **INT-2 Post**
Area **3.0 ha**

INT-2 Post

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Dunedin	D	C	3.0	100			0			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			3.0		0.0		0	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	2.1	69	146.832	0.0		0	Roadway	0.332
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0.06
		0			0			0	Building	0.48
		0			0			0		
0.0		0	2.1		146.832	0.0		0		0.872

XImp **13** %

TImp **29** %

Composite Curve Number (for previous areas) **69.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	0.0	0.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	2.1	10.6
Impervious	2	0.9	1.7

Total Property Area 3.0 ha

Number of Houses	12	
Building footprint	400	m^2
Pavement Width	10	m
Sidewalks		m^2
Length ROW	332	m
Driveway	48	m^2

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	5	2.00	65	0.15
Impervious	2	2	290	0.013

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	290	m
Elevation Drop	10.5	m
Sw	3.62	%

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn	0.11	2.1	0.2	0.05	0.0	0.0		0.0	0.0		0	0.0
Cultivated		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.9	0.8									
Total			1.1			0.0			0.0			0.0

Composite Runoff Coefficient 0.35

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration	27.1	min	0.45	hours
Time to Peak	18.1	min	0.30	hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

TIME TO PEAK	
Appropriate Method	AIRPORT METHOD
Tp	0.30

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration	15.0	min	0.25	hours
Time to Peak	10.1	min	0.17	hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	**D.A.**	**Int-3 Post**
Project No.:	119-2528	**Area**	**0.2 ha**
File:	Hyd Parameters		
Design by:	K. Simmons		
Date:	22-May-07		

Int-3 Post

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Dunedin	D	Clay	0.2	100	0.2	79	13.43			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			0.2		0.2		13.43	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

XImp **0** %

TImp **0** %

Composite Curve Number (for previous areas) **79.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	0.2	1.7
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area 0.2 ha

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	22.22	18	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	18 m
Elevation Drop	4 m
Sw	22.22 %

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	0.2	0.1		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			0.1			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration 2.9 min 0.05 hours

Time to Peak 1.9 min 0.03 hours

$$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{\ 0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration 15.0 min 0.25 hours

Time to Peak 10.1 min 0.17 hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	D.A.	Int-4 Post
Project No.:	119-2528	Area	0.6 ha
File:	Hyd Parameters		
Design by:	K. Simmons		
Date:	22-May-07		

Int-4 Post

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Dunedin	D	Clay	0.6	100	0.6	79	45.82			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			0.6		0.6		45.82	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

XImp **0** %

TImp **0** %

Composite Curve Number (for previous areas) **79.0**

Total Property Area 0.6 ha

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	0.6	5.8
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	27.08	24	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	24	m
Elevation Drop	6.5	m
Sw	27.08	%

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.52	0.6	0.3		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			0.3			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration **3.1** min **0.05** hours

Time to Peak **2.1** min **0.03** hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration **15.0** min **0.25** hours

Time to Peak **10.1** min **0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC

HYDROLOGIC PARAMETERS

Project: Alta Phase II
Project No.: 119-2528
File: Hyd Parameters
Design by: K. Simmons
Date: 22-May-07

D.A. **Int-5 Post**
Area **0.1 ha**

Int-5 Post

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Soil Area Composition Percent	Woodland Area	Woodland CN	Woodland CN*A	Meadow Area	Meadow CN	Meadow CN*A
Dunedin	D	Clay	0.1	100	0.1	79	7.9			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			0.1		0.1		7.9	0.0		0

Wetlands Area	Wetlands CN	Wetlands CN*A	Lawn Area	Lawn CN	Lawn CN*A	Cultivated Area	Cultivated CN	Cultivated CN*A	Impervious Land Use	Impervious Area (ha)
0.0		0	0.0		0			0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

Ximp **0** %

Timp **0** %

Composite Curve Number (for previous areas) **79.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	0.1	1.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area 0.1 ha

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10	19.23	13	0.4
Impervious	2	0.5	na	na

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path 13 m
Elevation Drop 2.5 m
Sw 19.23 %

Runoff Coefficient Determination

Land Use	Dunedin C(-)	Dunedin Area	Dunedin CA	0 C(-)	0 Area	0 CA	0 C(-)	0 Area	0 CA	0 C(-)	0 Area	0 CA
Woodland	0.52	0.1	0.1		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated	0.35	0.0	0.0	0.22	0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.0	0.0									
Total			0.1			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration **2.6** min **0.04** hours
Time to Peak **1.7** min **0.03** hours

$$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{\ 0.33}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration **15.0** min **0.25** hours
Time to Peak **10.1** min **0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	
Project No.:	119-2528	
File:	Hyd Parameters	
Design by:	K. Simmons	
Date:	22-May-07	

D.A. **Unc-1 Post**
Area **0.8 ha**

Unc-1 Post

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Kemble	C	Silty Clay	0.8	100			0			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			0.8		0.0		0	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	0.8	79	63.2	0.0		0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.8		63.2	0.0		0		0

Ximp **0** %

Timp **0** %

Composite Curve Number (for previous areas) **79.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	0.0	0.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.8	4.0
Impervious	2	0.0	0.0

Total Property Area	0.8	ha
Average Lot Size		ha
Number of Houses		
Building footprint		m^2
Pavement Width		m
Sidewalks		m^2
Length ROW		m
Driveway		m^2

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	5	2.00	65	0.15
Impervious	2	2	500	0.013

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	211	m
Elevation Drop	15.5	m
Sw	7.35	%

Runoff Coefficient Determination

Land Use	Kemble C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn	0.35	0.8	0.3		0.0	0.0		0.0	0.0		0	0.0
Cultivated		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Impervious		0.0	0.0									
Total			0.3			0.0			0.0			0.0

Composite Runoff Coefficient 0.35

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration **18.4** min **0.31** hours
Time to Peak **12.3** min **0.21** hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

TIME TO PEAK	
Appropriate Method	AIRPORT METHOD
Tp	0.21

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration **15.0** min **0.25** hours
Time to Peak **10.1** min **0.17** hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

CF CROZIER & ASSOCIATES INC

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	D.A.	Unc-2 Post
Project No.:	119-2528	Area	1.5 ha
File:	Hyd Parameters		
Design by:	K. Simmons		
Date:	22-May-07		

Unc-2 Post

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Kemble	C	Silty Clay	1.5	100	0.0	73	0			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			1.5		0.0		0	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	1.2	79	98.319608	0.0		0	Roadway	0.089
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0.006448
		0			0			0	Building	0.16
		0			0			0		
0.0		0	1.2		98.319608	0.0		0		0.255448

Ximp 6 %

Timp 17 %

Composite Curve Number 82.2

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	0.0	0.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	1.2	6.2
Impervious	2	0.3	0.5

Total Property Area	1.5	ha
Average Lot Size	0.135	ha
Number of Houses	4	
Building footprint	400	m^2
Pavement Width	10	m
Sidewalks		m^2
Length ROW	89	m
Driveway	16	m^2

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	5	2.00	65	0.15
Impervious	2	2	90	0.013

4.489104

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	131.6	m
Elevation Drop	5.5	m
Sw	4.18	%

Runoff Coefficient Determination

Land Use	Kemble C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland	0.4	0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn	0.35	1.2	0.4		0.0	0.0		0.0	0.0		0	0.0
Cultivated		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Impervious	0.95	0.3	0.2									
Total			0.7			0.0			0.0			0.0

Composite Runoff Coefficient 0.45

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km²)

Time of Concentration 15.1 min 0.25 hours

Time to Peak 10.1 min 0.17 hours

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration 15.0 min 0.25 hours

Time to Peak 10.1 min 0.17 hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC

HYDROLOGIC PARAMETERS

Project:	Alta Phase II	D.A.	Unc-3 Post
Project No.:	119-2528	Area	2.1 ha
File:	Hyd Parameters		
Design by:	K. Simmons		
Date:	22-May-07		

Unc-3 Post

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition		Woodland			Meadow		
			Area(ha)	Percent	Area	CN	CN*A	Area	CN	CN*A
Kemble	C	Silty Clay	2.1	100	2.1	73	153.3			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			2.1		2.1		153.3	0.0		0

Wetlands			Lawn			Cultivated			Impervious	
Area	CN	CN*A	Area	CN	CN*A	Area	CN	CN*A	Land Use	Area (ha)
0.0		0		79	0	0.0		0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	0.0		0	0.0		0		0

XImp <u>0</u> %

TImp <u>0</u> %

Composite Curve Number (for previous areas) <u>73.0</u>

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	2.1	21.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	0.0	0.0
Impervious	2	0.0	0.0

Total Property Area	2.0	ha
Average Lot Size		ha
Number of Houses		
Building footprint		m^2
Pavement Width		m
Sidewalks		m^2
Length ROW		m
Driveway		m^2

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	10.5	2.00	324	0.4
Impervious	2	2	0	0.013

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	112	m
Elevation Drop	25	m
Sw	22.32	%

Runoff Coefficient Determination

Land Use	Kemble C(-)	Kemble Area	Kemble CA	0 C(-)	0 Area	0 CA	0 C(-)	0 Area	0 CA	0 C(-)	0 Area	0 CA
Woodland	0.52	2.1	1.1		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn	0.35	0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Cultivated		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Impervious		0.0	0.0									
Total			1.1			0.0			0.0			0.0

Composite Runoff Coefficient 0.52

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration	<u>7.2</u>	min	<u>0.12</u>	hours
Time to Peak	<u>4.8</u>	min	<u>0.08</u>	hours

$$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{\ 0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration	<u>15.0</u>	min	<u>0.25</u>	hours
Time to Peak	<u>10.1</u>	min	<u>0.17</u>	hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	BRANSBY-WILLIAMS METHOD
Tp	0.17

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

HYDROLOGIC PARAMETERS

Project:	Alta Phase II
Project No.:	119-2528
File:	Hyd Parameters
Design by:	K. Simmons
Date:	22-May-07

D.A. **Unc-4 Post**
Area **3.0 ha**

Unc-4 Post

CURVE NUMBER

Soil Series	Hydrologic Soil Group	Soil Texture	Soil Area Composition Area(ha)	Percent	Woodland Area	CN	CN*A	Meadow Area	CN	CN*A
Kemble	C	Silty Clay	3.0	100		73	0			0
				0			0			0
				0			0			0
				0			0			0
				0			0			0
Totals			3.0		0.0		0	0.0		0

Wetlands Area	CN	CN*A	Lawn Area	CN	CN*A	Cultivated Area	CN	CN*A	Impervious Land Use	Area (ha)
0.0		0	3.0	79	237	0.0		0	Roadway	0
		0			0			0	Sidewalk	0
		0			0			0	Driveway	0
		0			0			0	Building	0
		0			0			0		
0.0		0	3.0		237	0.0		0		0

XImp 0 %

TImp 0 %

Composite Curve Number (for previous areas) **79.0**

Land Use	Initial Abstraction (mm)	Area (ha)	IA*A
Wetlands	16	0.0	0.0
Woodland	10	0.0	0.0
Meadow	8	0.0	0.0
Cultivated	7	0.0	0.0
Lawn	5	3.0	15.0
Impervious	2	0.0	0.0

Soil Type	Initial Abstraction (mm)	Slope (%)	Lot Depth/Travel Length (m)	Mannings n
Pervious	5.172413793	2.00	324	0.15
Impervious	2	2	0	0.013

Total Property Area	**2.9**	ha
Average Lot Size		ha
Number of Houses		
Building footprint		m^2
Pavement Width		m
Sidewalks		m^2
Length ROW		m
Driveway		m^2

TIME OF CONCENTRATION

GENERAL INPUTS

Longest Flow Path	324	m
Elevation Drop	35	m
Sw	10.80	%

Runoff Coefficient Determination

Land Use	Kemble C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA	0 C(-)	Area	CA
Woodland		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Meadow		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Wetlands		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Lawn	0.35	3.0	1.1		0.0	0.0		0.0	0.0		0	0.0
Cultivated		0.0	0.0		0.0	0.0		0.0	0.0		0	0.0
Impervious		0.0	0.0									
Total			1.1			0.0			0.0			0.0

Composite Runoff Coefficient 0.35

AIRPORT METHOD
(runoff coefficient less than 0.40, <1 km^2)

Time of Concentration	20.1 min	0.33 hours	
Time to Peak	13.4 min	0.22 hours	

$$t_c = \frac{3.26*(1.1-C)*L^{0.5}}{S_w^{0.33}}$$

BRANSBY-WILLIAMS METHOD
(Runoff Coefficient greater than 0.40, <25km^2)

Time of Concentration	15.0 min	0.25 hours
Time to Peak	10.1 min	0.17 hours

$$t_c = \frac{0.057 * L}{S^{0.2} * A^{0.1}}$$

TIME TO PEAK	
Appropriate Method	AIRPORT METHOD
Tp	0.22

APPENDIX B

SWMHYMO Model Files

```
2     Metric units
*#*************************************************************************
*#  Project Name: [ALTA PHASE II]    Project Number: [119-]
*#  Date          : 05-24-2007
*#  Modeller      : [          ]
*#  Company       : C.F. Crozier & Associates Inc.
*#  License #     :  3737016
*#*************************************************************************
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                    [  ] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
*#-----------------|----------25mm-----------------------------------------|
*#-----------------|-------------------------------------------------------|
READ STORM           STORM_FILENAME=["25mm.stm"]
*#-----------------|-------------------------------------------------------|
*#-----------------|-----------PRE-DEVELOPMENT-----------------------------|
*#-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[5], NHYD=["EXT-1"], DT=[5]min, AREA=[3.5](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[2], NHYD=["EXT-2"], DT=[5]min, AREA=[4.1](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[3], NHYD=["EXT-3"], DT=[5]min, AREA=[2.2](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[4], NHYD=["INT-4"], DT=[5]min, AREA=[2.0](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[6], NHYD=["INT-1"], DT=[5]min, AREA=[1.4](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT  |
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
ADD HYD              IDsum=[1], NHYD=["800mm"], IDs to add=[5,2,3,4,6]
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[4], NHYD=["EXT-4"], DT=[5]min, AREA=[2.6](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[5], NHYD=["INT-5"], DT=[5]min, AREA=[0.9](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[6], NHYD=["INT-2"], DT=[5]min, AREA=[5.8](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[7], NHYD=["UNC-3"], DT=[5]min, AREA=[1.9](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT  |
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
ADD HYD              IDsum=[2], NHYD=["900mm"], IDs to add=[4,5,6,7]
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[5], NHYD=["EXT-5"], DT=[5]min, AREA=[5.2](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[6], NHYD=["INT-6"], DT=[5]min, AREA=[0.7](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[7], NHYD=["INT-3"], DT=[5]min, AREA=[4.9](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[8], NHYD=["UNC-4"], DT=[5]min, AREA=[3.2](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH       |
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
ADD HYD              IDsum=[3], NHYD=["NE_DITCH"], IDs to add=[5,6,7,8]
*%-----------------|-------------------------------------------------------|

*#-----------------|-------------------------------------------------------|
*#-----------------|---------2 YEAR----------------------------------------|
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
CHICAGO STORM        IUNITS=[2],  TD=[4](hrs), TPRAT=[0.333],  CSDT=[10](min),
                     ICASEcs=[2],
                     Enter ordinates of IDF curve below, at least seven points
                         TIME (min)     Intensity(mm/hr)
                           [5    ]         [95]
                           [10   ]         [70 ]
                           [15   ]         [58 ]
                           [30   ]         [38 ]
                           [60   ]         [25 ]
                           [180  ]         [17 ]
                           [360  ]         [6.3]
                           [720  ]         [3.5]
                           [1440]          [1.9]
                             -1               -1
*%-----------------|-------------------------------------------------------|

*%-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
*#-----------------|-----------PRE-DEVELOPMENT-----------------------------|
*#-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[5], NHYD=["EXT-1"], DT=[5]min, AREA=[3.5](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[2], NHYD=["EXT-2"], DT=[5]min, AREA=[4.1](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[3], NHYD=["EXT-3"], DT=[5]min, AREA=[2.2](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[4], NHYD=["INT-4"], DT=[5]min, AREA=[2.0](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[6], NHYD=["INT-1"], DT=[5]min, AREA=[1.4](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT  |
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
ADD HYD              IDsum=[1], NHYD=["800mm"], IDs to add=[5,2,3,4,6]
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[4], NHYD=["EXT-4"], DT=[5]min, AREA=[2.6](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[5], NHYD=["INT-5"], DT=[5]min, AREA=[0.9](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[6], NHYD=["INT-2"], DT=[5]min, AREA=[5.8](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[7], NHYD=["UNC-3"], DT=[5]min, AREA=[1.9](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT  |
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
ADD HYD              IDsum=[2], NHYD=["900mm"], IDs to add=[4,5,6,7]
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[5], NHYD=["EXT-5"], DT=[5]min, AREA=[5.2](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[6], NHYD=["INT-6"], DT=[5]min, AREA=[0.7](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[7], NHYD=["INT-3"], DT=[5]min, AREA=[4.9](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[8], NHYD=["UNC-4"], DT=[5]min, AREA=[3.2](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH       |
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
ADD HYD              IDsum=[3], NHYD=["NE_DITCH"], IDs to add=[5,6,7,8]
*%-----------------|-------------------------------------------------------|

*#-----------------|-------------------------------------------------------|
*#-----------------|----------10YR-----------------------------------------|
*#-----------------|-------------------------------------------------------|
CHICAGO STORM        IUNITS=[2],  TD=[4](hrs), TPRAT=[0.333],  CSDT=[10](min),
                     ICASEcs=[2],
                     Enter ordinates of IDF curve below, at least seven points
                         TIME (min)     Intensity(mm/hr)
                           [5    ]         [150]
                           [10   ]         [105 ]
                           [15   ]         [89 ]
                           [30   ]         [57 ]
                           [60   ]         [38 ]
                           [180  ]         [24 ]
                           [360  ]         [11]
                           [720  ]         [5.5]
                           [1440]          [3]
                             -1               -1
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
*#-----------------|-----------PRE-DEVELOPMENT-----------------------------|
*#-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[5], NHYD=["EXT-1"], DT=[5]min, AREA=[3.5](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[2], NHYD=["EXT-2"], DT=[5]min, AREA=[4.1](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[3], NHYD=["EXT-3"], DT=[5]min, AREA=[2.2](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[4], NHYD=["INT-4"], DT=[5]min, AREA=[2.0](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[6], NHYD=["INT-1"], DT=[5]min, AREA=[1.4](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT  |
*#-----------------|-------------------------------------------------------|
*#-----------------|-------------------------------------------------------|
ADD HYD              IDsum=[1], NHYD=["800mm"], IDs to add=[5,2,3,4,6]
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[4], NHYD=["EXT-4"], DT=[5]min, AREA=[2.6](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
CALIB NASHYD         ID=[5], NHYD=["INT-5"], DT=[5]min, AREA=[0.9](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
```

```
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[6], NHYD=["INT-2"], DT=[5]min, AREA=[5.8](ha),
                         DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[7], NHYD=["UNC-3"], DT=[5]min, AREA=[1.9](ha),
                         DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT        |
*#-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[2], NHYD=["900mm"], IDs to add=[4,5,6,7]
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[5], NHYD=["EXT-5"], DT=[5]min, AREA=[5.2](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[6], NHYD=["INT-6"], DT=[5]min, AREA=[0.7](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[7], NHYD=["INT-3"], DT=[5]min, AREA=[4.9](ha),
                         DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[8], NHYD=["UNC-4"], DT=[5]min, AREA=[3.2](ha),
                         DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH              |
*#-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[3], NHYD=["NE_DITCH"], IDs to add=[5,6,7,8]
*#-----------------|--------------------------------------------------------------|


*#-----------------|--------------------------------------------------------------|
*#-----------------|-----------100YR------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
CHICAGO STORM            IUNITS=[2],  TD=[4](hrs), TPRAT=[0.333],  CSDT=[10](min),
                         ICASEcs=[2],
                         Enter ordinates of IDF curve below, at least seven points
                             TIME (min)    Intensity(mm/hr)
                               [5   ]        [215]
                               [10  ]        [145]
                               [15  ]        [125]
                               [30  ]        [82 ]
                               [60  ]        [56 ]
                               [180 ]        [34 ]
                               [360 ]        [16 ]
                               [720 ]        [8  ]
                               [1440]        [4.5  ]
                                 -1             -1
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|-----------PRE-DEVELOPMENT--------------------------------------|
*#-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[5], NHYD=["EXT-1"], DT=[5]min, AREA=[3.5](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[2], NHYD=["EXT-2"], DT=[5]min, AREA=[4.1](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[3], NHYD=["EXT-3"], DT=[5]min, AREA=[2.2](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[4], NHYD=["INT-4"], DT=[5]min, AREA=[2.0](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[6], NHYD=["INT-1"], DT=[5]min, AREA=[1.4](ha),
                         DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT        |
*#-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[1], NHYD=["800mm"], IDs to add=[5,2,3,4,6]
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[4], NHYD=["EXT-4"], DT=[5]min, AREA=[2.6](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[5], NHYD=["INT-5"], DT=[5]min, AREA=[0.9](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[6], NHYD=["INT-2"], DT=[5]min, AREA=[5.8](ha),
                         DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[7], NHYD=["UNC-3"], DT=[5]min, AREA=[1.9](ha),
                         DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT        |
*#-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[2], NHYD=["900mm"], IDs to add=[4,5,6,7]
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[5], NHYD=["EXT-5"], DT=[5]min, AREA=[5.2](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[6], NHYD=["INT-6"], DT=[5]min, AREA=[0.7](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[7], NHYD=["INT-3"], DT=[5]min, AREA=[4.9](ha),
                         DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD             ID=[8], NHYD=["UNC-4"], DT=[5]min, AREA=[3.2](ha),
                         DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH              |
*#-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
ADD HYD                  IDsum=[3], NHYD=["NE_DITCH"], IDs to add=[5,6,7,8]
*#-----------------|--------------------------------------------------------------|

FINISH
```

```
 ===========================================================================
  SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
  S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
  SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
      S   W W   M   M  H   H    Y    M   M  O   O       9999   9999 July 1999
  SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9 =========
                                                       9   9  9   9 # 3737016
       StormWater Management HYdrologic Model           999    999  =========

  **************************************************************************
  ************************ SWMHYMO-99 Ver/4.02 *****************************
  *******  A single event and continuous hydrologic simulation model  *******
  *******     based on the principles of HYMO and its successors      *******
  *******                OTTHYMO-83 and OTTHYMO-89.                   *******
  **************************************************************************
  ******* Distributed by:  J.F. Sabourin and Associates Inc.          *******
  *******                  Ottawa,  Ontario: (613) 727-5199           *******
  *******                  Gatineau, Quebec: (819) 243-6858           *******
  *******                  E-Mail: swmhymo@jfsa.Com                   *******
  **************************************************************************

  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  +++++++ Licensed user: C.F. Crozier & Associates Inc.              +++++++
  +++++++                 Collingwood            SERIAL#:3737016     +++++++
  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

  **************************************************************************
  *******            ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *******
  *******            Maximum value for ID numbers  :    10           *******
  *******            Max. number of rainfall points:  15000          *******
  *******            Max. number of flow points    :  15000          *******
  **************************************************************************

 *** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) ***
 ***-------------------------------------------------------------------***
 ***     ID:  Hydrograph IDentification numbers, (1-10).                ***
 ***   NHYD:  Hydrograph reference numbers, (6 digits or characters).   ***
 ***   AREA:  Drainage area associated with hydrograph, (ac.) or (ha.). ***
 *** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).    ***
 *** TpeakDate_hh:mm is the date and time of the peak flow.             ***
 ***   R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).      ***
 ***   R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).      ***
 ***      *:  see WARNING or NOTE message printed at end of run.        ***
 ***     **:  see  ERROR  message printed at end of run.                ***
 **************************************************************************
 **************************************************************************

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

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

 ********************    S U M M A R Y   O U T P U T    *******************
 **************************************************************************
 *      DATE: 2007-06-19      TIME: 13:59:50      RUN COUNTER: 001628     *
 **************************************************************************
 * Input   filename: J:\119-TA~1\2528\Design\SWMHYM~1\PRE-TR.Dat          *
 * Output  filename: J:\119-TA~1\2528\Design\SWMHYM~1\PRE-TR.out          *
 * Summary filename: J:\119-TA~1\2528\Design\SWMHYM~1\PRE-TR.sum          *
 * User comments:                                                         *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 **************************************************************************


#***************************************************************************
#  Project Name: [ALTA PHASE II]    Project Number: [119-]
#  Date          : 05-24-2007
#  Modeller      : [           ]
#  Company       : C.F. Crozier & Associates Inc.
#  License #     :  3737016
#***************************************************************************
 RUN:COMMAND#
 001:0001------------------------------------------------------------------
     START
      [TZERO =     .00 hrs on         0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   0 ]
      [NRUN  =   1 ]
#-----------------|--------------------------------------------------------|
#-----------------|-----------25mm-----------------------------------------|
#-----------------|--------------------------------------------------------|
 001:0002------------------------------------------------------------------
     READ STORM
      Filename = 25mm.stm
      Comment  = 25 mm Event
      [SDT= 4.80:SDUR=   3.04:PTOT=  25.05]
#-----------------|--------------------------------------------------------|
#-----------------|-----------PRE-DEVELOPMENT------------------------------|
#-----------------|--------------------------------------------------------|
 001:0003---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       05:EXT-1       3.50     .024 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:EXT-2       4.10     .028 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       03:EXT-3       2.20     .015 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       04:INT-4       2.00     .014 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       06:INT-1       1.40     .007 No_date    1:17    2.04 .081
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
#-----------------|--------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT  |
#-----------------|--------------------------------------------------------|
#-----------------|--------------------------------------------------------|
 001:0008---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:EXT-1       3.50     .024 No_date    1:17    2.69  n/a
                      + 02:EXT-2       4.10     .028 No_date    1:17    2.69  n/a
                      + 03:EXT-3       2.20     .015 No_date    1:17    2.69  n/a
                      + 04:INT-4       2.00     .014 No_date    1:17    2.69  n/a
                      + 06:INT-1       1.40     .007 No_date    1:17    2.04  n/a
      [DT= 4.80]  SUM= 01:800mm       13.20     .088 No_date    1:17    2.62  n/a
 001:0009---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       04:EXT-4       2.60     .018 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0010---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       05:INT-5        .90     .006 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0011---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       06:INT-2       5.80     .029 No_date    1:17    2.04 .081
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0012---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       07:UNC-3       1.90     .010 No_date    1:17    2.04 .081
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
#-----------------|--------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT  |
#-----------------|--------------------------------------------------------|
#-----------------|--------------------------------------------------------|
 001:0013---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:EXT-4       2.60     .018 No_date    1:17    2.69  n/a
                      + 05:INT-5        .90     .006 No_date    1:17    2.69  n/a
                      + 06:INT-2       5.80     .029 No_date    1:17    2.04  n/a
                      + 07:UNC-3       1.90     .010 No_date    1:17    2.04  n/a
      [DT= 4.80]  SUM= 02:900mm       11.20     .063 No_date    1:17    2.24  n/a
 001:0014---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       05:EXT-5       5.20     .035 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0015---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       06:INT-6        .70     .005 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0016---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       07:INT-3       4.90     .025 No_date    1:17    2.04 .081
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0017---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       08:UNC-4       3.20     .016 No_date    1:17    2.04 .081
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
#-----------------|--------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH       |
#-----------------|--------------------------------------------------------|
#-----------------|--------------------------------------------------------|
 001:0018---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:EXT-5       5.20     .035 No_date    1:17    2.69  n/a
                      + 06:INT-6        .70     .005 No_date    1:17    2.69  n/a
                      + 07:INT-3       4.90     .025 No_date    1:17    2.04  n/a
                      + 08:UNC-4       3.20     .016 No_date    1:17    2.04  n/a
      [DT= 4.80]  SUM= 03:NE_DIT      14.00     .081 No_date    1:17    2.31  n/a
#-----------------|--------------------------------------------------------|
#-----------------|----------2 YEAR----------------------------------------|
#-----------------|--------------------------------------------------------|
 001:0019------------------------------------------------------------------
     CHICAGO STORM
      [SDT=10.00:SDUR=   4.00:PTOT=  37.95]
      {A/B/C=1461.279/  18.094/    .907: R=.9944}
#-----------------|--------------------------------------------------------|
#-----------------|-----------PRE-DEVELOPMENT------------------------------|
#-----------------|--------------------------------------------------------|
 001:0020---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       05:EXT-1       3.50     .080 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0021---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:EXT-2       4.10     .094 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0022---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       03:EXT-3       2.20     .050 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0023---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       04:INT-4       2.00     .046 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0024---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       06:INT-1       1.40     .025 No_date    1:35    6.41 .169
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|--------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT  |
#-----------------|--------------------------------------------------------|
#-----------------|--------------------------------------------------------|
 001:0025---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:EXT-1       3.50     .080 No_date    1:35    8.18  n/a
                      + 02:EXT-2       4.10     .094 No_date    1:35    8.18  n/a
                      + 03:EXT-3       2.20     .050 No_date    1:35    8.18  n/a
                      + 04:INT-4       2.00     .046 No_date    1:35    8.18  n/a
                      + 06:INT-1       1.40     .025 No_date    1:35    6.41  n/a
      [DT= 5.00]  SUM= 01:800mm       13.20     .294 No_date    1:35    7.99  n/a
 001:0026---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       04:EXT-4       2.60     .059 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0027---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       05:INT-5        .90     .021 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0028---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       06:INT-2       5.80     .102 No_date    1:35    6.41 .169
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0029---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       07:UNC-3       1.90     .033 No_date    1:35    6.41 .169
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|--------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT  |
#-----------------|--------------------------------------------------------|
#-----------------|--------------------------------------------------------|
 001:0030---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:EXT-4       2.60     .059 No_date    1:35    8.18  n/a
                      + 05:INT-5        .90     .021 No_date    1:35    8.18  n/a
                      + 06:INT-2       5.80     .102 No_date    1:35    6.41  n/a
                      + 07:UNC-3       1.90     .033 No_date    1:35    6.41  n/a
      [DT= 5.00]  SUM= 02:900mm       11.20     .215 No_date    1:35    6.96  n/a
 001:0031---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       05:EXT-5       5.20     .119 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0032---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       06:INT-6        .70     .016 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0033---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       07:INT-3       4.90     .086 No_date    1:35    6.41 .169
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0034---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       08:UNC-4       3.20     .056 No_date    1:35    6.41 .169
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|--------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH       |
#-----------------|--------------------------------------------------------|
#-----------------|--------------------------------------------------------|
 001:0035---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:EXT-5       5.20     .119 No_date    1:35    8.18  n/a
                      + 06:INT-6        .70     .016 No_date    1:35    8.18  n/a
                      + 07:INT-3       4.90     .086 No_date    1:35    6.41  n/a
                      + 08:UNC-4       3.20     .056 No_date    1:35    6.41  n/a
      [DT= 5.00]  SUM= 03:NE_DIT      14.00     .277 No_date    1:35    7.15  n/a
#-----------------|--------------------------------------------------------|
#-----------------|--------------------------------------------------------|
#-----------------|----------10YR------------------------------------------|
```

```
#-----------------|-----------------------------------------------------------|
 001:0036---------------------------------------------------------------------
     CHICAGO STORM
      [SDT=10.00:SDUR=   4.00:PTOT=  58.19]
      (A/B/C=1786.143/  15.082/    .868: R=.9956)
#-----------------|-----------------------------------------------------------|
#-----------------|-----------PRE-DEVELOPMENT---------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0037---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        05:EXT-1        3.50     .212 No_date    1:30   20.07 .345
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0038---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:EXT-2        4.10     .249 No_date    1:30   20.07 .345
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0039---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        03:EXT-3        2.20     .133 No_date    1:30   20.07 .345
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0040---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        04:INT-4        2.00     .121 No_date    1:30   20.07 .345
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0041---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        06:INT-1        1.40     .067 No_date    1:30   16.34 .281
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT      |
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0042---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             05:EXT-1        3.50     .212 No_date    1:30   20.07  n/a
                       + 02:EXT-2        4.10     .249 No_date    1:30   20.07  n/a
                       + 03:EXT-3        2.20     .133 No_date    1;30   20.07  n/a
                       + 04:INT-4        2.00     .121 No_date    1:30   20.07  n/a
                       + 06:INT-1        1.40     .067 No_date    1:30   16.34  n/a
      [DT= 5.00]  SUM=   01:800mm       13.20     .783 No_date    1:30   19.67  n/a
 001:0043---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        04:EXT-4        2.60     .158 No_date    1:30   20.07 .345
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0044---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        05:INT-5         .90     .055 No_date    1:30   20.07 .345
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0045---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        06:INT-2        5.80     .277 No_date    1:30   16.34 .281
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0046---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        07:UNC-3        1.90     .091 No_date    1:30   16.34 .281
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT      |
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0047---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:EXT-4        2.60     .158 No_date    1:30   20.07  n/a
                       + 05:INT-5         .90     .055 No_date    1:30   20.07  n/a
                       + 06:INT-2        5.80     .277 No_date    1:30   16.34  n/a
                       + 07:UNC-3        1.90     .091 No_date    1:30   16.34  n/a
      [DT= 5.00]  SUM=   02:900mm       11.20     .580 No_date    1:30   17.50  n/a
 001:0048---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        05:EXT-5        5.20     .315 No_date    1:30   20.07 .345
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0049---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        06:INT-6         .70     .042 No_date    1:30   20.07 .345
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0050---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        07:INT-3        4.90     .234 No_date    1:30   16.34 .281
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0051---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        08:UNC-4        3.20     .153 No_date    1:30   16.34 .281
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH           |
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0052---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             05:EXT-5        5.20     .315 No_date    1:30   20.07  n/a
                       + 06:INT-6         .70     .042 No_date    1:30   20.07  n/a
                       + 07:INT-3        4.90     .234 No_date    1:30   16.34  n/a
                       + 08:UNC-4        3.20     .153 No_date    1:30   16.34  n/a
      [DT= 5.00]  SUM=   03:NE_DIT      14.00     .745 No_date    1:30   17.91  n/a
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
#-----------------|-----------100YR-------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0053---------------------------------------------------------------------
     CHICAGO STORM
      [SDT=10.00:SDUR=   4.00:PTOT=  84.33]
      (A/B/C=2435.365/  15.071/    .857: R=.9959]
#-----------------|-----------------------------------------------------------|
#-----------------|-----------PRE-DEVELOPMENT---------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0054---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        05:EXT-1        3.50     .433 No_date    1:30   38.95 .462
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0055---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:EXT-2        4.10     .508 No_date    1:30   38.95 .462
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0056---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        03:EXT-3        2.20     .272 No_date    1:30   38.95 .462
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0057---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        04:INT-4        2.00     .248 No_date    1:30   38.95 .462
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0058---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        06:INT-1        1.40     .142 No_date    1:30   32.83 .389
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT      |
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0059---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             05:EXT-1        3.50     .433 No_date    1:30   38.95  n/a
                       + 02:EXT-2        4.10     .508 No_date    1:30   38.95  n/a
                       + 03:EXT-3        2.20     .272 No_date    1:30   38.95  n/a
                       + 04:INT-4        2.00     .248 No_date    1:30   38.95  n/a
                       + 06:INT-1        1.40     .142 No_date    1:30   32.83  n/a
      [DT= 5.00]  SUM=   01:800mm       13.20    1.602 No_date    1:30   38.30  n/a
 001:0060---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        04:EXT-4        2.60     .322 No_date    1:30   38.95 .462
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0061---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        05:INT-5         .90     .111 No_date    1:30   38.95 .462
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0062---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        06:INT-2        5.80     .586 No_date    1:30   32.83 .389
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0063---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        07:UNC-3        1.90     .192 No_date    1:30   32.83 .389
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT      |
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0064---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:EXT-4        2.60     .322 No_date    1:30   38.95  n/a
                       + 05:INT-5         .90     .111 No_date    1:30   38.95  n/a
                       + 06:INT-2        5.80     .586 No_date    1:30   32.83  n/a
                       + 07:UNC-3        1.90     .192 No_date    1:30   32.83  n/a
      [DT= 5.00]  SUM=   02:900mm       11.20    1.212 No_date    1:30   34.74  n/a
 001:0065---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        05:EXT-5        5.20     .644 No_date    1:30   38.95 .462
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0066---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        06:INT-6         .70     .087 No_date    1:30   38.95 .462
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0067---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        07:INT-3        4.90     .495 No_date    1:30   32.83 .389
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0068---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        08:UNC-4        3.20     .323 No_date    1:30   32.83 .389
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH           |
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0069---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             05:EXT-5        5.20     .644 No_date    1:30   38.95  n/a
                       + 06:INT-6         .70     .087 No_date    1:30   38.95  n/a
                       + 07:INT-3        4.90     .495 No_date    1:30   32.83  n/a
                       + 08:UNC-4        3.20     .323 No_date    1:30   32.83  n/a
      [DT= 5.00]  SUM=   03:NE_DIT      14.00    1.549 No_date    1:30   35.41  n/a
#-----------------|-----------------------------------------------------------|
 001:0070---------------------------------------------------------------------
      FINISH
------------------------------------------------------------------------------
******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2007-06-19     at 13:59:51
==============================================================================
```

```
2     Metric units
*#*****************************************************************************
*#  Project Name: [ALTA PHASE-II]    Project Number: [119-2528]
*#  Date          : 05-24-2007
*#  Modeller      : [          ]
*#  Company       : C.F. Crozier & Associates Inc.
*#  License #     :  3737016
*#*****************************************************************************
START                 TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                     [  ] <--storm filename, one per line for NSTORM time
*#-----------------|--------------------------------------------------------|
*#-----------------|----------25mm------------------------------------------|
*#-----------------|--------------------------------------------------------|
READ STORM            STORM_FILENAME=["25mm.stm"]
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
*#-----------------|-----------POST-DEVELOPMENT-----------------------------|
*#-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[2], NHYD=["EXT-1"], DT=[5]min, AREA=[3.5](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[3], NHYD=["INT-3"], DT=[5]min, AREA=[0.2](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[4], NHYD=["UNC-1"], DT=[5]min, AREA=[0.8](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[5](mm),
                      N=[3], TP=[0.21]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT   |
*#-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[1], NHYD=["800mm"], IDs to add=[2,3,4]
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[5], NHYD=["EXT-2"], DT=[5]min, AREA=[4.1](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*#-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[8], NHYD=["EXT-3"], DT=[5]min, AREA=[2.2](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB STANDHYD        ID=[6], NHYD=["INT-2"], DT=[5](min), AREA=[3](ha),
                      XIMP=[0.13], TIMP=[0.29], DWF=[0](cms), LOSS=[2],
                      SCS curve number CN=[69],
                      Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                           LGP=[65](m), MNP=[0.15], SCP=[0](min),
                      Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
                                           LGI=[290](m), MNI=[0.13], SCI=[0](min),
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[7], NHYD=["INT-4"], DT=[5]min, AREA=[0.6](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB STANDHYD        ID=[9], NHYD=["INT-1"], DT=[5](min), AREA=[9.9](ha),
                      XIMP=[0.19], TIMP=[0.37], DWF=[0](cms), LOSS=[2],
                      SCS curve number CN=[79],
                      Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                           LGP=[65](m), MNP=[0.15], SCP=[0](min),
                      Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
                                           LGI=[500](m), MNI=[0.13], SCI=[0](min),
                      RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE RESERVOIR       |
*#-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[3], NHYD=["POOL1"], IDs to add=[5,8,6,7,9]
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
ROUTE RESERVOIR       IDout=[6],   NHYD=["POOL"],  IDin=[3],
                      RDT=[5](min),
                            TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms) - (ha-m)
                                      [   0.0 ,   0.0 ]
                                      [ 0.1,   0.1 ]
                                      [ 0.4 ,   0.2]
                                      [ 1.09 ,   0.36]
                                      [    -1  ,  -1  ]  (max twenty pts)
                            IDovf=[7], NHYDovf=["OVF1"]
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[10], NHYD=["UNC-2"], DT=[5]min, AREA=[1.5](ha),
                      DWF=[0](cms),  CN/C=[82], IA=[4.5](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[4], NHYD=["UNC-3s1"], DT=[5]min, AREA=[2.1](ha),
                      DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT   |
*#-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[2], NHYD=["900mm"], IDs to add=[4,6,7,10]
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[4], NHYD=["EXT-4"], DT=[5]min, AREA=[2.6](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[5], NHYD=["EXT-5"], DT=[5]min, AREA=[5.2](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[8], NHYD=["INT-5"], DT=[5]min, AREA=[0.1](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[6], NHYD=["UNC-4s1"], DT=[5]min, AREA=[3.0](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[5](mm),
                      N=[3], TP=[0.22]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[7], NHYD=["Ext-6"], DT=[5]min, AREA=[6](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.21]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[9], NHYD=["Ext-7"], DT=[5]min, AREA=[6](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[10], NHYD=["Ext-8"], DT=[5]min, AREA=[12.8](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.26]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH        |
*#-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[3], NHYD=["NE_DITCH"], IDs to add=[4,5,6,8]
*#-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[4], NHYD=["NE_DITCH"], IDs to add=[7,3,9,10]
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[6], NHYD=["Ext-9"], DT=[5]min, AREA=[7](ha),
                      DWF=[0](cms),  CN/C=[60], IA=[9.76](mm),
                      N=[3], TP=[0.35]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS Subwatershed 21A Outflow--------|
*#-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[5], NHYD=["21A"], IDs to add=[4,6]
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[4], NHYD=["Ext-10A"], DT=[5]min, AREA=[27.9](ha),
                      DWF=[0](cms),  CN/C=[49.4], IA=[9.8](mm),
                      N=[3], TP=[.42]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[3], NHYD=["Ext-11"], DT=[5]min, AREA=[3.9](ha),
                      DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[6], NHYD=["Ext-12"], DT=[5]min, AREA=[5.2](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO EX. STORAGE AREA------|
*#-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[5], NHYD=["WET-STO"], IDs to add=[1,2,4,3,6]
*%-----------------|--------------------------------------------------------|
ROUTE RESERVOIR       IDout=[4],   NHYD=["22"],  IDin=[5],
                      RDT=[1](min),
                            TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms) - (ha-m)
                                      [   0.0 ,   0.0 ]
                                      [   0.0102 ,   0.002 ]
                                      [   0.04230 ,   0.004 ]
                                      [   0.0939 ,   0.006 ]
                                      [   0.1286 ,   0.008 ]
                                      [   0.16330 ,   0.045 ]
                                      [   0.2489 ,   0.262 ]
                                      [   0.3488 ,   0.622 ]
                                      [   0.4601 ,   1.088 ]
                                      [   0.51955 ,   1.623 ]
                                      [   0.579 ,   1.925 ]
                                      [   0.7014 ,   2.253 ]
                                      [   0.8216 ,   2.951 ]
                                      [   0.9345 ,   3.689 ]
                                      [    -1  ,  -1  ]  (max twenty pts)
                            IDovf=[6], NHYDovf=["OVF"]
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[3], NHYD=["Ext-10B"], DT=[5]min, AREA=[4.9](ha),
                      DWF=[0](cms),  CN/C=[36], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS SUBWATERSHED 22 OUTFLOW --------|
*#-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[5], NHYD=["22"], IDs to add=[3,4]
*%-----------------|--------------------------------------------------------|
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
*#-----------------|----------2 YEAR----------------------------------------|
*#-----------------|--------------------------------------------------------|
CHICAGO STORM         IUNITS=[2],  TD=[4](hrs), TPRAT=[0.333],  CSDT=[10](min),
                      ICASEcs=[2],
                      Enter ordinates of IDF curve below, at least seven points
                          TIME (min)     Intensity(mm/hr)
                            [5    ]        [95]
                            [10   ]        [70 ]
                            [15   ]        [58 ]
                            [30   ]        [38 ]
                            [60   ]        [25 ]
                            [180 ]         [17 ]
                            [360 ]         [6.3]
                            [720 ]         [3.5]
                            [1440]         [1.9]
                               -1             -1
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
*#-----------------|-----------POST-DEVELOPMENT-----------------------------|
*#-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[2], NHYD=["EXT-1"], DT=[5]min, AREA=[3.5](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[3], NHYD=["INT-3"], DT=[5]min, AREA=[0.2](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[4], NHYD=["UNC-1"], DT=[5]min, AREA=[0.8](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[5](mm),
                      N=[3], TP=[0.21]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT   |
*#-----------------|--------------------------------------------------------|
ADD HYD               IDsum=[1], NHYD=["800mm"], IDs to add=[2,3,4]
*%-----------------|--------------------------------------------------------|
*#-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[5], NHYD=["EXT-2"], DT=[5]min, AREA=[4.1](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                      N=[3], TP=[0.17]hrs,
                      RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*#-----------------|--------------------------------------------------------|
CALIB NASHYD          ID=[8], NHYD=["EXT-3"], DT=[5]min, AREA=[2.2](ha),
                      DWF=[0](cms),  CN/C=[79], IA=[10](mm),
```

```
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD           ID=[6], NHYD=["INT-2"], DT=[5](min), AREA=[3](ha),
                         XIMP=[0.13], TIMP=[0.29], DWF=[0](cms), LOSS=[2],
                         SCS curve number CN=[69],
                         Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                              LGP=[65](m), MNP=[0.15], SCP=[0](min),
                         Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
                                              LGI=[290](m), MNI=[0.13], SCI=[0](min),
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[7], NHYD=["INT-4"], DT=[5]min, AREA=[0.6](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD           ID=[9], NHYD=["INT-1"], DT=[5](min), AREA=[9.9](ha),
                         XIMP=[0.19], TIMP=[0.37], DWF=[0](cms), LOSS=[2],
                         SCS curve number CN=[79],
                         Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                              LGP=[65](m), MNP=[0.15], SCP=[0](min),
                         Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
                                              LGI=[500](m), MNI=[0.13], SCI=[0](min),
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE RESERVOIR            |
*#-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[3], NHYD=["POOL1"], IDs to add=[5,8,6,7,9]
*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
ROUTE RESERVOIR          IDout=[6],   NHYD=["POOL"],  IDin=[3],
                         RDT=[5](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms) - (ha-m)
                                      [   0.0 ,  0.0 ]
                                      [ 0.1,  0.1 ]
                                      [ 0.4 ,  0.2]
                                      [ 1.09 ,  0.36]
                                      [   -1  ,  -1  ]  (max twenty pts)
                              IDovf=[7], NHYDovf=["OVF1"]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[10], NHYD=["UNC-2"], DT=[5]min, AREA=[1.5](ha),
                         DWF=[0](cms),  CN/C=[82], IA=[4.5](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[4], NHYD=["UNC-3s1"], DT=[5]min, AREA=[2.1](ha),
                         DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT        |
*#-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[2], NHYD=["900mm"], IDs to add=[4,6,7,10]
*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[4], NHYD=["EXT-4"], DT=[5]min, AREA=[2.6](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[5], NHYD=["EXT-5"], DT=[5]min, AREA=[5.2](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[8], NHYD=["INT-5"], DT=[5]min, AREA=[0.1](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[6], NHYD=["UNC-4s1"], DT=[5]min, AREA=[3.0](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[5](mm),
                         N=[3], TP=[0.22]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[7], NHYD=["Ext-6"], DT=[5]min, AREA=[6](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.21]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[9], NHYD=["Ext-7"], DT=[5]min, AREA=[6](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[10], NHYD=["Ext-8"], DT=[5]min, AREA=[12.8](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.26]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|

*#-----------------|-------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH             |
*#-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[3], NHYD=["NE_DITCH"], IDs to add=[4,5,6,8]
*#-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[4], NHYD=["NE_DITCH"], IDs to add=[7,3,9,10]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[6], NHYD=["Ext-9"], DT=[5]min, AREA=[7](ha),
                         DWF=[0](cms),  CN/C=[60], IA=[9.76](mm),
                         N=[3], TP=[0.35]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS Subwatershed 21A Outflow--------|
*#-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[5], NHYD=["21A"], IDs to add=[4,6]
*%-----------------|-------------------------------------------------------------|

CALIB NASHYD             ID=[4], NHYD=["Ext-10A"], DT=[5]min, AREA=[27.9](ha),
                         DWF=[0](cms),  CN/C=[49.4], IA=[9.8](mm),
                         N=[3], TP=[.42]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[3], NHYD=["Ext-11"], DT=[5]min, AREA=[3.9](ha),
                         DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[6], NHYD=["Ext-12"], DT=[5]min, AREA=[5.2](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|

*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO EX. STORAGE AREA------|
*#-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[5], NHYD=["WET-STO"], IDs to add=[1,2,4,3,6]
*%-----------------|-------------------------------------------------------------|
ROUTE RESERVOIR          IDout=[4],   NHYD=["22"],  IDin=[5],
                         RDT=[1](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms) - (ha-m)
                                      [   0.0 ,  0.0 ]
                                      [   0.0102 ,  0.002 ]
                                      [   0.04230 ,  0.004 ]
                                      [   0.0939 ,  0.006 ]
                                      [   0.1286 ,  0.008 ]
                                      [   0.16330 ,  0.045 ]
                                      [   0.2489 ,  0.262 ]
                                      [   0.3488 ,  0.622 ]
                                      [   0.4601 ,  1.088 ]
                                      [   0.51955 ,  1.623 ]
                                      [   0.579 ,  1.925 ]
                                      [   0.7014 ,  2.253 ]
                                      [   0.8216 ,  2.951 ]
                                      [   0.9345 ,  3.689 ]
                                      [   -1  ,  -1  ]  (max twenty pts)
                              IDovf=[6], NHYDovf=["OVF"]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[3], NHYD=["Ext-10B"], DT=[5]min, AREA=[4.9](ha),
                         DWF=[0](cms),  CN/C=[36], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS SUBWATERSHED 22 OUTFLOW --------|
*#-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[5], NHYD=["22"], IDs to add=[3,4]
*%-----------------|-------------------------------------------------------------|

*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
*#-----------------|----------5YR------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
CHICAGO STORM            IUNITS=[2],  TD=[4](hrs), TPRAT=[0.333],  CSDT=[10](min),
                         ICASEcs=[2],
                         Enter ordinates of IDF curve below, at least seven points
                             TIME (min)    Intensity(mm/hr)
                               [5   ]        [139.4]
                               [10  ]        [99.4]
                               [15  ]        [82]
                               [30  ]        [54.8]
                               [60  ]        [33.1]
                               [180 ]        [19.1]
                               [360 ]        [7.9]
                               [720 ]        [4.5]
                               [1440]        [2.5]
                                 -1             -1
*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
*#-----------------|-----------POST-DEVELOPMENT----------------------------------|
*#-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[2], NHYD=["EXT-1"], DT=[5]min, AREA=[3.5](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1

*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[3], NHYD=["INT-3"], DT=[5]min, AREA=[0.2](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[4], NHYD=["UNC-1"], DT=[5]min, AREA=[0.8](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[5](mm),
                         N=[3], TP=[0.21]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT        |
*#-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[1], NHYD=["800mm"], IDs to add=[2,3,4]
*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[5], NHYD=["EXT-2"], DT=[5]min, AREA=[4.1](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*#-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[8], NHYD=["EXT-3"], DT=[5]min, AREA=[2.2](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD           ID=[6], NHYD=["INT-2"], DT=[5](min), AREA=[3](ha),
                         XIMP=[0.13], TIMP=[0.29], DWF=[0](cms), LOSS=[2],
                         SCS curve number CN=[69],
                         Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                              LGP=[65](m), MNP=[0.15], SCP=[0](min),
                         Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
                                              LGI=[290](m), MNI=[0.13], SCI=[0](min),
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[7], NHYD=["INT-4"], DT=[5]min, AREA=[0.6](ha),
                         DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
CALIB STANDHYD           ID=[9], NHYD=["INT-1"], DT=[5](min), AREA=[9.9](ha),
                         XIMP=[0.19], TIMP=[0.37], DWF=[0](cms), LOSS=[2],
                         SCS curve number CN=[79],
                         Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                              LGP=[65](m), MNP=[0.15], SCP=[0](min),
                         Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
                                              LGI=[500](m), MNI=[0.13], SCI=[0](min),
                         RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE RESERVOIR            |
*#-----------------|-------------------------------------------------------------|
ADD HYD                  IDsum=[3], NHYD=["POOL1"], IDs to add=[5,8,6,7,9]
*%-----------------|-------------------------------------------------------------|
*#-----------------|-------------------------------------------------------------|
ROUTE RESERVOIR          IDout=[6],   NHYD=["POOL"],  IDin=[3],
                         RDT=[5](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms) - (ha-m)
                                      [   0.0 ,  0.0 ]
                                      [ 0.1,  0.1 ]
                                      [ 0.4 ,  0.2]
                                      [ 1.09 ,  0.36]
                                      [   -1  ,  -1  ]  (max twenty pts)
                              IDovf=[7], NHYDovf=["OVF1"]
*%-----------------|-------------------------------------------------------------|
CALIB NASHYD             ID=[10], NHYD=["UNC-2"], DT=[5]min, AREA=[1.5](ha),
                         DWF=[0](cms),  CN/C=[82], IA=[4.5](mm),
                         N=[3], TP=[0.17]hrs,
                         RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
```

```
CALIB NASHYD         ID=[4], NHYD=["UNC-3s1"], DT=[5]min, AREA=[2.1](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT       |
*#-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[2], NHYD=["900mm"], IDs to add=[4,6,7,10]
*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[4], NHYD=["EXT-4"], DT=[5]min, AREA=[2.6](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[5], NHYD=["EXT-5"], DT=[5]min, AREA=[5.2](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[8], NHYD=["INT-5"], DT=[5]min, AREA=[0.1](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[6], NHYD=["UNC-4s1"], DT=[5]min, AREA=[3.0](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[5](mm),
                     N=[3], TP=[0.22]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[7], NHYD=["Ext-6"], DT=[5]min, AREA=[6](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.21]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[9], NHYD=["Ext-7"], DT=[5]min, AREA=[6](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[10], NHYD=["Ext-8"], DT=[5]min, AREA=[12.8](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.26]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|

*#-----------------|------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH            |
*#-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[3], NHYD=["NE_DITCH"], IDs to add=[4,5,6,8]
*#-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[4], NHYD=["NE_DITCH"], IDs to add=[7,3,9,10]
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[6], NHYD=["Ext-9"], DT=[5]min, AREA=[7](ha),
                     DWF=[0](cms),  CN/C=[60], IA=[9.76](mm),
                     N=[3], TP=[0.35]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS Subwatershed 21A Outflow--------|
*#-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[5], NHYD=["21A"], IDs to add=[4,6]
*%-----------------|------------------------------------------------------------|

CALIB NASHYD         ID=[4], NHYD=["Ext-10A"], DT=[5]min, AREA=[27.9](ha),
                     DWF=[0](cms),  CN/C=[49.4], IA=[9.8](mm),
                     N=[3], TP=[.42]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[3], NHYD=["Ext-11"], DT=[5]min, AREA=[3.9](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[6], NHYD=["Ext-12"], DT=[5]min, AREA=[5.2](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|

*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO EX. STORAGE AREA------|
*#-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[5], NHYD=["WET-STO"], IDs to add=[1,2,4,3,6]
*%-----------------|------------------------------------------------------------|
ROUTE RESERVOIR      IDout=[4],   NHYD=["22"],  IDin=[5],
                     RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [   0.0102 ,  0.002 ]
                                  [   0.04230 ,  0.004 ]
                                  [   0.0939 ,  0.006 ]
                                  [   0.1286 ,  0.008 ]
                                  [   0.16330 ,  0.045 ]
                                  [   0.2489 ,  0.262 ]
                                  [   0.3488 ,  0.622 ]
                                  [   0.4601 ,  1.088 ]
                                  [   0.51955 ,  1.623 ]
                                  [   0.579 ,  1.925 ]
                                  [   0.7014 ,  2.253 ]
                                  [   0.8216 ,  2.951 ]
                                  [   0.9345 ,  3.689 ]
                                  [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[6], NHYDovf=["OVF"]
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[3], NHYD=["Ext-10B"], DT=[5]min, AREA=[4.9](ha),
                     DWF=[0](cms),  CN/C=[36], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS SUBWATERSHED 22 OUTFLOW --------|
*#-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[5], NHYD=["22"], IDs to add=[3,4]
*%-----------------|------------------------------------------------------------|


*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
*#-----------------|----------10YR----------------------------------------------|
*#-----------------|------------------------------------------------------------|
CHICAGO STORM        IUNITS=[2],  TD=[4](hrs), TPRAT=[0.333],  CSDT=[10](min),
                     ICASEcs=[2],
                     Enter ordinates of IDF curve below, at least seven points
                         TIME (min)     Intensity(mm/hr)
                           [5   ]        [150]
                           [10  ]        [105 ]
                           [15  ]        [89 ]
                           [30  ]        [57 ]
                           [60  ]        [38 ]
                           [180 ]        [24 ]
                           [360 ]        [11]
                           [720 ]        [5.5]
                           [1440]        [3]
                              -1            -1
*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
*#-----------------|-----------POST-DEVELOPMENT---------------------------------|
*#-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[2], NHYD=["EXT-1"], DT=[5]min, AREA=[3.5](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1

*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[3], NHYD=["INT-3"], DT=[5]min, AREA=[0.2](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[4], NHYD=["UNC-1"], DT=[5]min, AREA=[0.8](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[5](mm),
                     N=[3], TP=[0.21]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT       |
*#-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[1], NHYD=["800mm"], IDs to add=[2,3,4]
*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[5], NHYD=["EXT-2"], DT=[5]min, AREA=[4.1](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*#-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[8], NHYD=["EXT-3"], DT=[5]min, AREA=[2.2](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB STANDHYD       ID=[6], NHYD=["INT-2"], DT=[5](min), AREA=[3](ha),
                     XIMP=[0.13], TIMP=[0.29], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[69],
                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                          LGP=[65](m), MNP=[0.15], SCP=[0](min),
                     Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
                                          LGI=[290](m), MNI=[0.13], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[7], NHYD=["INT-4"], DT=[5]min, AREA=[0.6](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB STANDHYD       ID=[9], NHYD=["INT-1"], DT=[5](min), AREA=[9.9](ha),
                     XIMP=[0.19], TIMP=[0.37], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[79],
                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                          LGP=[65](m), MNP=[0.15], SCP=[0](min),
                     Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
                                          LGI=[500](m), MNI=[0.13], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE RESERVOIR           |
*#-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[3], NHYD=["POOL1"], IDs to add=[5,8,6,7,9]
*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
ROUTE RESERVOIR      IDout=[6],   NHYD=["POOL"],  IDin=[3],
                     RDT=[5](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [ 0.1,  0.1 ]
                                  [ 0.4 ,  0.2]
                                  [ 1.09 ,  0.36]
                                  [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[7], NHYDovf=["OVF1"]
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[10], NHYD=["UNC-2"], DT=[5]min, AREA=[1.5](ha),
                     DWF=[0](cms),  CN/C=[82], IA=[4.5](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[4], NHYD=["UNC-3s1"], DT=[5]min, AREA=[2.1](ha),
                     DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT       |
*#-----------------|------------------------------------------------------------|
ADD HYD              IDsum=[2], NHYD=["900mm"], IDs to add=[4,6,7,10]
*%-----------------|------------------------------------------------------------|
*#-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[4], NHYD=["EXT-4"], DT=[5]min, AREA=[2.6](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[5], NHYD=["EXT-5"], DT=[5]min, AREA=[5.2](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[8], NHYD=["INT-5"], DT=[5]min, AREA=[0.1](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[6], NHYD=["UNC-4s1"], DT=[5]min, AREA=[3.0](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[5](mm),
                     N=[3], TP=[0.22]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[7], NHYD=["Ext-6"], DT=[5]min, AREA=[6](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.21]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[9], NHYD=["Ext-7"], DT=[5]min, AREA=[6](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.17]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
CALIB NASHYD         ID=[10], NHYD=["Ext-8"], DT=[5]min, AREA=[12.8](ha),
                     DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                     N=[3], TP=[0.26]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|------------------------------------------------------------|
```

```
*#----------------|---------------------------------------------------------|
*#----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH          |
*#----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
ADD HYD           IDsum=[3], NHYD=["NE_DITCH"], IDs to add=[4,5,6,8]
*#----------------|---------------------------------------------------------|
ADD HYD           IDsum=[4], NHYD=["NE_DITCH"], IDs to add=[7,3,9,10]
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[6], NHYD=["Ext-9"], DT=[5]min, AREA=[7](ha),
                  DWF=[0](cms),  CN/C=[60], IA=[9.76](mm),
                  N=[3], TP=[0.35]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
*#----------------|  THE ADD HYD BELOW MODELS Subwatershed 21A Outflow--------|
*#----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
ADD HYD           IDsum=[5], NHYD=["21A"], IDs to add=[4,6]
*%----------------|---------------------------------------------------------|

CALIB NASHYD      ID=[4], NHYD=["Ext-10A"], DT=[5]min, AREA=[27.9](ha),
                  DWF=[0](cms),  CN/C=[49.4], IA=[9.8](mm),
                  N=[3], TP=[.42]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[3], NHYD=["Ext-11"], DT=[5]min, AREA=[3.9](ha),
                  DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[6], NHYD=["Ext-12"], DT=[5]min, AREA=[5.2](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|

*%----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
*#----------------|  THE ADD HYD BELOW MODELS FLOW INTO EX. STORAGE AREA------|
*#----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
ADD HYD           IDsum=[5], NHYD=["WET-STO"], IDs to add=[1,2,4,3,6]
*%----------------|---------------------------------------------------------|
ROUTE RESERVOIR   IDout=[4],    NHYD=["22"],   IDin=[5],
                  RDT=[1](min),
                      TABLE of ( OUTFLOW-STORAGE ) values
                               (cms) - (ha-m)
                             [   0.0 ,    0.0 ]
                             [   0.0102 ,   0.002 ]
                             [   0.04230 ,   0.004 ]
                             [   0.0939 ,   0.006 ]
                             [   0.1286 ,   0.008 ]
                             [   0.16330 ,   0.045 ]
                             [   0.2489 ,   0.262 ]
                             [   0.3488 ,   0.622 ]
                             [   0.4601 ,   1.088 ]
                             [   0.51955 ,   1.623 ]
                             [   0.579 ,   1.925 ]
                             [   0.7014 ,   2.253 ]
                             [   0.8216 ,   2.951 ]
                             [   0.9345 ,   3.689 ]
                             [   -1  ,   -1  ]  (max twenty pts)
                      IDovf=[6], NHYDovf=["OVF"]
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[3], NHYD=["Ext-10B"], DT=[5]min, AREA=[4.9](ha),
                  DWF=[0](cms),  CN/C=[36], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
*%----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
*#----------------|  THE ADD HYD BELOW MODELS SUBWATERSHED 22 OUTFLOW --------|
*#----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
ADD HYD           IDsum=[5], NHYD=["22"], IDs to add=[3,4]
*%----------------|---------------------------------------------------------|

*%----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
*#----------------|----------25YR-------------------------------------------|
*#----------------|---------------------------------------------------------|
CHICAGO STORM     IUNITS=[2],   TD=[4](hrs), TPRAT=[0.333],   CSDT=[10](min),
                  ICASEcs=[2],
                  Enter ordinates of IDF curve below, at least seven points
                       TIME (min)     Intensity(mm/hr)
                        [5   ]          [180]
                        [10  ]          [120]
                        [15  ]          [105]
                        [30  ]          [67]
                        [60  ]          [46 ]
                        [180 ]          [28 ]
                        [360 ]          [13 ]
                        [720 ]          [6.5 ]
                        [1440]          [3.6 ]
                          -1               -1
*%----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
*#----------------|-----------POST-DEVELOPMENT------------------------------|
*#----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[2], NHYD=["EXT-1"], DT=[5]min, AREA=[3.5](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[3], NHYD=["INT-3"], DT=[5]min, AREA=[0.2](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[4], NHYD=["UNC-1"], DT=[5]min, AREA=[0.8](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[5](mm),
                  N=[3], TP=[0.21]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
*#----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT     |
*#----------------|---------------------------------------------------------|
ADD HYD           IDsum=[1], NHYD=["800mm"], IDs to add=[2,3,4]
*#----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[5], NHYD=["EXT-2"], DT=[5]min, AREA=[4.1](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*#----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[8], NHYD=["EXT-3"], DT=[5]min, AREA=[2.2](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB STANDHYD    ID=[6], NHYD=["INT-2"], DT=[5](min), AREA=[3](ha),
                  XIMP=[0.13], TIMP=[0.29], DWF=[0](cms), LOSS=[2],
                  SCS curve number CN=[69],
                  Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                       LGP=[65](m), MNP=[0.15], SCP=[0](min),
                  Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
                                       LGI=[290](m), MNI=[0.13], SCI=[0](min),
                  RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[7], NHYD=["INT-4"], DT=[5]min, AREA=[0.6](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB STANDHYD    ID=[9], NHYD=["INT-1"], DT=[5](min), AREA=[9.9](ha),
                  XIMP=[0.19], TIMP=[0.37], DWF=[0](cms), LOSS=[2],
                  SCS curve number CN=[79],
                  Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                       LGP=[65](m), MNP=[0.15], SCP=[0](min),
                  Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
                                       LGI=[500](m), MNI=[0.13], SCI=[0](min),
                  RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
*#----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE RESERVOIR         |
*#----------------|---------------------------------------------------------|
ADD HYD           IDsum=[3], NHYD=["POOL1"], IDs to add=[5,8,6,7,9]
*%----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
ROUTE RESERVOIR   IDout=[6],    NHYD=["POOL"],   IDin=[3],
                  RDT=[5](min),
                      TABLE of ( OUTFLOW-STORAGE ) values
                               (cms) - (ha-m)
                             [   0.0 ,    0.0 ]
                             [ 0.1,   0.1 ]
                             [ 0.4 ,   0.2]
                             [ 1.09 ,   0.36]
                             [   -1  ,   -1  ]  (max twenty pts)
                      IDovf=[7], NHYDovf=["OVF1"]
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[10], NHYD=["UNC-2"], DT=[5]min, AREA=[1.5](ha),
                  DWF=[0](cms),  CN/C=[82], IA=[4.5](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[4], NHYD=["UNC-3sl"], DT=[5]min, AREA=[2.1](ha),
                  DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
*#----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT     |
*#----------------|---------------------------------------------------------|
ADD HYD           IDsum=[2], NHYD=["900mm"], IDs to add=[4,6,7,10]
*%----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[4], NHYD=["EXT-4"], DT=[5]min, AREA=[2.6](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[5], NHYD=["EXT-5"], DT=[5]min, AREA=[5.2](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[8], NHYD=["INT-5"], DT=[5]min, AREA=[0.1](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[6], NHYD=["UNC-4sl"], DT=[5]min, AREA=[3.0](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[5](mm),
                  N=[3], TP=[0.22]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[7], NHYD=["Ext-6"], DT=[5]min, AREA=[6](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.21]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[9], NHYD=["Ext-7"], DT=[5]min, AREA=[6](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[10], NHYD=["Ext-8"], DT=[5]min, AREA=[12.8](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.26]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|

*#----------------|---------------------------------------------------------|
*#----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH          |
*#----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
ADD HYD           IDsum=[3], NHYD=["NE_DITCH"], IDs to add=[4,5,6,8]
*#----------------|---------------------------------------------------------|
ADD HYD           IDsum=[4], NHYD=["NE_DITCH"], IDs to add=[7,3,9,10]
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[6], NHYD=["Ext-9"], DT=[5]min, AREA=[7](ha),
                  DWF=[0](cms),  CN/C=[60], IA=[9.76](mm),
                  N=[3], TP=[0.35]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
*#----------------|  THE ADD HYD BELOW MODELS Subwatershed 21A Outflow--------|
*#----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
ADD HYD           IDsum=[5], NHYD=["21A"], IDs to add=[4,6]
*%----------------|---------------------------------------------------------|

CALIB NASHYD      ID=[4], NHYD=["Ext-10A"], DT=[5]min, AREA=[27.9](ha),
                  DWF=[0](cms),  CN/C=[49.4], IA=[9.8](mm),
                  N=[3], TP=[.42]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[3], NHYD=["Ext-11"], DT=[5]min, AREA=[3.9](ha),
                  DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|
CALIB NASHYD      ID=[6], NHYD=["Ext-12"], DT=[5]min, AREA=[5.2](ha),
                  DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                  N=[3], TP=[0.17]hrs,
                  RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%----------------|---------------------------------------------------------|

*%----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
*#----------------|  THE ADD HYD BELOW MODELS FLOW INTO EX. STORAGE AREA------|
*#----------------|---------------------------------------------------------|
*#----------------|---------------------------------------------------------|
ADD HYD           IDsum=[5], NHYD=["WET-STO"], IDs to add=[1,2,4,3,6]
*%----------------|---------------------------------------------------------|
ROUTE RESERVOIR   IDout=[4],    NHYD=["22"],   IDin=[5],
                  RDT=[1](min),
                      TABLE of ( OUTFLOW-STORAGE ) values
                               (cms) - (ha-m)
```

```
                                          [    0.0 ,   0.0 ]
                                          [    0.0102 ,   0.002 ]
                                          [    0.04230 ,   0.004 ]
                                          [    0.0939 ,   0.006 ]
                                          [    0.1286 ,   0.008 ]
                                          [    0.16330 ,   0.045 ]
                                          [    0.2489 ,   0.262 ]
                                          [    0.3488 ,   0.622 ]
                                          [    0.4601 ,   1.088 ]
                                          [    0.51955 ,   1.623 ]
                                          [    0.579 ,   1.925 ]
                                          [    0.7014 ,   2.253 ]
                                          [    0.8216 ,   2.951 ]
                                          [    0.9345 ,   3.689 ]
                                          [    -1   ,   -1   ]  (max twenty pts)
                                 IDovf=[6], NHYDovf=["OVF"]
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[3], NHYD=["Ext-10B"], DT=[5]min, AREA=[4.9](ha),
                   DWF=[0](cms),  CN/C=[36], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS SUBWATERSHED 22 OUTFLOW --------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
ADD HYD            IDsum=[5], NHYD=["22"], IDs to add=[3,4]
*%-----------------|--------------------------------------------------------------|


*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|----------100YR-----------------------------------------------|
*#-----------------|--------------------------------------------------------------|
CHICAGO STORM      IUNITS=[2],  TD=[4](hrs), TPRAT=[0.333],  CSDT=[10](min),
                   ICASEcs=[2],
                   Enter ordinates of IDF curve below, at least seven points
                       TIME (min)    Intensity(mm/hr)
                         [5    ]       [215]
                         [10   ]       [145]
                         [15   ]       [125]
                         [30   ]       [82 ]
                         [60   ]       [56 ]
                         [180  ]       [34 ]
                         [360  ]       [16 ]
                         [720  ]       [8  ]
                         [1440]        [4.5  ]
                            -1             -1
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|-----------POST-DEVELOPMENT-----------------------------------|
*#-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[2], NHYD=["EXT-1"], DT=[5]min, AREA=[3.5](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1

*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[3], NHYD=["INT-3"], DT=[5]min, AREA=[0.2](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[4], NHYD=["UNC-1"], DT=[5]min, AREA=[0.8](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[5](mm),
                   N=[3], TP=[0.21]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT        |
*#-----------------|--------------------------------------------------------------|
ADD HYD            IDsum=[1], NHYD=["800mm"], IDs to add=[2,3,4]
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[5], NHYD=["EXT-2"], DT=[5]min, AREA=[4.1](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*#-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[8], NHYD=["EXT-3"], DT=[5]min, AREA=[2.2](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB STANDHYD     ID=[6], NHYD=["INT-2"], DT=[5](min), AREA=[3](ha),
                   XIMP=[0.13], TIMP=[0.29], DWF=[0](cms), LOSS=[2],
                   SCS curve number CN=[69],
                   Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                        LGP=[65](m), MNP=[0.15], SCP=[0](min),
                   Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
                                        LGI=[290](m), MNI=[0.13], SCI=[0](min),
                   RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[7], NHYD=["INT-4"], DT=[5]min, AREA=[0.6](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB STANDHYD     ID=[9], NHYD=["INT-1"], DT=[5](min), AREA=[9.9](ha),
                   XIMP=[0.19], TIMP=[0.37], DWF=[0](cms), LOSS=[2],
                   SCS curve number CN=[79],
                   Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                        LGP=[65](m), MNP=[0.15], SCP=[0](min),
                   Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
                                        LGI=[500](m), MNI=[0.13], SCI=[0](min),
                   RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE RESERVOIR            |
*#-----------------|--------------------------------------------------------------|
ADD HYD            IDsum=[3], NHYD=["POOL1"], IDs to add=[5,8,6,7,9]
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
ROUTE RESERVOIR    IDout=[6],   NHYD=["POOL"],  IDin=[3],
                   RDT=[5](min),
                        TABLE of ( OUTFLOW-STORAGE ) values
                                  (cms) - (ha-m)
                                [   0.0 ,   0.0 ]
                                [ 0.1,   0.1 ]
                                [ 0.4 ,   0.2]
                                [ 1.09 ,   0.36]
                                [   -1   ,   -1   ]   (max twenty pts)
                        IDovf=[7], NHYDovf=["OVF1"]
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[10], NHYD=["UNC-2"], DT=[5]min, AREA=[1.5](ha),
                   DWF=[0](cms),  CN/C=[82], IA=[4.5](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[4], NHYD=["UNC-3s1"], DT=[5]min, AREA=[2.1](ha),
                   DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT        |
*#-----------------|--------------------------------------------------------------|
ADD HYD            IDsum=[2], NHYD=["900mm"], IDs to add=[4,6,7,10]
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[4], NHYD=["EXT-4"], DT=[5]min, AREA=[2.6](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[5], NHYD=["EXT-5"], DT=[5]min, AREA=[5.2](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[8], NHYD=["INT-5"], DT=[5]min, AREA=[0.1](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[6], NHYD=["UNC-4s1"], DT=[5]min, AREA=[3.0](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[5](mm),
                   N=[3], TP=[0.22]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[7], NHYD=["Ext-6"], DT=[5]min, AREA=[6](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                   N=[3], TP=[0.21]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[9], NHYD=["Ext-7"], DT=[5]min, AREA=[6](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[10], NHYD=["Ext-8"], DT=[5]min, AREA=[12.8](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                   N=[3], TP=[0.26]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|

*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH             |
*#-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
ADD HYD            IDsum=[3], NHYD=["NE_DITCH"], IDs to add=[4,5,6,8]
*#-----------------|--------------------------------------------------------------|
ADD HYD            IDsum=[4], NHYD=["NE_DITCH"], IDs to add=[7,3,9,10]
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[6], NHYD=["Ext-9"], DT=[5]min, AREA=[7](ha),
                   DWF=[0](cms),  CN/C=[60], IA=[9.76](mm),
                   N=[3], TP=[0.35]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS Subwatershed 21A Outflow--------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
ADD HYD            IDsum=[5], NHYD=["21A"], IDs to add=[4,6]
*%-----------------|--------------------------------------------------------------|
*%-----------------|--------------------------------------------------------------|

CALIB NASHYD       ID=[4], NHYD=["Ext-10A"], DT=[5]min, AREA=[27.9](ha),
                   DWF=[0](cms),  CN/C=[49.4], IA=[9.8](mm),
                   N=[3], TP=[.42]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[3], NHYD=["Ext-11"], DT=[5]min, AREA=[3.9](ha),
                   DWF=[0](cms),  CN/C=[73], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[6], NHYD=["Ext-12"], DT=[5]min, AREA=[5.2](ha),
                   DWF=[0](cms),  CN/C=[79], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|

*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO EX. STORAGE AREA------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
ADD HYD            IDsum=[5], NHYD=["WET-STO"], IDs to add=[1,2,4,3,6]
*%-----------------|--------------------------------------------------------------|
ROUTE RESERVOIR    IDout=[4],   NHYD=["22"],  IDin=[5],
                   RDT=[1](min),
                        TABLE of ( OUTFLOW-STORAGE ) values
                                  (cms) - (ha-m)
                                [    0.0 ,   0.0 ]
                                [    0.0102 ,   0.002 ]
                                [    0.04230 ,   0.004 ]
                                [    0.0939 ,   0.006 ]
                                [    0.1286 ,   0.008 ]
                                [    0.16330 ,   0.045 ]
                                [    0.2489 ,   0.262 ]
                                [    0.3488 ,   0.622 ]
                                [    0.4601 ,   1.088 ]
                                [    0.51955 ,   1.623 ]
                                [    0.579 ,   1.925 ]
                                [    0.7014 ,   2.253 ]
                                [    0.8216 ,   2.951 ]
                                [    0.9345 ,   3.689 ]
                                [    -1   ,   -1   ]  (max twenty pts)
                        IDovf=[6], NHYDovf=["OVF"]
*%-----------------|--------------------------------------------------------------|
CALIB NASHYD       ID=[3], NHYD=["Ext-10B"], DT=[5]min, AREA=[4.9](ha),
                   DWF=[0](cms),  CN/C=[36], IA=[10](mm),
                   N=[3], TP=[0.17]hrs,
                   RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|--------------------------------------------------------------|
*%-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|  THE ADD HYD BELOW MODELS SUBWATERSHED 22 OUTFLOW --------|
*#-----------------|--------------------------------------------------------------|
*#-----------------|--------------------------------------------------------------|
ADD HYD            IDsum=[5], NHYD=["22"], IDs to add=[3,4]
*%-----------------|--------------------------------------------------------------|

FINISH
```

```
===============================================================================
SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
    S   W W   M   M  H   H    Y    M   M  O   O       9999   9999 July 1999
SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9 =========
                                                     9   9  9   9 # 3737016
     StormWater Management HYdrologic Model           999    999  =========
*******************************************************************************
*************************** SWMHYMO-99 Ver/4.02 *******************************
*******  A single event and continuous hydrologic simulation model     *******
*******     based on the principles of HYMO and its successors         *******
*******                 OTTHYMO-83 and OTTHYMO-89.                     *******
*******************************************************************************
******* Distributed by:  J.F. Sabourin and Associates Inc.             *******
*******                  Ottawa,  Ontario: (613) 727-5199              *******
*******                  Gatineau, Quebec: (819) 243-6858              *******
*******                  E-Mail: swmhymo@jfsa.Com                      *******
*******************************************************************************
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++ Licensed user: C.F. Crozier & Associates Inc.                  +++++++
+++++++                Collingwood             SERIAL#:3737016         +++++++
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
*******************************************************************************
*******              ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *******
*******              Maximum value for ID numbers   :     10           *******
*******              Max. number of rainfall points:  15000            *******
*******              Max. number of flow points    :  15000            *******
*******************************************************************************
*** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) ***
***-----------------------------------------------------------------------***
***     ID:  Hydrograph IDentification numbers, (1-10).                   ***
***   NHYD:  Hydrograph reference numbers, (6 digits or characters).      ***
***   AREA:  Drainage area associated with hydrograph, (ac.) or (ha.).    ***
***  QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).      ***
***  TpeakDate_hh:mm is the date and time of the peak flow.               ***
***   R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).         ***
***   R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).         ***
***      *:  see WARNING or NOTE message printed at end of run.           ***
***     **:  see  ERROR  message printed at end of run.                   ***
*******************************************************************************
*******************************************************************************
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
*******************************************************************************
********************   S U M M A R Y   O U T P U T   ********************
*******************************************************************************
*      DATE: 2008-01-28     TIME: 12:28:56     RUN COUNTER: 000553            *
*******************************************************************************
* Input   filename: J:\119-TA-1\2528\Design\SWMHYM~1\POST-SWS.Dat             *
* Output  filename: J:\119-TA-1\2528\Design\SWMHYM~1\POST-SWS.out             *
* Summary filename: J:\119-TA-1\2528\Design\SWMHYM~1\POST-SWS.sum             *
* User comments:                                                              *
* 1:__________________________________________________________________________*
* 2:__________________________________________________________________________*
* 3:__________________________________________________________________________*
*******************************************************************************
#******************************************************************************
#  Project Name: [ALTA PHASE-II]    Project Number: [119-2528]
#  Date         : 05-24-2007
#  Modeller     : [         ]
#  Company      : C.F. Crozier & Associates Inc.
#  License #    :  3737016
#******************************************************************************
 RUN:COMMAND#
 001:0001------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   0 ]
      [NRUN  =   1 ]
#-----------------|-------------------------------------------------------------|
#-----------------|----------25mm----------------------------------------------|
#-----------------|-------------------------------------------------------------|
 001:0002------------------------------------------------------------------------
     READ STORM
      Filename = 25mm.stm
      Comment  = 25 mm Event
      [SDT= 4.80:SDUR=   3.04:PTOT=  25.05]
#-----------------|-------------------------------------------------------------|
#-----------------|-----------POST-DEVELOPMENT----------------------------------|
#-----------------|-------------------------------------------------------------|
 001:0003---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       02:EXT-1       3.50      .024 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       03:INT-3        .20      .001 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       04:UNC-1        .80      .010 No_date    1:17    4.53 .181
      [CN= 79.0: N= 3.00]
      [Tp=  .21:DT= 4.80]
#-----------------|-------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT       |
#-----------------|-------------------------------------------------------------|
 001:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            02:EXT-1       3.50      .024 No_date    1:17    2.69  n/a
                   +    03:INT-3        .20      .001 No_date    1:17    2.69  n/a
                   +    04:UNC-1        .80      .010 No_date    1:17    4.53  n/a
      [DT= 4.80]  SUM=  01:800mm       4.50      .036 No_date    1:17    3.02  n/a
#-----------------|-------------------------------------------------------------|
 001:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       05:EXT-2       4.10      .028 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
#-----------------|-------------------------------------------------------------|
 001:0008---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       08:EXT-3       2.20      .015 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0009---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     06:INT-2       3.00      .030 No_date    1:22    6.29 .251
      [XIMP=.13:TIMP=.29]
      [LOSS= 2 :CN= 69.0]
      [Pervious    area: IAper= 5.00:SLPP=2.00:LGP=  65.:MNP=.150:SCP=   .0]
      [Impervious  area: IAimp= 2.00:SLPI=2.00:LGI= 290.:MNI=.130:SCI=   .0]
 001:0010---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       07:INT-4        .60      .004 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0011---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD     09:INT-1       9.90      .123 No_date    1:50    9.21 .368
      [XIMP=.19:TIMP=.37]
      [LOSS= 2 :CN= 79.0]
      [Pervious    area: IAper= 5.00:SLPP=2.00:LGP=  65.:MNP=.150:SCP=   .0]
      [Impervious  area: IAimp= 2.00:SLPI=2.00:LGI= 500.:MNI=.130:SCI=   .0]
#-----------------|-------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE RESERVOIR           |
#-----------------|-------------------------------------------------------------|
 001:0012---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            05:EXT-2       4.10      .028 No_date    1:17    2.69  n/a
                   +    08:EXT-3       2.20      .015 No_date    1:17    2.69  n/a
                   +    06:INT-2       3.00      .030 No_date    1:22    6.29  n/a
                   +    07:INT-4        .60      .004 No_date    1:17    2.69  n/a
                   +    09:INT-1       9.90      .123 No_date    1:50    9.21  n/a
      [DT= 4.80]  SUM=  03:POOL1      19.80      .181 No_date    1:36    6.50  n/a
#-----------------|-------------------------------------------------------------|
 001:0013---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 03:POOL1      19.80      .181 No_date    1:36    6.50  n/a
      [RDT= 4.80] out<- 06:POOL       19.80      .070 No_date    3:12    6.50  n/a
             overflow <= 07:OVF1        .00      .000 No_date    0:00     .00  n/a
     [MxStoUsed=.7003E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0014---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       10:UNC-2       1.50      .027 No_date    1:12    5.46 .218
      [CN= 82.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0015---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       04:UNC-3s      2.10      .011 No_date    1:17    2.04 .081
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
#-----------------|-------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT       |
#-----------------|-------------------------------------------------------------|
 001:0016---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:UNC-3s      2.10      .011 No_date    1:17    2.04  n/a
                   +    06:POOL       19.80      .070 No_date    3:12    6.50  n/a
                   +    07:OVF1         .00      .000 No_date    0:00     .00  n/a
                   +    10:UNC-2       1.50      .027 No_date    1:12    5.46  n/a
      [DT= 4.80]  SUM=  02:900mm      23.40      .076 No_date    2:58    6.03  n/a
#-----------------|-------------------------------------------------------------|
 001:0017---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       04:EXT-4       2.60      .018 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0018---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       05:EXT-5       5.20      .035 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0019---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       08:INT-5        .10      .001 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0020---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       06:UNC-4s      3.00      .038 No_date    1:17    4.53 .181
      [CN= 79.0: N= 3.00]
      [Tp=  .22:DT= 4.80]
 001:0021---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       07:Ext-6       6.00      .038 No_date    1:22    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .21:DT= 4.80]
 001:0022---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       09:Ext-7       6.00      .041 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0023---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       10:Ext-8      12.80      .073 No_date    1:26    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .26:DT= 4.80]
#-----------------|-------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH            |
#-----------------|-------------------------------------------------------------|
 001:0024---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:EXT-4       2.60      .018 No_date    1:17    2.69  n/a
                   +    05:EXT-5       5.20      .035 No_date    1:17    2.69  n/a
                   +    06:UNC-4s      3.00      .038 No_date    1:17    4.53  n/a
                   +    08:INT-5        .10      .001 No_date    1:17    2.69  n/a
      [DT= 4.80]  SUM=  03:NE_DIT     10.90      .092 No_date    1:17    3.20  n/a
#-----------------|-------------------------------------------------------------|
 001:0025---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            07:Ext-6       6.00      .038 No_date    1:22    2.69  n/a
                   +    03:NE_DIT     10.90      .092 No_date    1:17    3.20  n/a
                   +    09:Ext-7       6.00      .041 No_date    1:17    2.69  n/a
                   +    10:Ext-8      12.80      .073 No_date    1:26    2.69  n/a
      [DT= 4.80]  SUM=  04:NE_DIT     35.70      .236 No_date    1:22    2.85  n/a
 001:0026---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       06:Ext-9       7.00      .016 No_date    1:36    1.24 .050
      [CN= 60.0: N= 3.00]
      [Tp=  .35:DT= 4.80]
#-----------------|-------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS Subwatershed 21A Outflow---------|
#-----------------|-------------------------------------------------------------|
#-----------------|-------------------------------------------------------------|
 001:0027---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:NE_DIT     35.70      .236 No_date    1:22    2.85  n/a
                   +    06:Ext-9       7.00      .016 No_date    1:36    1.24  n/a
      [DT= 4.80]  SUM=  05:21A        42.70      .249 No_date    1:22    2.58  n/a
 001:0028---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       04:Ext-10     27.90      .038 No_date    1:46     .83 .033
      [CN= 49.4: N= 3.00]
      [Tp=  .42:DT= 4.80]
 001:0029---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       03:Ext-11      3.90      .020 No_date    1:17    2.04 .081
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
 001:0030---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       06:Ext-12      5.20      .035 No_date    1:17    2.69 .107
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
#-----------------|-------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO EX. STORAGE AREA-------|
#-----------------|-------------------------------------------------------------|
#-----------------|-------------------------------------------------------------|
 001:0031---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:800mm       4.50      .036 No_date    1:17    3.02  n/a
                   +    02:900mm      23.40      .076 No_date    2:58    6.03  n/a
                   +    04:Ext-10     27.90      .038 No_date    1:46     .83  n/a
                   +    03:Ext-11      3.90      .020 No_date    1:17    2.04  n/a
                   +    06:Ext-12      5.20      .035 No_date    1:17    2.69  n/a
      [DT= 4.80]  SUM=  05:WET-ST     64.90      .160 No_date    1:22    3.08  n/a
 001:0032---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 05:WET-ST     64.90      .160 No_date    1:22    3.08  n/a
      [RDT=  .96] out<- 04:22         64.90      .132 No_date    2:08    3.08  n/a
             overflow <= 06:OVF         .00      .000 No_date    0:00     .00  n/a
     [MxStoUsed=.1173E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0033---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD       03:Ext-10      4.90      .006 No_date    1:17     .48 .019
      [CN= 36.0: N= 3.00]
      [Tp=  .17:DT= 4.80]
#-----------------|-------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS SUBWATERSHED 22 OUTFLOW ---------|
#-----------------|-------------------------------------------------------------|
#-----------------|-------------------------------------------------------------|
 001:0034---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            03:Ext-10      4.90      .006 No_date    1:17     .48  n/a
                   +    04:22         64.90      .132 No_date    2:08    3.08  n/a
      [DT=  .96]  SUM=  05:22         69.80      .135 No_date    1:44    2.90  n/a
#-----------------|-------------------------------------------------------------|
#-----------------|----------2 YEAR--------------------------------------------|
#-----------------|-------------------------------------------------------------|
```

```
 001:0035--------------------------------------------------------------------
     CHICAGO STORM
      [SDT=10.00:SDUR=   4.00:PTOT=  37.95]
      {A/B/C=1461.279/  18.094/    .907: R=.9944}
#-----------------|-----------------------------------------------------------|
#-----------------|-----------POST-DEVELOPMENT--------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0036---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:EXT-1       3.50      .080 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0037---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        03:INT-3        .20      .005 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0038---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        04:UNC-1        .80      .024 No_date    1:35   10.80 .285
      [CN= 79.0: N= 3.00]
      [Tp=  .21:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT      |
#-----------------|-----------------------------------------------------------|
 001:0039---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             02:EXT-1       3.50      .080 No_date    1:35    8.18  n/a
                       + 03:INT-3        .20      .005 No_date    1:35    8.18  n/a
                       + 04:UNC-1        .80      .024 No_date    1:35   10.80  n/a
      [DT= 5.00]  SUM=   01:800mm       4.50      .109 No_date    1:35    8.65  n/a
#-----------------|-----------------------------------------------------------|
 001:0040---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        05:EXT-2       4.10      .094 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
 001:0041---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        08:EXT-3       2.20      .050 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0042---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      06:INT-2       3.00      .063 No_date    1:50   12.53 .330
      [XIMP=.13:TIMP=.29]
      [LOSS= 2 :CN= 69.0]
      [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  65.:MNP=.150:SCP=   .0]
      [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 290.:MNI=.130:SCI=   .0]
 001:0043---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        07:INT-4        .60      .014 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0044---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      09:INT-1       9.90      .264 No_date    2:00   17.68 .466
      [XIMP=.19:TIMP=.37]
      [LOSS= 2 :CN= 79.0]
      [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  65.:MNP=.150:SCP=   .0]
      [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 500.:MNI=.130:SCI=   .0]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE RESERVOIR          |
#-----------------|-----------------------------------------------------------|
 001:0045---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             05:EXT-2       4.10      .094 No_date    1:35    8.18  n/a
                       + 08:EXT-3       2.20      .050 No_date    1:35    8.18  n/a
                       + 06:INT-2       3.00      .063 No_date    1:50   12.53  n/a
                       + 07:INT-4        .60      .014 No_date    1:35    8.18  n/a
                       + 09:INT-1       9.90      .264 No_date    2:00   17.68  n/a
      [DT= 5.00]  SUM=   03:POOL1      19.80      .429 No_date    1:45   13.59  n/a
#-----------------|-----------------------------------------------------------|
 001:0046---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 03:POOL1      19.80      .429 No_date    1:45   13.59  n/a
      [RDT= 5.00] out<- 06:POOL       19.80      .196 No_date    2:55   13.59  n/a
             overflow <= 07:OVF1        .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1320E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0047---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        10:UNC-2       1.50      .059 No_date    1:30   12.54 .330
      [CN= 82.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0048---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        04:UNC-3s      2.10      .037 No_date    1:35    6.41 .169
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT      |
#-----------------|-----------------------------------------------------------|
 001:0049---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:UNC-3s      2.10      .037 No_date    1:35    6.41  n/a
                       + 06:POOL       19.80      .196 No_date    2:55   13.59  n/a
                       + 07:OVF1         .00      .000 No_date    0:00     .00  n/a
                       + 10:UNC-2       1.50      .059 No_date    1:30   12.54  n/a
      [DT= 5.00]  SUM=   02:900mm      23.40      .210 No_date    2:55   12.88  n/a
#-----------------|-----------------------------------------------------------|
 001:0050---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        04:EXT-4       2.60      .059 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0051---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        05:EXT-5       5.20      .119 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0052---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        08:INT-5        .10      .002 No_date    1:35    8.18 .215
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0053---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        06:UNC-4s      3.00      .089 No_date    1:35   10.80 .285
      [CN= 79.0: N= 3.00]
      [Tp=  .22:DT= 5.00]
 001:0054---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        07:Ext-6       6.00      .126 No_date    1:40    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .21:DT= 5.00]
 001:0055---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        09:Ext-7       6.00      .137 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0056---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        10:Ext-8      12.80      .245 No_date    1:45    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .26:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH           |
#-----------------|-----------------------------------------------------------|
 001:0057---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:EXT-4       2.60      .059 No_date    1:35    8.18  n/a
                       + 05:EXT-5       5.20      .119 No_date    1:35    8.18  n/a
                       + 06:UNC-4s      3.00      .089 No_date    1:35   10.80  n/a
                       + 08:INT-5        .10      .002 No_date    1:35    8.18  n/a
      [DT= 5.00]  SUM=   03:NE_DIT     10.90      .269 No_date    1:35    8.90  n/a
#-----------------|-----------------------------------------------------------|
 001:0058---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             07:Ext-6       6.00      .126 No_date    1:40    8.18  n/a
                       + 03:NE_DIT     10.90      .269 No_date    1:35    8.90  n/a
                       + 09:Ext-7       6.00      .137 No_date    1:35    8.18  n/a
                       + 10:Ext-8      12.80      .245 No_date    1:45    8.18  n/a
      [DT= 5.00]  SUM=   04:NE_DIT     35.70      .760 No_date    1:40    8.40  n/a
 001:0059---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        06:Ext-9       7.00      .055 No_date    1:55    4.02 .106
      [CN= 60.0: N= 3.00]
      [Tp=  .35:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS Subwatershed 21A Outflow--------|
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0060---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:NE_DIT     35.70      .760 No_date    1:40    8.40  n/a
                       + 06:Ext-9       7.00      .055 No_date    1:55    4.02  n/a
      [DT= 5.00]  SUM=   05:21A        42.70      .806 No_date    1:40    7.68  n/a
 001:0061---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        04:Ext-10     27.90      .135 No_date    2:00    2.75 .072
      [CN= 49.4: N= 3.00]
      [Tp=  .42:DT= 5.00]
 001:0062---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        03:Ext-11      3.90      .068 No_date    1:35    6.41 .169
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0063---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        06:Ext-12      5.20      .119 No_date    1:35    8.18 .216
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO EX. STORAGE AREA------|
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0064---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             01:800mm       4.50      .109 No_date    1:35    8.65  n/a
                       + 02:900mm      23.40      .210 No_date    2:55   12.88  n/a
                       + 04:Ext-10     27.90      .135 No_date    2:00    2.75  n/a
                       + 03:Ext-11      3.90      .068 No_date    1:35    6.41  n/a
                       + 06:Ext-12      5.20      .119 No_date    1:35    8.18  n/a
      [DT= 5.00]  SUM=   05:WET-ST     64.90      .510 No_date    1:40    7.46  n/a
 001:0065---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 05:WET-ST     64.90      .510 No_date    1:40    7.46  n/a
      [RDT= 1.00] out<- 04:22         64.90      .208 No_date    4:01    7.46  n/a
             overflow <= 06:OVF          .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1593E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0066---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        03:Ext-10      4.90      .021 No_date    1:35    1.63 .043
      [CN= 36.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS SUBWATERSHED 22 OUTFLOW --------|
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0067---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             03:Ext-10      4.90      .021 No_date    1:35    1.63  n/a
                       + 04:22         64.90      .208 No_date    4:01    7.46  n/a
      [DT= 1.00]  SUM=   05:22         69.80      .211 No_date    3:57    7.05  n/a
#-----------------|-----------------------------------------------------------|
#-----------------|-----------5YR---------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0068--------------------------------------------------------------------
     CHICAGO STORM
      [SDT=10.00:SDUR=   4.00:PTOT=  47.36]
      {A/B/C=1508.929/  11.438/    .877: R=.9976}
#-----------------|-----------------------------------------------------------|
#-----------------|-----------POST-DEVELOPMENT--------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0069---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        02:EXT-1       3.50      .149 No_date    1:30   13.31 .281
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0070---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        03:INT-3        .20      .009 No_date    1:30   13.31 .281
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0071---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        04:UNC-1        .80      .040 No_date    1:35   16.33 .345
      [CN= 79.0: N= 3.00]
      [Tp=  .21:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT      |
#-----------------|-----------------------------------------------------------|
 001:0072---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             02:EXT-1       3.50      .149 No_date    1:30   13.31  n/a
                       + 03:INT-3        .20      .009 No_date    1:30   13.31  n/a
                       + 04:UNC-1        .80      .040 No_date    1:35   16.33  n/a
      [DT= 5.00]  SUM=   01:800mm       4.50      .197 No_date    1:30   13.85  n/a
#-----------------|-----------------------------------------------------------|
 001:0073---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        05:EXT-2       4.10      .174 No_date    1:30   13.31 .281
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
 001:0074---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        08:EXT-3       2.20      .094 No_date    1:30   13.31 .281
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0075---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      06:INT-2       3.00      .103 No_date    1:45   17.84 .377
      [XIMP=.13:TIMP=.29]
      [LOSS= 2 :CN= 69.0]
      [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  65.:MNP=.150:SCP=   .0]
      [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 290.:MNI=.130:SCI=   .0]
 001:0076---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        07:INT-4        .60      .026 No_date    1:30   13.31 .281
      [CN= 79.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0077---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB STANDHYD      09:INT-1       9.90      .418 No_date    1:55   24.57 .519
      [XIMP=.19:TIMP=.37]
      [LOSS= 2 :CN= 79.0]
      [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  65.:MNP=.150:SCP=   .0]
      [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 500.:MNI=.130:SCI=   .0]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE RESERVOIR          |
#-----------------|-----------------------------------------------------------|
 001:0078---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             05:EXT-2       4.10      .174 No_date    1:30   13.31  n/a
                       + 08:EXT-3       2.20      .094 No_date    1:30   13.31  n/a
                       + 06:INT-2       3.00      .103 No_date    1:45   17.84  n/a
                       + 07:INT-4        .60      .026 No_date    1:30   13.31  n/a
                       + 09:INT-1       9.90      .418 No_date    1:55   24.57  n/a
      [DT= 5.00]  SUM=   03:POOL1      19.80      .716 No_date    1:40   19.62  n/a
#-----------------|-----------------------------------------------------------|
 001:0079---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 03:POOL1      19.80      .716 No_date    1:40   19.62  n/a
      [RDT= 5.00] out<- 06:POOL       19.80      .333 No_date    2:40   19.62  n/a
             overflow <= 07:OVF1        .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1779E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0080---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        10:UNC-2       1.50      .098 No_date    1:30   18.63 .393
      [CN= 82.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0081---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     CALIB NASHYD        04:UNC-3s      2.10      .069 No_date    1:30   10.63 .224
      [CN= 73.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT      |
#-----------------|-----------------------------------------------------------|
 001:0082---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD             04:UNC-3s      2.10      .069 No_date    1:30   10.63  n/a
                       + 06:POOL       19.80      .333 No_date    2:40   19.62  n/a
                       + 07:OVF1         .00      .000 No_date    0:00     .00  n/a
```

```
                    +  10:UNC-2        1.50      .098 No_date     1:30    18.63  n/a
     [DT= 5.00]  SUM=  02:900mm       23.40      .360 No_date     2:35    18.75  n/a
#-----------------|-----------------------------------------------------------|
 001:0083---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       04:EXT-4        2.60      .111 No_date     1:30    13.31 .281
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0084---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       05:EXT-5        5.20      .221 No_date     1:30    13.31 .281
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0085---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       08:INT-5         .10      .004 No_date     1:30    13.30 .281
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0086---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       06:UNC-4s       3.00      .148 No_date     1:35    16.33 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .22:DT= 5.00]
 001:0087---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       07:Ext-6        6.00      .231 No_date     1:35    13.31 .281
     [CN= 79.0: N= 3.00]
     [Tp=  .21:DT= 5.00]
 001:0088---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       09:Ext-7        6.00      .255 No_date     1:30    13.31 .281
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0089---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       10:Ext-8       12.80      .441 No_date     1:40    13.31 .281
     [CN= 79.0: N= 3.00]
     [Tp=  .26:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH           |
#-----------------|-----------------------------------------------------------|
 001:0090---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            04:EXT-4        2.60      .111 No_date     1:30    13.31  n/a
                    +  05:EXT-5        5.20      .221 No_date     1:30    13.31  n/a
                    +  06:UNC-4s       3.00      .148 No_date     1:35    16.33  n/a
                    +  08:INT-5         .10      .004 No_date     1:30    13.30  n/a
     [DT= 5.00]  SUM=  03:NE_DIT      10.90      .480 No_date     1:30    14.14  n/a
#-----------------|-----------------------------------------------------------|
 001:0091---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            07:Ext-6        6.00      .231 No_date     1:35    13.31  n/a
                    +  03:NE_DIT      10.90      .480 No_date     1:30    14.14  n/a
                    +  09:Ext-7        6.00      .255 No_date     1:30    13.31  n/a
                    +  10:Ext-8       12.80      .441 No_date     1:40    13.31  n/a
     [DT= 5.00]  SUM=  04:NE_DIT      35.70     1.379 No_date     1:35    13.56  n/a
 001:0092---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       06:Ext-9        7.00      .100 No_date     1:50     6.83 .144
     [CN= 60.0: N= 3.00]
     [Tp=  .35:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS Subwatershed 21A Outflow--------|
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0093---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            04:NE_DIT      35.70     1.379 No_date     1:35    13.56  n/a
                    +  06:Ext-9        7.00      .100 No_date     1:50     6.83  n/a
     [DT= 5.00]  SUM=  05:21A         42.70     1.459 No_date     1:35    12.46  n/a
 001:0094---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       04:Ext-10      27.90      .246 No_date     1:55     4.74 .100
     [CN= 49.4: N= 3.00]
     [Tp=  .42:DT= 5.00]
 001:0095---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       03:Ext-11       3.90      .129 No_date     1:30    10.63 .224
     [CN= 73.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0096---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       06:Ext-12       5.20      .221 No_date     1:30    13.31 .281
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO EX. STORAGE AREA------|
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0097---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:800mm        4.50      .197 No_date     1:30    13.85  n/a
                    +  02:900mm       23.40      .360 No_date     2:35    18.75  n/a
                    +  04:Ext-10      27.90      .246 No_date     1:55     4.74  n/a
                    +  03:Ext-11       3.90      .129 No_date     1:30    10.63  n/a
                    +  06:Ext-12       5.20      .221 No_date     1:30    13.31  n/a
     [DT= 5.00]  SUM=  05:WET-ST      64.90      .916 No_date     1:35    11.46  n/a
 001:0098---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 05:WET-ST      64.90      .916 No_date     1:35    11.46  n/a
     [RDT= 1.00] out<- 04:22          64.90      .272 No_date     4:07    11.46  n/a
            overflow <= 06:OVF          .00      .000 No_date     0:00      .00  n/a
    (MxStoUsed=.3454E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0099---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       03:Ext-10       4.90      .040 No_date     1:35     2.85 .060
     [CN= 36.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS SUBWATERSHED 22 OUTFLOW --------|
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0100---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            03:Ext-10       4.90      .040 No_date     1:35     2.85  n/a
                    +  04:22          64.90      .272 No_date     4:07    11.46  n/a
     [DT= 1.00]  SUM=  05:22          69.80      .276 No_date     4:00    10.86  n/a
#-----------------|-----------------------------------------------------------|
#-----------------|-----------10YR---------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0101-----------------------------------------------------------------------
    CHICAGO STORM
     [SDT=10.00:SDUR=   4.00:PTOT=  58.19]
     [A/B/C=1786.143/  15.082/    .868: R=.9956)
#-----------------|-----------------------------------------------------------|
#-----------------|-----------POST-DEVELOPMENT--------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0102---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       02:EXT-1        3.50      .212 No_date     1:30    20.07 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0103---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       03:INT-3         .20      .012 No_date     1:30    20.07 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0104---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       04:UNC-1         .80      .054 No_date     1:35    23.44 .403
     [CN= 79.0: N= 3.00]
     [Tp=  .21:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT      |
#-----------------|-----------------------------------------------------------|
 001:0105---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            02:EXT-1        3.50      .212 No_date     1:30    20.07  n/a
                    +  03:INT-3         .20      .012 No_date     1:30    20.07  n/a
                    +  04:UNC-1         .80      .054 No_date     1:35    23.44  n/a
     [DT= 5.00]  SUM=  01:800mm        4.50      .277 No_date     1:30    20.67  n/a
#-----------------|-----------------------------------------------------------|
 001:0106---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       05:EXT-2        4.10      .249 No_date     1:30    20.07 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
 001:0107---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       08:EXT-3        2.20      .133 No_date     1:30    20.07 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0108---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD     06:INT-2        3.00      .138 No_date     1:45    24.60 .423
     [XIMP=.13:TIMP=.29]
     [LOSS= 2 :CN= 69.0]
     [Pervious    area: IAper= 5.00:SLPP=2.00:LGP=  65.:MNP=.150:SCP=   .0]
     [Impervious  area: IAimp= 2.00:SLPI=2.00:LGI= 290.:MNI=.130:SCI=   .0]
 001:0109---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       07:INT-4         .60      .036 No_date     1:30    20.07 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0110---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD     09:INT-1        9.90      .573 No_date     1:50    33.03 .568
     [XIMP=.19:TIMP=.37]
     [LOSS= 2 :CN= 79.0]
     [Pervious    area: IAper= 5.00:SLPP=2.00:LGP=  65.:MNP=.150:SCP=   .0]
     [Impervious  area: IAimp= 2.00:SLPI=2.00:LGI= 500.:MNI=.130:SCI=   .0]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE RESERVOIR          |
#-----------------|-----------------------------------------------------------|
 001:0111---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            05:EXT-2        4.10      .249 No_date     1:30    20.07  n/a
                    +  08:EXT-3        2.20      .133 No_date     1:30    20.07  n/a
                    +  06:INT-2        3.00      .138 No_date     1:45    24.60  n/a
                    +  07:INT-4         .60      .036 No_date     1:30    20.07  n/a
                    +  09:INT-1        9.90      .573 No_date     1:50    33.03  n/a
     [DT= 5.00]  SUM=  03:POOL1       19.80     1.004 No_date     1:40    27.24  n/a
#-----------------|-----------------------------------------------------------|
 001:0112---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 03:POOL1       19.80     1.004 No_date     1:40    27.24  n/a
     [RDT= 5.00] out<- 06:POOL        19.80      .519 No_date     2:30    27.24  n/a
            overflow <= 07:OVF1         .00      .000 No_date     0:00      .00  n/a
    (MxStoUsed=.2277E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0113---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       10:UNC-2        1.50      .128 No_date     1:30    26.34 .453
     [CN= 82.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0114---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       04:UNC-3s       2.10      .100 No_date     1:30    16.34 .281
     [CN= 73.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT      |
#-----------------|-----------------------------------------------------------|
 001:0115---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            04:UNC-3s       2.10      .100 No_date     1:30    16.34  n/a
                    +  06:POOL        19.80      .519 No_date     2:30    27.24  n/a
                    +  07:OVF1          .00      .000 No_date     0:00      .00  n/a
                    +  10:UNC-2        1.50      .128 No_date     1:30    26.34  n/a
     [DT= 5.00]  SUM=  02:900mm       23.40      .567 No_date     2:25    26.20  n/a
#-----------------|-----------------------------------------------------------|
 001:0116---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       04:EXT-4        2.60      .158 No_date     1:30    20.07 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0117---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       05:EXT-5        5.20      .315 No_date     1:30    20.07 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0118---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       08:INT-5         .10      .006 No_date     1:30    20.07 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0119---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       06:UNC-4s       3.00      .198 No_date     1:35    23.44 .403
     [CN= 79.0: N= 3.00]
     [Tp=  .22:DT= 5.00]
 001:0120---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       07:Ext-6        6.00      .332 No_date     1:35    20.07 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .21:DT= 5.00]
 001:0121---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       09:Ext-7        6.00      .364 No_date     1:30    20.07 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0122---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       10:Ext-8       12.80      .638 No_date     1:40    20.07 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .26:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH           |
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0123---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            04:EXT-4        2.60      .158 No_date     1:30    20.07  n/a
                    +  05:EXT-5        5.20      .315 No_date     1:30    20.07  n/a
                    +  06:UNC-4s       3.00      .198 No_date     1:35    23.44  n/a
                    +  08:INT-5         .10      .006 No_date     1:30    20.07  n/a
     [DT= 5.00]  SUM=  03:NE_DIT      10.90      .671 No_date     1:30    20.99  n/a
#-----------------|-----------------------------------------------------------|
 001:0124---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            07:Ext-6        6.00      .332 No_date     1:35    20.07  n/a
                    +  03:NE_DIT      10.90      .671 No_date     1:30    20.99  n/a
                    +  09:Ext-7        6.00      .364 No_date     1:30    20.07  n/a
                    +  10:Ext-8       12.80      .638 No_date     1:40    20.07  n/a
     [DT= 5.00]  SUM=  04:NE_DIT      35.70     1.965 No_date     1:35    20.35  n/a
 001:0125---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       06:Ext-9        7.00      .152 No_date     1:50    10.77 .185
     [CN= 60.0: N= 3.00]
     [Tp=  .35:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS Subwatershed 21A Outflow--------|
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0126---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            04:NE_DIT      35.70     1.965 No_date     1:35    20.35  n/a
                    +  06:Ext-9        7.00      .152 No_date     1:50    10.77  n/a
     [DT= 5.00]  SUM=  05:21A         42.70     2.087 No_date     1:35    18.78  n/a
 001:0127---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       04:Ext-10      27.90      .379 No_date     1:55     7.59 .130
     [CN= 49.4: N= 3.00]
     [Tp=  .42:DT= 5.00]
 001:0128---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       03:Ext-11       3.90      .186 No_date     1:30    16.34 .281
     [CN= 73.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0129---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD       06:Ext-12       5.20      .315 No_date     1:30    20.07 .345
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
#-----------------|-----------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO EX. STORAGE AREA------|
#-----------------|-----------------------------------------------------------|
#-----------------|-----------------------------------------------------------|
 001:0130---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:800mm        4.50      .277 No_date     1:30    20.67  n/a
                    +  02:900mm       23.40      .567 No_date     2:25    26.20  n/a
                    +  04:Ext-10      27.90      .379 No_date     1:55     7.59  n/a
                    +  03:Ext-11       3.90      .186 No_date     1:30    16.34  n/a
                    +  06:Ext-12       5.20      .315 No_date     1:30    20.07  n/a
     [DT= 5.00]  SUM=  05:WET-ST      64.90     1.319 No_date     1:40    16.73  n/a
 001:0131---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
```

```
    ROUTE RESERVOIR -> 05:WET-ST    64.90    1.319 No_date    1:40   16.73  n/a
     [RDT= 1.00] out<- 04:22        64.90     .343 No_date    4:14   16.73  n/a
           overflow <= 06:OVF         .00     .000 No_date    0:00     .00  n/a
     [MxStoUsed=.6013E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0132---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        03:Ext-10     4.90     .061 No_date    1:35    4.65 .080
     [CN= 36.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
#-----------------|------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS SUBWATERSHED 22 OUTFLOW --------|
#-----------------|------------------------------------------------------------|
#-----------------|------------------------------------------------------------|
 001:0133---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             03:Ext-10     4.90     .061 No_date    1:35    4.65  n/a
                      + 04:22        64.90     .343 No_date    4:14   16.73  n/a
     [DT= 1.00]  SUM=   05:22        69.80     .349 No_date    4:00   15.88  n/a
#-----------------|------------------------------------------------------------|
#-----------------|----------25YR----------------------------------------------|
#-----------------|------------------------------------------------------------|
 001:0134-----------------------------------------------------------------------
    CHICAGO STORM
     [SDT=10.00:SDUR=   4.00:PTOT=  68.79]
     [A/B/C=2004.494/  14.438/    .859: R=.9957]
#-----------------|------------------------------------------------------------|
#-----------------|-----------POST-DEVELOPMENT---------------------------------|
#-----------------|------------------------------------------------------------|
 001:0135---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        02:EXT-1      3.50     .299 No_date    1:30   27.36 .398
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0136---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        03:INT-3       .20     .017 No_date    1:30   27.36 .398
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0137---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        04:UNC-1       .80     .072 No_date    1:35   30.99 .450
     [CN= 79.0: N= 3.00]
     [Tp=  .21:DT= 5.00]
#-----------------|------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT      |
#-----------------|------------------------------------------------------------|
 001:0138---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             02:EXT-1      3.50     .299 No_date    1:30   27.36  n/a
                      + 03:INT-3       .20     .017 No_date    1:30   27.36  n/a
                      + 04:UNC-1       .80     .072 No_date    1:35   30.99  n/a
     [DT= 5.00]  SUM=   01:800mm      4.50     .388 No_date    1:30   28.01  n/a
#-----------------|------------------------------------------------------------|
 001:0139---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        05:EXT-2      4.10     .350 No_date    1:30   27.36 .398
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
#-----------------|------------------------------------------------------------|
 001:0140---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        08:EXT-3      2.20     .188 No_date    1:30   27.36 .398
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0141---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD      06:INT-2      3.00     .195 No_date    1:40   31.76 .462
     [XIMP=.13:TIMP=.29]
     [LOSS= 2 :CN= 69.0]
     [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  65.:MNP=.150:SCP=   .0]
     [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 290.:MNI=.130:SCI=   .0]
 001:0142---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        07:INT-4       .60     .051 No_date    1:30   27.36 .398
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0143---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD      09:INT-1      9.90     .751 No_date    1:50   41.75 .607
     [XIMP=.19:TIMP=.37]
     [LOSS= 2 :CN= 79.0]
     [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  65.:MNP=.150:SCP=   .0]
     [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 500.:MNI=.130:SCI=   .0]
#-----------------|------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE RESERVOIR          |
#-----------------|------------------------------------------------------------|
 001:0144---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             05:EXT-2      4.10     .350 No_date    1:30   27.36  n/a
                      + 08:EXT-3      2.20     .188 No_date    1:30   27.36  n/a
                      + 06:INT-2      3.00     .195 No_date    1:40   31.76  n/a
                      + 07:INT-4       .60     .051 No_date    1:30   27.36  n/a
                      + 09:INT-1      9.90     .751 No_date    1:50   41.75  n/a
     [DT= 5.00]  SUM=   03:POOL1     19.80    1.353 No_date    1:40   35.22  n/a
#-----------------|------------------------------------------------------------|
 001:0145---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 03:POOL1     19.80    1.353 No_date    1:40   35.22  n/a
     [RDT= 5.00] out<- 06:POOL      19.80     .734 No_date    2:25   35.22  n/a
           overflow <= 07:OVF1        .00     .000 No_date    0:00     .00  n/a
     [MxStoUsed=.2779E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0146---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        10:UNC-2      1.50     .169 No_date    1:30   34.43 .501
     [CN= 82.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0147---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        04:UNC-3s     2.10     .144 No_date    1:30   22.63 .329
     [CN= 73.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
#-----------------|------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT      |
#-----------------|------------------------------------------------------------|
 001:0148---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             04:UNC-3s     2.10     .144 No_date    1:30   22.63  n/a
                      + 06:POOL      19.80     .734 No_date    2:25   35.22  n/a
                      + 07:OVF1        .00     .000 No_date    0:00     .00  n/a
                      + 10:UNC-2      1.50     .169 No_date    1:30   34.43  n/a
     [DT= 5.00]  SUM=   02:900mm     23.40     .806 No_date    2:20   34.04  n/a
#-----------------|------------------------------------------------------------|
 001:0149---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        04:EXT-4      2.60     .222 No_date    1:30   27.36 .398
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0150---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        05:EXT-5      5.20     .444 No_date    1:30   27.36 .398
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0151---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        08:INT-5       .10     .009 No_date    1:30   27.36 .398
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0152---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        06:UNC-4s     3.00     .264 No_date    1:35   30.99 .450
     [CN= 79.0: N= 3.00]
     [Tp=  .22:DT= 5.00]
 001:0153---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        07:Ext-6      6.00     .463 No_date    1:35   27.36 .398
     [CN= 79.0: N= 3.00]
     [Tp=  .21:DT= 5.00]
 001:0154---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        09:Ext-7      6.00     .513 No_date    1:30   27.36 .398
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0155---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        10:Ext-8     12.80     .886 No_date    1:40   27.36 .398
     [CN= 79.0: N= 3.00]
     [Tp=  .26:DT= 5.00]
#-----------------|------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH           |
#-----------------|------------------------------------------------------------|
#-----------------|------------------------------------------------------------|
 001:0156---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             04:EXT-4      2.60     .222 No_date    1:30   27.36  n/a
                      + 05:EXT-5      5.20     .444 No_date    1:30   27.36  n/a
                      + 06:UNC-4s     3.00     .264 No_date    1:35   30.99  n/a
                      + 08:INT-5       .10     .009 No_date    1:30   27.36  n/a
     [DT= 5.00]  SUM=   03:NE_DIT    10.90     .934 No_date    1:30   28.36  n/a
#-----------------|------------------------------------------------------------|
 001:0157---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             07:Ext-6      6.00     .463 No_date    1:35   27.36  n/a
                      + 03:NE_DIT    10.90     .934 No_date    1:30   28.36  n/a
                      + 09:Ext-7      6.00     .513 No_date    1:30   27.36  n/a
                      + 10:Ext-8     12.80     .886 No_date    1:40   27.36  n/a
     [DT= 5.00]  SUM=   04:NE_DIT    35.70    2.726 No_date    1:35   27.67  n/a
 001:0158---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        06:Ext-9      7.00     .217 No_date    1:50   15.26 .222
     [CN= 60.0: N= 3.00]
     [Tp=  .35:DT= 5.00]
#-----------------|------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS Subwatershed 21A Outflow--------|
#-----------------|------------------------------------------------------------|
#-----------------|------------------------------------------------------------|
 001:0159---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             04:NE_DIT    35.70    2.726 No_date    1:35   27.67  n/a
                      + 06:Ext-9      7.00     .217 No_date    1:50   15.26  n/a
     [DT= 5.00]  SUM=   05:21A       42.70    2.906 No_date    1:35   25.63  n/a
 001:0160---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        04:Ext-10    27.90     .550 No_date    1:55   10.90 .158
     [CN= 49.4: N= 3.00]
     [Tp=  .42:DT= 5.00]
 001:0161---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        03:Ext-11     3.90     .267 No_date    1:30   22.63 .329
     [CN= 73.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0162---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        06:Ext-12     5.20     .444 No_date    1:30   27.36 .398
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
#-----------------|------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO EX. STORAGE AREA------|
#-----------------|------------------------------------------------------------|
#-----------------|------------------------------------------------------------|
 001:0163---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             01:800mm      4.50     .388 No_date    1:30   28.01  n/a
                      + 02:900mm     23.40     .806 No_date    2:20   34.04  n/a
                      + 04:Ext-10    27.90     .550 No_date    1:55   10.90  n/a
                      + 03:Ext-11     3.90     .267 No_date    1:30   22.63  n/a
                      + 06:Ext-12     5.20     .444 No_date    1:30   27.36  n/a
     [DT= 5.00]  SUM=   05:WET-ST    64.90    1.902 No_date    1:40   22.45  n/a
 001:0164---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 05:WET-ST    64.90    1.902 No_date    1:40   22.45  n/a
     [RDT= 1.00] out<- 04:22        64.90     .413 No_date    4:16   22.45  n/a
           overflow <= 06:OVF         .00     .000 No_date    0:00     .00  n/a
     [MxStoUsed=.8909E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0165---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        03:Ext-10     4.90     .090 No_date    1:30    6.77 .098
     [CN= 36.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
#-----------------|------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS SUBWATERSHED 22 OUTFLOW --------|
#-----------------|------------------------------------------------------------|
#-----------------|------------------------------------------------------------|
 001:0166---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             03:Ext-10     4.90     .090 No_date    1:30    6.77  n/a
                      + 04:22        64.90     .413 No_date    4:16   22.45  n/a
     [DT= 1.00]  SUM=   05:22        69.80     .421 No_date    4:00   21.35  n/a
#-----------------|------------------------------------------------------------|
#-----------------|----------100YR---------------------------------------------|
#-----------------|------------------------------------------------------------|
 001:0167-----------------------------------------------------------------------
    CHICAGO STORM
     [SDT=10.00:SDUR=   4.00:PTOT=  84.33]
     [A/B/C=2435.365/  15.071/    .857: R=.9959]
#-----------------|------------------------------------------------------------|
#-----------------|-----------POST-DEVELOPMENT---------------------------------|
#-----------------|------------------------------------------------------------|
 001:0168---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        02:EXT-1      3.50     .433 No_date    1:30   38.95 .462
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0169---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        03:INT-3       .20     .025 No_date    1:30   38.94 .462
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0170---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        04:UNC-1       .80     .100 No_date    1:30   42.85 .508
     [CN= 79.0: N= 3.00]
     [Tp=  .21:DT= 5.00]
#-----------------|------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 800mm CULVERT      |
#-----------------|------------------------------------------------------------|
 001:0171---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             02:EXT-1      3.50     .433 No_date    1:30   38.95  n/a
                      + 03:INT-3       .20     .025 No_date    1:30   38.94  n/a
                      + 04:UNC-1       .80     .100 No_date    1:30   42.85  n/a
     [DT= 5.00]  SUM=   01:800mm      4.50     .558 No_date    1:30   39.64  n/a
#-----------------|------------------------------------------------------------|
 001:0172---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        05:EXT-2      4.10     .508 No_date    1:30   38.95 .462
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
#-----------------|------------------------------------------------------------|
 001:0173---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        08:EXT-3      2.20     .272 No_date    1:30   38.95 .462
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0174---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD      06:INT-2      3.00     .274 No_date    1:40   43.02 .510
     [XIMP=.13:TIMP=.29]
     [LOSS= 2 :CN= 69.0]
     [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  65.:MNP=.150:SCP=   .0]
     [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 290.:MNI=.130:SCI=   .0]
 001:0175---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB NASHYD        07:INT-4       .60     .074 No_date    1:30   38.95 .462
     [CN= 79.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0176---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    CALIB STANDHYD      09:INT-1      9.90    1.068 No_date    1:45   55.06 .653
     [XIMP=.19:TIMP=.37]
     [LOSS= 2 :CN= 79.0]
     [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  65.:MNP=.150:SCP=   .0]
     [Impervious   area: IAimp= 2.00:SLPI=2.00:LGI= 500.:MNI=.130:SCI=   .0]
#-----------------|------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE RESERVOIR          |
#-----------------|------------------------------------------------------------|
 001:0177---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             05:EXT-2      4.10     .508 No_date    1:30   38.95  n/a
                      + 08:EXT-3      2.20     .272 No_date    1:30   38.95  n/a
                      + 06:INT-2      3.00     .274 No_date    1:40   43.02  n/a
                      + 07:INT-4       .60     .074 No_date    1:30   38.95  n/a
                      + 09:INT-1      9.90    1.068 No_date    1:45   55.06  n/a
     [DT= 5.00]  SUM=   03:POOL1     19.80    1.994 No_date    1:40   47.62  n/a
#-----------------|------------------------------------------------------------|
```

```
 001:0178---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ROUTE RESERVOIR -> 03:POOL1      19.80    1.994 No_date    1:40   47.62  n/a
        [RDT= 5.00] out<- 06:POOL      19.80    1.090 No_date    2:15   47.62  n/a
             overflow <= 07:OVF1         .00     .000 No_date    0:00     .00  n/a
      {MxStoUsed=.3600E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0179---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        10:UNC-2       1.50     .231 No_date    1:30   47.00 .557
        [CN= 82.0: N= 3.00]
        [Tp=  .17:DT= 5.00]
 001:0180---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        04:UNC-3s      2.10     .212 No_date    1:30   32.83 .389
        [CN= 73.0: N= 3.00]
        [Tp=  .17:DT= 5.00]
#-----------------|--------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE 900mm CULVERT         |
#-----------------|--------------------------------------------------------------|
 001:0181---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD             04:UNC-3s      2.10     .212 No_date    1:30   32.83  n/a
                        + 06:POOL       19.80    1.090 No_date    2:15   47.62  n/a
                        + 07:OVF1         .00     .000 No_date    0:00     .00  n/a
                        + 10:UNC-2       1.50     .231 No_date    1:30   47.00  n/a
        [DT= 5.00]  SUM= 02:900mm      23.40    1.209 No_date    2:10   46.25  n/a
#-----------------|--------------------------------------------------------------|
 001:0182---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        04:EXT-4       2.60     .322 No_date    1:30   38.95 .462
        [CN= 79.0: N= 3.00]
        [Tp=  .17:DT= 5.00]
 001:0183---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        05:EXT-5       5.20     .644 No_date    1:30   38.95 .462
        [CN= 79.0: N= 3.00]
        [Tp=  .17:DT= 5.00]
 001:0184---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        08:INT-5        .10     .012 No_date    1:30   38.94 .462
        [CN= 79.0: N= 3.00]
        [Tp=  .17:DT= 5.00]
 001:0185---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        06:UNC-4s      3.00     .366 No_date    1:35   42.85 .508
        [CN= 79.0: N= 3.00]
        [Tp=  .22:DT= 5.00]
 001:0186---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        07:Ext-6       6.00     .668 No_date    1:35   38.95 .462
        [CN= 79.0: N= 3.00]
        [Tp=  .21:DT= 5.00]
 001:0187---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        09:Ext-7       6.00     .743 No_date    1:30   38.95 .462
        [CN= 79.0: N= 3.00]
        [Tp=  .17:DT= 5.00]
 001:0188---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        10:Ext-8      12.80    1.276 No_date    1:40   38.95 .462
        [CN= 79.0: N= 3.00]
        [Tp=  .26:DT= 5.00]
#-----------------|--------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO THE NE DITCH              |
#-----------------|--------------------------------------------------------------|
#-----------------|--------------------------------------------------------------|
 001:0189---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD             04:EXT-4       2.60     .322 No_date    1:30   38.95  n/a
                        + 05:EXT-5       5.20     .644 No_date    1:30   38.95  n/a
                        + 06:UNC-4s      3.00     .366 No_date    1:35   42.85  n/a
                        + 08:INT-5        .10     .012 No_date    1:30   38.94  n/a
        [DT= 5.00]  SUM= 03:NE_DIT     10.90    1.340 No_date    1:30   40.02  n/a
#-----------------|--------------------------------------------------------------|
 001:0190---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD             07:Ext-6       6.00     .668 No_date    1:35   38.95  n/a
                        + 03:NE_DIT     10.90    1.340 No_date    1:30   40.02  n/a
                        + 09:Ext-7       6.00     .743 No_date    1:30   38.95  n/a
                        + 10:Ext-8      12.80    1.276 No_date    1:40   38.95  n/a
        [DT= 5.00]  SUM= 04:NE_DIT     35.70    3.913 No_date    1:35   39.27  n/a
 001:0191---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        06:Ext-9       7.00     .328 No_date    1:45   22.80 .270
        [CN= 60.0: N= 3.00]
        [Tp=  .35:DT= 5.00]
#-----------------|--------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS Subwatershed 21A Outflow--------|
#-----------------|--------------------------------------------------------------|
#-----------------|--------------------------------------------------------------|
 001:0192---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD             04:NE_DIT     35.70    3.913 No_date    1:35   39.27  n/a
                        + 06:Ext-9       7.00     .328 No_date    1:45   22.80  n/a
        [DT= 5.00]  SUM= 05:21A        42.70    4.191 No_date    1:35   36.57  n/a
 001:0193---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        04:Ext-10     27.90     .843 No_date    1:55   16.59 .197
        [CN= 49.4: N= 3.00]
        [Tp=  .42:DT= 5.00]
 001:0194---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        03:Ext-11      3.90     .394 No_date    1:30   32.83 .389
        [CN= 73.0: N= 3.00]
        [Tp=  .17:DT= 5.00]
 001:0195---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        06:Ext-12      5.20     .644 No_date    1:30   38.95 .462
        [CN= 79.0: N= 3.00]
        [Tp=  .17:DT= 5.00]
#-----------------|--------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS FLOW INTO EX. STORAGE AREA------|
#-----------------|--------------------------------------------------------------|
#-----------------|--------------------------------------------------------------|
 001:0196---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD             01:800mm       4.50     .558 No_date    1:30   39.64  n/a
                        + 02:900mm      23.40    1.209 No_date    2:10   46.25  n/a
                        + 04:Ext-10     27.90     .843 No_date    1:55   16.59  n/a
                        + 03:Ext-11      3.90     .394 No_date    1:30   32.83  n/a
                        + 06:Ext-12      5.20     .644 No_date    1:30   38.95  n/a
        [DT= 5.00]  SUM= 05:WET-ST     64.90    2.911 No_date    1:40   31.65  n/a
 001:0197---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ROUTE RESERVOIR -> 05:WET-ST     64.90    2.911 No_date    1:40   31.65  n/a
        [RDT= 1.00] out<- 04:22        64.90     .493 No_date    4:18   31.65  n/a
             overflow <= 06:OVF          .00     .000 No_date    0:00     .00  n/a
      [MxStoUsed=.1383E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0198---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      CALIB NASHYD        03:Ext-10      4.90     .142 No_date    1:30   10.50 .125
        [CN= 36.0: N= 3.00]
        [Tp=  .17:DT= 5.00]
#-----------------|--------------------------------------------------------------|
#-----------------|  THE ADD HYD BELOW MODELS SUBWATERSHED 22 OUTFLOW --------|
#-----------------|--------------------------------------------------------------|
#-----------------|--------------------------------------------------------------|
 001:0199---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD             03:Ext-10      4.90     .142 No_date    1:30   10.50  n/a
                        + 04:22         64.90     .493 No_date    4:18   31.65  n/a
        [DT= 1.00]  SUM= 05:22         69.80     .507 No_date    4:00   30.17  n/a
 001:0200-----------------------------------------------------------------------
       FINISH
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2008-01-28     at 12:28:59
================================================================================
```

APPENDIX C

Hydraulic Calculations

PROPOSED OVERLAND FLOW HYDRAULIC CALCULATIONS

Project Summary Report

Project Description	
Worksheet	External 1
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.050	
Slope	015000	m/m
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	0.00	m
Discharge	0.4330	m³/s

1.5%
Section A-A (Fig 6)

100yr flow Ext-1

Depth @ 100yr Peak (Ext-1)

Results		
Depth	0.42	m
Flow Area	0.5	m²
Wetted Perim	2.64	m
Top Width	2.50	m
Critical Depth	0.34	m
Critical Slope	0.047690	m/m
Velocity	0.83	m/s
Velocity Head	0.04	m
Specific Energ	0.45	m
Froude Numb	0.58	
Flow Type	Subcritical	

Project Summary Report

Project Description	
Worksheet	External 2
Flow Element	Trapezoidal Cha
Method	Manning's Formu
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.050	
Slope	007000	m/m
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	0.00	m
Discharge	0.5080	m³/s

6.7%

Section A-A (fig 6)

100 yr Storm Flow Ext-2

Depth @ 100 yr Peak (Ext-2)

Results		
Depth	0.51	m
Flow Area	0.8	m²
Wetted Perim	3.23	m
Top Width	3.06	m
Critical Depth	0.36	m
Critical Slope	0.046685	m/n
Velocity	0.65	m/s
Velocity Head	0.02	m
Specific Energ	0.53	m
Froude Numb	0.41	
Flow Type	Subcritical	

Project Summary Report

Project Description	
Worksheet	External 3
Flow Element	Trapezoidal Cha
Method	Manning's Formi
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.050	
Slope	006000	m/m
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	0.00	m
Discharge	0.2720	m³/s

0.6%
Section A-A (Fig 6)

100 yr Storm flow Ext 3

Depth @ 100 yr Peak (Ext 3)

Results		
Depth	0.42	m
Flow Area	0.5	m²
Wetted Perim	2.63	m
Top Width	2.49	m
Critical Depth	0.28	m
Critical Slope	0.050740	m/n
Velocity	0.52	m/s
Velocity Head	0.01	m
Specific Enerç	0.43	m
Froude Numb	0.37	
Flow Type	Subcritical	

Project Summary Report

Project Description	
Worksheet	External 4
Flow Element	Trapezoidal Cha
Method	Manning's Formi
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.050	
Slope	010000	m/m
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	0.00	m
Discharge	0.3220	m³/s

1.0%
Section A-A (fig 6)

100 yr Storm flow Ext 4

Depth @ 100 yr Peak (Ext4)

Results		
Depth	0.40	m
Flow Area	0.5	m²
Wetted Perim	2.54	m
Top Width	2.41	m
Critical Depth	0.30	m
Critical Slope	0.049611	m/n
Velocity	0.66	m/s
Velocity Head	0.02	m
Specific Enerç	0.42	m
Froude Numb	0.47	
Flow Type	Subcritical	

Project Summary Report

Project Description	
Worksheet	External 5
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.050	
Slope	007500	m/m
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	0.00	m
Discharge	0.6440	m³/s

0.75%
Section A-A (Fig 6)

100yr Storm flow Ext 5

Depth @ 100yr Peak (Ext 5)

Results		
Depth	0.55	m
Flow Area	0.9	m²
Wetted Perimı	3.48	m
Top Width	3.30	m
Critical Depth	0.39	m
Critical Slope	0.045231	m/n
Velocity	0.71	m/s
Velocity Head	0.03	m
Specific Enerç	0.58	m
Froude Numbı	0.43	
Flow Type	Subcritical	

Project Summary Report

Project Description	
Worksheet	NE Bypass
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Location: South of Lot 39

Input Data		
Mannings Coeffic	0.050	
Slope	007000	m/m
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	0.50	m
Discharge	0.9660	m³/s

0.7%
Section B-B

Combination of Ext 5 + Ext 4 (100yr)

100yr Flow Depth

Results		
Depth	0.57	m
Flow Area	1.3	m²
Wetted Perimı	4.12	m
Top Width	3.93	m
Critical Depth	0.39	m
Critical Slope	0.042513	m/n
Velocity	0.76	m/s
Velocity Head	0.03	m
Specific Enerç	0.60	m
Froude Numbı	0.43	
Flow Type	Subcritical	

SUB-WATERSHED STUDY

HYDRAULIC CALCULATION SHEET

Project Summary Report

Tailwater Calculation for culvert 1

Project Description	
Worksheet	Culvert 1
Flow Element	Irregular Chani
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Slope	072800	m/m
Discharg	1.2000	m³/s

7.2%

Options	
Current Roughness Methc	›ved Lotter's Method
Open Channel Weighting	›ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficiei	0.030	
Water Surface Elev	221.55	m
Elevation Range	l.24 to 222.15	
Flow Area	0.5	m²
Wetted Perimeter	3.04	m
Top Width	2.97	m
Actual Depth	0.31	m
Critical Elevation	221.66	m
Critical Slope	0.015287	m/n
Velocity	2.58	m/s
Velocity Head	0.34	m
Specific Energy	221.89	m
Froude Number	2.08	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+15	0.030

Natural Channel Points

Station (m)	Elevation (m)
0+00	222.15
0+04	221.68
0+06	221.24
0+09	221.91
0+15	222.10

Culvert Calculator Report
Culvert 1

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	222.67 m	Headwater Depth/Height	1.56
Computed Headwater Elevation	222.67 m	Discharge	1.2085 m³/s
Inlet Control HW Elev.	222.65 m	Tailwater Elevation	221.24 m
Outlet Control HW Elev.	222.67 m	Control Type	Entrance Control

Grades

Upstream Invert	221.36 m	Downstream Invert	220.70 m
Length	9.90 m	Constructed Slope	0.066667 m/m

Hydraulic Profile

Profile	S2	Depth, Downstream	0.47 m
Slope Type	Steep	Normal Depth	0.47 m
Flow Regime	Supercritical	Critical Depth	0.67 m
Velocity Downstream	3.89 m/s	Critical Slope	0.027756 m/m

Section

Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	0.80 m
Section Size	800 mm	Rise	0.80 m
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	222.67 m	Upstream Velocity Head	0.34 m
Ke	0.90	Entrance Loss	0.31 m

Inlet Control Properties

Inlet Control HW Elev.	222.65 m	Flow Control	N/A
Inlet Type	Projecting	Area Full	0.5 m²
K	0.03400	HDS 5 Chart	2
M	1.50000	HDS 5 Scale	3
C	0.05530	Equation Form	1
Y	0.54000		

Project Summary Report

Tailwater Calculation for Culvert 2

Project Description	
Worksheet	Culvert 2
Flow Element	Irregular Chanı
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Slope	110000	m/m
Discharg	0.6000	m³/s

11 %

Options	
Current Roughness Methc	›ved Lotter's Method
Open Channel Weighting	›ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficiei	0.030	
Water Surface Elev	220.32	m
Elevation Range	).02 to 221.40	
Flow Area	0.2	m²
Wetted Perimeter	1.49	m
Top Width	1.37	m
Actual Depth	0.30	m
Critical Elevation	220.45	m
Critical Slope	0.016609	m/n
Velocity	2.94	m/s
Velocity Head	0.44	m
Specific Energy	220.76	m
Froude Number	2.43	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+19	0.030

Natural Channel Points

Station (m)	Elevation (m)
0+00	221.34
0+08	221.40
0+12	220.02
0+13	220.58
0+19	221.19

Culvert Calculator Report
culvert 2

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	221.60 m	Headwater Depth/Height	3.48
Computed Headwater Elevation	221.60 m	Discharge	0.6470 m³/s
Inlet Control HW Elev.	221.60 m	Tailwater Elevation	0.00 m
Outlet Control HW Elev.	221.58 m	Control Type	Inlet Control

Grades

Upstream Invert	220.54 m	Downstream Invert	220.42 m
Length	7.00 m	Constructed Slope	0.017143 m/m

Hydraulic Profile

Profile	CompositeM2PressureProfile	Depth, Downstream	0.30 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.30 m
Velocity Downstream	2.97 m/s	Critical Slope	0.041125 m/m

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	0.30 m
Section Size	300 mm	Rise	0.30 m
Number Sections	3		

Outlet Control Properties

Outlet Control HW Elev.	221.58 m	Upstream Velocity Head	0.45 m
Ke	0.20	Entrance Loss	0.09 m

Inlet Control Properties

Inlet Control HW Elev.	221.60 m	Flow Control	N/A
Inlet Type	Groove end w/headwall	Area Full	0.2 m²
K	0.00180	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	2
C	0.02920	Equation Form	1
Y	0.74000		

Culvert Calculator Report
Culvert 3

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	218.30 m	Headwater Depth/Height	1.15
Computed Headwater Elevation	218.30 m	Discharge	0.9043 m³/s
Inlet Control HW Elev.	218.19 m	Tailwater Elevation	0.00 m
Outlet Control HW Elev.	218.30 m	Control Type	Entrance Control

Grades

Upstream Invert	217.34 m	Downstream Invert	215.87 m
Length	12.00 m	Constructed Slope	0.122500 m/m

Hydraulic Profile

Profile	S2	Depth, Downstream	0.33 m
Slope Type	Steep	Normal Depth	0.33 m
Flow Regime	Supercritical	Critical Depth	0.58 m
Velocity Downstream	4.59 m/s	Critical Slope	0.020770 m/m

Section

Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	0.80 m
Section Size	800 mm	Rise	0.80 m
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	218.30 m	Upstream Velocity Head	0.26 m
Ke	0.50	Entrance Loss	0.13 m

Inlet Control Properties

Inlet Control HW Elev.	218.19 m	Flow Control	N/A
Inlet Type	Headwall	Area Full	0.5 m²
K	0.00780	HDS 5 Chart	2
M	2.00000	HDS 5 Scale	1
C	0.03790	Equation Form	1
Y	0.69000		

No Tailwater expected

Culvert Calculator Report
culvert 4

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	196.34 m	Headwater Depth/Height	2.19
Computed Headwater Elevation	196.34 m	Discharge	1.8921 m^3/s
Inlet Control HW Elev.	196.34 m	Tailwater Elevation	193.84 m
Outlet Control HW Elev.	196.25 m	Control Type	Inlet Control

Grades

Upstream Invert	194.34 m	Downstream Invert	193.18 m
Length	7.00 m	Constructed Slope	0.000000 m/m

Hydraulic Profile

Profile	CompositeH2PressureProfile	Depth, Downstream	0.80 m
Slope Type	Horizontal	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.80 m
Velocity Downstream	3.12 m/s	Critical Slope	0.031158 m/m

Section

Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	0.91 m
Section Size	900 mm	Rise	0.91 m
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	196.25 m	Upstream Velocity Head	0.42 m
Ke	0.90	Entrance Loss	0.38 m

Inlet Control Properties

Inlet Control HW Elev.	196.34 m	Flow Control	N/A
Inlet Type	Projecting	Area Full	0.7 m^2
K	0.03400	HDS 5 Chart	2
M	1.50000	HDS 5 Scale	3
C	0.05530	Equation Form	1
Y	0.54000		

No Tailwater expected

Project Summary Report

Tailwater Calculation for Culvert 5

Project Description	
Worksheet	Culvert 5
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Slope	018000	m/m
Discharg	1.2913	m³/s

1.8%

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.030	
Water Surface Elev	181.30	m
Elevation Range	).89 to 181.99	
Flow Area	0.7	m²
Wetted Perimeter	2.94	m
Top Width	2.78	m
Actual Depth	0.41	m
Critical Elevation	181.32	m
Critical Slope	0.014620	m/n
Velocity	1.77	m/s
Velocity Head	0.16	m
Specific Energy	181.46	m
Froude Number	1.10	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+15	0.030

Natural Channel Points

Station (m)	Elevation (m)
0+00	181.99
0+05	181.63
0+06	180.99
0+07	180.89
0+08	181.04
0+09	181.82
0+15	181.79

Culvert Calculator Report
Culvert 5

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	182.46 m	Headwater Depth/Height	1.72
Computed Headwater Elevation	182.46 m	Discharge	1.2913 m^3/s
Inlet Control HW Elev.	182.46 m	Tailwater Elevation	181.30 m
Outlet Control HW Elev.	182.39 m	Control Type	Inlet Control

Grades

Upstream Invert	181.02 m	Downstream Invert	180.89 m
Length	8.73 m	Constructed Slope	0.014891 m/m

Hydraulic Profile

Profile	CompositeM2PressureProfile	Depth, Downstream	0.68 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.68 m
Velocity Downstream	2.83 m/s	Critical Slope	0.030354 m/m

Section

Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	0.80 m
Section Size	800 mm	Rise	0.80 m
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	182.39 m	Upstream Velocity Head	0.28 m
Ke	0.90	Entrance Loss	0.25 m

Inlet Control Properties

Inlet Control HW Elev.	182.46 m	Flow Control	N/A
Inlet Type	Projecting	Area Full	0.5 m^2
K	0.03400	HDS 5 Chart	2
M	1.50000	HDS 5 Scale	3
C	0.05530	Equation Form	1
Y	0.54000		

Project Summary Report

Tailwater Calculation for Culvert 6

Project Description	
Worksheet	Culvert 6
Flow Element	Irregular Chani
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Slope	009050	m/m
Discharg	0.6603	m³/s

0.9%

Options	
Current Roughness Methc	›ved Lotter's Method
Open Channel Weighting	›ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficiei	0.030	
Water Surface Elev	179.75	m
Elevation Range	).40 to 180.11	
Flow Area	0.6	m²
Wetted Perimeter	2.50	m
Top Width	2.34	m
Actual Depth	0.35	m
Critical Elevation	179.70	m
Critical Slope	0.016088	m/n
Velocity	1.17	m/s
Velocity Head	0.07	m
Specific Energy	179.82	m
Froude Number	0.76	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+17	0.030

Natural Channel Points

Station (m)	Elevation (m)
0+00	179.88
0+07	179.88
0+08	179.41
0+09	179.40
0+11	180.11
0+17	180.03

Culvert Calculator Report
Culvert 6

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	180.55 m	Headwater Depth/Height	1.19
Computed Headwater Elevation	180.55 m	Discharge	0.6603 m^3/s
Inlet Control HW Elev.	180.49 m	Tailwater Elevation	179.75 m
Outlet Control HW Elev.	180.55 m	Control Type	Outlet Control

Grades

Upstream Invert	179.64 m	Downstream Invert	179.37 m
Length	15.37 m	Constructed Slope	0.017567 m/m

Hydraulic Profile

Profile	M2	Depth, Downstream	0.50 m
Slope Type	Mild	Normal Depth	0.51 m
Flow Regime	Subcritical	Critical Depth	0.50 m
Velocity Downstream	2.08 m/s	Critical Slope	0.018625 m/m

Section

Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	0.76 m
Section Size	750 mm	Rise	0.76 m
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	180.55 m	Upstream Velocity Head	0.21 m
Ke	0.90	Entrance Loss	0.19 m

Inlet Control Properties

Inlet Control HW Elev.	180.49 m	Flow Control	N/A
Inlet Type	Projecting	Area Full	0.5 m^2
K	0.03400	HDS 5 Chart	2
M	1.50000	HDS 5 Scale	3
C	0.05530	Equation Form	1
Y	0.54000		

Project Summary Report

Tailwater Calculation For Culvert 7

Project Description	
Worksheet	Culvert 7
Flow Element	Irregular Chan
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Slope	066900	m/m
Discharg	1.1759	m³/s

6.7%

Options	
Current Roughness Meth	›ved Lotter's Method
Open Channel Weighting	›ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.030	
Water Surface Elev	179.30	m
Elevation Range	).02 to 180.29	
Flow Area	0.4	m²
Wetted Perimeter	2.23	m
Top Width	2.11	m
Actual Depth	0.28	m
Critical Elevation	179.43	m
Critical Slope	0.014855	m/n
Velocity	2.82	m/s
Velocity Head	0.41	m
Specific Energy	179.71	m
Froude Number	2.03	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+11	0.030

Natural Channel Points

Station (m)	Elevation (m)
0+00	180.29
0+04	180.15
0+07	179.07
0+08	179.02
0+08	179.08
0+09	179.79
0+11	179.93

Culvert Calculator Report
Culvert 7

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	180.20 m	Headwater Depth/Height	1.63
Computed Headwater Elevation	180.20 m	Discharge	1.1759 m³/s
Inlet Control HW Elev.	180.11 m	Tailwater Elevation	179.30 m
Outlet Control HW Elev.	180.20 m	Control Type	Outlet Control

Grades

Upstream Invert	178.83 m	Downstream Invert	178.82 m
Length	9.31 m	Constructed Slope	0.001074 m/m

Hydraulic Profile

Profile	CompositeM2PressureProfile	Depth, Downstream	0.65 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.66 m
Velocity Downstream	2.68 m/s	Critical Slope	0.026825 m/m

Section

Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	0.80 m
Section Size	800 mm	Rise	0.80 m
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	180.20 m	Upstream Velocity Head	0.23 m
Ke	0.90	Entrance Loss	0.21 m

Inlet Control Properties

Inlet Control HW Elev.	180.11 m	Flow Control	N/A
Inlet Type	Projecting	Area Full	0.5 m²
K	0.03400	HDS 5 Chart	2
M	1.50000	HDS 5 Scale	3
C	0.05530	Equation Form	1
Y	0.54000		

Culvert Calculator Report
Culvert 8

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	180.73	m	Headwater Depth/Height	2.35	
Computed Headwater Elevation	180.73	m	Discharge	2.8402	m³/s
Inlet Control HW Elev.	180.28	m	Tailwater Elevation	179.00	m
Outlet Control HW Elev.	180.73	m	Control Type	Outlet Control	

Grades

Upstream Invert	178.58	m	Downstream Invert	178.28	m
Length	36.46	m	Constructed Slope	0.008228	m/m

Hydraulic Profile

Profile	CompositeM2PressureProfile		Depth, Downstream	0.74	m
Slope Type	Mild		Normal Depth	N/A	m
Flow Regime	Subcritical		Critical Depth	0.74	m
Velocity Downstream	3.04	m/s	Critical Slope	0.024621	m/m

Section

Section Shape	Arch		Mannings Coefficient	0.025	
Section MateSteel and Aluminum Var CR Historic			Span	1.47	m
Section Size	1470 x 910 mm		Rise	0.91	m
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	180.73	m	Upstream Velocity Head	0.37	m
Ke	0.90		Entrance Loss	0.33	m

Inlet Control Properties

Inlet Control HW Elev.	180.28	m	Flow Control	N/A	
Inlet Type	Thin wall projecting		Area Full	1.1	m²
K	0.03400		HDS 5 Chart	34	
M	1.50000		HDS 5 Scale	3	
C	0.04960		Equation Form	1	
Y	0.57000				

No tailwater expected

Culvert Calculator Report
culvert 9

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	185.21 m	Headwater Depth/Height	0.82
Computed Headwater Elevation	185.21 m	Discharge	0.4805 m³/s
Inlet Control HW Elev.	185.14 m	Tailwater Elevation	0.00 m
Outlet Control HW Elev.	185.21 m	Control Type	Outlet Control

Grades

Upstream Invert	184.65 m	Downstream Invert	184.52 m
Length	8.60 m	Constructed Slope	0.015116 m/m

Hydraulic Profile

Profile	M2	Depth, Downstream	0.31 m
Slope Type	Mild	Normal Depth	0.33 m
Flow Regime	Subcritical	Critical Depth	0.31 m
Velocity Downstream	1.64 m/s	Critical Slope	0.017714 m/m

Section

Section Shape	Arch	Mannings Coefficient	0.028
Section Material	teel and Alu[illegible]less CR 3x1 Corrugations Historic	Span	1.09 m
Section Size	1090 x 690 mm	Rise	0.69 m
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	185.21 m	Upstream Velocity Head	0.12 m
Ke	0.90	Entrance Loss	0.11 m

Inlet Control Properties

Inlet Control HW Elev.	185.14 m	Flow Control	N/A
Inlet Type	18 inch CR structural plate, projecting	Area Full	0.6 m²
K	0.03000	HDS 5 Chart	35
M	1.50000	HDS 5 Scale	1
C	0.04960	Equation Form	1
Y	0.57000		

No tailwater expected

Culvert Calculator Report
Culvert 10

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	183.15 m	Headwater Depth/Height	1.10
Computed Headwater Elev:	183.15 m	Discharge	1.1486 m³/s
Inlet Control HW Elev.	183.07 m	Tailwater Elevation	0.00 m
Outlet Control HW Elev.	183.15 m	Control Type	Entrance Control

Grades

Upstream Invert	182.31 m	Downstream Invert	182.07 m
Length	8.00 m	Constructed Slope	0.030000 m/m

Hydraulic Profile

Profile	S2	Depth, Downstream	0.39 m
Slope Type	Steep	Normal Depth	0.39 m
Flow Regime	Supercritical	Critical Depth	0.47 m
Velocity Downstream	2.41 m/s	Critical Slope	0.017412 m/m

Section

Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	0.76 m
Section Size	750 mm	Rise	0.76 m
Number Sections	2		

Outlet Control Properties

Outlet Control HW Elev.	183.15 m	Upstream Velocity Head	0.20 m
Ke	0.90	Entrance Loss	0.18 m

Inlet Control Properties

Inlet Control HW Elev.	183.07 m	Flow Control	Unsubmerged
Inlet Type	Projecting	Area Full	0.9 m²
K	0.03400	HDS 5 Chart	2
M	1.50000	HDS 5 Scale	3
C	0.05530	Equation Form	1
Y	0.54000		

No tailwater expected

Project Summary Report

Tailwater Calculation for Culvert 11

Project Description	
Worksheet	Culvert 11
Flow Element	Irregular Chanı
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Slope	030860	m/m
Discharg	2.7182	m^3/s

Options	
Current Roughness Methc	›ved Lotter's Method
Open Channel Weighting	›ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficiei	0.030	
Water Surface Elev	180.28	m
Elevation Range	).77 to 180.50	
Flow Area	1.0	m^2
Wetted Perimeter	3.17	m
Top Width	2.91	m
Actual Depth	0.51	m
Critical Elevation	180.45	m
Critical Slope	0.016915	m/n
Velocity	2.72	m/s
Velocity Head	0.38	m
Specific Energy	180.66	m
Froude Number	1.48	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+15	0.030

Natural Channel Points

Station (m)	Elevation (m)
0+00	180.50
0+07	180.31
0+08	179.80
0+09	179.77
0+09	179.77
0+10	180.45
0+15	180.34

Culvert Calculator Report
Culvert 11

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	181.60	m	Headwater Depth/Height	1.43	
Computed Headwater Elevation	181.60	m	Discharge	2.7182	m³/s
Inlet Control HW Elev.	181.45	m	Tailwater Elevation	180.28	m
Outlet Control HW Elev.	181.60	m	Control Type	Outlet Control	

Grades

Upstream Invert	180.15	m	Downstream Invert	179.96	m
Length	31.35	m	Constructed Slope	0.006061	m/m

Hydraulic Profile

Profile	CompositeM2PressureProfile		Depth, Downstream	0.69	m
Slope Type	Mild		Normal Depth	N/A	m
Flow Regime	Subcritical		Critical Depth	0.69	m
Velocity Downstream	2.70	m/s	Critical Slope	0.017183	m/m

Section

Section Shape	Arch		Mannings Coefficient	0.025	
Section Material	Steel and Aluminum Var CR Historic		Span	1.65	m
Section Size	1650 x 1020 mm		Rise	1.02	m
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	181.60	m	Upstream Velocity Head	0.22	m
Ke	0.90		Entrance Loss	0.20	m

Inlet Control Properties

Inlet Control HW Elev.	181.45	m	Flow Control	N/A	
Inlet Type	Thin wall projecting		Area Full	1.3	m²
K	0.03400		HDS 5 Chart	34	
M	1.50000		HDS 5 Scale	3	
C	0.04960		Equation Form	1	
Y	0.57000				

APPENDIX D

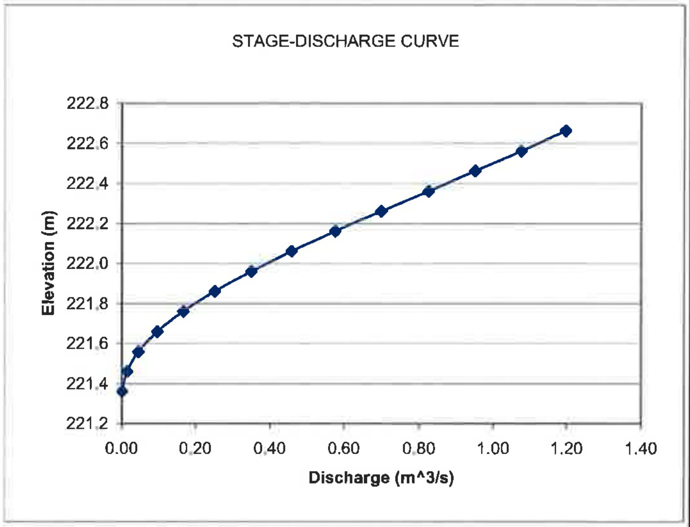
Culvert Data Sheets

CULVERT DATA

WATERCOURSE:	22	STRUCTURE NO.	1
LOCATION:	Hidden Lake Road		
		CAPACITY:	1.2 m^3/s
SIZE/TYPE:	825 mm CSP	RETURN PERIOD:	>100 yr

SPECIFICATIONS

LENGTH OF STRUCTURE:	9.90 m
TOP OF ROAD ELEVATION:	222.76 m
LOW CHORD ELEVATION:	222.19 m
MAX ALLOWABLE HEADWATER	222.67 m
UPSTREAM INVERT ELEVATION:	221.36 m
DOWNSTREAM INVERT ELEVATION:	220.70 m
EFFECTIVE FLOW AREA:	0.70 m^2



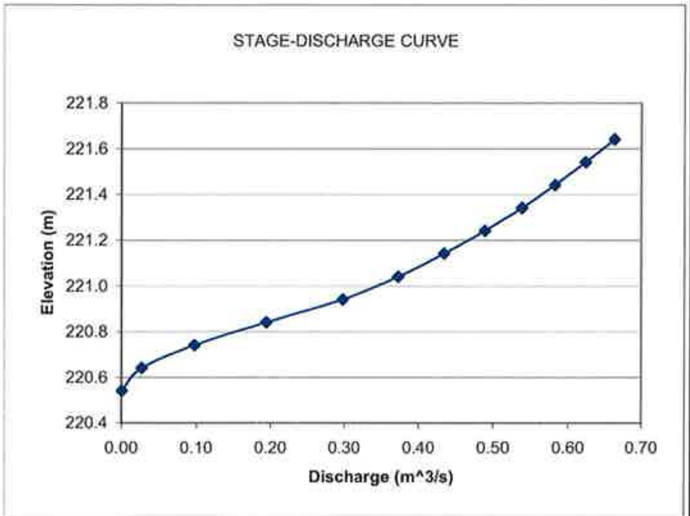
PHOTOGRAPHIC PRESENTATION

CULVERT DATA

WATERCOURSE:	22	STRUCTURE NO.	2
LOCATION:	Hidden Lake Road - Private Laneway	CAPACITY:	0.6 m^3/s
SIZE/TYPE:	3 X 300 mm Concrete	RETURN PERIOD:	>100 yr

SPECIFICATIONS

LENGTH OF STRUCTURE:	7.00 m
TOP OF ROAD ELEVATION:	221.60 m
LOW CHORD ELEVATION:	220.84 m
MAX ALLOWABLE HEADWATER	221.60 m
UPSTREAM INVERT ELEVATION:	220.54 m
DOWNSTREAM INVERT ELEVATION:	220.42 m
EFFECTIVE FLOW AREA:	0.21 m^2



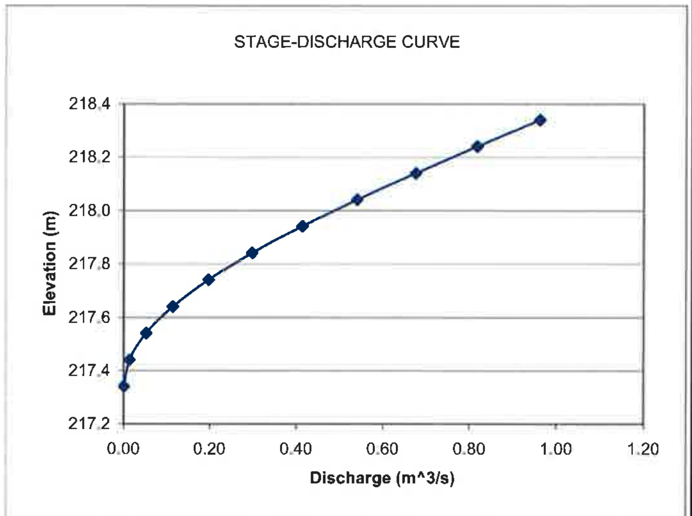
PHOTOGRAPHIC PRESENTATION

CULVERT DATA

WATERCOURSE:	22	STRUCTURE NO.	3
LOCATION:	Rear Yard		
		CAPACITY:	0.9 m^3/s
SIZE/TYPE:	825 mm CSP	RETURN PERIOD:	>100 yr

SPECIFICATIONS

LENGTH OF STRUCTURE:	12.00 m
TOP OF ROAD ELEVATION:	N/A m
LOW CHORD ELEVATION:	218.17 m
MAX ALLOWABLE HEADWATER	218.30 m
UPSTREAM INVERT ELEVATION:	217.34 m
DOWNSTREAM INVERT ELEVATION:	215.87 m
EFFECTIVE FLOW AREA:	0.54 m^2



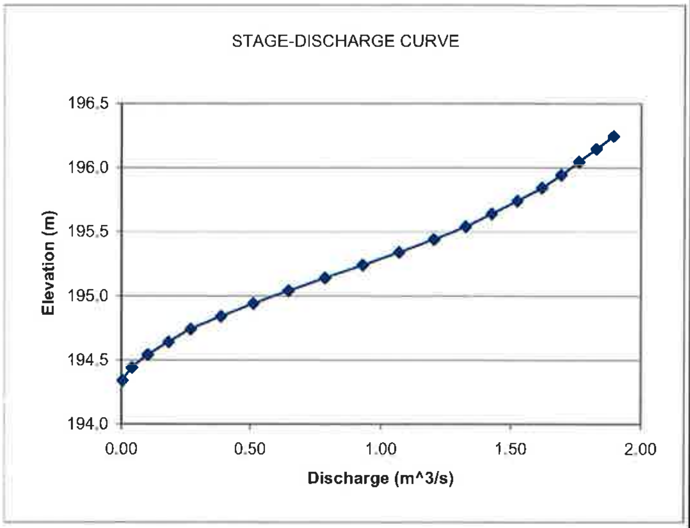
PHOTOGRAPHIC PRESENTATION

CULVERT DATA

WATERCOURSE:	22	STRUCTURE NO.	4
LOCATION:	Hidden Lake Road		
		CAPACITY:	1.89 m^3/s
SIZE/TYPE:	900 mm CSP	RETURN PERIOD:	>100 yr

SPECIFICATIONS

LENGTH OF STRUCTURE:	7.00 m
TOP OF ROAD ELEVATION:	196.34 m
LOW CHORD ELEVATION:	195.24 m
MAX ALLOWABLE HEADWATER	196.34 m
UPSTREAM INVERT ELEVATION:	194.34 m
DOWNSTREAM INVERT ELEVATION:	193.18 m
EFFECTIVE FLOW AREA:	7.00 m^2



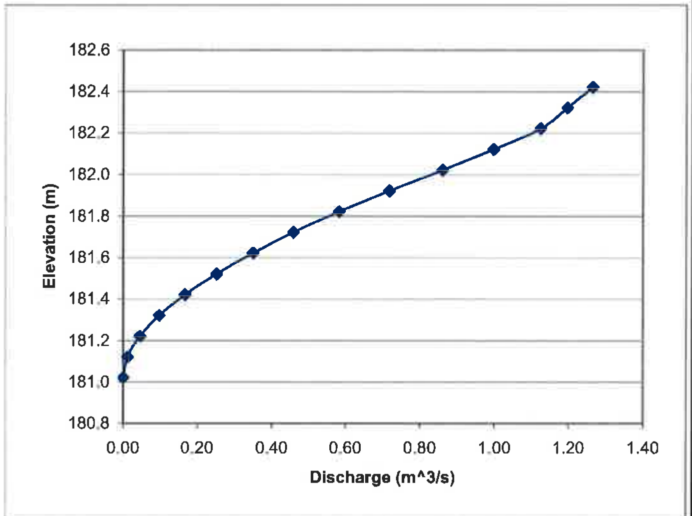
PHOTOGRAPHIC PRESENTATION

CULVERT DATA

WATERCOURSE:	22	STRUCTURE NO.	5
LOCATION:	Georgian Trail	CAPACITY:	1.3 m^3/s
SIZE/TYPE:	825 mm CSP	RETURN PERIOD:	>100 yr

SPECIFICATIONS

LENGTH OF STRUCTURE:	8.73 m
TOP OF ROAD ELEVATION:	182.46 m
LOW CHORD ELEVATION:	181.85 m
MAX ALLOWABLE HEADWATER	182.46 m
UPSTREAM INVERT ELEVATION:	181.02 m
DOWNSTREAM INVERT ELEVATION:	180.89 m
EFFECTIVE FLOW AREA:	0.60 m^2



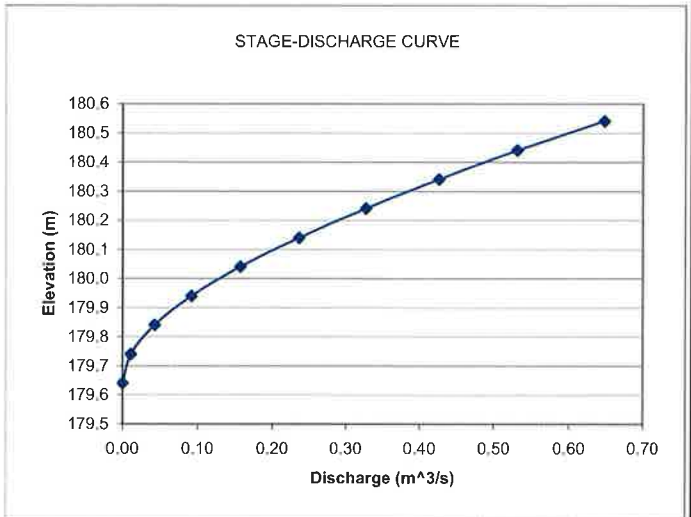
PHOTOGRAPHIC PRESENTATION

CULVERT DATA

WATERCOURSE:	22	STRUCTURE NO.	6
LOCATION:	Rear Yard		
		CAPACITY:	0.66 m^3/s
SIZE/TYPE:	750 mm CSP	RETURN PERIOD:	>100 yr

SPECIFICATIONS

LENGTH OF STRUCTURE:	15.37 m
TOP OF ROAD ELEVATION:	na m
LOW CHORD ELEVATION:	180.39 m
MAX ALLOWABLE HEADWATER	180.55 m
UPSTREAM INVERT ELEVATION:	179.64 m
DOWNSTREAM INVERT ELEVATION:	179.37 m
EFFECTIVE FLOW AREA:	0.30 m^2



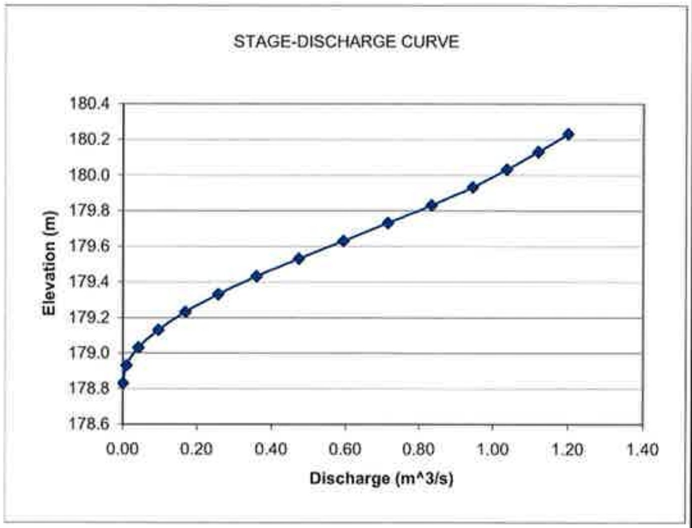
PHOTOGRAPHIC PRESENTATION

CULVERT DATA

WATERCOURSE:	22	STRUCTURE NO.	7
LOCATION:	Private Driveway		
		CAPACITY:	1.2 m^3/s
SIZE/TYPE:	825 mm CSP	RETURN PERIOD:	>100 yr

SPECIFICATIONS

LENGTH OF STRUCTURE:	9.31 m
TOP OF ROAD ELEVATION:	N/A m
LOW CHORD ELEVATION:	179.66 m
MAX ALLOWABLE HEADWATER	180.20 m
UPSTREAM INVERT ELEVATION:	178.83 m
DOWNSTREAM INVERT ELEVATION:	178.82 m
EFFECTIVE FLOW AREA:	0.60 m^2



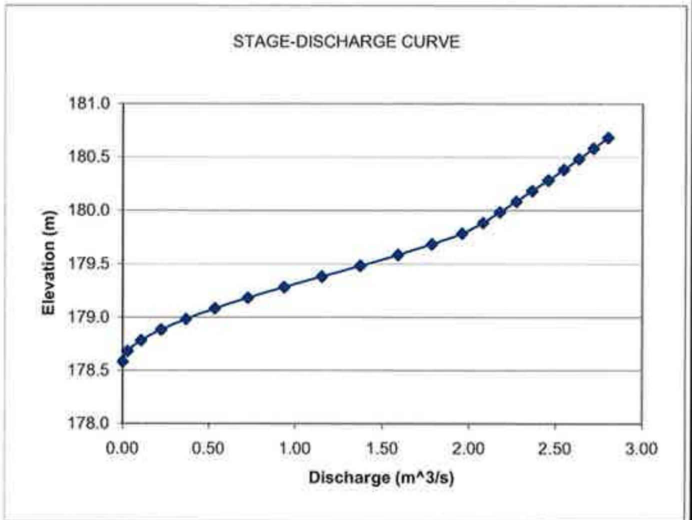
PHOTOGRAPHIC PRESENTATION

CULVERT DATA

WATERCOURSE:	22	STRUCTURE NO.	8
LOCATION:	Highway 26		
		CAPACITY:	2.8 m^3/s
SIZE/TYPE:	1470 X 910 mm CSP	RETURN PERIOD:	>100 yr

SPECIFICATIONS

LENGTH OF STRUCTURE:	36.46 m
TOP OF ROAD ELEVATION:	180.73 m
LOW CHORD ELEVATION:	179.49 m
MAX ALLOWABLE HEADWATER	180.73 m
UPSTREAM INVERT ELEVATION:	178.58 m
DOWNSTREAM INVERT ELEVATION:	178.28 m
EFFECTIVE FLOW AREA:	1.10 m^2



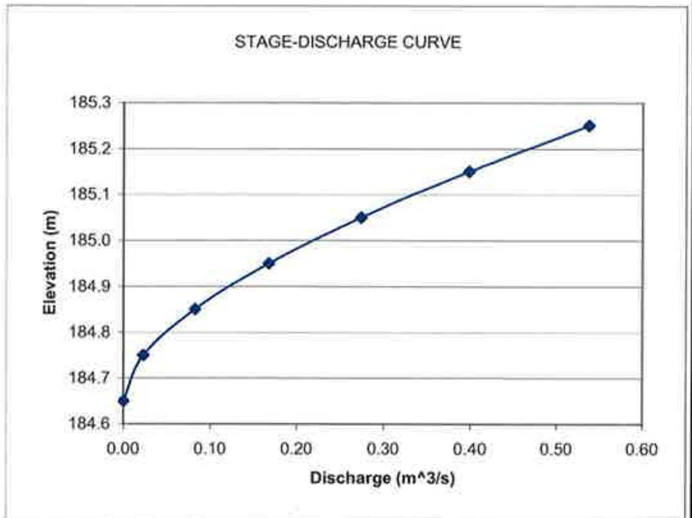
PHOTOGRAPHIC PRESENTATION

CULVERT DATA

WATERCOURSE:	21A	STRUCTURE NO.	9
LOCATION:	Private Driveways along Hidden Lake Road		
		CAPACITY:	0.5 m^3/s
SIZE/TYPE:	1090 x 690 mm CSP Arch	RETURN PERIOD:	>100 yr

SPECIFICATIONS

LENGTH OF STRUCTURE:	8.60 m
TOP OF ROAD ELEVATION:	185.50 m
LOW CHORD ELEVATION:	185.34 m
MAX ALLOWABLE HEADWATER	185.50 m
UPSTREAM INVERT ELEVATION:	184.65 m
DOWNSTREAM INVERT ELEVATION:	184.52 m
EFFECTIVE FLOW AREA:	0.60 m^2



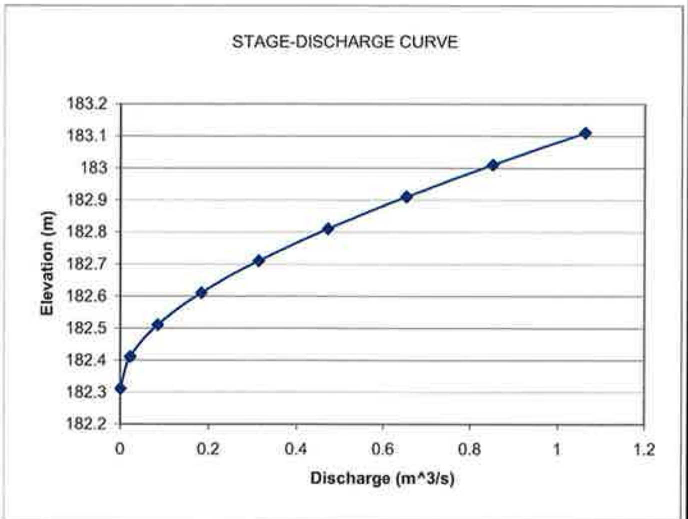
PHOTOGRAPHIC PRESENTATION

CULVERT DATA

WATERCOURSE:	21A	STRUCTURE NO.	10
LOCATION:	Georgian Trail		
		CAPACITY:	1.2 m^3/s
SIZE/TYPE:	2 x 750 mm CSP	RETURN PERIOD:	>100 yr

SPECIFICATIONS

LENGTH OF STRUCTURE:	8.00 m
TOP OF ROAD ELEVATION:	183.15 m
LOW CHORD ELEVATION:	183.06 m
MAX ALLOWABLE HEADWATER	183.15 m
UPSTREAM INVERT ELEVATION:	182.31 m
DOWNSTREAM INVERT ELEVATION:	182.07 m
EFFECTIVE FLOW AREA:	0.50 m^2



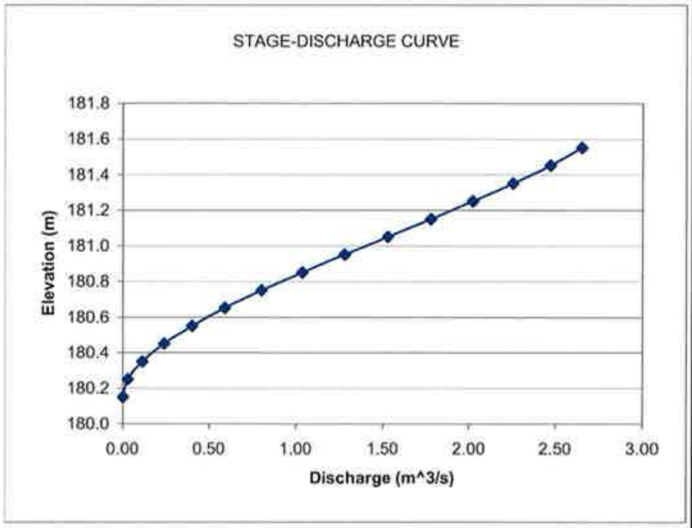
PHOTOGRAPHIC PRESENTATION

CULVERT DATA

WATERCOURSE:	21A	STRUCTURE NO.	11
LOCATION:	Highway 26		
		CAPACITY:	2.7 m^3/s
SIZE/TYPE:	1650 x 1020 mm CSP elipse	RETURN PERIOD:	>100 yr

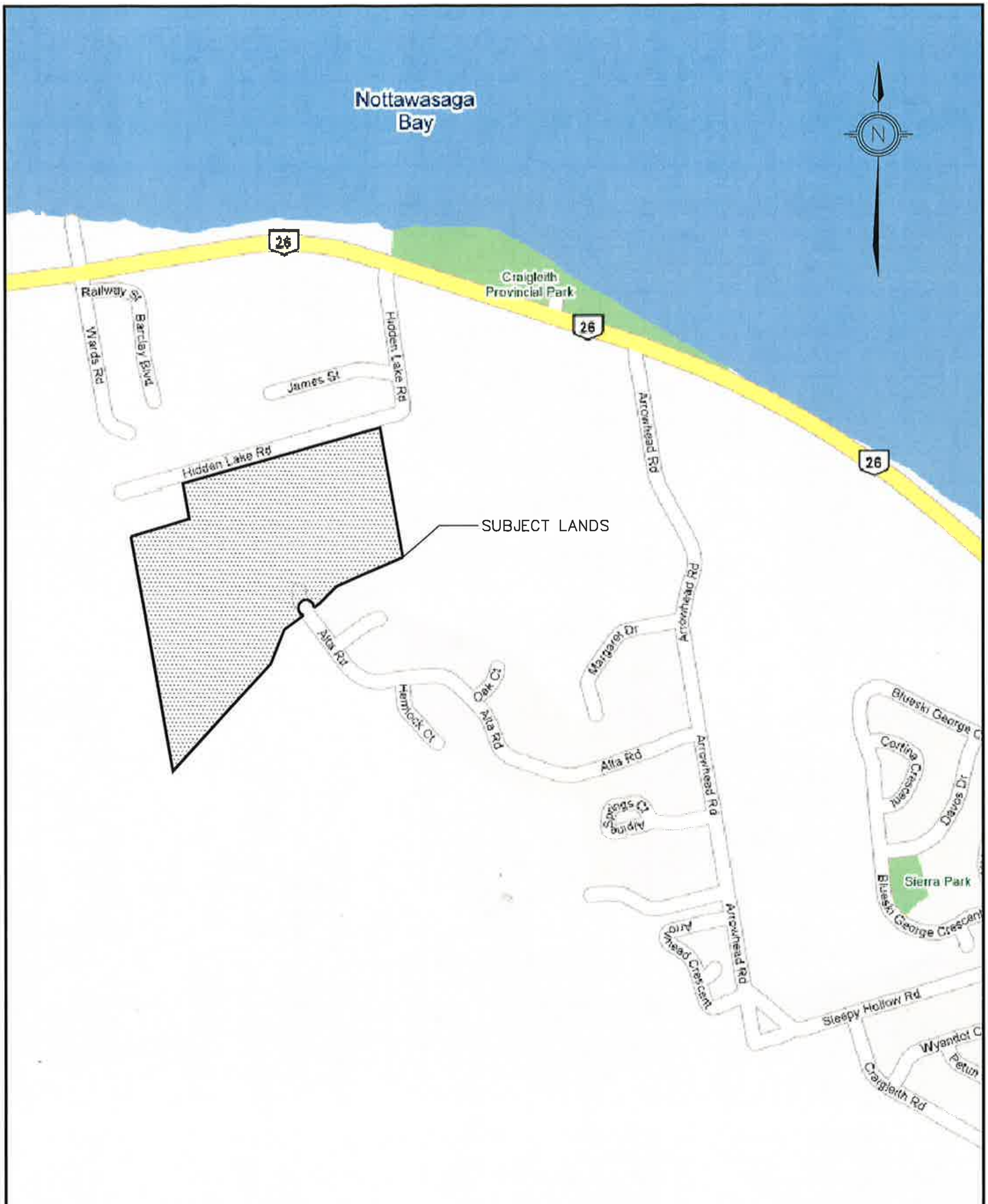
SPECIFICATIONS

LENGTH OF STRUCTURE:	31.35 m
TOP OF ROAD ELEVATION:	181.60 m
LOW CHORD ELEVATION:	181.10 m
MAX ALLOWABLE HEADWATER	181.60 m
UPSTREAM INVERT ELEVATION:	180.15 m
DOWNSTREAM INVERT ELEVATION:	179.96 m
EFFECTIVE FLOW AREA:	1.30 m^2



PHOTOGRAPHIC PRESENTATION

LIST OF FIGURES



CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

110 PINE STREET
COLLINGWOOD ON
L9Y 2N9

T. 705-446-3510
F. 705-446-3520
CFCROZIER.CA

PROJECT ALTA SUBDIVISION PHASE II TOWN OF THE BLUE MOUNTAINS	DRAWN BY: J.R.S. DATE: 01/25/2008	PROJECT No.: 119-2528-201 SCALE: N.T.S.
TITLE SITE LOCATION PLAN	DRAWING No.: FIG. 1	

Drawing: J:\119 - TABERA LTD\2528\CAD\2528_201-202.DWG, Layout Tab:201

NOTE: TOPOGRAPHIC SURVEY PER PATTEN & THOMSEN. (DISPLAYED CONTOUR INTERVAL, 1.0m)

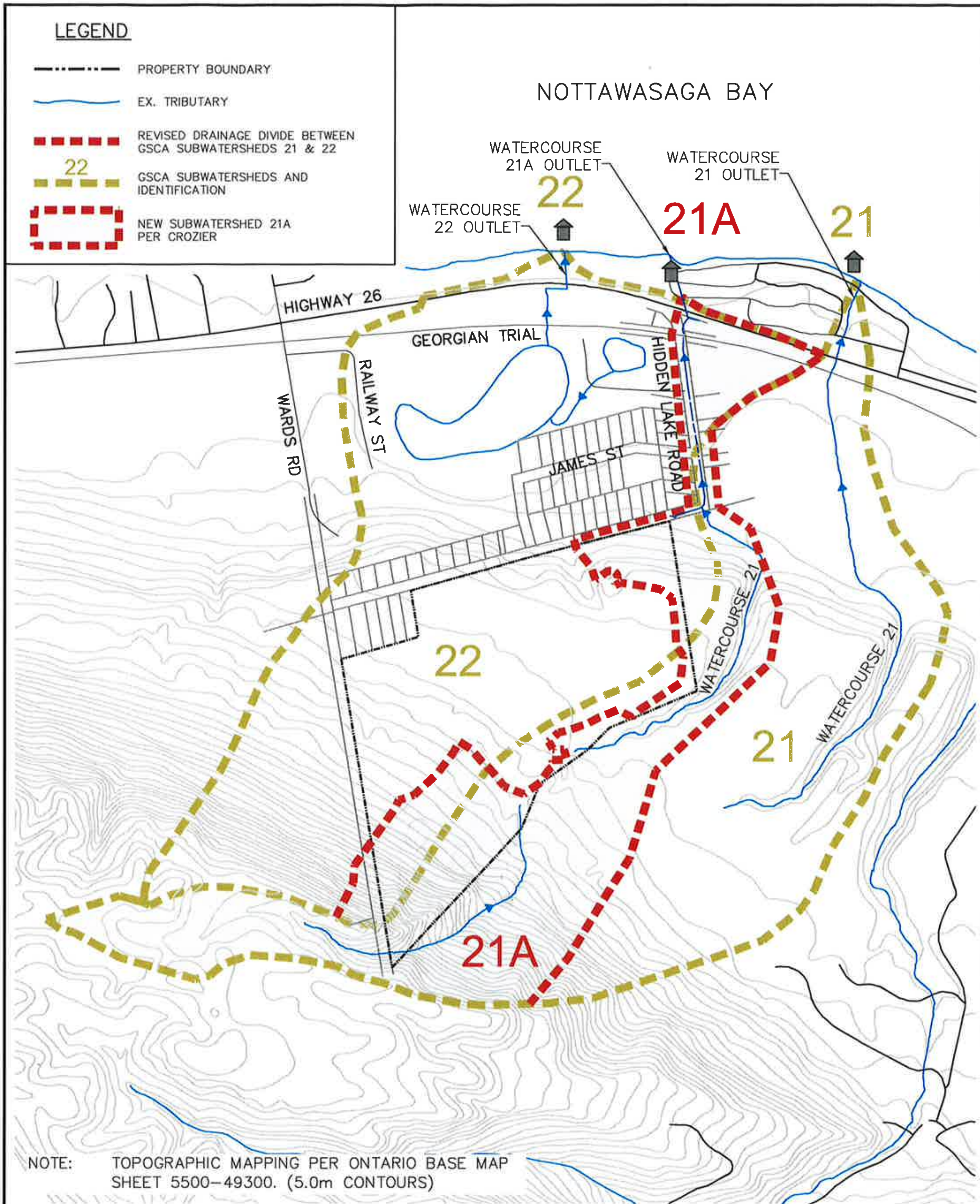
Project	ALTA SUBDIVISION PHASE II TOWN OF THE BLUE MOUNTAINS
Drawing	DRAFT PLAN

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET COLLINGWOOD ON L9Y 2N9 T. 705-446-3510 F. 705-446-3520 CFCROZIER.CA

Drawn By J.R.S. & R.C.G.	Check By K.G.S.	Project No. 119-2528-202
Scale 1:2500	Date 01/25/2008	Drawing No. FIG. 2

File Last Updated: Tue, 29 Jan 2008

Drawing: J:\119 - TABERA LTD\2528\CAD\2528_201-202.DWG, Layout Tab:202

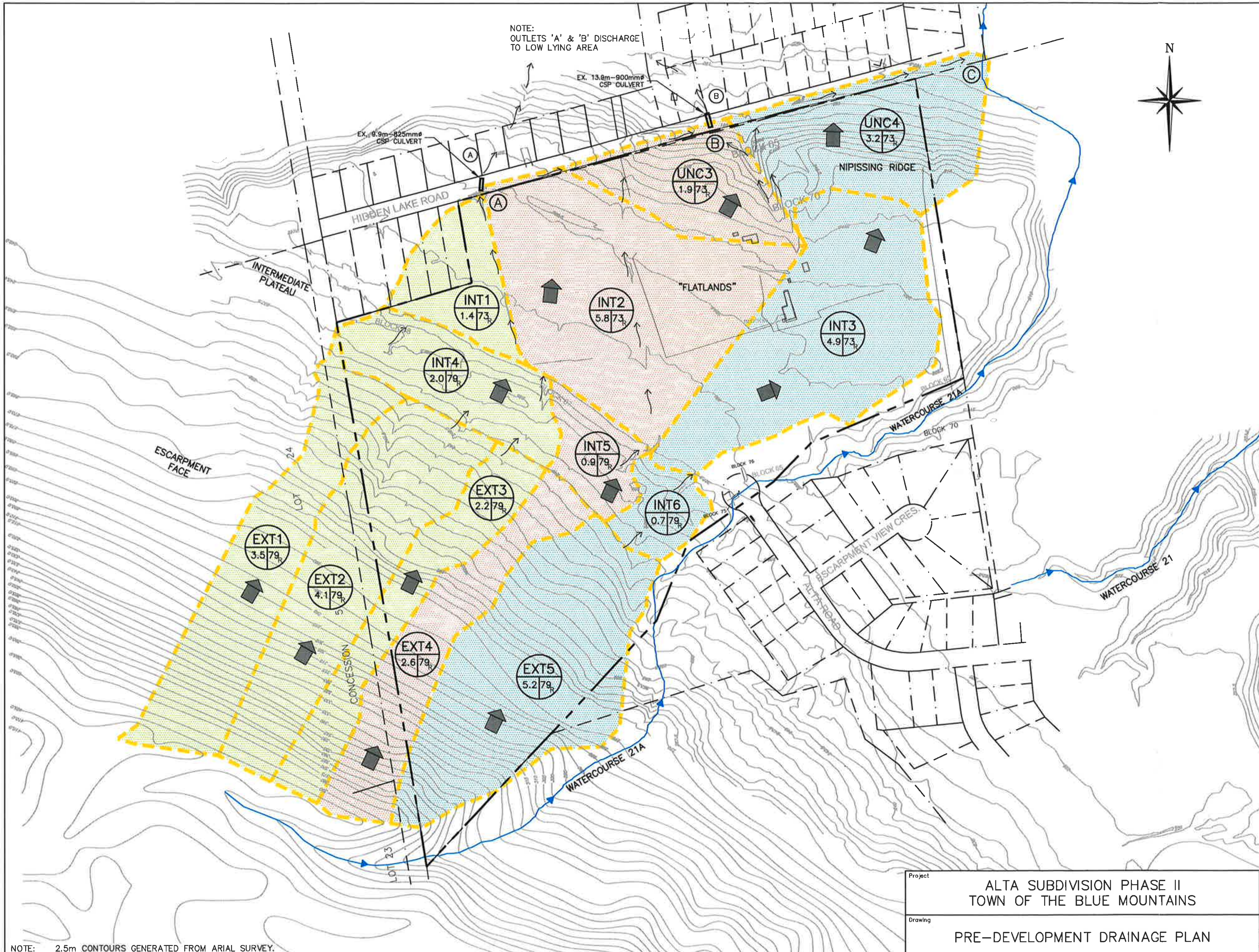


NOTE: TOPOGRAPHIC MAPPING PER ONTARIO BASE MAP SHEET 5500–49300. (5.0m CONTOURS)

Drawing: J:\119 – TABERA LTD\2528\CAD\2528_214–215.DWG, Layout Tab:214

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET COLLINGWOOD ON L9Y 2N9
T. 705-446-3510 F. 705-446-3520 CFCROZIER.CA

PROJECT: ALTA SUBDIVISION PHASE II TOWN OF THE BLUE MOUNTAINS	DRAWN BY: J.R.S.	PROJECT No.: 119–2528–214	
	DATE: 01/25/2008	SCALE: 1:10 000	
TITLE: REGIONAL SUBWATERSHED MAP	DRAWING No.: FIG. 3		



LEGEND

- PROPERTY BOUNDARY
- CATCHMENT BOUNDARY
- EX. DRAINAGE FLOW
- EX. SWALE
- EX. CULVERT
- EX. WATERCOURSE
- CATCHMENT I.D.; R=RURAL (CURVE NUMBER), U=URBAN (% IMPERVIOUSNESS); AREA (ha) — EXT4 2.6 79 R
- (A) OUTLET I.D.
- AREA CONTRIBUTING TO OUTLET (A)
- AREA CONTRIBUTING TO OUTLET (B)
- AREA CONTRIBUTING TO OUTLET (C)

NOTE: REFER TO FIGURE 8 FOR MODEL SCHEMATIC

NOTE: 2.5m CONTOURS GENERATED FROM ARIAL SURVEY.

Project: ALTA SUBDIVISION PHASE II
TOWN OF THE BLUE MOUNTAINS

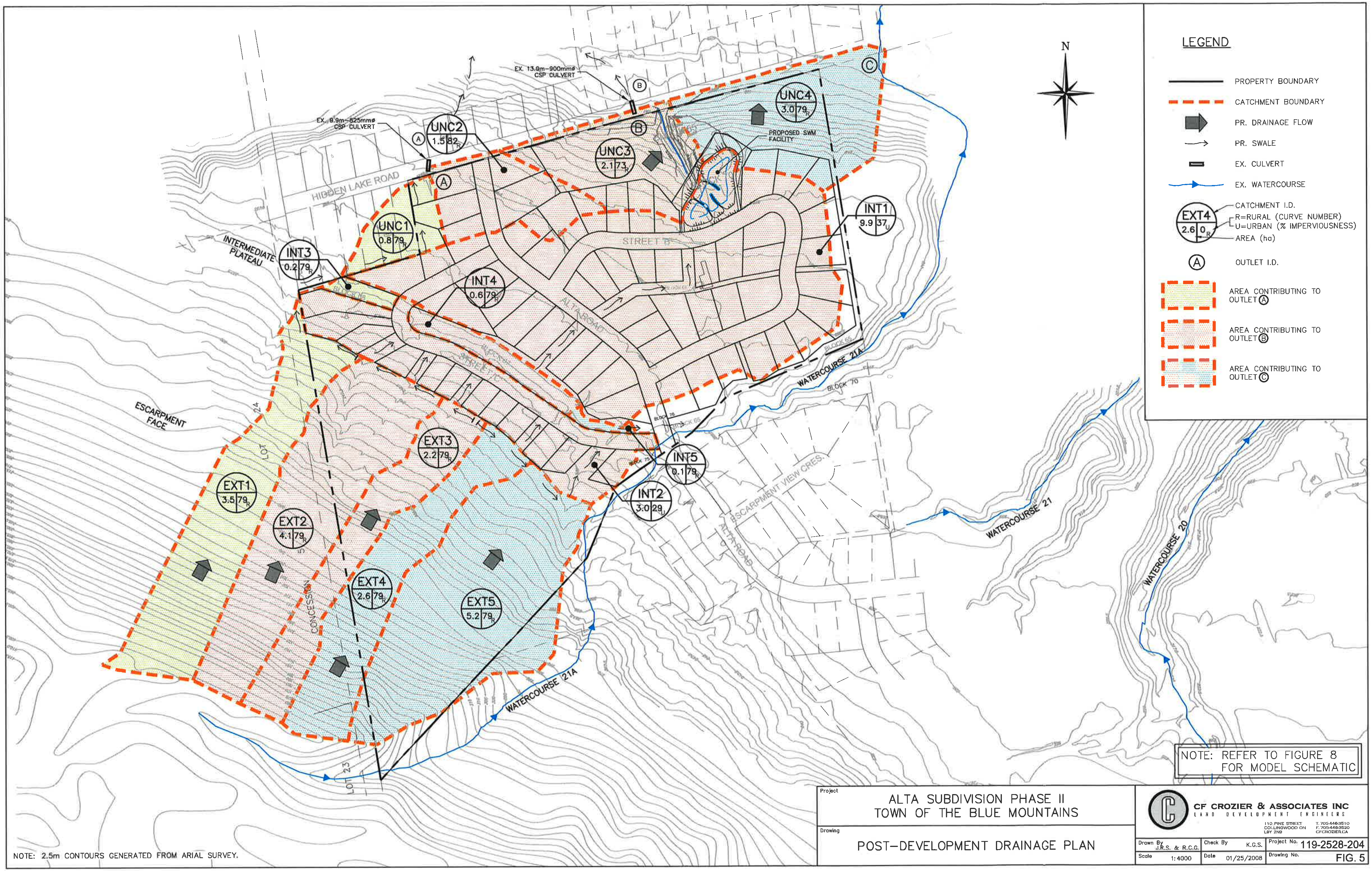
Drawing: PRE–DEVELOPMENT DRAINAGE PLAN

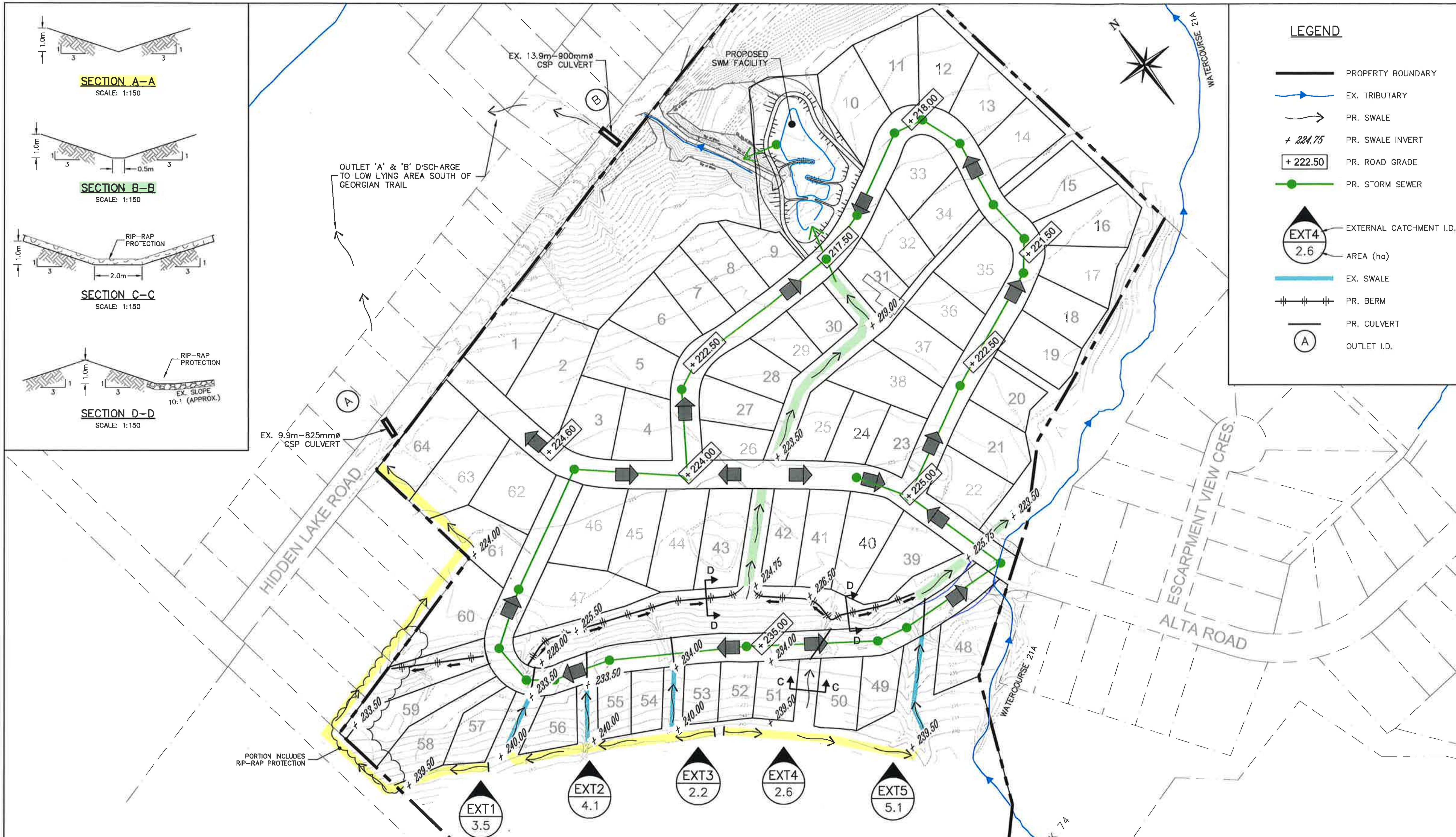
CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET COLLINGWOOD ON L9Y 2N8
T.705.446.3510 F.705.446.3520 CFCROZIER.CA

Drawn By	Check By	Project No.
J.R.S. & R.C.G.	K.G.S.	119-2528-203
Scale 1:4000	Date 01/25/2008	Drawing No. FIG. 4

File Last Updated: Tue, 29 Jan 2008

Drawing: J:\119 – TABERA LTD\2528\CAD\2528_203-207, 209-210.DWG, Layout Tab:203


LEGEND
PROPERTY BOUNDARY
CATCHMENT BOUNDARY
PR. DRAINAGE FLOW
PR. SWALE
EX. CULVERT
EX. WATERCOURSE
CATCHMENT I.D.
R=RURAL (CURVE NUMBER)
U=URBAN (% IMPERVIOUSNESS)
AREA (ha)
OUTLET I.D.
AREA CONTRIBUTING TO OUTLET A
AREA CONTRIBUTING TO OUTLET B
AREA CONTRIBUTING TO OUTLET C
N
NOTE: REFER TO FIGURE 8 FOR MODEL SCHEMATIC
EX. 9.9m-825mmø CSP CULVERT
EX. 13.9m-900mmø CSP CULVERT
PROPOSED SWM FACILITY
HIDDEN LAKE ROAD
INTERMEDIATE PLATEAU
ESCARPMENT FACE
STREET B
ALTA ROAD
ESCARPMENT VIEW CRES.
CONCESSION
LOT 24
LOT 23
WATERCOURSE 21A
WATERCOURSE 21
WATERCOURSE 20
BLOCK 70
BLOCK 65
UNC1 0.8 79 R
UNC2 1.5 82 R
UNC3 2.1 73 U
UNC4 3.0 79 R
INT1 9.9 37 U
INT2 3.0 29 U
INT3 0.2 79 R
INT4 0.6 79 R
INT5 0.1 79 R
EXT1 3.5 79 R
EXT2 4.1 79 R
EXT3 2.2 79 R
EXT4 2.6 79 R
EXT5 5.2 79 R
EXT4 2.6 0 R
NOTE: 2.5m CONTOURS GENERATED FROM ARIAL SURVEY.
Project
ALTA SUBDIVISION PHASE II
TOWN OF THE BLUE MOUNTAINS
Drawing
POST-DEVELOPMENT DRAINAGE PLAN
CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
Drawn By J.R.S. & R.C.G.
Check By K.G.S.
Project No. 119-2528-204
Scale 1:4000
Date 01/25/2008
Drawing No. FIG. 5



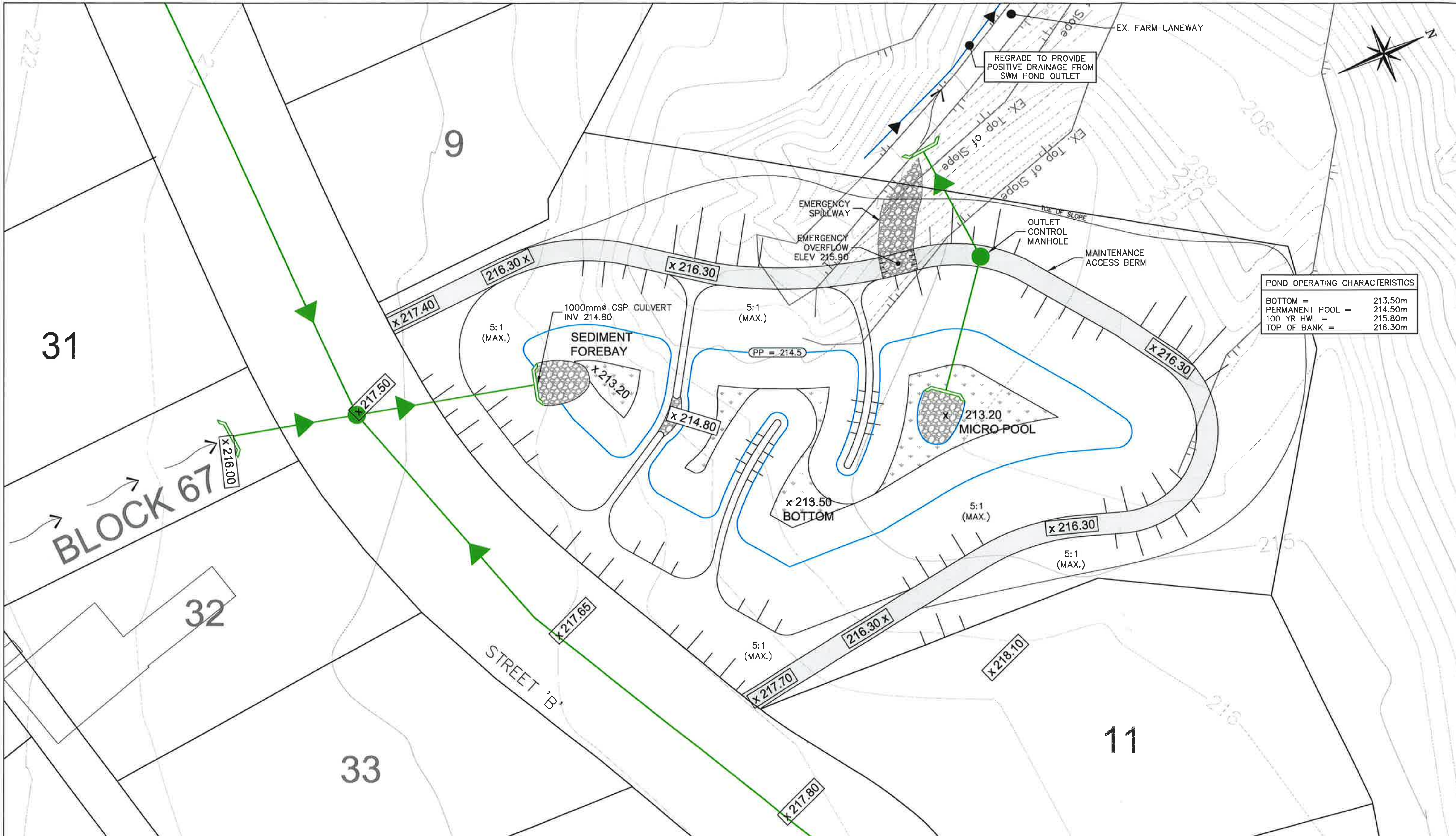
Project	ALTA SUBDIVISION PHASE II TOWN OF THE BLUE MOUNTAINS
Drawing	PRELIMINARY GRADING & STORMWATER MANAGEMENT PLAN

NOTE: TOPOGRAPHIC SURVEY PER PATTEN & THOMSEN.
(DISPLAYED CONTOUR INTERVAL, 1.0m)

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET COLLINGWOOD ON L9Y 2N9
T. 705-446-3510 F. 705-446-3520 CFCROZIER.CA

Drawn By J.R.S. & R.C.G.	Check By K.G.S.	Project No. 119-2528-206	
Scale 1:2500	Date 01/25/2008	Drawing No. FIG. 6	

File Last Updated: Tue, 29 Jan 2008
Drawing: J:\119 – TABERA LTD\2528\CAD\2528_203-207, 209-210.DWG, Layout Tab: 206



NOTE: TOPOGRAPHIC SURVEY PER PATTEN & THOMSEN.
(DISPLAYED CONTOUR INTERVAL, 1.0m)

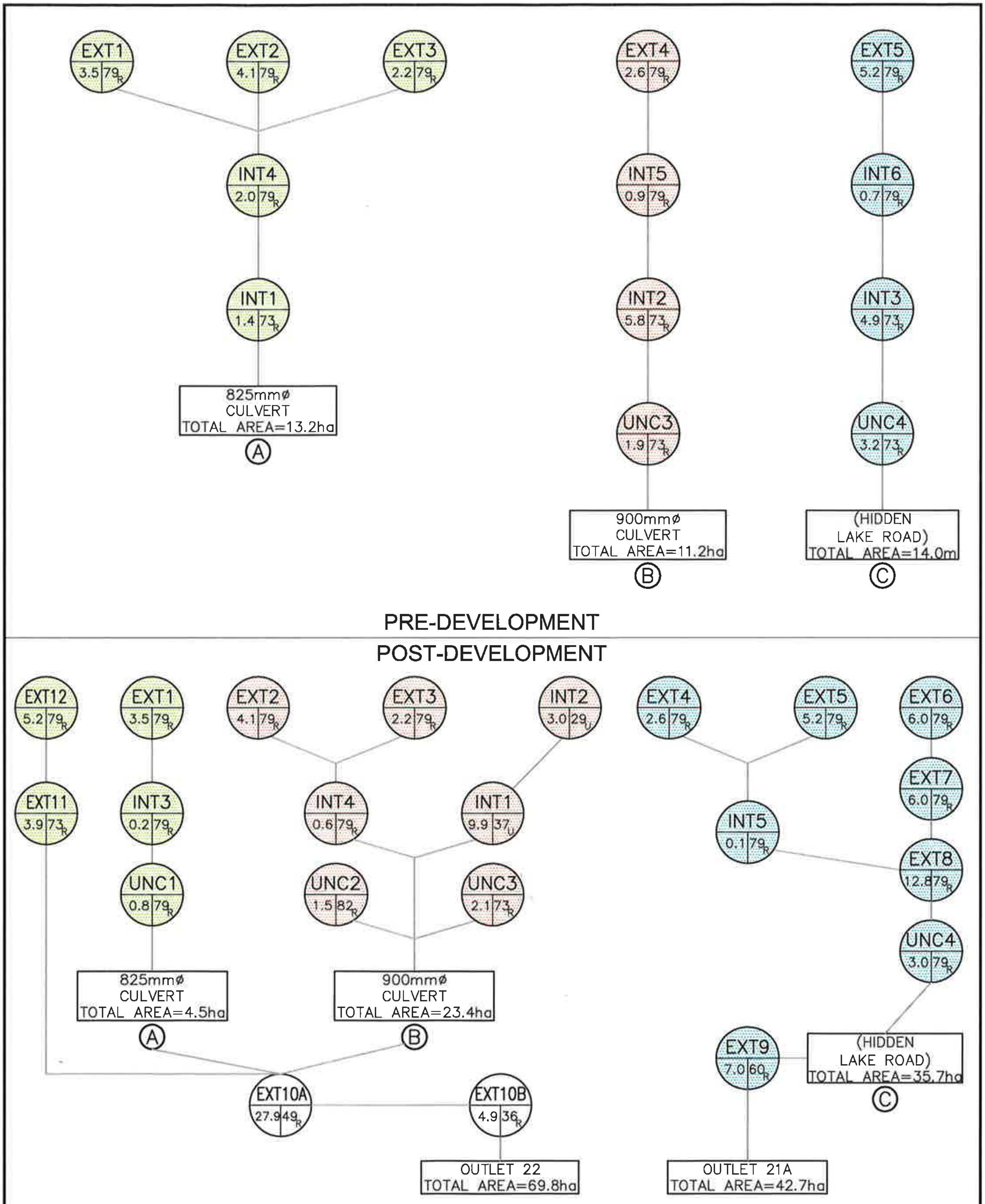
Project	ALTA SUBDIVISION PHASE II TOWN OF THE BLUE MOUNTAINS
Drawing	PRELIMINARY SWM POND GRADING PLAN

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

Drawn By J.R.S. & R.C.G.	Check By K.G.S.	Project No. 119-2528-207
Scale 1:500	Date 01/25/2008	Drawing No. FIG. 7

File Last Updated: Tue, 29 Jan 2008

Drawing: J:\119 - TABERA LTD\2528\CAD\2528_203-207, 209-210.DWG, Layout Tab:207



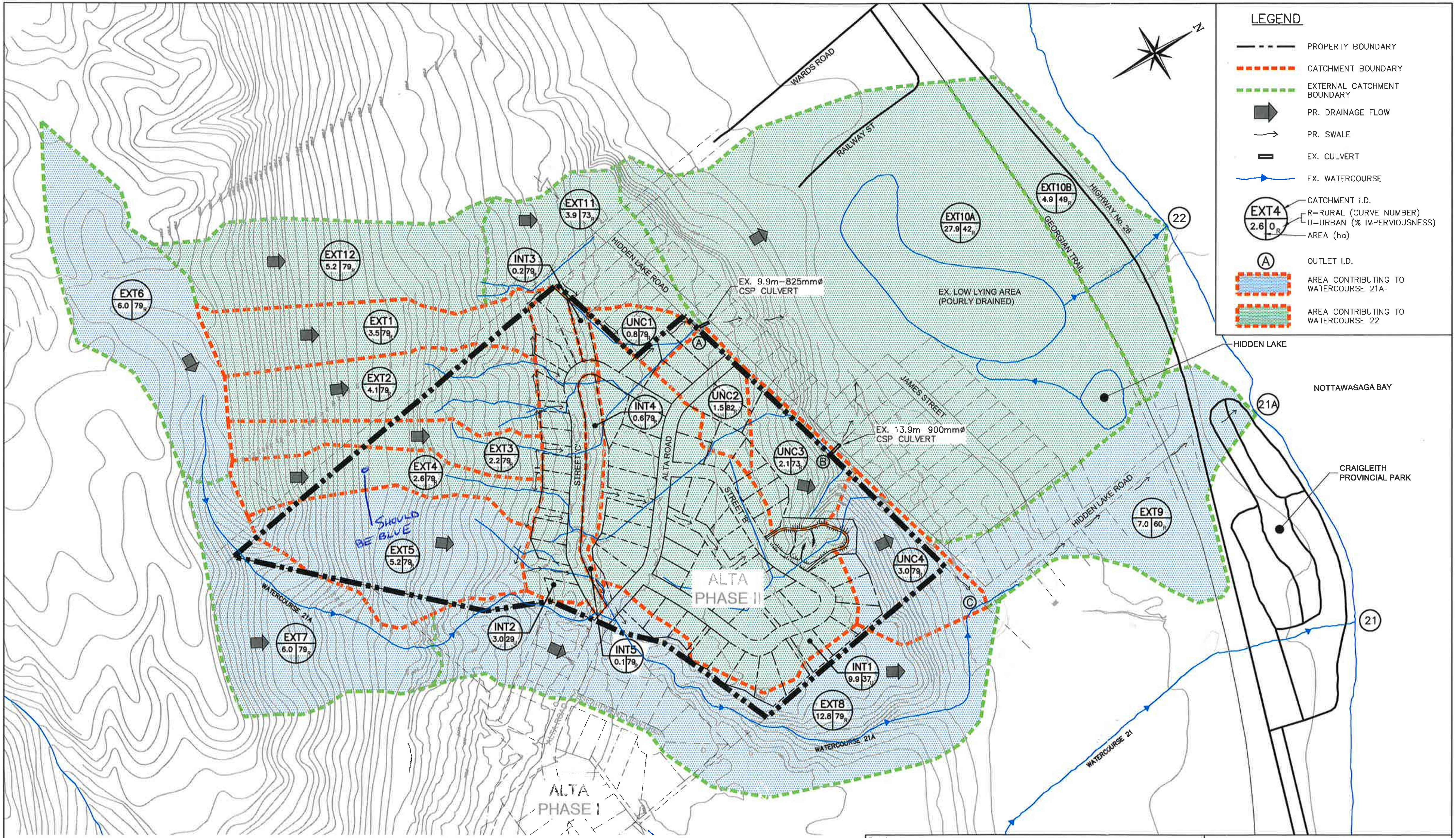
Drawing: J:\119 - TABERA LTD\2528\CAD\2528_203-207, 209-210.DWG, Layout Tab:205

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

110 PINE STREET
COLLINGWOOD ON
L9Y 2N9

T. 705-446-3510
F. 705-446-3520
CFCROZIER.CA

PROJECT ALTA SUBDIVISION PHASE II TOWN OF THE BLUE MOUNTAINS	DRAWN BY: J.R.S.	PROJECT No.: 119-2528-205
	DATE: 01/25/2008	SCALE: N/A
TITLE SWMHYMO MODEL SCHEMATIC PRE / POST	DRAWING No.: FIG. 8	



NOTE:
TOPOGRAPHIC SURVEY PER AIREAL BASE MAPPING (DISPLAYED CONTOUR INTERVAL 2.5m)
& PER ONTARIO BASE MAP SHEET 5500-49300 (DISPLAYED CONTOUR INTERVAL 5.0m)

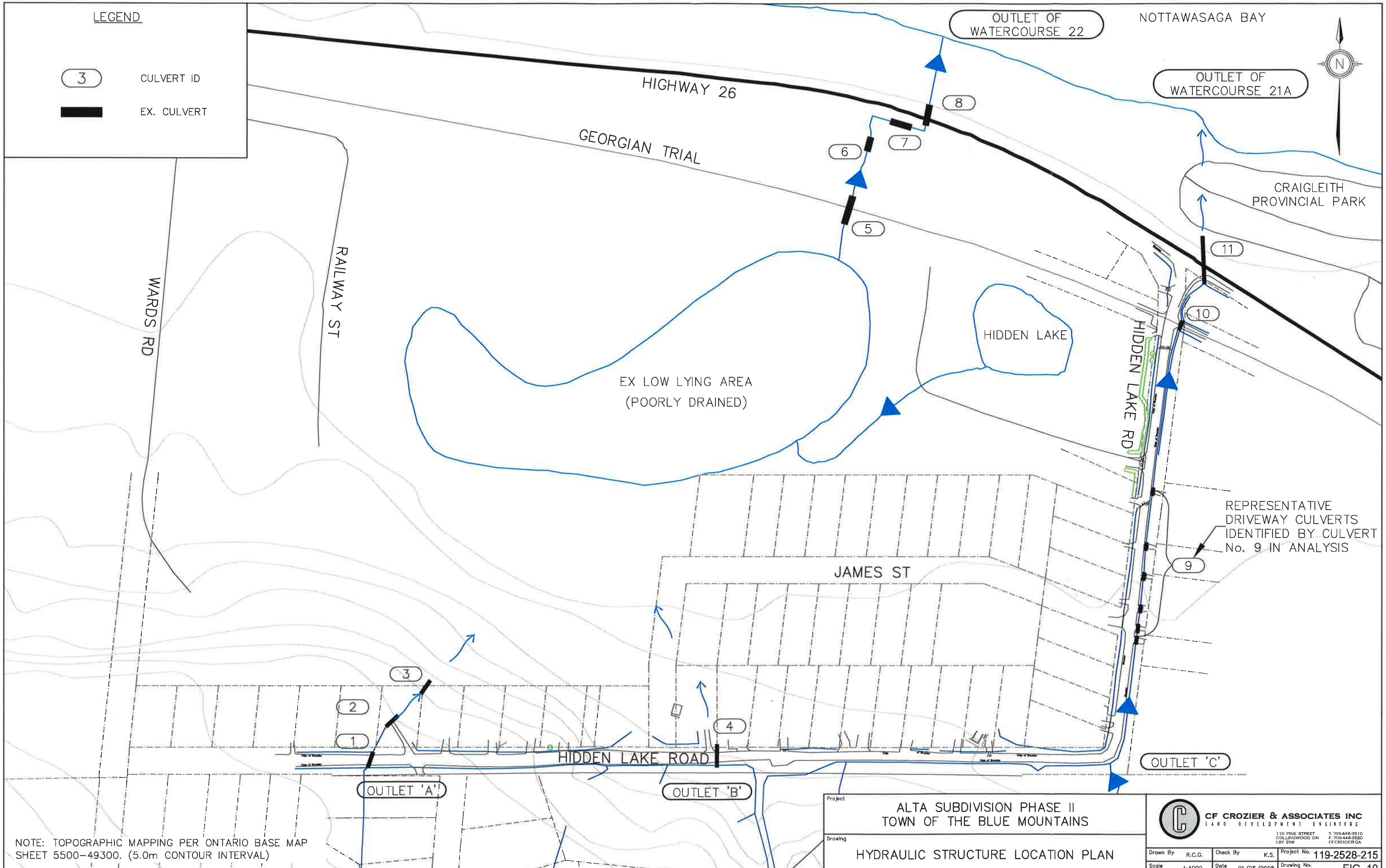
Project: ALTA SUBDIVISION PHASE II
TOWN OF THE BLUE MOUNTAINS

Drawing: POST–DEVELOPMENT SUBWATERSHED PLAN

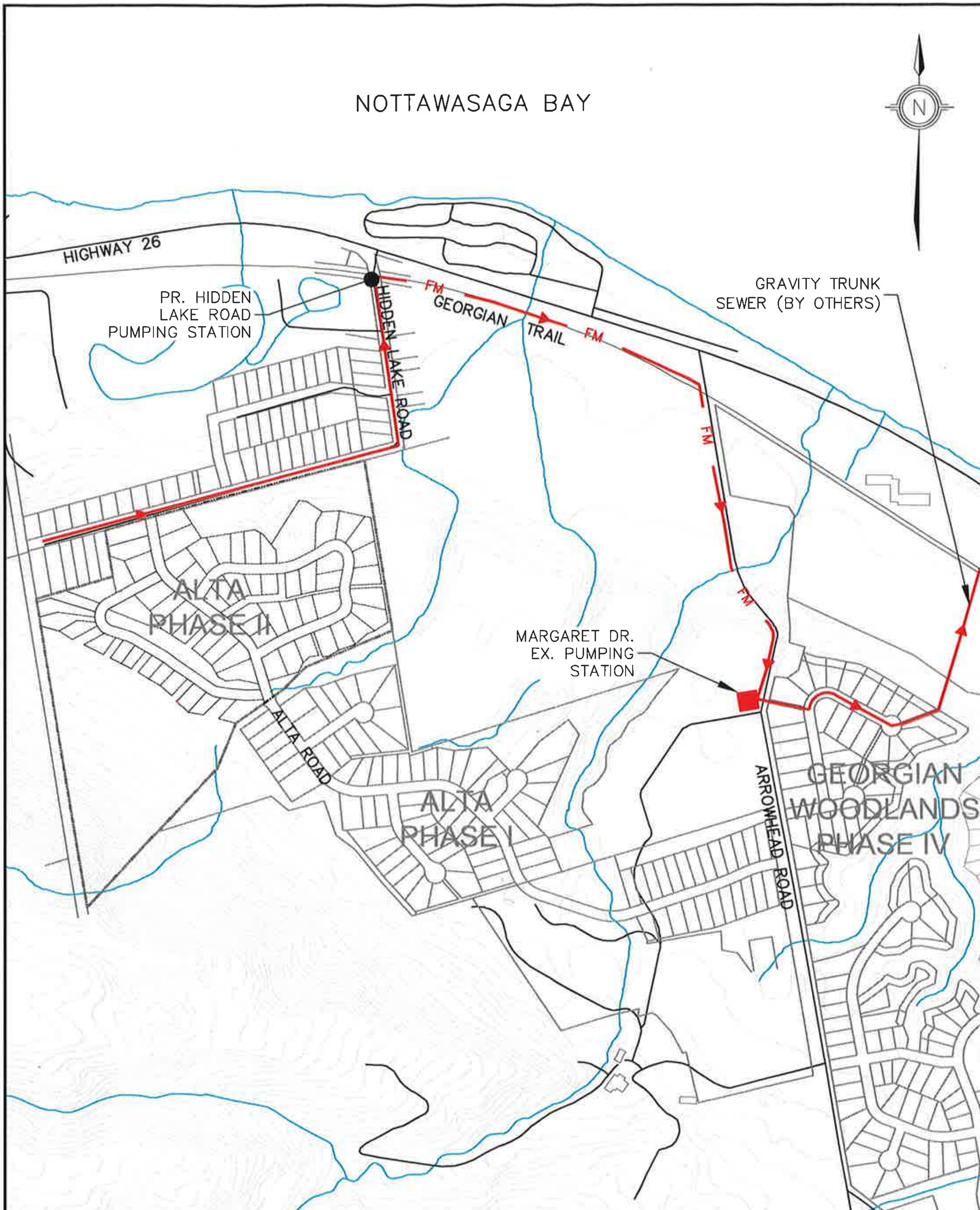
CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS

Drawn By: J.R.S. & R.C.G.	Check By: K.G.S.	Project No. 119-2528-212	
Scale: 1:5000	Date: 01/25/2008	Drawing No.	FIG. 9

File Last Updated: Tue, 29 Jan 2008
Drawing: J:\119 – TABERA LTD\2528\CAD\2528_212.DWG, Layout Tab:212



LEGEND
3 CULVERT ID
EX. CULVERT
File Last Updated: Tue, 29 Jan 2008
OUTLET OF WATERCOURSE 22
NOTTAWASAGA BAY
OUTLET OF WATERCOURSE 21A
N
HIGHWAY 26
GEORGIAN TRIAL
CRAIGLEITH PROVINCIAL PARK
WARDS RD
RAILWAY ST
EX LOW LYING AREA
(POORLY DRAINED)
HIDDEN LAKE
HIDDEN LAKE RD
REPRESENTATIVE DRIVEWAY CULVERTS IDENTIFIED BY CULVERT No. 9 IN ANALYSIS
JAMES ST
HIDDEN LAKE ROAD
OUTLET 'A'
OUTLET 'B'
OUTLET 'C'
1
2
3
4
5
6
7
8
9
10
11
NOTE: TOPOGRAPHIC MAPPING PER ONTARIO BASE MAP SHEET 5500-49300. (5.0m CONTOUR INTERVAL)
Project
ALTA SUBDIVISION PHASE II
TOWN OF THE BLUE MOUNTAINS
Drawing
HYDRAULIC STRUCTURE LOCATION PLAN
CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
Drawn By R.C.G.
Check By K.S.
Project No. 119-2528-215
Scale 1:1000
Date 01/25/2008
Drawing No. FIG. 10



Drawing: J:\119 - TABERA LTD\2528\CAD\2528_211.DWG, Layout Tab: 211

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET
COLLINGWOOD ON
L9Y 2N9
T. 705-446-3510
F. 705-446-3520
CFCROZIER.CA

PROJECT: ALTA SUBDIVISION PHASE II TOWN OF THE BLUE MOUNTAINS	DRAWN BY: J.R.S.	PROJECT No.: 119-2528-211
	DATE: 06/29/2007	SCALE: 1:10 000
TITLE: OVERALL SANITARY DRAINAGE PLAN	DRAWING No.: FIG. 11	

File Last Updated: Tue, 29 Jan 2008

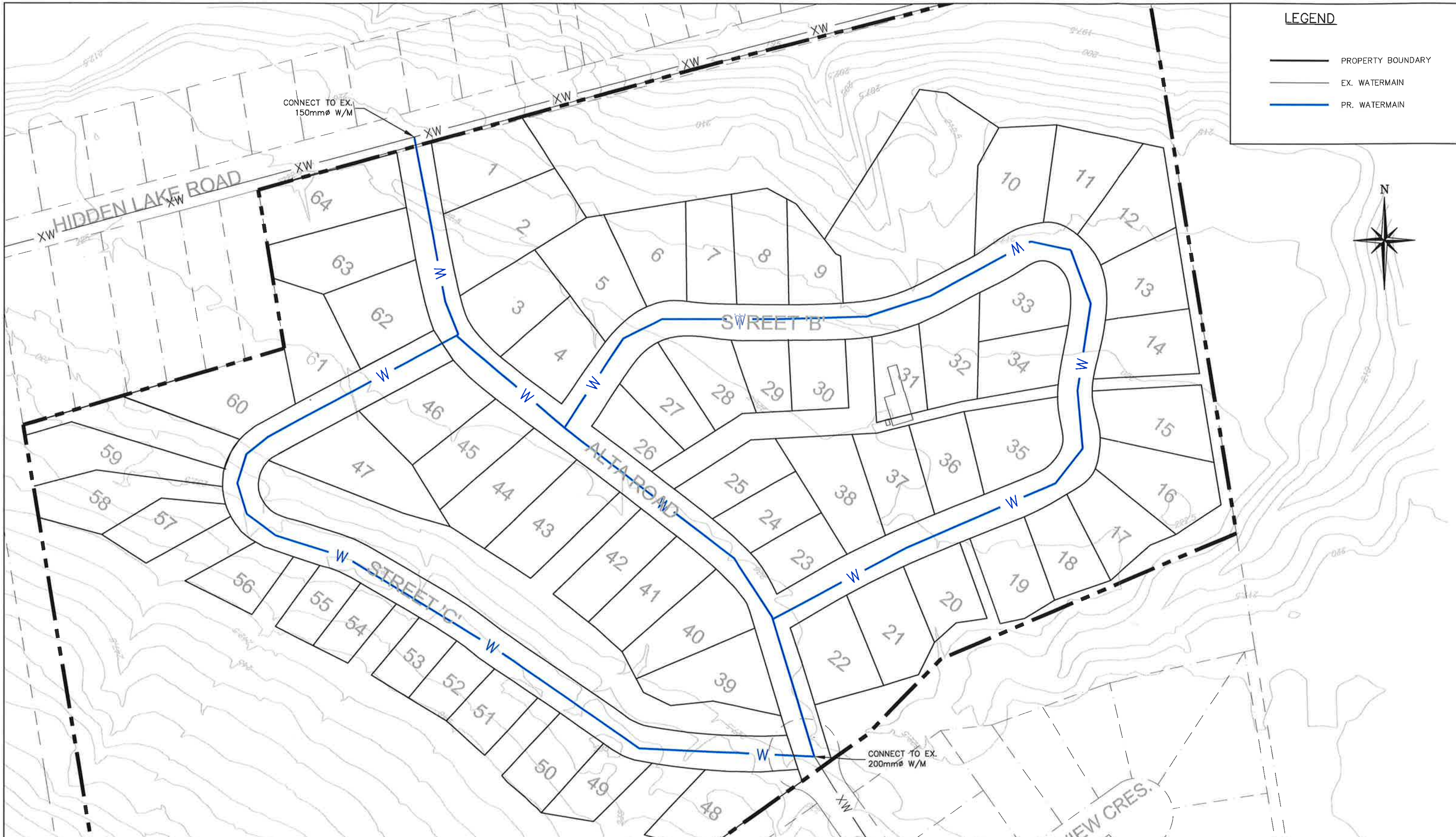
Drawing: J:\119 - TABERA LTD\2528\CAD\2528_203-207, 209-210.DWG, Layout Tab 210

NOTE: 2.5m CONTOURS GENERATED FROM ARIAL SURVEY.

Project	ALTA SUBDIVISION PHASE II TOWN OF THE BLUE MOUNTAINS
Drawing	PRELIMINARY INTERNAL SANITARY DRAINAGE PLAN

CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT ENGINEERS
110 PINE STREET COLLINGWOOD ON L9Y 2N9
T. 705-446-3510 F. 705-446-3520 CFCROZIER.CA

Drawn By J.R.S. & R.C.G.	Check By K.G.S.	Project No.	119-2528-210
Scale 1:2000	Date 01/25/2008	Drawing No.	FIG. 12



File Last Updated: Tue, 29 Jan 2008

Drawing: J:\119 - TABERA LTD\2528\CAD\2528_203-207, 209-210.DWG, Layout Tab:209

NOTE: 2.5m CONTOURS GENERATED FROM ARIAL SURVEY.

Project: ALTA SUBDIVISION PHASE II TOWN OF THE BLUE MOUNTAINS		CF CROZIER & ASSOCIATES INC LAND DEVELOPMENT ENGINEERS 110 PINE STREET COLLINGWOOD ON L9Y 2N9 T. 705-446-3510 F. 705-446-3520 CFCROZIER.CA	
Drawing: PRELIMINARY WATER DISTRIBUTION PLAN	Drawn By: J.R.S. & R.C.G.	Check By: K.G.S.	Project No. 119-2528-209
	Scale: 1:2000	Date: 01/25/2008	Drawing No. FIG. 13