APPENDIX 1

ARCHAEOLOGICAL ASSESSMENT

Stage 1 Archaeological Assessment
Kincardine Business Park Servicing Master Plan
Lots 1, 2, 3, and 4, Concession 1 SDR
Geographic Township of Kincardine
Now the Municipality of Kincardine
County of Bruce

Submitted to

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Executive Summary

The Municipality of Kincardine is undertaking a Servicing Master Plan for the Kincardine Business Park, a 77.3 ha property located immediately east of the Town of Kincardine. The Servicing Master Plan study area encompasses a rectangular-shaped parcel of land situated in the southeast corner of the intersection of Highway 21 and Highway 9 (Durham Road; Broadway Street), comprising Lots 1, 2, 3 and 4 of Concession 1 South of the Durham Road in the Geographic Township of Kincardine, Bruce County, Ontario. The study area includes agricultural lands, residential and farm lots and natural areas, in addition to a developed commercial block along Highway 21. Timmins Martelle Heritage Consultants Inc. was contracted to carry out a Stage 1 archaeological assessment for the Servicing Plan Study Area by B.M Ross & Associates who are coordinating the study on behalf of the Municipality of Kincardine. The intent of the Master Plan is to identify infrastructure requirements (roads, water, sanitary sewage and stormwater) for the continued development of the business park. The Stage 1 assessment was undertaken as part of the larger planning study but also as a precursor to more specific Environmental Assessment requirements. All work was done in accordance with the *Standards and Guidelines for Consultant Archaeologists* (MTC 2011).

The Stage 1 background study included a review of soils, physiography and drainage for the area, former and current land use, as well as registered archaeological sites and past archaeological activity within the immediate vicinity. According to the map-based review, the study area contains or is in proximity to features signalling archaeological potential, namely: 1) watercourses (active and seasonal); 2) 19th century thoroughfares and colonization roads (Hwy. 21 - Goderich Road and Hwy. 9 - Durham Road); 3) the 19th century settled town core of Kincardine; and 4) registered and known archaeological sites. Therefore, based on a mapping review, some portions of the study area have potential for either First Peoples or EuroCanadian sites (63.9% have been unassessed; 21.47% previously assessed; of the unassessed lands - 13.84% treed, 50.06% agricultural land). Nonetheless, some lands within the study area have also witnessed significant prior disturbance (11.38%) and do not retain archaeological potential. Most notable in this regard are the commercial complexes and rights-of-way. More isolated disturbances are present within the residential/farm lots (where buildings and laneways are present). However, due to restrictions on property access, a formal property inspection could not be undertaken to visually confirm extent of disturbance. Other areas within the property are also of low potential, namely the watercourse (2.85%) and its sloped valley lands (0.39%).

Two parcels within the study area have been previously assessed: 1) a Millennium Way northern extension (TMHC 2006; constructed); and 2) a portion of a proposed residential development off Highway 9 (AMICK 2005; further work necessary). One 19th century archaeological site found during the latter study (BbHj-37) requires Stage 3 assessment. Based on the information compiled in the background study, the following recommendations are made:

1) The previously assessed lands in the 2006 TMHC survey of the Millennium Way road extension are of no further archaeological concern and no additional assessment is recommended.

2) Registered site BbHj-37, recorded by AMICK during a 2005 partial survey of a proposed development property within the study area, requires Stage 3 testing to current MTCS standards. Based on the information provided in the consultant report for this project, the

site would be classified as a post-contact site of cultural heritage value or interest. The proposed excavation strategy should follow that defined for small post-contact sites of established cultural heritage value or interest (MTCS 2011; Table 3.1. Standards 3 and 4), with initial test units placed at 10 metre intervals across the surface scatter and an additional 40% of units placed in areas of interest. As the Stage 2 reporting indicated a maximum site size of roughly 60 by 60 metres, methodological provisions for Stage 3 testing of large sites (MTCS 2011; Section 3.31, Subsection 3.3.1 Standard 1) might also be applicable. Until Stage 3 testing is undertaken, all lands within 70 metres of the Stage 2 site limits have further archaeological concern and are protected from land alterations (other than typical agricultural cultivation) by the provisions of the *Ontario Heritage Act* which prohibit any ground disturbance within a registered archaeological site.

3) The remaining lands surveyed by AMICK in 2005 require no further archaeological assessment.

4) All former and active agricultural lands within the study area that were not previously surveyed demonstrate potential for the discovery of archaeological resources. Based on provincial standards these require ploughing and a pedestrian or “walk-over” survey at a five metre interval. Ploughed surfaces must be well-weathered by heavy rainfall and the ploughed surface must be clean of vegetation resulting in at least 80% surface visibility.

5) The low-lying, wet and steeply sloped lands associated with the tributary of the Penetangore River are considered to have low archaeological potential and do not require further assessment. However, given that a formal field inspection could not be undertaken, the precise limits of the these could not be mapped and therefore a detailed field inspection will minimally be required prior to any future servicing work taking place in these areas.

6) The previously disturbed lands within the commercial zones and residential/farm lots do not retain potential to house intact archaeological resources and therefore no further work is recommended in these areas. However, given that a formal field inspection could not be undertaken, the precise limits of these could not be mapped and therefore a detailed field inspection will minimally be required prior to any future servicing work taking place in these areas.

7) The treed lands associated with the Penetangore River tributary and the grassed areas within the residential/farm lots and commercial zone have potential for the discovery of archaeological resources. Based on provincial standards, these lands must be subject to a test pit survey at a five metre interval. Where test pitting is conducted each test pit should measure approximately 30 cm (shovel-width) in diameter and be excavated into the first five centimetres of subsoil. The soil from each test pit should be passed through 6 mm hardware cloth in an effort to retain any artifacts that might be present. When the screening process is completed, the soil strata should be examined and the pits filled in as best as possible and re-capped with sod.

These recommendations are subject to report review and acceptance by the Ministry of Tourism, Culture and Sport.

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Project Personnel

TMHC would like to thank the following staff members who contributed to this project:

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Acknowledgements

TMHC would like to acknowledge the assistance of the following individuals:

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Kelly Vader	*Environmental Planner* B.M. Ross and Associates Limited, Goderich
Robert von Bitter	*Archaeological Data Coordinator* Ministry of Tourism, Culture and Sport, Toronto

Stage 1 Archaeological Assessment
Kincardine Business Park – Servicing Master Plan
Lots 1, 2, 3, and 4, Concession 1 SDR
Geographic Township of Kincardine
Now the Municipality of the Kincardine
County of Bruce

1.0 PROJECT CONTEXT

1.1 Development Context

1.1.1 Introduction

The Municipality of Kincardine is undertaking a Servicing Master Plan for the Kincardine Business Park, a 77.3 ha property located immediately east of the Town of Kincardine. The Servicing Master Plan study area encompasses a rectangular-shaped parcel of land situated in the southeast corner of the intersection of Highway 21 and Highway 9 (Durham Road; Broadway Street), comprising Lots 1, 2, 3 and 4 of Concession 1 South of the Durham Road, in the Geographic Township of Kincardine, Bruce County, Ontario. The study area includes agricultural lands, residential and farm lots and natural areas, in addition to a developed commercial block along Highway 21. Timmins Martelle Heritage Consultants Inc. was contracted to carry out a Stage 1 archaeological assessment for the Servicing Plan Study Area by B.M Ross & Associates who are coordinating the study on behalf of the Municipality of Kincardine. The intent of the Master Plan is to identify infrastructure requirements (roads, water, sanitary sewage and stormwater) for the continued development of the business park. The Stage 1 assessment was undertaken as part of the larger planning study but also as a precursor to more specific Environmental Assessment requirements. All work was done in accordance with the *Standards and Guidelines for Consultant Archaeologists* (MTC 2011).

All archaeological assessment activities were performed under the professional archaeological license of Tara Jenkins, M.A. (P357) and in accordance with the 2011 *Standards and Guidelines for Consultant Archaeologists* (MTC 2011). Permission to commence the study was given by Lisa J. Courtney, of B.M. Ross & Associates Ltd., agent for the Municipality of Kincardine. No property access was given and no formal property inspection was undertaken as this study is being carried out for planning purposes only.

1.1.2 Purpose and Legislative Context

The *Ontario Heritage Act* makes provisions for the protection and conservation of heritage resources in the Province of Ontario. Heritage concerns are recognized as a matter of provincial interest in Section 2.6.2 of the *Provincial Policy Statement* which stipulates that municipalities shall have regard for the conservation of features of significant architectural, cultural, historical, archaeological or scientific interest. The purpose of a Stage 1 background study is to determine if there is potential for cultural resources to be found on a property for which a change in land use is pending. It is used to determine the need for a Stage 2 field assessment involving the search for archaeological sites. In accordance with *Provincial Policy Statement* 2.6, if significant sites are found, a strategy (usually avoidance, preservation or excavation) must be put forth for their mitigation.

The Servicing Master Plan is being undertaken as a planning precursor to future environmental assessment work for specific servicing elements within the Kincardine Business Park. As such, it is intended to act as an environmental screening tool and help satisfy future requirements under the *Environmental Assessment Act*. The latter provides for the protection and conservation of the “environment,” widely defined to cover “cultural heritage” resources. Section 5(3)(c) of the *Act* stipulates that heritage resources to be affected by a proposed undertaking be identified during the environmental screening process. Within the context of an environmental assessment, the purpose of a Stage 1 background study is to determine if identify any negative impacts to known or potential archaeological resources.

2.0 STAGE 1 BACKGROUND REVIEW

2.1 Research Methods and Sources

A Stage 1 background study and property inspection was conducted to gather information about known and potential archaeological resources within the study area. According to the Province of Ontario’s 2011 *Standards and Guidelines for Consultant Archaeologists*, a Stage 1 background study must include a review of:

- an up-to-date listing of sites from the Ontario Archaeological Sites Database (OASD) of archaeological sites with 1 km of the property;
- reports of previous archaeological fieldwork within a radius of 50 metres;
- topographic maps at 1:10,000 (recent and historical) or the most detailed scale available;
- historic settlement maps (e.g., historical atlas, surveys)
- archaeological management plans or other archaeological potential mapping (when available); and
- commemorative plaques or monuments on or near the property.

For this project, the following activities were carried out to satisfy or exceed the above requirements:

- a database search was filed with Robert von Bitter of the Ministry of Tourism, Culture and Sport requesting a listing of registered archaeological sites within 1 km of the study area (received Sept. 6, 2013);
- a review of known prior archaeological reports for the property and adjacent lands was undertaken (note: the Ministry of Tourism, Culture and Sport currently does not keep a publicly accessible record of archaeological assessments carried out in the Province of Ontario, so a complete inventory of prior assessment work nearby is not available);
- Ontario Base Mapping (1:10,000) was considered through ArcGIS and mapping layers provided by geographynetwork.ca; detailed mapping providing by the client was also examined, and;
- a review of public consultation documents was undertaken.

Additional sources of information were also consulted, including modern aerial photographs, local history accounts, soils and physiography data provided by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), and both 1:50,000 (Natural Resources Canada) and finer scale topographic mapping.

As access to privately-owned lands within the study area could not be provided, a formal property inspection could not be undertaken. The report recommendations reflect this fact.

When compiled, background information was used to create a summary of the characteristics of the study area, in an effort to evaluate its archaeological potential. The Province of Ontario (MTC 2011 – Section 1.3.1) has defined the criteria that identify archaeological potential as:

- previously identified archaeological sites
- water sources
    - primary water sources (lakes, rivers, streams, creeks)
    - secondary water courses (intermittent streams and creeks, springs, marshes, swamps)
    - features indicating past water sources (e.g., glacial lake shorelines indicated by the presence of raised sand or gravel beach ridges, relic river or stream channels indicated by clear dip or swale in topography, shorelines of drained lakes or marshes, cobble beaches)
    - accessible or inaccessible shoreline (e.g., high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh)
- elevated topography (e.g., eskers, drumlins, large knolls, plateaux)
- pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground

- distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases; there may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings
- resource areas, including:
    - food or medicinal plants (e.g., migratory routes, spawning areas, prairie)
    - scarce raw materials (e.g., quartz, copper, ochre or outcrops of chert)
    - early Euro-Canadian industry (e.g., fur trade, logging, prospecting, mining)
- areas of early Euro-Canadian settlement. These include places of early military or pioneer settlement (e.g., pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches and early cemeteries. There may be commemorative markers of their history, such as local, provincial, or federal monuments or heritage parks.
- early historical transportation routes (e.g., trails, passes, roads, railways, portage routes)
- property listed on a municipal register or designated under the *Ontario Heritage Act* or that is a federal, provincial, or municipal historic landmark or site; and
- property that local histories or informants have identified with possible archaeological sites, historical events, activities or occupations.

In Southern Ontario (south of the Canadian Shield), any lands within 300 metres of any of the features listed above are considered to have potential for the discovery of archaeological resources.

Typically, a Stage 1 assessment will determine potential for precontact First Peoples' and historic era sites independently. This is due to the fact that lifeways varied considerably during these eras so that criteria used to evaluate potential for each type of site also varies.

It should be noted that some factors can also negate the potential for discovery of intact archaeological deposits. Subsection 1.3.2 of the 2011 *Standards and Guidelines for Consultant Archaeologists* indicates that archaeological potential can be removed in instances where land has been subject to extensive and deep land alterations that have severely damaged the integrity of any archaeological resources. Major disturbances indicating removal of archaeological potential include, but are not limited to:

- quarrying
- major landscaping involving grading below topsoil
- building footprints; and
- sewage and infrastructure development.

Some activities (agricultural cultivation, surface landscaping, installation of gravel trails, etc.) may result in minor alterations to the surface topsoil but do not necessarily affect or remove archaeological potential. It is not uncommon for archaeological sites, including structural foundations, subsurface features and burials, to be found intact beneath major surface features like roadways and parking lots. Archaeological potential is, therefore, not removed in cases where there is a chance of deeply buried deposits, as in a developed or urban context or floodplain where modern features or alluvial soils can effectively cap and preserve archaeological resources.

2.2 Project Context: Archaeological Context

2.2.1 Study Area: Overview and Physical Setting

The Kincardine Business Park Servicing Master Plan study area occupies the southeast corner of the intersection of Highway 9 (Durham Road) and Highway 21 near the east edge of the Town of Kincardine (Maps 1 to 3). The study area is a roughly 77.3 hectare rectangular parcel that comprises Lots 1, 2, 3, and 4, Concession 1 South of the Durham Road, in the Geographic Township of Kincardine, Bruce County, Ontario, now in the Municipality of Kincardine. The majority of the study area is undeveloped vacant and agricultural lands. However, it also includes developed commercial parcels along Highway 21 and three residential/farm lots along Highway 9. Finally, the southernmost portion of the study area also contains the treed valley lands of a tributary of the Penetangore River.

The study area falls within the Huron Slope physiographic region (Chapman and Putnam 1966:263) (Map 4). The Huron Slope covers an area of 1000 square miles of gently sloping land from Algonquin shore cliff to the Wyoming moraine along the eastern shore of Lake Huron. The upper till sheet is formed from brown calcareous clay and lies 1m-3m deep over stratified clay of the same colour (Chapman and Putnam 1966:264). The clay found within the upper till sheet is reworked lacustrine material from the underlying clay beds. These features stand in contrast to the sandy beach, plains and dune topography of the Huron Fringe that rests to the west, between Hwy 21 and Lake Huron. The underlying bedrock of the Norfolk formation and consists of fine grained limestone, magnesium limestone and dolomite bedrock (Hoffman and Richards 1954:14). The overall topography of the Huron Slope is smooth and gently rolling. The study area rests within bevelled till plains (Map 4). A shoreline of glacial Lake Algonquin is present within the sand plain east of Highway 21, at a distance of roughly 1.5 km from the study area.

The predominant soil type within the study area is Perth Clay Loam (Map 5), an imperfectly draining soil developed on calcareous fine textured till and associated with soft maple and elm tree cover (Hoffman and Richards 1954:49). Perth clay loam covers a significant portion of Bruce County. Within the study area, Brookston Clay Loam is present within the pathways of active and intermittent tributaries of the Penetangore River. The latter soil is poorly draining, associated with elm, ash and cedar tree cover and derived from clay till intermixed with lacustrine materials (Hoffman and Richards 1954:49).

The Penetangore River drains the Kincardine area and lands to the east. The study area rests between two main branches of the river (which merge at a point roughly 1.3 km to the west), the more northerly being the North Penetangore River. Kincardine Creek feeds into the North Penetangore River roughly 500 metres north of the study area. A lesser but active tributary of the river crosses through the southern portion of the study area, with other feeding branches present within 300 metres of it (Map 6). Swales and ditches associated with seasonal and intermittent tributaries of the river cross the central portion of the study area, which also includes at least one drainage ditch.

2.2.2 Summary of Registered or Known Archaeological Sites

An inquiry to the Ontario Archaeological Sites Database (OASD) (received September 5, 2013) indicated that there is one archaeological site within one kilometre of the study area and, in fact, falls within it. This is the Clements Site (BbHj-37), an historic-era homestead reported by AMICK consultants in 2005 (see discussion in Section 2.2.3 below).

2.2.3 Summary of Past Archaeological Investigations Within 50 Metres

During our background review it was established that at least two previous archaeological projects had taken place within 50 metres of the study area. Both of these studies were undertaken on lands within the Servicing Master Plan Study Area. As the Province does not currently maintain an accessible database of archaeological assessment areas *per se*, it is not known whether this is a complete inventory of archaeological assessment activities undertaken within 50 metres of the study area.

AMICK Consultants – Proposed Residential Subdivision – Stewart Property (41T-2005-02.22) (PIF: P038-143; Licensee Marilyn Cornies, P038)(AMICK 2005)

In 2005, a partial Stage 1 and 2 archaeological assessment was conducted by AMICK Consultants Limited for a proposed residential property comprising part of Lots 2 and 3, Concession 1 SDR. The proposed development area occupies the majority of the easterly two thirds of the current study area but excludes the residential/farm lots along Highway 9. Only a portion of the 2005 subject property could be surveyed at that time due to crop conditions, that being a field in the central-east portion of the current study area, encompassing lands extending south of Durham Road to the valley lands of the Penetangore River tributary. The Stage 1 background study indicated the property had potential for the discovery of archaeological resources. A Stage 2 pedestrian survey of a portion of the property resulted in the discovery of one historic-era site (1840-1860) and one isolated find spot (a waste flake). Two reports were prepared for this project: a) an interim report written in 2005; and b) a revised report submitted in 2010. The initial report is entitled *Interim Report on the 2005 Stage 1-2 Archaeological Assessment of the Proposed Stewart Property (41T-2005-02.22), Part of Lots 2 & 3, Concession 17[sic], Town of Kincardine, County of Bruce* (PIF P038-143). The revised report is entitled: *Revised Report on the 2005 Stage 1-2 Archaeological Assessment of the Proposed Stewart Property (41T-2005-02.22) Part of Lots 2 & 3, Concession 1 SDR, Town of Kincardine, County of Bruce* (PIF P038-143). A copy of the first report was obtained by B.M. Ross from the landowner/municipality, whereas the Ministry of Tourism, Culture and Sport provided a copy of the revised report of 2010.

In interpreting the results of this study and the assessment map provided in the 2010 report, the following archaeological activities are required to clear the entire 2005 project area of archaeological concern:

a) Stage 3 assessment of the ca. 1840-1860 historic site found on the property, namely the Clements Site (BbHj-37); Stage 4 mitigation may also be required pending the results of the Stage 3 assessment;

b) The assessment (through test pitting or visual inspection and photo-documentation) of the valley lands associated with the tributary of the Penetangore River; if additional archaeological sites are identified during this assessment follow up assessment work may be required; and

c) The assessment (through pedestrian survey) of those agricultural lands not available for study in 2005 and comprising the western portion of the 2005 subject property and central portion of the current study area; if additional archaeological sites are identified during this assessment follow up assessment work may be required.

The isolated waste flake also recorded during the 2005 Stage 2 survey was not recommended for further assessment. The Clements Site is described as a scatter of 61 points representing 108 artifacts covering roughly 60 by 60 metres.

Due to copyright restrictions, the survey map from the 2005 assessment is not included in this report. However, Map 8 does show the area subject to previous survey and SD-1 in the Supplementary Documentation portion of this report also shows the location of the archaeological find spots.

Timmins Martelle Heritage Consultants Inc. – Millennium Way Extension (PIF: P064-114-2006; Licensee Holly Martelle, P064) (TMHC 2006)

The following year, Timmins Martelle Heritage Consultants Inc. (TMHC) undertook a Stage 1 and 2 archaeological assessment for a 250 long by 30 metre wide extension of Millennium Way, a road that services the Kincardine Business Park. The Stage 1 assessment established that the project area had potential for the discovery of archaeological resources and the Stage 2 test pit survey (5 m interval) did not result in the discovery of artifacts. The 2006 survey segment falls within Lot 1, Concession 1 SDR, in the northwest portion of the current study area. The results of this assessment were present in a report entitled *Stage 1 & 2 Archaeological Assessment, Class EA, Millennium Way Extension, Municipality of Kincardine, Bruce County, Ontario* (PIF P064-114-2006; Holly Martelle licensee, P064). Map 9 shows the location of the 2006 survey area.

2.3 Project Context: Historical Context

2.3.1 Pre- and Early Post-Contact First Peoples Settlement in Southern Ontario

Through the integration of region-specific archaeological information and data from province-wide models, a baseline cultural chronology for pre-contact First Peoples settlement can be proposed as generalized below and in Table 1.

There is archaeological evidence in Southern Ontario of past native settlement from at least as early as 12,000 years to pre-Confederation times. The wildlife, physical and natural resources of the area are still of great concern to local native groups who continue to hunt, trap and fish.

Paleoindian

The first human populations to inhabit the area came to the region between 12,000 and 10,000 years ago, coincident with the end of the last period of glaciation. Climate and environmental conditions were significantly different then they are today; local environs would not have been welcoming to anything but short-term settlement. Termed Paleoindians by archaeologists, Ontario's first peoples would have crossed the landscape in small groups (i.e., bands or family units) searching for food, particularly migratory game species. In this area, caribou may have provided the staple of Paleoindian diet, supplemented by wild plants, small game and fish.

Given the low density of populations on the landscape at this time and their mobile nature, Paleoindian sites are small and ephemeral. They are usually identified by the presence of fluted projectile points often manufactured on a highly distinctive whitish-grey chert named "Fossil Hill" (after the formation) or "Collingwood," from the Niagara Escarpment west of Collingwood. In Ontario, Paleoindian sites are often found in association with former glacial shorelines, beaches and embayments. Although there are no documented Paleoindian sites in the immediate vicinity of the study area, Paleoindian occupations and find spots have been recorded elsewhere in Bruce and Huron counties, some as a result of ongoing cultural resource management projects being carried out under the *Green Energy Act.* These finds have typically been associated with former glacial shorelines.

Table 1: Generalized Cultural Chronology of First Peoples Settlement in Bruce County

Period			Time Range (circa)	Diagnostic Features	Complexes
Paleoindian	Early		9000 - 8400 B.C.	fluted projectile points	Gainey, Barnes, Crowfield
	Late		8400 - 8000 B.C.	non-fluted and lanceolate points	Holcombe, Hi-Lo, Lanceolate
Archaic	Early		8000 - 6000 B.C.	serrated, notched, bifurcate base points	Nettling, Bifurcate Base Horizon
	Middle		6000 - 2500 B.C.	stemmed, side & corner notched points	Brewerton, Otter Creek, Stanly/Neville
	Late		2000 - 1800 B.C.	narrow points	Lamoka
			1800 - 1500 B.C.	broad points	Genesee, Adder Orchard, Perkiomen
			1500 - 1100 B.C.	small points	Crawford Knoll
	Terminal		1100 - 950 B.C.	first true cemeteries	Hind
Woodland	Early		950 - 400 B.C.	expanding stemmed points, Vinette pottery	Meadowood
	Middle		400 B.C. - A.D. 500	dentate, pseudo-scallop pottery	Saugeen
	Transitional		A.D. 500 - 900	first corn, cord-wrapped stick pottery	Princess Point
	Late	Early Iroquoian	A.D. 900 - 1300	first villages, corn horticulture, longhouses	Glen Meyer
		Middle Iroquoian	A.D. 1300 - 1400	large villages and houses	Uren, Middleport
		Late Iroquoian	A.D. 1400 - 1650	tribal emergence, territoriality	Odawa
Contact		Aboriginal	A.D. 1700 - 1875	treaties, mixture of Native & European items	Ojibway, Odawa populations
		Euro-Canadian	A.D. 1796 - present	English goods, homesteads	European settlement, pioneer life

Archaic

Settlement and subsistence patterns change significantly during the Archaic period as both the landscape and ecosystem adjusted to the retreat of the glaciers. Building on earlier patterns, early Archaic populations continued the mobile lifestyle of their predecessors. Through time and with the development of more resource rich local environments, these groups gradually reduced the size of the territories they exploited on a regular basis. A seasonal pattern of warm season riverine or lakeshore settlements and interior cold weather occupations has been documented in the archaeological record. Since the large cold weather mammal species that formed the basis of the Paleoindian subsistence pattern became extinct or moved northward with the onset of warmer climate conditions Archaic populations had a more varied diet, exploiting a range of plant, bird, mammal and fish species. Reliance on specific food resources like fish, deer and nuts becomes more pronounced through time and the presence of more hospitable environments and resource abundance led to the expansion of band and family sizes. In the archaeological record, this is evident in the presence of larger sites and aggregation camps, where several families or bands would come together in times of plenty. The change to more preferable environmental circumstances led to a rise in population density. As a result, Archaic sites are more abundant than those from the earlier period.

Artifacts typical of these occupations include a variety of stemmed and notched projectile points, chipped stone scrapers, ground stone tools (e.g., celts, adzes) and ornaments (e.g., bannerstones, gorgets), bifaces or tool blanks, animal bone (where and when preserved) and waste flakes, a byproduct of the tool making process.

Early, Middle and Transitional Woodland Periods

Significant changes in cultural and environmental patterns are witnessed in the Early, Middle and Transitional Woodland periods (ca. 950 B.C. to 1000 A.D.). Occupations became increasingly more permanent in this period, culminating in major semi-permanent villages by roughly 1,000 years ago. Archaeologically, the most significant changes by Woodland peoples are the appearance of artifacts manufactured from modeled clay and the emergence of more sedentary villages. The earliest pottery was crudely made by the coiling method and early house structures were simple oval enclosures. The Early and Middle Woodland periods are also characterized by extensive trade in raw materials, objects and finished tools, with sites in Ontario containing trade items with origins in the Mississippi and Ohio River valleys. A rise in mortuary ceremonialism is also evident, culminating in the construction of large burial mounds.

Late Woodland Period

Beginning circa 1000 A.D. the archaeological record in Southern Ontario documents the emergence of more substantial, semi-permanent settlements and the adoption of corn horticulture. These developments are most often associated with Iroquoian-speaking populations, the ancestors of the Wendat (Huron), Petun (Tobacco Nation) and Attawandaron (Neutral) nations who were known to have resided in the province upon the arrival of the first European explorers and missionaries. Iroquoian villages incorporated a number of longhouses, multi-family dwellings that contained several families related through the female line. Pre-contact Iroquoian sites may be identified by a predominance of well-made pottery decorated with various simple and geometric motifs, triangular projectile points, clay pipes and ground stone artifacts. Sites post-dating European contact are recognized through the appearance of various items of European manufacture. The latter include materials acquired by trade (e.g. glass beads, copper/brass kettles, iron axes, knives and other metal implements) in addition to the personal items of European visitors and Jesuit missionaries (e.g. finger rings, stoneware, rosaries, and glassware).

Algonquian Populations

At the time of European contact in the early 17th century the Bruce peninsula was occupied by Algonkian speaking groups (Odawa, Potawatomi, Ojibwa) who maintained a close relationship with the Iroquoian speaking Petun peoples living along the southern end of Georgian Bay (Fox 1990:461). Like other First Peoples in the area, these groups were dispersed in the mid-17th century as a result of the conflict between the Five Nations

Iroquois and the Huron-Petun. Many moved along the Lake Huron shoreline into Huron County, with others settling in the peninsula proper.

2.3.2 Historic Era of First Peoples Settlement

At the time of European contact in the early 17th century, the Bruce Peninsula was occupied by Algonquin speaking Odawa groups who maintained a close relationship with the Iroquoian speaking Petun peoples living along the southern shore of Nottawasaga Bay (Fox 1990:461). The Ojibwa (a.k.a. the "Chippewa", who called themselves "Anishnabe"), who are also Algonquian speakers, lived in the region extending from the Georgian Bay area to the north shore of Lake Superior prior to European contact (Schmalz 1977). Both the Odawa and Ojibwa were disrupted and displaced by Iroquois hostilities in the 1650s (Schmalz 1977), but regrouped by the last quarter of the 17th century (Ferris 1989) and returned to their homeland. The 1690s witnessed significant battles between the Iroquois and Anishnabe Three Fires Confederacy (Ottawa, Ojibway, Pottawatomi), with the result being that Ojibway groups took control over Bruce County lands (Wilson McArthur 2005:49) and held them until the negotiation of Crown transfers a century later. S

The (Saugeen) Ojibwa surrendered portions of Grey and Wellington Counties in 1818 (McMullen 1997:28). This was done with the understanding that they would have continued use of Bruce County and that they would receive annuities for the lands surrendered. Further land was surrendered in the area with the establishment of the Huron Tract in 1825, later to be followed by the surrender of Bruce County in 1836 (Lee 2004:21). The surrender of Bruce County did not include the Bruce Peninsula, known as the Saugeen Peninsula by the resident Ojibwa. The Neyaashiinigmiing Indian Reserve Number 27 on the southeast side of the Bruce Peninsula (Nawash Ojibwa) and the Saugeen Indian Reserve Number 29 above Southampton (Saugeen Ojibwa) were established in 1854 (Chippewas of Nawash 2010).

Furthermore, Schmalz (1977:1) indicates that a group of Ojibwa (including Mississauga, Potawatomi, Ottawa and Caughnawaga) settled in the Saugeen Township. The Chippewas of Saugeen First Nation and the Chippewas of Nawash First Nation share the same traditional territories in southwestern Ontario. They were a part of the ancient Three Fires Confederacy of Ojibwa, Odawa, and Pottawatomi. Throughout the eighteenth century the Saugeen Territory was inhabited by several generations of Ojibwa whose immediate territory was threatened neither by war nor by European settlers.

What was to become Kincardine Township formed part of a parcel of land that was subject to a surrender by the Ojibwa to the Crown in 1836 called the Treaty of Manitowaning (Lee 2004:21). The land surrendered accounted for 607,000ha (Schmalz 1977:233). The Treaty formalized the surrender of the County of Bruce which included the townships of Saugeen, Arran, Bruce, Elderslie, Kincardine, Greenock, Brant, Huron, Kinloss, Culross, and Carrick (Robertson 1906). The Treaty was concluded by Sir

Francis Bond Head at Manitowaning on August 9, 1836. Shortly thereafter, the townships were surveyed for municipal settlement.

Historic native occupation of the region is poorly documented archaeologically. Many historic native sites were short-term occupied resource exploitation camps that left behind few archaeological remains, making them difficult to find. Later native sites of the 18th and 19th centuries may be difficult to recognize because their material culture assemblages are very similar to the more prevalent and better documented Euro-Canadian sites of the same time. Further, typical Euro-Canadian histories generally included little information on First Peoples groups, their land use or site locations during the 19th century municipal settlement period. Thus, information regarding the locales of historic-era native settlements is limited and difficult to collect through traditional historical sources. Additionally, the information bias is particularly strong for the northern reaches of southern Ontario, within the traditional territory of the Saugeen-Nawash Ojibwa Nation and the Saugeen Métis Nation. In an effort to overcome some of this bias, more detailed historical background research was carried out in an effort to consult information sources that might better highlight historic-era native land use. In the past, land surveyor's field notes have proved useful in highlighting the location of 19th century land use sites. The following is a brief summary of the early surveys conducted in Kincardine townships and the details provided in the surveyors' notes.

The Township of Kincardine was surveyed by James W. Bridgland in 1850 whose notes make no reference to aboriginal presence in the area. Bridgland did, however, provide a thorough account of his survey which is accompanied by detailed mapping of conditions and state of improvements (e.g., cleared lands, structures) within the township at that time. Improvements are scattered along the Lake Range of the township from north to south with concentrations in the town site of Penetangor (now Kincardine) and in the western portion of the township along Concession Roads 1 and 2, south of the Durham Road and Concession Road 2 and 3, north of the road (Bridgland 1850). Survey mapping shows little improvement along the Durham Road which is notable given the fact that it served as an early colonization route.

In summary, while the early surveyor's field notes do not specifically note any First Peoples' or other occupation within the study area, there is potential for historic-era settlements to exist.

2.3.3 Historic Métis

The Historic Saugeen Métis are descendants of the Métis who traded at Saugeen (see Wilson McArthur 2005). Pierre Piché was considered this first Métis in the area, trading in about 1816. The Ojibwa invited Piché to share the resources within the Saugeen territory, but also required him to "share" in the protection of these same resources and the environment for mutual benefit. The Historic Saugeen Métis are descended from unions between European traders and native women. The Lake Huron watershed Métis lived, fished, hunted, trapped and harvested the lands and waters of the Bruce Peninsula, the Lake Huron proper shoreline and its watershed (Saugeen Métis 2013). These are considered the traditional Métis territory.

2.3.4 Historic Euro-Canadian and Municipal Settlement

The study area comprises Lots 1, 2, 3, and 4, Concession 1 South of the Durham Road (SDR) in the Geographic Township of Kincardine, Bruce County, Ontario. A brief discussion of early municipal settlement is provided below, along with a summary of historic land use. This will provide a general context for identifying features of archaeological potential.

Prior to the formation of Bruce County, this region was part of the "Queen's Bush," an extensive tract of land surrendered by local Ojibwa populations to the British through the Treaty of Manitowaning in 1836 (Robertson 1906:11). Some accounts suggest that the first Europeans to traverse through Bruce County were French explorer Samuel de Champlain and Jesuit missionaries who traveled here in the 17th century. It is reported that the first Euro-Canadian settlers to establish homes in Bruce County were William Withers and Allan Cameron (Robertson 1906:429). In the spring of 1848 these pioneers settled at the mouth of Penetangore River located in present day Kincardine.

The census of 1851 reported that there were no more than 499 families living in Bruce County, many of whom lived in temporary shanties. These shanties were typical dwellings for early settlers while their land was cleared, and were often a stipulation of the land grant process. The population of the county grew quickly into the 1860s, which was facilitated by the construction of a series of stone roads that provided access between the various settlements within the County.

Early on, the focal point for both residence and industry was the Lake Huron shoreline. The mouth of the Penetangore River was an attractive locale for docking and shipping. Its readiness for access by water gave Kincardine Township the earliest and largest pioneer settlement in the county. For the first 10 years after its formation Kincardine was the leading township in Bruce County. Unlike the other Bruce County townships Kincardine Township was surveyed in three sections at different times (Robertson 1906:429). The first survey in 1848 was the town plot that was formally dubbed "Penetangor." This name was later changed to Kincardine when it was incorporated in 1858. The second survey was the 1848-49 Durham Road Survey by A.P Borough, PLS (Robertson 1906:429).

Historic Durham Road (now Hwy 9) forms the northern boundary of the study area. The 1848-1849 Durham Road was planned as a model for "colonized roads" of the mid-nineteenth century (Kincardine News 1969). The construction of the road would make a major contribution to the development of Grey and Bruce Counties by opening up the interior lands for habitation. The original Durham Road survey laid out the road and three concessions on either side of it, with the creation of 50 acre lots which could be granted free to settlers; other lands were withheld for sale and purchase at a later date (Kincardine News 1969). Once the road was surveyed, the lots alongside it were some of the first to be offered for sale; these were occupied quickly and generally by 1850 (Roberston 1906:429) (H. Belden & Co 1880). John Dingman and Major William Daniel were the first settlers on the Durham Road. Also in 1849 "free grant' lots were made to many settlers on the south side of the Durham Road, with grantees including George Ryckman, Samuel Taylor, William Fanning, Robert Stewart, and John Sellery. Many families who settled along the Durham Road were Highland Scotch by birth or descent (Roberston 1906).

The 1880 Map of Kincardine Township by H. Belden & Co. does not list landowners for Lots 1 through 4 of Concession 1 South of the Durham Road, nor does it show any structures within the lot limits (Map 8). This information is contrary to that provided in the AMICK 2005 which places the 2005 subject property in Concession 2 rather than Concession 1. The lack of both a landowner name and structure on each of the lots is not an indication that the lands were unsettled, as historic atlas maps are not always accurate renderings of land use conditions of the time. Landowners often had to pay a subscribers fee to be shown in the atlas and many families may have simply chosen not to do so. The fact that other occupants of Concession 1 SDR are listed in the 1871 census and that BbHj-37 (Clements Site) documented a reported ca. 1840-1860 domestic site provides further evidence for early pioneer settlement along the Durham Road.

2.3.5 Modern Land Use

The study area incorporates a number of modern land uses. The northwest and central-west portion has undergone commercial development and contains a number of businesses (Canadian Tire, Sobey's, Meridian Credit Union, Boston Pizza, Holiday Inn Hotel and a professional office building) and their associated infrastructure including access roads, parking lots, utilities, landscaping and drainage (Images 1 to 7). These are all accessed off of Highway 21 via Durham Street, with a north-south arterial route (Millennium Way) present along the east side of the commercial complex (Images 8 and 9). Evidence of significant underground servicing is present throughout the commercial zone (Images 1 to 7), along the rights-of-way for both major adjacent highways and the arterial roads, all of which are also ditched in places. A deep drainage ditch has been cut along the south side of the commercial zone (Image 10) and a ditch and berm are present adjacent to Highway 21. An earth berm runs along a treed property line extending south from Highway 9 and separates the commercial zone from residential/farm lots to the east (Image 7). A wood pole hydro line runs along a field edge east of the commercial properties. Regardless of the presence of standing buildings, a small portion of the northwest corner of the commercial complex and study area is grassed and undeveloped (Image 11). It is not known whether this area was disturbed during the construction of the adjacent commercial areas.

To the east of the commercial area along Highway 9 are three rural residential properties with laneways off of the highway (Images 12 to 14). These contain structures (houses, barns, sheds, outbuildings), laneways and areas of manicured lawn. Farm machinery roads extend southward into the associated agricultural fields.

The remainder of the study area is comprised of active or former agricultural fields (cropped, hay fields, now vacant lands) (Images 15 to 17) as well as a natural area associated with a tributary of the Penetangore River (Image 18) which includes some wet and steeply sloped lands. Throughout the study area there are several seasonal/relic watercourses and swales running east to west across the fields (Image 16 and 17).

2.4 Analysis and Conclusions

As noted in Section 2.1, the Province of Ontario has identified numerous factors that signal the potential of a property to contain archaeological resources. Based on the archaeological and historical context reviewed above, the study area contains or is in proximity to features signalling archaeological potential, namely: 1) watercourses (active and seasonal); 2) 19th century thoroughfares and colonization roads (Hwy. 21 - Goderich Road and Hwy. 9 - Durham Road); 3) the 19th century settled town core of Kincardine (see Map 8); and 4) registered and known archaeological sites. Therefore, based on a mapping review, some portions of the study area have potential for either First Peoples or EuroCanadian sites.

Nonetheless, some lands within the study area have also witnessed significant prior disturbance and do not retain archaeological potential. Most notable in this regard are the commercial complexes and rights-of-way. More isolated disturbances are present within the residential/farm lots (where buildings and laneways are present). However, due to restrictions on property access, a formal property inspection could not be undertaken to visually confirm extent of disturbance. Other areas within the property are also of low potential, namely the watercourse and its sloped valley lands.

Based on our generalized mapping review, roughly 11.38% (8.8 ha) of the project area is considered to be disturbed and does not retain potential for the discovery of intact archaeological resources. An additional 3.24% is also considered to have low potential due to wet (2.85%; 2.2 ha) or steeply sloped (0.39%; 0.3 ha) conditions. A total of 16.6 ha or 21.47% was previously surveyed. The remaining 63.9% is considered to have archaeological potential, with 50.06% (38.7 ha) consisting of former or active agricultural lands and 13.84% (10.7 ha) consisting of treed or lawn areas. Areas of varying archaeological potential are shown on Map 9 and on the proponent map shown in Map 10. However, this mapping was done without the benefit of complete property access and a formal property inspection to meet provincial standards. Therefore, these evaluations of potential are considered preliminary and are for general planning purposes. Confirmation in the field is required once more detailed servicing plans are made.

Two separate parcels within the study area have been previously subject to archaeological assessment. The entire Millennium Way extension was surveyed by TMHC in 2006, received provincial clearance, and the road extension was built. Therefore this section can be entirely eliminated from archaeological concern. The lands subject to Stage 1 assessment by AMICK in 2005 were only partially surveyed and one archaeological site was found, with a requirement for Stage 3 survey. All of the surveyed lands that are 70 metres or more from distant from the Stage 2 limit of BbHj-37 have been cleared of archaeological concern, with further assessment required for site area proper and the lands that were not surveyed during the 2005 study.

Table 2: Documentary Records

- Field notes and maps November 20 and 22, 2013
- Photograph log and images: November 20 (P1010334-355), November 22 (P1010383-435)
- Records on file at Timmins Martelle Heritage Consultants Inc., 1600 Attawandaron Road, London, ON N6G 3M6

2.5 Recommendations

Based on the information compiled in the background study, the following recommendations are made:

1) The previously assessed lands in the 2006 TMHC survey of the Millennium Way road extension are of no further archaeological concern and no additional assessment is recommended.

2) Registered site BbHj-37, recorded by AMICK during a 2005 partial survey of a proposed development property within the study area, requires Stage 3 testing to current MTCS standards. Based on the information provided in the consultant report for this project, the site would be classified as a post-contact site of cultural heritage value or interest.[1] The proposed excavation strategy should follow that defined for small post-contact sites of established cultural heritage value or interest (MTCS 2011; Table 3.1. Standards 3 and 4), with initial test units placed at 10 metre intervals across the surface scatter and an additional 40% of units placed in areas of interest. As the Stage 2 reporting indicated a maximum site size of roughly 60 by 60 metres, methodological provisions for Stage 3 testing of large sites (MTCS 2011; Section 3.31, Subsection 3.3.1 Standard 1) might also be applicable. Until Stage 3 testing is undertaken, all lands within 70 metres of the Stage 2 site limits have further archaeological concern and are protected from land alterations (other than typical agricultural cultivation) by the provisions of

[1] Note that this evaluation is based on a date range of ca. 1840-1860. No land registry information is available to confirm or refute this.

the *Ontario Heritage Act* which prohibit disturbance to registered archaeological sites.

3) The remaining lands surveyed by AMICK in 2005 require no further archaeological assessment.

4) All former and active agricultural lands within the study area that were not previously surveyed demonstrate potential for the discovery of archaeological resources. Based on provincial standards these require ploughing and a pedestrian or "walk-over" survey at a five metre interval. Ploughed surfaces must be well-weathered by heavy rainfall and the ploughed surface must be clean of vegetation resulting in at least 80% surface visibility.

5) The low-lying, wet and steeply sloped lands associated with the tributary of the Penetangore River are considered to have low archaeological potential and do not require further assessment. However, given that a formal field inspection could not be undertaken, the precise limits of the these could not be mapped and therefore a detailed field inspection will minimally be required prior to any future servicing work can take place in these areas.

6) The previously disturbed lands within the commercial zones and residential/farm lots do not retain potential to house intact archaeological resources and therefore no further work is recommended in these areas. However, given that a formal field inspection could not be undertaken, the precise limits of the these could not be mapped and therefore a detailed field inspection will minimally be required prior to any future servicing work can take place in these areas.

7) The treed lands associated with the Penetangore River tributary and the lawn areas within the residential/farm lots have potential for the discovery of archaeological resources. Based on provincial standards, these lands must be subject to a test pit survey at a five metre interval. Where test pitting is conducted each test pit should measure approximately 30 cm (shovel-width) in diameter and be excavated into the first five centimetres of subsoil. The soil from each test pit should be passed through 6 mm hardware cloth in an effort to retain any artifacts that might be present. When the screening process is completed, the soil strata should be examined and the pits filled in as best as possible and re-capped with sod.

These recommendations are subject to report review and acceptance by the Ministry of Tourism, Culture and Sport.

4.0 SUMMARY

A Stage 1 background study was undertaken for a roughly 77.3 ha study area that was selected by the Municipality of Kincardine for the preparation of a Servicing Master Plan for the Kincardine Business Park in the Town of Kincardine. The study area includes agricultural lands, residential and farm lots and natural areas, in addition to a developed commercial block along Highway 21. The background research indicated that the study area was in proximity to features signalling archaeological potential, namely: 1) watercourses; 2) 19th century thoroughfares and colonization roads (Goderich Road and Durham Road); 3) the 19th century town core of Kincardine; and 4) registered or known archaeological sites. Therefore, lands within the study area have archaeological potential for both First Peoples and historic era EuroCanadian sites. The background study also indicated that some lands within the study area have already been subject to Stage 2 survey and cleared of archaeological concern. Furthermore, one 19th century site identified in a previous study is present within the study area and requires Stage 3 testing. The previously unsurveyed agricultural and undeveloped lands within the study area retain archaeological potential and warrant Stage 2 assessment involving pedestrian or test pit survey. The developed lands and lands containing built features do not retain archaeological potential and require no further archaeological assessment, as do the low potential low-lying and sloped valley lands of the Penetangore River tributary. Because property access was restricted and a complete and formal property could not be undertaken, areas of low potential should be subject to more detailed field inspection in the future if and when plans to service these areas are put in place.

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION

This report is submitted to the Ministry of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the

Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented (i.e., unknown or deeply buried) archaeological resources be discovered, there may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*. Further, archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.

The *Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33* (when proclaimed in force) requires that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Small Business and Consumer Services. The Registrar of Cemeteries, Cemeteries Regulation Unit can be reached at (416)326-8404 or (416)326-8393.

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7.0 IMAGES

Image 1: Overview of Commercial Lands Along Highway 21, South of Durham Street (looking south)

Image 2: Commercial Lands on Highway 21 North of Durham Street (looking north)

Image 3: Canadian Tire Store Along Highway 21 (looking northeast)

Image 4: Commercial Lands South of Durham Street (looking southeast)

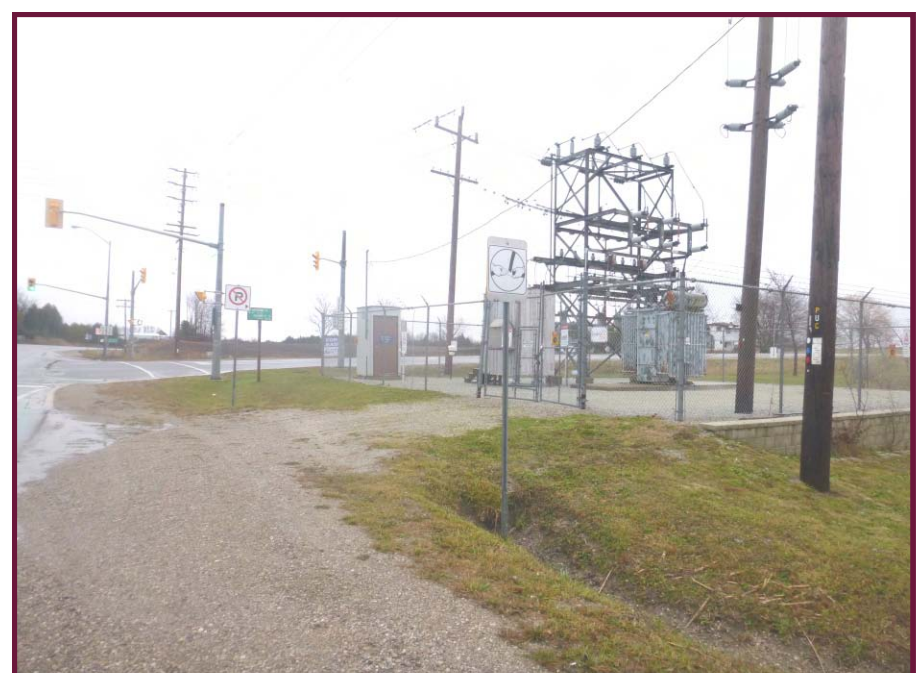


Image 5: Transformer Station in Northwest Corner of Study Area (looking northeast)

Image 6: Underground Services in Commercial Lands South of Durham Road (looking east)

Image 7: Landscaped Earth Berm East of Commercial Lands on Highway 9 (looking south)

Image 8: Commercial Complex Access Roads - Intersection of Durham Street and Millennium Way (looking east)

Image 9: Northern Extension of Millennium Way (looking north)

Image 10: Drainage Ditch South of Commercial Lands off Highway 21 (looking west)

Image 11: Grassed, Undeveloped Lands Within Commercial Complex off Highway 21 (looking south)

Image 12: Manicured Lawn and Treed Area in Front of Residential Property on Highway 9 (looking south)

Image 13: Residential/Farm Lot off Highway 9 (looking southwest)

Image 14: Residential/Farm Lot in Northeast Corner of Study Area (looking southwest)

Image 15: Agricultural Field in Northeast Portion of Study Area (looking south)

Image 16: Agricultural Field East of Commercial Lands (looking southeast)

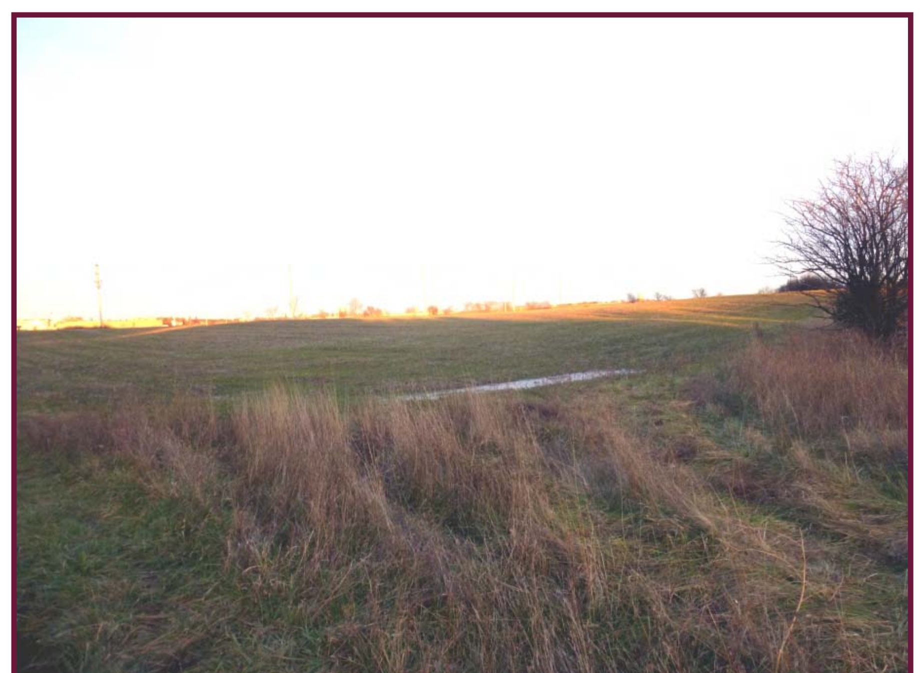


Image 17: Agricultural Field in Southern Portion of Study Area (looking northeast)

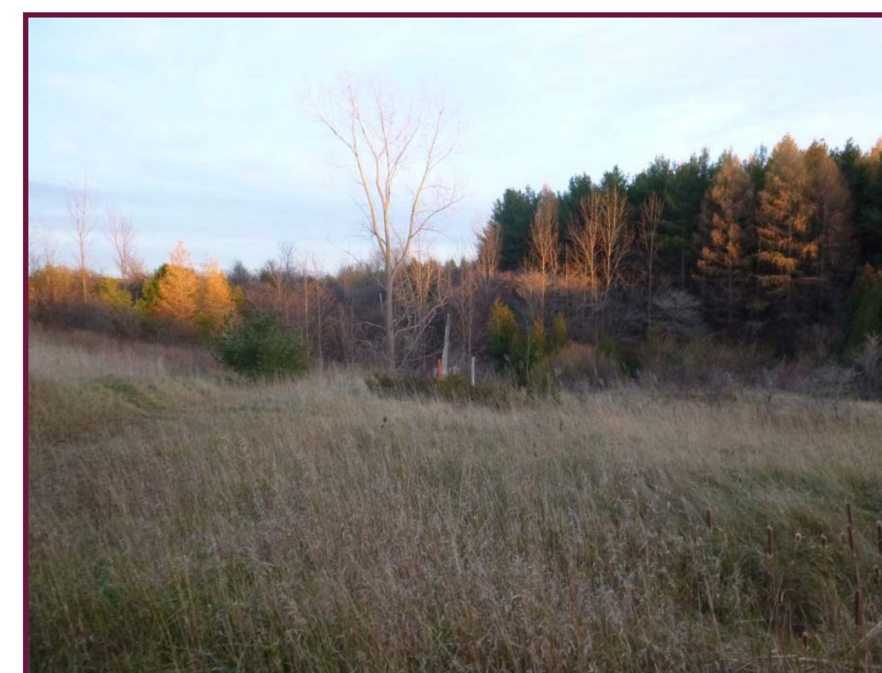
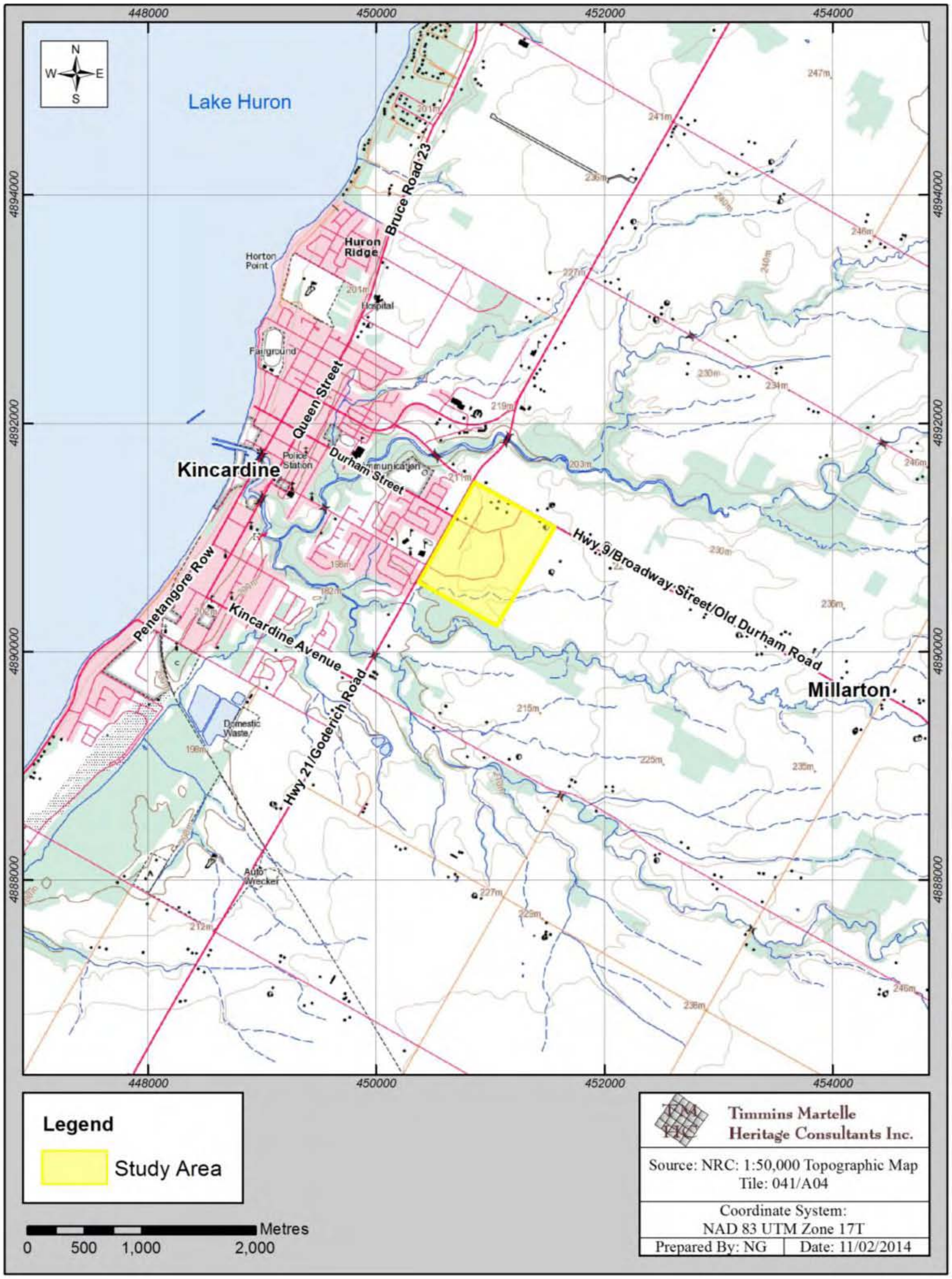


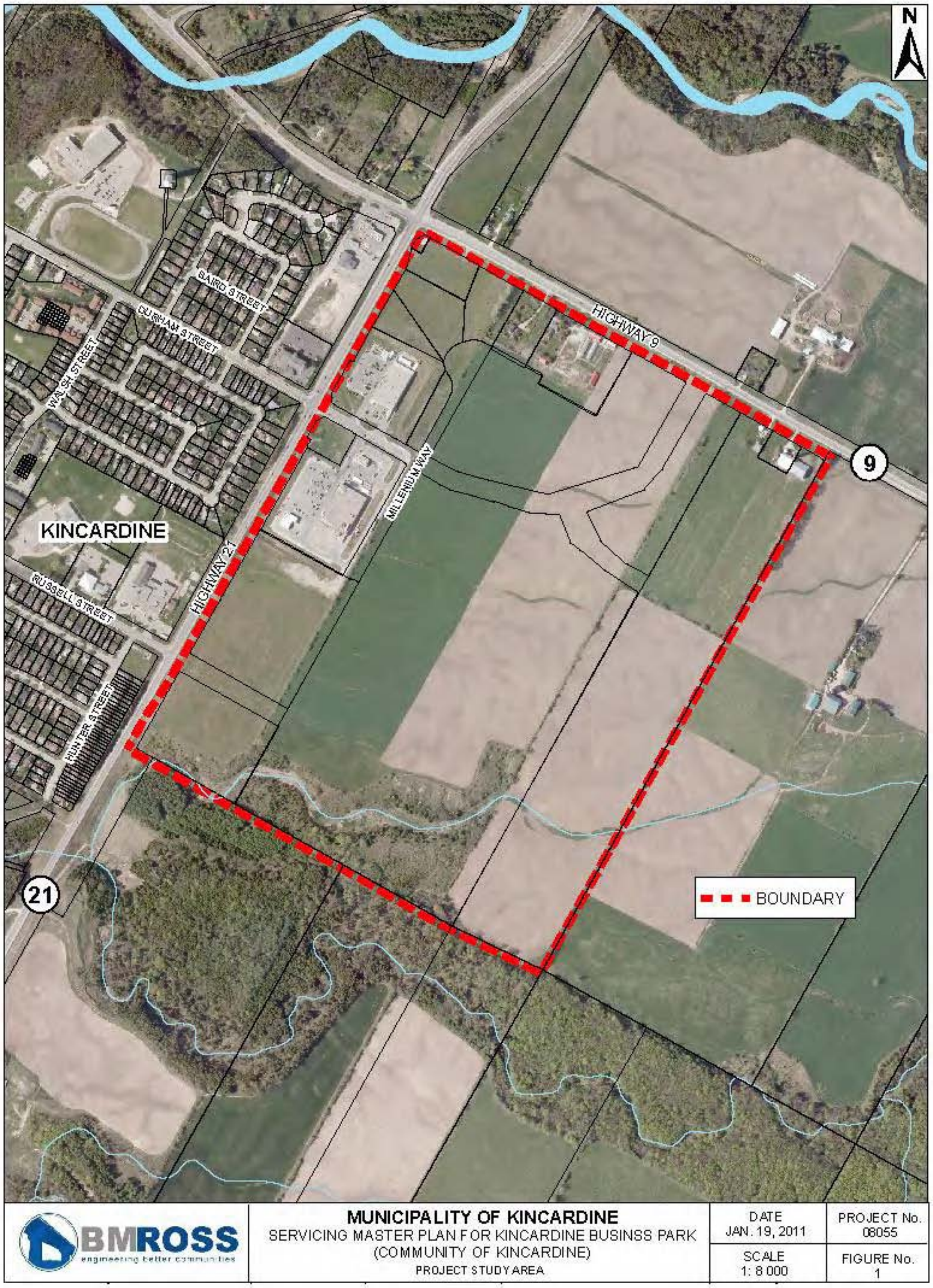
Image 18: Penentangore River Tributary Treed and Sloped Valley Lands in South Portion of Study Area (looking east)

8.0 MAPS

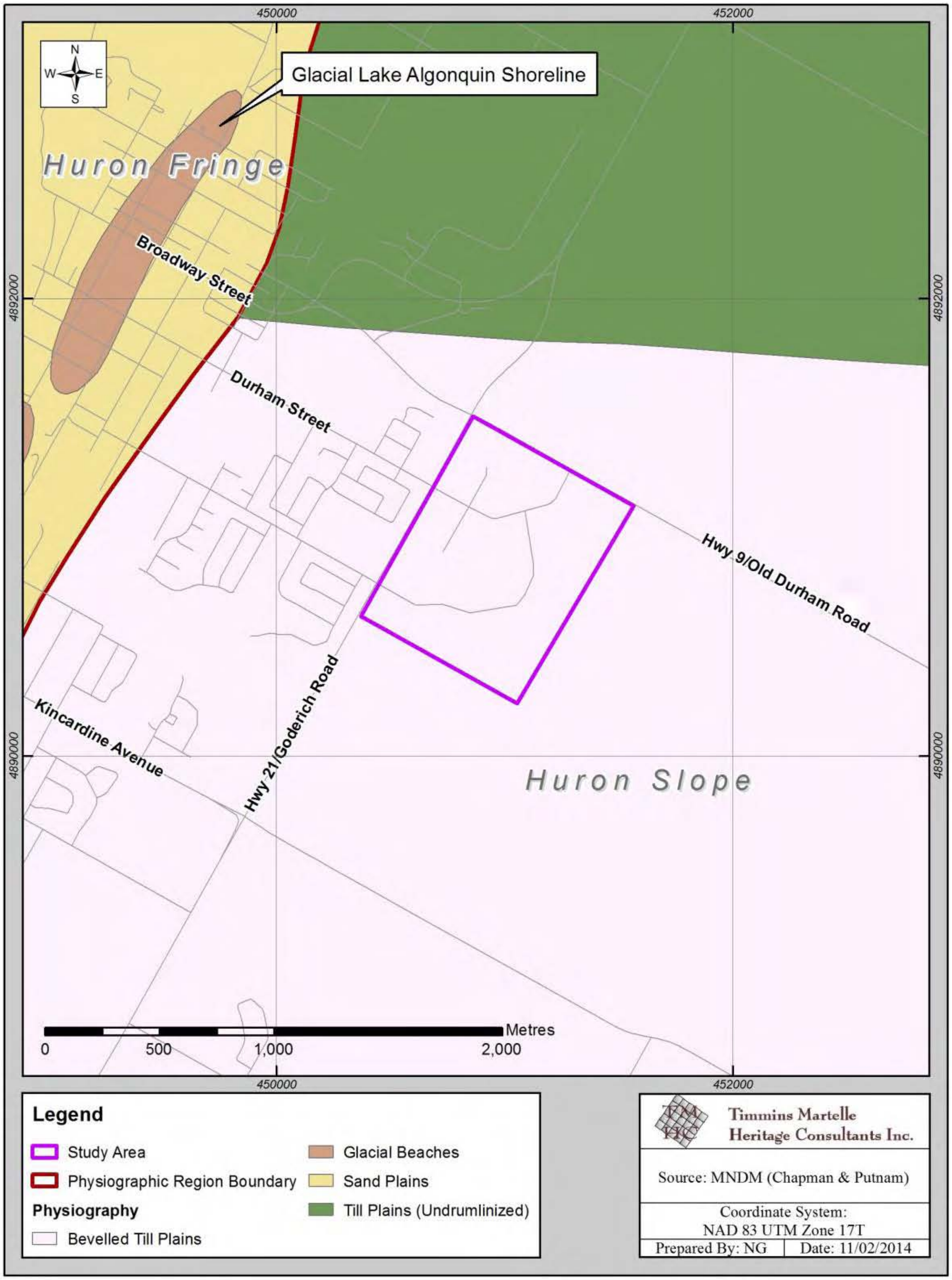


Map 1: Location of the Study Area in Kincardine, ON

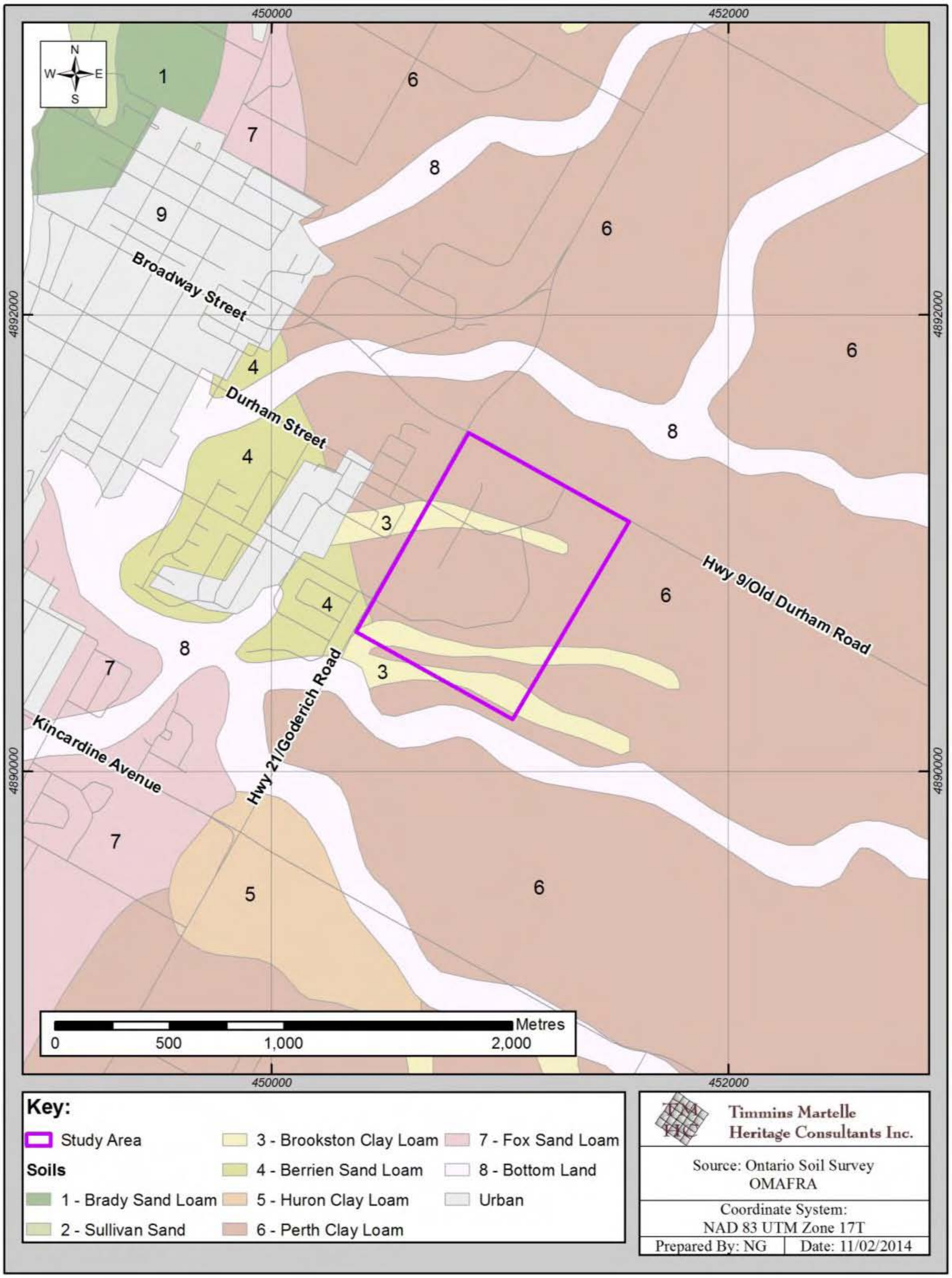
Map 2: Aerial Photograph Showing the Location of the Study Area in Kincardine, ON



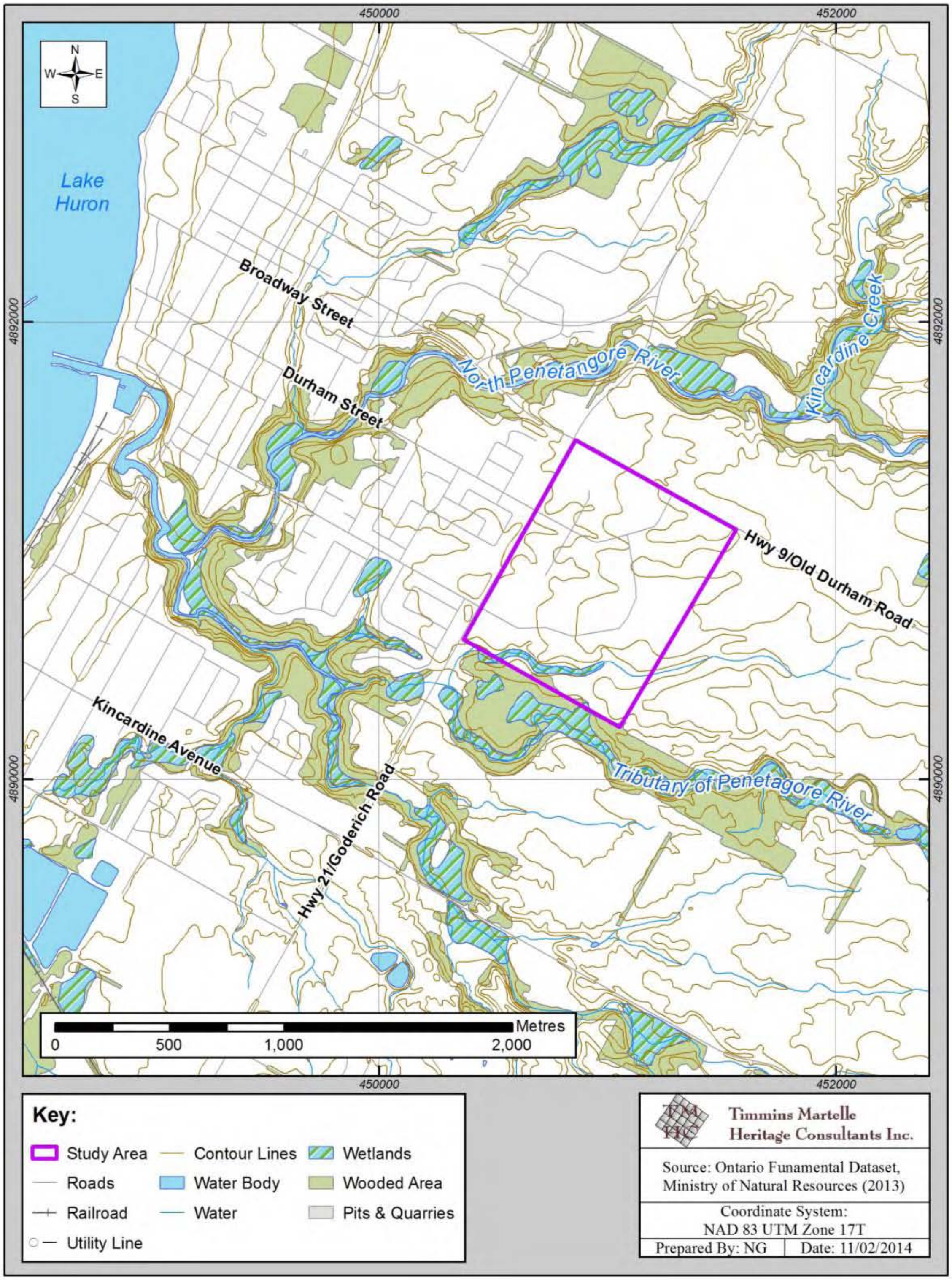
Map 3: Proponent Map Showing the Limits of the Study Area for the Servicing Master Plan



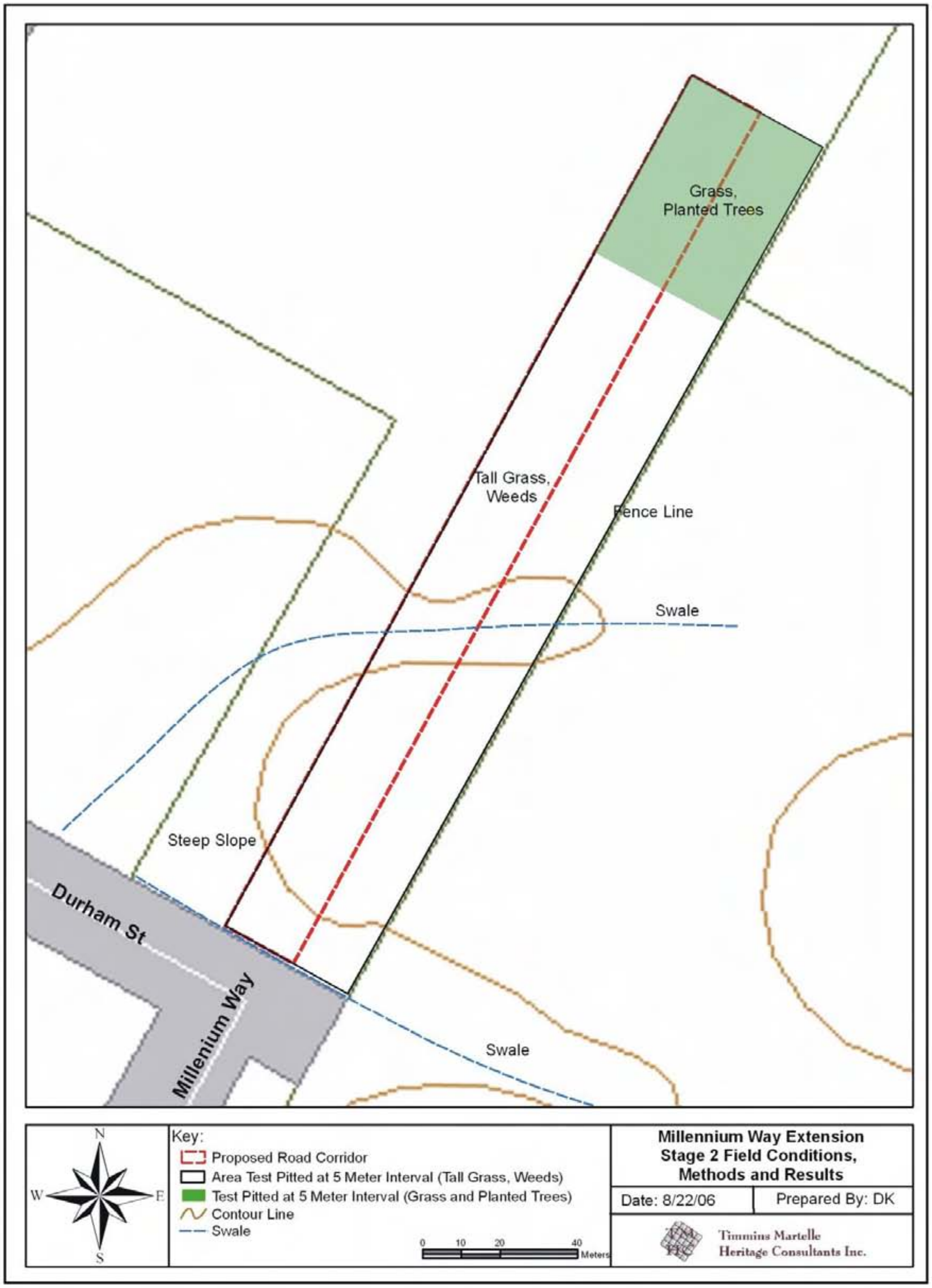
Map 4: Physiography Within the Vicinity of the Study Area



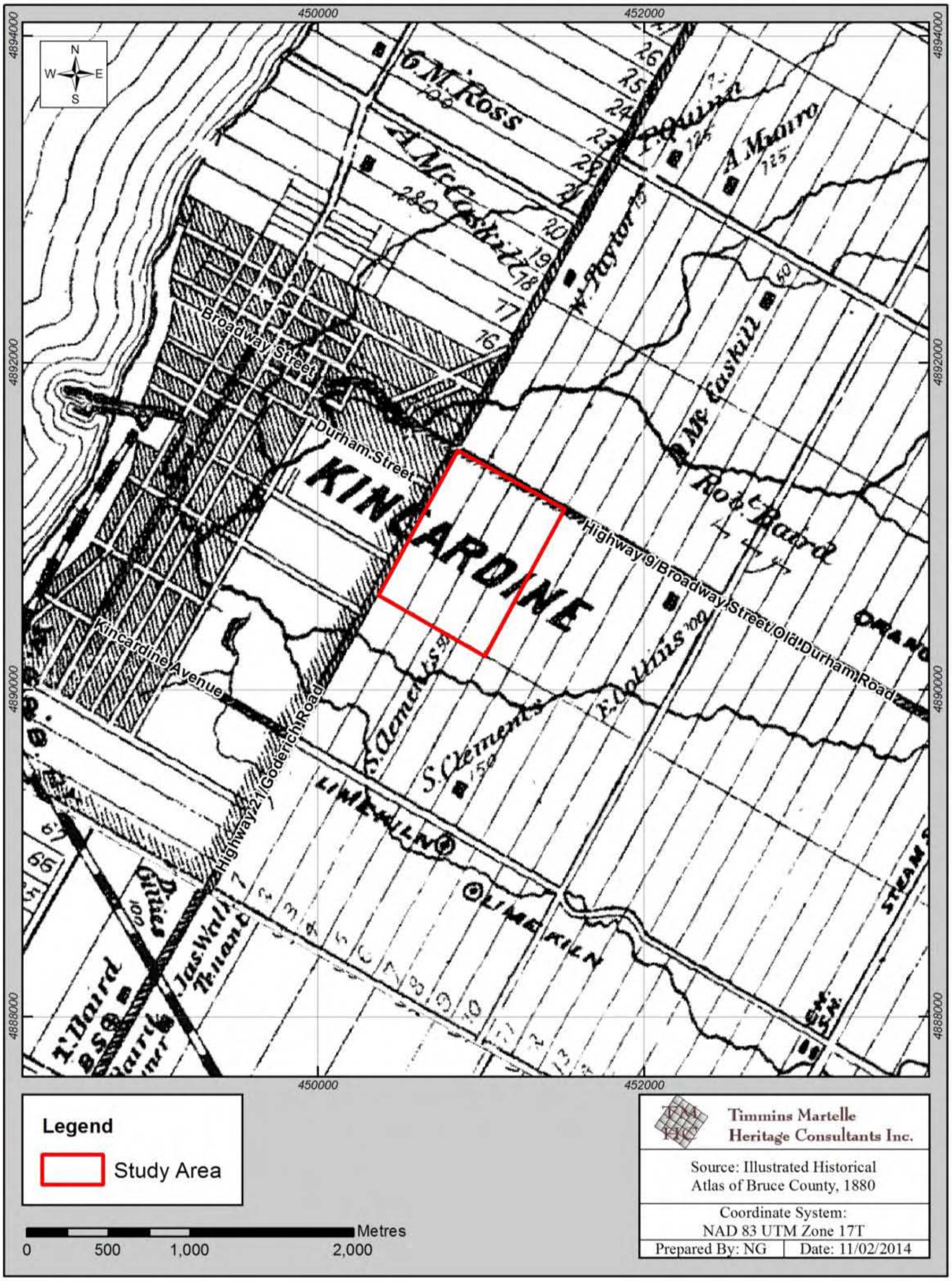
Map 5: Soils Within the Vicinity of the Study Area



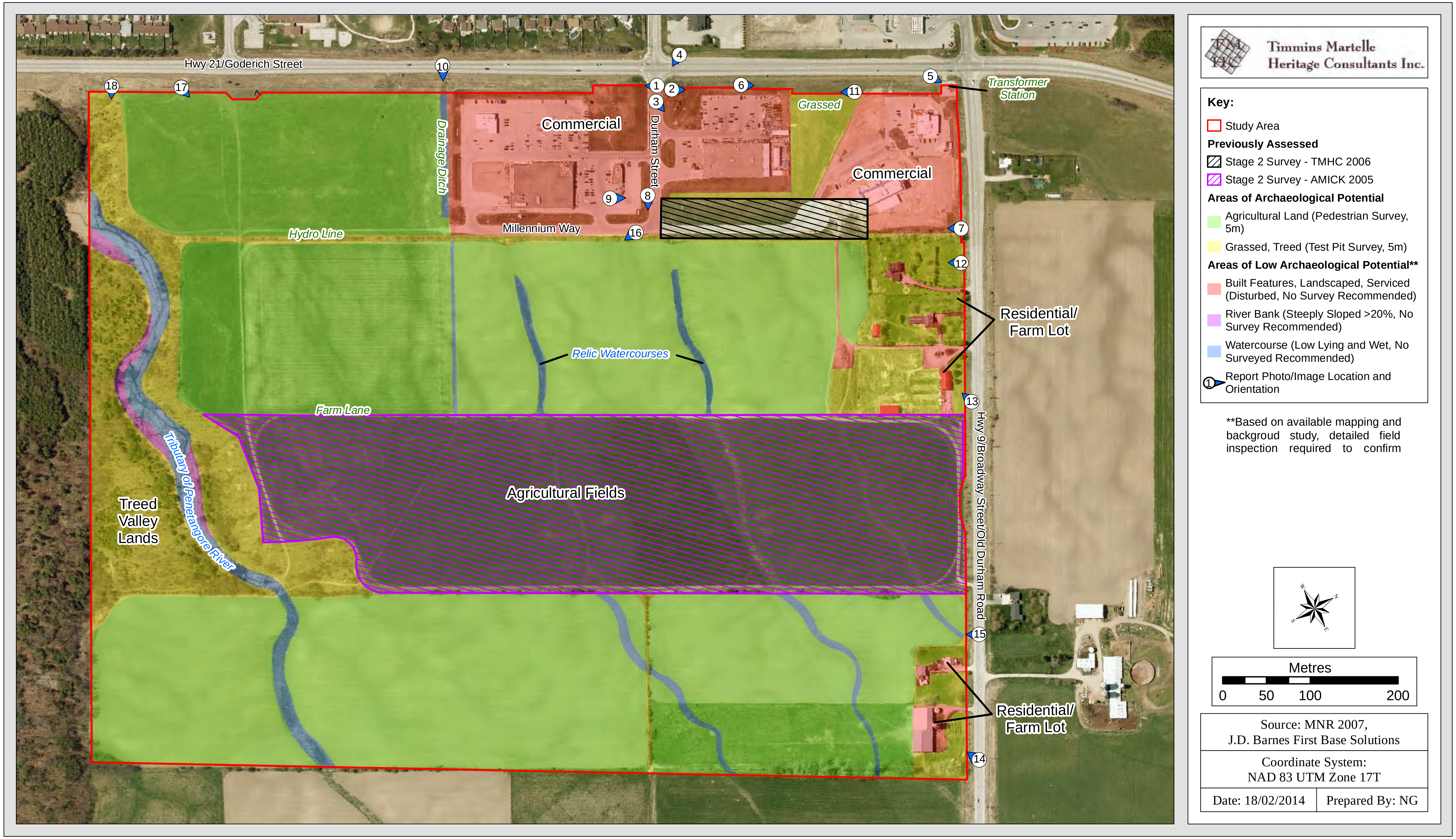
Map 6: Drainage Within the Vicinity of the Study Area



Map 7: Stage 2 Assessment Results Map for TMHC (2006) Survey of Millennium Way Extension



Map 8: Study Area Shown on the 1880 Map of Kincardine Township, ON



Map 9: Areas of Archaeological Potential Established by Stage 1 Background Study

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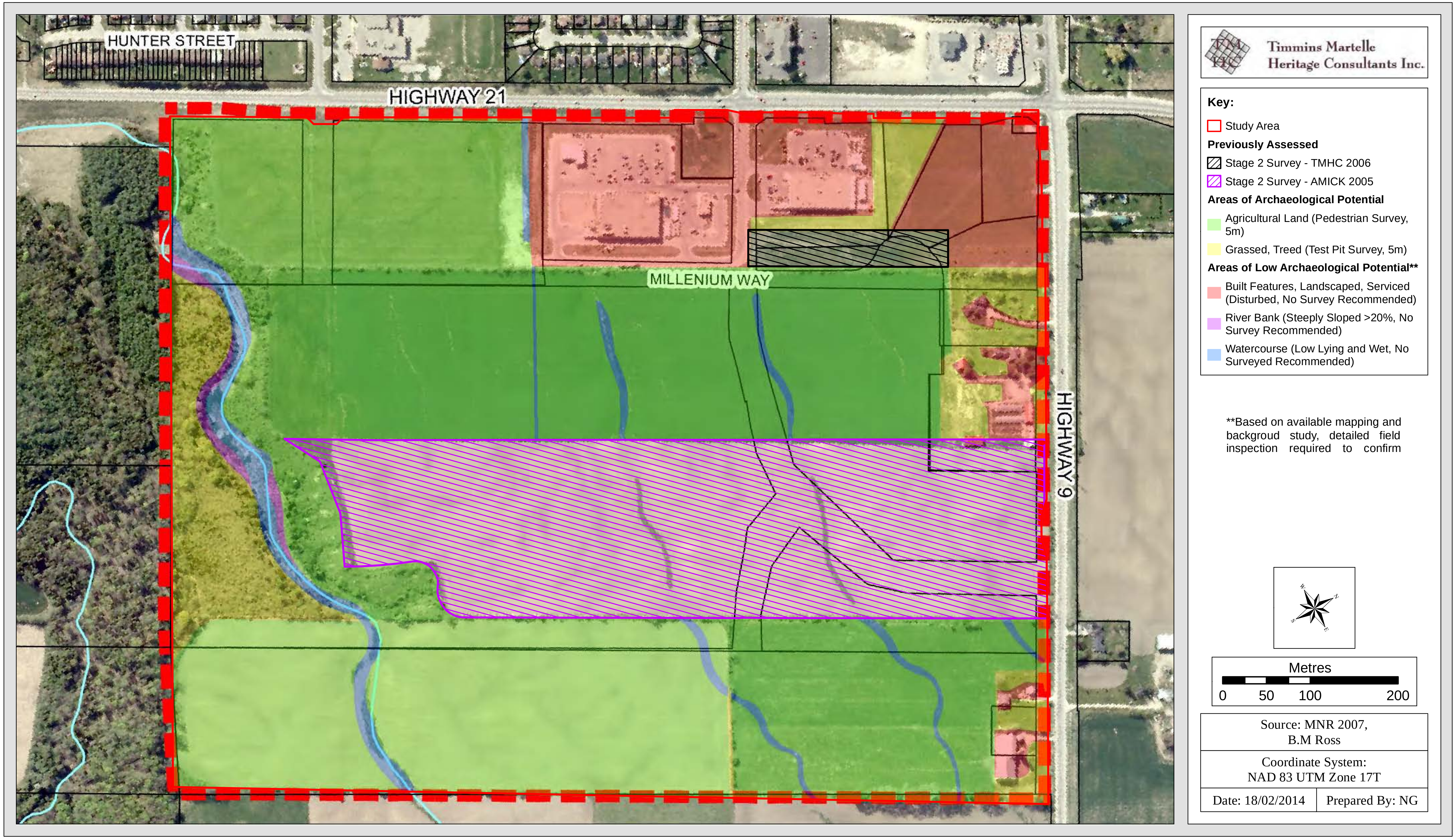

Map 10: Areas of Archaeological Potential Established by Stage 1 Background Study - Shown on Proponent Mapping

APPENDIX 2

SERVICING PLAN

MUNICIPALITY OF KINCARDINE

KINCARDINE BUSINESS PARK
SERVICING PLAN

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KINCARDINE BUSINESS PARK
SERVICING PLAN

DRAFT

September 19, 2011
Revised June 29, 2016

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File No. 08055

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MUNICIPALITY OF KINCARDINE
KINCARDINE BUSINESS PARK
SERVICING PLAN

1.0 INTRODUCTION

The Municipality of Kincardine wishes to determine a practical approach to provide servicing for the balance of the Business Park. The Business Park is primarily located southeast of the intersection of Highway 9 and Highway 21. The balance of the remaining undeveloped lands is about 70 gross ha, however, the Holtby Drain prevents development of the southerly lands and reduces the developable land area to under 60 Ha.

Generally, the Business Park area includes the first four farm lots east of Highway 21 and south of Highway 9 together with a small parcel on the north side of Highway 9. All four farm lots have been designated as Business Park in the Municipality's official plan. The first lot was purchased by Kincardine who became the developer of the northerly two thirds of the lot, most of which has been built-out with Commercial facilities.

The purpose of this study is to outline how the balance of the four farm lots can be provided with sanitary servicing, potable water, storm drainage, stormwater management, and road systems from a Master Plan perspective.

This report has been prepared primarily focused on the four farm lots southeast of Highway 9 and Highway 21 although some consideration has been given to the lands located north of Highway 9.

2.0 TRANSPORTATION AND ROAD PATTERN

2.1 Road Pattern

The County of Bruce Planning Department has completed a recommended pattern for development and installation of new roads throughout the Business Park area. This road pattern, as slightly modified by BMROSS, including the preferred road widths, is shown on Figure TR1. It is anticipated that these roads will be constructed as development progresses.

The Ministry of Transportation (MTO) has provided comments based on the road pattern presented on Figure TR1 and have suggested that it may be appropriate to modify the orientation of Russell Street. The suggested MTO road concept has been provided for comparative purposes as Figure TR2.

The Ministry has noted possible issues with the road, labeled ‘Private Drive’, connecting Millennium Way and the extension of Russell Street and has suggested that Private Drive is situated too close to the intersection of Highway 21 and Russell Street and that future left-turning movements from Russell St. onto Private Drive, will slow and possibly block traffic flow through the Highway 21-Russell St. intersection.

Following discussions with the Municipality, the MTO, and the property owners within the Business Park the preferred internal road layout of Russell Street can be finalized.

Regardless of the final configuration of the internal road system, it is proposed that the Business Park will access the existing road network at the following locations:

- Highway 21 at Durham Street
- Highway 21 at Russell Street
- Highway 9 at an extension of Durham Street

2.2 Road Cross Section

Although subject to change as part of future geotechnical recommendations to be completed for final design it is anticipated that at a minimum the road cross section for each street type will consist of the following:

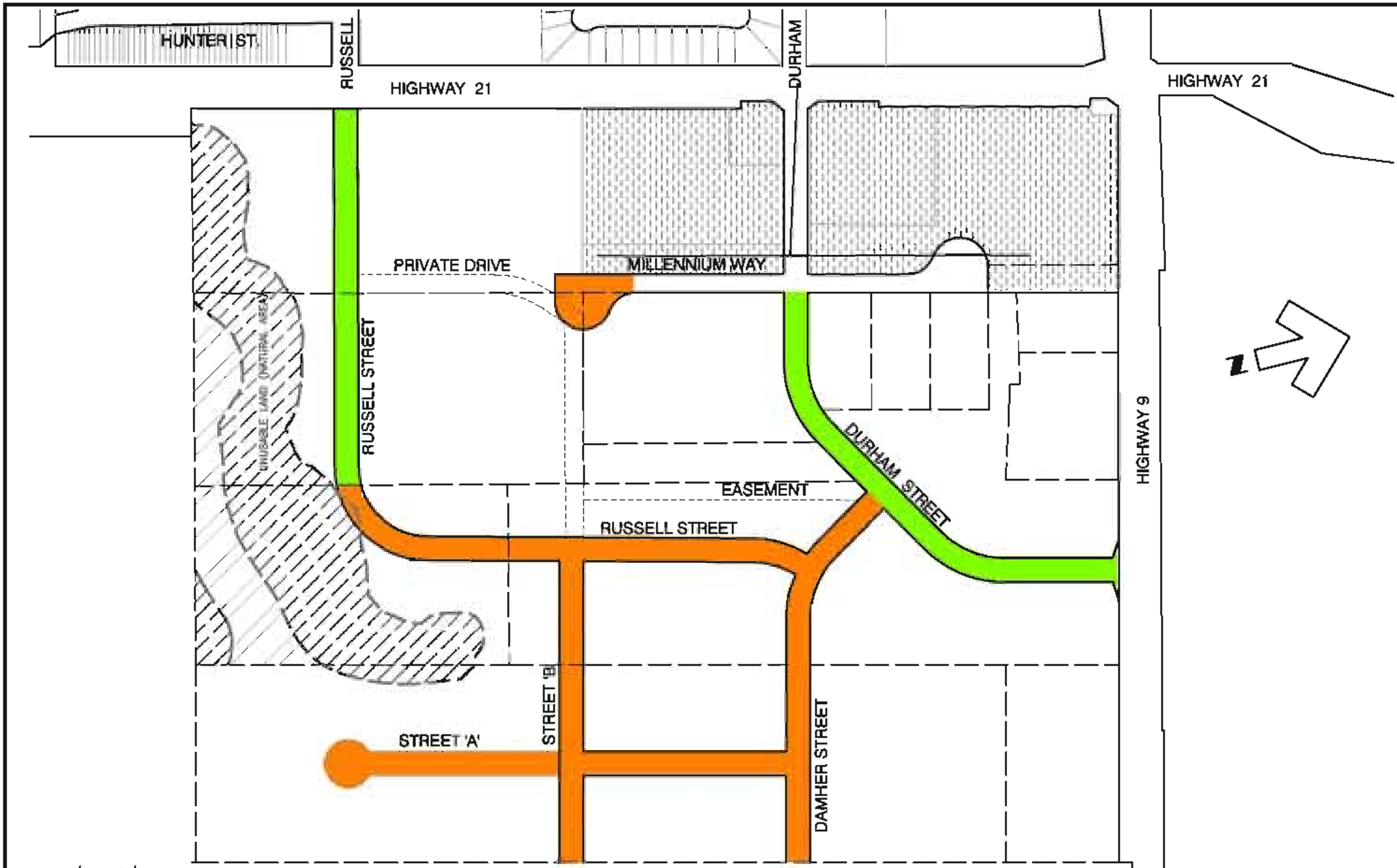
i. 10.5 metre Wide Road
   - 50mm HL3, 50mm HL4, 150mm Granular A, 400mm Granular B

ii. 8.5 metre Wide Road
   - 40mm HL3, 40mm HL4, 150mm Granular A, 300mm Granular B

All roads are to be constructed with a minimum of 2% cross fall, adequate sub-grade drainage, curb and gutter, sidewalk on one side (where warranted), grass boulevard restoration, street lighting, and required utilities.

2.3 Development Grading and Road Layout

Preliminary grading and drainage of the development area has been completed to match existing topography. Figure TR-3 has been provided to illustrate the conceptual finished road elevations and overall intent of grading at key locations throughout the Business Park.



Legend

Existing commercial Area

Future 10.5m wide road (26m min. wide road allowance)

Future 8.5m wide road (20m min. wide road allowance)

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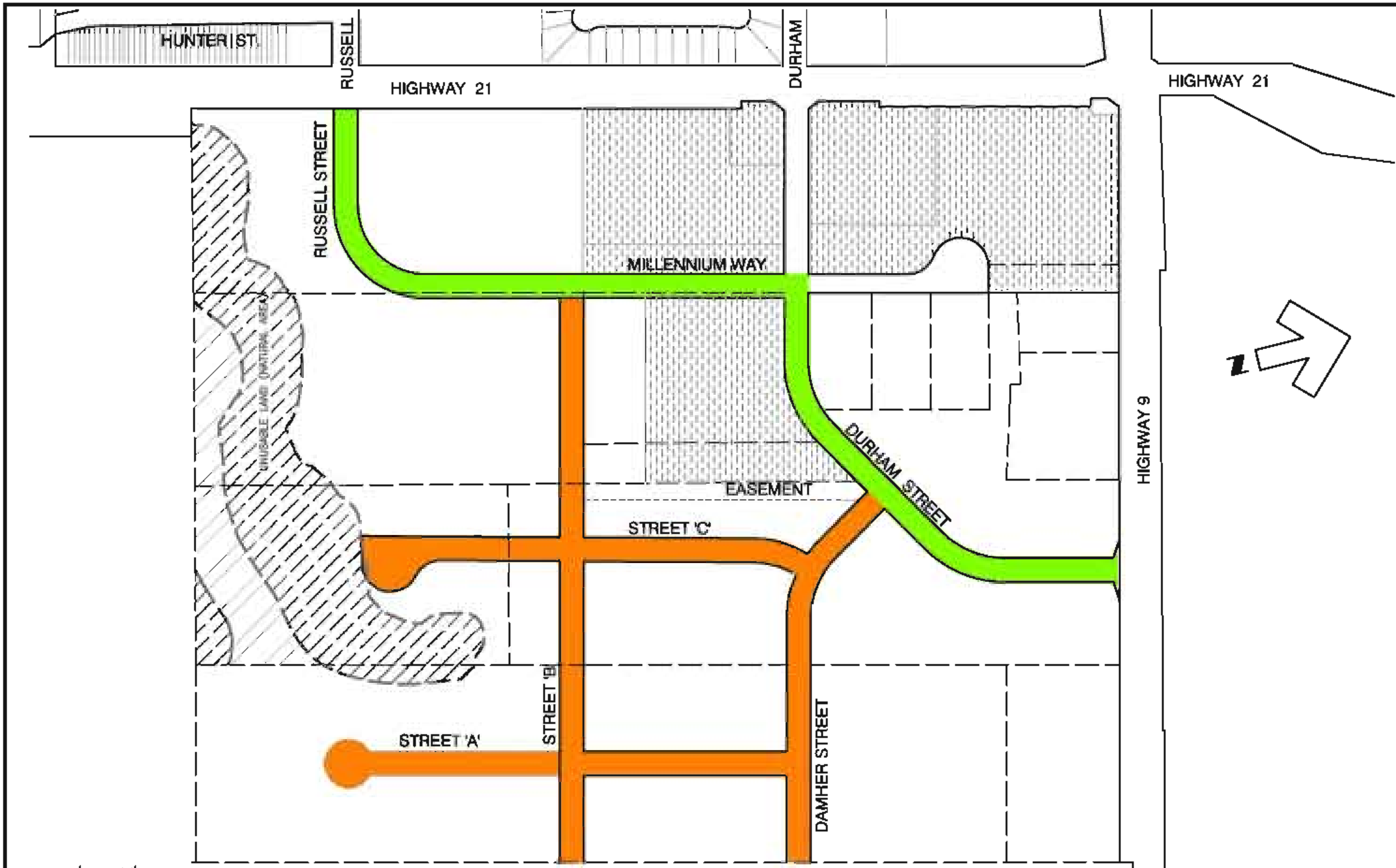
Kincardine Business Park
Servicing - Transportation

Proposed Road Layout and Net Developable Land Areas

DATE	PROJECT No.
June 2016	08055
SCALE	FIGURE No.
1:6,000	TR1



Legend

Existing commercial Area

Future 10.5m wide road
(26m min. wide road allowance)

Future 8.5m wide road
(20m min. wide road allowance)

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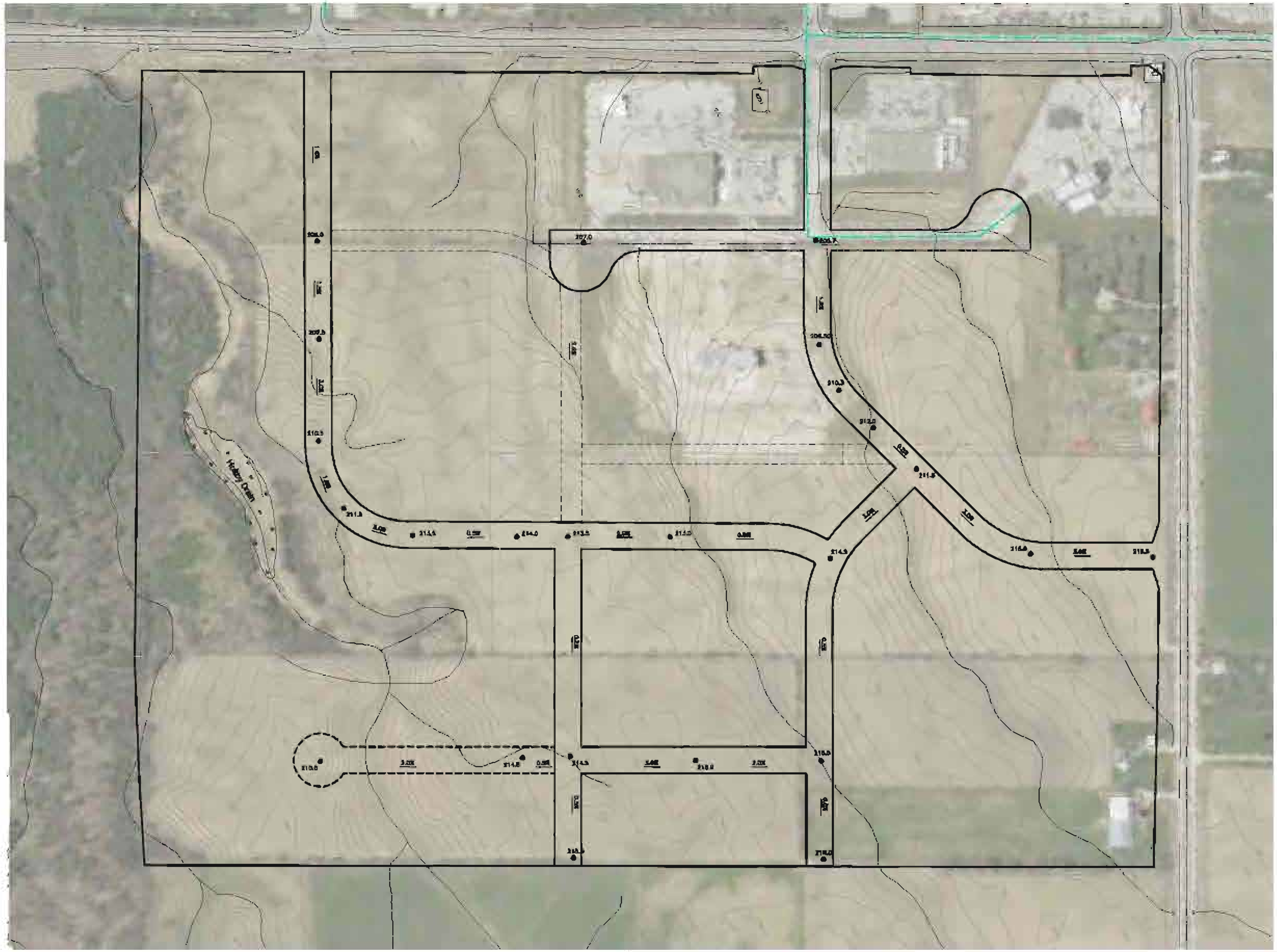
Servicing - Transportation
MTO Road Concept

DATE June 2016	PROJECT No. 08055
SCALE 1:6,000	FIGURE No. TR2



Legend

- 211.7 Preliminary Road Elevation
- 0.5% Direction of Drainage (% Grade)

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Servicing - Transportation

Preliminary Grading

DATE	PROJECT No.
June 2015	09055
SCALE 1:4,000	FIGURE No. TR3

2.4 Traffic Impact Study

A traffic impact study associated with the proposed Business Park was undertaken by Paradigm Transportation Solutions Limited. The current version of the Traffic Impact Study is an update to a previous study completed by Paradigm. This latest study, finalized in November 2015, examined updated traffic counts, as well as comments from the MTO. Impacts based on forecasted background traffic and increased traffic volume as a result of development of the Business Park, were examined for the following intersections:

- Highway 21 and Highway 9/Broadway Street
- Highway 21 and Durham Street
- Highway 21 and Russell Street
- Highway 21 and Kincardine Avenue/South Line
- Durham Street and Millennium Way
- Highway 9 and the future Durham Street extension

Impacts and measures to accommodate traffic were examined for 5-year, 10-year and 15-year forecast periods. Traffic counts for Durham Street, Russell Street, Millennium Way, and Kincardine Avenue are from July 2013. The traffic count for Highway 9 is from October 2012. To determine the peak hour traffic volume generated by the Business Park, the following land use codes (from the Institute of Transportation Engineers Trip Generation Manual 9th Edition) were used: Hotel, Building Materials and Lumber Store, Shopping Centre, and Specialty Retail Centre.

It is forecasted that the Business Park will generate 424 total new trips in the AM Peak hour and 983 in the PM Peak. Growth in the background traffic volumes was assumed to be 2% over the forecast periods.

2.4.1 Forecasted Traffic Conditions

2020 Forecast Period

- The increase in background traffic is expected to result in a similar Level of Service (LOS) as the existing conditions, with slight increases in delays to left turns from westbound Highway 9 onto Highway 21 during the PM peak hour (LOS E).
- With the additional traffic resulting from the development of the Business Park, the following deficiencies were identified:
    - Westbound traffic on Highway 9 turning left onto Highway 21 will operate a LOS of F.
    - At the intersection of Russell Street and Highway 21, the east and westbound movements are forecasted to operate at LOS F and well above a volume to capacity ratio of 1.0 during the peak PM hour.

2025

- The increase in background traffic will result in similar conditions as the 2020 background traffic, with the left turn from westbound Highway 9 onto Highway 21 operating at LOS E.
- With the additional Business Park traffic, the following deficiencies were identified:

    - The left turn movement from westbound Highway 9 onto Highway 21 will be at LOS F during the peak PM hour.
    - At the intersection of Russell Street and Highway 21, the east and westbound movements are forecasted to operate at LOS F and well above a volume to capacity ratio of 1.0 during the peak PM hour.
    - Eastbound movements at Highway 21 and Kincardine Avenue/South Line will operate at LOS F during the peak PM hour, however, the volume to capacity ratio will is expected to be below 1.0

2030

- The increase in background traffic is, again, expected to have similar impacts as the previous time periods; however, the delay for a left turn from westbound Highway 9 onto Highway 21 at the peak PM hour will result in a decline of the LOS from E to F.
- With the additional Business Park traffic, the following deficiencies were identified:
    - The left turn movement from westbound Highway 9 onto Highway 21 will be at LOS F during the peak PM hour.
    - At the intersection of Russell Street and Highway 21, the east and westbound movements are forecasted to operate at LOS F and well above a volume to capacity ratio of 1.0 during the peak PM hour.
    - Eastbound movements at Highway 21 and Kincardine Avenue/South Line will operate at LOS F during the peak PM hour, however, the volume to capacity ratio will is expected to be below 1.0

2.4.2 Remedial Measures and Recommended Improvements

<u>Signals</u>

- Warranted at Russell Street and Highway 21 by 2020
    - Also recommend construction of separate westbound left turn lane (on Russell Street from the Business Park) and a southbound (on Highway 21) left turn lane.
- Not warranted at Kincardine Avenue and Highway 21.

<u>Left Turn Lane Warrants</u>

- Assessed for the intersection of the future Durham Street extension and Highway 9. A left turn lane on Durham Street was not warranted.

<u>Right Turn Lanes</u>

- Given 2020 traffic levels, right turn lanes should be considered on Highway 21 at its intersections with Durham and Russell Streets.

<u>Signal Changes</u>

- At the intersection of Highways 21 and 9, it is recommended that by 2020 an advanced turn signal for left turns from westbound Highway 9 onto Highway 21 be implemented.

- At the intersection of Highway 21 and Durham Street, it is recommended that by 2030 an advanced turn signal for left turns from westbound Durham Street onto Highway 21 be implemented.
- Implementation of a left turn signal from westbound Russell Street onto Highway 21 and a southbound left turn from Highway 21 onto Russell Street is advised with the installation of a the previously recommended new signal.

3.0 WATER SERVICING

Water servicing of the development area is anticipated to occur through the extension of the existing municipal water distribution system. The primary source of supply for the lands will be from the existing 300 mm watermain at Russell Street and the 300mm on Durham Street at Millenium Way.

A preliminary review of the water distribution system was completed and was based on hydrant flow tests undertaken at the intersection of Highway 21 / Durham Street and Highway 21 / Russell Street.

3.1 WaterCAD Model

A WaterCAD model was created in order to analyze the watermain extensions to the development lands. For the purpose of the model, the following assumptions were made:

- Water supply from the existing eastern terminus on Russell Street and from the intersection of Durham Street and Millenium Way are treated as two independent sources. (Note: This is assumed to simplify the model and is assumed to be reasonable because of the relatively high number of connecting watermains upstream of each location.)
- The water supply at each connection location was modelled as a pump, with curve characteristics based on theoretical flow and pressure values calculated from the hydrant flow tests. See below for theoretical flow and pressure values.
- Available flow and pressure in this area is based on no pumps at the WTP operational (i.e., because this was the case during the hydrant tests).

Appendix B provides technical details related to the modelling completed using WaterCAD.

Based on the results of the infrastructure review, the following observations were noted:

- The existing water infrastructure in Kincardine can accommodate the growth of the Business Park lands while maintaining fire flow supply and quantity;

- Pressures within the development area, under most flow demands, typically fall between 250 and 330kPa (36 to 48 PSI). MOE guidelines would suggest that these pressures should preferably be in the range of 350 to 550 kPa (50 to 80 PSI).

- A booster pumping system will be required in conjunction with the later phases of construction to ensure that adequate pressures are provided under development densities. The Municipality should establish pressure monitoring to track system operation as development proceeds to better determine the appropriate timing to construct the pressure boosting facilities.

3.2 Booster Pumping System

Operating pressures in the area of the Russell Street extension, without additional pressure boosting, appear to be higher than other areas of the development lands. This is attributable to the lower ground elevations for this area of the Business Park. It is anticipated that booster pumping facilities would be more advantageous in the area of Millenium Way and Durham Street and could be phased in as part of a pressure monitoring program within the development.

From the results of the hydrant flow testing, it is assumed that the new pressure zone can be continually fed by the existing municipal system at a rate of at least 70 L/s. This is sufficient to meet design average and maximum day demands, and nearly sufficient to meet design peak day demands, assuming that adequate booster pumping is provided within the new pressure zone, but in terms of available supply for fire protection probably represents a "worst case" for storage considerations because it corresponds to maintaining a residual pressure of 300 kPa in the existing system, which is significantly higher than the 140 kPa minimum allowable under fire conditions. The "best case" for minimizing storage requirements corresponds to having 190 L/s available from the existing system.

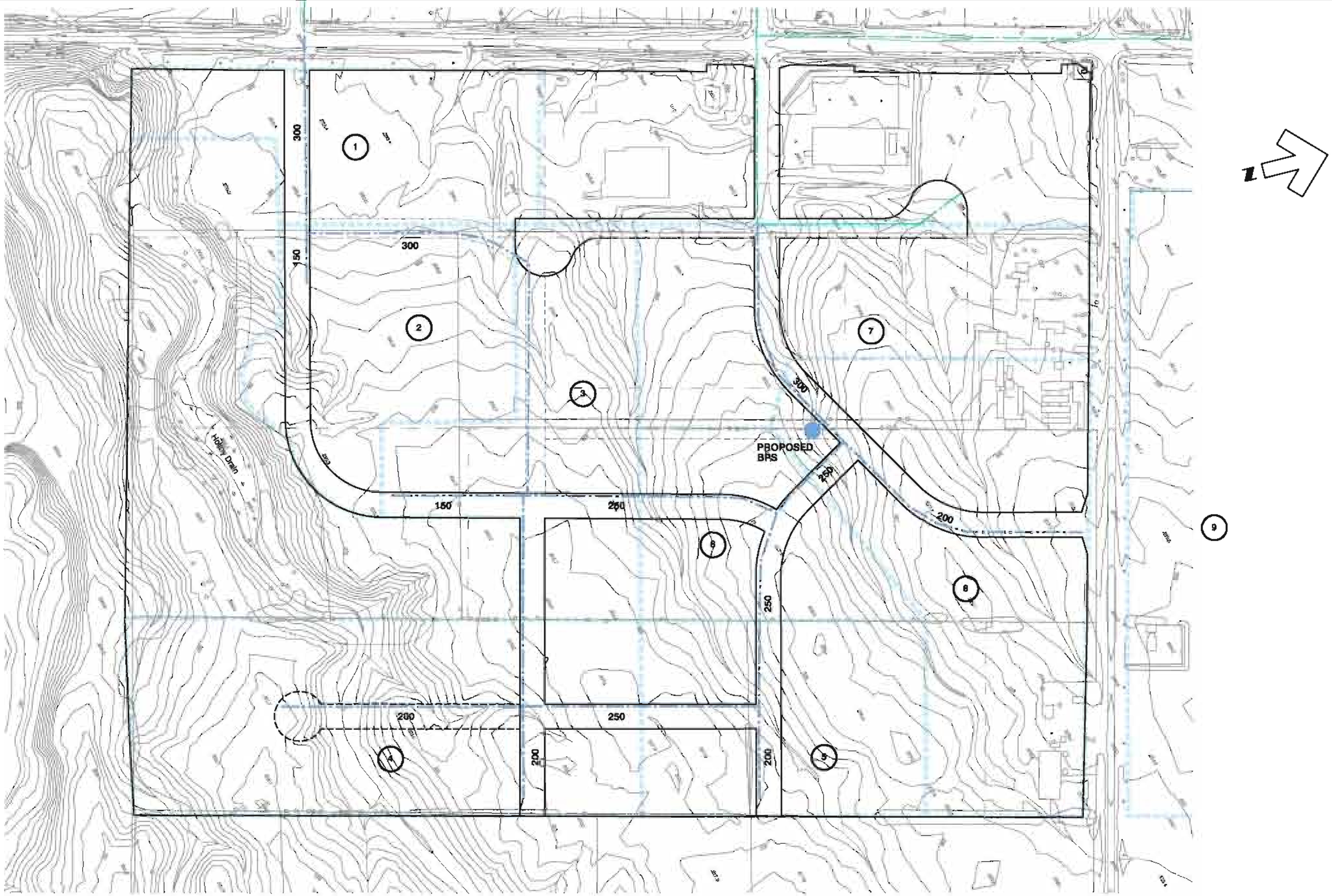
From the 2008 MOE Design Guidelines for Drinking-Water Systems Table 8.1, at a design fire flow of 150 L/s, the storage requirement is based on a duration of between 2 and 3 hours. For the purposes of this analysis, a 2.5 hour storage requirement has been assumed.

Based on the calculations summarized in Appendix B, under the “worst case” scenario approximately 1200 m^3 of storage is required while under minimum storage design conditions, no storage would be required.

It is recommended that the need for storage be re-evaluated as the initial phases of development proceed and the actual development demands become apparent.

3.3 Distribution System

As shown on Figure WM1, the proposed watermain distribution system will be installed within the proposed road allowance throughout the development area with sizing ranging from 150mm to 300mm.



Legend

1	Area Identification - Water Demand	200	Watermain and Pipe Diameter (mm)
	Water Demand Areas		Proposed Booster Pumping Station

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Kincardine Business Park

Servicing - Water

Detailed Area Plan -
Proposed Watermain Layout

DATE	PROJECT No.
June 2016	08055
SCALE	FIGURE No.
1:4,000	WM1

4.0 SANITARY SERVICING

The purpose of this portion of the study is to review the ability of the existing sanitary sewer collection system, in the Park Street Pumping Station tributary area, to receive flows from the proposed Business Park.

There are two potential corridors available for sanitary outlet from the Business Park area:

- Durham Street – Existing sanitary sewer connection.
- Russell Street – Proposed sanitary sewer connection.

Both corridors are within the same tributary area of the Park Street Sewage Pumping Station and both routes ultimately meet at the Scott Street portion of the sewer system.

Historical study work completed for the area, and further confirmed through the analysis summarized herein, determined that sanitary sewage flows for the remainder of the Business Park area would be better directed to a new sewage outlet along Russell Street to Scott Street as capacity in the downstream portion of the Durham Street corridor is limited.

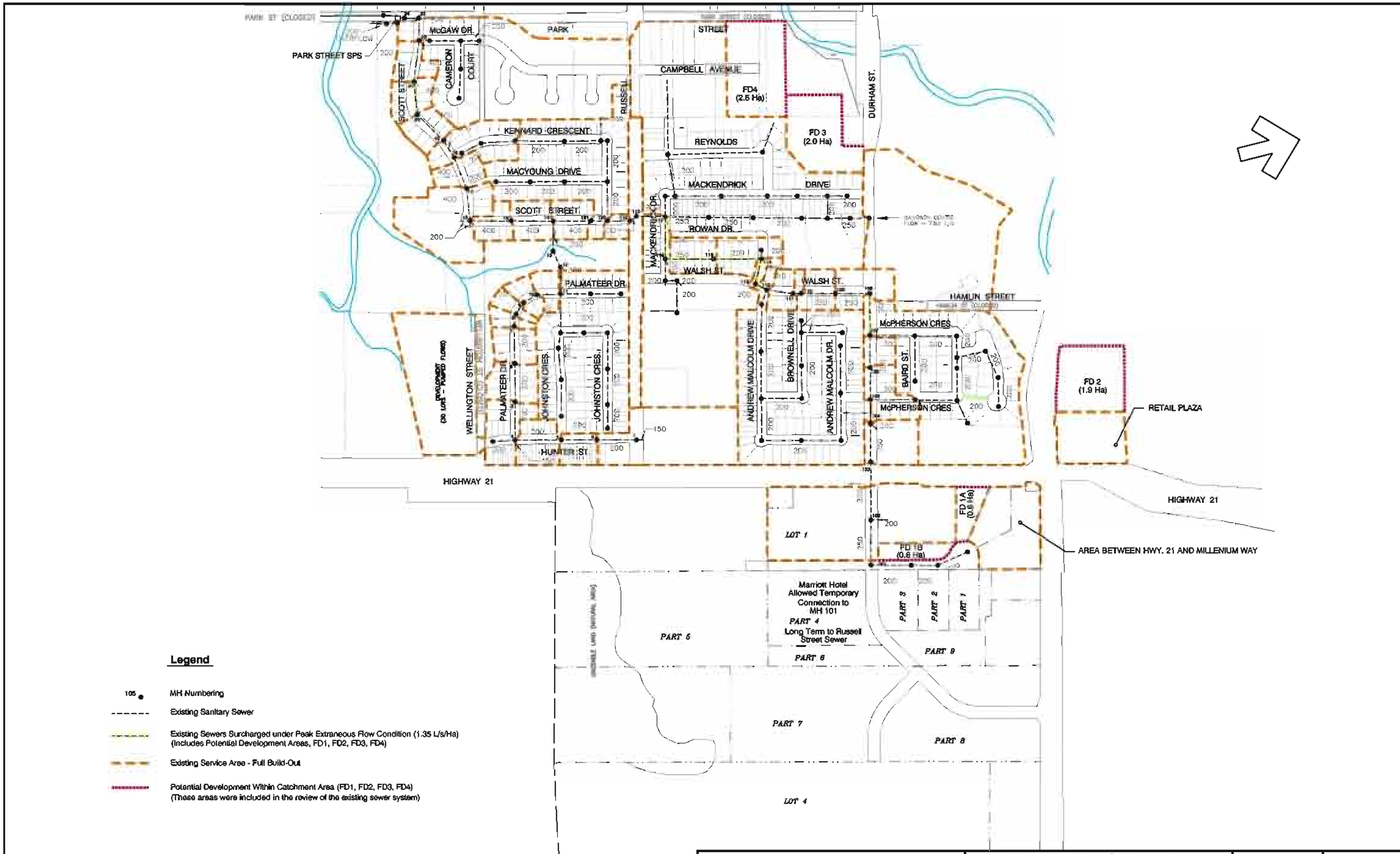
Given the capacity limitations of the Durham Street corridor, any further development requests, beyond what is currently connected to the Durham Street sewer should be considered on a case by case basis.

The following summarizes the existing and proposed data and provides the necessary technical evaluation in support of the use of the Park Street sewage system.

4.1 Existing Collection System

The existing sanitary sewer collection system for the Park Street tributary area was constructed in the 1970s to service the expanding residential growth in Kincardine. At the time, no consideration for an expanded service area, beyond the Highway 21 corridor, was included in those original designs. Figure SA1 shows the current service area that is tributary to the Park Street system. At this time the existing collection system services, in addition to the residential development, the following:

- Davidson Recreation Centre, two schools, one church
- Commercial development along the westerly side of Highway 21
- Business Park development consisting of Canadian Tire, Tim Horton's, Sobey's, a bank, Holiday Inn Express, Boston Pizza, and dentist office.
- Currently under construction and not yet contributing sewage is a proposed carwash and the new Marriott Hotel. The Marriott hotel sanitary sewage connection to the Durham Street outlet is considered temporary until such time that additional sanitary sewer extensions may be completed to the Russell Street corridor.



BMROSS engineering better communities	**Municipality of Kincardine** **Kincardine Business Park** **Servicing - Sanitary** Existing Conditions and Associated Drainage Areas	DATE June 2016 SCALE 1:7,500	PROJECT No. 08055 FIGURE No. SA1

4.2 Existing Collection System Sewage Flows

Existing sewer capacities are assessed by comparing the actual carrying capacity of the various sewer sections to the expected peak flow rates that must be conveyed in these sections. For the existing Park Street sewage pumping station drainage area the total sewage flows are comprised of:

- A domestic sewage flow component. (Residential and Commercial); and an
- Extraneous sewage flow (infiltration and inflow) component.

For the purpose of this investigation, peaked values for the various sewage flow components have been calculated on an area flow basis in litres per second per hectare (L/s/ha) based on calculations summarized below.

4.3 Sewage Flow Data

In 2011, a review of the sanitary sewage system was completed based on sewage flow data from the late 2000's. This information is presented below in Table 1A:

Table 1A
Sewage Flow Data for 2006 to 2009

Year	Pumped Volume m^3	Average Day m^3/day	Max. Day m^3/day
2006	350577	960	3177
2007	299313	820	4536
2008	392465	1075	6454
2009	326686	895	5053
Avg.	**340,000**	**940**	**6454**

For comparison purposes, sanitary sewage data for more recent years was reviewed and summarized below in Table 1B:

Table 1B
Sewage Flow Data for 2012 to 2015

Year	Pumped Volume m^3	Average Day m^3/day	Max. Day m^3/day
2012	322,163	880	2294
2013	345,870	949	9012
2014	344,601	943	3121
2015	293,944	806	2234
Total	**325,000**	**895**	**9012**

Based on a review of the above it is evident that the average day flow has not changed significantly from past years of record. A high flow event was recorded however in 2013 that exceeded the event recorded in 2008.

4.4 Existing Domestic Sewage Flows

A domestic sewage flow component is defined as the total wastewater flow exclusive of any extraneous (infiltration/inflow) component.

From the data provided in Table 1A and 1B, a domestic sewage flow component of approximately 900 m^3/day seems to be an appropriate average day flow for the more recent years of record considered.

4.5 Existing Maximum Extraneous Sewage Flows

Based on the above information, maximum day flow events were observed in 2008 (January thaw/rain event) with a value of 6454 m^3/day (75 L/s) and in 2013 (January thaw/rain event) with a value of 9012 m^3/day (104 L/s). As reported by Kincardine Operation staff, during the 2008 event it was necessary to run 3 pumps to avoid a bypass.

The Operation staff noted that events, such as the one in 2013, have occurred where 3 pumps have not been able to keep up with the peak flow and a "bypass" resulted. During these "bypass" events, the recorded data does not accurately represent the max. daily flow as the wetwell transducer (during the submerged period) will not accurately record the wetwell volume during the bypass period.

Given the above information, the most reliable data available is the January 2008 event where a bypass almost occurred but did not. However, in order to provide a conservative approach to the evaluation of the sewage collection system it is suggested that the flow event from the 2013 data be used to estimate the peak flow for the existing tributary area.

The total drainage area tributary to the Park Street SPS, near the end of 2015, was in the order of 100 Ha.

For the sake of round numbers the following values are suggested:

- Average Domestic Sewage Flow = 900 m^3/day
- Peak Extraneous Flow Value = 9000 m^3/day

As part of the recommendations of this study, the Municipality should complete an investigation to determine (where possible) the source(s) of the extraneous flow and reduce or eliminate the source, where possible.

4.6 Existing Total Sewage Flows – Calculation of Area Flow Rate Extreme Extraneous Flow Conditions

Using the values stated above, an existing total peak sewage flow value can be calculated for the existing drainage area as follows:

$$\text{Q peak (L/s/ha)} = \frac{(\text{Avg. Domestic Q} \times 4.0) + (\text{Max Extraneous Q})}{(\text{Drainage Area (ha)} \times 24 \times 60 \times 60)} \times \frac{1000}{1}$$

Where:

Average Domestic Sewage Flow = 900 m^3/day

Domestic Peak Factor = 4.0 x Avg.

Total Peak Extraneous Flow Value = 9000 m^3/day

Drainage Area = 100 Ha

Max Extraneous Q = Recorded high max day – Avg. Domestic day
= 9000 m^3/day – 900 m^3/day
= 8100 m^3/day

Therefore:

$$\text{Q peak (L/s)} = \frac{(900 \text{x} 4.0) + (8100)}{100 \times 24 \times 3600} \times \frac{1000}{1}$$

= **1.35 L/s/ha** (Based on existing flow information)

By comparison, standard MOECC Design Guidelines for sewage flow in L/s/ha would be calculated as follows:

$$\text{Q peak (L/s/ha)} = \frac{\text{Avg. Domestic Q} \times 4.0}{1\text{ha} \times 24 \times 60 \times 60} + \text{Extraneous Q allowance}$$

Where:

Avg. Domestic Q = 450 L/capita/day x 40 persons/ha
= 18,000 L/day/ha

Domestic Peak Factor = 4.0 x Avg.

Max Extraneous Q = 0.2 L/s/ha

Therefore:

$$Q\ peak\ (L/s) = \frac{18{,}000 \times 4.0}{1 \times 24 \times 3600} + 0.2$$

$$= \mathbf{1.03\ L/s/ha}\ \text{(Based on MOECC design guidelines)}$$

From the above calculation, it can be seen that the recorded domestic and peak extraneous flows are in the area of 30% more than standard MOECC design guidelines. This demonstrates the significance of the high extraneous flow events on the calculation of remaining sewer capacity and the need for the municipality to be vigilant in pursuing the reduction of these extraneous flows.

For the purpose of this report the unit peak flow rate of 1.35 L/s/ha will be used in capacity considerations and the evaluation of sewer and pipe capacities.

4.7 Existing Collection System

The existing collection system for the Park Street Pumping Station has been analyzed assuming that the tributary area has been built-out. Total peak sewage flows have been applied to the system based on the unit peak flow rate of noted above. The evaluation of the existing system includes the following:

- Existing Tributary Area: 100 Ha
- Area FD1A: 0.6 Ha (Area immediately north of Canadian Tire)
- Area FD1B: 0.6 Ha (Proposed Carwash site)
- Area FD2: 1.9 Ha (Residential west of Liquor Store Retail plaza)
- Area FD3: 2.0 Ha (Possible Residential west of MacKendrick Dr.)
- Area FD4: 2.5 Ha (Planned Residential at north end of Campbell St.)

Future development areas, to the east of Millenium Drive, within the Business Park, have not been included in this analysis as the purpose of the review was to determine what areas of the sewer system do or do not presently have available capacity.

Appendix C includes the existing sanitary sewer design sheets for the drainage areas noted on SA1 and identifies the design flows under current peak domestic and the maximum extraneous flow event discussed above.

4.7.1 Existing System Analysis and Areas of Concern

Assuming build-out of the current tributary area, and inclusion of areas FD1 to FD4, Figure SA1 identifies the existing sewers which will theoretically experience surcharging. These areas are identified as follows:

- Scott Street (21-22):

  This single section of sewer is predicted to have minor surcharging that is less than 100 mm above the top of the pipe. The sewer is at a depth of over 5.0 m in this location and the calculated amount of surcharging should not negatively impact the system.

- Walsh and Mackendrick (115-117):

  This section of sewer is predicted to have minor surcharging ranging from 200 mm to 300 mm above the top of pipe. As the sewer is at a depth ranging from 3.8 m to 6.0 m the surcharging is not expected to negatively impact development that are connected to the pipe.

- Durham Street (107-108):

  This single section of sewer is predicted to have minor surcharging that is less than 200mm above the top of the pipe. As the sewer is at a depth of over 3.6 m in this location the calculated surcharging should not negatively impact the system.

4.7.2 Existing System Observations and Opportunities

Based on the analysis and modelling of the existing system, the following observations and opportunities are summarized:

- The Durham Street sewer is not of sufficient depth to provide sanitary outlet for the southerly half of the Business Park lands.

- It is suggested that areas beyond those identified on Figure SA1 be excluded from the Durham Street sanitary sewer corridor so that the limited capacity available on Walsh and Mackendrick is not reduced further.

- The existing sewer on Scott Street is at a depth ranging from 3.2 m to 7.5 m and as such some degree of surcharging within this section of sewer (structures 118 to 121 and structures 14 to 24) can be tolerated.

Following a review of the above observations, the preferred and most practical means of servicing the Business Park area appears to be through the construction of a new trunk sewer along Russell Street, from Highway 21 to Scott, with outlet to the existing sanitary sewer at the Russell and Scott Street intersection.

The Municipality of Kincardine completed the design of this sewer in 2005 and received MOECC approval for the construction from Scott Street to east of Highway 21 at that time. Unfortunately, the approval contains a construction window which limits its validity to only 5 years. Since the sewer has not been constructed an amendment application in the future will be necessary to allow construction of the Russell Street sewer to proceed.

Given the contemplated development densities for the Business Park , additional assessment was undertaken, as part of this study, to review the impact of adding sewage flow to the Scott Street sanitary sewers and the Park Street sewage pumping station. The following provides details related to this review.

4.8 Scott Street Sewer – Impact from Business Park

4.8.1 Business Park Design Flows

Review of design flows for the full development of the Business Park are based upon MOECC guidelines. It is recognized, however, that the MOECC guidelines may be conservative given that the possible uses within the Business Park area may ultimately consist of “dry” type industry and big box shopping centres which typically do not generate significant sewage amounts.

The Business Park is to consist of a mix of various development types including the following:

- Residential (R)
- Highway Service Commercial (HSC)
- Large Format Commercial (LFC)
- Light Industrial (LI)

Sewage Criteria for each development type is summarized below:

Residential Population Density = 35 ppHa
Residential Sewage Flow = 450 L/cap/day

Land Use	Average Sewage Flow	Peaking Factor	Infiltration Allowance
R	0.18 L/Ha/s	Harmon	0.2 L/Ha/s
HSC	0.28 L/Ha/s	2.0	0.2 L/Ha/s
LFC	0.28 L/Ha/s	2.0	0.2 L/Ha/s
LI	0.35 L/Ha/s	3.5	0.2 L/Ha/s

Figure SA2 provides an illustration of the various development types and areas within the Business Park areas as well as the limit of the current tributary area.

The stages referred to herein should not be confused with suggested phasing. The development stages have been defined as a way to define the tributary areas considered as part of the collection system analysis and were somewhat arbitrarily established.

A summary of the possible future development areas (as illustrated in Figure SA2) are summarized below:

- Stage 1A

  Represents the remaining potential development areas that are immediately adjacent to, or within, the current tributary drainage area for the Park Street SPS.

- Stage 1B

  Represents the most westerly half of the Business Park that is not yet developed.

- Stage 2

  Stage 2 is represented by the easterly half of the Business Park lands.

- Stage 3

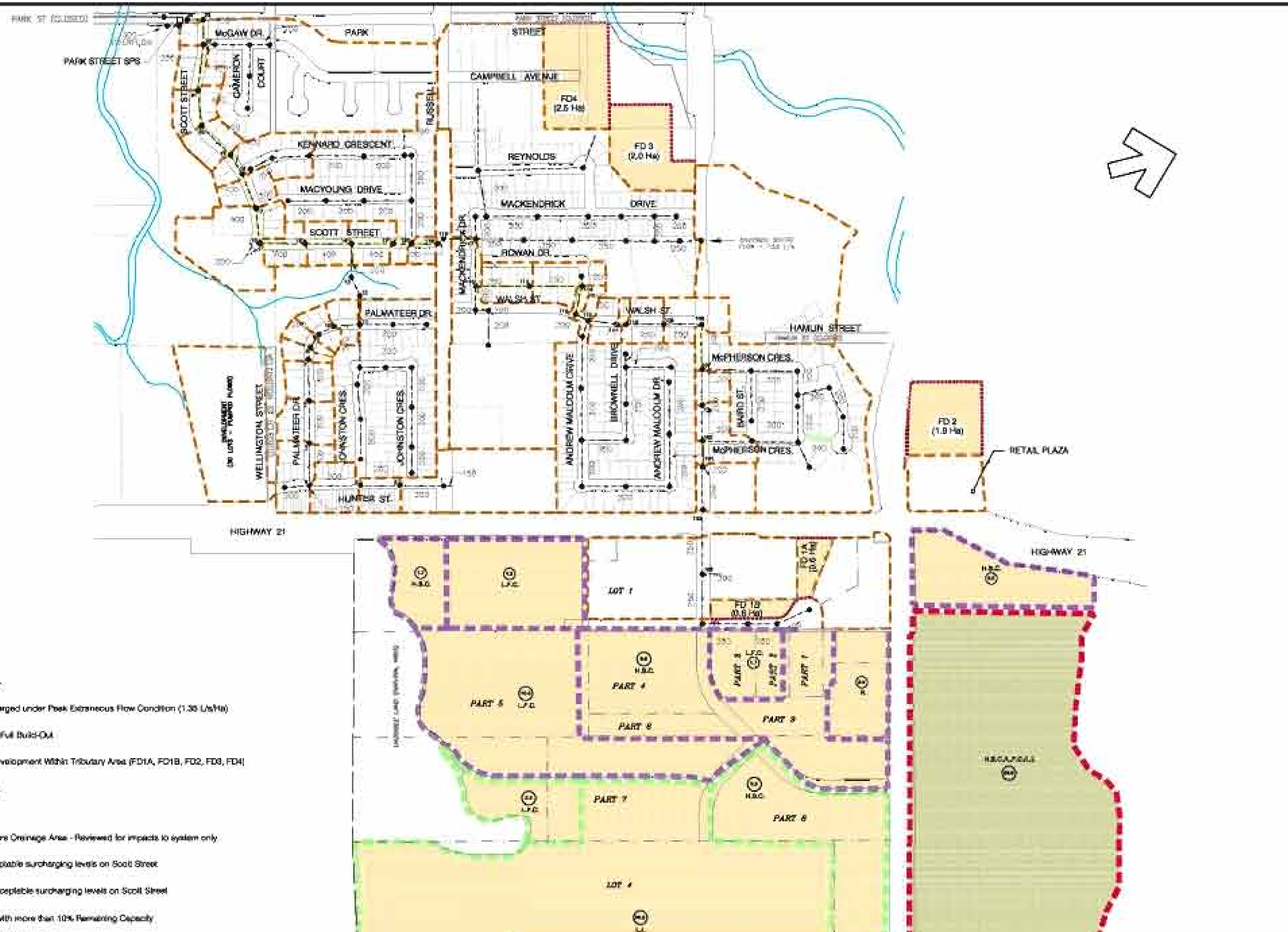
  Stage 3 represents the area north of Highway 9 which is currently not included in the official plan area of the Municipality. This area was included in the collection system review to determine the feasibility of including it in the tributary area of a new sewer.

A detailed summary of the development types that each Stage is comprised of is summarized below in the following table:

Stage	**Development Type (Ha)**				**Summary (Ha)**
	R	**HSC**	**LFC**	**LI**	
1A	6.4	1.2	0.0	0.0	7.6
1B	2.2	15.1	16.3	0.0	33.6
2	0.0	9.7	2.2	20.8	32.7
3	0.0	7.6	7.6	7.6	22.9
Total	**8.6**	**33.6**	**26.1**	**28.4**	**96.8**

Given the above areas and the development types, the following peak sewage flows are estimated for each area:

Stage	**Total Additional Flow to Park St. SPS**	
	Incremental Flows L/s	**Note**
Stage 1A	7.0	Flows to Outlet upstream of Scott St. and Russell St.
Stage 1B	26.0	Flows to Russell St. Sewer
Stage 2	31.0	Flows to Russell St. Sewer
Stage 3	20.0	Flows to Russell St. Sewer



Legend

MH Numbering

Existing Sanitary Sewer

Existing Sewers Surcharged under Peak Extraneous Flow Condition (1.36 L/s/Ha)

Existing Service Area - Full Build-Out

Stage 1A - Potential Development Within Tributary Area (FD1A, FD1B, FD2, FD3, FD4)

Stage 1B Development

Stage 2 Development

Stage 3 - Possible Future Drainage Area - Reviewed for impacts to system only

Areas resulting in acceptable surcharging levels on Scott Street

Areas resulting in unacceptable surcharging levels on Scott Street

Existing Trunk Sewer with more than 10% Remaining Capacity

Existing Sewers Approaching Capacity

Existing Sewers Surcharged

BMROSS engineering better communities	**Municipality of Kincardine** **Kincardine Business Park** **Servicing - Sanitary** Future Conditions - Stage 1, 2, 3 and Associated Drainage Areas	DATE June 2016	PROJECT No. 08055
		SCALE 1:7,500	FIGURE No. SA2

4.8.2 Capacity Analysis

Appendix C includes a copy of the sanitary sewer design sheets prepared to review the impact of adding the incremental stages, summarized above, as noted on Figure SA2.

4.8.3 Development of Stage 1B

Under this scenario it is assumed that the existing tributary area is built-out in addition to the first half of the future business park lands that are not yet developed. These future flows are to be conveyed within the new sanitary sewer on Russell Street.

The addition of the predicted flows from Stage 1B of the Business Park area will result in most of the Scott Street sewer surcharging beyond what it currently experiences under wet weather flow conditions. Existing sanitary sewers from structure 14 to 22 range in depth from 3.4 to 7.5 metres. The surcharge depths correspondingly range from 0.1 metres to 0.5 metres above the top of the existing pipe. The resultant theoretical surcharge levels are not considered significant given the depth of the sewer system.

The addition of Stage 1B development can be accommodated in the Scott Street sanitary sewer.

4.8.4 Development of Stage 2

Under this scenario it is assumed that the Stage 1A and Stage 1B lands have been developed in addition to Stage 2 which complete the development of the Business Park. These future flows would be conveyed within the new sanitary sewer on Russell Street to its outlet at Scott Street Predicted flows from Stage 1A, 1B and Stage 2 of the Business Park area will result in all of the Scott Street sewer surcharging beyond what it currently experiences under wet weather flow conditions. Existing sanitary sewers from structure 118 to 120 and from structure 15 to 24 will have acceptable surcharge depths that in theory do not come with 2.5 metres of the finished ground. Existing sanitary sewers from structure 120 to 15 are somewhat shallower with depths between 3.2 and 4.2 metres. This section of sewer may experience surcharging depths that in theory could be within 2.5 metres of the finished ground. It is recommended that monitoring of these locations be completed near the end of build-out of Stage 2 and the Business Park.

Stage 1 and Stage 2 of the Business Park area will theoretical contribute a combined sewage flow of about 59 L/s to the Park Street system and will require a 300mm sanitary sewer on Russell Street installed at a minimum grade of 0.5%.

4.8.5 Addition of Stage 3

Under this scenario about 27 Ha more of developed land area will be added beyond the Stage 1B and Stage 2 development from the north side of Highway 9. Predicted flows from all three stages of development will result in a greater level of surcharging than what would be acceptable. Theoretical depths of surcharging on Scott Street range will come within 0.5 metres of the finished grade in the shallower sections of the sewer.

The possibility of basement flooding with the inclusion of the Stage 3 area is very high along several sections of Scott Street and possibly some branch sewer sections. In order to accommodate the future Stage 3 lands, the existing sewers on Scott Street would require upgrading or an alternative relief sewer would need to be installed to remove sewage flow from the Scott Street sewers. It is understood that the soil and water table conditions in the area of Scott Street would significantly complicate construction activities and possible future sewer replacements if the Stage 3 area was to be considered.

Based on the forgoing, the Municipality may wish to incorporate capacity into the proposed Russell Street Sewer and the internal pipe network of the Business Park with the understanding that Stage 3 could only proceed in the future following long term monitoring of the sewage flows within the Scott Street Sewer and/or the upgrade of the Scott Street system at some point in the future.

4.8.6 Summary of Collection System Review

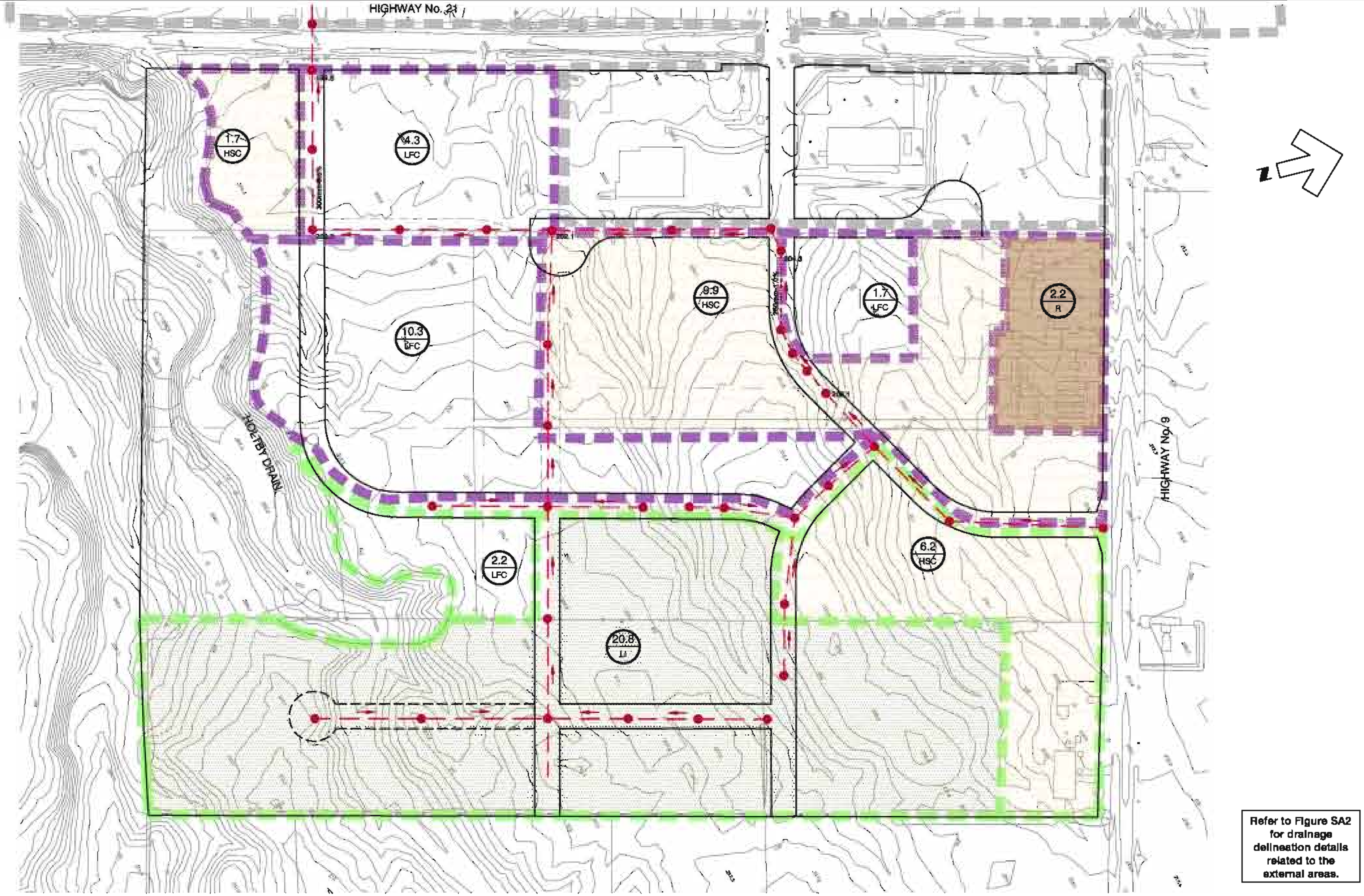
It is recommended that the Municipality proceed with the construction of the Russell Street sanitary sewer as follows:

- Allow the additional development on the remaining northerly part of lot 1 to proceed with the Durham Street sewer outlet

- Consider on a case by case basis to allowing some of the future development along Millenium Way with access to the Durham Street sewer outlet.

- Construct or have constructed the Russell Street trunk sewer to provide access to the Business Park lands.

Figure SA3 shows the potential location of sanitary sewer route in the business park area.



Refer to Figure SA2 for drainage delineation details related to the external areas.

Legend

	Highway Service Commercial		Light Industrial		Stage 1B Development Areas
	Large Format Commercial		Proposed Sanitary Sewer and Invert		Stage 2 Development Areas
	Residential		Built Sanitary Sewer and Invert		Existing Servicing Area

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Municipality of Kincardine
Kincardine Business Park
Servicing - Sanitary

Detailed Area Plan -
Proposed Sanitary Sewer Layout

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1:4,000	SA3

4.9 Assessment of Park Street Sewage Pumping Station Capacity

4.9.1 Introduction

The Park Street Sewage Pumping Station was originally designed by BMROSS and constructed in 1976. The station was sized based on population values provided at the time by the upstream land developer.

The station is a drypit/wetwell configuration with 3 pumps in total (2 pumps in parallel providing the required capacity). The station drypit/wetwell are constructed below the control building which houses the existing 75 kW generator. All three pumps are Fairbank Morse Series 5443-32, 22.4 kW (30 Hp).

The station pumps directly to the headworks of the Kincardine sewage treatment plant through approximately 1,200 metres of 300mm dia. forcemain. A portion of the existing forcemain was installed under the Penetangore River.

4.9.2 Calculation of Existing Peak Sewage Flow to Station under Extreme Extraneous Flow Conditions

Based on the 2013 peak flow event it is estimated that the upon occasion, the pumping station sees wet weather peak flow of approximately 115 L/s. It is noted that this value assumes a 10% uncertainty factor.

Based on the expected peak sewage flow and current pump capacities, it is therefore evident that the inflow rates to the Park Street pumping station are exceeding the stations firm capacity (two pumps) under an extreme extraneous inflow period as on several occasions the operation of all 3 pumps has been required and still has not averted a bypass situation.

4.9.3 Calculation of Proposed Peak Sewage Flow to Station with Business Park Areas Included

The anticipated cumulative peak sewage flow to the Park Street Sewage Pumping Station is estimated as follows:

- Existing 115.0 L/s
- Stage 1A 122.0 L/s
- Stage 1B 148.0 L/s
- Stage 2 179.0 L/s
- Stage 3 199.0 L/s

4.10 Drawdown Testing

Drawdown testing to determine current pump capacities was conducted on April 14, 2008 which revealed the following pump operating conditions.

- Pump 1 60 L/s
- Pump 2 59 L/s
- Pump 3 55 L/s
- Pump 1 and Pump 2 85 L/s
- Pump 2 and Pump 3 82 L/s
- Pump 1 and Pump 3 82 L/s

4.11 Pumping Station Improvements

It is acknowledged that pumping station improvements are required as the development of the Business Park proceeds.

Three basic alternatives with possibilities for staging to increase the capacity of the existing pumping station to meet the cumulative peak sewage flow received at the Park Street SPS were identified and evaluated. These were:

- Install larger pumps in the existing dry pit and use the existing forcemain.
- Retain the existing pumps and twin the existing forcemain.
- Install larger pumps and twin the existing forcemain to maximize station capacity.

Detailed calculations related to the review of the station capacity and upgrade possibilities are included in Appendix D.

4.11.1 Alternative 1 – Install Larger Pumps in the Existing Dry Pit and Use the Existing Forcemain

Revised station capacity: 155 to 190 L/s (depending on motor size selected)
Probable option cost: $840,000 to $960,000

Discussion:

- This would involve replacing all three existing pumps with 63 kW (85 Hp) to 78 kW (105 Hp) units and will increase the capacity by 90 to 130% depending on which pump is selected.

- A substantial increase in the discharge pressure is required to move the greater flows through the existing forcemain. This results in greater power costs for operation and increased risk of forcemain failure.

- The existing standby power system will not be adequate for the larger pumps and will need to be replaced with a larger unit.

- VFD control of the larger pumps will be required to avoid excessive cycling and to maintain forcemain velocities to within the range suggested by the MOE in their guidelines.

- Modifications to the power supply and pump control system will likely be required under this option which given the age of the station is probably an appropriate maintenance upgrade at this time.

4.11.2 Alternative 2 – Retain Existing Pumps and Twin the Existing Forcemain

Revised station capacity: 115 L/s
Probable option cost: $960,000

Discussion:

- This option involves installing a second 300mm diameter forcemain from the existing pumping station to the existing inlet structure at the lagoons. A second forcemain will allow two of the three pumps to pump through its own forcemain. This should allow each of the pumps to deliver its full single-pump capacity when operating in parallel. This would then give a station capacity of around 115 L/s. It is noted that twinning the forcemain alone does not provide sufficient capacity to accommodate the future business park development.

- Operation in this manner would mean that there would be no electrical or standby power upgrade requirements under this option.

- Modifications will be required to the existing bypass valve chamber and the lagoon inlet chamber to accommodate the second forcemain.

- Capacity could be increased further through pump replacement (see Alternative 3)

4.11.3 Alternative 3 – Replace Existing Pumps and Twin the Existing Forcemain

Revised station capacity: 230 L/s
Probable option cost: $1,920,000

Discussion:

- This is a combination of the previous options which will maximize station capacity by replacing the existing pumps with three new pumps, each having a capacity of 115 L/s, and twinning the existing forcemain. This will give a firm station capacity of 230 L/s, with one pump acting as standby.

- Cost is high relative to the increase in station capacity that can be achieved through a straight pump replacement.

Considering the upgrade options contemplated, Alternative 1 is preferred. It allows capacity to be staged by changing the pump motor size and has less environmental impact than the forcemain twinning associated with Alternative 2 or 3.

4.12 Summary

Portions of the sewage collection system are at or near capacity under existing wet weather sewage flow conditions.

Allowing significant flows to the Durham Street outlet would result in replacement of numerous sections of sewers throughout the collection system both on the Durham Street and Russell Street outlet.

It is recommended that a Russell Street trunk sewer be constructed from Scott Street easterly to provide collection for flows from the Business Park area east of Highway 21 and south of Highway 9.

Based on the expected peak sewage flow, current pump capacities of the Park Street SPS, and occasional by-pass events, it is evident that the inflow rates to the Park Street pumping station are at times beyond the stations firm pumping capacity and requires upgrade to accommodate any significant additional flows. As summarized above, the following alternatives were considered:

- Install larger pumps in the existing dry pit and use the existing forcemain.
- Retain the existing pumps and twin the existing forcemain.
- Install larger pumps and twin the existing forcemain to maximize station capacity.

The installation of larger pumps and pumping through the existing forcemain appears to be the most practical means of increasing the pumping capacity of the Park Street SPS and will provide the benefit of upgrading the existing pump control and communication system with current more modern technology.

5.0 STORMWATER MANAGEMENT

In conjunction with the development of the Kincardine Business Park, The Municipality of Kincardine is proposing the construction of stormwater management facilities to control the stormwater runoff from the proposed development area.

Two new facilities will be required which have been designed as water quality and quantity treatment ponds (wet pond facilities) in accordance with the "Stormwater Management Planning and Design Manual" by the MOE, dated March 2003 and the requirements of the Saugeen Valley Conservation Authority (SVCA) and the Ministry of Transportation.

5.1 Existing Conditions

5.1.1 Site Topography and Soils

The site can be described as moderate sloping with underlying soils identified as being a Berrien Sandy Loam (Bes) and Perth clay loam (Pc) as classified under the hydrologic soil group "B-C". Both these soils are further described as imperfectly drained soils.

5.1.2 Pre-Existing Drainage Conditions

Existing drainage for the general watershed area is typically in an east-west direction towards the Highway No. 21 road corridor.

The proposed Business Park is traversed by a series of main catchment groups (including the Holtby Drain) that convey flows to one of two separate outlet locations under Highway No. 21:

A) 1500mm CSP Culvert

This culvert is located at the upstream end (under Highway No. 21) of the storm sewer system along the north limit of the school property. The total drainage area tributary to this outlet is about 82 Ha.

B) 5790 x 3650 mm Multi-Plate Arch

This large multi-plate structure is located on a tributary of the Penetangore River, immediately south of the Business Park. The total drainage area upstream of this outlet is about 1840 Ha.

It is recognized that an area of commercial development exists along the Highway 21 corridor from Highway 9 southerly for about 600 meters and spans from Highway 21 to Millenium Way. These development areas have their own existing runoff control measures that have been designed, approved, and constructed through the appropriate planning process.

In order to adequately compare the original conditions that the two Highway 21 outlets would have been designed for, the pre-development hydrologic modeling has been prepared assuming that the existing commercial area was not developed.

The main catchment groups that traverse the business park lands, and their corresponding sub-catchment areas, are summarized below:

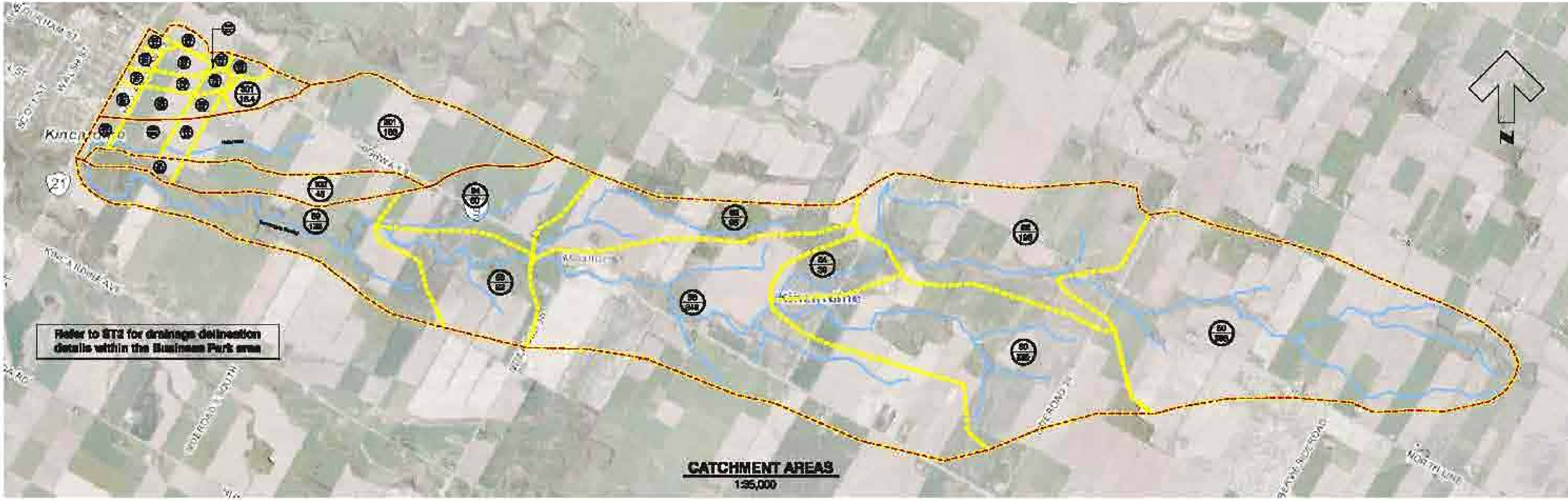
Outlet Location A – 1500mm CSP Culvert

The catchment group consisting of drainage areas 301, 302, 303, 304, 401, 402, 403, 404, 501, 502, 503, 504, 603, and 605 discharge to the Highway 21 corridor ditch and to outlet location A (1500mm CSP Culvert).

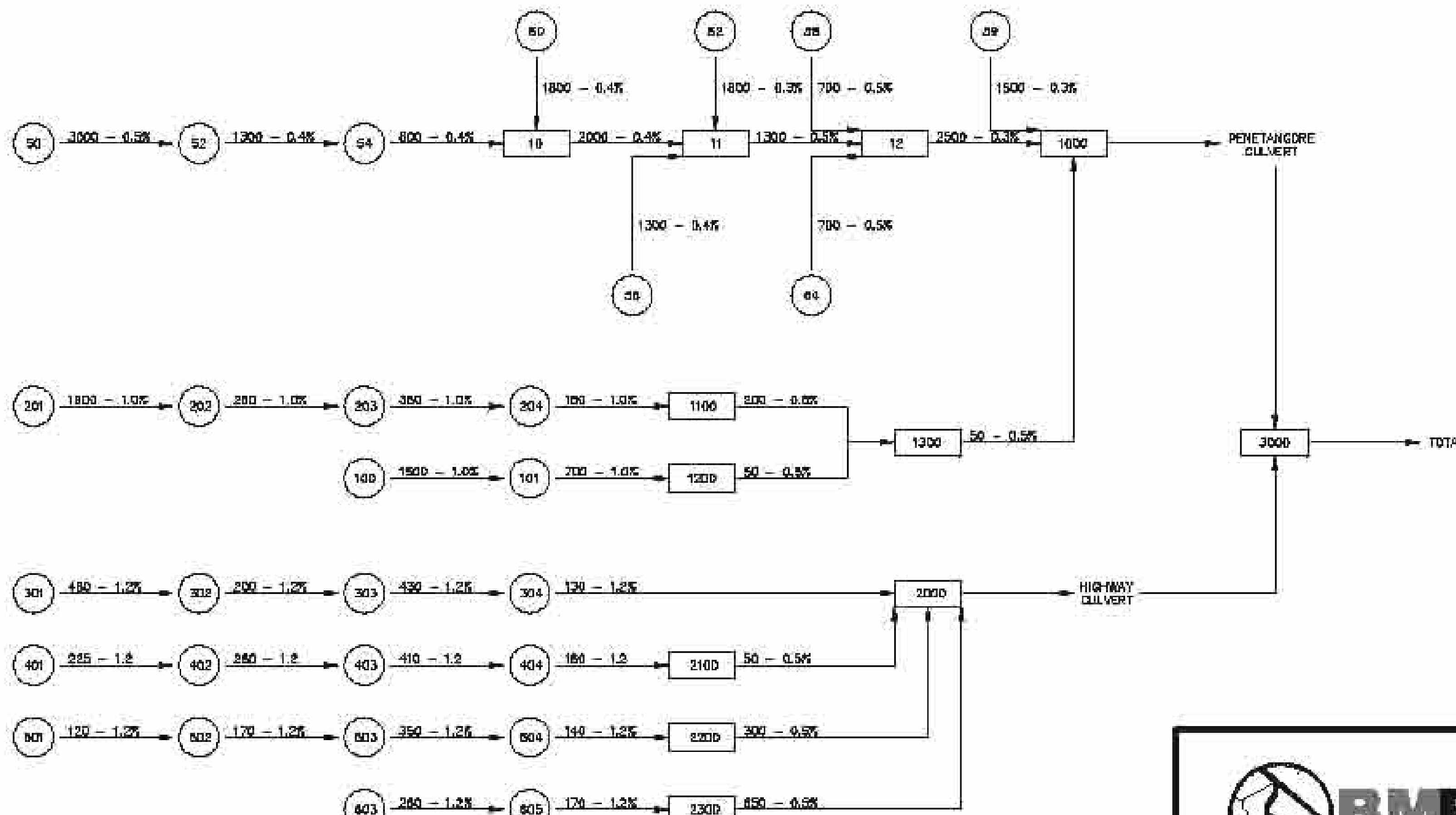
Outlet Location B – 5790 x 3650 mm Multi-Plate Arch

The catchment group consisting of drainage areas 50, 52, 54, 56, 58, 59, 60, 62, 64, 100, 101, 201, 202, 203, 204 discharge to the Highway 21 Multi-Plate Arch on the tributary of the Pentangore. Catchments 201 through 204 represent the drainage limits for the Holtby Drain and total approximately 194 Ha.

Figures ST1 and ST 2 illustrate the pre-existing drainage features for the area.



CATCHMENT AREAS
1:35,000



MIDUSS MODEL SCHEMATIC

Legend

- Pre-Existing Drainage Catchment Areas
- Delineation of Primary Catchment Groups
- Existing Open Channel Drain
- Miduss Drainage Catchment (I.D. / Area in Hectares)
- Catchment Area / I.D.
- 2000 – 0.4% Conveyance (Channel / Pipe)
- 3000 Confluence Location

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Servicing - Stormwater Management

Pre-Existing Drainage Areas and Miduss Modelling Schematic

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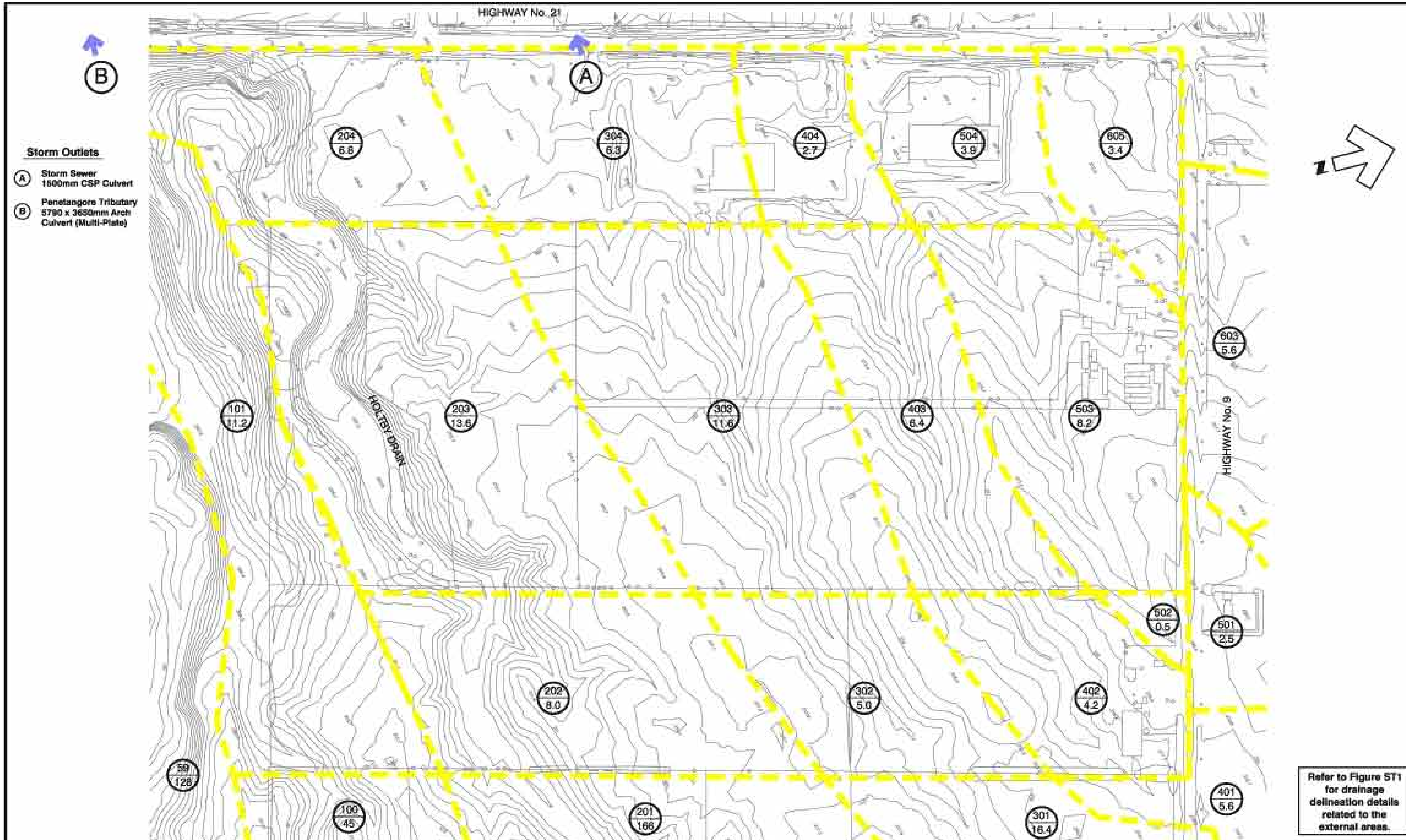
SCALE	FIGURE No.
1:35,000	ST1



Legend

Pre-Existing Drainage Catchment Areas

151 / 135 — Midusa Drainage Catchment (I.D. / Area in Hectares)

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Municipality of Kincardine
Kincardine Business Park
Servicing - Stormwater Management

Detailed Area Plan -
Pre-Existing Drainage Areas
and Midusa Modelling Schematic

DATE	PROJECT No.
June 2016	08055
SCALE	FIGURE No.
1:4,000	ST2

5.2 Stormwater Management Criteria

The stormwater management plan for the Kincardine Business Park has been developed to minimize any impacts to the downstream drainage systems and watercourses.

The stormwater management criteria for the area has been developed based on previous development proposals and past discussions with the SVCA. The criteria for both Quantity and Quality control measures are summarized below:

5.2.1 Quantity Control Criteria

Provide suitable attenuation storage so that the peak flows are not exceeded. The following locations will be used for comparison purposes:

i. Holtby Drain (immediately prior to its convergence with the Penetangore tributary)
ii. Highway 21 Outlet A - CSP culvert (school site)
iii. Highway 21 Outlet B - Multi-plate Arch culvert (Penetangore tributary)
iv. Combined Flow at both Highway 21 outlet locations.

5.2.2 Quality Control Criteria

The following summarizes the water quality control requirements for each of the two outlet locations:

a) 1500mm CSP Culvert – All runoff shall meet MOE "Enhanced" Level criteria (80% TSS removal) prior to discharge to any open watercourse.

b) 5790 x 3650 mm Multi-Plate Arch – All runoff shall meet MOE "Enhanced" Level criteria (80% TSS removal) prior to discharge to any open watercourse.

All of the above is to be addressed and designed in accordance with the "Stormwater Management Planning and Design Manual" by the MOE, dated March 2003.

5.2.3 Consideration of External Lands

The new stormwater management facilities will provide for quantity and quality control of stormwater discharge from the proposed development areas within the Business Park lands.

Although some of the external drainage areas, generally east of the Business Park, will be conveyed through the proposed stormwater management facilities, the external lands have been modeled in their current state (i.e., agricultural usage) and remain unchanged under the future development conditions. Future development of these external lands will require a further review of stormwater management for each particular area.

5.2.4 Methodology for Computing Stormwater Run-off

Pre and post development modelling was prepared using Miduss V2 (Allen A. Smith Inc., 17 Lyndale Drive, Dundas, Ontario, L9H 3L4) to simulate the following synthetic design storms and rainfall events:

- Goderich 6 hr, SCS Type II for the 1:2 through 1:100 year return periods

The total rainfall data used in the analysis of the plan was derived from the Goderich Weather Station.

Figure Nos. ST1, ST2, ST3, and ST4 include the following key information used in the development of the Miduss models:

- Miduss Model Schematics for the individual catchments for the existing and proposed drainage area conditions;
- Sub-catchment numbers and drainage boundaries for the existing and proposed drainage area conditions.

Additional input parameter and rainfall summary information is provided in Appendix E.

The initial abstraction values used in the Miduss model are based on a calculated value of 0.1s for all drainage areas. The resulting initial abstraction values range from 5.20 to 8.02 mm for the pervious area which is consistent with that recommended in the Miduss model and the MOE Guidelines. The impervious initial abstraction used results in a value of 0.52 mm which is conservative and will result in similarly conservative flow values.

A summary of the curve number (CN) and manning values used in the model are contained within Appendix E along with the model input parameters noted above. The values used are consistent with standard practice.

Miduss modelling results for the existing and proposed drainage area conditions are presented in Section 4.7 and a printed and digital copy of the Output files have been provided in Appendix F.

It is noted that only printed versions of the 1:5, 1:25, and 1:100 flow events have been provided in the Appendix to minimize the report size.

5.3 Stormwater Management Plan

Two new stormwater management facilities are proposed as part of the plan for the Business Park. The possibility of limiting the new facilities to a single pond was reviewed, however, due to topographical and property constraints a single facility was not feasible.

In addition to the two new ponds noted, the existing dry pond (corner of Durham Street and Highway 2, referred to as Pond 1) will be used to control a portion of the development area.

The following describes the proposed stormwater management plan, in more detail, for those drainage areas located within the Business Park. Figure ST4 can be referred to for details related to the noted catchment areas.

5.3.1 Existing Commercial Area (406, 500, 605, 750, 751)

The existing commercial areas identified as catchments 406, 500, 605, 750, and 751 have been constructed with their own stormwater management facilities. Brief details related to the controls provided for each area are summarized as follows:

5.3.1.1 Areas 406, 500:

Runoff from areas 406 and 500 discharge to the existing SWM facility identified as Pond 1. The pond was originally designed and constructed as a dry pond in conjunction with the Canadian Tire development and in recent years was expanded to include the Sobeys grocery store. The pond is located at the south-east corner of the intersection of Highway 21 and Durham Street and it provides basic water quality along with pre to post water quantity control for the noted catchment areas as well as a portion of the currently undeveloped Business Park area. The pond outlets directly to the ditch located within the Highway 21 road corridor.

5.3.1.2 Areas 750, 751:

These areas have been constructed with roof top control devices to limit the discharge rate to the ditch within the Highway 21 road corridor.

5.3.1.3 Area 605:

This is the latest area of development within the existing commercial lands and currently includes a Boston Pizza, a Holiday Inn Express, and a couple other vacant lease buildings. This catchment area has been designed with on-site quality and quantity control facilities which discharge directly to the ditch along Highway 21.

5.3.2 Catchment Area 604

This area is currently developed with a combination of residential and agricultural type buildings and the area has been developed for some time and was never provided with any type of development control. Future development intensification of these lands will need to address potential impacts related to the runoff characteristics generated from the site.

5.3.3 Catchment Area 405

The existing SWM facility (noted as Pond 1) was designed to accommodate runoff from these future development lands. On-site quality controls however, will be required and it is anticipated that quality control can be provided through the installation of oil-grit separators, or similar type treatment devices, on the property. It is anticipated that both major and minor storm runoff events will be conveyed to Pond 1.

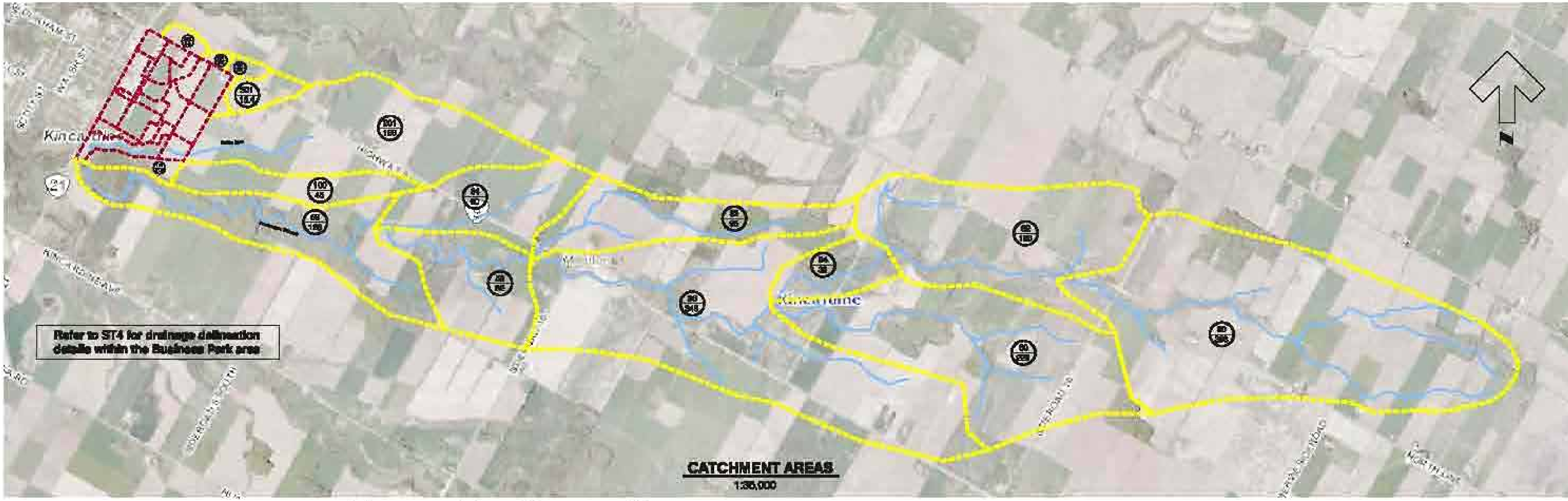
5.3.4 Catchment Areas 302, 303, 310, 402, 403, 404, 407

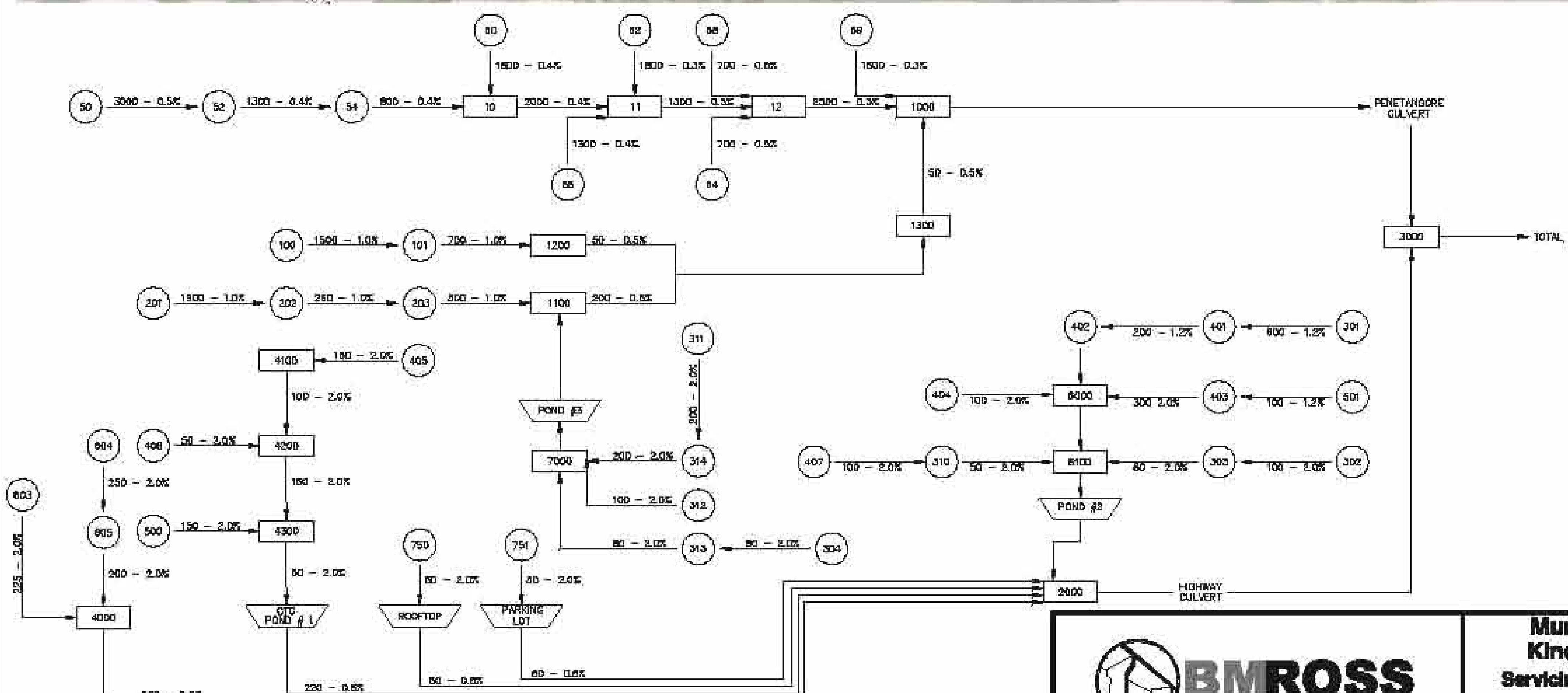
These future development areas are all tributary to the proposed SWM facility noted as Pond 2. The proposed pond has been designed as a wet pond with forebay and main pond features summarized in more detail in later sections of this report. The pond is to outlet into the Highway 21 ditch. As noted, the external lands tributary to Pond 2 have been included in the design based on their current development levels (i.e., 0% impervious).

5.3.8 Catchment Areas 304, 311, 312, 313, 314

These future development areas are all tributary to the proposed SWM facility noted as Pond 3. The proposed pond has been designed as a wet pond with forebay and main pond features summarized in more detail in later sections of this report. The pond is to outlet immediately downstream of the Holtby Drain.

Details related to the design of Pond 2 and Pond 3 are provided in further detail in the following sections related to their design quality and quantity control capabilities. As noted Pond 1 is an existing facility and no modifications to the pond are proposed at this time.



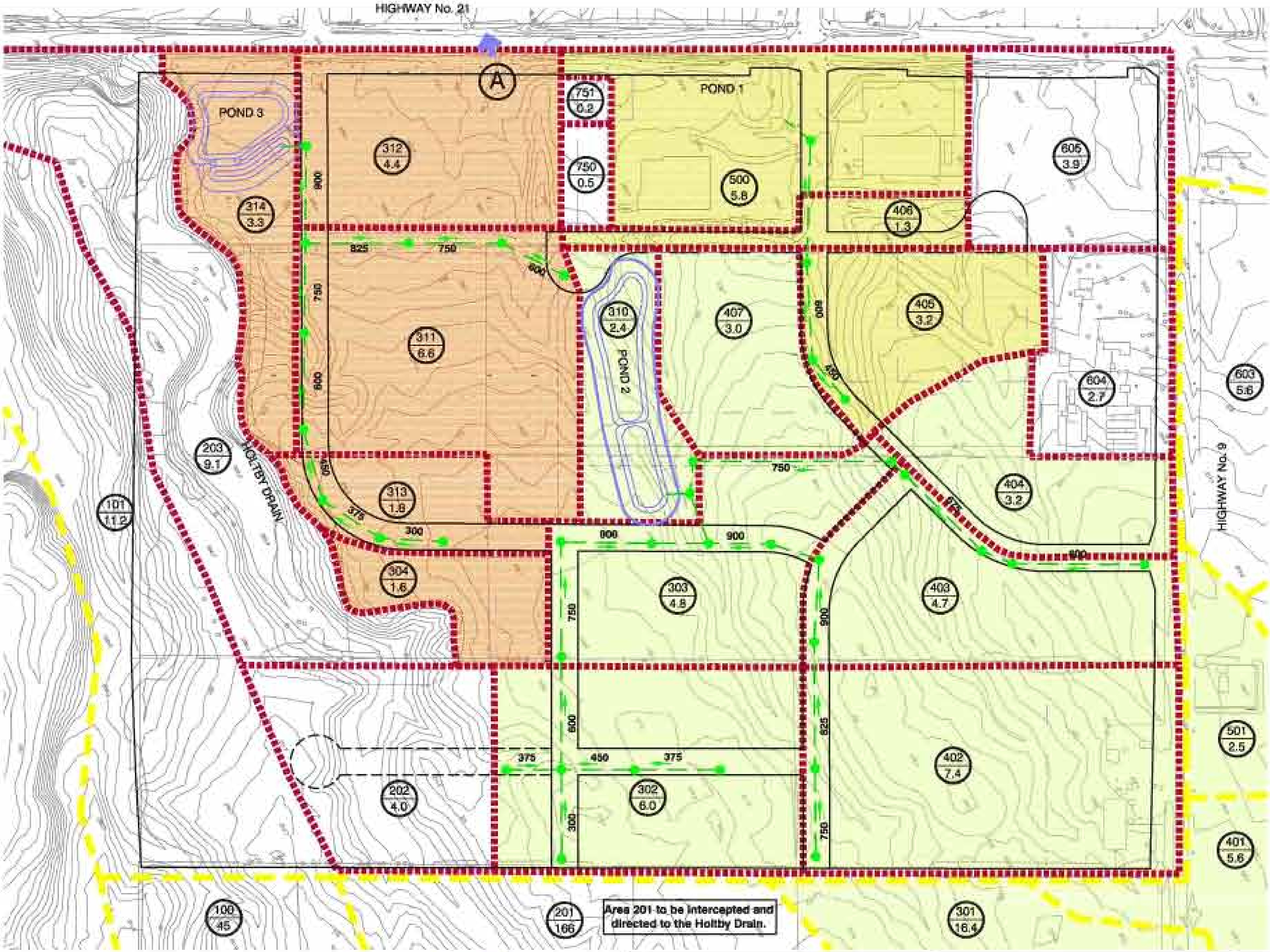


MIDUSS MODEL SCHEMATIC

Legend

- Pre-Existing Drainage Catchment Areas
- Post Development Drainage Catchment Areas (Business Park Area)
- Existing Open Channel Drain
- Miduss Drainage Catchment (I.D. / Area in Hectares)
- Catchment Area / I.D.
- Conveyance (Channel / Pipe)
- Confluence Location

BMROSS engineering better communities	**Municipality of Kincardine** **Kincardine Business Park** **Servicing - Stormwater Management** Post Development Drainage Areas and Miduss Modelling Schematic	DATE June 2016 SCALE 1:35,000	PROJECT No. 08055 FIGURE No. ST3



Refer to Figure ST3 for drainage delineation details related to the external areas.

Storm Outlets

(A) Storm Sewer 1500mm CSP Culvert

(B) Penetangore Tributary 5790 x 3650mm Arch Culvert (Multi-Plate)

Legend

Pre-Existing Drainage Catchment Areas

Post Development Drainage Catchment Areas

151 / 135 Miduss Drainage Catchment (I.D. / Area in Hectares)

1200 Proposed Storm Sewer and Pipe Size (mm)

Pond 1 - Tributary Area

Pond 2 - Tributary Area

Pond 3 - Tributary Area

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Municipality of Kincardine Kincardine Business Park Servicing - Stormwater Management Detailed Area Plan - Post Development Drainage Areas and Miduss Modelling Schematic	DATE June 2016	PROJECT No. 08055
	SCALE 1:4,000	FIGURE No. ST4

5.4 Water Quality Control

As noted in the MOE guidelines, the preferred facility type from drainage areas over 10 Ha is an extended detention wet pond facility. This is the most practical strategy for providing stormwater management within the drainage area for the business park.

Each facility will be designed to include the following:

- Permanent pool area.
- Wet pond quality and quantity control area for extended detention.
- Outlet structure with control gates for possible pond isolation.
- Maintenance access to the forebay and outlet structure.
- Landscaping.

Details and characteristics of each new pond are summarized below:

<u>Pond 2 - Stormwater Management Facility</u>

Design parameters for the facility have been based on the following:

- Drainage area impervious level for lands within the proposed Business Park (31.5 Ha) are to be based on an average value of 64%. It is noted, however that the impervious level for the various catchments varies from between 50% and 75%. The detailed Miduss input parameter sheets (refer to Appendix) should be referred to for the specific impervious value of each catchment area. The external tributary lands (24.5 Ha) have been modeled based on their current impervious level of 0%.

    - Proposed Business Park Area: 31.5 Ha
    - Average Impervious Level: 64%

    - External Drainage Area: 24.5 Ha
    - Average Impervious Level: 0%

    - Total Drainage Area: 56.0 Ha
    - Net Impervious Level: 36%

- Level 1 receiving stream and 35% impervious level.
- End-of-pipe, extended detention, wet pond configuration.
- From Table 3.2, an interpolated storage volume of 143 m^3/Ha results (40m^3/Ha extended detention and 103 m^3/Ha of permanent pool).

Based on these parameters, the minimum storage requirements for Pond 2 include a permanent pool volume of 5,740 m^3 and an extended detention volume of 2,240 m^3. A 37 hour extended detention time will be provided by means of a 200 mm diameter orifice outlet.

Pond 3 - Stormwater Management Facility

Design parameters for the facility have been based on the following:

- Drainage area impervious level for lands within the proposed Industrial Park (18.0 Ha) are to be based on an average value of 73%. The majority of the areas have been designed with an impervious level of 75%, however, there is one catchment with an impervious level of 50%. The detailed Miduss input parameter sheets (Appendix A) should be referred to for the specific impervious value of each catchment area. There are no external lands that are tributary to this facility.

    - Proposed Business Park Area: 17.7 Ha
    - Average Impervious Level: 69%

- Level 1 receiving stream and 69% impervious level.
- End-of-pipe, extended detention, wet pond configuration.
- From Table 3.2, an interpolated storage volume of 223 m^3/Ha results (40m^3/Ha extended detention and 183 m^3/Ha of permanent pool).

Based on these parameters, the minimum storage requirements for Pond 3 include a permanent pool volume of 3,233 m^3 and an extended detention volume of 708 m^3. A 22 hour extended detention time will be provided by means of a 200 mm diameter orifice outlet.

Confirmation of pond storage requirements, actual pond volumes, forebay sizing, cleanout frequency and drawdown timing is provided in Appendix G.

5.5 Water Quantity Control

Both of the proposed Stormwater Management Facilities have been designed with an extended detention volume component for pre to post development control of the 1:2 through to the 1:100 storm events.

Pre and post hydrologic models were developed as follows:

- Pre-development flows were assessed considering the entire watershed area for each of the two outlets under Highway 21. The assessment included the existing tributary of the Penetangore. This approach ensures that a full review of the flows downstream of the Business Park was completed.
- Post-development flows were assessed considering development within the proposed Industrial Park and all external drainage areas for the two outlets under Highway 21 as completed for the pre-development area. It is noted that a significant portion of the external lands are conveyed within the tributary of the Penetangore and are not within the development boundaries of the Business Park.

a) Minor Drainage System

Minor system surface flow will be directed into each SWM facility from all sub-catchment areas within the Business Park. Typically the minor system will be conveyed within a new storm sewer system designed to accommodate the 1:5 year storm event. Storm sewers are proposed to outlet to the end-of-pipe wet pond SWM facilities shown on Figure ST4.

b) Major Storm System

Major system surface flow will be directed into each SWM facility from all sub-catchment areas within the Business Park. Typically the major system will be conveyed within the finished road surface.

c) Modelling Results

The following tables summarize the results for both the pre-existing condition and the proposed development state. For comparative purposes, flow values at the following locations have been included in the summaries:

i. Holtby Drain (immediately prior to its convergence with the Penetangore tributary)
ii. Highway 21 Outlet A - CSP culvert (school site)
iii. Highway 21 Outlet B - Multi-plate Arch culvert (Penetangore tributary)
iv. Combined Flow at both Highway 21 outlet locations.

- Table 2 presents the pre-existing site flows for the 2 yr through 100 yr rainfall events.

- Table 3 presents the post development site flows for the 2 yr through 100 yr rainfall events.

- Table 4 presents the comparison between Table 2 and Table 3 (as a percentage increase or decrease).

Table 2
Pre-Existing Miduss Flows (m^3/s)

Storm Event (year)	Holtby Drain at Confluence with Penetangore Tributary (Confluence 1100)	A 1500mm CSP under Hwy. 21 (Confluence 2000)	B Multi-Plate Arch under Hwy. 21 (Confluence 1000)	A+B Combined at Hwy. 21 (Confluence 3000)
2	3.3	1.9	16.9	17.4
5	7.8	4.5	41.7	43.0
10	11.6	6.6	63.0	65.0
25	17.1	9.4	94.6	97.6
50	21.5	11.6	120.8	124.7
100	26.2	13.6	149.0	153.6

Table 3
Post-Development Miduss Flows (m^3/s)

Storm Event (year)	Holtby Drain at Confluence with Penetangore Tributary (Confluence 1100)	A 1500mm CSP under Hwy. 21 (Confluence 2000)	B Multi-Plate Arch under Hwy. 21 (Confluence 1000)	A+B Combined at Hwy. 21 (Confluence 3000)
2	3.1	0.6	16.8	17.1
5	7.4	1.3	41.5	42.3
10	11.1	2.0	62.7	64.4
25	16.3	3.6	94.1	97.2
50	20.5	4.8	120.2	124.5
100	25.5	6.1	148.4	153.7

Table 4
Comparison Miduss Flows (% Change)

Storm Event (year)	Holtby Drain at Confluence with Penetangore Tributary (Confluence 1100)	A 1500mm CSP under Hwy. 21 (Confluence 2000)	B Multi-Plate Arch under Hwy. 21 (Confluence 1000)	A+B Combined at Hwy. 21 (Confluence 3000)
2	-4.9	-69.1	-0.3	-2.0
5	-5.3	-71.2	-0.4	-1.7
10	-4.6	-69.7	-0.5	-1.0
25	-4.9	-61.6	-0.5	-0.4
50	-4.8	-58.5	-0.5	-0.2
100	-2.7	-55.3	-0.4	0.1

Discussion related to the above results is summarized below for each location considered:

- Holtby Drain

  Under all storm flow events (i.e., 2 through 100 year storms) there appears to be a nominal decrease in the peak flow events experienced under the developed state of the Business Park.

- 1500mm CSP Culvert under Highway 21

  The proposed plan will significantly reduce flows to this outlet under Highway 21 as compared to the pre-existing condition (i.e., no commercial development). This is typically due to the fact that some of the predevelopment drainage areas are being redirected to the new stormwater management facility proposed for the Business Park.

- Multi-Plate Arch

  The proposed plan will result in essentially no change to the peak flows experienced under 2 through 100 year flow events and the developed state.

- Combined Total at Highway 21

  The proposed plan will not result in an increase, under all flow events, for the combined drainage area upstream of Highway 21.

5.7 Construction Sediment and Erosion Control

Before commencing stripping operations on the site, erosion and sediment controls are to be installed.

Monthly Erosion and Sediment Control Inspection Reports (Report Sheet included as Appendix H) are to be completed and made available to interested parties. These reports are to be based on bi-weekly inspections and after significant storm events (>13 mm). These reports are to be submitted until the site has been stabilized.

5.8 Monitoring and Maintenance Program

The facility has been designed to reduce maintenance requirements. General maintenance and monitoring for the facility should be in compliance with the "Stormwater Management Planning and Design Manual" by the MOE, March 2003, and would include the following:

- Inspection of the facility initially and after each significant rainfall event for the first two years following construction. It is proposed that inspections then be carried out after the first two years on an annual basis.

- Cleaning of debris from the outlet structure.

- Replacement of any plantings that have died.

- Removal of accumulated sediments from the forebay. It is expected that the cleaning of the forebay will be required approximately every 12 years and 6.5 years for Pond 2 and Pond 3, respectively (refer to Appendix G for calculations).

5.9 Summary of Stormwater Management Plan

1. This report outlines the provisions of Stormwater Management Facilities for the Business Park to be located at Highway 9 and 21 in Kincardine.

2. Through the study process, it was determined that two new end-of-pipe Extended Detention Wet Pond Facilities would provide a suitable strategy for providing stormwater management for the area. In addition, the existing dry pond, at the intersection of Durham Street and Highway 21 will be utilized for a portion of the development lands.

   The proposed facilities have been designed in compliance with the criteria established in the MOE "Stormwater Management Planning and Design Manual", dated March 2003.

3. The SWM facilities have been designed to provide:

   - Quality and Quantity control of the developed business park lands and any existing external lands at their current impervious level.

4. Details regarding monitoring and maintenance of the SWM facilities as well as sediment and erosion control measures during and after construction phases, has been outlined in this report.

5. Modelling results demonstrate that peak flow rates from the developed lands will generally not change significantly from that of the pre-existing condition for the area.

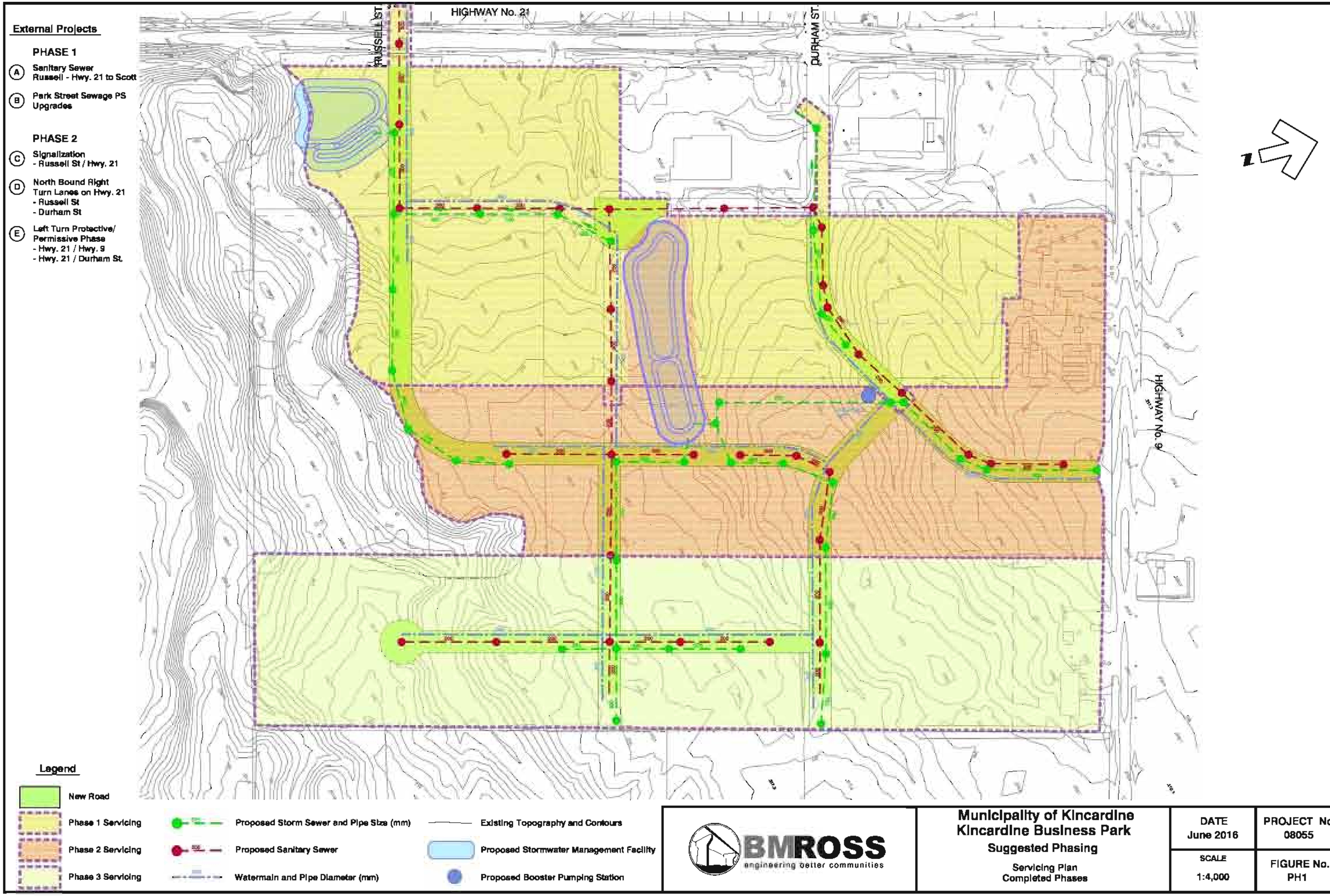
Based on the recommendations contained in this Stormwater Management Report, it is concluded that the construction of the proposed Extended Detention Wet Pond Facilities will provide suitable quality and quantity treatment of stormwater run-off from the development area and not adversely impact the receiving channels downstream of Highway No. 21.

6.0 POSSIBLE DEVELOPMENT PHASING

It is anticipated that the completion of the development of the business park will take a number of years and will therefore need to follow a phased-in infrastructure plan. Further discussions need to be undertaken with the various property owners to ascertain what areas of the Business Park may need to proceed in advance of others.

Figure PH-1 provides a suggested phasing scenario for the Business Park with the progression logically being from west to east to maximize upon the existing infrastructure that's exists adjacent to the Highway 21 corridor. Three (3) phases have been proposed as shown in the figure.

It is anticipated that by the completed of the second phase of the project, all required external infrastructure improvements and proposed works should be completed.



HIGHWAY No. 21
RUSSELL ST.
DURHAM ST.
HIGHWAY No. 9
External Projects
PHASE 1
(A) Sanitary Sewer Russell - Hwy. 21 to Scott
(B) Park Street Sewage PS Upgrades
PHASE 2
(C) Signalization - Russell St / Hwy. 21
(D) North Bound Right Turn Lanes on Hwy. 21 - Russell St - Durham St
(E) Left Turn Protective/ Permissive Phase - Hwy. 21 / Hwy. 9 - Hwy. 21 / Durham St.
Legend
New Road
Phase 1 Servicing
Phase 2 Servicing
Phase 3 Servicing
Proposed Storm Sewer and Pipe Size (mm)
Proposed Sanitary Sewer
Watermain and Pipe Diameter (mm)
Existing Topography and Contours
Proposed Stormwater Management Facility
Proposed Booster Pumping Station
BMROSS
engineering better communities
Municipality of Kincardine
Kincardine Business Park
Suggested Phasing
Servicing Plan
Completed Phases
DATE
June 2016
PROJECT No.
08055
SCALE
1:4,000
FIGURE No.
PH1

7.0 PROBABLE COSTS

Preliminary estimated costs to provide full servicing and road construction for the Business Park have been prepared and are presented based upon recent tenders for similar works. All costs include allowances for local sanitary collection, external sanitary collection and pumping upgrades, water distribution and pressure boosting facilities, storm sewer collection, storm water management, road construction, street lighting, engineering, and contingencies.

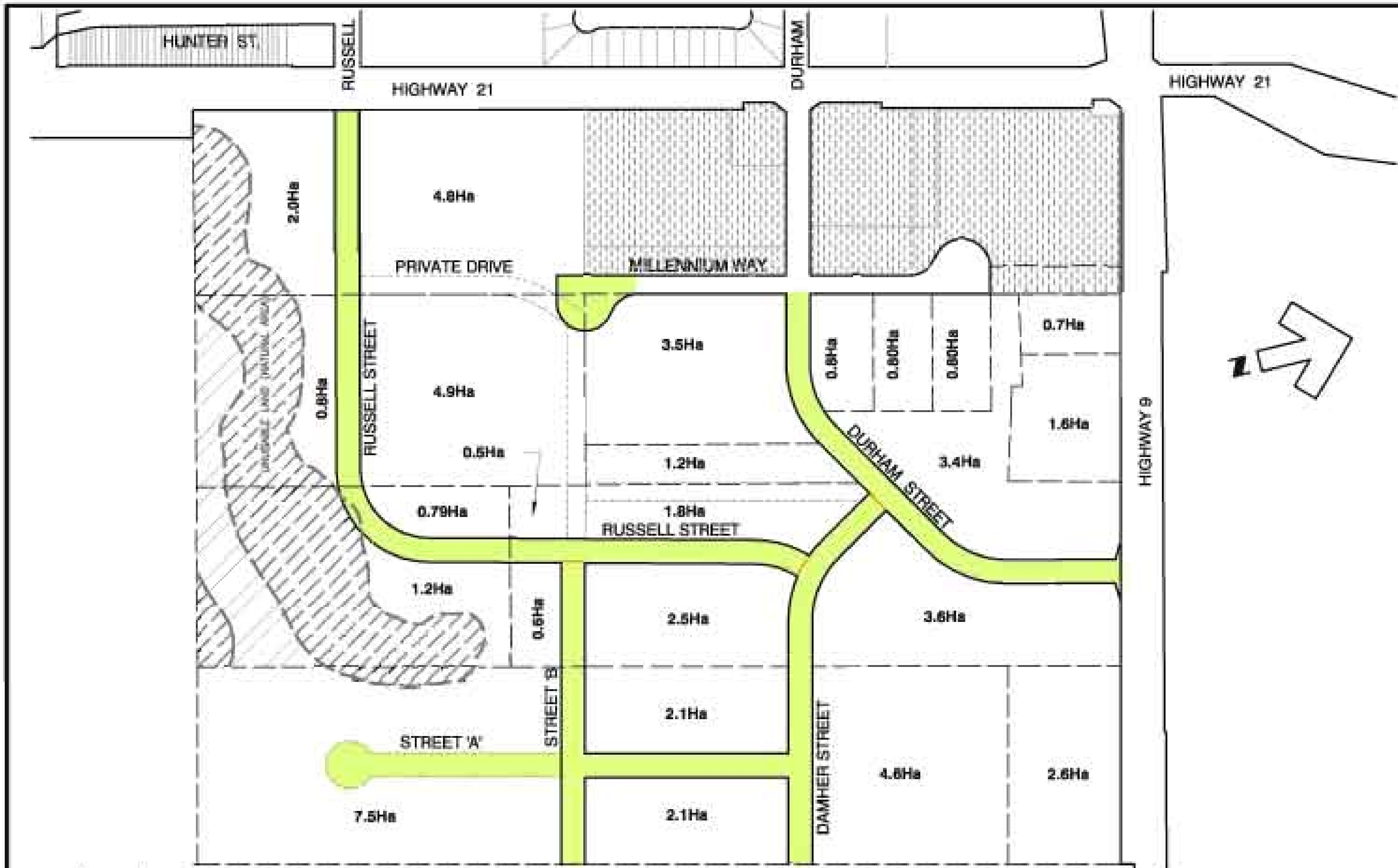
The anticipated total costs and estimated cost per hectare are summarized in the following table. Appendix I provides further breakdown and additional details of the costs shown.

Table 5
Estimated Probable Costs

Servicing Component	**Cost**			
	Phase 1	**Phase 2**	**Phase 3**	**Total**
Internal Servicing				
Road System	$1,082,000	$1,744,000	$1,176,000	$4,002,000
Storm Collection System	$710,000	$880,000	$354,000	$1,944,000
Stormwater Management Facilities	$384,000	$302,000	$0	$686,000
Sanitary Collection System	$389,000	$315,000	$257,000	$961,000
Water Distribution System	$501,000	$348,000	$237,000	$1,086,000
Subtotal - Internal Servicing	**$3,066,000**	**$3,589,000**	**$2,024,000**	**$8,679,000**
External / Other Servicing				
Russell Street Sanitary Sewer	$627,000	$0	$0	$627,000
Park Street Pumping Station Upgrades	$950,000	$0	$0	$950,000
Hwy. 21 Improvements	$0	$617,000	$0	$617,000
Water Booster Station	$0	$799,000	$0	$799,000
Subtotal - External / Other Servicing	**$1,577,000**	**$1,416,000**	**$0**	**$2,993,000**
TOTAL - Internal / External / Other Servicing	**$4,643,000**	**$5,005,000**	**$2,024,000**	**$11,672,000**

HST has not been included in the costs presented.

As shown on Figure CS1, there is approximately 52 net developable hectares (total area – road allowance and SWM blocks) within the Business Park land area. Based on the above, it is estimated the approximate cost per Developable hectare is approximately $230,000.



Legend

	Existing commercial Area
	Proposed Road Allowances
7.5Ha	Net Developable Land Area

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engineering better communities

Municipality of Kincardine
Kincardine Business Park
Servicing - Cost Sharing

Net Developable Land Areas

DATE	PROJECT No.
June 2016	08055
SCALE	FIGURE No.
1:6,000	CS1

8.0 SUMMARY

Based on the findings presented in this report, it is suggested that the Business Park area can be adequately serviced by municipal water, sewage, storm drainage, and road system. It is anticipated that the majority of the servicing can be phased depending on development interests. The following important items, related to servicing are noted:

- The installation of a new sanitary sewer, external to the development, is required on Russell Street from Highway 21 to Scott Street;
- Upgrades at the Park Street Sewage Pumping Station will be required;
- Pressure Boosting facilities will be required as development proceeds within the Business Park;
- The lands north of Highway 9 will result in significant (and unacceptable) surcharging in the existing Park Street sewers;
- Transportation improvements including signalization at Durham as well as right turn lanes on Highway 21 at Russell and Durham will be required as development proceeds;
- Further discussion with the MTO and property owners is warranted related to the internal configuration of Russell Street;
- Further investigation will be required, as the nature of development becomes more well-known, to determine the need to expand Highway 21 to four lanes between Highway 9 and the Russell Street intersection.
- It is possible to phase-in servicing depending on the nature of development interests for the area.
- The municipality and the developers will need to reach some consensus as to how the services on the balance of the Business Park will be funded.

All of which is respectfully submitted.

B. M. ROSS AND ASSOCIATES LIMITED

Per__________________________________
Dale Erb, P. Eng.

Per __________________________________
Bruce W. Potter, P. Eng.

DLE/

APPENDIX A

TRANSPORATION STUDY
PARADIGM TRANSPORTATION SOLUTIONS

Kincardine Business Park Traffic Impact Study

Paradigm Transportation Solutions Limited

November 2015

Project Summary

Project Number
140720

November 2015

Client
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Goderich ON N7A 2T4

Client Contact
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Kincardine Business Park
Draft Traffic Impact Study

List of Revisions

Version	Date	Author	Description
1	April 2015	J Mallett	For comments
2	November 2015	J Mallett	For submission

Signatures and Seals

Signature

Engineer's Seal

Disclaimer

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Executive Summary

Content

A commercial subdivision is proposed to be built on the southeast corner of the intersection of Highway 21 and Highway 9 in Kincardine, Ontario. The subdivision is planned to have a mix of commercial uses including, but not limited to retail, hotels and restaurants. The subdivision will access Highway 21 at Durham Street and Russell Street and will access Highway 9 at a Durham Street extension.

Development Concept

The location of the development is on the southeast corner of the intersection of Highway 21 and Highway 9 in Kincardine, Ontario. The development has had some development occur on it already with a Sobey's, Tim Hortons, Canadian Tire, Boston Pizza, Meridian, a Holiday Inn Express and a Dentist Office. The remainder of the developable land to be considered in this study is approximately 17.77 hectares. The land uses for the remaining land include retail, hotel, car wash, and building supply and sales. The site will access the existing road network on Highway 21 at Durham Street and Russell Street and on Highway 9 at an extension of Durham Street.

The remainder of the site to the east is not considered in this report. During pre-study communication with the MTO, it was determined that the development plans for lands to the east are too unknown and the time frame too long to make reasonable forecasts. When development plans for those lands are known, additional study is expected to be done.

For the purposes of forecasting in this study, it was assumed that the completion date will be five years from the writing of this report (2020).

Conclusions

Based on the analyses contained in the report, it is concluded that:

- The intersections within the study area operate within acceptable levels.
- The westbound left-turn movement on Highway 9 at Highway 21 is forecast to operate at LOS F during the PM peak hour at the 2030 background horizon, the 2020 total horizon, 2025 total horizon, and 2030 total horizon.
- The westbound left-turn movement on Durham Street at Highway 21 is forecast to operate at LOS F during the PM peak hour at the 2030 total horizon.

- The sidestreet operations of the intersection of Highway 21 and Russell Street operate at LOS F during the PM peak hour at the 2020 total horizon, 2025 total horizon, and during both peak hours at the 2030 total horizon.
- The eastbound movements on Kincardine Avenue at Highway 21 are forecast to operate at LOS F during the PM peak hour at the 2025 and 2030 total horizons.

The following improvements are warranted:

- A westbound protected / permissive left-turn phase is forecast to be warranted at the intersection of Highway 21 and Highway 9 at the 2020 horizon.
- A westbound protected / permissive left-turn phase is forecast to be warranted at the intersection of Highway 21 and Durham Street at the 2030 horizon.
- A signal is forecast to be warranted by the 2020 horizon at the intersection of Highway 21 and Russell Street. Along with signalization, westbound and southbound left-turn lanes should be constructed as well as westbound and southbound protected / permissive left-turn phases.
- A northbound right turn lane is forecast to be warranted on Highway 21 at Durham Street.
- A northbound right turn lane is forecast to be warranted on Highway 21 at Russell Street.

Recommendations

Based on the foregoing analyses, it is recommended that the planning applications be approved as proposed with the following conditions related to transportation system improvements:

- A westbound protected / permissive phase be implemented at the intersection of Highway 21 and Highway 9.
- A westbound protected / permissive phase be implemented at the intersection of Highway 21 and Durham Street.
- A northbound right-turn lane be constructed on Highway 21 at Durham Street.
- A signal be constructed at the intersection of Highway 21 and Russell Street with a westbound and southbound left-turn lanes, a northbound right-turn lane and westbound and southbound protected / permissive left-turn phases.

Contents

Appendices

Figures

Tables

1 Introduction

1.1 Background

A commercial subdivision is proposed to be built on the southeast corner of the intersection of Highway 21 and Highway 9 in Kincardine, Ontario. The subdivision is planned to have a mix of commercial uses including, but not limited to retail, hotels and restaurants. The subdivision will access Highway 21 at Durham Street and Russell Street and will access Highway 9 at a Durham Street extension. The location of the development is shown in **Figure 1.1**.

A draft Traffic Impact Study (TIS) was originally prepared in June 2011 for this property. This updated TIS has been prepared based on updates to the site, traffic volumes and comments received from the Ministry of Transportation (MTO). A pre-study meeting was held with representation from the MTO, Municipality of Kincardine, BM Ross and Paradigm on 31 March 2014 where a scope outline was agreed upon.

1.1 Purpose and Scope

Paradigm Transportation Solutions Limited was retained to conduct a traffic impact study for the proposed subdivision. The purpose of the study is to determine the impact of the development on the following intersections:

- Highway 21 and Highway 9 / Broadway Street
- Highway 21 and Durham Street
- Highway 21 and Russell Street
- Highway 21 and Kincardine Avenue / South Line
- Durham Street and Millennium Way
- Highway 9 and Durham Street

The scope of the study includes determination of the current traffic and site conditions in the vicinity of the development, additional traffic that will be generated by the development, analyses of the impact of the traffic and development of recommendations on the measures required in order to accommodate this traffic in a satisfactory manner for a planning horizon of the assumed opening year (five years from present) and five and ten years from opening year. The AM and PM peak hours were used for analysis in this report.

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Development Location

Kincardine Business Park TIS
140720

Figure 1.1

2 Existing Conditions

This section documents current traffic conditions, operational deficiencies, and constraints experienced by the public traveling at the intersections within the study area. The operational deficiencies and constraints identified at this stage will provide input to the problem statement and will be fundamental to the process of defining alternative solutions.

2.1 Existing Roads

The location of the planned subdivision is on the southeast corner of the intersection of Highway 21 and Highway 9 in Kincardine, Ontario. Highway 21 is a two lane provincial highway with a speed limit of 80 km/h.

Highway 9 is also a two-lane provincial highway with a speed limit of 80 km/h. West of Highway 21, Highway 9 becomes the municipal road Broadway Street.

Durham Street is a two-lane municipal road with a speed limit of 50 km/h. Durham Street is proposed to extend east and northward through the subject development to intersect with Highway 9.

The intersections of Highway 21 with Highway 9 / Broadway Street and Durham Street are signalized.

2.2 Transit, Cycling and Pedestrian Services

There is no transit service or dedicated bicycle facilities within the study area. There are sidewalks on one side of Durham Street and Millennium Way.

2.3 Base Year Traffic Volumes

Existing turning movement volumes for the intersections along Highway 21 were provided by the Ministry of Transportation. The counts at Durham Street, Russell Street and Kincardine Avenue were conducted in July 2013 and the count at Highway 9 was conducted in October 2012. The intersection of Durham Street and Millennium Way was counted by Paradigm Transportation Solutions Limited in July 2013. The existing AM and PM peak hour traffic volumes are shown in **Figure 2.1**.

2.4 Base Year Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying the average delay experienced by drivers at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles desiring to make a particular movement, compared to the estimated capacity for that movement. The capacity is based on a number of criteria related to the opposing traffic flows and intersection geometry.

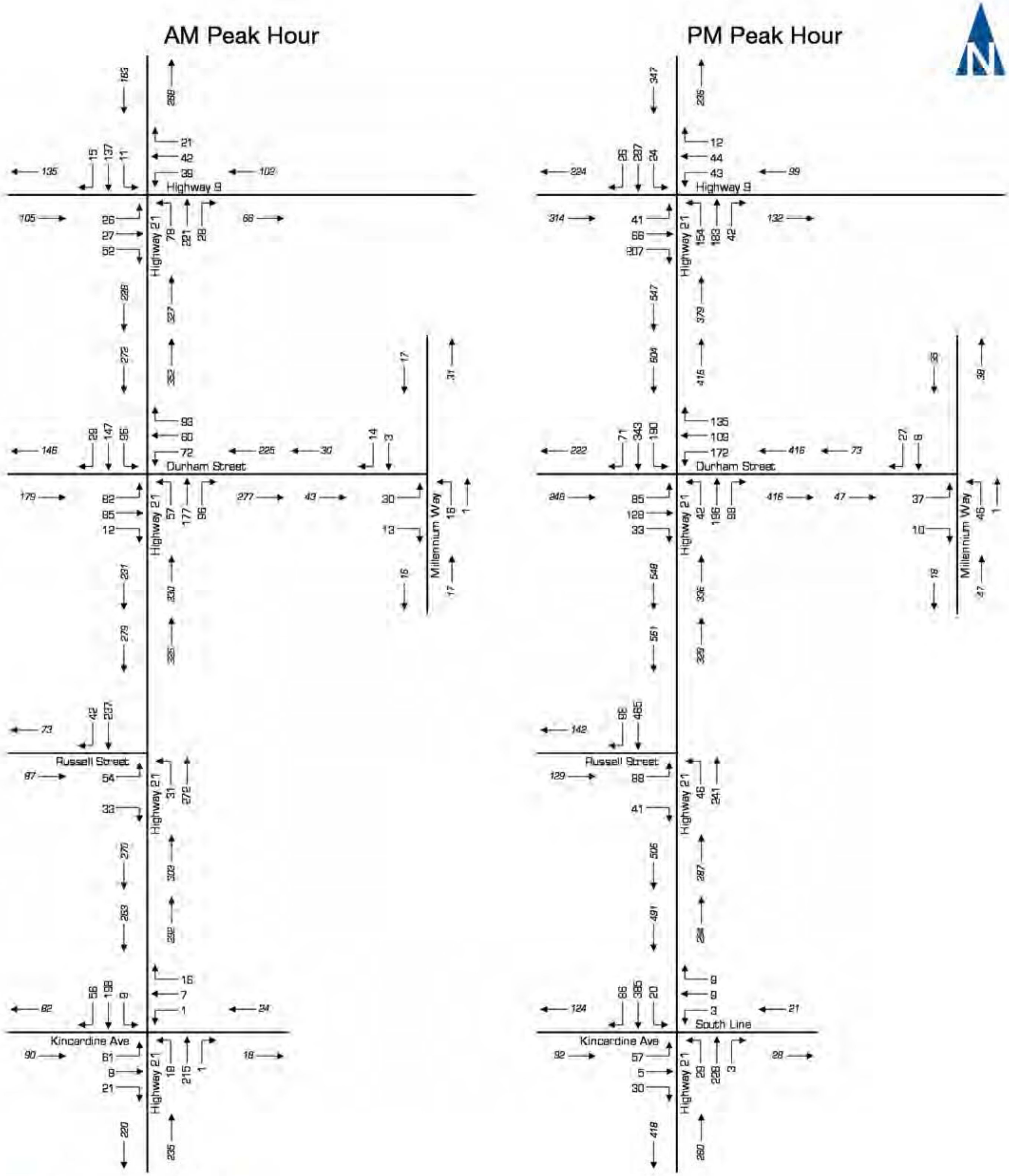
The highest possible rating is LOS A, under which the average total delay is equal or less than 10.0 seconds per vehicle. When the average delay exceeds 80 seconds for signalized intersections, 50 seconds for unsignalized intersections or when the volume to capacity ratio is greater than 1.0, the movement is classed as LOS F and remedial measures are usually implemented, if they are feasible. LOS E is usually used as a guideline for the determination of road improvement needs on through lanes, while LOS F may be acceptable for left-turn movements at peak times, depending on delays.

The operations of intersections in the study area were evaluated with the existing turning movement volumes using Synchro 9.

The intersection analysis considered two separate measures of performance:

- The volume to capacity ratio for each intersection; and
- The LOS for each turning movement. LOS is based on the average control delay per vehicle.

The operation of the intersections within the study area was evaluated using Synchro 9 with the existing turning movement volumes. The analysis shows that the movements at all intersections operate well under existing conditions. A summary of the operations and detailed Synchro outputs are provided in **Appendix A**.



Base Year Traffic Volumes

Figure 2.1

3 Development Concept

The location of the development is on the southeast corner of the intersection of Highway 21 and Highway 9 in Kincardine, Ontario. The development has had some development occur on it already with a Sobey's, Tim Hortons, Canadian Tire, Boston Pizza, Meridian, a Holiday Inn Express and a Destist Office. The remainder of the developable land to be considered in this study is approximately 17.77 hectares. The land uses for the remaining land include retail, hotel, car wash, and building supply and sales. The site will access the existing road network on Highway 21 at Durham Street and Russell Street and on Highway 9 at an extension of Durham Street. The proposed site concept plan is shown in **Figure 3.1**.

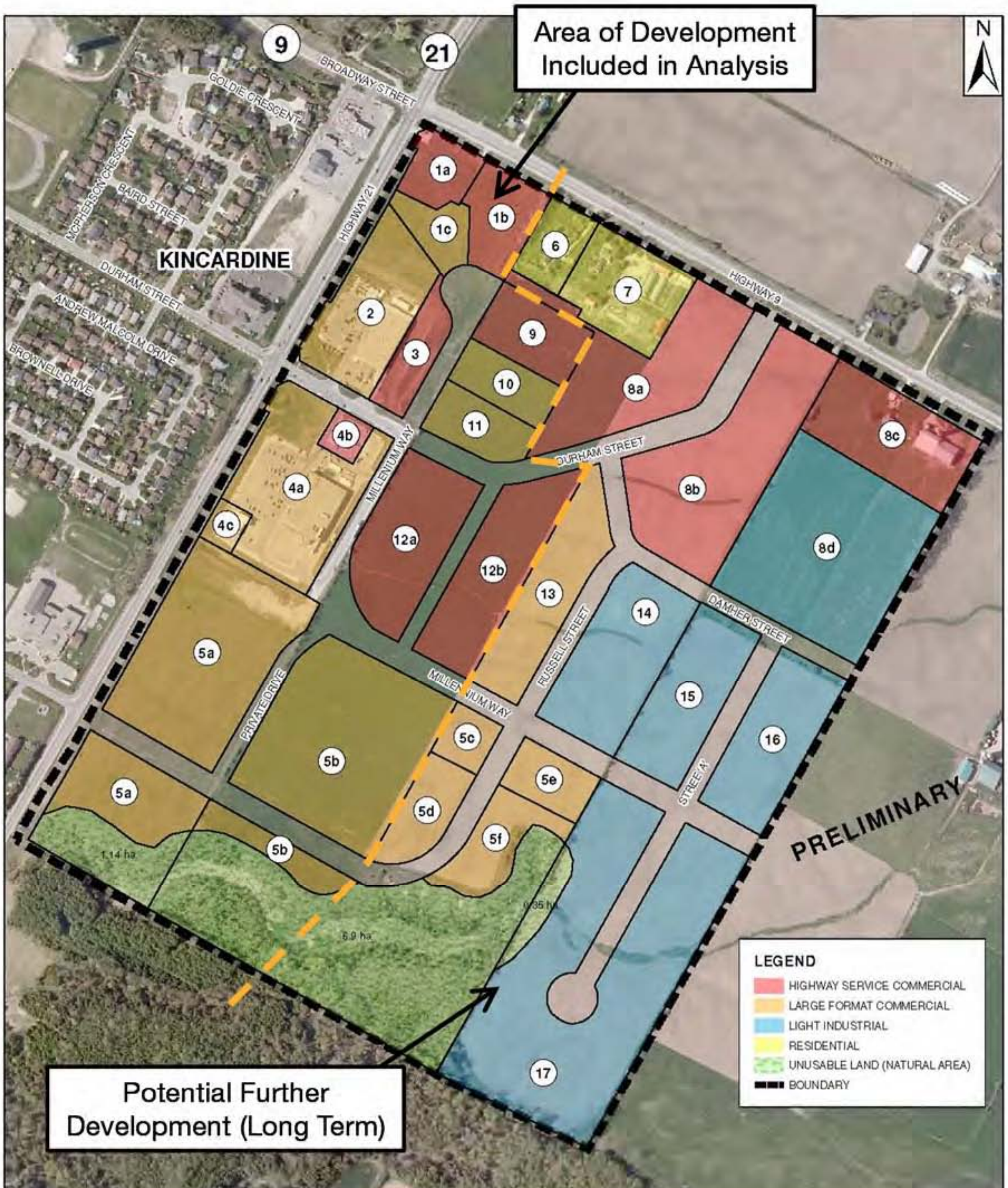
The remainder of the site to the east is not considered in this report. During pre-study communication with the MTO, it was determined that the development plans for lands to the east are too unknown and the time frame too long to make reasonable forecasts. When development plans for those lands are known, additional study is expected to be done.

For the purposes of forecasting in this study, it was assumed that the completion date will be five years from the writing of this report (2020).

3.1 Development Trip Generation

The analysis of the first phase of the development includes lots 5a, 5b, 9, 10, 11, 12a, and 12b. Based on the best estimate of land use at the time of this report, the types of land use include retail, hotels, and building supplies and sales. The Institute of Transportation Engineers (ITE) Trip Generation Manual 9th Edition was used to estimate the peak hour traffic volumes that will be generated by the components of this development. The following land use codes were used:

- **LUC 310 (Hotel)**: Hotels are places of lodging that provide sleeping accommodations and supporting facilities such as restaurants, cocktail lounges, meeting and banquet rooms or convention facilities, limited recreational facilities (pool, fitness room), and/or other retial and service shops.
- **LUC 812 (Building Materials and Lumber Store)**: A building materials and lumber store is a free-standing building that sells hardware, building materials and lumber. The lumber may be stored in the main building, yard, or storage shed. The buildings contained in this land use are less than 30,000 square feet gross floor area.
- **LUC 820 (Shopping Centre)**: Integrated group of commercial establishments that is planned, developed, owned and managed as a unit. The composition is related to its market area in terms of size, location and type of store. Provides on-site parking facilities sufficient to serve its parking demands.



LOT	AREA	DESCRIPTION	LOT	AREA	DESCRIPTION	LOT	AREA	DESCRIPTION	LOT	AREA	DESCRIPTION
1a	0.65	Boston Pizza	5a	1.44	buildings B, C, D, E, F	6	0.68	single detached dwelling	11	0.81	Building Supply and Sales
1b	0.95	hotel (200 sq m / floor)	5a	3.85	buildings G, H	7	1.52	single detached dwelling, greenhouse	12a	2.08	hotel - 100 room
1c	0.57	retail	5b	4.29	building A, SWM	8a	2.70	retail, Nursery	12b	2.11	3 restaurants, 2 retail stores
2	2.00	Canadian Tire	5b	0.63	building A, SWM	8b	3.51	Marine, Rec and Small Engine Sales	13	1.83	Fitness Centre (950 sq m / floor)
3	0.70	car wash	5c	0.43	building A, SWM	8c	2.03	Auto Sales	14	2.32	2-storey office building (930 sq m / floor)
4a	2.80	Sobeys	5d	0.86	building A, SWM	8d	4.38	Commercial Vehicle Sales / Service	15	1.87	2-storey office building (930 sq m / floor)
4b	0.25	Tim Hortons	5e	0.69	building A, SWM	9	1.01	hotel - 97 room, meeting space (150 sq m / floor)	16	1.94	Research Lab
4c	0.24	Meridian	5f	1.00	building A, SWM	10	0.76	retail	17	7.09	Warehousing, Contractor's Yard

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Site Concept Plan

Figure 3.1

- **LUC 826 (Specialty Retail Centre)**: Includes gasoline/service station with convenience markets where the primary business is the fueling of motor vehicles. These stations may also have ancillary facilities for servicing and repairing motor vehicles. Some commonly sold convenience items are newspapers, coffee or other beverages and snack items usually consumed in the car. Generally located at intersections or interchanges.

The gross floor area (GFA) of the retail uses were determined by assuming a 25% coverage of the total area of the lots. The estimated trip generation for the development is displayed in **Table 3.1**. For this development, it is expected that 424 and 983 new trips will be generated in the AM and PM peak hour, respectively.

TABLE 3.1: DEVELOPMENT TRIP GENERATION

Block	Land Use	ITE Land Use Code	Area	Units	AM Peak Hour				PM Peak Hour			
					Rate	Total	In	Out	Rate	Total	In	Out
5a North	Retail	820 Shopping Centre	3.85 ha	103.6 x 1000 ft^2	0.92	95	59	36	3.71	384	184	200
		Passby			n/a	0	0	0	34%	131	65	65
5a South	Retail	820 Shopping Centre	1.44 ha	38.8 x 1000 ft^2	0.92	36	22	14	3.71	144	69	75
		Passby			n/a	0	0	0	34%	49	24	24
5b North	Retail	820 Shopping Centre	4.29 ha	115.4 x 1000 ft^2	0.92	106	66	40	3.71	428	206	223
		Passby			n/a	0	0	0	34%	146	73	73
5Bb South	Retail	820 Shopping Centre	0.63 ha	17.0 x 1000 ft^2	0.92	16	10	6	3.71	63	30	33
		Passby			n/a	0	0	0	34%	21	11	11
9	Hotel	310 Hotel	1.01 ha	97 rooms	0.53	51	30	21	0.60	58	30	29
		Passby			n/a	0	0	0	n/a	0	0	0
10	Retail	820 Shopping Centre	0.76 ha	20.5 x 1000 ft^2	0.92	19	12	7	3.71	76	36	39
		Passby			n/a	0	0	0	34%	26	13	13
11	Building Supplies and Sales	812 Building Materials and Lumber Store	0.81 ha	21.8 x 1000 ft^2	2.60	57	38	19	4.49	98	46	52
		Passby			n/a	0	0	0	n/a	0	0	0
12a	Retail	826 Specialty Retail Centre	1.27 ha	20.0 x 1000 ft^2	n/a	0	0	0	2.71	54	24	30
		Passby			n/a	0	0	0	n/a	0	0	0
12b	Hotel	310 Hotel	0.84 ha	84 rooms	0.53	45	26	18	0.60	50	26	25
		Passby			n/a	0	0	0	n/a	0	0	0
				Total Trips		424	263	161		1356	651	705
				Total Passby		0	0	0		372	186	186
				Net New Trips		424	263	161		983	465	519

3.2 Development Trip Distribution and Assignment

The trip distribution was based on the proximity of nearby residential areas and weighting the existing turning movement volumes at the intersections on Highway 21. The trip distributions of new trips used in this study are summarized in **Table 3.2**. Passby traffic distribution, which is the diversion of existing traffic into the site, was based on the existing traffic volumes at the intersection Highway 21 and Highway 9. The distribution used for passby traffic is summarized in **Table 3.3**.

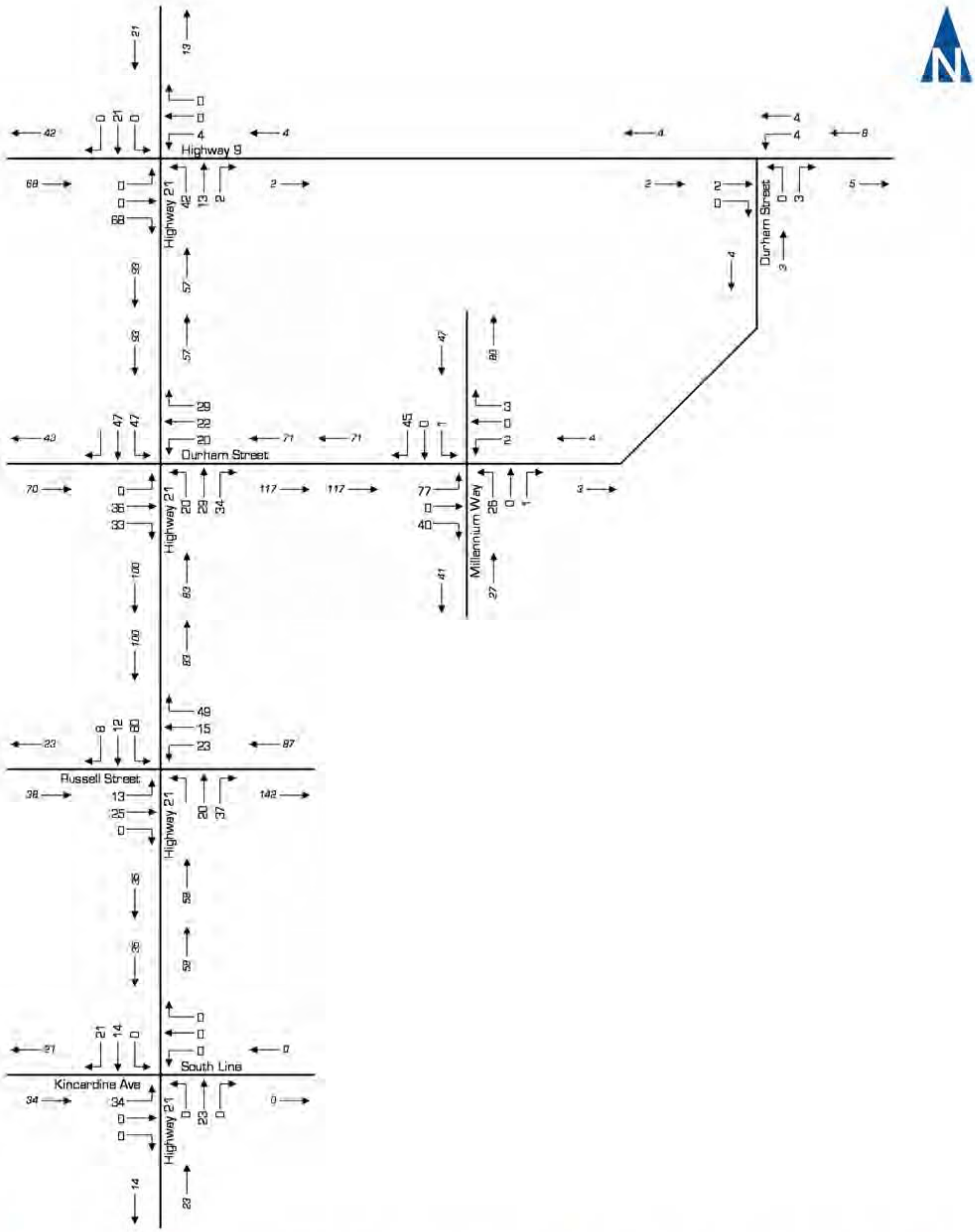
TABLE 3.2: NEW TRIP DISTRIBUTION

Direction	Distribution
West (Broadway)	26%
West (Durham)	27%
West (Russell)	14%
West (Kincardine Ave)	13%
South (Hwy 21)	9%
East (Hwy 9)	3%
North (Hwy 21)	8%

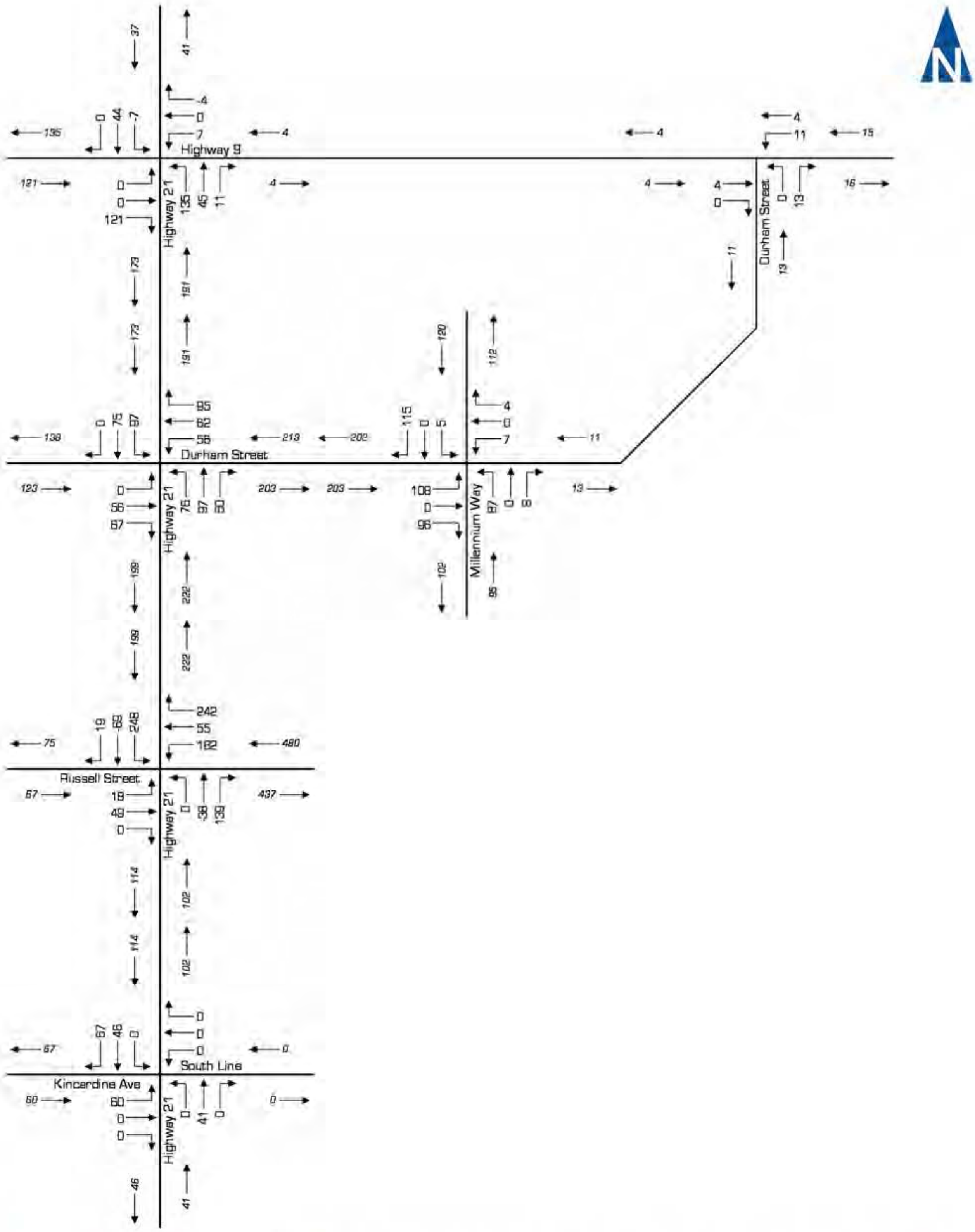
TABLE 3.3: PASSBY TRIP DISTRIBUTION

Direction	Distribution
North (21) to East (9)	4%
North (21) to South (21)	49%
South (21) to East (9)	7%
South (21) to North (21)	30%
East (9) to North (21)	2%
East (9) to South (21)	7%

Figure 3.2a and **Figure 3.2b** show the site generated traffic forecasts, (including the passby traffic for the PM peak hour). The new generated traffic and passby traffic for the PM peak hour are shown separately in **Appendix B**.



Development AM Peak Hour Traffic Volume Forecasts



Development PM Peak Hour Traffic Volume Forecasts

Figure 3.2b

4 Evaluation of Future Traffic Conditions

The assessment of future traffic conditions contained in this section includes estimates of future background and total traffic and analysis for planning horizons of expected completion (2020) and five and ten years from completion (2025 and 2030, as required by the MTO requirements for Traffic Impact Studies. The likely future traffic volumes in the vicinity of the development will likely consist of increased non-site traffic volumes (background traffic) and the traffic generated by the proposed development (site traffic).

4.1 2020 Horizon

4.1.1 2020 Background Traffic Growth

The non-site traffic increase is generalized traffic growth in the Kincardine area. As requested by MTO in the pre-study consultations, a 2% per year growth rate was used to forecast background traffic volumes. The 2020 background traffic is shown in **Figure 4.1**.

4.1.2 2020 Background Traffic Operations

Based on the forecasted 2016 background traffic volumes, LOS analyses have been conducted using Synchro 8 to determine the AM and PM peak hour conditions for the intersections within the study area. No changes to the existing geometry or signal phasing structure or cycle lengths were made in the analysis, but the signal timings were otherwise optimized by Synchro. The analysis indicates that the operations will be nearly identical to the existing conditions, with slight increases to delay, particularly to the westbound left-turn movement at Highway 21 and Highway 9 during the PM peak hour, which is forecast to operate at LOS E. A summary of the 2020 background traffic operations and the detailed Synchro reports are included in **Appendix C**.

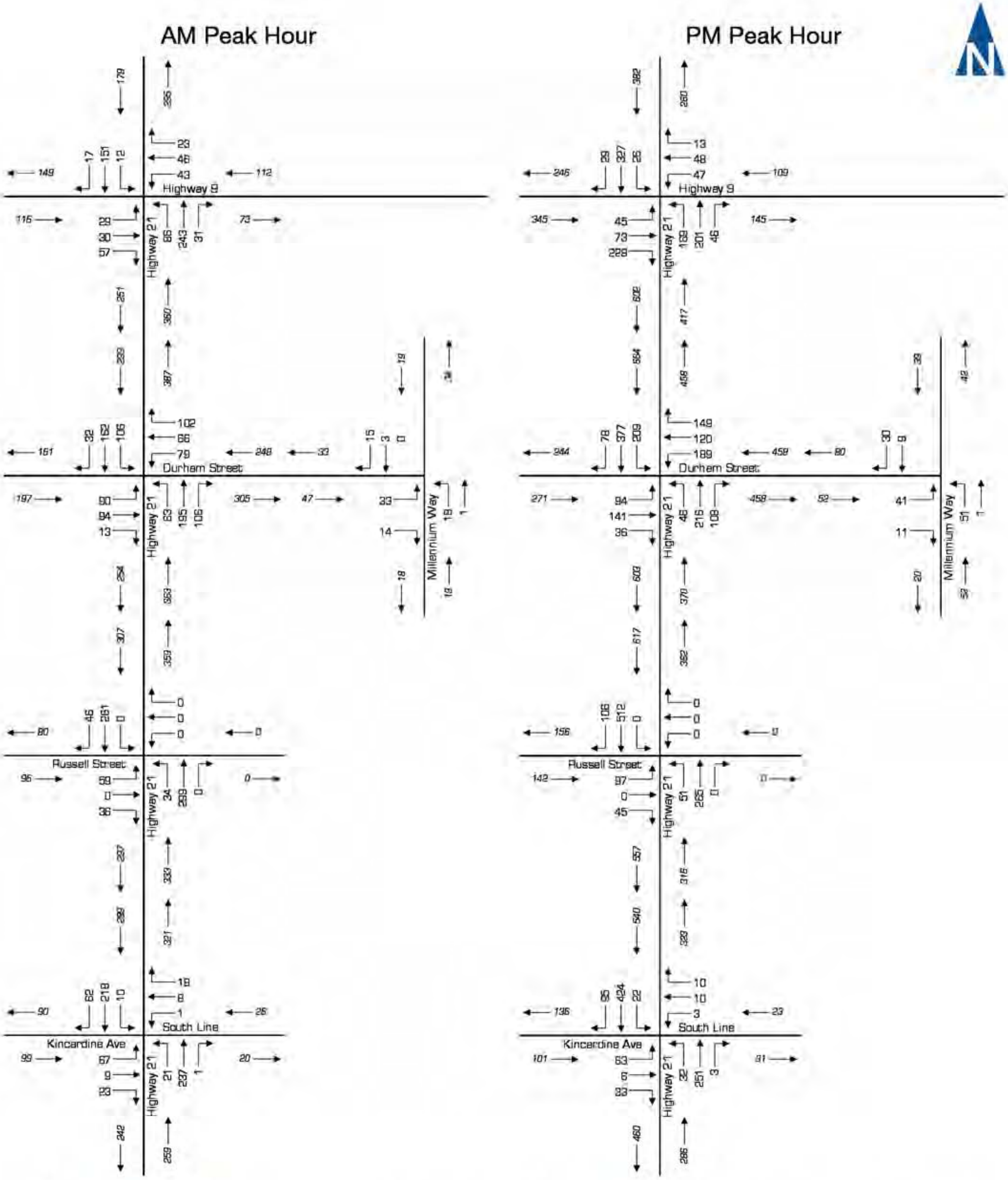
4.1.3 Total 2020 Traffic Volumes

The total 2020 traffic volumes, which are the background volumes added to the site generated volumes are shown in **Figure 4.2a** and **Figure 4.2b**.

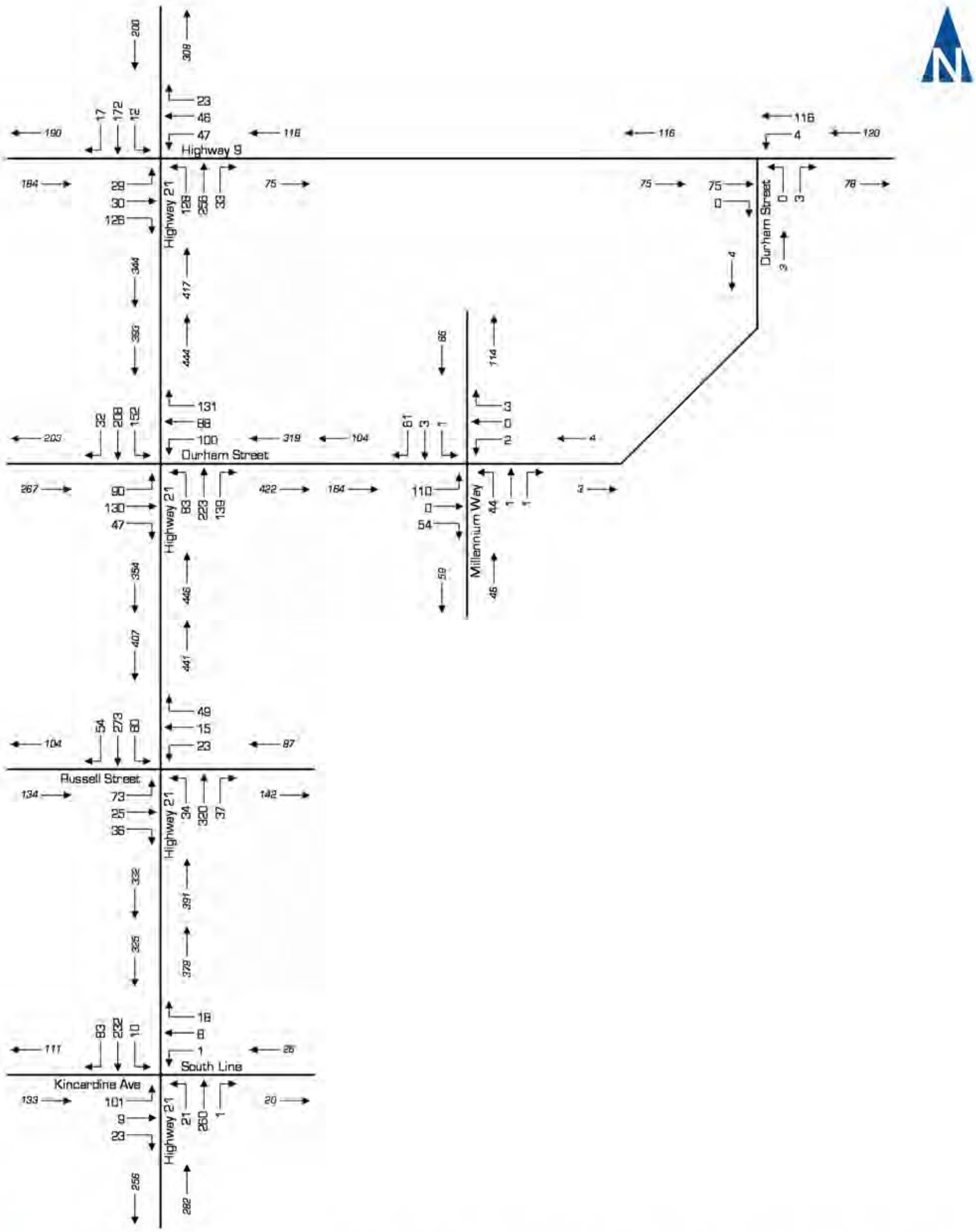
4.1.4 Total 2020 Traffic Operations

Based on the forecasted 2020 total traffic volumes, LOS analyses have been conducted using Synchro 9 and the AM and PM peak hour conditions for the study area. No changes to the existing geometry or signal phasing structure or cycle lengths were made in the analysis, but the signal timings were otherwise optimized by Synchro. A summary of the 2020 total traffic operations and the detailed Synchro reports are included in **Appendix D**. The analysis indicates the following deficiencies in traffic operations are forecast to occur:

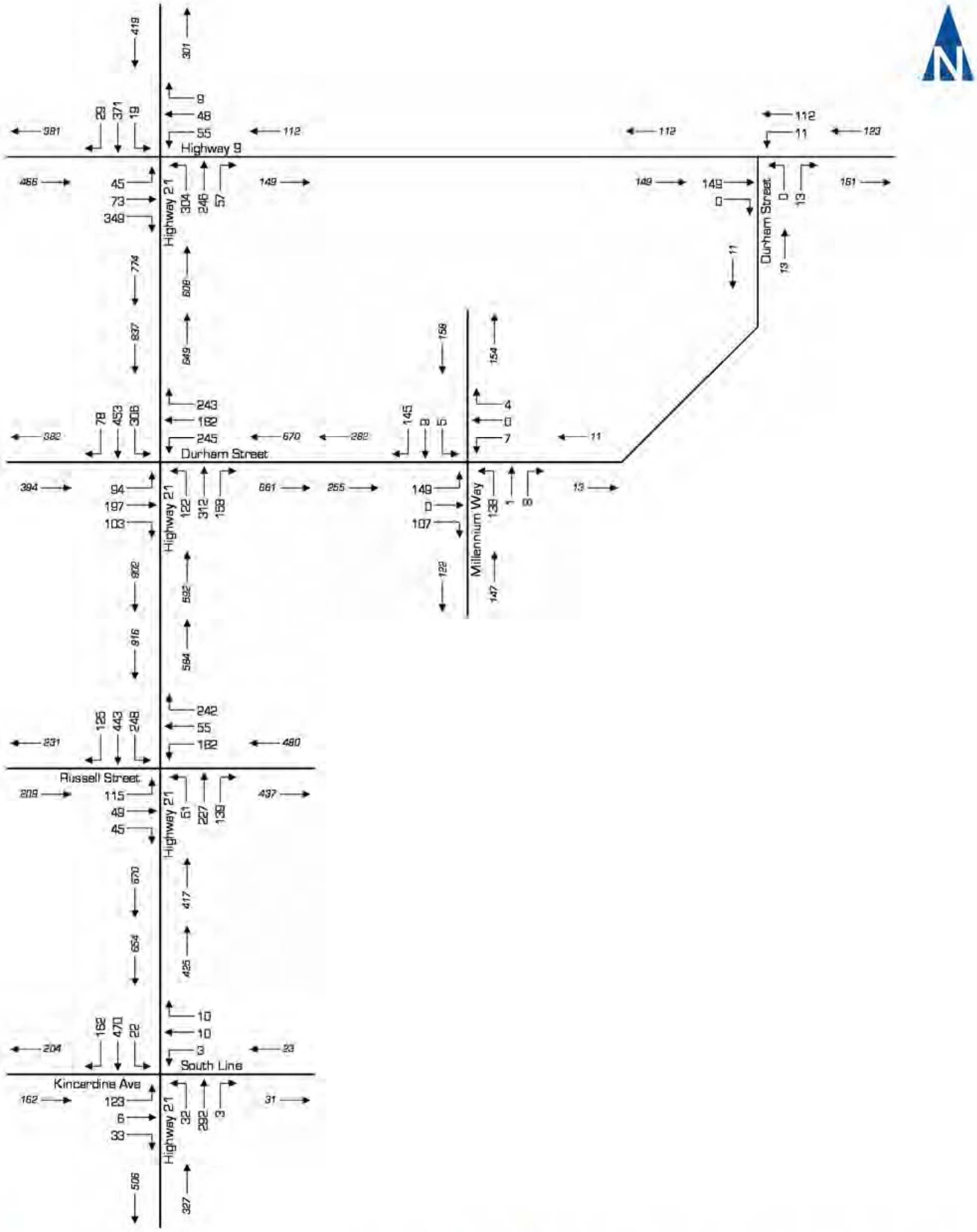
- The westbound left-turn movement on Highway 9 at Highway 21 is forecast to operate at LOS F during the PM peak hour.
- The sidestreet (east and westbound) movements on Russell Street at Highway 21 are forecast to operate at LOS F and well above a V/C ratio of 1.0 during the PM peak hour.



2020 Background Traffic Volume Forecasts



2020 Total AM Peak Hour Traffic Volume Forecasts



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2020 Total PM Peak Hour Traffic Volume Forecasts

4.2 2025 Horizon

4.2.1 2025 Background Traffic Growth

Similar to the 2020 horizon year, the 2025 background traffic was determined by applying a 2% growth rate to the existing volumes. The 2025 background traffic is shown in **Figure 4.3**.

4.2.2 2025 Background Traffic Operations

Based on the forecast 2024 background traffic volumes, LOS analyses have been conducted using Synchro 9 to determine the AM and PM peak hour conditions for the intersections within the study area. No changes to the existing geometry or signal phasing structure or cycle lengths were made in the analysis, but the signal timings were otherwise optimized by Synchro. The analysis indicates that the operations will be nearly identical to the 2020 background conditions, with the westbound left-turn movement at Highway 21 and Highway 9 during the PM peak hour forecast operating at LOS E. A summary of the 2025 background traffic operations and the detailed Synchro reports are included in **Appendix E**.

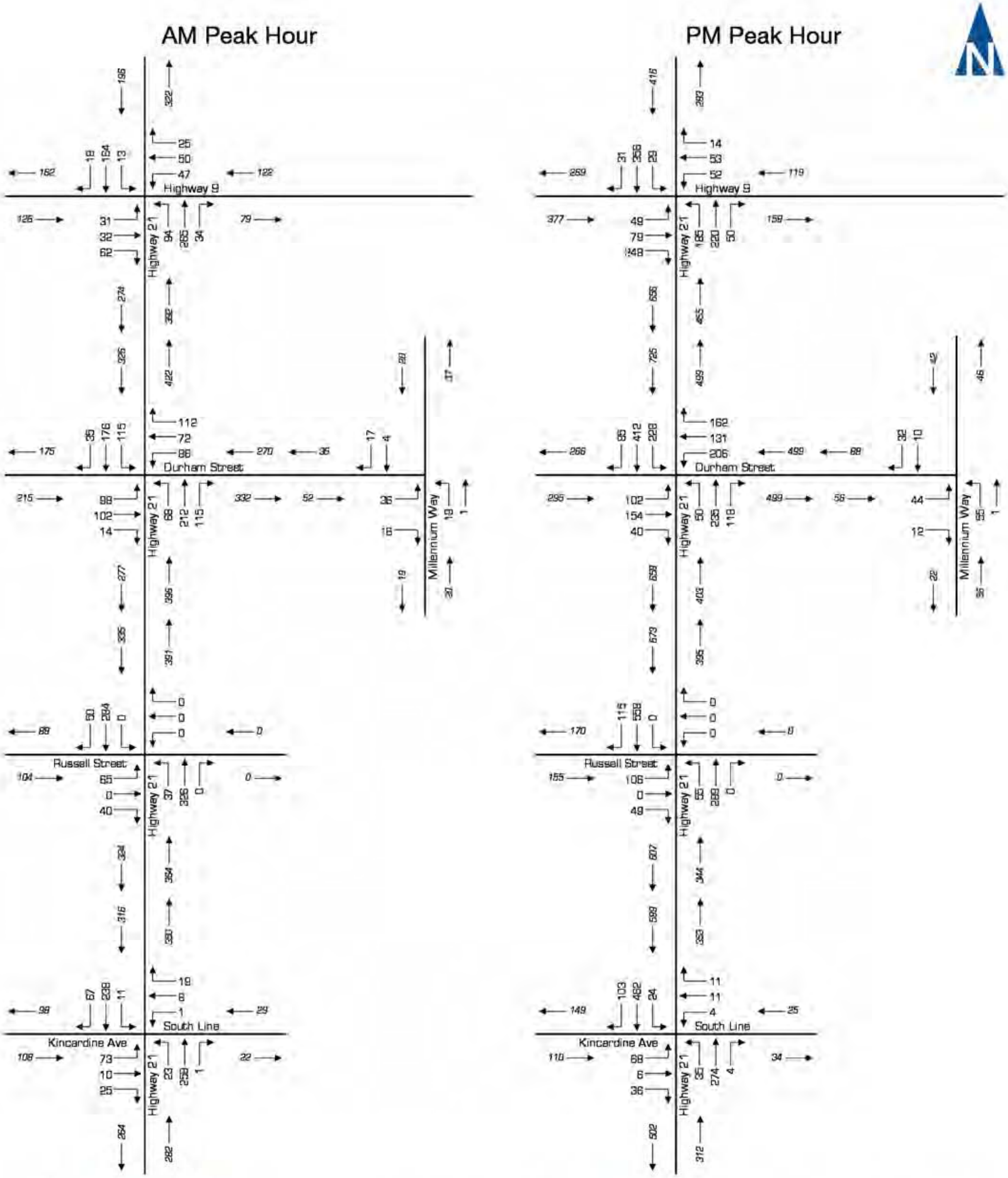
4.2.3 Total 2025 Traffic Volumes

The total 2025 traffic volumes, which are the background volumes added to the site generated volumes are shown in **Figure 4.4a** and **Figure 4.4b**.

4.2.4 Total 2025 Traffic Operations

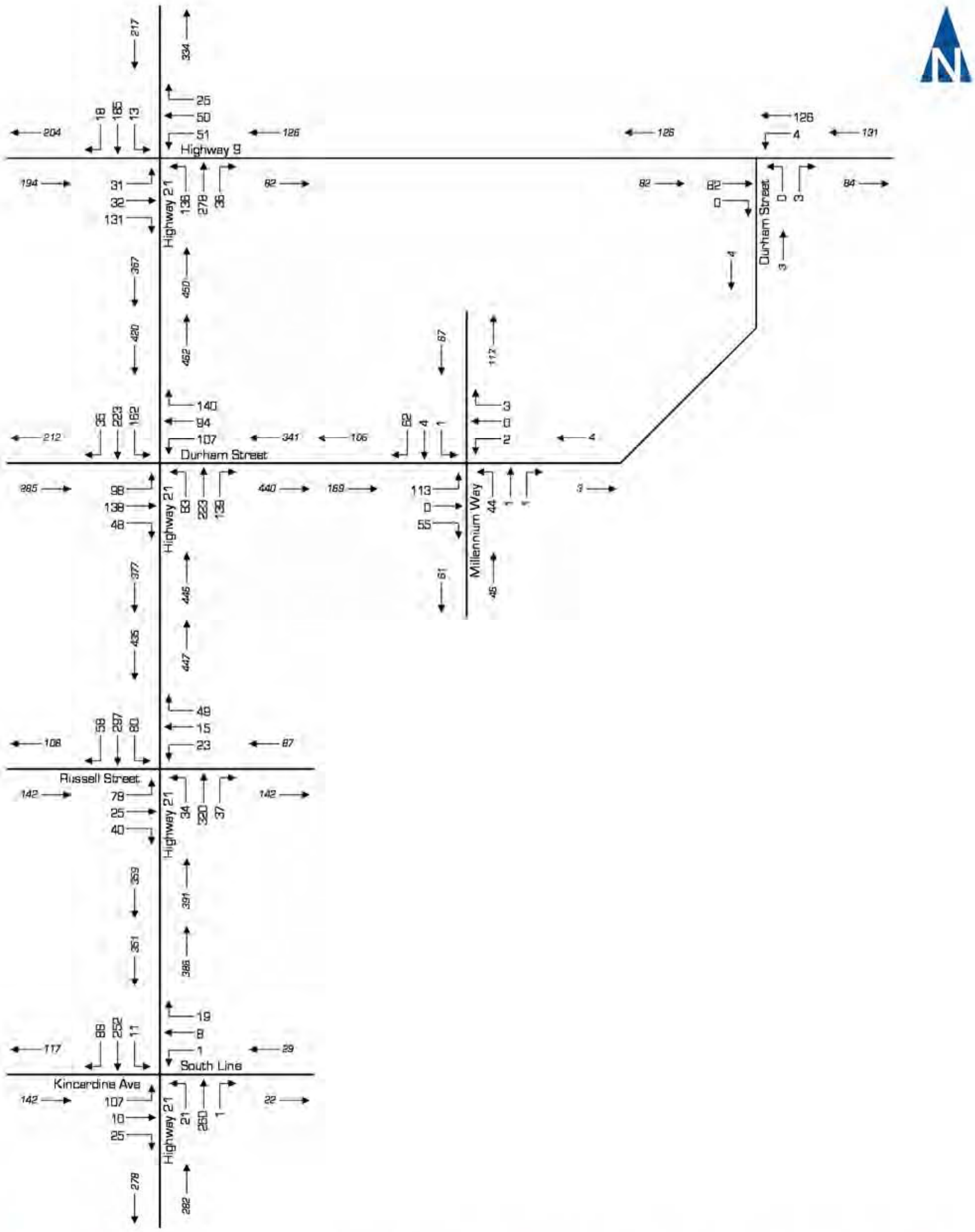
Based on the forecasted 2025 total traffic volumes, LOS analyses have been conducted using Synchro 9 and the AM and PM peak hour conditions for the study area. No changes to the existing geometry or signal phasing structure or cycle lengths were made in the analysis, but the signal timings were otherwise optimized by Synchro. A summary of the 2025 total traffic operations and the detailed Synchro reports are included in **Appendix F.** The analysis indicates the following deficiencies in traffic operations are forecast to occur:

- The westbound left-turn movement on Highway 9 at Highway 21 is forecast to operate at LOS F during the PM peak hour.
- The sidestreet (east and westbound) movements on Russell Street at Highway 21 are forecast to operate at LOS F and well above a V/C ratio of 1.0 during the PM peak hour.
- The eastbound movements on Kincardine Avenue at Highway 21 are forecast to operate at LOS F during the PM peak hour, but below a V/C ratio of 1.0.

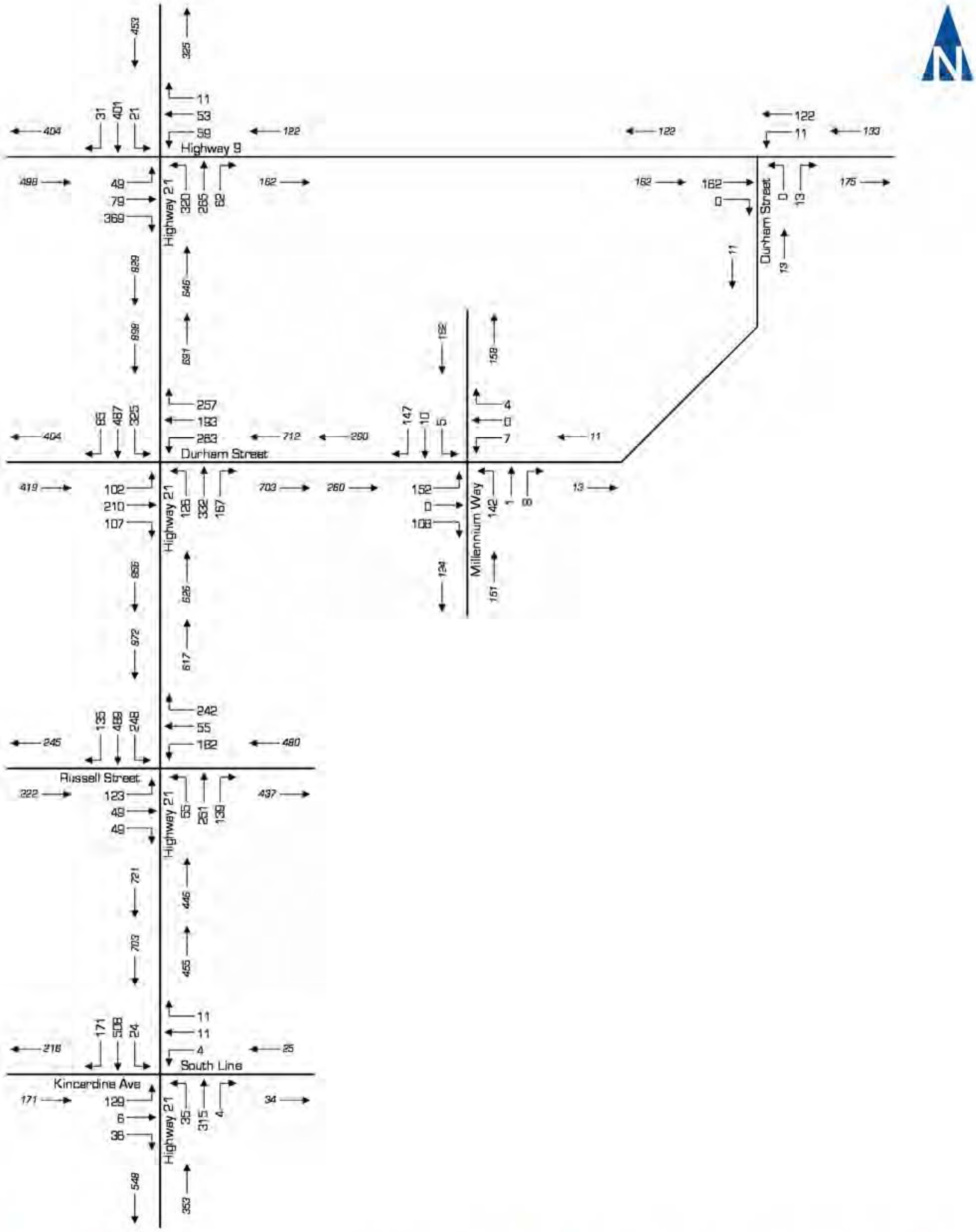


2025 Background Traffic Volume Forecasts

Figure 4.3



2025 Total AM Peak Hour Traffic Volume Forecasts



2025 Total PM Peak Hour Traffic Volume Forecasts

Figure 4.4b

4.3 2030 Horizon

4.3.1 2030 Background Traffic Growth

Similar to the 2020 and 2025 horizon years, the 2030 background traffic was determined by applying a 2% growth rate to the existing volumes. The 2030 background traffic is shown in **Figure 4.5**.

4.3.2 2030 Background Traffic Operations

Based on the forecast 2030 background traffic volumes, LOS analyses have been conducted using Synchro 9 to determine the AM and PM peak hour conditions for the intersections within the study area. No changes to the existing geometry or signal phasing structure or cycle lengths were made in the analysis, but the signal timings were otherwise optimized by Synchro. The analysis indicates that the operations will be mostly similar to the 2020 and 2025 background conditions, but with the delay for the westbound left-turn movement at Highway 21 and Highway 9 during the PM peak hour forecast to increase to LOS F from E. Also notable is the increase of the forecast eastbound operations on Russell Street to be LOS E. A summary of the 2030 background traffic operations and the detailed Synchro reports are included in **Appendix G**.

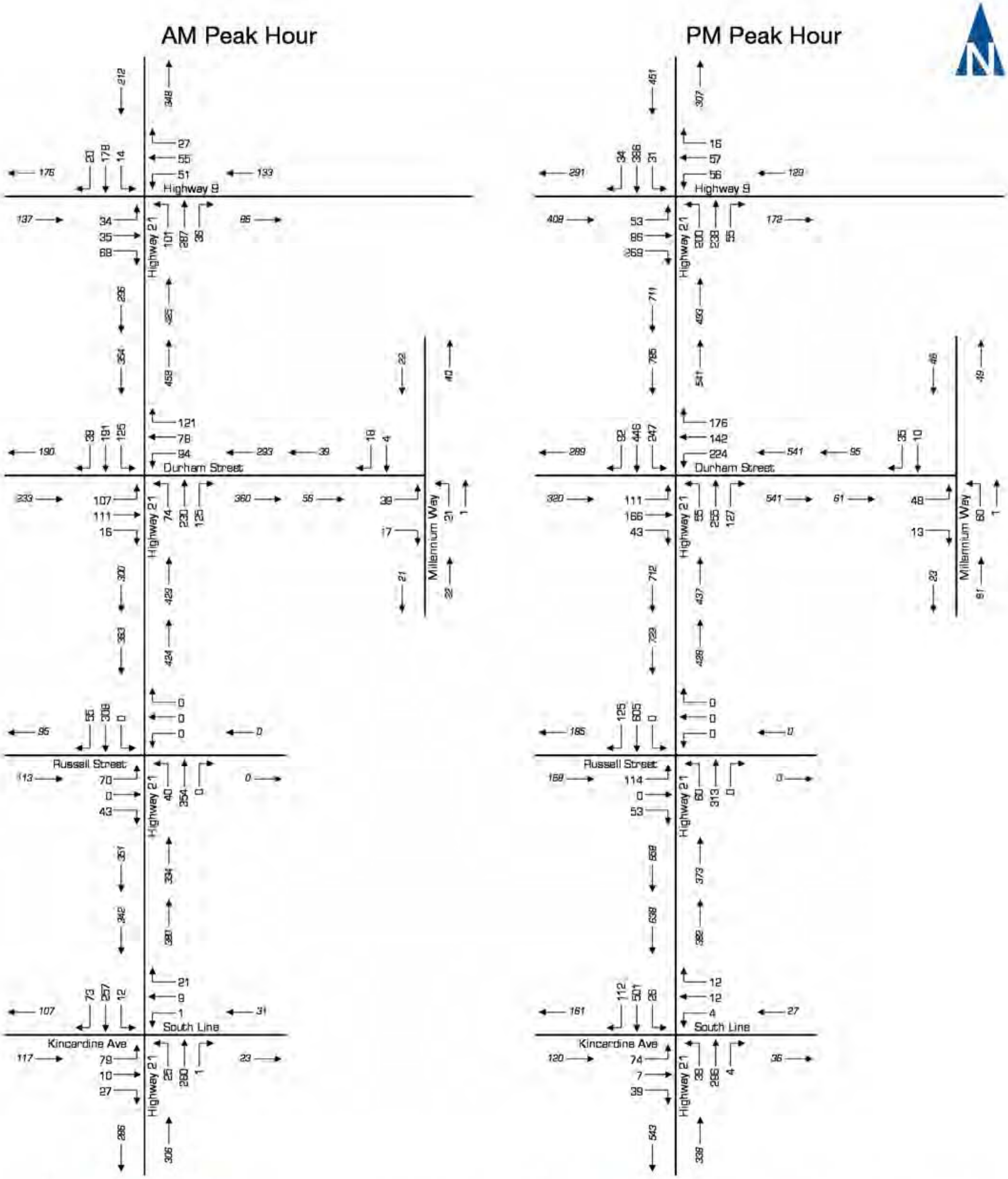
4.3.3 Total 2030 Traffic Volumes

The total 2030 traffic volumes, which are the background volumes added to the site generated volumes are shown in **Figure 4.6a** and **Figure 4.6b**.

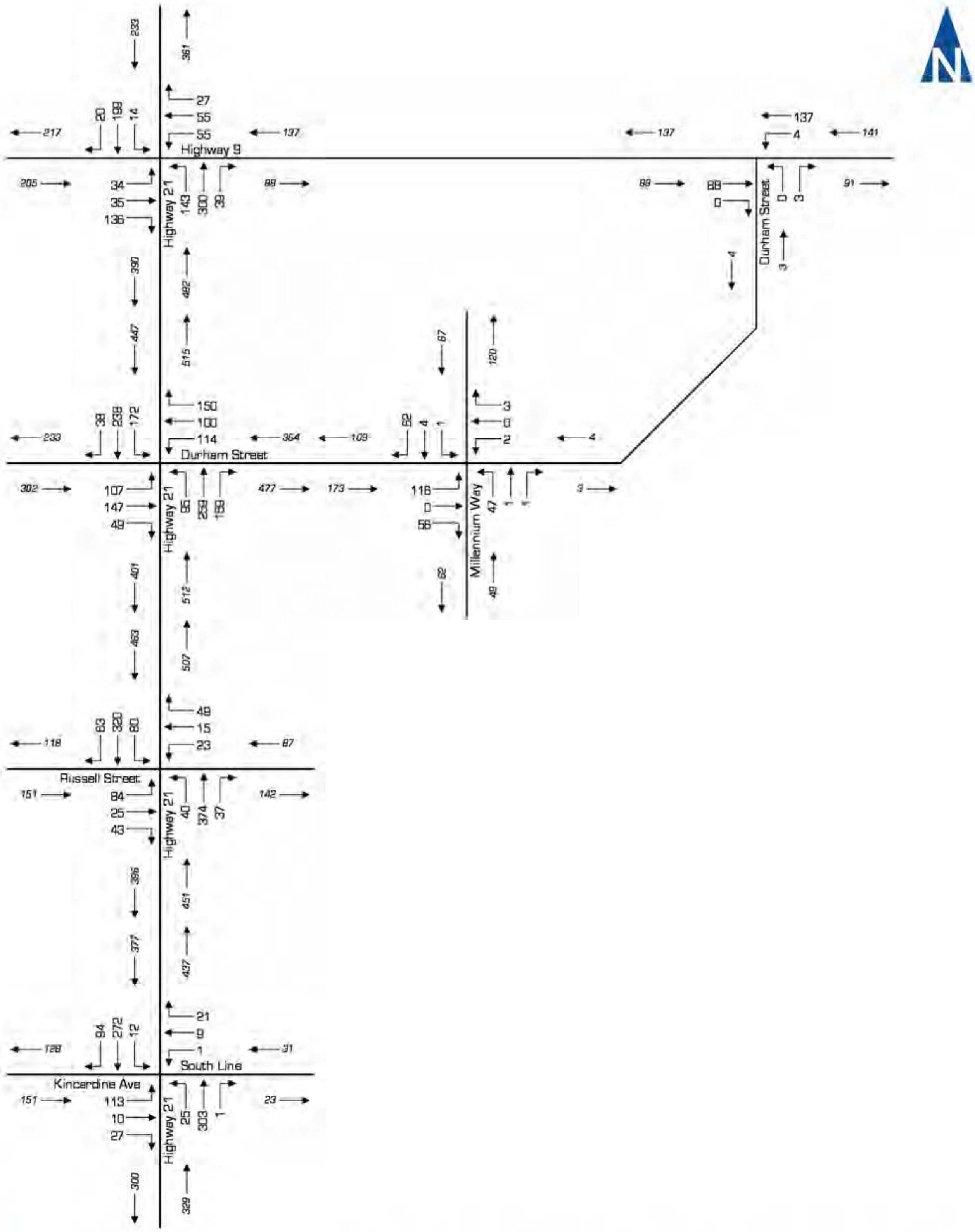
4.2.4 Total 2030 Traffic Operations

Based on the forecasted 2030 total traffic volumes, LOS analyses have been conducted using Synchro 9 and the AM and PM peak hour conditions for the study area. No changes to the existing geometry or signal phasing structure or cycle lengths were made in the analysis, but the signal timings were otherwise optimized by Synchro. A summary of the 2030 total traffic operations and the detailed Synchro reports are included in **Appendix H.** The analysis indicates the following deficiencies in traffic operations are forecast to occur:

- The westbound left-turn movement on Highway 9 at Highway 21 is forecast to operate at LOS F during the PM peak hour.
- The sidestreet (east and westbound) movements on Russell Street at Highway 21 are forecast to operate at LOS F and well above a V/C ratio of 1.0 during the PM peak hour.
- The eastbound movements on Kincardine Avenue at Highway 21 are forecast to operate at LOS F during the PM peak hour, but below a V/C ratio of 1.0.

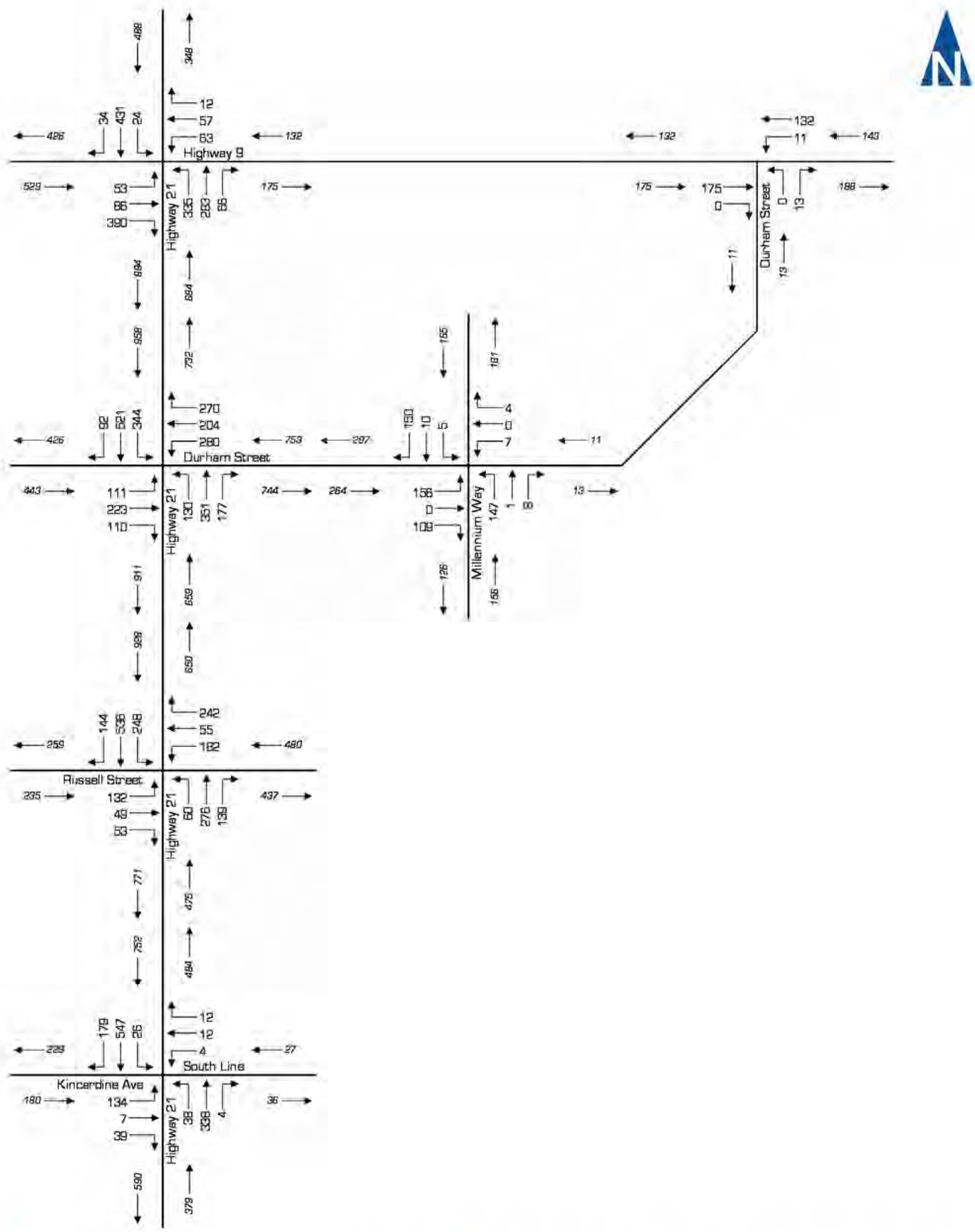


2030 Background Traffic Volume Forecasts



2030 Total AM Peak Hour Traffic Volume Forecasts

Figure 4.6a



2030 Total PM Peak Hour Traffic Volume Forecasts

Figure 4.6b

5 Remedial Measures

The following sections review what, if any, measures should be implemented to mitigate the increases in delay resulting from the development of the site.

5.1 Signal Warrants

5.1.1 Highway 21 and Russell Street

The intersection of Highway 21 and Russell Street was checked if signals will be warranted at any of the forecast horizon years. **Table 5.1** summarizes the results of the signal warrant analyses and the signal warrant worksheets are included in **Appendix I**.

The analysis indicates that a signal will be warranted at the intersection of Highway 21 and Russell Street by the development by the 2020 horizon year. A separate westbound left-turn lane should be constructed as a part of this intersection as the left-turn volumes are forecast to represent nearly half the westbound volume. Also, as part of the reconfiguration of this intersection from a 3-legged stop-controlled intersection to a 4-legged signalized intersection, a southbound left-turn lane should be constructed, which can be placed in the existing shadow lane of the northbound left-turn lane.

TABLE 5.1: SIGNAL WARRANT ANALYSIS SUMMARY

	2020	2025	2030
Background	Not Warranted	Not Warranted	Not Warranted
Total	Warranted	Warranted	Warranted

5.1.2 Highway 21 and Kincardine Avenue

The intersection of Highway 21 and Kincardine Avenue was also checked if signal would be warranted. The analysis shows that at the 2030 total horizon, a signal is not warranted at this intersection (and therefore, not warranted at the other horizons, which have lower volumes). The signal warrant worksheet is included in **Appendix I**. Despite the poor level of service for the eastbound movements, the sidestreet volumes are not high enough to warrant a signal.

5.2 Left-Turn Lane Warrants

The need for a left-turn lane was analyzed for the westbound direction on Highway 9 at the future Durham Street extension. Left-turn lane warrants are based on the Ministry of Transportation Geometric Design Standards manual. Warrants are based on the percentage of vehicles turning left in the advancing volume and warrants start at 5%. Based on the percentage of left-turning vehicles forecast for the future horizons, the AM peak hours will use the 5% nomograph and the PM peak hours will use the 10%

nomograph. A design speed of 20 km/h over the speed limit of 80 km/h was assumed. The results of the left-turn lane warrant analysis are shown in **Figure 5.1**. The results are that a left-turn lane is not warranted at this intersection.

5.3 Right-Turn Lanes

While there is not a concrete rule on when a right-turn lane is warranted, generally when the right-turn volume reaches 100 vehicles per hour, a right-turn lane should be considered. By 2020, the northbound right-turn volumes on Highway 21 at Durham Street is forecast to reach 139 vph and 159 vph during the AM and PM peak hours, respectively. Also, the northbound right-turn volume on Highway 21 at Russell Street is forecast to reach 139 vph during the PM peak hour. Therefore, right-turn lanes should be considered on Highway 21 at both Durham Street and Russell Street

5.4 Signalized Intersections

The intersections of Highway 21 with Highway 9 and Durham Street are forecasted to have movements operate poorly by the 2030 total horizon:

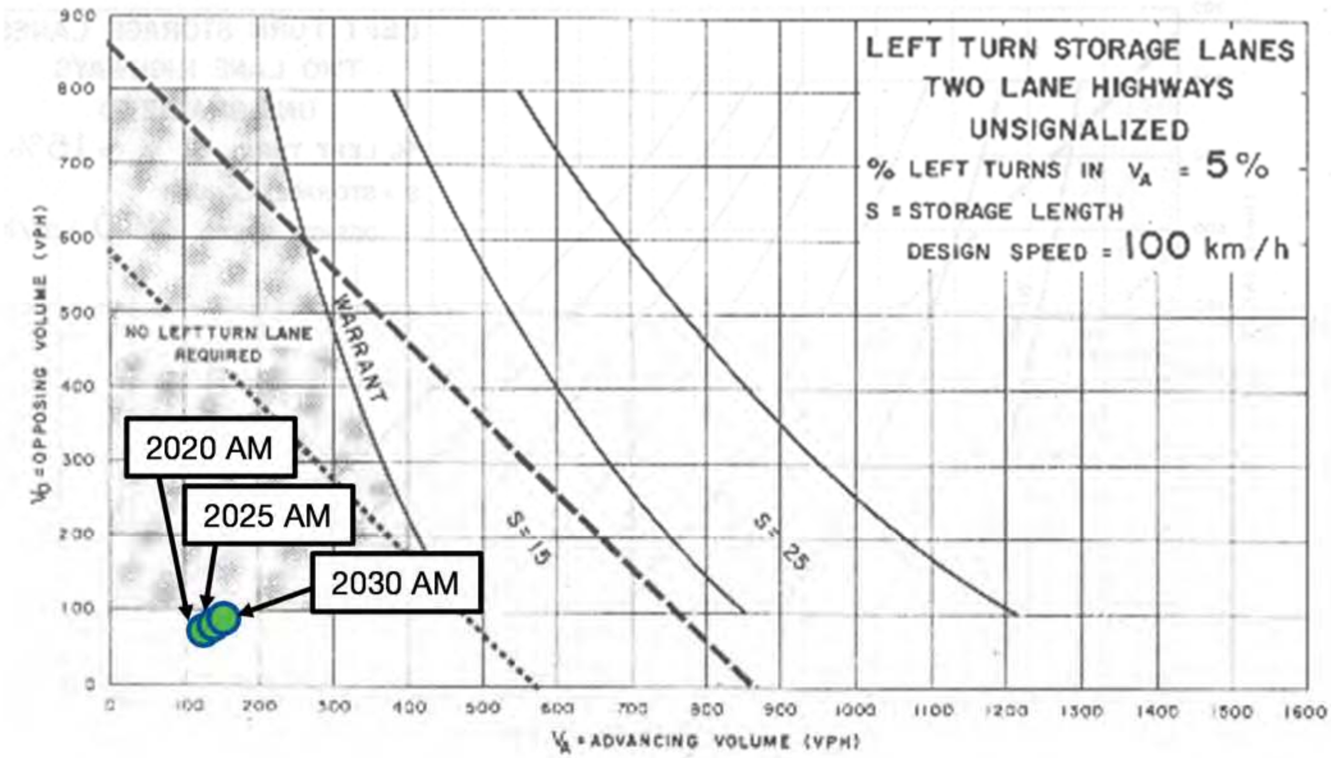
- The westbound left-turn movement on Highway 9 at Highway 21 is forecast to operate at LOS F at the 2030 background PM peak hour, and the 2020, 2025, and 2030 total PM peak hour horizons.
- The westbound left-turn movement on Durham Street at Highway 21 is forecast to operate at LOS F at the 2030 total PM peak hour horizon.

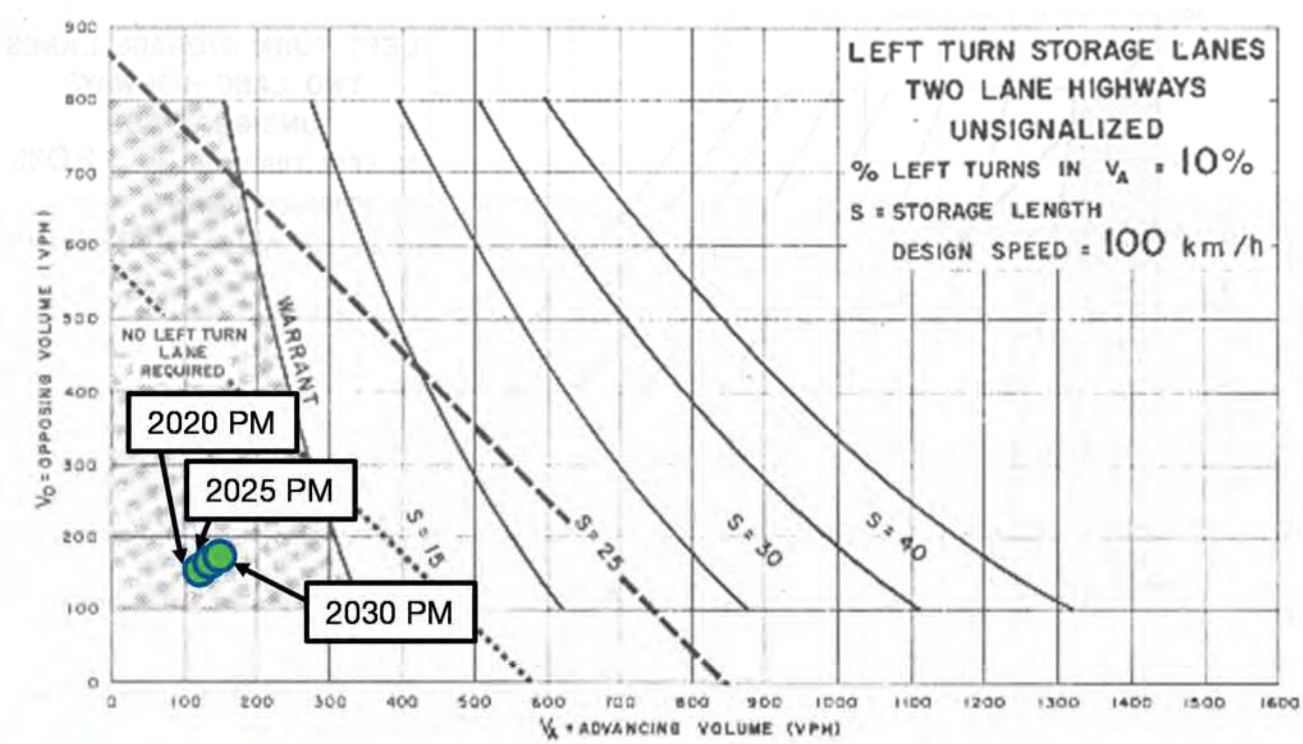
To improve operations, the following changes should be made to the signals, based on the 2021 total horizon:

- At Highway 21 and Highway 9, a westbound left-turn protected/permissive phase should be implemented by the 2020 horizon.
- At Highway 21 and Durham Street, a westbound left-turn protected/permissive phase should be implemented by the 2030 horizon.

5.5 Traffic Operations With Improvements

The traffic operations with the 2030 total horizon volumes were analysed in Synchro 9, with the improvements noted above. It was found that the traffic is forecast to operate in a satisfactory manor with the improvement. Of note, the new signal at Highway 21 and Russell Street was found to operate best with a westbound and southbound protected / permissive left-turn phases in addition to the improvements noted in Section 5.1.1. A summary of the 2030 total traffic operations and the detailed Synchro reports are included in **Appendix J.**





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Left-turn Lane Warrant Nomographs
Highway 9 and Durham Street

Figure 5.1

6 Conclusions and Recommendations

6.1 Conclusions

Based on the analyses contained in the report, it is concluded that:

- The intersections within the study area operate within acceptable levels.
- The westbound left-turn movement on Highway 9 at Highway 21 is forecast to operate at LOS F during the PM peak hour at the 2030 background horizon, the 2020 total horizon, 2025 total horizon, and 2030 total horizon.
- The westbound left-turn movement on Durham Street at Highway 21 is forecast to operate at LOS F during the PM peak hour at the 2030 total horizon.
- The sidestreet operations of the intersection of Highway 21 and Russell Street operate at LOS F during the PM peak hour at the 2020 total horizon, 2025 total horizon, and during both peak hours at the 2030 total horizon.
- The eastbound movements on Kincardine Avenue at Highway 21 are forecast to operate at LOS F during the PM peak hour at the 2025 and 2030 total horizons.

The following improvements are warranted:

- A westbound protected / permissive left-turn phase is forecast to be warranted at the intersection of Highway 21 and Highway 9 at the 2020 horizon.
- A westbound protected / permissive left-turn phase is forecast to be warranted at the intersection of Highway 21 and Durham Street at the 2030 horizon.
- A signal is forecast to be warranted by the 2020 horizon at the intersection of Highway 21 and Russell Street. Along with signalization, westbound and southbound left-turn lanes should be constructed as well as westbound and southbound protected / permissive left-turn phases.
- A northbound right turn lane is forecast to be warranted on Highway 21 at Durham Street.
- A northbound right turn lane is forecast to be warranted on Highway 21 at Russell Street.

6.2 Recommendations

Based on the foregoing analyses, it is recommended that the planning applications be approved as proposed with the following conditions related to transportation system improvements:

- A westbound protected / permissive phase be implemented at the intersection of Highway 21 and Highway 9.
- A westbound protected / permissive phase be implemented at the intersection of Highway 21 and Durham Street.
- A northbound right-turn lane be constructed on Highway 21 at Durham Street.
- A signal be constructed at the intersection of Highway 21 and Russell Street with a westbound and southbound left-turn lanes, a northbound right-turn lane and westbound and southbound protected / permissive left-turn phases.

Appendix A

Base Year Traffic Operations Reports

Analysis Period	Intersection	Control Type	MOE	Eastbound Left	Eastbound Through	Eastbound Right	Eastbound Approach	Westbound Left	Westbound Through	Westbound Right	Westbound Approach	Northbound Left	Northbound Through	Northbound Right	Northbound Approach	Southbound Left	Southbound Through	Southbound Right	Southbound Approach	Overall
AM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	D	C	C	**C**	D	D	A	**C**	A	A	A	**A**	A	A	A	**A**	**B**
			Delay	39	21	21	**25**	41	39	4	**32**	4	4	4	**4**	4	4	0	**3**	**11**
			V/C	0.19	0.36	0.36		0.27	0.22	0.11		0.09	0.20	0.20		0.02	0.11	0.01		
			Queue	12.8	18.4	18.4		17.0	17.9	2.3		8.4	22.0	22.0		2.0	12.8	0.2		
	2 - Highway 21 & Durham Street	Signal	LOS	D	D	D	**D**	D	D	B	**C**	A	A	A	**A**	A	A	A	**A**	**B**
			Delay	52	43	43	**47**	50	41	12	**32**	8	8	8	**8**	3	5	1	**4**	**19**
			V/C	0.53	0.44	0.44		0.48	0.27	0.36		0.08	0.27	0.27		0.13	0.13	0.03		
			Queue	31.8	33.6	33.6		28.7	24.0	14.2		11.2	40.4	40.4		9.2	17.0	2.4		
	3 - Durham Street & Millennium Way	TWSC	LOS	A		A	**A**					A	A		**A**		A	A	**A**	
			Delay	5		5	**5**					10	10		**10**		9	9	**9**	**7**
			V/C	0.02		0.02						0.02	0.02				0.02	0.02		
			Queue	0.5		0.5						0.6	0.6				0.4	0.4		
	4 - Highway 21 & Russell Street	TWSC	LOS	B		B	**B**					A	A		**A**		A	A	**A**	
			Delay	13		13	**13**					8	0		**1**		0	0	**0**	**2**
			V/C	0.18		0.18						0.03	0.17				0.15	0.03		
			Queue	5.2		5.2						0.7	0.0				0.0	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	B	B	B	**B**	B	B	B	**B**	A	A	A	**A**	A	A	A	**A**	
			Delay	14	14	14	**14**	11	11	11	**11**	8	0	0	**1**	0	0	0	**0**	**3**
			V/C	0.17	0.17	0.17		0.04	0.04	0.04		0.02	0.14	0.14		0.01	0.01	0.04		
			Queue	5.0	5.0	5.0		1.0	1.0	1.0		0.4	0.0	0.0		0.2	0.2	0.0		
PM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	C	C	C	**C**	E	C	A	**D**	A	A	A	**A**	A	A	A	**A**	**B**
			Delay	34	26	26	**27**	64	32	0	**42**	7	6	6	**6**	6	7	1	**6**	**15**
			V/C	0.22	0.73	0.73		0.59	0.17	0.04		0.23	0.20	0.20		0.03	0.25	0.02		
			Queue	15.8	44.9	44.9		18.7	16.1	0.0		23.5	28.0	28.0		4.9	39.6	1.8		
	2 - Highway 21 & Durham Street	Signal	LOS	C	C	C	**C**	E	C	A	**C**	B	B	B	**B**	A	A	A	**A**	**C**
			Delay	34	33	33	**34**	58	33	7	**34**	16	16	16	**16**	7	10	3	**8**	**20**
			V/C	0.33	0.43	0.43		0.78	0.29	0.32		0.09	0.34	0.34		0.27	0.31	0.07		
			Queue	27.3	43.6	43.6		55.5	32.2	14.0		13.6	66.3	66.3		27.9	57.1	6.3		
	3 - Durham Street & Millennium Way	TWSC	LOS	A		A	**A**					A	A		**A**		A	A	**A**	
			Delay	6		6	**6**					10	10		**10**		9	9	**9**	**8**
			V/C	0.02		0.02						0.06	0.06				0.04	0.04		
			Queue	0.6		0.6						1.6	1.6				0.9	0.9		
	4 - Highway 21 & Russell Street	TWSC	LOS	C		C	**C**					A	A		**A**		A	A	**A**	
			Delay	21		21	**21**					9	0		**1**		0	0	**0**	**3**
			V/C	0.39		0.39						0.05	0.15				0.30	0.06		
			Queue	14.5		14.5						1.3	0.0				0.0	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	C	C	C	**C**	C	C	C	**C**	A	A	A	**A**	A	A	A	**A**	
			Delay	18	18	18	**18**	16	16	16	**16**	9	0	0	**1**	1	1	0	**1**	**3**
			V/C	0.24	0.24	0.24		0.06	0.06	0.06		0.03	0.15	0.15		0.02	0.02	0.05		
			Queue	7.2	7.2	7.2		1.6	1.6	1.6		0.7	0.0	0.0		0.4	0.4	0.0		

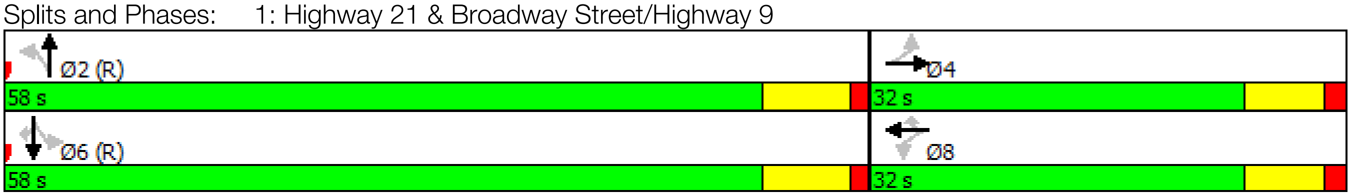
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	27	52	39	42	21	78	221	28	11	137	15
Future Volume (vph)	26	27	52	39	42	21	78	221	28	11	137	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.901				0.850		0.983				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1640	0	1805	1827	1380	1703	1766	0	1504	1759	1615
Flt Permitted	0.727			0.701			0.662			0.593		
Satd. Flow (perm)	1303	1640	0	1332	1827	1380	1187	1766	0	939	1759	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		57				52		11				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			694.0			358.0			262.4	
Travel Time (s)		17.0			31.2			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	9%	2%	0%	4%	17%	6%	6%	4%	20%	8%	0%
Adj. Flow (vph)	28	29	57	42	46	23	85	240	30	12	149	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	28	86	0	42	46	23	85	270	0	12	149	16
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	32.0	32.0		32.0	32.0	32.0	58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%		35.6%	35.6%	35.6%	64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	10.3	10.3		10.3	10.3	10.3	70.2	70.2		70.2	70.2	70.2
Actuated g/C Ratio	0.11	0.11		0.11	0.11	0.11	0.78	0.78		0.78	0.78	0.78
v/c Ratio	0.19	0.36		0.27	0.22	0.11	0.09	0.20		0.02	0.11	0.01
Control Delay	39.1	20.6		41.2	38.8	3.7	4.0	3.9		3.7	3.8	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	39.1	20.6		41.2	38.8	3.7	4.0	3.9		3.7	3.8	0.0
LOS	D	C		D	D	A	A	A		A	A	A
Approach Delay		25.2			32.4			3.9			3.4	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	4.7	4.9		7.2	7.8	0.0	3.8	12.4		0.5	6.6	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	12.8	18.4		17.0	17.9	2.3	8.4	22.0		2.0	12.8	0.2
Internal Link Dist (m)		211.6			670.0			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	361	496		370	507	420	926	1380		732	1372	1270
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.08	0.17		0.11	0.09	0.05	0.09	0.20		0.02	0.11	0.01

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.36
Intersection Signal Delay: 11.2 Intersection LOS: B
Intersection Capacity Utilization 60.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9

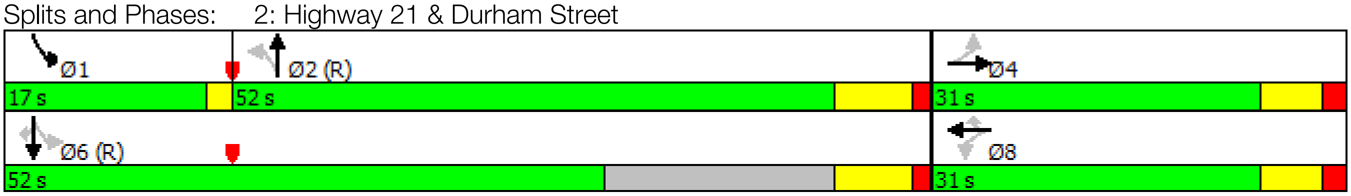


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	85	12	72	60	93	57	177	96	96	147	29
Future Volume (vph)	82	85	12	72	60	93	57	177	96	96	147	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981				0.850		0.947				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1852	0	1770	1863	1509	1805	1664	0	1626	1712	1583
Flt Permitted	0.715			0.689			0.656			0.562		
Satd. Flow (perm)	1332	1852	0	1283	1863	1509	1246	1664	0	962	1712	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				101		35				38
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	5%	2%	2%	7%	0%	12%	1%	11%	11%	2%
Adj. Flow (vph)	89	92	13	78	65	101	62	192	104	104	160	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	89	105	0	78	65	101	62	296	0	104	160	32
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	31.0	31.0		31.0	31.0	31.0	52.0	52.0		17.0	52.0	52.0
Total Split (%)	31.0%	31.0%		31.0%	31.0%	31.0%	52.0%	52.0%		17.0%	52.0%	52.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	12.7	12.7		12.7	12.7	12.7	66.0	66.0		78.8	73.5	73.5
Actuated g/C Ratio	0.13	0.13		0.13	0.13	0.13	0.66	0.66		0.79	0.74	0.74
v/c Ratio	0.53	0.44		0.48	0.27	0.36	0.08	0.27		0.13	0.13	0.03
Control Delay	51.6	42.5		49.8	41.3	11.5	8.1	7.9		3.2	4.6	1.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	51.6	42.5		49.8	41.3	11.5	8.1	7.9		3.2	4.6	1.4
LOS	D	D		D	D	B	A	A		A	A	A
Approach Delay		46.7			31.7			7.9			3.7	
Approach LOS		D			C			A			A	
Queue Length 50th (m)	17.4	18.9		15.1	12.3	0.0	4.2	19.8		3.6	7.8	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	31.8	33.6		28.7	24.0	14.2	11.2	40.4		9.2	17.0	2.4
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	326	459		314	456	445	822	1110		857	1257	1173
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.27	0.23		0.25	0.14	0.23	0.08	0.27		0.12	0.13	0.03

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 19.0	Intersection LOS: B
Intersection Capacity Utilization 62.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Highway 21 & Durham Street



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	30	13	16	1	3	14
Future Volume (vph)	30	13	16	1	3	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.960				0.887	
Flt Protected	0.966			0.955		
Satd. Flow (prot)	1649	0	0	1468	1685	0
Flt Permitted	0.966			0.955		
Satd. Flow (perm)	1649	0	0	1468	1685	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.4			138.6	84.1	
Travel Time (s)	13.6			10.0	6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	23%	25%	0%	0%	0%
Adj. Flow (vph)	33	14	17	1	3	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	47	0	0	18	18	0
Sign Control	Free			Stop	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 17.6% ICU Level of Service A
Analysis Period (min) 15

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	13	16	1	3	14
Future Volume (Veh/h)	30	13	16	1	3	14
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	14	17	1	3	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (m)	189					
pX, platoon unblocked						
vC, conflicting volume	0		90	73	80	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		90	73	80	0
tC, single (s)	4.1		7.3	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.7	4.0	4.0	3.3
p0 queue free %	98		98	100	100	99
cM capacity (veh/h)	1636		816	805	798	1091

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	47	18	18
Volume Left	33	17	0
Volume Right	14	0	15
cSH	1636	816	1028
Volume to Capacity	0.02	0.02	0.02
Queue Length 95th (m)	0.5	0.5	0.4
Control Delay (s)	5.1	9.5	8.6
Lane LOS	A	A	A
Approach Delay (s)	5.1	9.5	8.6
Approach LOS		A	A

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	54	33	31	272	237	42
Future Volume (vph)	54	33	31	272	237	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	15.0			45.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		30.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.949					0.850
Flt Protected	0.970		0.950			
Satd. Flow (prot)	1678	0	1752	1776	1759	1524
Flt Permitted	0.970		0.950			
Satd. Flow (perm)	1678	0	1752	1776	1759	1524
Link Speed (k/h)	50			80	80	
Link Distance (m)	71.8			1178.3	487.8	
Travel Time (s)	5.2			53.0	22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	3%	3%	7%	8%	6%
Adj. Flow (vph)	59	36	34	296	258	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	95	0	34	296	258	46
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 30.8% ICU Level of Service A
Analysis Period (min) 15

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	54	33	31	272	237	42
Future Volume (Veh/h)	54	33	31	272	237	42
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	36	34	296	258	46
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	622	258	304			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	622	258	304			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	95	97			
cM capacity (veh/h)	433	778	1251			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	95	34	296	258	46
Volume Left	59	34	0	0	0
Volume Right	36	0	0	0	46
cSH	521	1251	1700	1700	1700
Volume to Capacity	0.18	0.03	0.17	0.15	0.03
Queue Length 95th (m)	5.3	0.7	0.0	0.0	0.0
Control Delay (s)	13.4	8.0	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	13.4	0.8		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	30.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	8	21	1	7	16	19	215	1	9	198	56
Future Volume (vph)	61	8	21	1	7	16	19	215	1	9	198	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.912			0.999				0.850
Flt Protected		0.958			0.998		0.950				0.998	
Satd. Flow (prot)	0	1747	1538	0	1729	0	1626	1726	0	0	1731	1615
Flt Permitted		0.958			0.998		0.950				0.998	
Satd. Flow (perm)	0	1747	1538	0	1729	0	1626	1726	0	0	1731	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	13%	5%	0%	0%	0%	11%	10%	0%	0%	10%	0%
Adj. Flow (vph)	66	9	23	1	8	17	21	234	1	10	215	61
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	75	23	0	26	0	21	235	0	0	225	61
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 34.9% ICU Level of Service A
Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	8	21	1	7	16	19	215	1	9	198	56
Future Volume (Veh/h)	61	8	21	1	7	16	19	215	1	9	198	56
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	9	23	1	8	17	21	234	1	10	215	61
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	532	512	215	516	572	234	276			235		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	532	512	215	516	572	234	276			235		
tC, single (s)	7.1	6.6	6.2	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.3	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	85	98	97	100	98	98	98			99		
cM capacity (veh/h)	432	439	817	444	422	810	1237			1344		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	98	26	21	235	225	61
Volume Left	66	1	21	0	10	0
Volume Right	23	17	0	1	0	61
cSH	566	616	1237	1700	1344	1700
Volume to Capacity	0.17	0.04	0.02	0.14	0.01	0.04
Queue Length 95th (m)	5.0	1.1	0.4	0.0	0.2	0.0
Control Delay (s)	13.7	11.1	8.0	0.0	0.4	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.7	11.1	0.7		0.3	
Approach LOS	B	B				

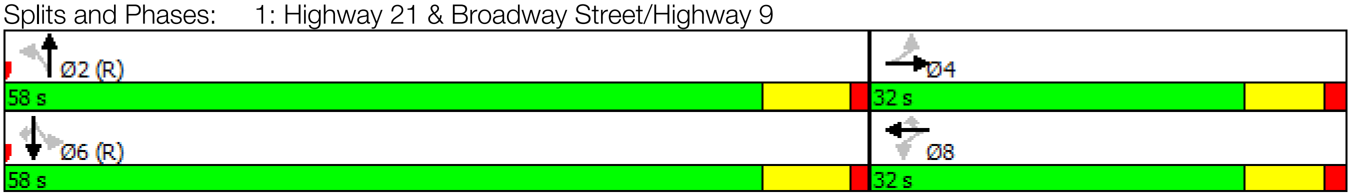
Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑↱		↰	↑	↱
Traffic Volume (vph)	41	66	207	43	44	12	154	183	42	24	297	26
Future Volume (vph)	41	66	207	43	44	12	154	183	42	24	297	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.886				0.850		0.972				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1683	0	1687	1863	1615	1805	1776	0	1805	1863	1615
Flt Permitted	0.726			0.288			0.565			0.607		
Satd. Flow (perm)	1352	1683	0	511	1863	1615	1074	1776	0	1153	1863	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		173				52		21				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			694.0			358.0			262.4	
Travel Time (s)		17.0			31.2			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	7%	2%	0%	0%	4%	4%	0%	2%	0%
Adj. Flow (vph)	45	72	225	47	48	13	167	199	46	26	323	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	45	297	0	47	48	13	167	245	0	26	323	28
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	32.0	32.0		32.0	32.0	32.0	58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%		35.6%	35.6%	35.6%	64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	13.9	13.9		13.9	13.9	13.9	61.8	61.8		61.8	61.8	61.8
Actuated g/C Ratio	0.15	0.15		0.15	0.15	0.15	0.69	0.69		0.69	0.69	0.69
v/c Ratio	0.22	0.73		0.59	0.17	0.04	0.23	0.20		0.03	0.25	0.02
Control Delay	33.7	25.6		64.1	32.2	0.2	7.1	5.8		6.0	6.7	1.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	33.7	25.6		64.1	32.2	0.2	7.1	5.8		6.0	6.7	1.1
LOS	C	C		E	C	A	A	A		A	A	A
Approach Delay		26.7			42.3			6.3			6.2	
Approach LOS		C			D			A			A	
Queue Length 50th (m)	7.4	21.3		8.2	7.8	0.0	9.2	12.0		1.3	18.3	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	15.8	44.9		18.7	16.1	0.0	23.5	28.0		4.9	39.6	1.8
Internal Link Dist (m)		211.6			670.0			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	375	592		141	517	486	737	1225		791	1278	1123
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.12	0.50		0.33	0.09	0.03	0.23	0.20		0.03	0.25	0.02

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 15.1	Intersection LOS: B
Intersection Capacity Utilization 81.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9

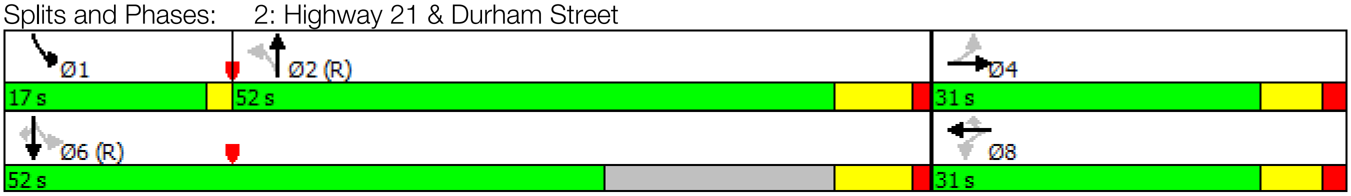


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	128	33	172	109	135	42	196	98	190	343	71
Future Volume (vph)	85	128	33	172	109	135	42	196	98	190	343	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.969				0.850		0.950				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1830	0	1787	1900	1583	1805	1752	0	1787	1881	1583
Flt Permitted	0.681			0.589			0.540			0.516		
Satd. Flow (perm)	1294	1830	0	1108	1900	1583	1026	1752	0	971	1881	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				147		33				77
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	1%	0%	2%	0%	4%	1%	1%	1%	2%
Adj. Flow (vph)	92	139	36	187	118	147	46	213	107	207	373	77
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	175	0	187	118	147	46	320	0	207	373	77
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	31.0	31.0		31.0	31.0	31.0	52.0	52.0		17.0	52.0	52.0
Total Split (%)	31.0%	31.0%		31.0%	31.0%	31.0%	52.0%	52.0%		17.0%	52.0%	52.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	21.7	21.7		21.7	21.7	21.7	52.7	52.7		69.8	64.5	64.5
Actuated g/C Ratio	0.22	0.22		0.22	0.22	0.22	0.53	0.53		0.70	0.64	0.64
v/c Ratio	0.33	0.43		0.78	0.29	0.32	0.09	0.34		0.27	0.31	0.07
Control Delay	34.1	33.2		57.5	32.5	6.6	16.0	15.5		7.2	9.8	2.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	34.1	33.2		57.5	32.5	6.6	16.0	15.5		7.2	9.8	2.5
LOS	C	C		E	C	A	B	B		A	A	A
Approach Delay		33.5			34.4			15.6			8.2	
Approach LOS		C			C			B			A	
Queue Length 50th (m)	15.9	28.8		36.1	20.2	0.0	4.4	31.5		12.6	30.6	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	27.3	43.6		55.5	32.2	14.0	13.6	66.3		27.9	59.1	6.3
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	334	482		286	491	518	550	954		800	1238	1068
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.28	0.36		0.65	0.24	0.28	0.08	0.34		0.26	0.30	0.07

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 20.4	Intersection LOS: C
Intersection Capacity Utilization 76.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Highway 21 & Durham Street



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	37	10	46	1	8	27
Future Volume (vph)	37	10	46	1	8	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.971				0.897	
Flt Protected	0.962			0.953		
Satd. Flow (prot)	1664	0	0	1811	1704	0
Flt Permitted	0.962			0.953		
Satd. Flow (perm)	1664	0	0	1811	1704	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.4			138.6	84.1	
Travel Time (s)	13.6			10.0	6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	20%	0%	0%	0%	0%
Adj. Flow (vph)	40	11	50	1	9	29
Shared Lane Traffic (%)						
Lane Group Flow (vph)	51	0	0	51	38	0
Sign Control	Free			Stop	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 19.3%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	37	10	46	1	8	27
Future Volume (Veh/h)	37	10	46	1	8	27
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	11	50	1	9	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (m)	189					
pX, platoon unblocked						
vC, conflicting volume	0		119	86	91	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		119	86	91	0
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	98		94	100	99	97
cM capacity (veh/h)	1617		815	788	783	1091

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	51	51	38
Volume Left	40	50	0
Volume Right	11	0	29
cSH	1617	815	998
Volume to Capacity	0.02	0.06	0.04
Queue Length 95th (m)	0.6	1.6	0.9
Control Delay (s)	5.8	9.7	8.8
Lane LOS	A	A	A
Approach Delay (s)	5.8	9.7	8.8
Approach LOS		A	A

Intersection Summary			
Average Delay	8.0		
Intersection Capacity Utilization	19.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	88	41	46	241	465	96
Future Volume (vph)	88	41	46	241	465	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	15.0			45.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		30.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.957					0.850
Flt Protected	0.967		0.950			
Satd. Flow (prot)	1712	0	1770	1845	1863	1615
Flt Permitted	0.967		0.950			
Satd. Flow (perm)	1712	0	1770	1845	1863	1615
Link Speed (k/h)	50			80	80	
Link Distance (m)	71.8			1178.3	487.8	
Travel Time (s)	5.2			53.0	22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	3%	2%	0%
Adj. Flow (vph)	96	45	50	262	505	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	141	0	50	262	505	104
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 45.2% ICU Level of Service A
Analysis Period (min) 15

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	88	41	46	241	465	96
Future Volume (Veh/h)	88	41	46	241	465	96
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	96	45	50	262	505	104
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	867	505	609			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	867	505	609			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	69	92	95			
cM capacity (veh/h)	305	567	970			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	141	50	262	505	104
Volume Left	96	50	0	0	0
Volume Right	45	0	0	0	104
cSH	358	970	1700	1700	1700
Volume to Capacity	0.39	0.05	0.15	0.30	0.06
Queue Length 95th (m)	14.6	1.3	0.0	0.0	0.0
Control Delay (s)	21.4	8.9	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	21.4	1.4		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	5	30	3	9	9	29	228	3	20	385	86
Future Volume (vph)	57	5	30	3	9	9	29	228	3	20	385	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.941			0.998				0.850
Flt Protected		0.956			0.994		0.950				0.998	
Satd. Flow (prot)	0	1752	1615	0	1561	0	1805	1824	0	0	1856	1615
Flt Permitted		0.956			0.994		0.950				0.998	
Satd. Flow (perm)	0	1752	1615	0	1561	0	1805	1824	0	0	1856	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	0%	0%	33%	22%	0%	0%	4%	0%	5%	2%	0%
Adj. Flow (vph)	62	5	33	3	10	10	32	248	3	22	418	93
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	67	33	0	23	0	32	251	0	0	440	93
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 53.3%	ICU Level of Service A
Analysis Period (min) 15	

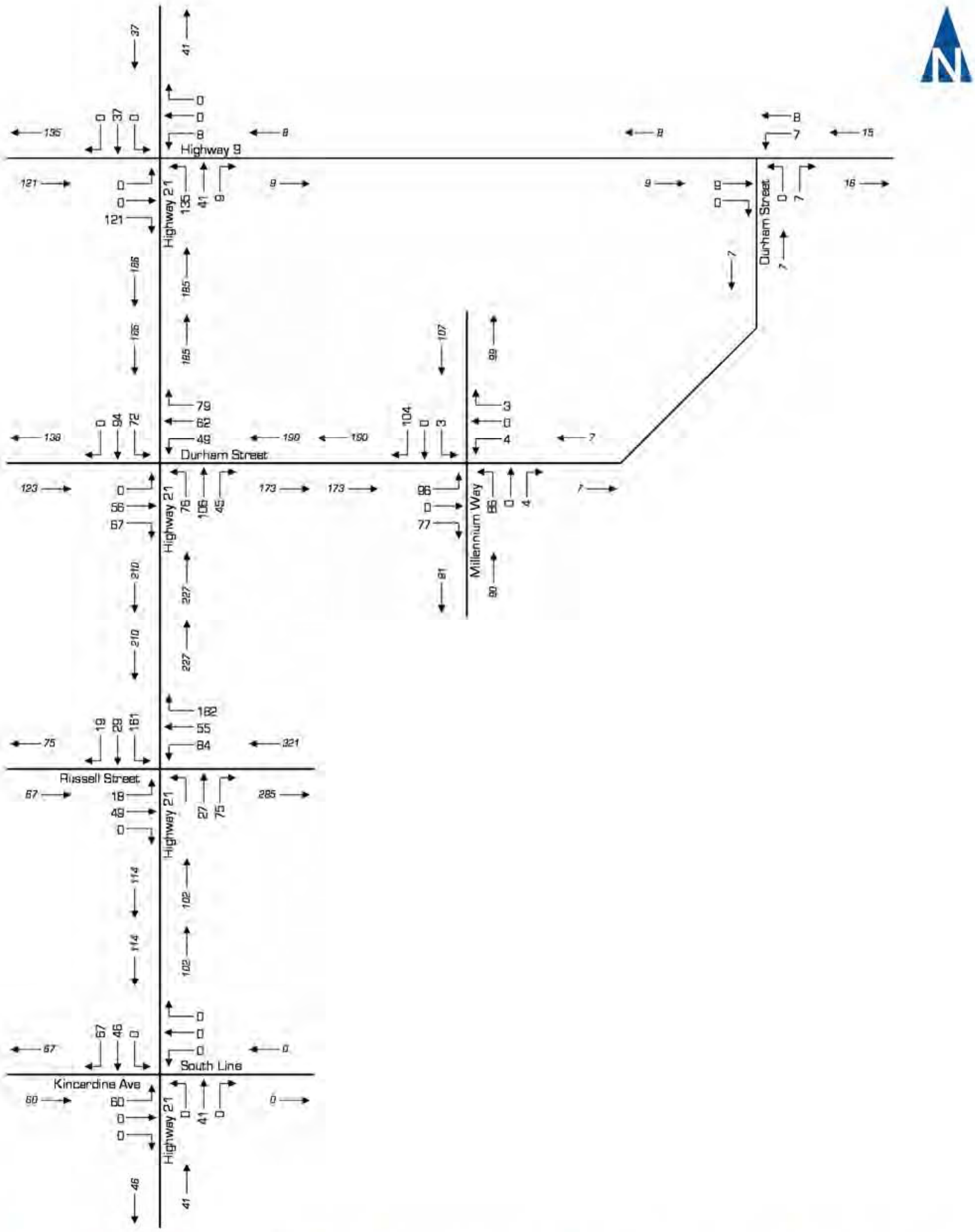
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	5	30	3	9	9	29	228	3	20	385	86
Future Volume (Veh/h)	57	5	30	3	9	9	29	228	3	20	385	86
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	5	33	3	10	10	32	248	3	22	418	93
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	789	777	418	778	868	250	511			251		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	789	777	418	778	868	250	511			251		
tC, single (s)	7.1	6.5	6.2	7.4	6.7	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.8	4.2	3.3	2.2			2.2		
p0 queue free %	78	98	95	99	96	99	97			98		
cM capacity (veh/h)	283	315	639	252	257	794	1065			1297		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	100	23	32	251	440	93
Volume Left	62	3	32	0	22	0
Volume Right	33	10	0	3	0	93
cSH	426	363	1065	1700	1297	1700
Volume to Capacity	0.23	0.06	0.03	0.15	0.02	0.05
Queue Length 95th (m)	7.2	1.6	0.7	0.0	0.4	0.0
Control Delay (s)	18.0	15.6	8.5	0.0	0.6	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	18.0	15.6	1.0		0.5	
Approach LOS	C	C				

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		

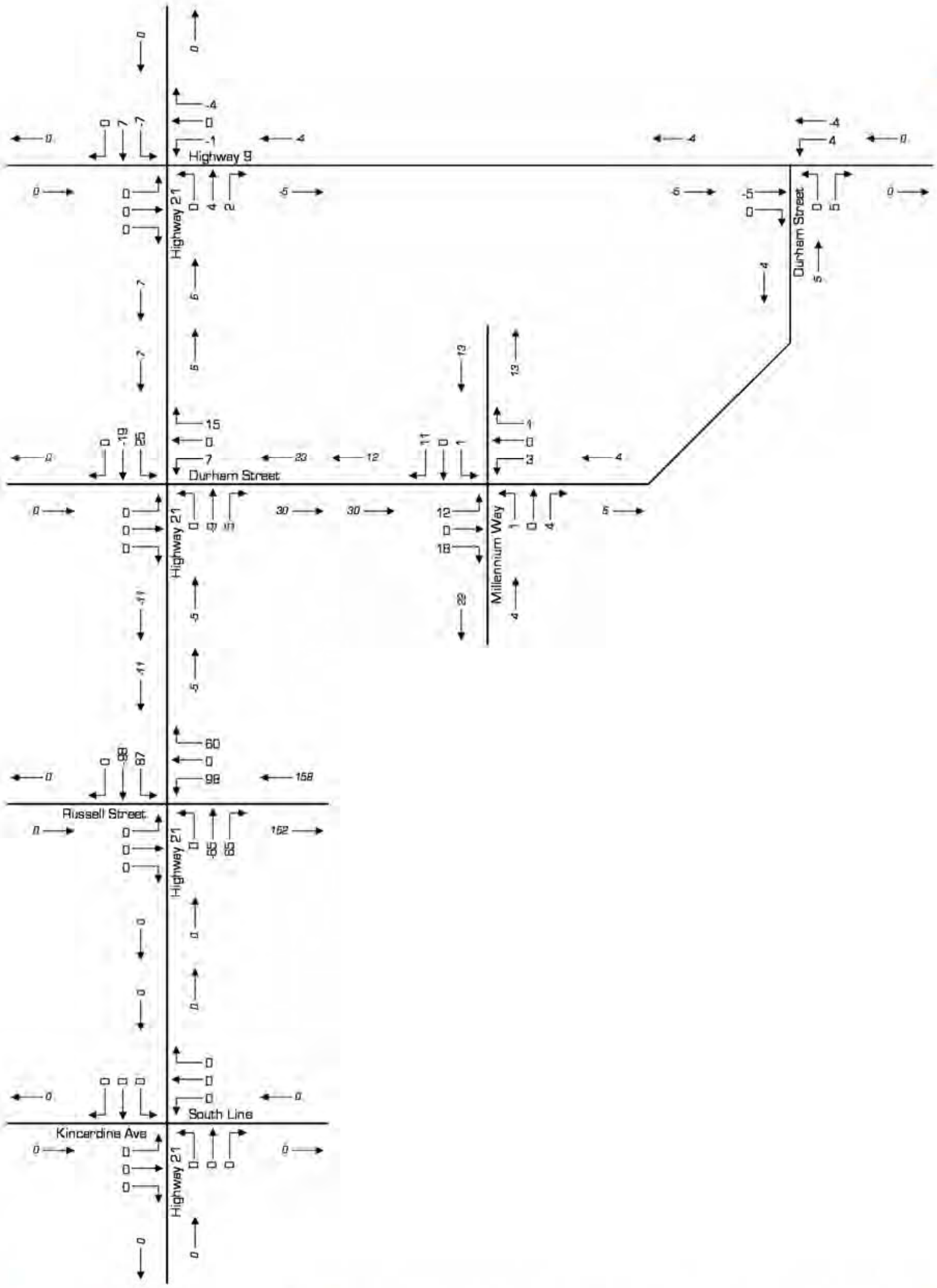
Appendix B

Development Generated Trip Forecasts



Development PM Peak Hour Traffic Volume Forecasts – New Trips

Figure B1



Development PM Peak Hour Traffic Volume Forecasts – Passby

Figure B2

Appendix C

2020 Background Traffic Operations Reports

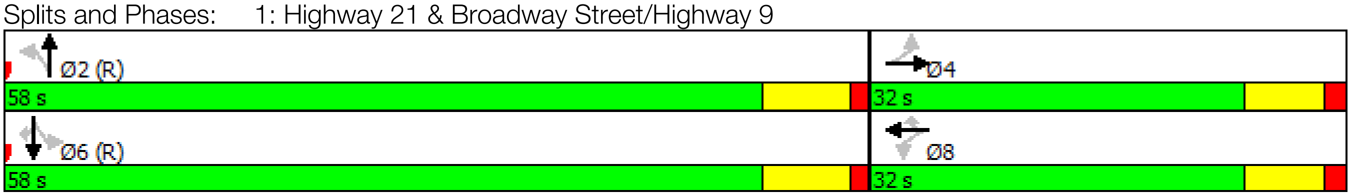
Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
AM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	D	C	C	**C**	D	D	A	**C**	A	A	A	**A**	A	A	A	**A**	**B**
			Delay	39	21	21	**25**	42	39	5	**33**	4	4	4	**4**	4	4	0	**4**	**11**
			V/C	0.21	0.39	0.39		0.31	0.23	0.12		0.10	0.22	0.22		0.02	0.12	0.01		
			Queue	13.9	19.5	19.5		18.4	19.0	2.8		9.4	25.1	25.1		2.2	14.5	0.4		
	2 - Highway 21 & Durham Street	Signal	LOS	D	D	D	**D**	D	D	B	**C**	A	A	A	**A**	A	A	A	**A**	**B**
			Delay	52	43	43	**47**	50	41	11	**32**	9	9	9	**9**	4	5	2	**4**	**19**
			V/C	0.56	0.46	0.46		0.51	0.29	0.38		0.09	0.31	0.31		0.15	0.14	0.03		
			Queue	34.1	36.3	36.3		30.8	25.4	14.8		12.5	47.5	47.5		10.6	19.2	2.8		
	3 - Durham Street & Millennium Way	TWSC	LOS	A		A	**A**					A	A		**A**		A	A	**A**	
			Delay	5		5	**5**					10	10		**10**		9	9	**9**	**7**
			V/C	0.02		0.02						0.03	0.03				0.02	0.02		
			Queue	0.5		0.5						0.6	0.6				0.5	0.5		
	4 - Highway 21 & Russell Street	TWSC	LOS	B		B	**B**					A	A		**A**		A	A	**A**	
			Delay	14		14	**14**					8	0		**1**		0	0	**0**	**2**
			V/C	0.21		0.21						0.03	0.19				0.17	0.03		
			Queue	6.4		6.4						0.7	0.0				0.0	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	C	C	C	**B**	B	B	B	**B**	A	A	A	**A**	A	A	A	**A**	
			Delay	15	15	15	**14**	11	11	11	**11**	8	0	0	**1**	0	0	0	**0**	**3**
			V/C	0.21	0.21	0.21		0.05	0.05	0.05		0.02	0.15	0.15		0.01	0.01	0.04		
			Queue	5.0	5.0	5.0		1.0	1.0	1.0		0.4	0.0	0.0		0.2	0.2	0.0		
PM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	C	C	C	**C**	E	C	A	**D**	A	A	A	**A**	A	A	A	**A**	**B**
			Delay	32	28	28	**28**	69	31	0	**44**	8	7	7	**7**	7	8	2	**7**	**16**
			V/C	0.22	0.76	0.76		0.65	0.17	0.04		0.26	0.22	0.22		0.04	0.28	0.03		
			Queue	16.3	51.1	51.1		20.3	16.5	0.0		28.3	32.9	32.9		5.6	46.9	2.4		
	2 - Highway 21 & Durham Street	Signal	LOS	C	C	C	**C**	D	C	A	**C**	B	B	B	**B**	A	B	A	**A**	**C**
			Delay	32	31	31	**31**	53	30	6	**32**	19	19	19	**19**	9	12	3	**10**	**21**
			V/C	0.32	0.42	0.42		0.77	0.28	0.32		0.10	0.40	0.40		0.33	0.35	0.08		
			Queue	28.8	45.9	45.9		59.4	33.6	14.1		15.7	79.7	79.7		32.8	70.2	6.9		
	3 - Durham Street & Millennium Way	TWSC	LOS	A		A	**A**					A	A		**A**		A	A	**A**	
			Delay	6		6	**6**					10	10		**10**		9	9	**9**	**8**
			V/C	0.03		0.03						0.07	0.07				0.04	0.04		
			Queue	0.7		0.7						1.8	1.8				1.1	1.1		
	4 - Highway 21 & Russell Street	TWSC	LOS	D		D	**D**					A	A		**A**		A	A	**A**	
			Delay	27		27	**27**					9	0		**1**		0	0	**0**	**4**
			V/C	0.49		0.49						0.06	0.17				0.33	0.07		
			Queue	20.2		20.2						1.5	0.0				0.0	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	C	C	C	**C**	C	C	C	**C**	A	A	A	**A**	A	A	A	**A**	
			Delay	21	21	21	**21**	17	17	17	**17**	9	0	0	**1**	1	1	0	**1**	**3**
			V/C	0.30	0.30	0.30		0.08	0.08	0.08		0.03	0.16	0.16		0.02	0.02	0.06		
			Queue	9.9	9.9	9.9		2.0	2.0	2.0		0.8	0.0	0.0		0.5	0.5	0.0		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	30	57	43	46	23	86	243	31	12	151	17
Future Volume (vph)	29	30	57	43	46	23	86	243	31	12	151	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.902				0.850		0.983				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1641	0	1805	1827	1380	1703	1766	0	1504	1759	1615
Flt Permitted	0.724			0.695			0.653			0.578		
Satd. Flow (perm)	1298	1641	0	1320	1827	1380	1170	1766	0	915	1759	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		62				52		12				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			490.2			358.0			262.4	
Travel Time (s)		17.0			22.1			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	9%	2%	0%	4%	17%	6%	6%	4%	20%	8%	0%
Adj. Flow (vph)	32	33	62	47	50	25	93	264	34	13	164	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	95	0	47	50	25	93	298	0	13	164	18
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	32.0	32.0		32.0	32.0	32.0	58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%		35.6%	35.6%	35.6%	64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	10.5	10.5		10.5	10.5	10.5	70.1	70.1		70.1	70.1	70.1
Actuated g/C Ratio	0.12	0.12		0.12	0.12	0.12	0.78	0.78		0.78	0.78	0.78
v/c Ratio	0.21	0.39		0.31	0.23	0.12	0.10	0.22		0.02	0.12	0.01
Control Delay	39.4	20.7		41.9	38.8	4.6	4.1	4.1		3.8	3.9	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	39.4	20.7		41.9	38.8	4.6	4.1	4.1		3.8	3.9	0.2
LOS	D	C		D	D	A	A	A		A	A	A
Approach Delay		25.4			33.0			4.1			3.5	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	5.4	5.6		8.0	8.5	0.0	4.1	13.9		0.6	7.4	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	13.9	19.5		18.4	19.0	2.8	9.4	25.1		2.2	14.5	0.4
Internal Link Dist (m)		211.6			466.2			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	360	500		366	507	420	911	1377		712	1370	1268
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.09	0.19		0.13	0.10	0.06	0.10	0.22		0.02	0.12	0.01

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.39	
Intersection Signal Delay: 11.4	Intersection LOS: B
Intersection Capacity Utilization 60.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9

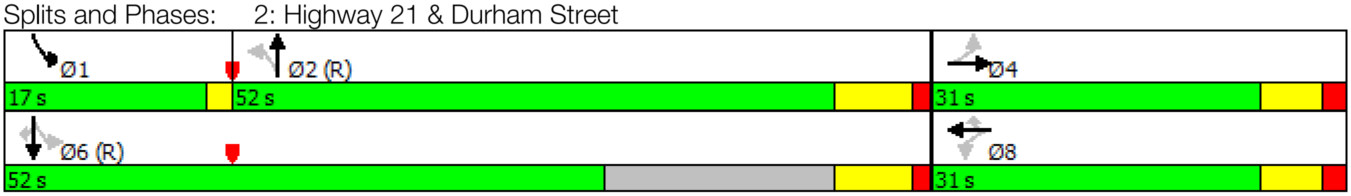


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	94	13	79	66	102	63	195	106	106	162	32
Future Volume (vph)	90	94	13	79	66	102	63	195	106	106	162	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982				0.850		0.947				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1855	0	1770	1863	1509	1805	1664	0	1626	1712	1583
Flt Permitted	0.710			0.682			0.646			0.539		
Satd. Flow (perm)	1323	1855	0	1270	1863	1509	1227	1664	0	923	1712	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				111		35				38
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	5%	2%	2%	7%	0%	12%	1%	11%	11%	2%
Adj. Flow (vph)	98	102	14	86	72	111	68	212	115	115	176	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	116	0	86	72	111	68	327	0	115	176	35
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	31.0	31.0		31.0	31.0	31.0	52.0	52.0		17.0	52.0	52.0
Total Split (%)	31.0%	31.0%		31.0%	31.0%	31.0%	52.0%	52.0%		17.0%	52.0%	52.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	13.3	13.3		13.3	13.3	13.3	63.6	63.6		78.2	72.9	72.9
Actuated g/C Ratio	0.13	0.13		0.13	0.13	0.13	0.64	0.64		0.78	0.73	0.73
v/c Ratio	0.56	0.46		0.51	0.29	0.38	0.09	0.31		0.15	0.14	0.03
Control Delay	52.2	42.7		50.3	41.0	10.9	8.6	8.9		3.5	4.9	1.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	52.2	42.7		50.3	41.0	10.9	8.6	8.9		3.5	4.9	1.6
LOS	D	D		D	D	B	A	A		A	A	A
Approach Delay		47.0			31.6			8.9			4.0	
Approach LOS		D			C			A			A	
Queue Length 50th (m)	19.1	20.9		16.7	13.5	0.0	4.7	23.4		4.2	8.9	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	34.1	36.3		30.8	25.4	14.8	12.5	47.5		10.6	19.2	2.8
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	324	459		311	456	453	780	1071		827	1247	1164
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.30	0.25		0.28	0.16	0.25	0.09	0.31		0.14	0.14	0.03

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.56	
Intersection Signal Delay: 19.4	Intersection LOS: B
Intersection Capacity Utilization 62.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Highway 21 & Durham Street



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	33	14	18	1	3	15
Future Volume (vph)	33	14	18	1	3	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.960				0.886	
Flt Protected	0.966			0.955		
Satd. Flow (prot)	1650	0	0	1466	1683	0
Flt Permitted	0.966			0.955		
Satd. Flow (perm)	1650	0	0	1466	1683	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.4			138.6	84.1	
Travel Time (s)	13.6			10.0	6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	23%	25%	0%	0%	0%
Adj. Flow (vph)	36	15	20	1	3	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	51	0	0	21	19	0
Sign Control	Free			Stop	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 17.7%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	33	14	18	1	3	15
Future Volume (Veh/h)	33	14	18	1	3	15
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	15	20	1	3	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (m)	189					
pX, platoon unblocked						
vC, conflicting volume	0		97	80	87	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		97	80	87	0
tC, single (s)	4.1		7.3	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.7	4.0	4.0	3.3
p0 queue free %	98		98	100	100	99
cM capacity (veh/h)	1636		805	797	789	1091

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	51	21	19
Volume Left	36	20	0
Volume Right	15	0	16
cSH	1636	805	1029
Volume to Capacity	0.02	0.03	0.02
Queue Length 95th (m)	0.5	0.6	0.5
Control Delay (s)	5.2	9.6	8.6
Lane LOS	A	A	A
Approach Delay (s)	5.2	9.6	8.6
Approach LOS		A	A

Intersection Summary			
Average Delay	6.9		
Intersection Capacity Utilization	17.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	59	36	34	299	261	46
Future Volume (vph)	59	36	34	299	261	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	15.0			45.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		30.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.949					0.850
Flt Protected	0.970		0.950			
Satd. Flow (prot)	1678	0	1752	1776	1759	1524
Flt Permitted	0.970		0.950			
Satd. Flow (perm)	1678	0	1752	1776	1759	1524
Link Speed (k/h)	50			80	80	
Link Distance (m)	71.8			1178.3	487.8	
Travel Time (s)	5.2			53.0	22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	3%	3%	7%	8%	6%
Adj. Flow (vph)	64	39	37	325	284	50
Shared Lane Traffic (%)						
Lane Group Flow (vph)	103	0	37	325	284	50
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 32.5%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	59	36	34	299	261	46
Future Volume (Veh/h)	59	36	34	299	261	46
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	64	39	37	325	284	50
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	683	284	334			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	683	284	334			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	84	95	97			
cM capacity (veh/h)	398	753	1220			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	103	37	325	284	50
Volume Left	64	37	0	0	0
Volume Right	39	0	0	0	50
cSH	484	1220	1700	1700	1700
Volume to Capacity	0.21	0.03	0.19	0.17	0.03
Queue Length 95th (m)	6.4	0.8	0.0	0.0	0.0
Control Delay (s)	14.4	8.0	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	14.4	0.8		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	32.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	9	23	1	8	18	21	237	1	10	218	62
Future Volume (vph)	67	9	23	1	8	18	21	237	1	10	218	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.910			0.999				0.850
Flt Protected		0.958			0.998		0.950				0.998	
Satd. Flow (prot)	0	1747	1538	0	1726	0	1626	1726	0	0	1731	1615
Flt Permitted		0.958			0.998		0.950				0.998	
Satd. Flow (perm)	0	1747	1538	0	1726	0	1626	1726	0	0	1731	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	13%	5%	0%	0%	0%	11%	10%	0%	0%	10%	0%
Adj. Flow (vph)	73	10	25	1	9	20	23	258	1	11	237	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	83	25	0	30	0	23	259	0	0	248	67
Sign Control		Stop			Stop			Free			Free	

Intersection Summary		
Area Type:	Other	
Control Type: Unsignalized		
Intersection Capacity Utilization 37.1%		ICU Level of Service A
Analysis Period (min) 15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	9	23	1	8	18	21	237	1	10	218	62
Future Volume (Veh/h)	67	9	23	1	8	18	21	237	1	10	218	62
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	73	10	25	1	9	20	23	258	1	11	237	67
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	588	564	237	568	630	258	304			259		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	588	564	237	568	630	258	304			259		
tC, single (s)	7.1	6.6	6.2	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.3	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	81	98	97	100	98	97	98			99		
cM capacity (veh/h)	393	408	795	406	390	785	1207			1317		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	108	30	23	259	248	67
Volume Left	73	1	23	0	11	0
Volume Right	25	20	0	1	0	67
cSH	514	588	1207	1700	1317	1700
Volume to Capacity	0.21	0.05	0.02	0.15	0.01	0.04
Queue Length 95th (m)	6.3	1.3	0.5	0.0	0.2	0.0
Control Delay (s)	14.9	11.5	8.0	0.0	0.4	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	14.9	11.5	0.7		0.3	
Approach LOS	B	B				

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		

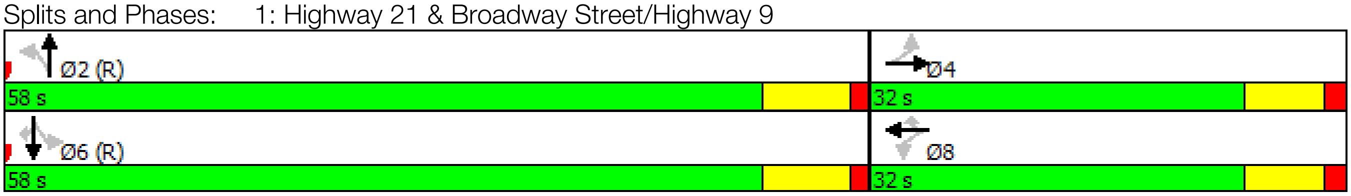
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	73	228	47	48	13	169	201	46	26	327	29
Future Volume (vph)	45	73	228	47	48	13	169	201	46	26	327	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.886				0.850		0.972				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1683	0	1687	1863	1615	1805	1776	0	1805	1863	1615
Flt Permitted	0.723			0.263			0.549			0.594		
Satd. Flow (perm)	1347	1683	0	467	1863	1615	1043	1776	0	1129	1863	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		174				52		21				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			492.9			358.0			262.4	
Travel Time (s)		17.0			22.2			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	7%	2%	0%	0%	4%	4%	0%	2%	0%
Adj. Flow (vph)	49	79	248	51	52	14	184	218	50	28	355	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	327	0	51	52	14	184	268	0	28	355	32
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	32.0	32.0		32.0	32.0	32.0	58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%		35.6%	35.6%	35.6%	64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	15.2	15.2		15.2	15.2	15.2	60.5	60.5		60.5	60.5	60.5
Actuated g/C Ratio	0.17	0.17		0.17	0.17	0.17	0.67	0.67		0.67	0.67	0.67
v/c Ratio	0.22	0.76		0.65	0.17	0.04	0.26	0.22		0.04	0.28	0.03
Control Delay	32.2	27.8		69.4	30.8	0.2	8.2	6.6		6.7	7.6	1.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	32.2	27.8		69.4	30.8	0.2	8.2	6.6		6.7	7.6	1.5
LOS	C	C		E	C	A	A	A		A	A	A
Approach Delay		28.4			44.0			7.3			7.0	
Approach LOS		C			D			A			A	
Queue Length 50th (m)	7.9	26.5		8.9	8.3	0.0	11.3	14.5		1.5	22.1	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	16.3	51.1		20.3	16.5	0.0	28.3	32.9		5.6	46.9	2.4
Internal Link Dist (m)		211.6			468.9			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	374	593		129	517	486	700	1200		758	1251	1101
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.13	0.55		0.40	0.10	0.03	0.26	0.22		0.04	0.28	0.03

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 16.2 Intersection LOS: B
Intersection Capacity Utilization 83.9% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9

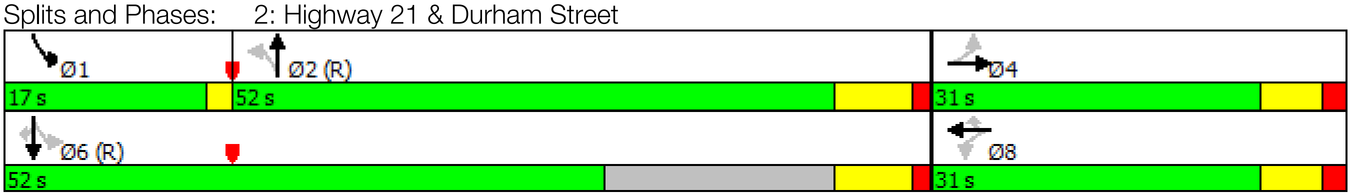


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	141	36	189	120	149	46	216	108	209	377	78
Future Volume (vph)	94	141	36	189	120	149	46	216	108	209	377	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970				0.850		0.950				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1832	0	1787	1900	1583	1805	1752	0	1787	1881	1583
Flt Permitted	0.674			0.573			0.522			0.473		
Satd. Flow (perm)	1281	1832	0	1078	1900	1583	992	1752	0	890	1881	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				162		32				85
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	1%	0%	2%	0%	4%	1%	1%	1%	2%
Adj. Flow (vph)	102	153	39	205	130	162	50	235	117	227	410	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	192	0	205	130	162	50	352	0	227	410	85
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	31.0	31.0		31.0	31.0	31.0	52.0	52.0		17.0	52.0	52.0
Total Split (%)	31.0%	31.0%		31.0%	31.0%	31.0%	52.0%	52.0%		17.0%	52.0%	52.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	24.7	24.7		24.7	24.7	24.7	48.8	48.8		66.8	61.5	61.5
Actuated g/C Ratio	0.25	0.25		0.25	0.25	0.25	0.49	0.49		0.67	0.62	0.62
v/c Ratio	0.32	0.42		0.77	0.28	0.32	0.10	0.40		0.33	0.35	0.08
Control Delay	31.7	30.9		53.4	30.2	5.8	18.6	18.8		8.8	11.8	2.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	31.7	30.9		53.4	30.2	5.8	18.6	18.8		8.8	11.8	2.7
LOS	C	C		D	C	A	B	B		A	B	A
Approach Delay		31.2			31.8			18.8			9.8	
Approach LOS		C			C			B			A	
Queue Length 50th (m)	17.0	30.6		38.7	21.3	0.0	5.3	39.9		16.0	38.5	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	28.8	45.9		59.4	33.6	14.1	15.7	79.7		32.8	70.2	6.9
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	347	506		293	516	548	504	905		729	1207	1046
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.29	0.38		0.70	0.25	0.30	0.10	0.39		0.31	0.34	0.08

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 20.7	Intersection LOS: C
Intersection Capacity Utilization 79.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Highway 21 & Durham Street



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	41	11	51	1	9	30
Future Volume (vph)	41	11	51	1	9	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.972				0.896	
Flt Protected	0.962			0.953		
Satd. Flow (prot)	1667	0	0	1811	1702	0
Flt Permitted	0.962			0.953		
Satd. Flow (perm)	1667	0	0	1811	1702	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.4			138.6	84.1	
Travel Time (s)	13.6			10.0	6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	20%	0%	0%	0%	0%
Adj. Flow (vph)	45	12	55	1	10	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	57	0	0	56	43	0
Sign Control	Free			Stop	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 19.5%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	11	51	1	9	30
Future Volume (Veh/h)	41	11	51	1	9	30
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	12	55	1	10	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (m)	189					
pX, platoon unblocked						
vC, conflicting volume	0		134	96	102	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		134	96	102	0
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	97		93	100	99	97
cM capacity (veh/h)	1617		792	776	770	1091

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	57	56	43
Volume Left	45	55	0
Volume Right	12	0	33
cSH	1617	791	994
Volume to Capacity	0.03	0.07	0.04
Queue Length 95th (m)	0.7	1.8	1.1
Control Delay (s)	5.8	9.9	8.8
Lane LOS	A	A	A
Approach Delay (s)	5.8	9.9	8.8
Approach LOS		A	A

Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	19.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	97	45	51	265	512	106
Future Volume (vph)	97	45	51	265	512	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	15.0			45.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		30.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.957					0.850
Flt Protected	0.967		0.950			
Satd. Flow (prot)	1712	0	1770	1845	1863	1615
Flt Permitted	0.967		0.950			
Satd. Flow (perm)	1712	0	1770	1845	1863	1615
Link Speed (k/h)	50			80	80	
Link Distance (m)	71.8			1178.3	487.8	
Travel Time (s)	5.2			53.0	22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	3%	2%	0%
Adj. Flow (vph)	105	49	55	288	557	115
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	0	55	288	557	115
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 48.4% ICU Level of Service A

Analysis Period (min) 15

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	97	45	51	265	512	106
Future Volume (Veh/h)	97	45	51	265	512	106
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	105	49	55	288	557	115
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	955	557	672			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	955	557	672			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	61	91	94			
cM capacity (veh/h)	268	530	919			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	154	55	288	557	115
Volume Left	105	55	0	0	0
Volume Right	49	0	0	0	115
cSH	318	919	1700	1700	1700
Volume to Capacity	0.48	0.06	0.17	0.33	0.07
Queue Length 95th (m)	20.0	1.5	0.0	0.0	0.0
Control Delay (s)	26.5	9.2	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	26.5	1.5		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	6	33	3	10	10	32	251	3	22	424	95
Future Volume (vph)	63	6	33	3	10	10	32	251	3	22	424	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.941			0.998				0.850
Flt Protected		0.957			0.994		0.950				0.998	
Satd. Flow (prot)	0	1755	1615	0	1564	0	1805	1824	0	0	1856	1615
Flt Permitted		0.957			0.994		0.950				0.998	
Satd. Flow (perm)	0	1755	1615	0	1564	0	1805	1824	0	0	1856	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	0%	0%	33%	22%	0%	0%	4%	0%	5%	2%	0%
Adj. Flow (vph)	68	7	36	3	11	11	35	273	3	24	461	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	75	36	0	25	0	35	276	0	0	485	103
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 57.4%	ICU Level of Service B
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	6	33	3	10	10	32	251	3	22	424	95
Future Volume (Veh/h)	63	6	33	3	10	10	32	251	3	22	424	95
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	68	7	36	3	11	11	35	273	3	24	461	103
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	868	855	461	857	956	274	564			276		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	868	855	461	857	956	274	564			276		
tC, single (s)	7.1	6.5	6.2	7.4	6.7	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.8	4.2	3.3	2.2			2.2		
p0 queue free %	72	98	94	99	95	99	97			98		
cM capacity (veh/h)	246	282	605	218	226	769	1018			1270		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	111	25	35	276	485	103
Volume Left	68	3	35	0	24	0
Volume Right	36	11	0	3	0	103
cSH	369	326	1018	1700	1270	1700
Volume to Capacity	0.30	0.08	0.03	0.16	0.02	0.06
Queue Length 95th (m)	9.9	2.0	0.9	0.0	0.5	0.0
Control Delay (s)	20.9	17.0	8.7	0.0	0.6	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	20.9	17.0	1.0		0.5	
Approach LOS	C	C				

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

Appendix D

2020 Total Traffic Operations Reports

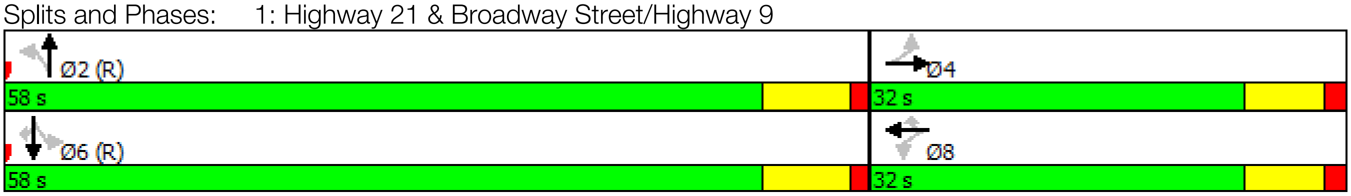
Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
AM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	D	B	B	**C**	D	D	A	**C**	A	A	A	**A**	A	A	A	**A**	**B**
			Delay	38	17	17	**20**	45	38	4	**34**	5	5	5	**5**	4	5	0	**4**	**12**
			V/C	0.20	0.54	0.54		0.39	0.23	0.12		0.17	0.25	0.25		0.02	0.15	0.02		
			Queue	13.7	23.8	23.8		19.7	18.6	2.7		14.7	28.4	28.4		2.4	17.4	0.4		
	2 - Highway 21 & Durham Street	Signal	LOS	D	D	D	**D**	E	D	A	**D**	B	B	B	**B**	A	A	A	**A**	**C**
			Delay	45	45	45	**45**	68	39	9	**36**	11	12	12	**12**	5	6	2	**5**	**22**
			V/C	0.48	0.64	0.64		0.75	0.32	0.40		0.13	0.39	0.39		0.24	0.19	0.03		
			Queue	32.3	52.6	52.6		38.1	30.4	15.5		18.9	69.6	69.6		17.7	28.5	3.2		
	3 - Durham Street & Millennium Way	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	B	B	B	**B**	A	A	A	**A**	
			Delay	5	5	5	**5**	3	3	3	**3**	13	13	13	**13**	9	9	9	**9**	**7**
			V/C	0.07	0.07	0.07		0.00	0.00	0.00		0.10	0.10	0.10		0.07	0.07	0.07		
			Queue	1.9	1.9	1.9		0.0	0.0	0.0		2.6	2.6	2.6		1.8	1.8	1.8		
	4 - Highway 21 & Russell Street	TWSC	LOS	E	E	E	**E**	C	C	C	**C**	A	A	A	**A**	A	A	A	**A**	
			Delay	38	38	38	**38**	20	20	20	**20**	8	0	0	**1**	3	3	0	**2**	**8**
			V/C	0.59	0.59	0.59		0.28	0.28	0.28		0.03	0.23	0.23		0.07	0.07	0.03		
			Queue	26.9	26.9	26.9		9.2	9.2	9.2		0.8	0.0	0.0		1.9	1.9	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	C	C	C	**C**	B	B	B	**B**	A	A	A	**A**	A	A	A	**A**	
			Delay	18	18	18	**18**	12	12	12	**12**	8	0	0	**1**	0	0	0	**0**	**4**
			V/C	0.32	0.32	0.32		0.05	0.05	0.05		0.02	0.17	0.17		0.01	0.01	0.05		
			Queue	11.0	11.0	11.0		1.3	1.3	1.3		0.5	0.0	0.0		0.2	0.2	0.0		
	6 - Highway 9 & Durham Street	TWSC	LOS		A	A	**A**	A	A		**A**	A		A	**A**					
			Delay		0	0	**0**	0	0		**0**	9		9	**9**					**0**
			V/C		0.05	0.05		0.00	0.00			0.00		0.00						
			Queue		0.0	0.0		0.1	0.1			0.1		0.1						
PM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	C	C	C	**C**	F	C	A	**D**	B	A	A	**B**	A	B	A	**A**	**B**
			Delay	27	23	23	**23**	84	26	0	**52**	17	10	10	**13**	9	11	2	**10**	**18**
			V/C	0.16	0.79	0.79		0.77	0.12	0.02		0.56	0.30	0.30		0.03	0.35	0.03		
			Queue	15.7	66.5	66.5		30.0	15.9	0.0		68.0	44.3	44.3		4.9	58.0	.2.6		
	2 - Highway 21 & Durham Street	Signal	LOS	C	C	C	**C**	D	C	A	**C**	C	D	D	**D**	D	C	A	**C**	**C**
			Delay	26	27	27	**27**	53	25	5	**28**	28	39	39	**36**	42	20	3	**26**	**29**
			V/C	0.23	0.47	0.47		0.82	0.27	0.35		0.42	0.82	0.82		0.90	0.54	0.11		
			Queue	31.8	84.5	84.5		113.3	53.2	18.8		32.1	109.6	109.6		54.4	76.3	6.7		
	3 - Durham Street & Millennium Way	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	C	C	C	**C**	A	A	A	**A**	
			Delay	5	5	5	**5**	5	5	5	**5**	23	23	23	**23**	10	10	10	**10**	**11**
			V/C	0.10	0.10	0.10		0.01	0.01	0.01		0.45	0.45	0.45		0.18	0.18	0.18		
			Queue	2.7	2.7	2.7		0.1	0.1	0.1		18.0	18.0	18.0		5.1	5.1	5.1		
	4 - Highway 21 & Russell Street	TWSC	LOS	F	F	F	**F**	F	F	F	**F**	A	A	A	**A**	A	A	A	**A**	
			Delay	Err	Err	Err	**9999**	Err	Err	Err	**Err**	9	0	0	**1**	5	5	0	**4**	**3583**
			V/C	9.33	9.33	9.33		6.72	6.72	6.72		0.06	0.23	0.23		0.23	0.23	0.08		
			Queue	Err	Err	Err		Err	Err	Err		1.5	0.0	0.0		7.2	7.2	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	E	E	E	**E**	C	C	C	**C**	A	A	A	**A**	A	A	A	**A**	
			Delay	42	42	42	**42**	20	20	20	**20**	9	0	0	**1**	1	1	0	**1**	**7**
			V/C	0.66	0.66	0.66		0.09	0.09	0.09		0.04	0.19	0.19		0.02	0.02	0.10		
			Queue	34.1	34.1	34.1		2.5	2.5	2.5		0.9	0.0	0.0		0.5	0.5	0.0		
	6 - Highway 9 & Durham Street	TWSC	LOS		A	A	**A**	A	A		**A**	A		A	**A**					
			Delay		0	0	**0**	1	1		**1**	9		9	**9**					**1**
			V/C		0.10	0.10		0.01	0.01			0.02		0.02						
			Queue		0.0	0.0		0.2	0.2			0.4		0.4						

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	30	126	47	46	23	128	256	33	12	172	17
Future Volume (vph)	29	30	126	47	46	23	128	256	33	12	172	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.879				0.850		0.983				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1616	0	1805	1827	1380	1703	1766	0	1504	1759	1615
Flt Permitted	0.724			0.575			0.640			0.570		
Satd. Flow (perm)	1298	1616	0	1092	1827	1380	1147	1766	0	903	1759	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		137				52		12				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			490.2			358.0			262.4	
Travel Time (s)		17.0			22.1			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	9%	2%	0%	4%	17%	6%	6%	4%	20%	8%	0%
Adj. Flow (vph)	32	33	137	51	50	25	139	278	36	13	187	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	170	0	51	50	25	139	314	0	13	187	18
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	32.0	32.0		32.0	32.0	32.0	58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%		35.6%	35.6%	35.6%	64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	10.9	10.9		10.9	10.9	10.9	64.8	64.8		64.8	64.8	64.8
Actuated g/C Ratio	0.12	0.12		0.12	0.12	0.12	0.72	0.72		0.72	0.72	0.72
v/c Ratio	0.20	0.54		0.39	0.23	0.12	0.17	0.25		0.02	0.15	0.02
Control Delay	38.3	17.0		45.0	37.8	4.4	4.8	4.8		4.1	4.5	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	38.3	17.0		45.0	37.8	4.4	4.8	4.8		4.1	4.5	0.2
LOS	D	B		D	D	A	A	A		A	A	A
Approach Delay		20.4			34.1			4.8			4.1	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	5.4	5.5		8.8	8.5	0.0	6.5	14.9		0.6	8.5	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	13.7	23.8		19.7	18.6	2.7	14.6	28.4		2.4	17.4	0.4
Internal Link Dist (m)		211.6			466.2			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	360	547		303	507	420	826	1274		650	1266	1175
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.09	0.31		0.17	0.10	0.06	0.17	0.25		0.02	0.15	0.02

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 11.5	Intersection LOS: B
Intersection Capacity Utilization 74.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9

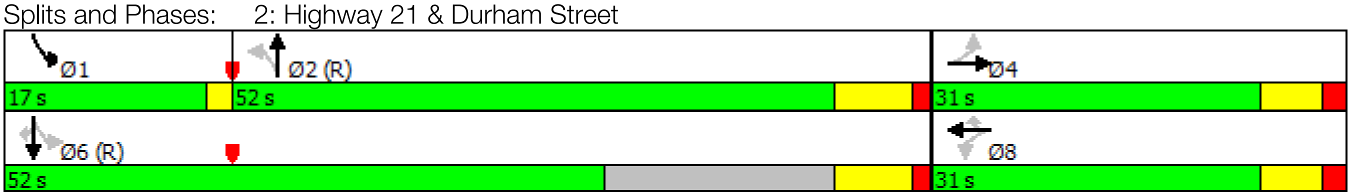


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	130	47	100	88	131	83	223	139	152	208	32
Future Volume (vph)	90	130	47	100	88	131	83	223	139	152	208	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.960				0.850		0.942				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1800	0	1770	1863	1509	1805	1661	0	1626	1712	1583
Flt Permitted	0.695			0.495			0.617			0.479		
Satd. Flow (perm)	1295	1800	0	922	1863	1509	1172	1661	0	820	1712	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17				142		41				38
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	5%	2%	2%	7%	0%	12%	1%	11%	11%	2%
Adj. Flow (vph)	98	141	51	109	96	142	90	242	151	165	226	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	192	0	109	96	142	90	393	0	165	226	35
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	31.0	31.0		31.0	31.0	31.0	52.0	52.0		17.0	52.0	52.0
Total Split (%)	31.0%	31.0%		31.0%	31.0%	31.0%	52.0%	52.0%		17.0%	52.0%	52.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	15.9	15.9		15.9	15.9	15.9	59.8	59.8		75.6	70.3	70.3
Actuated g/C Ratio	0.16	0.16		0.16	0.16	0.16	0.60	0.60		0.76	0.70	0.70
v/c Ratio	0.48	0.64		0.75	0.32	0.40	0.13	0.39		0.24	0.19	0.03
Control Delay	44.7	44.9		68.2	38.7	9.2	11.3	12.0		4.9	6.3	2.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	44.7	44.9		68.2	38.7	9.2	11.3	12.0		4.9	6.3	2.1
LOS	D	D		E	D	A	B	B		A	A	A
Approach Delay		44.8			35.9			11.9			5.4	
Approach LOS		D			D			B			A	
Queue Length 50th (m)	18.5	33.9		21.6	17.7	0.0	7.3	33.7		7.4	13.5	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	32.3	52.6		38.1	30.4	15.5	18.9	69.6		17.7	28.5	3.2
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	317	453		225	456	476	701	1010		741	1203	1124
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.31	0.42		0.48	0.21	0.30	0.13	0.39		0.22	0.19	0.03

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 21.7	Intersection LOS: C
Intersection Capacity Utilization 74.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Highway 21 & Durham Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	0	54	2	0	3	44	1	1	1	3	61
Future Volume (vph)	110	0	54	2	0	3	44	1	1	1	3	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.956			0.919			0.997			0.873	
Flt Protected		0.968			0.980			0.954			0.999	
Satd. Flow (prot)	0	1634	0	0	1678	0	0	1457	0	0	1657	0
Flt Permitted		0.968			0.980			0.954			0.999	
Satd. Flow (perm)	0	1634	0	0	1678	0	0	1457	0	0	1657	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		189.4			73.4			138.6			84.1	
Travel Time (s)		13.6			5.3			10.0			6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	23%	2%	2%	2%	25%	0%	2%	2%	0%	0%
Adj. Flow (vph)	120	0	59	2	0	3	48	1	1	1	3	66
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	179	0	0	5	0	0	50	0	0	70	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 31.4%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	0	54	2	0	3	44	1	1	1	3	61
Future Volume (Veh/h)	110	0	54	2	0	3	44	1	1	1	3	61
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	120	0	59	2	0	3	48	1	1	1	3	66
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		189										
pX, platoon unblocked												
vC, conflicting volume	3			59			342	276	30	276	304	2
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3			59			342	276	30	276	304	2
tC, single (s)	4.1			4.1			7.3	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.7	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			100			90	100	100	100	99	94
cM capacity (veh/h)	1632			1545			503	587	1045	636	566	1089

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	179	5	50	70
Volume Left	120	2	48	1
Volume Right	59	3	1	66
cSH	1632	1545	510	1037
Volume to Capacity	0.07	0.00	0.10	0.07
Queue Length 95th (m)	1.9	0.0	2.6	1.7
Control Delay (s)	5.1	2.9	12.8	8.7
Lane LOS	A	A	B	A
Approach Delay (s)	5.1	2.9	12.8	8.7
Approach LOS			B	A

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	25	36	23	15	49	34	320	37	80	273	54
Future Volume (vph)	73	25	36	23	15	49	34	320	37	80	273	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	0.0		45.0
Storage Lanes	0		0	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.964			0.924			0.985				0.850
Flt Protected		0.973			0.987		0.950				0.989	
Satd. Flow (prot)	0	1715	0	0	1699	0	1752	1758	0	0	1762	1524
Flt Permitted		0.973			0.987		0.950				0.989	
Satd. Flow (perm)	0	1715	0	0	1699	0	1752	1758	0	0	1762	1524
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		71.8			63.0			1178.3			487.8	
Travel Time (s)		5.2			4.5			53.0			22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	3%	2%	2%	2%	3%	7%	2%	2%	8%	6%
Adj. Flow (vph)	79	27	39	25	16	53	37	348	40	87	297	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	145	0	0	94	0	37	388	0	0	384	59
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 62.1%	ICU Level of Service B
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	25	36	23	15	49	34	320	37	80	273	54
Future Volume (Veh/h)	73	25	36	23	15	49	34	320	37	80	273	54
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	79	27	39	25	16	53	37	348	40	87	297	59
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	954	933	297	966	972	368	356			388		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	954	933	297	966	972	368	356			388		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	58	89	95	87	93	92	97			93		
cM capacity (veh/h)	189	239	740	187	226	677	1197			1170		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	145	94	37	388	384	59
Volume Left	79	25	37	0	87	0
Volume Right	39	53	0	40	0	59
cSH	249	333	1197	1700	1170	1700
Volume to Capacity	0.58	0.28	0.03	0.23	0.07	0.03
Queue Length 95th (m)	26.7	9.1	0.8	0.0	1.9	0.0
Control Delay (s)	37.9	20.0	8.1	0.0	2.5	0.0
Lane LOS	E	C	A		A	
Approach Delay (s)	37.9	20.0	0.7		2.1	
Approach LOS	E	C				

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	9	23	1	8	18	21	260	1	10	232	83
Future Volume (vph)	101	9	23	1	8	18	21	260	1	10	232	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.910			0.999				0.850
Flt Protected		0.956			0.998		0.950				0.998	
Satd. Flow (prot)	0	1749	1538	0	1726	0	1626	1726	0	0	1730	1615
Flt Permitted		0.956			0.998		0.950				0.998	
Satd. Flow (perm)	0	1749	1538	0	1726	0	1626	1726	0	0	1730	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	13%	5%	0%	0%	0%	11%	10%	0%	0%	10%	0%
Adj. Flow (vph)	110	10	25	1	9	20	23	283	1	11	252	90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	120	25	0	30	0	23	284	0	0	263	90
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 39.7%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	101	9	23	1	8	18	21	260	1	10	232	83
Future Volume (Veh/h)	101	9	23	1	8	18	21	260	1	10	232	83
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	110	10	25	1	9	20	23	283	1	11	252	90
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	628	604	252	608	694	284	342			284		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	628	604	252	608	694	284	342			284		
tC, single (s)	7.1	6.6	6.2	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.3	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	70	97	97	100	97	97	98			99		
cM capacity (veh/h)	369	387	779	381	359	760	1169			1290		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	145	30	23	284	263	90
Volume Left	110	1	23	0	11	0
Volume Right	25	20	0	1	0	90
cSH	447	555	1169	1700	1290	1700
Volume to Capacity	0.32	0.05	0.02	0.17	0.01	0.05
Queue Length 95th (m)	11.1	1.4	0.5	0.0	0.2	0.0
Control Delay (s)	17.7	11.9	8.1	0.0	0.4	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	17.7	11.9	0.6		0.3	
Approach LOS	C	B				

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	75	0	4	116	0	3
Future Volume (vph)	75	0	4	116	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected				0.998		
Satd. Flow (prot)	1863	0	0	1859	1611	0
Flt Permitted				0.998		
Satd. Flow (perm)	1863	0	0	1859	1611	0
Link Speed (k/h)	50			80	50	
Link Distance (m)	490.2			203.9	128.0	
Travel Time (s)	35.3			9.2	9.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	0	4	126	0	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	82	0	0	130	3	0
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 19.3%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	75	0	4	116	0	3
Future Volume (Veh/h)	75	0	4	116	0	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	82	0	4	126	0	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			82		216	82
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			82		216	82
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1515		770	978

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	82	130	3
Volume Left	0	4	0
Volume Right	0	0	3
cSH	1700	1515	978
Volume to Capacity	0.05	0.00	0.00
Queue Length 95th (m)	0.0	0.1	0.1
Control Delay (s)	0.0	0.2	8.7
Lane LOS		A	A
Approach Delay (s)	0.0	0.2	8.7
Approach LOS			A

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	19.3%	ICU Level of Service	A
Analysis Period (min)	15		

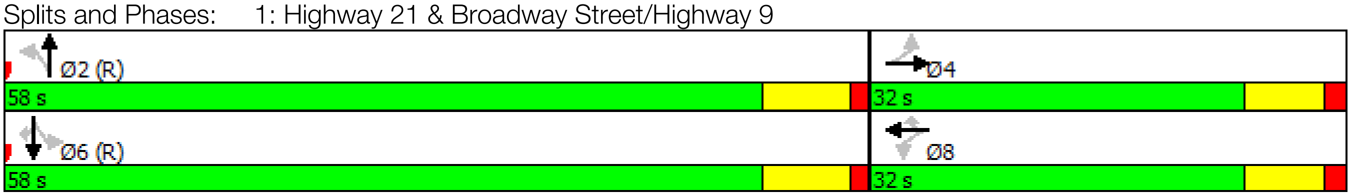
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	73	349	55	48	9	304	246	57	19	371	29
Future Volume (vph)	45	73	349	55	48	9	304	246	57	19	371	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.876				0.850		0.972				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1664	0	1687	1863	1615	1805	1776	0	1805	1863	1615
Flt Permitted	0.723			0.197			0.500			0.557		
Satd. Flow (perm)	1347	1664	0	350	1863	1615	950	1776	0	1058	1863	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		266				52		21				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			492.9			358.0			262.4	
Travel Time (s)		17.0			22.2			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	7%	2%	0%	0%	4%	4%	0%	2%	0%
Adj. Flow (vph)	49	79	379	60	52	10	330	267	62	21	403	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	458	0	60	52	10	330	329	0	21	403	32
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	32.0	32.0		32.0	32.0	32.0	58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%		35.6%	35.6%	35.6%	64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	20.3	20.3		20.3	20.3	20.3	55.4	55.4		55.4	55.4	55.4
Actuated g/C Ratio	0.23	0.23		0.23	0.23	0.23	0.62	0.62		0.62	0.62	0.62
v/c Ratio	0.16	0.79		0.77	0.12	0.02	0.56	0.30		0.03	0.35	0.03
Control Delay	26.5	23.0		84.0	25.6	0.1	16.8	9.7		9.1	10.8	1.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	26.5	23.0		84.0	25.6	0.1	16.8	9.7		9.1	10.8	1.7
LOS	C	C		F	C	A	B	A		A	B	A
Approach Delay		23.4			52.2			13.2			10.1	
Approach LOS		C			D			B			B	
Queue Length 50th (m)	7.0	31.5		10.0	7.4	0.0	34.4	25.4		1.5	35.1	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	15.7	66.5		#30.0	15.9	0.0	68.0	44.3		4.9	58.0	2.6
Internal Link Dist (m)		211.6			468.9			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	384	664		100	531	497	592	1114		659	1160	1024
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.13	0.69		0.60	0.10	0.02	0.56	0.30		0.03	0.35	0.03

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 18.1 Intersection LOS: B
Intersection Capacity Utilization 93.9% ICU Level of Service F
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9



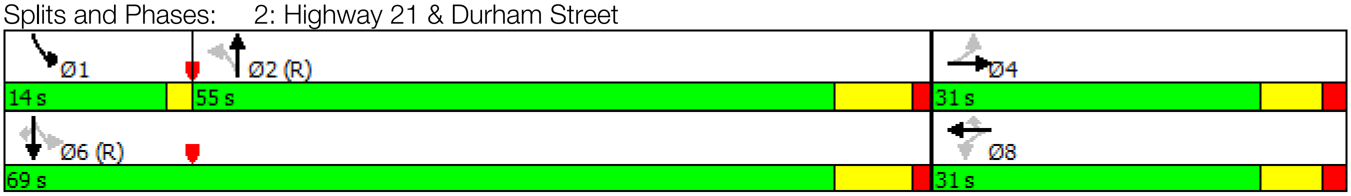
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	197	103	245	182	243	122	312	158	306	453	78
Future Volume (vph)	94	197	103	245	182	243	122	312	158	306	453	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.948				0.850		0.950				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1783	0	1787	1900	1583	1805	1753	0	1787	1881	1583
Flt Permitted	0.614			0.457			0.484			0.202		
Satd. Flow (perm)	1167	1783	0	860	1900	1583	920	1753	0	380	1881	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25				264		35				77
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	1%	0%	2%	0%	4%	1%	1%	1%	2%
Adj. Flow (vph)	102	214	112	266	198	264	133	339	172	333	492	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	326	0	266	198	264	133	511	0	333	492	85
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	31.0	31.0		31.0	31.0	31.0	55.0	55.0		14.0	69.0	69.0
Total Split (%)	31.0%	31.0%		31.0%	31.0%	31.0%	55.0%	55.0%		14.0%	69.0%	69.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	38.0	38.0		38.0	38.0	38.0	34.2	34.2		53.5	48.2	48.2
Actuated g/C Ratio	0.38	0.38		0.38	0.38	0.38	0.34	0.34		0.54	0.48	0.48
v/c Ratio	0.23	0.47		0.82	0.27	0.35	0.42	0.82		0.90	0.54	0.11
Control Delay	26.2	26.6		52.6	25.3	4.9	27.7	38.5		41.7	19.6	3.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	26.2	26.6		52.6	25.3	4.9	27.7	38.5		41.7	19.6	3.2
LOS	C	C		D	C	A	C	D		D	B	A
Approach Delay		26.5			27.9			36.3			26.2	
Approach LOS		C			C			D			C	
Queue Length 50th (m)	14.0	45.8		48.3	27.7	0.0	20.5	88.1		36.5	67.3	0.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	31.8	84.5		#113.3	53.2	18.8	32.1	109.6		#54.4	76.3	6.7
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	443	692		326	721	764	438	854		372	1160	1006
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.23	0.47		0.82	0.27	0.35	0.30	0.60		0.90	0.42	0.08

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 29.1 Intersection LOS: C
Intersection Capacity Utilization 93.7% ICU Level of Service F
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Highway 21 & Durham Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	0	107	7	0	4	138	1	8	5	9	145
Future Volume (vph)	149	0	107	7	0	4	138	1	8	5	9	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.944			0.955			0.992			0.877	
Flt Protected		0.972			0.968			0.955			0.999	
Satd. Flow (prot)	0	1584	0	0	1722	0	0	1798	0	0	1664	0
Flt Permitted		0.972			0.968			0.955			0.999	
Satd. Flow (perm)	0	1584	0	0	1722	0	0	1798	0	0	1664	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		189.4			77.0			138.6			84.1	
Travel Time (s)		13.6			5.5			10.0			6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	20%	2%	2%	2%	0%	0%	2%	2%	0%	0%
Adj. Flow (vph)	162	0	116	8	0	4	150	1	9	5	10	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	278	0	0	12	0	0	160	0	0	173	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 44.9%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	149	0	107	7	0	4	138	1	8	5	9	145
Future Volume (Veh/h)	149	0	107	7	0	4	138	1	8	5	9	145
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	162	0	116	8	0	4	150	1	9	5	10	158
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		189										
pX, platoon unblocked												
vC, conflicting volume	4			116			563	402	58	410	458	2
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4			116			563	402	58	410	458	2
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			99			56	100	99	99	98	85
cM capacity (veh/h)	1611			1473			340	483	1008	503	449	1088

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	278	12	160	173
Volume Left	162	8	150	5
Volume Right	116	4	9	158
cSH	1611	1473	354	975
Volume to Capacity	0.10	0.01	0.45	0.18
Queue Length 95th (m)	2.7	0.1	18.1	5.1
Control Delay (s)	4.7	5.0	23.3	9.5
Lane LOS	A	A	C	A
Approach Delay (s)	4.7	5.0	23.3	9.5
Approach LOS			C	A

Intersection Summary			
Average Delay	10.8		
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	49	45	182	55	242	51	227	139	248	443	125
Future Volume (vph)	115	49	45	182	55	242	51	227	139	248	443	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	0.0		45.0
Storage Lanes	0		0	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.971			0.932			0.943				0.850
Flt Protected		0.973			0.981		0.950				0.982	
Satd. Flow (prot)	0	1750	0	0	1703	0	1770	1746	0	0	1829	1615
Flt Permitted		0.973			0.981		0.950				0.982	
Satd. Flow (perm)	0	1750	0	0	1703	0	1770	1746	0	0	1829	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		71.8			79.2			1178.3			487.8	
Travel Time (s)		5.2			5.7			53.0			22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	0%
Adj. Flow (vph)	125	53	49	198	60	263	55	247	151	270	482	136
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	227	0	0	521	0	55	398	0	0	752	136
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 98.2%	ICU Level of Service F
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	49	45	182	55	242	51	227	139	248	443	125
Future Volume (Veh/h)	115	49	45	182	55	242	51	227	139	248	443	125
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	125	53	49	198	60	263	55	247	151	270	482	136
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1672	1530	482	1530	1590	322	618			398		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1672	1530	482	1530	1590	322	618			398		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	37	92	0	23	63	94			77		
cM capacity (veh/h)	14	85	584	36	78	718	962			1161		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	227	521	55	398	752	136
Volume Left	125	198	55	0	270	0
Volume Right	49	263	0	151	0	136
cSH	24	78	962	1700	1161	1700
Volume to Capacity	9.43	6.71	0.06	0.23	0.23	0.08
Queue Length 95th (m)	Err	Err	1.5	0.0	7.2	0.0
Control Delay (s)	Err	Err	9.0	0.0	5.1	0.0
Lane LOS	F	F	A		A	
Approach Delay (s)	Err	Err	1.1		4.3	
Approach LOS	F	F				

Intersection Summary			
Average Delay	3582.4		
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	6	33	3	10	10	32	292	3	22	470	162
Future Volume (vph)	123	6	33	3	10	10	32	292	3	22	470	162
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.941			0.999				0.850
Flt Protected		0.955			0.994		0.950				0.998	
Satd. Flow (prot)	0	1748	1615	0	1564	0	1805	1826	0	0	1857	1615
Flt Permitted		0.955			0.994		0.950				0.998	
Satd. Flow (perm)	0	1748	1615	0	1564	0	1805	1826	0	0	1857	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	0%	0%	33%	22%	0%	0%	4%	0%	5%	2%	0%
Adj. Flow (vph)	134	7	36	3	11	11	35	317	3	24	511	176
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	141	36	0	25	0	35	320	0	0	535	176
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 63.1%	ICU Level of Service B
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	6	33	3	10	10	32	292	3	22	470	162
Future Volume (Veh/h)	123	6	33	3	10	10	32	292	3	22	470	162
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	134	7	36	3	11	11	35	317	3	24	511	176
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	962	949	511	951	1124	318	687			320		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	962	949	511	951	1124	318	687			320		
tC, single (s)	7.1	6.5	6.2	7.4	6.7	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.8	4.2	3.3	2.2			2.2		
p0 queue free %	36	97	94	98	94	98	96			98		
cM capacity (veh/h)	210	248	567	185	178	727	916			1223		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	177	25	35	320	535	176
Volume Left	134	3	35	0	24	0
Volume Right	36	11	0	3	0	176
cSH	265	269	916	1700	1223	1700
Volume to Capacity	0.67	0.09	0.04	0.19	0.02	0.10
Queue Length 95th (m)	34.6	2.4	1.0	0.0	0.5	0.0
Control Delay (s)	42.8	19.8	9.1	0.0	0.6	0.0
Lane LOS	E	C	A		A	
Approach Delay (s)	42.8	19.8	0.9		0.4	
Approach LOS	E	C				

Intersection Summary				
Average Delay	6.9			
Intersection Capacity Utilization	63.1%	ICU Level of Service		B
Analysis Period (min)	15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	149	0	11	112	0	13
Future Volume (vph)	149	0	11	112	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected				0.996		
Satd. Flow (prot)	1863	0	0	1859	1644	0
Flt Permitted				0.996		
Satd. Flow (perm)	1863	0	0	1859	1644	0
Link Speed (k/h)	50			80	50	
Link Distance (m)	492.9			201.2	105.0	
Travel Time (s)	35.5			9.1	7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	2%	0%	0%
Adj. Flow (vph)	162	0	12	122	0	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	162	0	0	134	14	0
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 25.0%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	149	0	11	112	0	13
Future Volume (Veh/h)	149	0	11	112	0	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	162	0	12	122	0	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			162		308	162
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			162		308	162
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	98
cM capacity (veh/h)			1429		683	888

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	162	134	14
Volume Left	0	12	0
Volume Right	0	0	14
cSH	1700	1429	888
Volume to Capacity	0.10	0.01	0.02
Queue Length 95th (m)	0.0	0.2	0.4
Control Delay (s)	0.0	0.7	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	0.7	9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix E

2025 Background Traffic Operations Reports

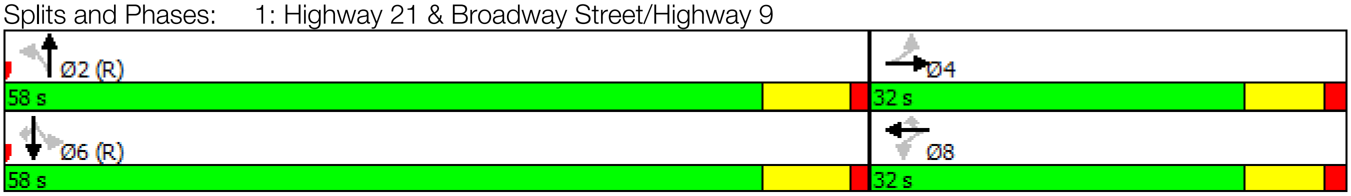
Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	D	C	C	**C**	D	D	A	**C**	A	A	A	**A**	A	A	A	**A**	**B**
			Delay	39	21	21	**25**	42	39	5	**33**	4	4	4	**4**	4	4	0	**4**	**12**
			V/C	0.22	0.40	0.40		0.33	0.25	0.13		0.11	0.24	0.24		0.02	0.13	0.02		
			Queue	14.6	20.3	20.3		19.5	19.8	3.4		10.4	28.4	28.4		2.4	16.0	0.6		
	2 - Highway 21 & Durham Street	Signal	LOS	D	D	D	**D**	D	D	B	**C**	A	A	A	**A**	A	A	A	**A**	**C**
			Delay	53	43	43	**47**	50	40	11	**31**	9	10	10	**10**	4	5	2	**4**	**20**
			V/C	0.58	0.48	0.48		0.53	0.30	0.39		0.10	0.34	0.34		0.17	0.15	0.03		
			Queue	36.4	38.7	38.7		32.4	26.9	15.1		14.0	54.5	54.5		11.9	21.5	3.2		
	3 - Durham Street & Millennium Way	TWSC	LOS	A		A	**A**					A	A		**A**		A	A	**A**	
			Delay	5		5	**5**					10	10		**10**		9	9	**9**	**7**
			V/C	0.02		0.02						0.03	0.03				0.02	0.02		
			Queue	0.6		0.6						0.7	0.7				0.6	0.6		
	4 - Highway 21 & Russell Street	TWSC	LOS	C		C	**C**					A	A		**A**		A	A	**A**	
			Delay	16		16	**16**					8	0		**1**		0	0	**0**	**2**
			V/C	0.25		0.25						0.03	0.21				0.18	0.03		
			Queue	7.9		7.9						0.8	0.0				0.0	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	C	C	C	**C**	B	B	B	**B**	A	A	A	**A**	A	A	A	**A**	
			Delay	16	16	16	**16**	12	12	12	**12**	8	0	0	**1**	0	0	0	**0**	**3**
			V/C	0.25	0.25	0.25		0.05	0.05	0.05		0.02	0.17	0.17		0.01	0.01	0.04		
			Queue	7.7	7.7	7.7		1.4	1.4	1.4		0.5	0.0	0.0		0.2	0.2	0.0		
PM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	C	C	C	**C**	E	C	A	**D**	A	A	A	**A**	A	A	A	**A**	**B**
			Delay	31	30	30	**30**	79	29	0	**48**	10	8	8	**8**	7	9	2	**8**	**18**
			V/C	0.21	0.79	0.79		0.73	0.17	0.04		0.31	0.25	0.25		0.04	0.32	0.03		
			Queue	16.7	57.0	57.0		24.1	17.3	0.0		33.9	38.6	38.6		6.5	54.9	2.9		
	2 - Highway 21 & Durham Street	Signal	LOS	C	C	C	**C**	D	C	A	**C**	C	C	C	**C**	B	B	A	**B**	**C**
			Delay	29	28	28	**28**	46	27	5	**28**	21	23	23	**23**	11	14	3	**12**	**21**
			V/C	0.30	0.39	0.39		0.73	0.26	0.30		0.13	0.49	0.49		0.41	0.42	0.10		
			Queue	30.6	49.2	49.2		65.3	35.6	14.2		16.9	89.4	89.4		37.0	80.0	7.4		
	3 - Durham Street & Millennium Way	TWSC	LOS	A		A	**A**					A	A		**A**		A	A	**A**	
			Delay	6		6	**6**					10	10		**10**		9	9	**9**	**8**
			V/C	0.03		0.03						0.08	0.08				0.05	0.05		
			Queue	0.7		0.7						2.0	2.0				1.2	1.2		
	4 - Highway 21 & Russell Street	TWSC	LOS	D		D	**D**					A	A		**A**		A	A	**A**	
			Delay	35		35	**35**					9	0		**2**		0	0	**0**	**5**
			V/C	0.59		0.59						0.07	0.18				0.36	0.07		
			Queue	28.2		28.2						1.8	0.0				0.0	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	D	D	D	**D**	C	C	C	**C**	A	A	A	**A**	A	A	A	**A**	
			Delay	25	25	25	**25**	19	19	19	**19**	9	0	0	**1**	1	1	0	**1**	**4**
			V/C	0.37	0.37	0.37		0.10	0.10	0.10		0.04	0.18	0.18		0.02	0.02	0.07		
			Queue	13.2	13.2	13.2		2.6	2.6	2.6		1.0	0.0	0.0		0.5	0.5	0.0		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	32	62	47	50	25	94	265	34	13	164	18
Future Volume (vph)	31	32	62	47	50	25	94	265	34	13	164	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.901				0.850		0.983				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1640	0	1805	1827	1380	1703	1766	0	1504	1759	1615
Flt Permitted	0.722			0.691			0.645			0.564		
Satd. Flow (perm)	1294	1640	0	1313	1827	1380	1156	1766	0	893	1759	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		67				52		12				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			490.2			358.0			262.4	
Travel Time (s)		17.0			22.1			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	9%	2%	0%	4%	17%	6%	6%	4%	20%	8%	0%
Adj. Flow (vph)	34	35	67	51	54	27	102	288	37	14	178	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	102	0	51	54	27	102	325	0	14	178	20
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	32.0	32.0		32.0	32.0	32.0	58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%		35.6%	35.6%	35.6%	64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	10.6	10.6		10.6	10.6	10.6	69.9	69.9		69.9	69.9	69.9
Actuated g/C Ratio	0.12	0.12		0.12	0.12	0.12	0.78	0.78		0.78	0.78	0.78
v/c Ratio	0.22	0.40		0.33	0.25	0.13	0.11	0.24		0.02	0.13	0.02
Control Delay	39.3	20.5		42.3	38.8	5.1	4.2	4.3		3.9	4.0	0.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	39.3	20.5		42.3	38.8	5.1	4.2	4.3		3.9	4.0	0.3
LOS	D	C		D	D	A	A	A		A	A	A
Approach Delay		25.2			33.3			4.3			3.6	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	5.8	5.9		8.7	9.2	0.0	4.6	15.5		0.6	8.1	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	14.6	20.3		19.5	19.8	3.4	10.4	28.4		2.4	16.0	0.6
Internal Link Dist (m)		211.6			466.2			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	359	503		364	507	420	897	1374		693	1366	1265
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.09	0.20		0.14	0.11	0.06	0.11	0.24		0.02	0.13	0.02

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.40	
Intersection Signal Delay: 11.5	Intersection LOS: B
Intersection Capacity Utilization 60.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9

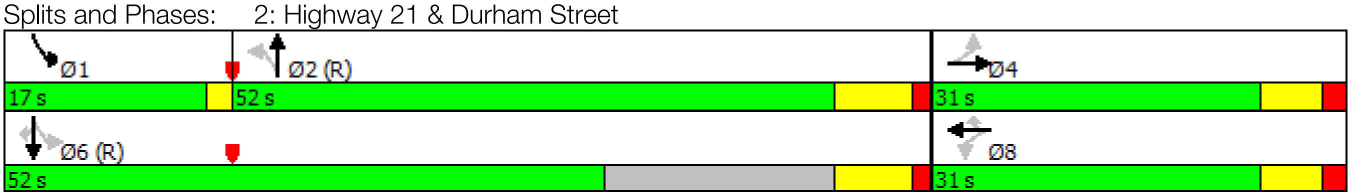


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	102	14	86	72	112	68	212	115	115	176	35
Future Volume (vph)	98	102	14	86	72	112	68	212	115	115	176	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982				0.850		0.947				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1855	0	1770	1863	1509	1805	1664	0	1626	1712	1583
Flt Permitted	0.706			0.676			0.637			0.516		
Satd. Flow (perm)	1315	1855	0	1259	1863	1509	1210	1664	0	883	1712	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				122		35				38
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	5%	2%	2%	7%	0%	12%	1%	11%	11%	2%
Adj. Flow (vph)	107	111	15	93	78	122	74	230	125	125	191	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	126	0	93	78	122	74	355	0	125	191	38
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	31.0	31.0		31.0	31.0	31.0	52.0	52.0		17.0	52.0	52.0
Total Split (%)	31.0%	31.0%		31.0%	31.0%	31.0%	52.0%	52.0%		17.0%	52.0%	52.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	13.9	13.9		13.9	13.9	13.9	62.8	62.8		77.6	72.3	72.3
Actuated g/C Ratio	0.14	0.14		0.14	0.14	0.14	0.63	0.63		0.78	0.72	0.72
v/c Ratio	0.58	0.48		0.53	0.30	0.39	0.10	0.34		0.17	0.15	0.03
Control Delay	52.6	43.0		50.3	40.4	10.5	9.2	9.8		3.8	5.2	1.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	52.6	43.0		50.3	40.4	10.5	9.2	9.8		3.8	5.2	1.8
LOS	D	D		D	D	B	A	A		A	A	A
Approach Delay		47.4			31.1			9.7			4.3	
Approach LOS		D			C			A			A	
Queue Length 50th (m)	20.9	23.0		18.0	14.6	0.0	5.4	27.0		4.8	10.2	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	36.4	38.7		32.4	26.9	15.1	14.0	54.5		11.9	21.5	3.2
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	322	459		308	456	461	759	1057		796	1237	1154
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.33	0.27		0.30	0.17	0.26	0.10	0.34		0.16	0.15	0.03

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 19.7	Intersection LOS: B
Intersection Capacity Utilization 63.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Highway 21 & Durham Street



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	36	16	19	1	4	17
Future Volume (vph)	36	16	19	1	4	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.959				0.890	
Flt Protected	0.966			0.954		
Satd. Flow (prot)	1645	0	0	1463	1691	0
Flt Permitted	0.966			0.954		
Satd. Flow (perm)	1645	0	0	1463	1691	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.4			138.6	84.1	
Travel Time (s)	13.6			10.0	6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	23%	25%	0%	0%	0%
Adj. Flow (vph)	39	17	21	1	4	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	56	0	0	22	22	0
Sign Control	Free			Stop	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 17.8%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	36	16	19	1	4	17
Future Volume (Veh/h)	36	16	19	1	4	17
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	17	21	1	4	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (m)	189					
pX, platoon unblocked						
vC, conflicting volume	0		106	86	95	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		106	86	95	0
tC, single (s)	4.1		7.3	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.7	4.0	4.0	3.3
p0 queue free %	98		97	100	99	98
cM capacity (veh/h)	1636		790	788	780	1091

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	56	22	22
Volume Left	39	21	0
Volume Right	17	0	18
cSH	1636	790	1017
Volume to Capacity	0.02	0.03	0.02
Queue Length 95th (m)	0.6	0.7	0.5
Control Delay (s)	5.1	9.7	8.6
Lane LOS	A	A	A
Approach Delay (s)	5.1	9.7	8.6
Approach LOS		A	A

Intersection Summary			
Average Delay	6.9		
Intersection Capacity Utilization	17.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	65	40	37	326	284	50
Future Volume (vph)	65	40	37	326	284	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	15.0			45.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		30.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.949					0.850
Flt Protected	0.970		0.950			
Satd. Flow (prot)	1678	0	1752	1776	1759	1524
Flt Permitted	0.970		0.950			
Satd. Flow (perm)	1678	0	1752	1776	1759	1524
Link Speed (k/h)	50			80	80	
Link Distance (m)	71.8			1178.3	487.8	
Travel Time (s)	5.2			53.0	22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	3%	3%	7%	8%	6%
Adj. Flow (vph)	71	43	40	354	309	54
Shared Lane Traffic (%)						
Lane Group Flow (vph)	114	0	40	354	309	54
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 34.3%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	65	40	37	326	284	50
Future Volume (Veh/h)	65	40	37	326	284	50
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	71	43	40	354	309	54
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	743	309	363			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	743	309	363			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	81	94	97			
cM capacity (veh/h)	366	729	1190			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	114	40	354	309	54
Volume Left	71	40	0	0	0
Volume Right	43	0	0	0	54
cSH	450	1190	1700	1700	1700
Volume to Capacity	0.25	0.03	0.21	0.18	0.03
Queue Length 95th (m)	8.0	0.8	0.0	0.0	0.0
Control Delay (s)	15.7	8.1	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	15.7	0.8		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	10	25	1	8	19	23	258	1	11	238	67
Future Volume (vph)	73	10	25	1	8	19	23	258	1	11	238	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.909			0.999				0.850
Flt Protected		0.958			0.998		0.950				0.998	
Satd. Flow (prot)	0	1746	1538	0	1724	0	1626	1726	0	0	1731	1615
Flt Permitted		0.958			0.998		0.950				0.998	
Satd. Flow (perm)	0	1746	1538	0	1724	0	1626	1726	0	0	1731	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	13%	5%	0%	0%	0%	11%	10%	0%	0%	10%	0%
Adj. Flow (vph)	79	11	27	1	9	21	25	280	1	12	259	73
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	90	27	0	31	0	25	281	0	0	271	73
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 39.4% ICU Level of Service A
Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	10	25	1	8	19	23	258	1	11	238	67
Future Volume (Veh/h)	73	10	25	1	8	19	23	258	1	11	238	67
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	79	11	27	1	9	21	25	280	1	12	259	73
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	638	614	259	619	686	280	332			281		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	638	614	259	619	686	280	332			281		
tC, single (s)	7.1	6.6	6.2	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.3	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	78	97	97	100	98	97	98			99		
cM capacity (veh/h)	361	381	772	372	361	763	1179			1293		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	117	31	25	281	271	73
Volume Left	79	1	25	0	12	0
Volume Right	27	21	0	1	0	73
cSH	473	562	1179	1700	1293	1700
Volume to Capacity	0.25	0.06	0.02	0.17	0.01	0.04
Queue Length 95th (m)	7.7	1.4	0.5	0.0	0.2	0.0
Control Delay (s)	16.2	11.8	8.1	0.0	0.4	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	16.2	11.8	0.7		0.3	
Approach LOS	C	B				

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	39.4%	ICU Level of Service	A
Analysis Period (min)	15		

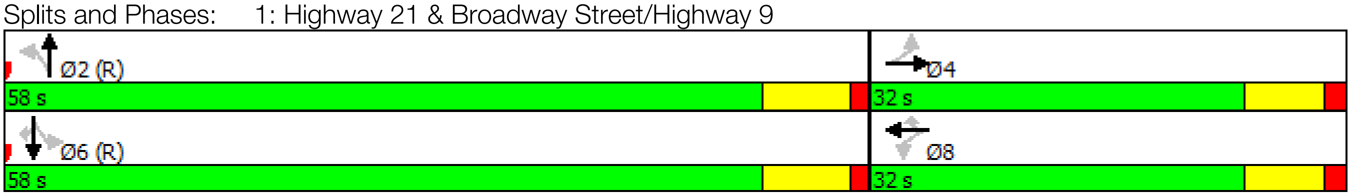
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	79	248	52	53	14	185	220	50	29	356	31
Future Volume (vph)	49	79	248	52	53	14	185	220	50	29	356	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.886				0.850		0.972				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1683	0	1687	1863	1615	1805	1776	0	1805	1863	1615
Flt Permitted	0.719			0.241			0.522			0.581		
Satd. Flow (perm)	1339	1683	0	428	1863	1615	992	1776	0	1104	1863	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		174				52		21				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			492.9			358.0			262.4	
Travel Time (s)		17.0			22.2			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	7%	2%	0%	0%	4%	4%	0%	2%	0%
Adj. Flow (vph)	53	86	270	57	58	15	201	239	54	32	387	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	356	0	57	58	15	201	293	0	32	387	34
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	32.0	32.0		32.0	32.0	32.0	58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%		35.6%	35.6%	35.6%	64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	16.6	16.6		16.6	16.6	16.6	59.1	59.1		59.1	59.1	59.1
Actuated g/C Ratio	0.18	0.18		0.18	0.18	0.18	0.66	0.66		0.66	0.66	0.66
v/c Ratio	0.21	0.79		0.73	0.17	0.04	0.31	0.25		0.04	0.32	0.03
Control Delay	30.7	29.8		78.7	29.4	0.2	9.6	7.5		7.4	8.6	1.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	30.7	29.8		78.7	29.4	0.2	9.6	7.5		7.4	8.6	1.8
LOS	C	C		E	C	A	A	A		A	A	A
Approach Delay		29.9			47.6			8.4			8.0	
Approach LOS		C			D			A			A	
Queue Length 50th (m)	8.3	31.9		9.9	9.0	0.0	13.7	17.4		1.8	26.5	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	16.7	57.0		#24.1	17.3	0.0	33.9	38.6		6.5	54.9	2.9
Internal Link Dist (m)		211.6			468.9			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	371	593		118	517	486	651	1173		724	1222	1076
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.14	0.60		0.48	0.11	0.03	0.31	0.25		0.04	0.32	0.03

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 17.6 Intersection LOS: B
Intersection Capacity Utilization 87.0% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9

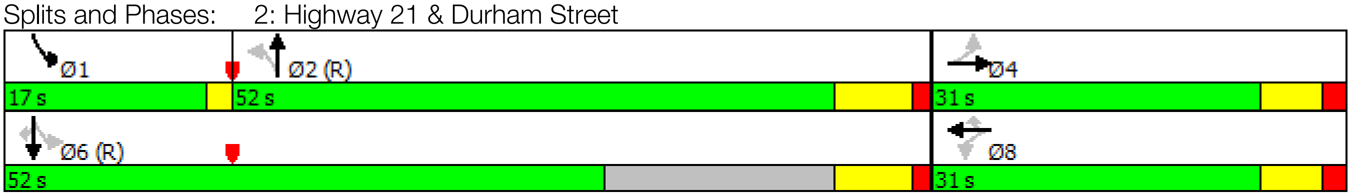


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	154	40	206	131	162	50	235	118	228	412	85
Future Volume (vph)	102	154	40	206	131	162	50	235	118	228	412	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.969				0.850		0.950				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1830	0	1787	1900	1583	1805	1752	0	1787	1881	1583
Flt Permitted	0.666			0.564			0.504			0.419		
Satd. Flow (perm)	1265	1830	0	1061	1900	1583	958	1752	0	788	1881	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				176		33				92
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	1%	0%	2%	0%	4%	1%	1%	1%	2%
Adj. Flow (vph)	111	167	43	224	142	176	54	255	128	248	448	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	111	210	0	224	142	176	54	383	0	248	448	92
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	31.0	31.0		31.0	31.0	31.0	52.0	52.0		17.0	52.0	52.0
Total Split (%)	31.0%	31.0%		31.0%	31.0%	31.0%	52.0%	52.0%		17.0%	52.0%	52.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	28.9	28.9		28.9	28.9	28.9	43.7	43.7		62.6	57.3	57.3
Actuated g/C Ratio	0.29	0.29		0.29	0.29	0.29	0.44	0.44		0.63	0.57	0.57
v/c Ratio	0.30	0.39		0.73	0.26	0.30	0.13	0.49		0.41	0.42	0.10
Control Delay	28.8	28.1		46.2	27.4	5.2	21.3	22.8		11.2	14.4	2.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	28.8	28.1		46.2	27.4	5.2	21.3	22.8		11.2	14.4	2.8
LOS	C	C		D	C	A	C	C		B	B	A
Approach Delay		28.3			27.9			22.6			12.0	
Approach LOS		C			C			C			B	
Queue Length 50th (m)	17.2	31.5		40.2	21.7	0.0	6.6	51.0		21.0	49.7	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	30.6	49.2		65.3	35.6	14.2	16.9	89.4		37.0	80.0	7.4
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	375	550		314	563	593	455	849		643	1175	1023
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.30	0.38		0.71	0.25	0.30	0.12	0.45		0.39	0.38	0.09

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 20.9	Intersection LOS: C
Intersection Capacity Utilization 83.3%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: Highway 21 & Durham Street



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	44	12	55	1	10	32
Future Volume (vph)	44	12	55	1	10	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.971				0.897	
Flt Protected	0.962			0.953		
Satd. Flow (prot)	1665	0	0	1811	1704	0
Flt Permitted	0.962			0.953		
Satd. Flow (perm)	1665	0	0	1811	1704	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.4			138.6	84.1	
Travel Time (s)	13.6			10.0	6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	20%	0%	0%	0%	0%
Adj. Flow (vph)	48	13	60	1	11	35
Shared Lane Traffic (%)						
Lane Group Flow (vph)	61	0	0	61	46	0
Sign Control	Free			Stop	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 19.8%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	44	12	55	1	10	32
Future Volume (Veh/h)	44	12	55	1	10	32
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	13	60	1	11	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (m)	189					
pX, platoon unblocked						
vC, conflicting volume	0		143	102	109	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		143	102	109	0
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	97		92	100	99	97
cM capacity (veh/h)	1617		777	768	762	1091

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	61	61	46
Volume Left	48	60	0
Volume Right	13	0	35
cSH	1617	777	989
Volume to Capacity	0.03	0.08	0.05
Queue Length 95th (m)	0.7	2.0	1.2
Control Delay (s)	5.8	10.0	8.8
Lane LOS	A	B	A
Approach Delay (s)	5.8	10.0	8.8
Approach LOS		B	A

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	19.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	106	49	55	289	558	115
Future Volume (vph)	106	49	55	289	558	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	15.0			45.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		30.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.957					0.850
Flt Protected	0.967		0.950			
Satd. Flow (prot)	1712	0	1770	1845	1863	1615
Flt Permitted	0.967		0.950			
Satd. Flow (perm)	1712	0	1770	1845	1863	1615
Link Speed (k/h)	50			80	80	
Link Distance (m)	71.8			1178.3	487.8	
Travel Time (s)	5.2			53.0	22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	3%	2%	0%
Adj. Flow (vph)	115	53	60	314	607	125
Shared Lane Traffic (%)						
Lane Group Flow (vph)	168	0	60	314	607	125
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 51.6%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	106	49	55	289	558	115
Future Volume (Veh/h)	106	49	55	289	558	115
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	115	53	60	314	607	125
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1041	607	732			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1041	607	732			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	51	89	93			
cM capacity (veh/h)	236	496	873			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	168	60	314	607	125
Volume Left	115	60	0	0	0
Volume Right	53	0	0	0	125
cSH	283	873	1700	1700	1700
Volume to Capacity	0.59	0.07	0.18	0.36	0.07
Queue Length 95th (m)	28.2	1.8	0.0	0.0	0.0
Control Delay (s)	34.7	9.4	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	34.7	1.5		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	6	36	4	11	11	35	274	4	24	462	103
Future Volume (vph)	68	6	36	4	11	11	35	274	4	24	462	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.942			0.998				0.850
Flt Protected		0.956			0.993		0.950				0.998	
Satd. Flow (prot)	0	1752	1615	0	1557	0	1805	1824	0	0	1856	1615
Flt Permitted		0.956			0.993		0.950				0.998	
Satd. Flow (perm)	0	1752	1615	0	1557	0	1805	1824	0	0	1856	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	0%	0%	33%	22%	0%	0%	4%	0%	5%	2%	0%
Adj. Flow (vph)	74	7	39	4	12	12	38	298	4	26	502	112
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	81	39	0	28	0	38	302	0	0	528	112
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 61.1%	ICU Level of Service B
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	6	36	4	11	11	35	274	4	24	462	103
Future Volume (Veh/h)	68	6	36	4	11	11	35	274	4	24	462	103
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	7	39	4	12	12	38	298	4	26	502	112
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	946	932	502	934	1042	300	614			302		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	946	932	502	934	1042	300	614			302		
tC, single (s)	7.1	6.5	6.2	7.4	6.7	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.8	4.2	3.3	2.2			2.2		
p0 queue free %	66	97	93	98	94	98	96			98		
cM capacity (veh/h)	215	253	573	189	199	744	975			1242		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	120	28	38	302	528	112
Volume Left	74	4	38	0	26	0
Volume Right	39	12	0	4	0	112
cSH	323	287	975	1700	1242	1700
Volume to Capacity	0.37	0.10	0.04	0.18	0.02	0.07
Queue Length 95th (m)	13.3	2.6	1.0	0.0	0.5	0.0
Control Delay (s)	24.7	18.9	8.8	0.0	0.6	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	24.7	18.9	1.0		0.5	
Approach LOS	C	C				

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

Appendix F

2025 Total Traffic Operations Reports

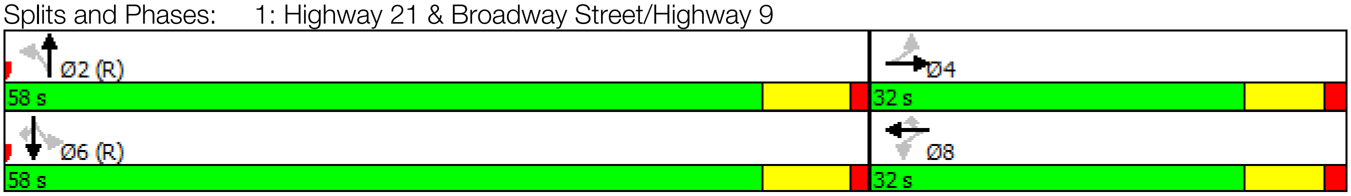
Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	D	B	B	C	D	D	A	D	A	A	A	A	A	A	A	A	B
			Delay	38	17	17	21	47	38	5	35	5	5	5	5	4	5	0	4	12
			V/C	0.22	0.55	0.55		0.43	0.24	0.13		0.18	0.27	0.27		0.02	0.16	0.02		
			Queue	14.4	24.5	24.5		20.9	19.5	3.3		15.7	31.6	31.6		2.5	19.0	0.6		
	2 - Highway 21 & Durham Street	Signal	LOS	D	D	D	D	E	D	A	D	B	B	B	B	A	A	A	A	C
			Delay	44	44	44	44	71	38	9	36	12	13	13	13	5	7	2	6	22
			V/C	0.50	0.64	0.64		0.78	0.33	0.40		0.13	0.40	0.40		0.26	0.20	0.03		
			Queue	34.2	54.2	54.2		40.0	31.3	15.8		19.9	72.9	72.9		19.7	32.0	3.8		
	3 - Durham Street & Millennium Way	TWSC	LOS	A	A	A	A	A	A	A	A	B	B	B	B	A	A	A	A	
			Delay	5	5	5	5	3	3	3	3	13	13	13	13	9	9	9	9	7
			V/C	0.08	0.08	0.08		0.00	0.00	0.00		0.10	0.10	0.10		0.07	0.07	0.07		
			Queue	2.0	2.0	2.0		0.0	0.0	0.0		2.6	2.6	2.6		1.8	1.8	1.8		
	4 - Highway 21 & Russell Street	TWSC	LOS	E	E	E	E	C	C	C	C	A	A	A	A	A	A	A	A	
			Delay	44	44	44	44	21	21	21	21	8	0	0	1	2	2	0	2	9
			V/C	0.65	0.65	0.65		0.30	0.30	0.30		0.03	0.23	0.23		0.07	0.07	0.04		
			Queue	32.0	32.0	32.0		9.7	9.7	9.7		0.8	0.0	0.0		1.9	1.9	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	C	C	C	C	B	B	B	B	A	A	A	A	A	A	A	A	
			Delay	19	19	19	19	12	12	12	12	8	0	0	1	0	0	0	0	4
			V/C	0.36	0.36	0.36		0.06	0.06	0.06		0.02	0.17	0.17		0.01	0.01	0.06		
			Queue	12.7	12.7	12.7		1.4	1.4	1.4		0.5	0.0	0.0		0.2	0.2	0.0		
	6 - Highway 9 & Durham Street	TWSC	LOS		A	A	A	A	A		A	A		A	A					
			Delay		0	0	0	0	0		0	9		9	9					0
			V/C		0.05	0.05		0.00	0.00			0.00		0.00						
			Queue		0.0	0.0		0.1	0.1			0.1		0.1						
PM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	C	C	C	C	F	C	A	E	C	A	A	B	A	B	A	B	C
			Delay	26	26	26	26	93	25	0	56	20	10	10	15	10	12	2	11	20
			V/C	0.17	0.82	0.82		0.82	0.13	0.03		0.64	0.33	0.33		0.04	0.39	0.03		
			Queue	16.1	72.6	72.6		31.2	16.7	0.0		85.0	51.5	51.5		5.6	67.5	3.1		
	2 - Highway 21 & Durham Street	Signal	LOS	C	C	C	C	E	C	A	D	C	D	D	D	E	C	A	C	D
			Delay	26	27	27	26	78	25	5	37	31	49	49	46	59	20	5	33	36
			V/C	0.27	0.51	0.51		0.96	0.30	0.37		0.46	0.90	0.90		0.96	0.57	0.11		
			Queue	31.5	81.1	81.1		116.6	51.3	17.6		39.1	152.1	152.1		98.6	97.8	10.3		
	3 - Durham Street & Millennium Way	TWSC	LOS	A	A	A	A	A	A	A	A	C	C	C	C	A	A	A	A	
			Delay	5	5	5	5	5	5	5	5	24	24	24	24	10	10	10	10	11
			V/C	0.10	0.10	0.10		0.01	0.01	0.01		0.47	0.47	0.47		0.18	0.18	0.18		
			Queue	2.7	2.7	2.7		0.1	0.1	0.1		19.5	19.5	19.5		5.3	5.3	5.3		
	4 - Highway 21 & Russell Street	TWSC	LOS	F	F	F	F	F	F	F	F	A	A	A	A	A	A	A	A	
			Delay	Err	Err	Err	Err	Err	Err	Err	Err	9	0	0	1	5	5	0	4	3472
			V/C	17.91	17.91	17.91		9.13	9.13	9.13		0.07	0.25	0.25		0.24	0.24	0.09		
			Queue	Err	Err	Err		Err	Err	Err		1.7	0.0	0.0		7.4	7.4	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	F	F	F	F	C	C	C	C	A	A	A	A	A	A	A	A	
			Delay	61	61	61	61	22	22	22	22	9	0	0	1	1	1	0	1	9
			V/C	0.79	0.79	0.79		0.12	0.12	0.12		0.04	0.20	0.20		0.02	0.02	0.11		
			Queue	46.9	46.9	46.9		3.2	3.2	3.2		1.1	0.0	0.0		0.5	0.5	0.0		
	6 - Highway 9 & Durham Street	TWSC	LOS		A	A	A	A	A		A	A		A	A					
			Delay		0	0	0	1	1		1	9		9	9					1
			V/C		0.10	0.10		0.01	0.01			0.02		0.02						
			Queue		0.0	0.0		0.2	0.2			0.4		0.4						

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	32	131	51	50	25	136	278	36	13	185	18
Future Volume (vph)	31	32	131	51	50	25	136	278	36	13	185	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.880				0.850		0.983				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1617	0	1805	1827	1380	1703	1766	0	1504	1759	1615
Flt Permitted	0.722			0.551			0.632			0.556		
Satd. Flow (perm)	1294	1617	0	1047	1827	1380	1133	1766	0	880	1759	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		142				52		12				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			490.2			358.0			262.4	
Travel Time (s)		17.0			22.1			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	9%	2%	0%	4%	17%	6%	6%	4%	20%	8%	0%
Adj. Flow (vph)	34	35	142	55	54	27	148	302	39	14	201	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	177	0	55	54	27	148	341	0	14	201	20
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	32.0	32.0		32.0	32.0	32.0	58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%		35.6%	35.6%	35.6%	64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	11.0	11.0		11.0	11.0	11.0	64.7	64.7		64.7	64.7	64.7
Actuated g/C Ratio	0.12	0.12		0.12	0.12	0.12	0.72	0.72		0.72	0.72	0.72
v/c Ratio	0.22	0.55		0.43	0.24	0.13	0.18	0.27		0.02	0.16	0.02
Control Delay	38.4	17.0		46.9	37.9	4.9	5.0	5.1		4.2	4.6	0.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	38.4	17.0		46.9	37.9	4.9	5.0	5.1		4.2	4.6	0.3
LOS	D	B		D	D	A	A	A		A	A	A
Approach Delay		20.5			35.0			5.0			4.2	
Approach LOS		C			D			A			A	
Queue Length 50th (m)	5.8	5.9		9.6	9.2	0.0	6.9	16.5		0.6	9.2	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	14.4	24.5		20.9	19.5	3.3	15.7	31.6		2.5	19.0	0.6
Internal Link Dist (m)		211.6			466.2			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	359	551		290	507	420	814	1272		632	1263	1173
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.09	0.32		0.19	0.11	0.06	0.18	0.27		0.02	0.16	0.02

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 11.7	Intersection LOS: B
Intersection Capacity Utilization 75.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9



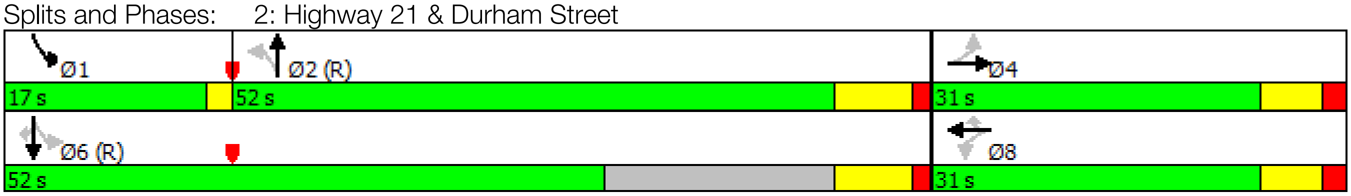
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	138	48	107	94	140	83	223	139	162	223	35
Future Volume (vph)	98	138	48	107	94	140	83	223	139	162	223	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.961				0.850		0.942				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1803	0	1770	1863	1509	1805	1661	0	1626	1712	1583
Flt Permitted	0.691			0.479			0.608			0.475		
Satd. Flow (perm)	1287	1803	0	892	1863	1509	1155	1661	0	813	1712	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17				152		41				38
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	5%	2%	2%	7%	0%	12%	1%	11%	11%	2%
Adj. Flow (vph)	107	150	52	116	102	152	90	242	151	176	242	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	202	0	116	102	152	90	393	0	176	242	38
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	31.0	31.0		31.0	31.0	31.0	52.0	52.0		17.0	52.0	52.0
Total Split (%)	31.0%	31.0%		31.0%	31.0%	31.0%	52.0%	52.0%		17.0%	52.0%	52.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	16.7	16.7		16.7	16.7	16.7	58.6	58.6		74.8	69.5	69.5
Actuated g/C Ratio	0.17	0.17		0.17	0.17	0.17	0.59	0.59		0.75	0.70	0.70
v/c Ratio	0.50	0.64		0.78	0.33	0.40	0.13	0.40		0.26	0.20	0.03
Control Delay	44.4	44.0		71.2	37.8	8.7	12.1	12.9		5.3	6.8	2.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	44.4	44.0		71.2	37.8	8.7	12.1	12.9		5.3	6.8	2.3
LOS	D	D		E	D	A	B	B		A	A	A
Approach Delay		44.1			36.3			12.7			5.9	
Approach LOS		D			D			B			A	
Queue Length 50th (m)	20.1	35.7		23.0	18.6	0.0	7.6	35.0		8.4	15.2	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	34.2	54.2		40.0	31.3	15.8	19.9	72.9		19.7	32.0	3.8
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	315	454		218	456	484	677	990		729	1189	1111
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.34	0.44		0.53	0.22	0.31	0.13	0.40		0.24	0.20	0.03

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 22.2 Intersection LOS: C
Intersection Capacity Utilization 74.9% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: Highway 21 & Durham Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	113	0	55	2	0	3	44	1	1	1	4	62
Future Volume (vph)	113	0	55	2	0	3	44	1	1	1	4	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.956			0.919			0.997			0.874	
Flt Protected		0.967			0.980			0.954			0.999	
Satd. Flow (prot)	0	1633	0	0	1678	0	0	1457	0	0	1658	0
Flt Permitted		0.967			0.980			0.954			0.999	
Satd. Flow (perm)	0	1633	0	0	1678	0	0	1457	0	0	1658	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		189.4			73.4			138.6			84.1	
Travel Time (s)		13.6			5.3			10.0			6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	23%	2%	2%	2%	25%	0%	2%	2%	0%	0%
Adj. Flow (vph)	123	0	60	2	0	3	48	1	1	1	4	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	183	0	0	5	0	0	50	0	0	72	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 31.8%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	113	0	55	2	0	3	44	1	1	1	4	62
Future Volume (Veh/h)	113	0	55	2	0	3	44	1	1	1	4	62
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	123	0	60	2	0	3	48	1	1	1	4	67
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		189										
pX, platoon unblocked												
vC, conflicting volume	3			60			350	283	30	283	312	2
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3			60			350	283	30	283	312	2
tC, single (s)	4.1			4.1			7.3	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.7	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			100			90	100	100	100	99	94
cM capacity (veh/h)	1632			1544			495	581	1044	629	560	1089

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	183	5	50	72
Volume Left	123	2	48	1
Volume Right	60	3	1	67
cSH	1632	1544	502	1025
Volume to Capacity	0.08	0.00	0.10	0.07
Queue Length 95th (m)	2.0	0.0	2.6	1.8
Control Delay (s)	5.2	2.9	13.0	8.8
Lane LOS	A	A	B	A
Approach Delay (s)	5.2	2.9	13.0	8.8
Approach LOS			B	A

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	31.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	25	40	23	15	49	34	320	37	80	297	58
Future Volume (vph)	78	25	40	23	15	49	34	320	37	80	297	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	0.0		45.0
Storage Lanes	0		0	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.963			0.924			0.985				0.850
Flt Protected		0.973			0.987		0.950				0.990	
Satd. Flow (prot)	0	1713	0	0	1699	0	1752	1758	0	0	1762	1524
Flt Permitted		0.973			0.987		0.950				0.990	
Satd. Flow (perm)	0	1713	0	0	1699	0	1752	1758	0	0	1762	1524
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		71.8			63.0			1178.3			487.8	
Travel Time (s)		5.2			4.5			53.0			22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	3%	2%	2%	2%	3%	7%	2%	2%	8%	6%
Adj. Flow (vph)	85	27	43	25	16	53	37	348	40	87	323	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	155	0	0	94	0	37	388	0	0	410	63
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 63.9% ICU Level of Service B
Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	25	40	23	15	49	34	320	37	80	297	58
Future Volume (Veh/h)	78	25	40	23	15	49	34	320	37	80	297	58
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	85	27	43	25	16	53	37	348	40	87	323	63
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	980	959	323	996	1002	368	386			388		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	980	959	323	996	1002	368	386			388		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	53	88	94	86	93	92	97			93		
cM capacity (veh/h)	181	230	716	176	217	677	1167			1170		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	155	94	37	388	410	63
Volume Left	85	25	37	0	87	0
Volume Right	43	53	0	40	0	63
cSH	240	320	1167	1700	1170	1700
Volume to Capacity	0.65	0.29	0.03	0.23	0.07	0.04
Queue Length 95th (m)	31.9	9.6	0.8	0.0	1.9	0.0
Control Delay (s)	43.9	20.9	8.2	0.0	2.4	0.0
Lane LOS	E	C	A		A	
Approach Delay (s)	43.9	20.9	0.7		2.1	
Approach LOS	E	C				

Intersection Summary			
Average Delay	8.7		
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	10	25	1	8	19	21	260	1	11	252	88
Future Volume (vph)	107	10	25	1	8	19	21	260	1	11	252	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.909			0.999				0.850
Flt Protected		0.956			0.998		0.950				0.998	
Satd. Flow (prot)	0	1749	1538	0	1724	0	1626	1726	0	0	1730	1615
Flt Permitted		0.956			0.998		0.950				0.998	
Satd. Flow (perm)	0	1749	1538	0	1724	0	1626	1726	0	0	1730	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	13%	5%	0%	0%	0%	11%	10%	0%	0%	10%	0%
Adj. Flow (vph)	116	11	27	1	9	21	23	283	1	12	274	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	127	27	0	31	0	23	284	0	0	286	96
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 42.0%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	107	10	25	1	8	19	21	260	1	11	252	88
Future Volume (Veh/h)	107	10	25	1	8	19	21	260	1	11	252	88
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	116	11	27	1	9	21	23	283	1	12	274	96
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	652	628	274	633	724	284	370			284		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	652	628	274	633	724	284	370			284		
tC, single (s)	7.1	6.6	6.2	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.3	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	67	97	96	100	97	97	98			99		
cM capacity (veh/h)	354	374	758	364	344	760	1141			1290		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	154	31	23	284	286	96
Volume Left	116	1	23	0	12	0
Volume Right	27	21	0	1	0	96
cSH	431	549	1141	1700	1290	1700
Volume to Capacity	0.36	0.06	0.02	0.17	0.01	0.06
Queue Length 95th (m)	12.8	1.4	0.5	0.0	0.2	0.0
Control Delay (s)	18.8	12.0	8.2	0.0	0.4	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	18.8	12.0	0.6		0.3	
Approach LOS	C	B				

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	82	0	4	126	0	3
Future Volume (vph)	82	0	4	126	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected				0.999		
Satd. Flow (prot)	1863	0	0	1861	1611	0
Flt Permitted				0.999		
Satd. Flow (perm)	1863	0	0	1861	1611	0
Link Speed (k/h)	50			80	50	
Link Distance (m)	490.2			203.9	128.0	
Travel Time (s)	35.3			9.2	9.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	89	0	4	137	0	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	89	0	0	141	3	0
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 19.9%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	82	0	4	126	0	3
Future Volume (Veh/h)	82	0	4	126	0	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	89	0	4	137	0	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			89		234	89
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			89		234	89
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1506		752	969

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	89	141	3
Volume Left	0	4	0
Volume Right	0	0	3
cSH	1700	1506	969
Volume to Capacity	0.05	0.00	0.00
Queue Length 95th (m)	0.0	0.1	0.1
Control Delay (s)	0.0	0.2	8.7
Lane LOS		A	A
Approach Delay (s)	0.0	0.2	8.7
Approach LOS			A

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	19.9%	ICU Level of Service	A
Analysis Period (min)	15		

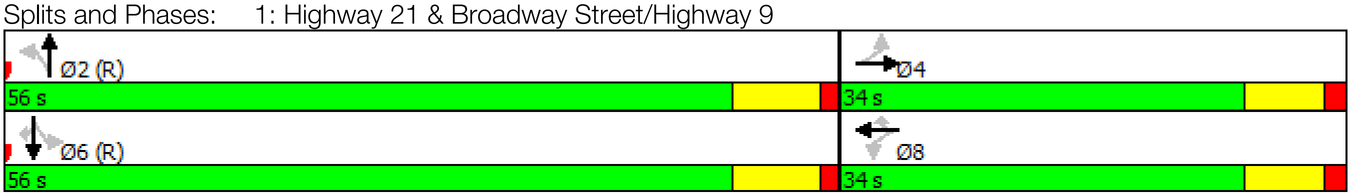
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	79	369	59	53	11	320	265	62	21	401	31
Future Volume (vph)	49	79	369	59	53	11	320	265	62	21	401	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.876				0.850		0.972				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1664	0	1687	1863	1615	1805	1776	0	1805	1863	1615
Flt Permitted	0.719			0.190			0.472			0.535		
Satd. Flow (perm)	1339	1664	0	337	1863	1615	897	1776	0	1016	1863	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		266				52		20				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			492.9			358.0			262.4	
Travel Time (s)		17.0			22.2			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	7%	2%	0%	0%	4%	4%	0%	2%	0%
Adj. Flow (vph)	53	86	401	64	58	12	348	288	67	23	436	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	487	0	64	58	12	348	355	0	23	436	34
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	34.0	34.0		34.0	34.0	34.0	56.0	56.0		56.0	56.0	56.0
Total Split (%)	37.8%	37.8%		37.8%	37.8%	37.8%	62.2%	62.2%		62.2%	62.2%	62.2%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	21.0	21.0		21.0	21.0	21.0	54.7	54.7		54.7	54.7	54.7
Actuated g/C Ratio	0.23	0.23		0.23	0.23	0.23	0.61	0.61		0.61	0.61	0.61
v/c Ratio	0.17	0.82		0.82	0.13	0.03	0.64	0.33		0.04	0.39	0.03
Control Delay	25.9	26.0		93.4	25.1	0.1	20.4	10.4		9.6	11.6	2.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	25.9	26.0		93.4	25.1	0.1	20.4	10.4		9.6	11.6	2.1
LOS	C	C		F	C	A	C	B		A	B	A
Approach Delay		26.0			55.5			15.4			10.9	
Approach LOS		C			E			B			B	
Queue Length 50th (m)	7.4	36.7		10.5	8.0	0.0	40.8	29.7		1.7	40.8	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	16.1	72.6		#31.2	16.7	0.0	#85.0	51.5		5.6	67.5	3.1
Internal Link Dist (m)		211.6			468.9			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	401	685		101	558	520	545	1087		617	1132	1000
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.13	0.71		0.63	0.10	0.02	0.64	0.33		0.04	0.39	0.03

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 20.1 Intersection LOS: C
Intersection Capacity Utilization 97.9% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	210	107	263	193	257	126	332	167	325	487	85
Future Volume (vph)	102	210	107	263	193	257	126	332	167	325	487	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.949				0.850		0.950				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1785	0	1787	1900	1583	1805	1753	0	1787	1881	1583
Flt Permitted	0.595			0.428			0.467			0.154		
Satd. Flow (perm)	1130	1785	0	805	1900	1583	887	1753	0	290	1881	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28				279		29				63
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	1%	0%	2%	0%	4%	1%	1%	1%	2%
Adj. Flow (vph)	111	228	116	286	210	279	137	361	182	353	529	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	111	344	0	286	210	279	137	543	0	353	529	92
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	40.0	40.0		40.0	40.0	40.0	44.0	44.0		16.0	60.0	60.0
Total Split (%)	40.0%	40.0%		40.0%	40.0%	40.0%	44.0%	44.0%		16.0%	60.0%	60.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	36.9	36.9		36.9	36.9	36.9	33.3	33.3		54.6	49.3	49.3
Actuated g/C Ratio	0.37	0.37		0.37	0.37	0.37	0.33	0.33		0.55	0.49	0.49
v/c Ratio	0.27	0.51		0.96	0.30	0.37	0.46	0.90		0.96	0.57	0.11
Control Delay	25.8	26.6		78.3	25.0	4.5	31.2	49.4		59.2	20.2	5.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	25.8	26.6		78.3	25.0	4.5	31.2	49.4		59.2	20.2	5.2
LOS	C	C		E	C	A	C	D		E	C	A
Approach Delay		26.4			37.3			45.7			32.9	
Approach LOS		C			D			D			C	
Queue Length 50th (m)	16.3	51.2		~62.5	31.2	0.0	21.1	96.3		43.9	69.5	2.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	31.5	81.1		#116.6	51.3	17.6	39.1	#152.1		#98.6	97.8	10.3
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	417	676		297	701	760	325	661		367	991	864
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.27	0.51		0.96	0.30	0.37	0.42	0.82		0.96	0.53	0.11

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 36.1 Intersection LOS: D
Intersection Capacity Utilization 98.1% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Highway 21 & Durham Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	152	0	108	7	0	4	142	1	8	5	10	147
Future Volume (vph)	152	0	108	7	0	4	142	1	8	5	10	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.944			0.955			0.993			0.877	
Flt Protected		0.972			0.968			0.955			0.999	
Satd. Flow (prot)	0	1584	0	0	1722	0	0	1800	0	0	1664	0
Flt Permitted		0.972			0.968			0.955			0.999	
Satd. Flow (perm)	0	1584	0	0	1722	0	0	1800	0	0	1664	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		189.4			77.0			138.6			84.1	
Travel Time (s)		13.6			5.5			10.0			6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	20%	2%	2%	2%	0%	0%	2%	2%	0%	0%
Adj. Flow (vph)	165	0	117	8	0	4	154	1	9	5	11	160
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	282	0	0	12	0	0	164	0	0	176	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 45.6%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (veh/h)	152	0	108	7	0	4	142	1	8	5	10	147
Future Volume (Veh/h)	152	0	108	7	0	4	142	1	8	5	10	147
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	165	0	117	8	0	4	154	1	9	5	11	160
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		189										
pX, platoon unblocked												
vC, conflicting volume	4			117			572	408	58	416	465	2
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4			117			572	408	58	416	465	2
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			99			54	100	99	99	98	85
cM capacity (veh/h)	1611			1471			333	478	1007	497	444	1088

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	282	12	164	176
Volume Left	165	8	154	5
Volume Right	117	4	9	160
cSH	1611	1471	347	968
Volume to Capacity	0.10	0.01	0.47	0.18
Queue Length 95th (m)	2.7	0.1	19.5	5.3
Control Delay (s)	4.7	5.0	24.4	9.5
Lane LOS	A	A	C	A
Approach Delay (s)	4.7	5.0	24.4	9.5
Approach LOS			C	A

Intersection Summary			
Average Delay	11.1		
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	49	49	182	55	242	55	251	139	248	489	135
Future Volume (vph)	123	49	49	182	55	242	55	251	139	248	489	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	0.0		45.0
Storage Lanes	0		0	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970			0.932			0.947				0.850
Flt Protected		0.973			0.981		0.950				0.983	
Satd. Flow (prot)	0	1749	0	0	1703	0	1770	1753	0	0	1831	1615
Flt Permitted		0.973			0.981		0.950				0.983	
Satd. Flow (perm)	0	1749	0	0	1703	0	1770	1753	0	0	1831	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		71.8			79.2			1178.3			487.8	
Travel Time (s)		5.2			5.7			53.0			22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	0%
Adj. Flow (vph)	134	53	53	198	60	263	60	273	151	270	532	147
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	240	0	0	521	0	60	424	0	0	802	147
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 101.7% ICU Level of Service G

Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	49	49	182	55	242	55	251	139	248	489	135
Future Volume (Veh/h)	123	49	49	182	55	242	55	251	139	248	489	135
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	134	53	53	198	60	263	60	273	151	270	532	147
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1758	1616	532	1620	1688	348	679			424		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1758	1616	532	1620	1688	348	679			424		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	28	90	0	10	62	93			76		
cM capacity (veh/h)	8	74	547	25	67	695	913			1135		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	240	521	60	424	802	147
Volume Left	134	198	60	0	270	0
Volume Right	53	263	0	151	0	147
cSH	13	57	913	1700	1135	1700
Volume to Capacity	18.66	9.15	0.07	0.25	0.24	0.09
Queue Length 95th (m)	Err	Err	1.7	0.0	7.4	0.0
Control Delay (s)	Err	Err	9.2	0.0	5.2	0.0
Lane LOS	F	F	A		A	
Approach Delay (s)	Err	Err	1.1		4.4	
Approach LOS	F	F				

Intersection Summary			
Average Delay	3470.4		
Intersection Capacity Utilization	101.7%	ICU Level of Service	G
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	6	36	4	11	11	35	315	4	24	504	171
Future Volume (vph)	129	6	36	4	11	11	35	315	4	24	504	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.942			0.998				0.850
Flt Protected		0.955			0.993		0.950				0.998	
Satd. Flow (prot)	0	1748	1615	0	1557	0	1805	1824	0	0	1857	1615
Flt Permitted		0.955			0.993		0.950				0.998	
Satd. Flow (perm)	0	1748	1615	0	1557	0	1805	1824	0	0	1857	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	0%	0%	33%	22%	0%	0%	4%	0%	5%	2%	0%
Adj. Flow (vph)	140	7	39	4	12	12	38	342	4	26	548	186
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	147	39	0	28	0	38	346	0	0	574	186
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 66.8%	ICU Level of Service C
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	129	6	36	4	11	11	35	315	4	24	504	171
Future Volume (Veh/h)	129	6	36	4	11	11	35	315	4	24	504	171
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	140	7	39	4	12	12	38	342	4	26	548	186
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1036	1022	548	1024	1206	344	734			346		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1036	1022	548	1024	1206	344	734			346		
tC, single (s)	7.1	6.5	6.2	7.4	6.7	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.8	4.2	3.3	2.2			2.2		
p0 queue free %	24	97	93	98	92	98	96			98		
cM capacity (veh/h)	183	223	540	162	157	703	880			1196		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	186	28	38	346	574	186
Volume Left	140	4	38	0	26	0
Volume Right	39	12	0	4	0	186
cSH	234	237	880	1700	1196	1700
Volume to Capacity	0.79	0.12	0.04	0.20	0.02	0.11
Queue Length 95th (m)	47.0	3.2	1.1	0.0	0.5	0.0
Control Delay (s)	60.7	22.2	9.3	0.0	0.6	0.0
Lane LOS	F	C	A		A	
Approach Delay (s)	60.7	22.2	0.9		0.5	
Approach LOS	F	C				

Intersection Summary			
Average Delay	9.3		
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	162	0	11	122	0	13
Future Volume (vph)	162	0	11	122	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected				0.996		
Satd. Flow (prot)	1863	0	0	1858	1644	0
Flt Permitted				0.996		
Satd. Flow (perm)	1863	0	0	1858	1644	0
Link Speed (k/h)	50			80	50	
Link Distance (m)	492.9			201.2	105.0	
Travel Time (s)	35.5			9.1	7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	2%	0%	0%
Adj. Flow (vph)	176	0	12	133	0	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	176	0	0	145	14	0
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 25.5%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	162	0	11	122	0	13
Future Volume (Veh/h)	162	0	11	122	0	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	176	0	12	133	0	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			176		333	176
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			176		333	176
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	98
cM capacity (veh/h)			1412		660	872

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	176	145	14
Volume Left	0	12	0
Volume Right	0	0	14
cSH	1700	1412	872
Volume to Capacity	0.10	0.01	0.02
Queue Length 95th (m)	0.0	0.2	0.4
Control Delay (s)	0.0	0.7	9.2
Lane LOS		A	A
Approach Delay (s)	0.0	0.7	9.2
Approach LOS			A

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	25.5%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix G

2030 Background Traffic Operations Reports

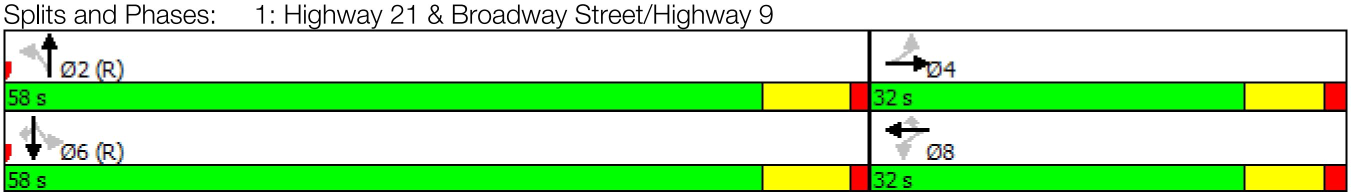
Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	D	C	C	**C**	D	D	A	**C**	A	A	A	**A**	A	A	A	**A**	**B**
			Delay	39	20	20	**25**	43	39	6	**34**	4	5	5	**5**	4	4	1	**4**	**12**
			V/C	0.24	0.43	0.43		0.35	0.27	0.14		0.12	0.26	0.26		0.02	0.14	0.02		
			Queue	15.2	21.5	21.5		20.6	21.5	4.0		11.4	31.6	31.6		2.5	17.6	0.8		
	2 - Highway 21 & Durham Street	Signal	LOS	D	D	D	**D**	D	D	A	**C**	A	B	B	**B**	A	A	A	**A**	**C**
			Delay	53	43	43	**47**	53	40	10	**32**	10	11	11	**11**	4	6	2	**5**	**20**
			V/C	0.61	0.50	0.50		0.59	0.31	0.40		0.11	0.37	0.37		0.19	0.17	0.04		
			Queue	38.6	41.3	41.3		35.1	28.3	15.5		15.5	62.9	62.9		13.4	24.3	3.5		
	3 - Durham Street & Millennium Way	TWSC	LOS	A		A	**A**					A	A		**A**		A	A	**A**	
			Delay	5		5	**5**					10	10		**10**		9	9	**9**	**7**
			V/C	0.03		0.03						0.03	0.03				0.02	0.02		
			Queue	0.6		0.6						0.8	0.8				0.6	0.6		
	4 - Highway 21 & Russell Street	TWSC	LOS	C		C	**C**					A	A		**A**		A	A	**A**	
			Delay	17		17	**17**					8	0		**1**		0	0	**0**	**3**
			V/C	0.29		0.29						0.04	0.23				0.20	0.04		
			Queue	9.7		9.7						0.9	0.0				0.0	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	C	C	C	**C**	B	B	B	**B**	A	A	A	**A**	A	A	A	**A**	
			Delay	18	18	18	**18**	12	12	12	**12**	8	0	0	**1**	0	0	0	**0**	**4**
			V/C	0.29	0.29	0.29		0.06	0.06	0.06		0.02	0.18	0.18		0.01	0.01	0.05		
			Queue	9.6	9.6	9.6		1.6	1.6	1.6		0.6	0.0	0.0		0.2	0.2	0.0		
PM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	C	C	C	**C**	F	C	A	**D**	B	A	A	**A**	A	A	A	**A**	**B**
			Delay	29	32	32	**31**	87	28	0	**50**	11	9	9	**10**	8	10	2	**9**	**19**
			V/C	0.22	0.81	0.81		0.78	0.17	0.05		0.36	0.28	0.28		0.05	0.35	0.04		
			Queue	17.3	62.9	62.9		26.7	17.9	0.3		40.1	44.9	44.9		7.3	63.8	3.3		
	2 - Highway 21 & Durham Street	Signal	LOS	C	C	C	**C**	D	C	A	**C**	C	C	C	**C**	B	B	A	**B**	**C**
			Delay	26	25	25	**25**	38	25	5	**24**	24	29	29	**29**	15	18	3	**15**	**22**
			V/C	0.28	0.35	0.35		0.66	0.23	0.28		0.18	0.63	0.63		0.53	0.50	0.12		
			Queue	34.5	55.4	55.4		80.9	39.6	15.3		17.6	95.0	95.0		37.4	83.2	8.1		
	3 - Durham Street & Millennium Way	TWSC	LOS	A		A	**A**					A	A		**A**		A	A	**A**	
			Delay	6		6	**6**					10	10		**10**		9	9	**9**	**8**
			V/C	0.03		0.03						0.09	0.09				0.05	0.05		
			Queue	0.8		0.8						2.3	2.3				1.2	1.2		
	4 - Highway 21 & Russell Street	TWSC	LOS	E		E	**E**					A	A		**A**		A	A	**A**	
			Delay	49		49	**49**					10	0		**2**		0	0	**0**	**7**
			V/C	0.72		0.72						0.08	0.20				0.39	0.08		
			Queue	39.8		39.8						2.0	0.0				0.0	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	D	D	D	**D**	C	C	C	**C**	A	A	A	**A**	A	A	A	**A**	
			Delay	31	31	31	**31**	21	21	21	**21**	9	0	0	**1**	1	1	0	**1**	**4**
			V/C	0.46	0.46	0.46		0.12	0.12	0.12		0.04	0.19	0.19		0.02	0.02	0.07		
			Queue	18.5	18.5	18.5		3.2	3.2	3.2		1.1	0.0	0.0		0.6	0.6	0.0		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	35	68	51	55	27	101	287	36	14	178	20
Future Volume (vph)	34	35	68	51	55	27	101	287	36	14	178	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.901				0.850		0.983				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1640	0	1805	1827	1380	1703	1766	0	1504	1759	1615
Flt Permitted	0.718			0.685			0.636			0.551		
Satd. Flow (perm)	1287	1640	0	1302	1827	1380	1140	1766	0	872	1759	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		74				52		11				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			490.2			358.0			262.4	
Travel Time (s)		17.0			22.1			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	9%	2%	0%	4%	17%	6%	6%	4%	20%	8%	0%
Adj. Flow (vph)	37	38	74	55	60	29	110	312	39	15	193	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	112	0	55	60	29	110	351	0	15	193	22
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	32.0	32.0		32.0	32.0	32.0	58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%		35.6%	35.6%	35.6%	64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	10.8	10.8		10.8	10.8	10.8	69.7	69.7		69.7	69.7	69.7
Actuated g/C Ratio	0.12	0.12		0.12	0.12	0.12	0.77	0.77		0.77	0.77	0.77
v/c Ratio	0.24	0.43		0.35	0.27	0.14	0.12	0.26		0.02	0.14	0.02
Control Delay	39.4	20.3		42.7	39.0	5.7	4.3	4.5		4.1	4.1	0.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	39.4	20.3		42.7	39.0	5.7	4.3	4.5		4.1	4.1	0.5
LOS	D	C		D	D	A	A	A		A	A	A
Approach Delay		25.1			33.7			4.5			3.8	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	6.3	6.4		9.4	10.2	0.0	5.0	17.2		0.6	8.8	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	15.2	21.5		20.6	21.5	4.0	11.4	31.6		2.5	17.6	0.8
Internal Link Dist (m)		211.6			466.2			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	357	509		361	507	420	883	1371		675	1363	1262
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.10	0.22		0.15	0.12	0.07	0.12	0.26		0.02	0.14	0.02

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.43	
Intersection Signal Delay: 11.7	Intersection LOS: B
Intersection Capacity Utilization 61.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9

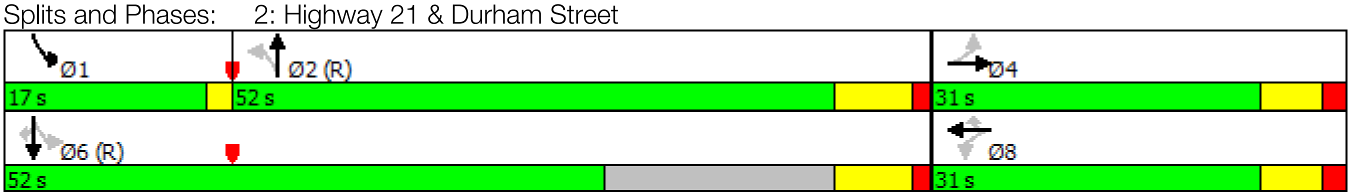


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	111	16	94	78	121	74	230	125	125	191	38
Future Volume (vph)	107	111	16	94	78	121	74	230	125	125	191	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982				0.850		0.947				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1854	0	1770	1863	1509	1805	1664	0	1626	1712	1583
Flt Permitted	0.702			0.642			0.628			0.490		
Satd. Flow (perm)	1308	1854	0	1196	1863	1509	1193	1664	0	839	1712	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				132		35				41
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	5%	2%	2%	7%	0%	12%	1%	11%	11%	2%
Adj. Flow (vph)	116	121	17	102	85	132	80	250	136	136	208	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	138	0	102	85	132	80	386	0	136	208	41
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	31.0	31.0		31.0	31.0	31.0	52.0	52.0		17.0	52.0	52.0
Total Split (%)	31.0%	31.0%		31.0%	31.0%	31.0%	52.0%	52.0%		17.0%	52.0%	52.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	14.6	14.6		14.6	14.6	14.6	61.8	61.8		76.9	71.6	71.6
Actuated g/C Ratio	0.15	0.15		0.15	0.15	0.15	0.62	0.62		0.77	0.72	0.72
v/c Ratio	0.61	0.50		0.59	0.31	0.40	0.11	0.37		0.19	0.17	0.04
Control Delay	53.0	42.7		52.9	39.9	10.0	9.8	10.7		4.1	5.6	1.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	53.0	42.7		52.9	39.9	10.0	9.8	10.7		4.1	5.6	1.9
LOS	D	D		D	D	A	A	B		A	A	A
Approach Delay		47.4			31.7			10.6			4.7	
Approach LOS		D			C			B			A	
Queue Length 50th (m)	22.6	25.0		19.8	15.8	0.0	6.0	31.4		5.5	11.6	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	38.6	41.3		35.1	28.3	15.5	15.5	62.9		13.4	24.3	3.5
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	320	459		293	456	469	737	1042		763	1226	1145
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.36	0.30		0.35	0.19	0.28	0.11	0.37		0.18	0.17	0.04

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 20.3	Intersection LOS: C
Intersection Capacity Utilization 73.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Highway 21 & Durham Street



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	39	17	21	1	4	18
Future Volume (vph)	39	17	21	1	4	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.959				0.887	
Flt Protected	0.966			0.954		
Satd. Flow (prot)	1647	0	0	1462	1685	0
Flt Permitted	0.966			0.954		
Satd. Flow (perm)	1647	0	0	1462	1685	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.4			138.6	84.1	
Travel Time (s)	13.6			10.0	6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	23%	25%	0%	0%	0%
Adj. Flow (vph)	42	18	23	1	4	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	0	0	24	24	0
Sign Control	Free			Stop	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 17.9%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	39	17	21	1	4	18
Future Volume (Veh/h)	39	17	21	1	4	18
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	18	23	1	4	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (m)	189					
pX, platoon unblocked						
vC, conflicting volume	0		115	93	102	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		115	93	102	0
tC, single (s)	4.1		7.3	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.7	4.0	4.0	3.3
p0 queue free %	97		97	100	99	98
cM capacity (veh/h)	1636		777	780	772	1091

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	60	24	24
Volume Left	42	23	0
Volume Right	18	0	20
cSH	1636	777	1020
Volume to Capacity	0.03	0.03	0.02
Queue Length 95th (m)	0.6	0.8	0.6
Control Delay (s)	5.1	9.8	8.6
Lane LOS	A	A	A
Approach Delay (s)	5.1	9.8	8.6
Approach LOS		A	A

Intersection Summary			
Average Delay	6.9		
Intersection Capacity Utilization	17.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	70	43	40	354	308	55
Future Volume (vph)	70	43	40	354	308	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	15.0			45.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		30.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.948					0.850
Flt Protected	0.970		0.950			
Satd. Flow (prot)	1676	0	1752	1776	1759	1524
Flt Permitted	0.970		0.950			
Satd. Flow (perm)	1676	0	1752	1776	1759	1524
Link Speed (k/h)	50			80	80	
Link Distance (m)	71.8			1178.3	487.8	
Travel Time (s)	5.2			53.0	22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	3%	3%	7%	8%	6%
Adj. Flow (vph)	76	47	43	385	335	60
Shared Lane Traffic (%)						
Lane Group Flow (vph)	123	0	43	385	335	60
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 36.1%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	70	43	40	354	308	55
Future Volume (Veh/h)	70	43	40	354	308	55
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	47	43	385	335	60
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	806	335	395			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	806	335	395			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	77	93	96			
cM capacity (veh/h)	334	705	1158			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	123	43	385	335	60
Volume Left	76	43	0	0	0
Volume Right	47	0	0	0	60
cSH	418	1158	1700	1700	1700
Volume to Capacity	0.29	0.04	0.23	0.20	0.04
Queue Length 95th (m)	9.7	0.9	0.0	0.0	0.0
Control Delay (s)	17.2	8.2	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	17.2	0.8		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	10	27	1	9	21	25	280	1	12	257	73
Future Volume (vph)	79	10	27	1	9	21	25	280	1	12	257	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.909							0.850
Flt Protected		0.958			0.999		0.950				0.998	
Satd. Flow (prot)	0	1748	1538	0	1725	0	1626	1728	0	0	1731	1615
Flt Permitted		0.958			0.999		0.950				0.998	
Satd. Flow (perm)	0	1748	1538	0	1725	0	1626	1728	0	0	1731	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	13%	5%	0%	0%	0%	11%	10%	0%	0%	10%	0%
Adj. Flow (vph)	86	11	29	1	10	23	27	304	1	13	279	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	97	29	0	34	0	27	305	0	0	292	79
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 41.5% ICU Level of Service A
Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	10	27	1	9	21	25	280	1	12	257	73
Future Volume (Veh/h)	79	10	27	1	9	21	25	280	1	12	257	73
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	11	29	1	10	23	27	304	1	13	279	79
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	691	664	279	669	742	304	358			305		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	691	664	279	669	742	304	358			305		
tC, single (s)	7.1	6.6	6.2	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.3	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	74	97	96	100	97	97	98			99		
cM capacity (veh/h)	330	355	753	342	334	740	1152			1267		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	126	34	27	305	292	79
Volume Left	86	1	27	0	13	0
Volume Right	29	23	0	1	0	79
cSH	432	532	1152	1700	1267	1700
Volume to Capacity	0.29	0.06	0.02	0.18	0.01	0.05
Queue Length 95th (m)	9.6	1.6	0.6	0.0	0.2	0.0
Control Delay (s)	17.9	12.2	8.2	0.0	0.4	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	17.9	12.2	0.7		0.3	
Approach LOS	C	B				

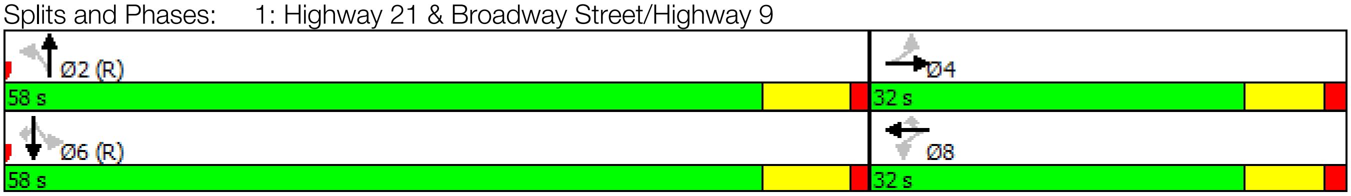
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	86	269	56	57	16	200	238	55	31	386	34
Future Volume (vph)	53	86	269	56	57	16	200	238	55	31	386	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.886				0.850		0.972				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1683	0	1687	1863	1615	1805	1776	0	1805	1863	1615
Flt Permitted	0.717			0.222			0.494			0.567		
Satd. Flow (perm)	1336	1683	0	394	1863	1615	939	1776	0	1077	1863	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		174				52		21				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			492.9			358.0			262.4	
Travel Time (s)		17.0			22.2			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	7%	2%	0%	0%	4%	4%	0%	2%	0%
Adj. Flow (vph)	58	93	292	61	62	17	217	259	60	34	420	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	385	0	61	62	17	217	319	0	34	420	37
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	32.0	32.0		32.0	32.0	32.0	58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%		35.6%	35.6%	35.6%	64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	18.0	18.0		18.0	18.0	18.0	57.7	57.7		57.7	57.7	57.7
Actuated g/C Ratio	0.20	0.20		0.20	0.20	0.20	0.64	0.64		0.64	0.64	0.64
v/c Ratio	0.22	0.81		0.78	0.17	0.05	0.36	0.28		0.05	0.35	0.04
Control Delay	29.4	31.6		86.9	28.1	0.2	11.2	8.5		8.2	9.7	2.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	29.4	31.6		86.9	28.1	0.2	11.2	8.5		8.2	9.7	2.2
LOS	C	C		F	C	A	B	A		A	A	A
Approach Delay		31.3			50.3			9.6			9.0	
Approach LOS		C			D			A			A	
Queue Length 50th (m)	8.9	37.3		10.6	9.4	0.0	16.4	20.8		2.1	31.5	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	17.3	62.9		#26.7	17.9	0.3	40.1	44.9		7.3	63.8	3.3
Internal Link Dist (m)		211.6			468.9			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	376	598		110	524	491	605	1152		694	1201	1058
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.15	0.64		0.55	0.12	0.03	0.36	0.28		0.05	0.35	0.03

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 18.9	Intersection LOS: B
Intersection Capacity Utilization 90.2%	ICU Level of Service E
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9



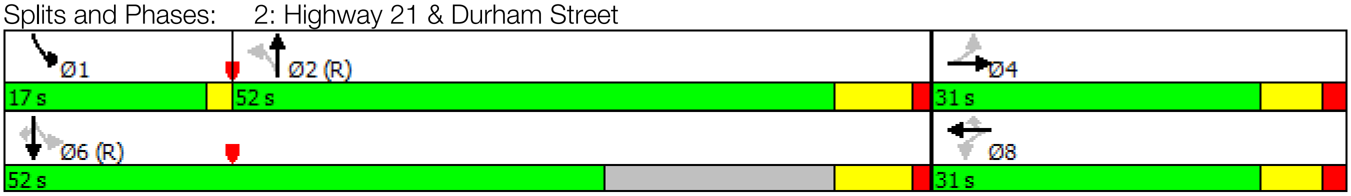
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	166	43	224	142	176	55	255	127	247	446	92
Future Volume (vph)	111	166	43	224	142	176	55	255	127	247	446	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.969				0.850		0.950				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1830	0	1787	1900	1583	1805	1752	0	1787	1881	1583
Flt Permitted	0.659			0.565			0.487			0.335		
Satd. Flow (perm)	1252	1830	0	1063	1900	1583	925	1752	0	630	1881	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				191		32				92
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	1%	0%	2%	0%	4%	1%	1%	1%	2%
Adj. Flow (vph)	121	180	47	243	154	191	60	277	138	268	485	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	121	227	0	243	154	191	60	415	0	268	485	100
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	31.0	31.0		31.0	31.0	31.0	52.0	52.0		17.0	52.0	52.0
Total Split (%)	31.0%	31.0%		31.0%	31.0%	31.0%	52.0%	52.0%		17.0%	52.0%	52.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	34.8	34.8		34.8	34.8	34.8	36.6	36.6		56.7	51.4	51.4
Actuated g/C Ratio	0.35	0.35		0.35	0.35	0.35	0.37	0.37		0.57	0.51	0.51
v/c Ratio	0.28	0.35		0.66	0.23	0.28	0.18	0.63		0.53	0.50	0.12
Control Delay	26.0	25.0		38.1	24.6	4.8	24.1	29.4		15.1	18.1	3.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	26.0	25.0		38.1	24.6	4.8	24.1	29.4		15.1	18.1	3.4
LOS	C	C		D	C	A	C	C		B	B	A
Approach Delay		25.4			23.8			28.8			15.4	
Approach LOS		C			C			C			B	
Queue Length 50th (m)	17.5	31.8		41.1	21.8	0.0	8.3	64.6		26.6	62.7	0.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	34.5	55.4		#80.9	39.6	15.3	17.6	95.0		37.4	83.2	8.1
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	435	644		369	661	675	413	800		530	1160	1011
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.28	0.35		0.66	0.23	0.28	0.15	0.52		0.51	0.42	0.10

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 21.9 Intersection LOS: C
Intersection Capacity Utilization 86.9% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Highway 21 & Durham Street



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	48	13	60	1	10	35
Future Volume (vph)	48	13	60	1	10	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.971				0.895	
Flt Protected	0.962			0.953		
Satd. Flow (prot)	1665	0	0	1811	1700	0
Flt Permitted	0.962			0.953		
Satd. Flow (perm)	1665	0	0	1811	1700	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.4			138.6	84.1	
Travel Time (s)	13.6			10.0	6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	20%	0%	0%	0%	0%
Adj. Flow (vph)	52	14	65	1	11	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	66	0	0	66	49	0
Sign Control	Free			Stop	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 20.2%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	48	13	60	1	10	35
Future Volume (Veh/h)	48	13	60	1	10	35
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	14	65	1	11	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (m)	189					
pX, platoon unblocked						
vC, conflicting volume	0		154	111	118	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		154	111	118	0
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	97		91	100	99	97
cM capacity (veh/h)	1617		760	758	751	1091

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	66	66	49
Volume Left	52	65	0
Volume Right	14	0	38
cSH	1617	760	990
Volume to Capacity	0.03	0.09	0.05
Queue Length 95th (m)	0.8	2.3	1.2
Control Delay (s)	5.8	10.2	8.8
Lane LOS	A	B	A
Approach Delay (s)	5.8	10.2	8.8
Approach LOS		B	A

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	20.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	114	53	60	313	605	125
Future Volume (vph)	114	53	60	313	605	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	15.0			45.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		30.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.957					0.850
Flt Protected	0.967		0.950			
Satd. Flow (prot)	1712	0	1770	1845	1863	1615
Flt Permitted	0.967		0.950			
Satd. Flow (perm)	1712	0	1770	1845	1863	1615
Link Speed (k/h)	50			80	80	
Link Distance (m)	71.8			1178.3	487.8	
Travel Time (s)	5.2			53.0	22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	3%	2%	0%
Adj. Flow (vph)	124	58	65	340	658	136
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	0	65	340	658	136
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 54.7%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	114	53	60	313	605	125
Future Volume (Veh/h)	114	53	60	313	605	125
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	124	58	65	340	658	136
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1128	658	794			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1128	658	794			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	40	88	92			
cM capacity (veh/h)	207	464	827			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	182	65	340	658	136
Volume Left	124	65	0	0	0
Volume Right	58	0	0	0	136
cSH	252	827	1700	1700	1700
Volume to Capacity	0.72	0.08	0.20	0.39	0.08
Queue Length 95th (m)	39.9	2.0	0.0	0.0	0.0
Control Delay (s)	49.4	9.7	0.0	0.0	0.0
Lane LOS	E	A			
Approach Delay (s)	49.4	1.6		0.0	
Approach LOS	E				

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	7	39	4	12	12	38	296	4	26	501	112
Future Volume (vph)	74	7	39	4	12	12	38	296	4	26	501	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.941			0.998				0.850
Flt Protected		0.957			0.993		0.950				0.998	
Satd. Flow (prot)	0	1754	1615	0	1558	0	1805	1824	0	0	1856	1615
Flt Permitted		0.957			0.993		0.950				0.998	
Satd. Flow (perm)	0	1754	1615	0	1558	0	1805	1824	0	0	1856	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	0%	0%	33%	22%	0%	0%	4%	0%	5%	2%	0%
Adj. Flow (vph)	80	8	42	4	13	13	41	322	4	28	545	122
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	88	42	0	30	0	41	326	0	0	573	122
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 64.8% ICU Level of Service C
Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	74	7	39	4	12	12	38	296	4	26	501	112
Future Volume (Veh/h)	74	7	39	4	12	12	38	296	4	26	501	112
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	8	42	4	13	13	41	322	4	28	545	122
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1024	1009	545	1011	1129	324	667			326		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1024	1009	545	1011	1129	324	667			326		
tC, single (s)	7.1	6.5	6.2	7.4	6.7	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.8	4.2	3.3	2.2			2.2		
p0 queue free %	57	96	92	98	93	98	96			98		
cM capacity (veh/h)	186	226	542	163	175	722	932			1217		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	130	30	41	326	573	122
Volume Left	80	4	41	0	28	0
Volume Right	42	13	0	4	0	122
cSH	281	257	932	1700	1217	1700
Volume to Capacity	0.46	0.12	0.04	0.19	0.02	0.07
Queue Length 95th (m)	18.5	3.1	1.1	0.0	0.6	0.0
Control Delay (s)	30.6	20.9	9.0	0.0	0.7	0.0
Lane LOS	D	C	A		A	
Approach Delay (s)	30.6	20.9	1.0		0.5	
Approach LOS	D	C				

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

Appendix H

2030 Total Traffic Operations Reports

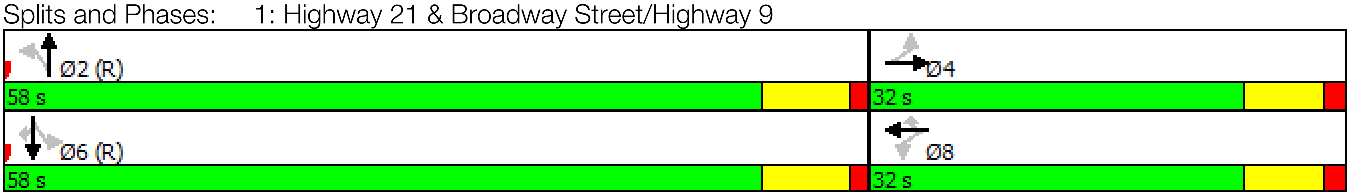
Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
AM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	D	B	B	**C**	D	D	A	**D**	A	A	A	**A**	A	A	A	**A**	**B**
			Delay	38	17	17	**21**	50	38	6	**36**	5	5	5	**5**	4	5	1	**4**	**12**
			V/C	0.23	0.56	0.56		0.48	0.26	0.13		0.19	0.29	0.29		0.02	0.17	0.02		
			Queue	14.9	25.3	25.3		22.5	21.1	3.9		17.0	35.5	35.5		2.7	20.9	0.8		
	2 - Highway 21 & Durham Street	Signal	LOS	D	D	D	**D**	E	D	A	**D**	B	B	B	**B**	A	A	A	**A**	**C**
			Delay	44	43	43	**43**	73	37	8	**36**	13	15	15	**15**	6	7	3	**7**	**23**
			V/C	0.51	0.64	0.64		0.81	0.33	0.41		0.16	0.47	0.47		0.30	0.22	0.04		
			Queue	35.9	55.9	55.9		42.2	32.5	15.7		23.6	93.7	93.7		22.3	36.1	4.1		
	3 - Durham Street & Millennium Way	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	B	B	B	**B**	A	A	A	**A**	
			Delay	5	5	5	**5**	3	3	3	**3**	13	13	13	**13**	9	9	9	**9**	**7**
			V/C	0.08	0.08	0.08		0.00	0.00	0.00		0.11	0.11	0.11		0.07	0.07	0.07		
			Queue	2.0	2.0	2.0		0.0	0.0	0.0		2.9	2.9	2.9		1.8	1.8	1.8		
	4 - Highway 21 & Russell Street	TWSC	LOS	F	F	F	**F**	D	D	D	**D**	A	A	A	**A**	A	A	A	**A**	
			Delay	70	70	70	**70**	25	25	25	**25**	8	0	0	**1**	2	2	0	**2**	**12**
			V/C	0.81	0.81	0.81		0.34	0.34	0.34		0.04	0.26	0.26		0.08	0.08	0.04		
			Queue	46.1	46.1	46.1		11.8	11.8	11.8		1.0	0.0	0.0		2.0	2.0	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	C	C	C	**C**	B	B	B	**B**	A	A	A	**A**	A	A	A	**A**	
			Delay	22	22	22	**22**	13	13	13	**13**	8	0	0	**1**	0	0	0	**0**	**5**
			V/C	0.43	0.43	0.43		0.07	0.07	0.07		0.02	0.19	0.19		0.01	0.01	0.06		
			Queue	16.9	16.9	16.9		1.7	1.7	1.7		0.6	0.0	0.0		0.3	0.3	0.0		
	6 - Highway 9 & Durham Street	TWSC	LOS		A	A	**A**	A	A		**A**	A		A	**A**					
			Delay		0	0	**0**	0	0		**0**	9		9	**9**					**0**
			V/C		0.06	0.06		0.00	0.00			0.00		0.00						
			Queue		0.0	0.0		0.1	0.1			0.1		0.1						
PM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	C	C	C	**C**	F	C	A	**E**	C	B	B	**C**	B	B	A	**B**	**C**
			Delay	24	24	24	**24**	104	24	0	**60**	29	12	12	**20**	11	13	3	**12**	**23**
			V/C	0.17	0.83	0.83		0.87	0.13	0.03		0.75	0.36	0.36		0.05	0.43	0.04		
			Queue	16.9	81.1	81.1		35.0	17.4	0.0		109.0	57.5	57.5		6.2	75.8	3.5		
	2 - Highway 21 & Durham Street	Signal	LOS	C	C	C	**C**	F	C	A	**E**	C	D	D	**D**	E	B	A	**D**	**D**
			Delay	28	30	30	**29**	152	27	5	**65**	31	52	52	**48**	71	19	5	**37**	**46**
			V/C	0.32	0.57	0.57		1.19	0.34	0.40		0.48	0.92	0.92		1.00	0.59	0.12		
			Queue	34.9	88.2	88.2		131.8	54.9	19.3		40.5	166.6	166.6		112.5	104.7	11.0		
	3 - Durham Street & Millennium Way	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	D	D	D	**D**	A	A	A	**A**	
			Delay	5	5	5	**5**	5	5	5	**5**	26	26	26	**26**	10	10	10	**10**	**12**
			V/C	0.11	0.11	0.11		0.01	0.01	0.01		0.50	0.50	0.50		0.19	0.19	0.19		
			Queue	2.8	2.8	2.8		0.1	0.1	0.1		21.5	21.5	21.5		5.4	5.4	5.4		
	4 - Highway 21 & Russell Street	TWSC	LOS	F	F	F	**F**	F	F	F	**F**	A	A	A	**A**	A	A	A	**A**	
			Delay	Err	Err	Err	**Err**	Err	Err	Err	**Err**	10	0	0	**1**	5	5	0	**5**	**Err**
			V/C	Err	Err	Err		14.16	14.16	14.16		0.08	0.27	0.27		0.24	0.24	0.09		
			Queue	Err	Err	Err		Err	Err	Err		1.9	0.0	0.0		7.6	7.6	0.0		
	5 - Highway 21 & Kincardine Avenue	TWSC	LOS	F	F	F	**F**	D	D	D	**D**	A	A	A	**A**	A	A	A	**A**	
			Delay	97	97	97	**97**	25	25	25	**25**	10	0	0	**1**	1	1	0	**1**	**14**
			V/C	0.97	0.97	0.97		0.15	0.15	0.15		0.05	0.22	0.22		0.02	0.11	0.11		
			Queue	65.3	65.3	65.3		4.0	4.0	4.0		1.2	0.0	0.0		0.6	0.6	0.0		
	6 - Highway 9 & Durham Street	TWSC	LOS		A	A	**A**	A	A		**A**	A		A	**A**					
			Delay		0	0	**0**	1	1		**1**	9		9	**9**					**1**
			V/C		0.11	0.11		0.01	0.01			0.02		0.02						
			Queue		0.0	0.0		0.2	0.2			0.4		0.4						

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	35	136	55	55	27	143	300	39	14	199	20
Future Volume (vph)	34	35	136	55	55	27	143	300	39	14	199	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.881				0.850		0.983				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1618	0	1805	1827	1380	1703	1766	0	1504	1759	1615
Flt Permitted	0.718			0.523			0.623			0.542		
Satd. Flow (perm)	1287	1618	0	994	1827	1380	1117	1766	0	858	1759	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		148				52		12				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			490.2			358.0			262.4	
Travel Time (s)		17.0			22.1			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	9%	2%	0%	4%	17%	6%	6%	4%	20%	8%	0%
Adj. Flow (vph)	37	38	148	60	60	29	155	326	42	15	216	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	186	0	60	60	29	155	368	0	15	216	22
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	32.0	32.0		32.0	32.0	32.0	58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%		35.6%	35.6%	35.6%	64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	11.3	11.3		11.3	11.3	11.3	64.4	64.4		64.4	64.4	64.4
Actuated g/C Ratio	0.13	0.13		0.13	0.13	0.13	0.72	0.72		0.72	0.72	0.72
v/c Ratio	0.23	0.56		0.48	0.26	0.13	0.19	0.29		0.02	0.17	0.02
Control Delay	38.3	17.0		49.6	38.0	5.5	5.2	5.4		4.4	4.8	0.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	38.3	17.0		49.6	38.0	5.5	5.2	5.4		4.4	4.8	0.5
LOS	D	B		D	D	A	A	A		A	A	A
Approach Delay		20.6			36.3			5.3			4.4	
Approach LOS		C			D			A			A	
Queue Length 50th (m)	6.3	6.4		10.5	10.2	0.0	7.3	18.2		0.6	10.1	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	14.9	25.3		22.5	21.1	3.9	17.0	35.5		2.7	20.9	0.8
Internal Link Dist (m)		211.6			466.2			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	357	556		276	507	420	799	1267		614	1259	1169
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.10	0.33		0.22	0.12	0.07	0.19	0.29		0.02	0.17	0.02

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.56	
Intersection Signal Delay: 12.1	Intersection LOS: B
Intersection Capacity Utilization 77.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9

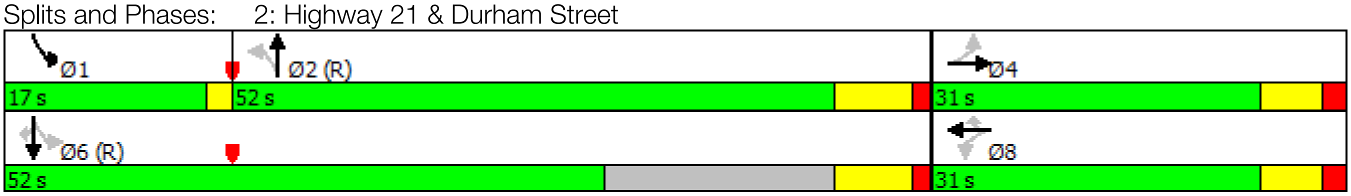


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	147	49	114	100	150	95	259	159	172	238	38
Future Volume (vph)	107	147	49	114	100	150	95	259	159	172	238	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.963				0.850		0.943				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1807	0	1770	1863	1509	1805	1662	0	1626	1712	1583
Flt Permitted	0.687			0.466			0.599			0.422		
Satd. Flow (perm)	1280	1807	0	868	1863	1509	1138	1662	0	722	1712	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16				163		40				41
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	5%	2%	2%	7%	0%	12%	1%	11%	11%	2%
Adj. Flow (vph)	116	160	53	124	109	163	103	282	173	187	259	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	213	0	124	109	163	103	455	0	187	259	41
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	31.0	31.0		31.0	31.0	31.0	52.0	52.0		17.0	52.0	52.0
Total Split (%)	31.0%	31.0%		31.0%	31.0%	31.0%	52.0%	52.0%		17.0%	52.0%	52.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	17.8	17.8		17.8	17.8	17.8	57.1	57.1		73.7	68.4	68.4
Actuated g/C Ratio	0.18	0.18		0.18	0.18	0.18	0.57	0.57		0.74	0.68	0.68
v/c Ratio	0.51	0.64		0.81	0.33	0.41	0.16	0.47		0.30	0.22	0.04
Control Delay	43.5	42.9		72.8	36.7	8.1	13.4	15.2		6.2	7.4	2.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	43.5	42.9		72.8	36.7	8.1	13.4	15.2		6.2	7.4	2.5
LOS	D	D		E	D	A	B	B		A	A	A
Approach Delay		43.1			36.3			14.9			6.5	
Approach LOS		D			D			B			A	
Queue Length 50th (m)	21.7	37.6		24.5	19.6	0.0	9.2	45.5		9.5	17.4	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	35.9	55.9		42.2	32.2	15.7	23.6	93.7		22.3	36.1	4.1
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	317	459		214	461	496	649	966		667	1175	1099
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.37	0.46		0.58	0.24	0.33	0.16	0.47		0.28	0.22	0.04

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 22.6	Intersection LOS: C
Intersection Capacity Utilization 75.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Highway 21 & Durham Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	0	56	2	0	3	47	1	1	1	4	62
Future Volume (vph)	116	0	56	2	0	3	47	1	1	1	4	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.956			0.919			0.997			0.874	
Flt Protected		0.967			0.980			0.954			0.999	
Satd. Flow (prot)	0	1634	0	0	1678	0	0	1456	0	0	1658	0
Flt Permitted		0.967			0.980			0.954			0.999	
Satd. Flow (perm)	0	1634	0	0	1678	0	0	1456	0	0	1658	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		189.4			73.4			138.6			84.1	
Travel Time (s)		13.6			5.3			10.0			6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	23%	2%	2%	2%	25%	0%	2%	2%	0%	0%
Adj. Flow (vph)	126	0	61	2	0	3	51	1	1	1	4	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	187	0	0	5	0	0	53	0	0	72	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 32.4%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	116	0	56	2	0	3	47	1	1	1	4	62
Future Volume (Veh/h)	116	0	56	2	0	3	47	1	1	1	4	62
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	126	0	61	2	0	3	51	1	1	1	4	67
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		189										
pX, platoon unblocked												
vC, conflicting volume	3			61			357	290	30	290	318	2
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3			61			357	290	30	290	318	2
tC, single (s)	4.1			4.1			7.3	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.7	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			100			90	100	100	100	99	94
cM capacity (veh/h)	1632			1542			489	575	1044	622	554	1089

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	187	5	53	72
Volume Left	126	2	51	1
Volume Right	61	3	1	67
cSH	1632	1542	496	1023
Volume to Capacity	0.08	0.00	0.11	0.07
Queue Length 95th (m)	2.0	0.0	2.9	1.8
Control Delay (s)	5.2	2.9	13.1	8.8
Lane LOS	A	A	B	A
Approach Delay (s)	5.2	2.9	13.1	8.8
Approach LOS			B	A

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	84	25	43	23	15	49	40	374	37	80	320	63
Future Volume (vph)	84	25	43	23	15	49	40	374	37	80	320	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	0.0		45.0
Storage Lanes	0		0	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.962			0.924			0.987				0.850
Flt Protected		0.973			0.987		0.950				0.990	
Satd. Flow (prot)	0	1711	0	0	1699	0	1752	1760	0	0	1761	1524
Flt Permitted		0.973			0.987		0.950				0.990	
Satd. Flow (perm)	0	1711	0	0	1699	0	1752	1760	0	0	1761	1524
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		71.8			63.0			1178.3			487.8	
Travel Time (s)		5.2			4.5			53.0			22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	3%	2%	2%	2%	3%	7%	2%	2%	8%	6%
Adj. Flow (vph)	91	27	47	25	16	53	43	407	40	87	348	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	165	0	0	94	0	43	447	0	0	435	68
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 68.5%	ICU Level of Service C
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	25	43	23	15	49	40	374	37	80	320	63
Future Volume (Veh/h)	84	25	43	23	15	49	40	374	37	80	320	63
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	91	27	47	25	16	53	43	407	40	87	348	68
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1076	1055	348	1096	1103	427	416			447		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1076	1055	348	1096	1103	427	416			447		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	40	87	93	83	91	92	96			92		
cM capacity (veh/h)	152	200	693	146	187	628	1138			1113		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	165	94	43	447	435	68
Volume Left	91	25	43	0	87	0
Volume Right	47	53	0	40	0	68
cSH	206	276	1138	1700	1113	1700
Volume to Capacity	0.80	0.34	0.04	0.26	0.08	0.04
Queue Length 95th (m)	45.7	11.7	0.9	0.0	2.0	0.0
Control Delay (s)	68.8	24.7	8.3	0.0	2.4	0.0
Lane LOS	F	C	A		A	
Approach Delay (s)	68.8	24.7	0.7		2.0	
Approach LOS	F	C				

Intersection Summary			
Average Delay	12.0		
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	113	10	27	1	9	21	25	303	1	12	272	94
Future Volume (vph)	113	10	27	1	9	21	25	303	1	12	272	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.909							0.850
Flt Protected		0.956			0.999		0.950				0.998	
Satd. Flow (prot)	0	1750	1538	0	1725	0	1626	1728	0	0	1730	1615
Flt Permitted		0.956			0.999		0.950				0.998	
Satd. Flow (perm)	0	1750	1538	0	1725	0	1626	1728	0	0	1730	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	13%	5%	0%	0%	0%	11%	10%	0%	0%	10%	0%
Adj. Flow (vph)	123	11	29	1	10	23	27	329	1	13	296	102
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	134	29	0	34	0	27	330	0	0	309	102
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 44.2%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	113	10	27	1	9	21	25	303	1	12	272	94
Future Volume (Veh/h)	113	10	27	1	9	21	25	303	1	12	272	94
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	123	11	29	1	10	23	27	329	1	13	296	102
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	733	706	296	711	808	330	398			330		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	733	706	296	711	808	330	398			330		
tC, single (s)	7.1	6.6	6.2	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.3	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	60	97	96	100	97	97	98			99		
cM capacity (veh/h)	308	335	736	320	306	717	1113			1241		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	163	34	27	330	309	102
Volume Left	123	1	27	0	13	0
Volume Right	29	23	0	1	0	102
cSH	377	501	1113	1700	1241	1700
Volume to Capacity	0.43	0.07	0.02	0.19	0.01	0.06
Queue Length 95th (m)	16.9	1.7	0.6	0.0	0.3	0.0
Control Delay (s)	22.5	12.7	8.3	0.0	0.4	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	22.5	12.7	0.6		0.3	
Approach LOS	C	B				

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	88	0	4	137	0	3
Future Volume (vph)	88	0	4	137	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected				0.999		
Satd. Flow (prot)	1863	0	0	1861	1611	0
Flt Permitted				0.999		
Satd. Flow (perm)	1863	0	0	1861	1611	0
Link Speed (k/h)	50			80	50	
Link Distance (m)	490.2			203.9	128.0	
Travel Time (s)	35.3			9.2	9.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	0	4	149	0	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	96	0	0	153	3	0
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 20.4%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	88	0	4	137	0	3
Future Volume (Veh/h)	88	0	4	137	0	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	96	0	4	149	0	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			96		253	96
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			96		253	96
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1498		734	960

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	96	153	3
Volume Left	0	4	0
Volume Right	0	0	3
cSH	1700	1498	960
Volume to Capacity	0.06	0.00	0.00
Queue Length 95th (m)	0.0	0.1	0.1
Control Delay (s)	0.0	0.2	8.8
Lane LOS		A	A
Approach Delay (s)	0.0	0.2	8.8
Approach LOS			A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	20.4%	ICU Level of Service	A
Analysis Period (min)	15		

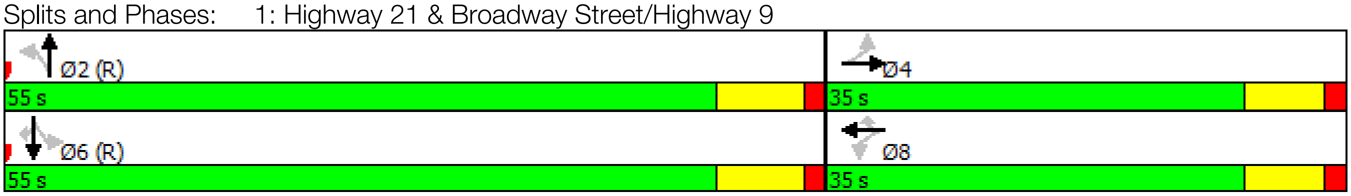
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	86	390	63	57	12	335	283	66	24	431	34
Future Volume (vph)	53	86	390	63	57	12	335	283	66	24	431	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.877				0.850		0.972				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1666	0	1687	1863	1615	1805	1776	0	1805	1863	1615
Flt Permitted	0.717			0.172			0.439			0.508		
Satd. Flow (perm)	1336	1666	0	305	1863	1615	834	1776	0	965	1863	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		265				52		20				48
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			492.9			358.0			262.4	
Travel Time (s)		17.0			22.2			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	7%	2%	0%	0%	4%	4%	0%	2%	0%
Adj. Flow (vph)	58	93	424	68	62	13	364	308	72	26	468	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	517	0	68	62	13	364	380	0	26	468	37
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		17.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	35.0	35.0		35.0	35.0	35.0	55.0	55.0		55.0	55.0	55.0
Total Split (%)	38.9%	38.9%		38.9%	38.9%	38.9%	61.1%	61.1%		61.1%	61.1%	61.1%
Yellow Time (s)	5.4	5.4		5.4	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.6	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	23.2	23.2		23.2	23.2	23.2	52.5	52.5		52.5	52.5	52.5
Actuated g/C Ratio	0.26	0.26		0.26	0.26	0.26	0.58	0.58		0.58	0.58	0.58
v/c Ratio	0.17	0.83		0.87	0.13	0.03	0.75	0.36		0.05	0.43	0.04
Control Delay	24.4	26.2		104.2	23.5	0.1	28.5	11.9		10.5	13.3	2.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	24.4	26.2		104.2	23.5	0.1	28.5	11.9		10.5	13.3	2.5
LOS	C	C		F	C	A	C	B		B	B	A
Approach Delay		26.0			59.8			20.0			12.4	
Approach LOS		C			E			C			B	
Queue Length 50th (m)	7.6	40.3		10.9	8.0	0.0	52.1	36.7		2.2	50.4	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	16.9	81.1		#35.0	17.4	0.0	#109.0	57.5		6.2	75.8	3.5
Internal Link Dist (m)		211.6			468.9			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	415	700		94	579	538	486	1044		562	1086	962
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.14	0.74		0.72	0.11	0.02	0.75	0.36		0.05	0.43	0.04

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 22.6 Intersection LOS: C
Intersection Capacity Utilization 102.0% ICU Level of Service G
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	223	110	280	204	270	130	351	177	344	521	92
Future Volume (vph)	111	223	110	280	204	270	130	351	177	344	521	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.950				0.850		0.950				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1787	0	1787	1900	1583	1805	1752	0	1787	1881	1583
Flt Permitted	0.572			0.390			0.452			0.135		
Satd. Flow (perm)	1087	1787	0	734	1900	1583	859	1752	0	254	1881	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26				293		29				65
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	1%	0%	2%	0%	4%	1%	1%	1%	2%
Adj. Flow (vph)	121	242	120	304	222	293	141	382	192	374	566	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	121	362	0	304	222	293	141	574	0	374	566	100
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	20.0	20.0		5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5	16.5	27.3	27.3		7.0	27.3	27.3
Total Split (s)	39.0	39.0		39.0	39.0	39.0	44.0	44.0		17.0	61.0	61.0
Total Split (%)	39.0%	39.0%		39.0%	39.0%	39.0%	44.0%	44.0%		17.0%	61.0%	61.0%
Yellow Time (s)	4.5	4.5		4.5	4.5	4.5	5.9	5.9		2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.4	1.4		0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.3	7.3		2.0	7.3	7.3
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	C-Min
Act Effct Green (s)	34.8	34.8		34.8	34.8	34.8	34.4	34.4		56.7	51.4	51.4
Actuated g/C Ratio	0.35	0.35		0.35	0.35	0.35	0.34	0.34		0.57	0.51	0.51
v/c Ratio	0.32	0.57		1.19	0.34	0.40	0.48	0.92		1.00	0.59	0.12
Control Delay	28.1	29.5		151.7	26.8	4.7	31.2	51.7		71.1	19.4	5.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	28.1	29.5		151.7	26.8	4.7	31.2	51.7		71.1	19.4	5.2
LOS	C	C		F	C	A	C	D		E	B	A
Approach Delay		29.1			65.3			47.7			36.7	
Approach LOS		C			E			D			D	
Queue Length 50th (m)	18.6	57.2		~78.9	34.4	0.0	21.5	102.6		51.6	72.6	3.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	34.9	88.2		#131.8	54.9	18.3	40.5	#166.6		#112.5	104.7	11.0
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	377	638		255	660	741	315	661		373	1010	880
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.32	0.57		1.19	0.34	0.40	0.45	0.87		1.00	0.56	0.11

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 45.7 Intersection LOS: D
Intersection Capacity Utilization 102.5% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Highway 21 & Durham Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	0	109	7	0	4	147	1	8	5	10	150
Future Volume (vph)	156	0	109	7	0	4	147	1	8	5	10	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.945			0.955			0.993			0.877	
Flt Protected		0.971			0.968			0.955			0.999	
Satd. Flow (prot)	0	1585	0	0	1722	0	0	1800	0	0	1664	0
Flt Permitted		0.971			0.968			0.955			0.999	
Satd. Flow (perm)	0	1585	0	0	1722	0	0	1800	0	0	1664	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		189.4			77.0			138.6			84.1	
Travel Time (s)		13.6			5.5			10.0			6.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	20%	2%	2%	2%	0%	0%	2%	2%	0%	0%
Adj. Flow (vph)	170	0	118	8	0	4	160	1	9	5	11	163
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	288	0	0	12	0	0	170	0	0	179	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 46.4%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	156	0	109	7	0	4	147	1	8	5	10	150
Future Volume (Veh/h)	156	0	109	7	0	4	147	1	8	5	10	150
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	170	0	118	8	0	4	160	1	9	5	11	163
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		189										
pX, platoon unblocked												
vC, conflicting volume	4			118			586	419	59	426	476	2
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4			118			586	419	59	426	476	2
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	89			99			51	100	99	99	97	85
cM capacity (veh/h)	1611			1470			325	470	1007	488	437	1088

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	288	12	170	179
Volume Left	170	8	160	5
Volume Right	118	4	9	163
cSH	1611	1470	337	966
Volume to Capacity	0.11	0.01	0.50	0.19
Queue Length 95th (m)	2.8	0.1	21.6	5.4
Control Delay (s)	4.8	5.0	26.0	9.6
Lane LOS	A	A	D	A
Approach Delay (s)	4.8	5.0	26.0	9.6
Approach LOS			D	A

Intersection Summary			
Average Delay	11.7		
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	49	53	182	55	242	60	276	139	248	536	144
Future Volume (vph)	132	49	53	182	55	242	60	276	139	248	536	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	0.0		45.0
Storage Lanes	0		0	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.969			0.932			0.950				0.850
Flt Protected		0.973			0.981		0.950				0.984	
Satd. Flow (prot)	0	1747	0	0	1703	0	1770	1758	0	0	1833	1615
Flt Permitted		0.973			0.981		0.950				0.984	
Satd. Flow (perm)	0	1747	0	0	1703	0	1770	1758	0	0	1833	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		71.8			79.2			1178.3			487.8	
Travel Time (s)		5.2			5.7			53.0			22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	0%
Adj. Flow (vph)	143	53	58	198	60	263	65	300	151	270	583	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	254	0	0	521	0	65	451	0	0	853	157
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 105.3% ICU Level of Service G

Analysis Period (min) 15

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	132	49	53	182	55	242	60	276	139	248	536	144
Future Volume (Veh/h)	132	49	53	182	55	242	60	276	139	248	536	144
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	53	58	198	60	263	65	300	151	270	583	157
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1846	1704	583	1713	1786	376	740			451		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1846	1704	583	1713	1786	376	740			451		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	17	89	0	0	61	92			76		
cM capacity (veh/h)	0	64	512	16	57	671	867			1109		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	254	521	65	451	853	157
Volume Left	143	198	65	0	270	0
Volume Right	58	263	0	151	0	157
cSH	0	37	867	1700	1109	1700
Volume to Capacity	Err	14.08	0.08	0.27	0.24	0.09
Queue Length 95th (m)	Err	Err	1.9	0.0	7.6	0.0
Control Delay (s)	Err	Err	9.5	0.0	5.3	0.0
Lane LOS	F	F	A		A	
Approach Delay (s)	Err	Err	1.2		4.5	
Approach LOS	F	F				

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	105.3%	ICU Level of Service	G
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	134	7	39	4	12	12	38	338	4	26	547	179
Future Volume (vph)	134	7	39	4	12	12	38	338	4	26	547	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	0.0		0.0	60.0		0.0	0.0		45.0
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.941			0.998				0.850
Flt Protected		0.955			0.993		0.950				0.998	
Satd. Flow (prot)	0	1748	1615	0	1558	0	1805	1824	0	0	1857	1615
Flt Permitted		0.955			0.993		0.950				0.998	
Satd. Flow (perm)	0	1748	1615	0	1558	0	1805	1824	0	0	1857	1615
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		244.8			293.0			246.9			1178.3	
Travel Time (s)		17.6			21.1			11.1			53.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	0%	0%	33%	22%	0%	0%	4%	0%	5%	2%	0%
Adj. Flow (vph)	146	8	42	4	13	13	41	367	4	28	595	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	154	42	0	30	0	41	371	0	0	623	195
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 71.1%	ICU Level of Service C
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	134	7	39	4	12	12	38	338	4	26	547	179
Future Volume (Veh/h)	134	7	39	4	12	12	38	338	4	26	547	179
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	146	8	42	4	13	13	41	367	4	28	595	195
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1120	1104	595	1106	1297	369	790			371		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1120	1104	595	1106	1297	369	790			371		
tC, single (s)	7.1	6.5	6.2	7.4	6.7	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.8	4.2	3.3	2.2			2.2		
p0 queue free %	7	96	92	97	91	98	95			98		
cM capacity (veh/h)	157	198	508	138	137	681	839			1171		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	196	30	41	371	623	195
Volume Left	146	4	41	0	28	0
Volume Right	42	13	0	4	0	195
cSH	202	210	839	1700	1171	1700
Volume to Capacity	0.97	0.14	0.05	0.22	0.02	0.11
Queue Length 95th (m)	65.5	3.9	1.2	0.0	0.6	0.0
Control Delay (s)	97.2	25.0	9.5	0.0	0.7	0.0
Lane LOS	F	C	A		A	
Approach Delay (s)	97.2	25.0	0.9		0.5	
Approach LOS	F	C				

Intersection Summary			
Average Delay	14.1		
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	175	0	11	132	0	13
Future Volume (vph)	175	0	11	132	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected				0.996		
Satd. Flow (prot)	1863	0	0	1858	1644	0
Flt Permitted				0.996		
Satd. Flow (perm)	1863	0	0	1858	1644	0
Link Speed (k/h)	50			80	50	
Link Distance (m)	492.9			201.2	105.0	
Travel Time (s)	35.5			9.1	7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	2%	0%	0%
Adj. Flow (vph)	190	0	12	143	0	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	190	0	0	155	14	0
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 26.0%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	175	0	11	132	0	13
Future Volume (Veh/h)	175	0	11	132	0	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	190	0	12	143	0	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			190		357	190
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			190		357	190
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	98
cM capacity (veh/h)			1396		640	857

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	190	155	14
Volume Left	0	12	0
Volume Right	0	0	14
cSH	1700	1396	857
Volume to Capacity	0.11	0.01	0.02
Queue Length 95th (m)	0.0	0.2	0.4
Control Delay (s)	0.0	0.7	9.3
Lane LOS		A	A
Approach Delay (s)	0.0	0.7	9.3
Approach LOS			A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	26.0%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix I

Signal Warrant Analyses

Signal Justification Calculation for Forecasted Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2020 Background
Region/City/Township: Kincardine

Major Street: Highway 21
Minor Street: Russell Street

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection? Y
Flow Conditions: Free

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

	Major Street						Minor Street					
	Highway 21						Russell Street					
	Northbound			Southbound			Eastbound			Westbound		
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
AM Peak Hour	34	299	0	0	261	46	59	0	36	0	0	0
PM Peak Hour	51	265	0	0	512	106	97	0	45	0	0	0
Average Hourly Volume	21	141	0	0	193	38	39	0	20	0	0	0

Warrant	AHV
1A - All	453
1B - Minor	59
2A - Major	394
2B - Cross	39

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	453
					% Fulfilled	94.3%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	180	255	180	255	59
					% Fulfilled	32.9%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	394
					% Fulfilled	82.0%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	39
					% Fulfilled	78.0%

Signal Justification Calculation for Forecasted Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2030 Background
Region/City/Township: Kincardine

Major Street: Highway 21
Minor Street: Russell Street

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection? Y
Flow Conditions: Free

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

	Major Street						Minor Street					
	Highway 21						Russell Street					
	Northbound			Southbound			Eastbound			Westbound		
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
AM Peak Hour	40	354	0	0	308	55	70	0	43	0	0	0
PM Peak Hour	60	313	0	0	605	125	114	0	53	0	0	0
Average Hourly Volume	25	167	0	0	228	45	46	0	24	0	0	0

Warrant	AHV
1A - All	535
1B - Minor	70
2A - Major	465
2B - Cross	46

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	535
					% Fulfilled	111.5%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	180	255	180	255	70
					% Fulfilled	38.9%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	465
					% Fulfilled	96.9%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	46
					% Fulfilled	92.0%

Signal Justification Calculation for Forecasted Volumes
(OTM Book 12 - Justification 7)

paradigm TRANSPORTATION SOLUTIONS LIMITED

Horizon Year: 2020 Total
Region/City/Township: Kincardine

Major Street: Highway 21
Minor Street: Russell Street

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Free

PM Forecast Only? N

Warrant Results		
150% Satisfied	Yes	Justification for new intersections with forecast traffic
120% Satisfied	Yes	Justification for existing intersections with forecast traffic

	Major Street						Minor Street					
	Highway 21						Russell Street					
	Northbound			Southbound			Eastbound			Westbound		
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
AM Peak Hour	34	320	39	83	273	54	73	25	36	24	16	51
PM Peak Hour	51	227	139	248	443	125	115	49	45	182	55	242
Average Hourly Volume	21	137	45	83	179	45	47	19	20	52	18	73

Warrant	AHV
1A - All	737
1B - Minor	228
2A - Major	509
2B - Cross	117

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	737
					% Fulfilled	153.6%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	120	170	120	170	228
					% Fulfilled	190.2%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	509
					% Fulfilled	106.0%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	117
					% Fulfilled	234.0%

Signal Justification Calculation for Forecasted Volumes
(OTM Book 12 - Justification 7)

Horizon Year: 2030 Total
Region/City/Township: Kincardine

Major Street: Highway 21
Minor Street: Kincardine Street

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Free

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

	Major Street						Minor Street					
	Highway 21						Kincardine Street					
	Northbound			Southbound			Eastbound			Westbound		
Time Period	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
AM Peak Hour	25	303	1	12	272	94	113	10	27	1	9	21
PM Peak Hour	38	338	4	26	547	179	134	7	39	4	12	12
Average Hourly Volume	16	160	1	10	205	68	62	4	17	1	5	8

Warrant	AHV
1A - All	557
1B - Minor	97
2A - Major	460
2B - Cross	68

Warrant 1 - Minimum Vehicular Volume

	Approach Lanes	1		2 or more		Average Hourly Volume
1A	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	557
					% Fulfilled	116.0%

	Approach Lanes	1		2 or more		Average Hourly Volume
1B	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	120	170	120	170	97
					% Fulfilled	81.0%

Warrant 2 - Delay To Cross Traffic

	Approach Lanes	1		2 or more		Average Hourly Volume
2A	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	460
					% Fulfilled	95.8%

	Approach Lanes	1		2 or more		Average Hourly Volume
2B	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	68
					% Fulfilled	136.5%

Appendix J

2030 Total Traffic with Improvements Operations Reports

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	D	B	B	**C**	C	C	A	**C**	B	B	B	**B**	A	A	A	**A**	**B**
			Delay	39	18	18	**21**	25	26	3	**21**	11	11	11	**11**	9	10	0	**9**	**14**
			V/C	0.24	0.57	0.57		0.21	0.14	0.08		0.23	0.34	0.34		0.03	0.20	0.02		
			Queue	15.0	25.4	25.4		16.1	17.0	3.2		27.0	56.9	56.9		4.3	33.1	0.0		
	2 - Highway 21 & Durham Street	Signal	LOS	D	D	D	**D**	C	C	A	**B**	C	C	A	**B**	B	B	A	**B**	**C**
			Delay	48	48	48	**48**	26	25	5	**17**	23	25	6	**19**	11	14	1	**12**	**22**
			V/C	0.56	0.70	0.70		0.37	0.19	0.28		0.21	0.39	0.22		0.30	0.27	0.04		
			Queue	37.8	58.8	58.8		27.8	25.9	12.6		31.5	76.2	17.0		32.7	50.4	1.3		
	4 - Highway 21 & Russell Street	Signal	LOS	D	D	D	**D**	C	B	B	**B**	B	B	A	**B**	A	A	A	**A**	**B**
			Delay	45	45	45	**45**	24	11	11	**15**	13	15	0	**14**	7	9	2	**8**	**16**
			V/C	0.69	0.69	0.69		0.09	0.19	0.19		0.07	0.40	0.04		0.14	0.30	0.07		
			Queue	43.6	43.6	43.6		8.6	11.5	11.5		10.7	77.8	0.0		13.1	53.0	4.0		
PM Peak Hour	1 - Highway 21 & Highway 9	Signal	LOS	C	D	D	**D**	C	C	A	**C**	D	B	B	**C**	B	B	A	**B**	**C**
			Delay	32	50	50	**48**	25	23	0	**22**	43	14	14	**28**	11	15	0	**14**	**30**
			V/C	0.20	0.95	0.95		0.35	0.11	0.02		0.87	0.40	0.40		0.05	0.47	0.04		
			Queue	19.9	126.0	126.0		17.9	17.4	0.0		114.0	57.5	57.5		6.2	75.8	0.0		
	2 - Highway 21 & Durham Street	Signal	LOS	D	E	E	**D**	D	C	A	**C**	D	D	B	**D**	C	C	A	**C**	**C**
			Delay	40	55	55	**51**	49	22	4	**26**	43	42	15	**35**	31	27	7	**26**	**32**
			V/C	0.45	0.84	0.84		0.87	0.29	0.36		0.56	0.69	0.34		0.78	0.64	0.13		
			Queue	39.5	103.0	103.0		88.2	49.0	15.6		49.9	112.5	33.3		92.2	138.7	12.9		
	4 - Highway 21 & Russell Street	Signal	LOS	D	D	D	**D**	C	A	A	**B**	C	C	A	**C**	B	C	A	**B**	**C**
			Delay	54	54	54	**54**	23	7	7	**13**	26	27	6	**21**	16	21	4	**17**	**21**
			V/C	0.84	0.84	0.84		0.45	0.44	0.44		0.22	0.47	0.24		0.49	0.62	0.18		
			Queue	74.9	74.9	74.9		39.3	24.8	24.8		20.0	70.6	15.2		44.4	118.4	12.7		

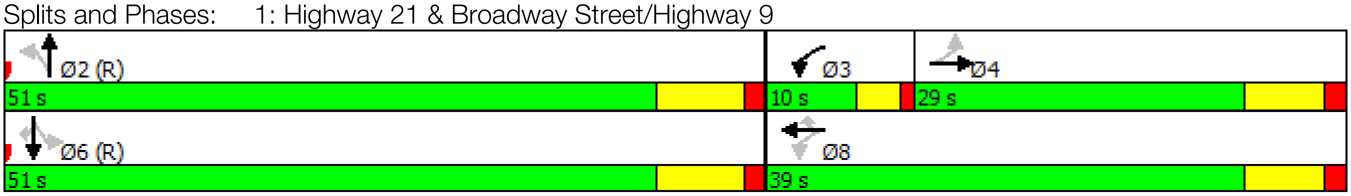
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	35	136	55	55	27	143	300	39	14	199	20
Future Volume (vph)	34	35	136	55	55	27	143	300	39	14	199	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.881				0.850		0.983				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1618	0	1805	1827	1380	1703	1766	0	1504	1759	1615
Flt Permitted	0.718			0.380			0.623			0.523		
Satd. Flow (perm)	1287	1618	0	722	1827	1380	1117	1766	0	828	1759	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		148				52		10				97
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			490.2			358.0			262.4	
Travel Time (s)		17.0			22.1			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	9%	2%	0%	4%	17%	6%	6%	4%	20%	8%	0%
Adj. Flow (vph)	37	38	148	60	60	29	155	326	42	15	216	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	186	0	60	60	29	155	368	0	15	216	22
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		3	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		4.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		8.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	29.0	29.0		10.0	39.0	39.0	51.0	51.0		51.0	51.0	51.0
Total Split (%)	32.2%	32.2%		11.1%	43.3%	43.3%	56.7%	56.7%		56.7%	56.7%	56.7%
Yellow Time (s)	5.4	5.4		3.0	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.0	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	11.0	11.0		23.7	20.7	20.7	55.0	55.0		55.0	55.0	55.0
Actuated g/C Ratio	0.12	0.12		0.26	0.23	0.23	0.61	0.61		0.61	0.61	0.61
v/c Ratio	0.24	0.57		0.21	0.14	0.08	0.23	0.34		0.03	0.20	0.02
Control Delay	39.0	17.5		24.5	25.7	3.3	10.5	10.6		9.3	9.6	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	39.0	17.5		24.5	25.7	3.3	10.5	10.6		9.3	9.6	0.1
LOS	D	B		C	C	A	B	B		A	A	A
Approach Delay		21.1			20.9			10.6			8.7	
Approach LOS		C			C			B			A	
Queue Length 50th (m)	6.3	6.4		8.2	8.6	0.0	12.0	30.0		1.0	16.5	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	15.0	25.4		16.1	17.0	3.2	27.0	56.9		4.3	33.1	0.0
Internal Link Dist (m)		211.6			466.2			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	314	507		283	649	524	682	1082		505	1074	1024
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.12	0.37		0.21	0.09	0.06	0.23	0.34		0.03	0.20	0.02

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 13.5 Intersection LOS: B
Intersection Capacity Utilization 75.3% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	147	49	114	100	150	95	259	159	172	238	38
Future Volume (vph)	107	147	49	114	100	150	95	259	159	172	238	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		30.0	30.0		30.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.963				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1807	0	1770	1863	1509	1805	1696	1599	1626	1712	1583
Flt Permitted	0.687			0.354			0.599			0.516		
Satd. Flow (perm)	1280	1807	0	659	1863	1509	1138	1696	1599	883	1712	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16				163			163			82
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	5%	2%	2%	7%	0%	12%	1%	11%	11%	2%
Adj. Flow (vph)	116	160	53	124	109	163	103	282	173	187	259	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	213	0	124	109	163	103	282	173	187	259	41
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	4	4		3	8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		4.0	10.0	10.0	20.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		8.0	16.5	16.5	27.3	27.3	27.3	7.0	27.3	27.3
Total Split (s)	30.0	30.0		13.0	43.0	43.0	43.0	43.0	43.0	14.0	57.0	57.0
Total Split (%)	30.0%	30.0%		13.0%	43.0%	43.0%	43.0%	43.0%	43.0%	14.0%	57.0%	57.0%
Yellow Time (s)	4.5	4.5		3.0	4.5	4.5	5.9	5.9	5.9	2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		1.0	2.0	2.0	1.4	1.4	1.4	0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		4.0	6.5	6.5	7.3	7.3	7.3	2.0	7.3	7.3
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	16.2	16.2		33.0	30.5	30.5	42.7	42.7	42.7	61.0	55.7	55.7
Actuated g/C Ratio	0.16	0.16		0.33	0.30	0.30	0.43	0.43	0.43	0.61	0.56	0.56
v/c Ratio	0.56	0.70		0.37	0.19	0.28	0.21	0.39	0.22	0.30	0.27	0.04
Control Delay	48.2	48.2		25.7	24.6	4.7	23.4	24.7	5.6	11.4	14.0	0.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.2	48.2		25.7	24.6	4.7	23.4	24.7	5.6	11.4	14.0	0.6
LOS	D	D		C	C	A	C	C	A	B	B	A
Approach Delay		48.2			16.7			18.5			11.9	
Approach LOS		D			B			B			B	
Queue Length 50th (m)	22.1	38.4		18.0	16.2	0.0	12.9	38.6	1.2	15.7	26.3	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	37.8	58.8		27.8	25.9	12.6	31.5	76.2	17.0	32.7	50.4	1.3
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0		30.0	30.0		30.0
Base Capacity (vph)	300	436		336	689	661	500	746	794	633	961	925
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.49		0.37	0.16	0.25	0.21	0.38	0.22	0.30	0.27	0.04

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 21.8 Intersection LOS: C
Intersection Capacity Utilization 73.0% ICU Level of Service C
Analysis Period (min) 15

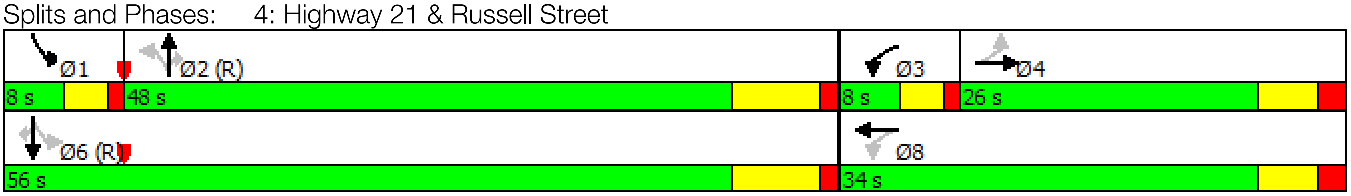
Splits and Phases: 2: Highway 21 & Durham Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	84	25	43	23	15	49	40	374	37	80	320	63
Future Volume (vph)	84	25	43	23	15	49	40	374	37	80	320	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		30.0	0.0		45.0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.962			0.885				0.850			0.850
Flt Protected		0.973		0.950			0.950			0.950		
Satd. Flow (prot)	0	1711	0	1770	1649	0	1752	1776	1583	1770	1759	1524
Flt Permitted		0.791		0.603			0.552			0.433		
Satd. Flow (perm)	0	1391	0	1123	1649	0	1018	1776	1583	807	1759	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			53				133			85
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		71.8			63.0			1178.3			487.8	
Travel Time (s)		5.2			4.5			53.0			22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	3%	2%	2%	2%	3%	7%	2%	2%	8%	6%
Adj. Flow (vph)	91	27	47	25	16	53	43	407	40	87	348	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	165	0	25	69	0	43	407	40	87	348	68
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0		8.0	22.0		23.9	23.9	23.9	8.0	23.9	23.9
Total Split (s)	26.0	26.0		8.0	34.0		48.0	48.0	48.0	8.0	56.0	56.0
Total Split (%)	28.9%	28.9%		8.9%	37.8%		53.3%	53.3%	53.3%	8.9%	62.2%	62.2%
Yellow Time (s)	4.0	4.0		3.0	4.0		5.9	5.9	5.9	3.0	5.9	5.9
All-Red Time (s)	2.0	2.0		1.0	2.0		1.4	1.4	1.4	1.0	1.4	1.4
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		4.0	6.0		7.3	7.3	7.3	4.0	7.3	7.3
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)		14.4		19.6	17.6		51.2	51.2	51.2	62.4	59.1	59.1
Actuated g/C Ratio		0.16		0.22	0.20		0.57	0.57	0.57	0.69	0.66	0.66
v/c Ratio		0.69		0.09	0.19		0.07	0.40	0.04	0.14	0.30	0.07
Control Delay		45.4		24.2	11.1		13.1	15.0	0.1	6.9	9.1	1.8
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		45.4		24.2	11.1		13.1	15.0	0.1	6.9	9.1	1.8
LOS		D		C	B		B	B	A	A	A	A
Approach Delay		45.4			14.6			13.6			7.8	
Approach LOS		D			B			B			A	
Queue Length 50th (m)		25.1		3.8	2.5		3.3	38.4	0.0	3.8	21.2	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)		43.6		8.6	11.5		10.7	77.8	0.0	13.1	53.0	4.4
Internal Link Dist (m)		47.8			39.0			1154.3			463.8	
Turn Bay Length (m)							15.0		30.0			45.0
Base Capacity (vph)		324		273	549		578	1009	957	621	1154	1029
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.51		0.09	0.13		0.07	0.40	0.04	0.14	0.30	0.07

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 15.5	Intersection LOS: B
Intersection Capacity Utilization 53.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 4: Highway 21 & Russell Street



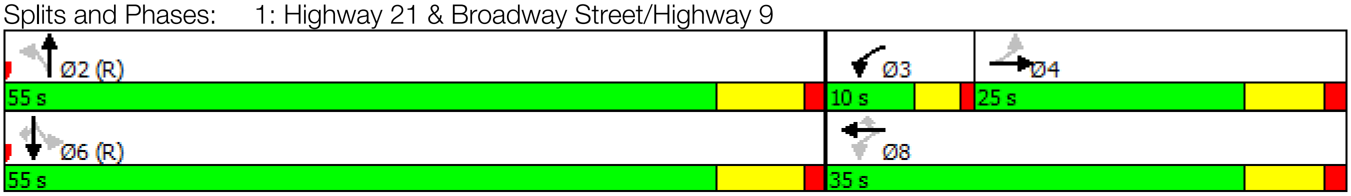
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	86	390	63	57	12	335	283	66	24	431	34
Future Volume (vph)	53	86	390	63	57	12	335	283	66	24	431	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		0.0	80.0		100.0	115.0		0.0	100.0		75.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.877				0.850		0.972				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1666	0	1687	1863	1615	1805	1776	0	1805	1863	1615
Flt Permitted	0.717			0.168			0.413			0.489		
Satd. Flow (perm)	1336	1666	0	298	1863	1615	785	1776	0	929	1863	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		228				52		20				97
Link Speed (k/h)		50			80			80			80	
Link Distance (m)		235.6			492.9			358.0			262.4	
Travel Time (s)		17.0			22.2			16.1			11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	7%	2%	0%	0%	4%	4%	0%	2%	0%
Adj. Flow (vph)	58	93	424	68	62	13	364	308	72	26	468	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	517	0	68	62	13	364	380	0	26	468	37
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		3	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		4.0	10.0	10.0	20.0	20.0		20.0	20.0	20.0
Minimum Split (s)	17.0	17.0		10.0	17.0	17.0	27.3	27.3		27.3	27.3	27.3
Total Split (s)	25.0	25.0		10.0	35.0	35.0	55.0	55.0		55.0	55.0	55.0
Total Split (%)	27.8%	27.8%		11.1%	38.9%	38.9%	61.1%	61.1%		61.1%	61.1%	61.1%
Yellow Time (s)	5.4	5.4		3.0	5.4	5.4	5.9	5.9		5.9	5.9	5.9
All-Red Time (s)	1.6	1.6		1.0	1.6	1.6	1.4	1.4		1.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0	7.0	7.3	7.3		7.3	7.3	7.3
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)	19.8	19.8		30.8	27.8	27.8	47.9	47.9		47.9	47.9	47.9
Actuated g/C Ratio	0.22	0.22		0.34	0.31	0.31	0.53	0.53		0.53	0.53	0.53
v/c Ratio	0.20	0.95		0.35	0.11	0.02	0.87	0.40		0.05	0.47	0.04
Control Delay	32.0	49.9		25.3	22.6	0.1	42.8	13.5		10.8	15.3	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	32.0	49.9		25.3	22.6	0.1	42.8	13.5		10.8	15.3	0.1
LOS	C	D		C	C	A	D	B		B	B	A
Approach Delay		48.1			21.8			27.8			14.0	
Approach LOS		D			C			C			B	
Queue Length 50th (m)	8.9	~57.5		8.4	8.0	0.0	54.7	36.7		2.2	50.4	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	19.9	#126.0		17.9	17.4	0.0	#114.0	57.5		6.2	75.8	0.0
Internal Link Dist (m)		211.6			468.9			334.0			238.4	
Turn Bay Length (m)	65.0			80.0		100.0	115.0			100.0		75.0
Base Capacity (vph)	294	544		194	592	549	423	966		501	1004	915
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.20	0.95		0.35	0.10	0.02	0.86	0.39		0.05	0.47	0.04

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 29.6 Intersection LOS: C
Intersection Capacity Utilization 94.6% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Highway 21 & Broadway Street/Highway 9



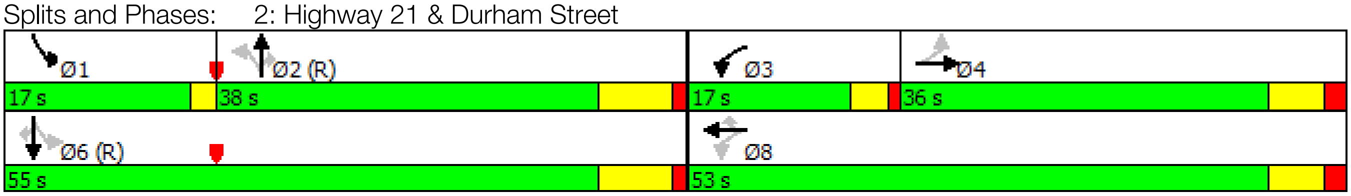
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	223	110	280	204	270	130	351	177	344	521	92
Future Volume (vph)	111	223	110	280	204	270	130	351	177	344	521	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	100.0		30.0	30.0		30.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	30.0			30.0			30.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.950				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1787	0	1787	1900	1583	1805	1827	1599	1787	1881	1583
Flt Permitted	0.620			0.198			0.443			0.302		
Satd. Flow (perm)	1178	1787	0	372	1900	1583	842	1827	1599	568	1881	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23				293			111			76
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		140.2			189.4			487.8			358.0	
Travel Time (s)		10.1			13.6			22.0			16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	1%	0%	2%	0%	4%	1%	1%	1%	2%
Adj. Flow (vph)	121	242	120	304	222	293	141	382	192	374	566	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	121	362	0	304	222	293	141	382	192	374	566	100
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	4	4		3	8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		4.0	10.0	10.0	20.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		8.0	16.5	16.5	27.3	27.3	27.3	7.0	27.3	27.3
Total Split (s)	36.0	36.0		17.0	53.0	53.0	38.0	38.0	38.0	17.0	55.0	55.0
Total Split (%)	33.3%	33.3%		15.7%	49.1%	49.1%	35.2%	35.2%	35.2%	15.7%	50.9%	50.9%
Yellow Time (s)	4.5	4.5		3.0	4.5	4.5	5.9	5.9	5.9	2.0	5.9	5.9
All-Red Time (s)	2.0	2.0		1.0	2.0	2.0	1.4	1.4	1.4	0.0	1.4	1.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5		4.0	6.5	6.5	7.3	7.3	7.3	2.0	7.3	7.3
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	24.9	24.9		45.9	43.4	43.4	32.5	32.5	32.5	56.1	50.8	50.8
Actuated g/C Ratio	0.23	0.23		0.42	0.40	0.40	0.30	0.30	0.30	0.52	0.47	0.47
v/c Ratio	0.45	0.84		0.87	0.29	0.36	0.56	0.69	0.34	0.78	0.64	0.13
Control Delay	40.1	54.8		48.9	22.4	3.6	43.1	42.2	15.4	30.6	26.6	6.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.1	54.8		48.9	22.4	3.6	43.1	42.2	15.4	30.6	26.6	6.5
LOS	D	D		D	C	A	D	D	B	C	C	A
Approach Delay		51.1			25.5			35.2			26.1	
Approach LOS		D			C			D			C	
Queue Length 50th (m)	22.8	71.6		44.3	31.8	0.0	27.7	78.9	13.9	50.0	95.3	2.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	39.5	103.0		#88.2	49.0	15.6	49.9	112.5	33.3	#92.2	138.7	12.9
Internal Link Dist (m)		116.2			165.4			463.8			334.0	
Turn Bay Length (m)	25.0			50.0		50.0	100.0		30.0	30.0		30.0
Base Capacity (vph)	321	504		348	818	848	257	559	566	481	885	785
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.72		0.87	0.27	0.35	0.55	0.68	0.34	0.78	0.64	0.13

Intersection Summary

Area Type: Other
Cycle Length: 108
Actuated Cycle Length: 108
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 32.0 Intersection LOS: C
Intersection Capacity Utilization 99.0% ICU Level of Service F
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Highway 21 & Durham Street



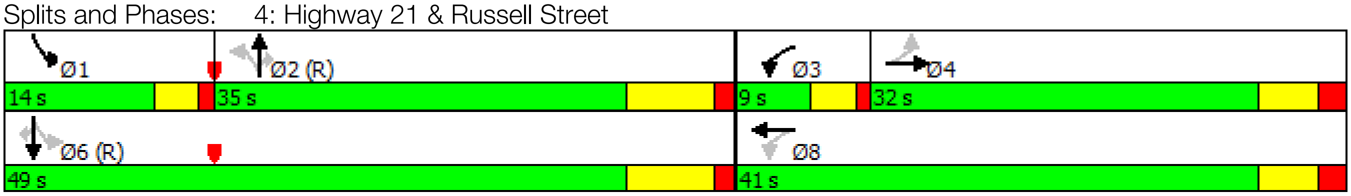
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	49	53	182	55	242	60	276	139	248	536	144
Future Volume (vph)	132	49	53	182	55	242	60	276	139	248	536	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		30.0	15.0		30.0	0.0		45.0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			30.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.969			0.878				0.850			0.850
Flt Protected		0.973		0.950			0.950			0.950		
Satd. Flow (prot)	0	1747	0	1770	1635	0	1770	1845	1583	1770	1863	1615
Flt Permitted		0.657		0.584			0.445			0.440		
Satd. Flow (perm)	0	1179	0	1088	1635	0	829	1845	1583	820	1863	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			263				138			133
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		71.8			79.2			1178.3			487.8	
Travel Time (s)		5.2			5.7			53.0			22.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	0%
Adj. Flow (vph)	143	53	58	198	60	263	65	300	151	270	583	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	254	0	198	323	0	65	300	151	270	583	157
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0		8.0	22.0		23.3	23.3	23.3	8.0	23.3	23.3
Total Split (s)	32.0	32.0		9.0	41.0		35.0	35.0	35.0	14.0	49.0	49.0
Total Split (%)	35.6%	35.6%		10.0%	45.6%		38.9%	38.9%	38.9%	15.6%	54.4%	54.4%
Yellow Time (s)	4.0	4.0		3.0	4.0		5.9	5.9	5.9	3.0	5.9	5.9
All-Red Time (s)	2.0	2.0		1.0	2.0		1.4	1.4	1.4	1.0	1.4	1.4
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		4.0	6.0		7.3	7.3	7.3	4.0	7.3	7.3
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)		22.1		33.1	31.1		31.4	31.4	31.4	48.9	45.6	45.6
Actuated g/C Ratio		0.25		0.37	0.35		0.35	0.35	0.35	0.54	0.51	0.51
v/c Ratio		0.84		0.45	0.44		0.22	0.47	0.24	0.49	0.62	0.18
Control Delay		54.1		23.3	6.5		25.8	27.1	6.3	15.5	20.6	4.2
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		54.1		23.3	6.5		25.8	27.1	6.3	15.5	20.6	4.2
LOS		D		C	A		C	C	A	B	C	A
Approach Delay		54.1			12.9			20.9			16.7	
Approach LOS		D			B			C			B	
Queue Length 50th (m)		40.1		24.3	7.1		8.8	44.8	1.7	26.2	76.0	2.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)		#74.9		39.3	24.8		20.0	70.6	15.2	44.4	118.4	12.7
Internal Link Dist (m)		47.8			55.2			1154.3			463.8	
Turn Bay Length (m)							15.0		30.0			45.0
Base Capacity (vph)		352		437	796		289	644	642	557	944	884
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.72		0.45	0.41		0.22	0.47	0.24	0.48	0.62	0.18

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 20.9 Intersection LOS: C
Intersection Capacity Utilization 84.6% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Highway 21 & Russell Street



APPENDIX B

WATERCAD DISCUSSION AND PRELIMINARY DESIGN NOTES

Municipality of Kincardine
Kincardine Business Park Water Supply
Calculations and Notes

Job # :	08055
Date :	August 17, 2011
Revised :	May 2016

1.0 Background

There is development proposed within the lands known as the Kincardine Business Park, generally east of Highway 21 and south of Highway 9. The notes below provide a summary of analysis completed to investigate the current flows and pressures that can be provided to this area.

2.0 Hydrant Flow Tests

On June 14, 2011, hydrant flow tests were carried out by staff of BMROSS and the Municipality. Refer to the attached maps and summary sheets for location details. Results of the flow tests are provided below. During the tests, no high-lift pumps at the WTP were operational (i.e., pressure from standpipe only).

Hydrant No. K-148		
Static Pressure	390	kPa
Flowing Pressure	310	kPa
Available Flow (at flowing pressure)	71	L/s
Theoretical Flow at 140 kPa	190	L/s

Hydrant No. K-144		
Static Pressure	385	kPa
Flowing Pressure	300	kPa
Available Flow (at flowing pressure)	70	L/s
Theoretical Flow at 140 kPa	203	L/s

During the day of the hydrant flow tests, the following average pressure data is available for the WTP:

Average P at plant with no high-lift pumps operating		91	psi
	=	627	kPa
Average P at plant with one high-lift pump operating		109	psi
	=	752	kPa

Hydrant flow test data for the hydrant at the intersection of Russell Street and Highway 21 was obtained from a May 8, 2007 test report included in "Functional Servicing Report in Support of Zoning By-Law Amendment", prepared by Counterpoint Engineering Inc. and dated September 7, 2007.

Hydrant No. K-95		
Static Pressure	415	kPa
Flowing Pressure	305	kPa
Available Flow (at flowing pressure)	71	L/s
Theoretical Flow at 140 kPa	166	L/s

3.0 Analysis & Model Data

3.1 Data

Reference	Item			Value	Unit
03137	WTP floor elevation @ high lift pumps			180.9	mASL
C of A	High lift pump TDH			79	m
	Ground elevation at hydrant K-46A			197.5	mASL
	Ground elevation at hydrant #2			200	mASL
78011	Standpipe ground elevation			207.5	mASL
Munic. staff	Standpipe LWL setpoint			37.2	m
"	Standpipe HWL setpoint			39.2	m
"	Standpipe LWL elevation			244.7	mASL
"	Standpipe HWL elevation			246.7	mASL
	Average water demand - highway service commercial			0.28	L/ha/s
	Average water demand - large format commercial			0.28	L/ha/s
	Average water demand - light industrial commercial			0.35	L/ha/s
MOE Guide	Max day factor			2.00	
MOE Guide	Peak day factor			3.00	
MOE Guide	Pipe C-factor	150	mm	100	
		200 - 250	mm	110	
		300 - 600	mm	120	

3.2 Water Demands by Area

See attached map for area locations.

Service Area	Hwy. Service Commercial Area (ha)	Large Format Commercial Area (ha)	Light Industrial Area (ha)	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Day Demand (L/s)
1	1.2	1.2	0.0	0.672	1.344	2.016
2	0.0	6.0	0.0	1.680	3.360	5.040
3	2.4	2.6	1.6	1.960	3.920	5.880
4	0.0	0.0	10.9	3.815	7.630	11.445
5	0.0	0.0	6.0	2.100	4.200	6.300
6	1.5	1.3	1.5	1.309	2.618	3.927
7	5.9	1.7	0.0	2.128	4.256	6.384
8	10.7	0.0	0.0	2.996	5.992	8.988
9	7.6	7.6	7.6	6.916	13.832	20.748
Existing	5.0	5.0	0.0	2.800	5.600	8.400

3.3 Watermain Routes

See attached map for proposed watermain routes to service development lands.

A WaterCAD model was created in order to analyze the watermain extensions to the development lands. For the purposes of the model, the following was assumed:

- Water supply from the existing eastern terminus on Russell Street and from the intersection of Durham Street and Millenium Way are treated as two independent sources. (Note: This is assumed to simplify the model and is assumed to be reasonable because of the relatively high number of connecting watermains upstream of each location.)
- The water supply at each connection location was modelled as a pump, with curve characteristics based on theoretical flow and pressure values calculated from the hydrant flow tests. See below for theoretical flow and pressure values.
- Available flow and pressure in this area is based on no pumps at the WTP operational (i.e., because this was the case during the hydrant tests).

Model Pump Location	Q (L/s)	P (kPa)
Pump 1 (Durham Street and Millenium Way)	0.0	385
	70.0	300
	203.0	140
Pump 2 (Russell Street and Hwy. 21)	0.0	415
	71.0	305
	166.0	140

4.0 Model Results

Ten junctions of interest were the focus of the analysis. Below is a list summarizing the junctions and their corresponding service area (refer also to the attached map).

Junction	Service Area	Avg. Day (L/s)	Max. Day (L/s)	Peak Day (L/s)
J-15	6	1.309	2.618	3.927
J-25	3	1.960	3.920	5.880
J-40	7	2.128	4.256	6.384
J-40	Existing	2.800	5.600	8.400
J-45	5	2.100	4.200	6.300
J-55	8	2.996	5.992	8.988
J-60	4	3.815	7.630	11.445
J-65	1	0.672	1.344	2.016
J-70	2	1.680	3.360	5.040
J-75	9	6.916	13.832	20.748

The average, maximum, and peak day demands listed in Section 3.0 were applied to each of the appropriate junctions. A fire flow of 150 L/s was applied to each junction at maximum day demand. Results of the analysis are summarized in the tables below. The values reported are for the condition of no high-lift pumps at the WTP operating.

Scenario A: P-65,70,75,35,40,45 at 300 mm dia., P-5,10,25 at 250 mm dia., other new w/m 200 mm dia.

Junction	P at Static (kPa)	P at Q_{AVG} (kPa)	P at Q_{MAX} (kPa)	P at Q_{PEAK} (kPa)	Available Fire Flow at 140 kPa (L/s)
J-5	417	399	381	364	
J-10	352	334	315	295	
J-15	319	300	281	260	85
J-20	304	286	266	245	
J-25	326	307	288	267	87
J-30	308	289	270	249	
J-35	384	366	348	330	
J-40	385	366	347	328	91
J-45	309	290	271	250	86
J-50	352	333	314	293	
J-55	313	294	275	254	84
J-60	315	296	277	256	86
J-65	411	393	375	357	99
J-70	391	373	355	336	95
J-75	258	238	214	186	31

Notes:

(red)	denotes operating pressure less than 275 kPa
(yellow)	denotes operating pressure above 275 kPa but less than 350 kPa
(green)	denotes operating pressure greater than 480 kPa
(orange)	denotes fire flow of less than 150 L/s at 140 kPa minimum system pressure

Municipality of Kincardine
Kincardine Business Park Water Supply
Preliminary Calculations and Notes

Job # :	08055
Date :	December 4, 2013
Revised :	May 2016

1.0 Background

There is development proposed within the lands known as the Kincardine Business Park, generally east of Highway 21 and south of Highway 9. Previous work under BMROSS 08055 identified the need for booster pumping facilities to provide adequate flow & pressure within the development area. The purpose of these notes is to provide some preliminary calculations regarding booster, and potentially storage, requirements.

It is noted that at the time of any detailed design related to the watermain and booster pumping facilities, actual watermain size and pump capacity requirements will require further consideration.

2.0 Supply Characteristics at Connection to Existing System

It is anticipated that the new pressure zone would be supplied via a connection to the existing municipal system at the intersection of Durham Street and Millenium Way. Previous hydrant flow testing was conducted to confirm supply characteristics; below is a summary of design values.

Q (L/s)	P (kPa)
0	385
70	300
190	140

A second connection between the existing system and new pressure zone would be provided at the intersection of Russell Street and Highway No. 21. The connection would consist of a check valve or flow control valve, to allow the main pressure zone to supply the new zone in the event of a booster pump failure in the new zone.

3.0 Analysis & Model Data

3.1 Data

Reference	Item			
	Average water demand - highway service commercial		0.28	L/ha/s
	Average water demand - large format commercial		0.28	L/ha/s
	Average water demand - light industrial commercial		0.35	L/ha/s
MOE Guide	Max day factor		2.00	
MOE Guide	Peak day factor		3.00	
MOE Guide	Pipe C-factor	150 mm	100	
		200 - 250 mm	110	
		300 - 600 mm	120	

3.2 Water Demands by Area

See attached map for area locations.

Service Area	Hwy. Service Commercial Area (ha)	Large Format Commercial Area (ha)	Light Industrial Area (ha)	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Day Demand (L/s)
1	1.2	1.2	0.0	0.672	1.344	2.016
2	0.0	6.0	0.0	1.680	3.360	5.040
3	2.4	2.6	1.6	1.960	3.920	5.880
4	0.0	0.0	10.9	3.815	7.630	11.445
5	0.0	0.0	6.0	2.100	4.200	6.300
6	1.5	1.3	1.5	1.309	2.618	3.927
7	5.9	1.7	0.0	2.128	4.256	6.384
8	10.7	0.0	0.0	2.996	5.992	8.988
9	7.6	7.6	7.6	6.916	13.832	20.748
Existing	5.0	5.0	0.0	2.800	5.600	8.400

3.3 Watermain Routes

See attached map for proposed watermain routes to service development lands.

4.0 <u>Model Results</u>

Below is a list summarizing the WaterCAD junctions and their corresponding service area (refer also to the attached map).

Junction	Service Area	Avg. Day (L/s)	Max. Day (L/s)	Peak Day (L/s)
J-15	6	1.309	2.618	3.927
J-20	5	1.050	2.100	3.150
J-25	3	1.960	3.920	5.880
J-30	4	1.272	2.543	3.815
J-40	7	2.128	4.256	6.384
J-40	Existing	2.800	5.600	8.400
J-45	5	1.050	2.100	3.150
J-50	4	1.272	2.543	3.815
J-55	8	2.996	5.992	8.988
J-60	4	1.272	2.543	3.815
J-65	1	0.672	1.344	2.016
J-70	2	1.680	3.360	5.040
J-75	9	6.916	13.832	20.748
Total		**26.376**	**52.752**	**79.128**

The average, maximum, and peak day demands listed in Section 3.0 were applied to each of the appropriate junctions. A fire flow of 150 L/s was applied to each junction at maximum day demand. Results of the analysis are summarized in the tables below.

4.1 Supply from Existing System Only

Trial A: Supply from Existing System, All new pipes at 300 mm dia.

Junction	P at Static (kPa)	P at Q_{AVG} (kPa)	P at Q_{MAX} (kPa)	P at Q_{PEAK} (kPa)	Available Fire Flow at 140 kPa (L/s)
J-15	320	289	254	217	37
J-20	305	274	239	202	37
J-25	327	296	261	223	37
J-30	309	278	243	206	37
J-40	386	355	322	289	41
J-45	310	279	244	207	37
J-50	353	322	287	250	37
J-55	314	283	249	212	37
J-60	316	285	250	212	37
J-65	412	381	346	308	37
J-70	392	361	326	289	37
J-75	259	228	193	156	33
Min	259	228	193	156	33
Max	412	381	346	308	41

Notes:

(red)	denotes operating pressure less than 275 kPa
(yellow)	denotes operating pressure above 275 kPa but less than 350 kPa
(green)	denotes operating pressure greater than 480 kPa
(orange)	denotes fire flow of less than 150 L/s at 140 kPa minimum system pressure

As observed in the results above, a single connection to the existing system at Durham Street & Millenium Way will not provide adequate pressures at many junctions under various demands, nor will available fire flows be close to the target range. This confirms previous analysis work & the conclusion that booster pumping will be required.

4.2 Add Booster Pump

See attached map for booster pump location. Below is a summary of pump curves assumed for the analysis; assume that:
-for model simplicity, boosting is from a reservoir (i.e. from atmosphere; not boosting a pressurized supply)
-under static or average day demands, one booster pump is operational
-under maximum day or peak day demands, two booster pumps are operational
-under maximum day plus fire flow conditions, one booster plus the fire pump are operational

Booster Pump		Fire Pump	
Q (L/s)	P (kPa)	Q (L/s)	P (kPa)
0	450	0	450
50	375	150	375
100	200	225	200

Trial B: Add Booster Pump, All new pipes at 300 mm dia.

Junction	P at Static (kPa)	P at Q_{AVG} (kPa)	P at Q_{MAX} (kPa)	P at Q_{PEAK} (kPa)	Available Fire Flow at 140 kPa (L/s)
J-15	385	359	357	328	194
J-20	370	344	342	313	179
J-25	391	366	363	335	192
J-30	374	348	346	317	177
J-40	450	425	425	400	232
J-45	375	349	347	318	189
J-50	418	392	390	361	181
J-55	379	353	351	323	194
J-60	381	355	353	324	186
J-65	477	451	448	419	175
J-70	457	431	429	400	180
J-75	324	298	296	267	148
Min	324	298	296	267	148
Max	477	451	448	419	232

Notes:
denotes operating pressure less than 275 kPa
denotes operating pressure above 275 kPa but less than 350 kPa
denotes operating pressure greater than 480 kPa
denotes fire flow of less than 150 L/s at 140 kPa minimum system pressure

Based on the above results, with a suitable booster pumping configuration it will be possible to generally achieve reasonable pressures and fire flows at all junctions. At the time of detailed design of the development and booster pumping station, more analysis should be completed to determine:
-if pipe diameters can be reduced in certain areas
-actual booster & fire pump design points/curves

4.3 Storage

From the results of the hydrant flow testing mentioned in Section 2.0, it is assumed that the new pressure zone can be continually fed by the existing municipal system at a rate of at least 70 L/s. This is sufficient to meet design average and maximum day demands, and nearly sufficient to meet design peak day demands, assuming that adequate booster pumping is provided within the new pressure zone, but in terms of available supply for fire protection probably represents a "worst case" for storage considerations because it corresponds to maintaining a residual pressure of 300 kPa in the existing system, which is significantly higher than the 140 kPa minimum allowable under fire conditions. The "best case" for minimizing storage requirements corresponds to having 190 L/s available from the existing system, and also includes removing Service Area 9 from the design areas.

It is understood that at present, no specific fire storage requirements have been determined for the industrial land. From the 2008 MOE Design Guidelines for Drinking-Water Systems Table 8.1, at a design fire flow of 150 L/s, the storage requirement is based on a duration of between 2 and 3 hours. For the purposes of this analysis, assume 2.5 hours.

"Worst Case" Storage Requirements (i.e. maximum storage)

Design maximum day demand		52.752	L/s
Design fire flow		150	L/s
Design total; maximum day + Fire		202.752	L/s
Deduct available supply from	-	70	L/s
Total required flow from storage		132.752	L/s
Fire duration, assumed		2.5	hrs
Storage requirement		1194768	L
	=	1194.768	m^3
Say		1200	m^3

"Best Case" Storage Requirements (i.e. minimum storage)

Design maximum day demand		38.920	L/s
Design fire flow		150	L/s
Design total; maximum day + Fire		188.920	L/s
Deduct available supply from	-	190	L/s
Total required flow from storage		-1.080	L/s

No storage required as available supply exceeds demand + fire flow.

Therefore, under minimum storage design conditions, no storage at all would be required. The available storage in the existing municipal distribution system should be reviewed to check that the proposed industrial development would not create a deficit in the available storage.

APPENDIX C

SANITARY MODELLING SHEETS FOR THE VARIOUS DEVELOPMENT SCENARIOS

KINCARDINE BUSINESS PARK - SANITARY COLLECTION SYSTEM REVIEW

DATE June 2016
FILE No. 08055

SEWER CAPACITY REVIEW AND HYDRAULIC GRADE LINE EVALUATION
CURRENT ACCEPTED AND POTENTIAL TRIBUTARY AREA

Flow Rate = 1.35L/Ha.s (Including Infiltration), refer to sewage flow evaluation.
Peak Flow Per Hectare 1.35 L/Ha.s

			SANITARY DRAINAGE AREA DATA						SEWER DATA																REVIEW OF HGL						
DRAINAGE AREA			INDIVIDUAL AREA		CUMULATIVE AREA		PEAK FLOW Q(p)	CUM. FLOW Q(D)	TYPE OF	DIA.	SLOPE	LENGTH	CAPACITY (L/s)	FULL FLOW VELOCITY	ACTUAL VELOCITY	REMAINING	SEWER INVERT ELEVATION		PIPE OBVERT ELEV.		FINISHED GROUND AT MH		DEPTH TO OBV		HGL Slope	ELEVATION OF HGL		DEPTH TO HGL		CHANGE IN DEPTH TO SEWAGE	
STREET	FROM	TO	POP	(ha)	POP	(ha)	L/s	L/s	PIPE	(mm)	(%)	(m)	n=0.013	(m/s)	Q(d)	CAPACITY	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	%	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER
			AREA EAST OF HWY. 21 TO MILLENIUM WAY ADDED IN																												
FD1A - Future			*Future*	0.60		0.60	0.63	0.63																							
FD1B - Under-Construction			*Carwash*	0.60		1.20	2.00	2.63																							
Temporary Marriott Hotel			*Under Const.*	0.00		1.20	0.00	2.63																							
Durham	101	102		7.80		9.00	10.53	13.16	PVC	250	0.28	90.00	31.47	0.6	0.6	18.31	203.56	203.31	203.81	203.56											
Durham	102	103		0.00		9.00	0.00	13.16	PVC	250	0.28	120.00	31.47	0.6	0.6	18.31	203.31	202.97	203.56	203.22											
Durham	103	104		1.03		10.03	1.39	14.55	PVC	250	0.28	79.50	31.47	0.6	0.6	16.92	202.97	202.75	203.22	203.00											
Durham	104	105		0.00		10.03	0.00	14.55	PVC	200	1.15	50.00	35.17	1.1	1.1	20.62	202.72	202.31	202.92	202.51											
Durham	105	106		0.93		10.96	1.26	15.81	PVC	200	1.46	66.80	39.63	1.3	1.2	23.82	202.28	201.30	202.48	201.50											
Durham	106	107		0.39		11.35	0.53	16.33	PVC	200	0.66	67.10	26.65	0.9	0.9	10.32	201.27	200.83	201.47	201.03											
			LIQUOR STORE AREA ADDED IN																												
Retail Plaza: LCBO, etc				1.50		1.50	1.58	1.58																							
FD2- Condo Site				1.90		3.40	2.00	3.57																							
Durham	107	108		8.00		22.75	10.80	30.70	PVC	200	0.50	87.50	23.19	0.7	0.8	-7.51	199.47	199.04	199.67	199.24	204.80	202.80	5.1	3.6	0.87	200.03	199.27	4.8	3.5	0.4	0.0
Walsh	108	109		0.89		23.64	1.20	31.90	PVC	250	0.46	71.60	40.33	0.8	0.9	8.43	199.02	198.68	199.27	198.93	202.80	204.90	3.5	6.0	0.29	199.27	198.93	3.5	6.0	0.0	0.0
Walsh	109	110		0.60		24.24	0.81	32.71	PVC	250	0.41	71.00	38.08	0.8	0.9	5.37	198.66	198.37	198.91	198.62	204.90	205.30	6.0	6.7	0.30	198.91	198.62	6.0	6.7	0.0	0.0
Walsh	110	111		0.11		24.35	0.15	32.86	PVC	250	1.19	17.40	64.87	1.3	1.3	32.01	198.37	198.16	198.62	198.41	205.30	205.20	6.7	6.8	0.30	198.62	198.41	6.7	6.8	0.0	0.0
Walsh	111	112		0.43		24.78	0.58	33.44	PVC	250	0.50	54.90	42.05	0.9	1.0	8.61	198.11	197.84	198.36	198.09	205.20	204.40	6.8	6.3	0.32	198.36	198.09	6.8	6.3	0.0	0.0
Walsh	112	113		8.69		33.47	11.73	45.18	PVC	250	0.46	26.50	40.33	0.8	0.9	-4.85	197.02	196.92	197.27	197.17	204.40	203.50	7.1	6.3	0.58	197.53	197.38	6.9	6.1	0.3	0.2
Walsh	113	114		0.19		33.66	0.26	45.43	PVC	250	0.46	53.60	40.33	0.8	0.9	-5.10	196.83	196.60	197.08	196.85	203.50	203.30	6.4	6.5	0.58	197.38	197.07	6.1	6.2	0.3	0.2
Easement	114	115		0.87		34.53	1.17	46.61	PVC	250	0.51	99.70	42.47	0.9	1.0	-4.14	196.52	196.01	196.77	196.26	203.30	200.30	6.5	4.0	0.61	197.07	196.46	6.2	3.8	0.3	0.2
Easement	115	116		0.74		35.27	1.00	47.61	PVC	250	0.46	100.60	40.33	0.8	0.9	-7.28	196.00	195.57	196.25	195.82	200.30	197.90	4.0	2.1	0.64	196.46	195.82	3.8	2.1	0.2	0.0
Mackendrick	116	117		6.44		41.71	8.69	56.30	PVC	250	0.60	83.20	46.06	0.9	1.1	-10.24	194.26	193.85	194.51	194.10	197.90	197.80	3.4	3.7	0.89	194.85	194.11	3.0	3.7	0.3	0.0
			AREA COMING INTO STRUCTURE 117																												
Davidson Centre			*Existing*	7.50		7.50		7.50																							
FD3 - Condos			*Future*	2.00		9.50	2.10	9.60																							
FD4 - Development			*Under Const.*	2.50		12.00	2.63	12.23																							
Easement	117	118		14.50		68.21	19.58	88.10	PVC	400	0.69	60.40	172.99	1.4	1.4	84.89	193.71	193.49	194.11	193.89	197.80	197.60	3.7	3.7	0.18	194.11	193.89	3.7	3.7	0.0	0.0

SEWER CAPACITY REVIEW AND HYDRAULIC GRADE LINE EVALUATION
CURRENT ACCEPTED AND POTENTIAL TRIBUTARY AREA

Flow Rate = 1.35L/Ha.s (Including Infiltration), refer to sewage flow evaluation.

Peak Flow Per Hectare 1.35 L/Ha.s

			SANITARY DRAINAGE AREA DATA						SEWER DATA																REVIEW OF HGL						
DRAINAGE AREA			INDIVIDUAL AREA		CUMULATIVE AREA		PEAK FLOW Q(p)	CUM. FLOW Q(D)	TYPE OF PIPE	DIA.	SLOPE	LENGTH	CAPACITY (L/s)	FULL FLOW VELOCITY	ACTUAL VELOCITY	REMAINING CAPACITY	SEWER INVERT ELEVATION		PIPE OBVERT ELEV.		FINISHED GROUND AT MH		DEPTH TO OBV		HGL Slope	ELEVATION OF HGL		DEPTH TO HGL		CHANGE IN DEPTH TO SEWAGE	
STREET	FROM	TO	POP	(ha)	POP	(ha)	L/s	L/s	PIPE	(mm)	(%)	(m)	n=0.013	(m/s)	Q(d)		UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	%	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER
			FUTURE AREAS FROM BUSINESS PARK																												
Stage 1 - KBP			*Future*	0.00		0.00	0.00	0.00																							
Stage 2 - KBP			*Future*	0.00		0.00	0.00	0.00																							
Stage 3 - KBP			*Future*	0.00		0.00	0.00	0.00																							
Scott	118	119		0.00		68.21	0.00	88.10	PVC	400	0.66	16.20	169.19	1.4	1.4	81.09	193.40	193.30	193.80	193.70	197.60	197.50	3.8	3.8	0.18	193.80	193.70	3.8	3.8	0.0	0.0
Scott	119	120		0.25		68.46	0.34	88.44	PVC	400	0.48	47.20	144.28	1.2	1.2	55.84	193.18	192.96	193.58	193.36	197.50	197.10	3.9	3.7	0.18	193.58	193.36	3.9	3.7	0.0	0.0
Scott	120	121		5.02		73.48	6.78	95.21	PVC	400	0.48	35.10	144.28	1.2	1.2	49.07	192.91	192.74	193.31	193.14	197.10	196.40	3.8	3.3	0.21	193.31	193.14	3.8	3.3	0.0	0.0
Scott	121	14		0.65		74.13	0.88	96.09	PVC	400	0.51	81.70	148.73	1.2	1.2	52.64	192.49	192.08	192.89	192.48	196.40	195.70	3.5	3.2	0.21	192.89	192.48	3.5	3.2	0.0	0.0
			AREA COMING INTO STRUCTURE 113 leading to 114																												
South of Wellington St.			*Existing*	4.00		4.00	5.40	5.40																							
Area North of Russell St.			*Existing*	3.10		7.10	4.19	9.59																							
Area South of Russell St.			*Existing*	11.10		18.20	14.99	24.57																							
Scott	14	15		0.69		93.02	0.93	121.59	PVC	400	0.40	87.20	131.71	1.1	1.2	10.12	191.77	191.43	192.17	191.83	195.70	196.00	3.5	4.2	0.34	192.17	191.83	3.5	4.2	0.0	0.0
Scott	15	16		0.53		93.55	0.72	122.31	PVC	400	0.40	85.30	131.71	1.1	1.2	9.40	191.38	191.04	191.78	191.44	196.00	196.50	4.2	5.1	0.34	191.78	191.44	4.2	5.1	0.0	0.0
Scott	16	17		2.40		95.95	3.24	125.55	PVC	400	0.46	68.00	141.25	1.1	1.3	15.70	190.99	190.68	191.39	191.08	196.50	197.10	5.1	6.0	0.36	191.39	191.08	5.1	6.0	0.0	0.0
Scott	17	18		0.59		96.54	0.80	126.34	PVC	400	0.58	69.80	158.60	1.3	1.4	32.26	190.67	190.26	191.07	190.66	197.10	196.40	6.0	5.7	0.37	191.07	190.66	6.0	5.7	0.0	0.0
Scott	18	19		1.71		98.25	2.31	128.65	PVC	400	0.43	37.80	136.56	1.1	1.2	7.91	190.20	190.04	190.60	190.44	196.40	196.20	5.8	5.8	0.38	190.60	190.44	5.8	5.8	0.0	0.0
Scott	19	20		0.63		98.88	0.85	129.50	PVC	400	0.40	77.40	131.71	1.1	1.2	2.21	190.03	189.72	190.43	190.12	196.20	195.70	5.8	5.6	0.39	190.43	190.14	5.8	5.6	0.0	0.0
Scott	20	21		0.64		99.52	0.86	130.37	PVC	400	0.37	68.20	126.68	1.0	1.1	-3.69	189.72	189.45	190.12	189.85	195.70	196.20	5.6	6.4	0.39	190.14	189.87	5.6	6.3	0.0	0.0
Scott	21	22		0.58		100.10	0.78	131.15	PVC	400	0.41	86.60	133.35	1.1	1.2	2.20	189.47	189.17	189.87	189.57	196.20	197.10	6.3	7.5	0.40	189.87	189.58	6.3	7.5	0.0	0.0
Scott	22	23		7.50		107.60	10.13	141.28	PVC	450	0.39	45.11	178.05	1.1	1.3	36.77	189.13	188.95	189.58	189.40	197.10	196.50	7.5	7.1	0.25	189.58	189.40	7.5	7.1	0.0	0.0
Park Street	23	24		0.00		107.60	0.00	141.28	PVC	450	0.40	42.00	180.32	1.1	1.3	39.04	188.80	188.68	189.25	189.13	196.50	195.40	7.3	6.3	0.25	189.25	189.13	7.3	6.3	0.0	0.0

KINCARDINE BUSINESS PARK - SANITARY COLLECTION SYSTEM REVIEW

DATE June 2016
FILE No. 08055

SEWER CAPACITY REVIEW AND HYDRAULIC GRADE LINE EVALUATION
CURRENT TRIBUTARY AREA + STAGE 1 BUSINESS PARK

Flow Rate = 1.35L/Ha.s (Including Infiltration), refer to sewage flow evaluation.

Peak Flow Per Hectare 1.35 L/Ha.s

DRAINAGE AREA			SANITARY DRAINAGE AREA DATA						SEWER DATA																REVIEW OF HGL						
			INDIVIDUAL AREA		CUMULATIVE AREA		PEAK FLOW Q(p)	CUM. FLOW Q(D)	TYPE OF PIPE	DIA.	SLOPE	LENGTH	CAPACITY (L/s)	FULL FLOW VELOCITY	ACTUAL VELOCITY	REMAINING CAPACITY	SEWER INVERT ELEVATION		PIPE OBVERT ELEV.		FINISHED GROUND AT MH		DEPTH TO OBV		HGL Slope	ELEVATION OF HGL		DEPTH TO HGL		CHANGE IN DEPTH TO SEWAGE	
STREET	FROM	TO	POP	(ha)	POP	(ha)	L/s	L/s		(mm)	(%)	(m)	n=0.013	(m/s)	Q(d)		UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	%	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER
			AREA EAST OF HWY. 21 TO MILLENIUM WAY ADDED IN																												
FD1A - Future			*Future*	0.60		0.60	0.63	0.63																							
FD1B - Under-Construction			*Carwash*	0.60		1.20	2.00	2.63																							
Temporary Marriott Hotel			*Under Const.*	0.00		1.20	0.00	2.63																							
Durham	101	102		7.80		9.00	10.53	13.16	PVC	250	0.28	90.00	31.47	0.6	0.6	18.31	203.56	203.31	203.81	203.56											
Durham	102	103		0.00		9.00	0.00	13.16	PVC	250	0.28	120.00	31.47	0.6	0.6	18.31	203.31	202.97	203.56	203.22											
Durham	103	104		1.03		10.03	1.39	14.55	PVC	250	0.28	79.50	31.47	0.6	0.6	16.92	202.97	202.75	203.22	203.00											
Durham	104	105		0.00		10.03	0.00	14.55	PVC	200	1.15	50.00	35.17	1.1	1.1	20.62	202.72	202.31	202.92	202.51											
Durham	105	106		0.93		10.96	1.26	15.81	PVC	200	1.46	66.80	39.63	1.3	1.2	23.82	202.28	201.30	202.48	201.50											
Durham	106	107		0.39		11.35	0.53	16.33	PVC	200	0.66	67.10	26.65	0.9	0.9	10.32	201.27	200.83	201.47	201.03											
			LIQUOR STORE AREA ADDED IN																												
Retail Plaza: LCBO, etc				1.50		1.50	1.58	1.58																							
FD2- Condo Site				1.90		3.40	2.00	3.57																							
Durham	107	108		8.00		22.75	10.80	30.70	PVC	200	0.50	87.50	23.19	0.7	0.8	-7.51	199.47	199.04	199.67	199.24	204.80	202.80	5.1	3.6	0.87	200.03	199.27	4.8	3.5	0.4	0.0
Walsh	108	109		0.89		23.64	1.20	31.90	PVC	250	0.46	71.60	40.33	0.8	0.9	8.43	199.02	198.68	199.27	198.93	202.80	204.90	3.5	6.0	0.29	199.27	198.93	3.5	6.0	0.0	0.0
Walsh	109	110		0.60		24.24	0.81	32.71	PVC	250	0.41	71.00	38.08	0.8	0.9	5.37	198.66	198.37	198.91	198.62	204.90	205.30	6.0	6.7	0.30	198.91	198.62	6.0	6.7	0.0	0.0
Walsh	110	111		0.11		24.35	0.15	32.86	PVC	250	1.19	17.40	64.87	1.3	1.3	32.01	198.37	198.16	198.62	198.41	205.30	205.20	6.7	6.8	0.30	198.62	198.41	6.7	6.8	0.0	0.0
Walsh	111	112		0.43		24.78	0.58	33.44	PVC	250	0.50	54.90	42.05	0.9	1.0	8.61	198.11	197.84	198.36	198.09	205.20	204.40	6.8	6.3	0.32	198.36	198.09	6.8	6.3	0.0	0.0
Walsh	112	113		8.69		33.47	11.73	45.18	PVC	250	0.46	26.50	40.33	0.8	0.9	-4.85	197.02	196.92	197.27	197.17	204.40	203.50	7.1	6.3	0.58	197.53	197.38	6.9	6.1	0.3	0.2
Walsh	113	114		0.19		33.66	0.26	45.43	PVC	250	0.46	53.60	40.33	0.8	0.9	-5.10	196.83	196.60	197.08	196.85	203.50	203.30	6.4	6.5	0.58	197.38	197.07	6.1	6.2	0.3	0.2
Easement	114	115		0.87		34.53	1.17	46.61	PVC	250	0.51	99.70	42.47	0.9	1.0	-4.14	196.52	196.01	196.77	196.26	203.30	200.30	6.5	4.0	0.61	197.07	196.46	6.2	3.8	0.3	0.2
Easement	115	116		0.74		35.27	1.00	47.61	PVC	250	0.46	100.60	40.33	0.8	0.9	-7.28	196.00	195.57	196.25	195.82	200.30	197.90	4.0	2.1	0.64	196.46	195.82	3.8	2.1	0.2	0.0
Mackendrick	116	117		6.44		41.71	8.69	56.30	PVC	250	0.60	83.20	46.06	0.9	1.1	-10.24	194.26	193.85	194.51	194.10	197.90	197.80	3.4	3.7	0.89	194.85	194.11	3.0	3.7	0.3	0.0
			AREA COMING INTO STRUCTURE 117																												
Davidson Centre			*Existing*	7.50		7.50		7.50																							
FD3 - Condos			*Future*	2.00		9.50	2.10	9.60																							
FD4 - Development			*Under Const.*	2.50		12.00	2.63	12.23																							
Easement	117	118		14.50		68.21	19.58	88.10	PVC	400	0.69	60.40	172.99	1.4	1.4	84.89	193.71	193.49	194.11	193.89	197.80	197.60	3.7	3.7	0.18	194.11	193.89	3.7	3.7	0.0	0.0

SEWER CAPACITY REVIEW AND HYDRAULIC GRADE LINE EVALUATION
CURRENT TRIBUTARY AREA + STAGE 1 BUSINESS PARK

Flow Rate = 1.35L/Ha.s (Including Infiltration), refer to sewage flow evaluation.

Peak Flow Per Hectare 1.35 L/Ha.s

DRAINAGE AREA			SANITARY DRAINAGE AREA DATA						SEWER DATA																REVIEW OF HGL						
			INDIVIDUAL AREA		CUMULATIVE AREA		PEAK FLOW Q(p) L/s	CUM. FLOW Q(D) L/s	TYPE OF PIPE	DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (L/s) n=0.013	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY Q(d)	REMAINING CAPACITY	SEWER INVERT ELEVATION		PIPE OBVERT ELEV.		FINISHED GROUND AT MH		DEPTH TO OBV		HGL Slope %	ELEVATION OF HGL		DEPTH TO HGL		CHANGE IN DEPTH TO SEWAGE	
STREET	FROM	TO	POP	(ha)	POP	(ha)											UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER		UPPER	LOWER	UPPER	LOWER	UPPER	LOWER
			FUTURE AREAS FROM BUSINESS PARK																												
Stage 1B - KBP			*Future*	33.60		33.60	26.00	26.00																							
Stage 2 - KBP			*Future*	0.00		33.60	0.00	26.00																							
Stage 3 - KBP			*Future*	0.00		33.60	0.00	26.00																							
Scott	118	119		0.00		101.81	0.00	114.10	PVC	400	0.66	16.20	169.19	1.4	1.4	55.09	193.40	193.30	193.80	193.70	197.60	197.50	3.8	3.8	0.30	193.80	193.70	3.8	3.8	0.0	0.0
Scott	119	120		0.25		102.06	0.34	114.44	PVC	400	0.48	47.20	144.28	1.2	1.3	29.84	193.18	192.96	193.58	193.36	197.50	197.10	3.9	3.7	0.30	193.58	193.36	3.9	3.7	0.0	0.0
Scott	120	121		5.02		107.08	6.78	121.21	PVC	400	0.48	35.10	144.28	1.2	1.3	23.07	192.91	192.74	193.31	193.14	197.10	196.40	3.8	3.3	0.34	193.31	193.14	3.8	3.3	0.0	0.0
Scott	121	14		0.65		107.73	0.88	122.09	PVC	400	0.51	81.70	148.73	1.2	1.3	26.64	192.49	192.08	192.89	192.48	196.40	195.70	3.5	3.2	0.34	192.89	192.48	3.5	3.2	0.0	0.0
			AREA COMING INTO STRUCTURE 113 leading to 114																												
South of Wellington St.			*Existing*	4.00		4.00	5.40	5.40																							
Area North of Russell St.			*Existing*	3.10		7.10	4.19	9.59																							
Area South of Russell St.			*Existing*	11.10		18.20	14.99	24.57																							
Scott	14	15		0.69		126.62	0.93	147.59	PVC	400	0.40	87.20	131.71	1.1	1.2	-15.88	191.77	191.43	192.17	191.83	195.70	196.00	3.5	4.2	0.50	192.31	191.87	3.4	4.1	0.1	0.0
Scott	15	16		0.53		127.15	0.72	148.31	PVC	400	0.40	85.30	131.71	1.1	1.2	-16.60	191.38	191.04	191.78	191.44	196.00	196.50	4.2	5.1	0.51	191.87	191.44	4.1	5.1	0.1	0.0
Scott	16	17		2.40		129.55	3.24	151.55	PVC	400	0.46	68.00	141.25	1.1	1.3	-10.30	190.99	190.68	191.39	191.08	196.50	197.10	5.1	6.0	0.53	191.44	191.08	5.1	6.0	0.0	0.0
Scott	17	18		0.59		130.14	0.80	152.34	PVC	400	0.58	69.80	158.60	1.3	1.4	6.26	190.67	190.26	191.07	190.66	197.10	196.40	6.0	5.7	0.53	191.07	191.09	6.0	5.3	0.0	0.4
Scott	18	19		1.71		131.85	2.31	154.65	PVC	400	0.43	37.80	136.56	1.1	1.2	-18.09	190.20	190.04	190.60	190.44	196.40	196.20	5.8	5.8	0.55	191.09	190.88	5.3	5.3	0.5	0.4
Scott	19	20		0.63		132.48	0.85	155.50	PVC	400	0.40	77.40	131.71	1.1	1.2	-23.79	190.03	189.72	190.43	190.12	196.20	195.70	5.8	5.6	0.56	190.88	190.45	5.3	5.2	0.5	0.3
Scott	20	21		0.64		133.12	0.86	156.37	PVC	400	0.37	68.20	126.68	1.0	1.1	-29.69	189.72	189.45	190.12	189.85	195.70	196.20	5.6	6.4	0.56	190.45	190.07	5.2	6.1	0.3	0.2
Scott	21	22		0.58		133.70	0.78	157.15	PVC	400	0.41	86.60	133.35	1.1	1.2	-23.80	189.47	189.17	189.87	189.57	196.20	197.10	6.3	7.5	0.57	190.07	189.58	6.1	7.5	0.2	0.0
Scott	22	23		7.50		141.20	10.13	167.28	PVC	450	0.39	45.11	178.05	1.1	1.3	10.77	189.13	188.95	189.58	189.40	197.10	196.50	7.5	7.1	0.34	189.58	189.40	7.5	7.1	0.0	0.0
Park Street	23	24		0.00		141.20	0.00	167.28	PVC	450	0.40	42.00	180.32	1.1	1.3	13.04	188.80	188.68	189.25	189.13	196.50	195.40	7.3	6.3	0.34	189.25	189.13	7.3	6.3	0.0	0.0

KINCARDINE BUSINESS PARK - SANITARY COLLECTION SYSTEM REVIEW

DATE June 2016
FILE No. 08055

SEWER CAPACITY REVIEW AND HYDRAULIC GRADE LINE EVALUATION
CURRENT TRIBUTARY AREA + STAGE 2 BUSINESS PARK

Flow Rate = 1.35L/Ha.s (Including Infiltration), refer to sewage flow evaluation.
Peak Flow Per Hectare 1.35 L/Ha.s

			SANITARY DRAINAGE AREA DATA						SEWER DATA																REVIEW OF HGL						
DRAINAGE AREA			INDIVIDUAL AREA		CUMULATIVE AREA		PEAK FLOW Q(p)	CUM. FLOW Q(D)	TYPE OF PIPE	DIA.	SLOPE	LENGTH	CAPACITY (L/s) n=0.013	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY Q(d)	REMAINING CAPACITY	SEWER INVERT ELEVATION		PIPE OBVERT ELEV.		FINISHED GROUND AT MH		DEPTH TO OBV		HGL Slope	ELEVATION OF HGL		DEPTH TO HGL		CHANGE IN DEPTH TO SEWAGE	
STREET	FROM	TO	POP	(ha)	POP	(ha)	L/s	L/s		(mm)	(%)	(m)					UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	%	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER
			AREA EAST OF HWY. 21 TO MILLENIUM WAY ADDED IN																												
FD1A - Future			*Future*	0.60		0.60	0.63	0.63																							
FD1B - Under-Construction			*Carwash*	0.60		1.20	2.00	2.63																							
Temporary Marriott Hotel			*Under Const.*	0.00		1.20	0.00	2.63																							
Durham	101	102		7.80		9.00	10.53	13.16	PVC	250	0.28	90.00	31.47	0.6	0.6	18.31	203.56	203.31	203.81	203.56											
Durham	102	103		0.00		9.00	0.00	13.16	PVC	250	0.28	120.00	31.47	0.6	0.6	18.31	203.31	202.97	203.56	203.22											
Durham	103	104		1.03		10.03	1.39	14.55	PVC	250	0.28	79.50	31.47	0.6	0.6	16.92	202.97	202.75	203.22	203.00											
Durham	104	105		0.00		10.03	0.00	14.55	PVC	200	1.15	50.00	35.17	1.1	1.1	20.62	202.72	202.31	202.92	202.51											
Durham	105	106		0.93		10.96	1.26	15.81	PVC	200	1.46	66.80	39.63	1.3	1.2	23.82	202.28	201.30	202.48	201.50											
Durham	106	107		0.39		11.35	0.53	16.33	PVC	200	0.66	67.10	26.65	0.9	0.9	10.32	201.27	200.83	201.47	201.03											
			LIQUOR STORE AREA ADDED IN																												
Retail Plaza: LCBO, etc				1.50		1.50	1.58	1.58																							
FD2- Condo Site				1.90		3.40	2.00	3.57																							
Durham	107	108		8.00		22.75	10.80	30.70	PVC	200	0.50	87.50	23.19	0.7	0.8	-7.51	199.47	199.04	199.67	199.24	204.80	202.80	5.1	3.6	0.87	200.03	199.27	4.8	3.5	0.4	0.0
Walsh	108	109		0.89		23.64	1.20	31.90	PVC	250	0.46	71.60	40.33	0.8	0.9	8.43	199.02	198.68	199.27	198.93	202.80	204.90	3.5	6.0	0.29	199.27	198.93	3.5	6.0	0.0	0.0
Walsh	109	110		0.60		24.24	0.81	32.71	PVC	250	0.41	71.00	38.08	0.8	0.9	5.37	198.66	198.37	198.91	198.62	204.90	205.30	6.0	6.7	0.30	198.91	198.62	6.0	6.7	0.0	0.0
Walsh	110	111		0.11		24.35	0.15	32.86	PVC	250	1.19	17.40	64.87	1.3	1.3	32.01	198.37	198.16	198.62	198.41	205.30	205.20	6.7	6.8	0.30	198.62	198.41	6.7	6.8	0.0	0.0
Walsh	111	112		0.43		24.78	0.58	33.44	PVC	250	0.50	54.90	42.05	0.9	1.0	8.61	198.11	197.84	198.36	198.09	205.20	204.40	6.8	6.3	0.32	198.36	198.09	6.8	6.3	0.0	0.0
Walsh	112	113		8.69		33.47	11.73	45.18	PVC	250	0.46	26.50	40.33	0.8	0.9	-4.85	197.02	196.92	197.27	197.17	204.40	203.50	7.1	6.3	0.58	197.53	197.38	6.9	6.1	0.3	0.2
Walsh	113	114		0.19		33.66	0.26	45.43	PVC	250	0.46	53.60	40.33	0.8	0.9	-5.10	196.83	196.60	197.08	196.85	203.50	203.30	6.4	6.5	0.58	197.38	197.07	6.1	6.2	0.3	0.2
Easement	114	115		0.87		34.53	1.17	46.61	PVC	250	0.51	99.70	42.47	0.9	1.0	-4.14	196.52	196.01	196.77	196.26	203.30	200.30	6.5	4.0	0.61	197.07	196.46	6.2	3.8	0.3	0.2
Easement	115	116		0.74		35.27	1.00	47.61	PVC	250	0.46	100.60	40.33	0.8	0.9	-7.28	196.00	195.57	196.25	195.82	200.30	197.90	4.0	2.1	0.64	196.46	195.82	3.8	2.1	0.2	0.0
Mackendrick	116	117		6.44		41.71	8.69	56.30	PVC	250	0.60	83.20	46.06	0.9	1.1	-10.24	194.26	193.85	194.51	194.10	197.90	197.80	3.4	3.7	0.89	194.85	194.11	3.0	3.7	0.3	0.0
			AREA COMING INTO STRUCTURE 117																												
Davidson Centre			*Existing*	7.50		7.50		7.50																							
FD3 - Condos			*Future*	2.00		9.50	2.10	9.60																							
FD4 - Development			*Under Const.*	2.50		12.00	2.63	12.23																							
Easement	117	118		14.50		68.21	19.58	88.10	PVC	400	0.69	60.40	172.99	1.4	1.4	84.89	193.71	193.49	194.11	193.89	197.80	197.60	3.7	3.7	0.18	194.11	193.89	3.7	3.7	0.0	0.0

SEWER CAPACITY REVIEW AND HYDRAULIC GRADE LINE EVALUATION
CURRENT TRIBUTARY AREA + STAGE 2 BUSINESS PARK

Flow Rate = 1.35L/Ha.s (Including Infiltration), refer to sewage flow evaluation.
Peak Flow Per Hectare 1.35 L/Ha.s

DRAINAGE AREA			SANITARY DRAINAGE AREA DATA						SEWER DATA																REVIEW OF HGL						
			INDIVIDUAL AREA		CUMULATIVE AREA		PEAK FLOW Q(p)	CUM. FLOW Q(D)	TYPE OF	DIA.	SLOPE	LENGTH	CAPACITY (L/s)	FULL FLOW VELOCITY	ACTUAL VELOCITY	REMAINING	SEWER INVERT ELEVATION		PIPE OBVERT ELEV.		FINISHED GROUND AT MH		DEPTH TO OBV		HGL Slope	ELEVATION OF HGL		DEPTH TO HGL		CHANGE IN DEPTH TO SEWAGE	
STREET	FROM	TO	POP	(ha)	POP	(ha)	L/s	L/s	PIPE	(mm)	(%)	(m)	n=0.013	(m/s)	Q(d)	CAPACITY	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	%	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER
			FUTURE AREAS FROM BUSINESS PARK																												
Stage 1B - KBP			*Future*	33.60		33.60	26.00	26.00																							
Stage 2 - KBP			*Future*	32.70		66.30	31.00	57.00																							
Stage 3 - KBP			*Future*	0.00		66.30	0.00	57.00																							
Scott	118	119		0.00		134.51	0.00	145.10	PVC	400	0.66	16.20	169.19	1.4	1.5	24.09	193.40	193.30	193.80	193.70	197.60	197.50	3.8	3.8	0.48	193.80	194.99	3.8	2.5	0.0	1.3
Scott	119	120		0.25		134.76	0.34	145.44	PVC	400	0.48	47.20	144.28	1.2	1.3	-1.16	193.18	192.96	193.58	193.36	197.50	197.10	3.9	3.7	0.49	194.99	194.76	2.5	2.3	1.4	1.4
Scott	120	121		5.02		139.78	6.78	152.21	PVC	400	0.48	35.10	144.28	1.2	1.3	-7.93	192.91	192.74	193.31	193.14	197.10	196.40	3.8	3.3	0.53	194.76	194.57	2.3	1.8	1.4	1.4
Scott	121	14		0.65		140.43	0.88	153.09	PVC	400	0.51	81.70	148.73	1.2	1.3	-4.36	192.49	192.08	192.89	192.48	196.40	195.70	3.5	3.2	0.54	194.57	194.13	1.8	1.6	1.7	1.6
			AREA COMING INTO STRUCTURE 113 leading to 114																												
South of Wellington St.			*Existing*	4.00		4.00	5.40	5.40																							
Area North of Russell St.			*Existing*	3.10		7.10	4.19	9.59																							
Area South of Russell St.			*Existing*	11.10		18.20	14.99	24.57																							
Scott	14	15		0.69		159.32	0.93	178.59	PVC	400	0.40	87.20	131.71	1.1	1.2	-46.88	191.77	191.43	192.17	191.83	195.70	196.00	3.5	4.2	0.73	194.13	193.49	1.6	2.5	2.0	1.7
Scott	15	16		0.53		159.85	0.72	179.31	PVC	400	0.40	85.30	131.71	1.1	1.2	-47.60	191.38	191.04	191.78	191.44	196.00	196.50	4.2	5.1	0.74	193.49	192.86	2.5	3.6	1.7	1.4
Scott	16	17		2.40		162.25	3.24	182.55	PVC	400	0.46	68.00	141.25	1.1	1.3	-41.30	190.99	190.68	191.39	191.08	196.50	197.10	5.1	6.0	0.77	192.86	192.34	3.6	4.8	1.5	1.3
Scott	17	18		0.59		162.84	0.80	183.34	PVC	400	0.58	69.80	158.60	1.3	1.4	-24.74	190.67	190.26	191.07	190.66	197.10	196.40	6.0	5.7	0.77	192.34	191.80	4.8	4.6	1.3	1.1
Scott	18	19		1.71		164.55	2.31	185.65	PVC	400	0.43	37.80	136.56	1.1	1.2	-49.09	190.20	190.04	190.60	190.44	196.40	196.20	5.8	5.8	0.79	191.80	191.50	4.6	4.7	1.2	1.1
Scott	19	20		0.63		165.18	0.85	186.50	PVC	400	0.40	77.40	131.71	1.1	1.2	-54.79	190.03	189.72	190.43	190.12	196.20	195.70	5.8	5.6	0.80	191.50	190.88	4.7	4.8	1.1	0.8
Scott	20	21		0.64		165.82	0.86	187.37	PVC	400	0.37	68.20	126.68	1.0	1.1	-60.69	189.72	189.45	190.12	189.85	195.70	196.20	5.6	6.4	0.81	190.88	190.33	4.8	5.9	0.8	0.5
Scott	21	22		0.58		166.40	0.78	188.15	PVC	400	0.41	86.60	133.35	1.1	1.2	-54.80	189.47	189.17	189.87	189.57	196.20	197.10	6.3	7.5	0.81	190.33	189.62	5.9	7.5	0.5	0.0
Scott	22	23		7.50		173.90	10.13	198.28	PVC	450	0.39	45.11	178.05	1.1	1.3	-20.23	189.13	188.95	189.58	189.40	197.10	196.50	7.5	7.1	0.48	189.62	189.40	7.5	7.1	0.0	0.0
Park Street	23	24		0.00		173.90	0.00	198.28	PVC	450	0.40	42.00	180.32	1.1	1.3	-17.96	188.80	188.68	189.25	189.13	196.50	195.40	7.3	6.3	0.48	189.33	189.13	7.2	6.3	0.1	0.0

KINCARDINE BUSINESS PARK - SANITARY COLLECTION SYSTEM REVIEW

DATE June 2016
FILE No. 08055

SEWER CAPACITY REVIEW AND HYDRAULIC GRADE LINE EVALUATION
CURRENT TRIBUTARY AREA + STAGE 3 (Area North of Hwy. 9)

Flow Rate = 1.35L/Ha.s (Including Infiltration), refer to sewage flow evaluation.

Peak Flow Per Hectare 1.35 L/Ha.s

DRAINAGE AREA			SANITARY DRAINAGE AREA DATA						SEWER DATA																REVIEW OF HGL						
STREET	FROM	TO	INDIVIDUAL AREA POP	INDIVIDUAL AREA (ha)	CUMULATIVE AREA POP	CUMULATIVE AREA (ha)	PEAK FLOW Q(p) L/s	CUM. FLOW Q(D) L/s	TYPE OF PIPE	DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (L/s) n=0.013	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY Q(d)	REMAINING CAPACITY	SEWER INVERT ELEVATION UPPER	SEWER INVERT ELEVATION LOWER	PIPE OBVERT ELEV. UPPER	PIPE OBVERT ELEV. LOWER	FINISHED GROUND AT MH UPPER	FINISHED GROUND AT MH LOWER	DEPTH TO OBV UPPER	DEPTH TO OBV LOWER	HGL Slope %	ELEVATION OF HGL UPPER	ELEVATION OF HGL LOWER	DEPTH TO HGL UPPER	DEPTH TO HGL LOWER	CHANGE IN DEPTH TO SEWAGE UPPER	CHANGE IN DEPTH TO SEWAGE LOWER
			AREA EAST OF HWY. 21 TO MILLENIUM WAY ADDED IN																												
FD1A - Future			*Future*	0.60		0.60	0.63	0.63																							
FD1B - Under-Construction			*Carwash*	0.60		1.20	2.00	2.63																							
Temporary Marriott Hotel			*Under Const.*	0.00		1.20	0.00	2.63																							
Durham	101	102		7.80		9.00	10.53	13.16	PVC	250	0.28	90.00	31.47	0.6	0.6	18.31	203.56	203.31	203.81	203.56											
Durham	102	103		0.00		9.00	0.00	13.16	PVC	250	0.28	120.00	31.47	0.6	0.6	18.31	203.31	202.97	203.56	203.22											
Durham	103	104		1.03		10.03	1.39	14.55	PVC	250	0.28	79.50	31.47	0.6	0.6	16.92	202.97	202.75	203.22	203.00											
Durham	104	105		0.00		10.03	0.00	14.55	PVC	200	1.15	50.00	35.17	1.1	1.1	20.62	202.72	202.31	202.92	202.51											
Durham	105	106		0.93		10.96	1.26	15.81	PVC	200	1.46	66.80	39.63	1.3	1.2	23.82	202.28	201.30	202.48	201.50											
Durham	106	107		0.39		11.35	0.53	16.33	PVC	200	0.66	67.10	26.65	0.9	0.9	10.32	201.27	200.83	201.47	201.03											
			LIQUOR STORE AREA ADDED IN																												
Retail Plaza: LCBO, etc				1.50		1.50	1.58	1.58																							
FD2- Condo Site				1.90		3.40	2.00	3.57																							
Durham	107	108		8.00		22.75	10.80	30.70	PVC	200	0.50	87.50	23.19	0.7	0.8	-7.51	199.47	199.04	199.67	199.24	204.80	202.80	5.1	3.6	0.87	200.03	199.27	4.8	3.5	0.4	0.0
Walsh	108	109		0.89		23.64	1.20	31.90	PVC	250	0.46	71.60	40.33	0.8	0.9	8.43	199.02	198.68	199.27	198.93	202.80	204.90	3.5	6.0	0.29	199.27	198.93	3.5	6.0	0.0	0.0
Walsh	109	110		0.60		24.24	0.81	32.71	PVC	250	0.41	71.00	38.08	0.8	0.9	5.37	198.66	198.37	198.91	198.62	204.90	205.30	6.0	6.7	0.30	198.91	198.62	6.0	6.7	0.0	0.0
Walsh	110	111		0.11		24.35	0.15	32.86	PVC	250	1.19	17.40	64.87	1.3	1.3	32.01	198.37	198.16	198.62	198.41	205.30	205.20	6.7	6.8	0.30	198.62	198.41	6.7	6.8	0.0	0.0
Walsh	111	112		0.43		24.78	0.58	33.44	PVC	250	0.50	54.90	42.05	0.9	1.0	8.61	198.11	197.84	198.36	198.09	205.20	204.40	6.8	6.3	0.32	198.36	198.09	6.8	6.3	0.0	0.0
Walsh	112	113		8.69		33.47	11.73	45.18	PVC	250	0.46	26.50	40.33	0.8	0.9	-4.85	197.02	196.92	197.27	197.17	204.40	203.50	7.1	6.3	0.58	197.53	197.38	6.9	6.1	0.3	0.2
Walsh	113	114		0.19		33.66	0.26	45.43	PVC	250	0.46	53.60	40.33	0.8	0.9	-5.10	196.83	196.60	197.08	196.85	203.50	203.30	6.4	6.5	0.58	197.38	197.07	6.1	6.2	0.3	0.2
Easement	114	115		0.87		34.53	1.17	46.61	PVC	250	0.51	99.70	42.47	0.9	1.0	-4.14	196.52	196.01	196.77	196.26	203.30	200.30	6.5	4.0	0.61	197.07	196.46	6.2	3.8	0.3	0.2
Easement	115	116		0.74		35.27	1.00	47.61	PVC	250	0.46	100.60	40.33	0.8	0.9	-7.28	196.00	195.57	196.25	195.82	200.30	197.90	4.0	2.1	0.64	196.46	195.82	3.8	2.1	0.2	0.0
Mackendrick	116	117		6.44		41.71	8.69	56.30	PVC	250	0.60	83.20	46.06	0.9	1.1	-10.24	194.26	193.85	194.51	194.10	197.90	197.80	3.4	3.7	0.89	194.85	194.11	3.0	3.7	0.3	0.0
			AREA COMING INTO STRUCTURE 117																												
Davidson Centre			*Existing*	7.50		7.50		7.50																							
FD3 - Condos			*Future*	2.00		9.50	2.10	9.60																							
FD4 - Development			*Under Const.*	2.50		12.00	2.63	12.23																							
Easement	117	118		14.50		68.21	19.58	88.10	PVC	400	0.69	60.40	172.99	1.4	1.4	84.89	193.71	193.49	194.11	193.89	197.80	197.60	3.7	3.7	0.18	194.11	193.89	3.7	3.7	0.0	0.0

SEWER CAPACITY REVIEW AND HYDRAULIC GRADE LINE EVALUATION
CURRENT TRIBUTARY AREA + STAGE 3 (Area North of Hwy. 9)

Flow Rate = 1.35L/Ha.s (Including Infiltration), refer to sewage flow evaluation.

Peak Flow Per Hectare 1.35 L/Ha.s

DRAINAGE AREA			SANITARY DRAINAGE AREA DATA						SEWER DATA																REVIEW OF HGL						
			INDIVIDUAL AREA		CUMULATIVE AREA		PEAK FLOW Q(p)	CUM. FLOW Q(D)	TYPE OF	DIA.	SLOPE	LENGTH	CAPACITY (L/s)	FULL FLOW VELOCITY	ACTUAL VELOCITY	REMAINING	SEWER INVERT ELEVATION		PIPE OBVERT ELEV.		FINISHED GROUND AT MH		DEPTH TO OBV		HGL Slope	ELEVATION OF HGL		DEPTH TO HGL		CHANGE IN DEPTH TO SEWAGE	
STREET	FROM	TO	POP	(ha)	POP	(ha)	L/s	L/s	PIPE	(mm)	(%)	(m)	n=0.013	(m/s)	Q(d)	CAPACITY	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	%	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER
			FUTURE AREAS FROM BUSINESS PARK																												
Stage 1 - KBP			*Future*	33.60		33.60	26.00	26.00																							
Stage 2 - KBP			*Future*	32.70		66.30	31.00	57.00																							
Stage 3 - KBP			*Future*	22.90		89.20	20.00	77.00																							
Scott	118	119		0.00		157.41	0.00	165.10	PVC	400	0.66	16.20	169.19	1.4	1.5	4.09	193.40	193.30	193.80	193.70	197.60	197.50	3.8	3.8	0.63	193.80	201.48	3.8	-4.0	0.0	7.8
Scott	119	120		0.25		157.66	0.34	165.44	PVC	400	0.48	47.20	144.28	1.2	1.3	-21.16	193.18	192.96	193.58	193.36	197.50	197.10	3.9	3.7	0.63	201.48	201.18	-4.0	-4.1	7.9	7.8
Scott	120	121		5.02		162.68	6.78	172.21	PVC	400	0.48	35.10	144.28	1.2	1.3	-27.93	192.91	192.74	193.31	193.14	197.10	196.40	3.8	3.3	0.68	201.18	200.94	-4.1	-4.5	7.9	7.8
Scott	121	14		0.65		163.33	0.88	173.09	PVC	400	0.51	81.70	148.73	1.2	1.3	-24.36	192.49	192.08	192.89	192.48	196.40	195.70	3.5	3.2	0.69	200.94	200.38	-4.5	-4.7	8.1	7.9
			AREA COMING INTO STRUCTURE 113 leading to 114																												
South of Wellington St.			*Existing*	4.00		4.00	5.40	5.40																							
Area North of Russell St.			*Existing*	3.10		7.10	4.19	9.59																							
Area South of Russell St.			*Existing*	11.10		18.20	14.99	24.57																							
Scott	14	15		0.69		182.22	0.93	198.59	PVC	400	0.40	87.20	131.71	1.1	1.2	-66.88	191.77	191.43	192.17	191.83	195.70	196.00	3.5	4.2	0.91	200.38	199.59	-4.7	-3.6	8.2	7.8
Scott	15	16		0.53		182.75	0.72	199.31	PVC	400	0.40	85.30	131.71	1.1	1.2	-67.60	191.38	191.04	191.78	191.44	196.00	196.50	4.2	5.1	0.91	199.59	198.81	-3.6	-2.3	7.8	7.4
Scott	16	17		2.40		185.15	3.24	202.55	PVC	400	0.46	68.00	141.25	1.1	1.3	-61.30	190.99	190.68	191.39	191.08	196.50	197.10	5.1	6.0	0.94	198.81	198.17	-2.3	-1.1	7.4	7.1
Scott	17	18		0.59		185.74	0.80	203.34	PVC	400	0.58	69.80	158.60	1.3	1.4	-44.74	190.67	190.26	191.07	190.66	197.10	196.40	6.0	5.7	0.95	198.17	197.50	-1.1	-1.1	7.1	6.8
Scott	18	19		1.71		187.45	2.31	205.65	PVC	400	0.43	37.80	136.56	1.1	1.2	-69.09	190.20	190.04	190.60	190.44	196.40	196.20	5.8	5.8	0.97	197.50	197.13	-1.1	-0.9	6.9	6.7
Scott	19	20		0.63		188.08	0.85	206.50	PVC	400	0.40	77.40	131.71	1.1	1.2	-74.79	190.03	189.72	190.43	190.12	196.20	195.70	5.8	5.6	0.98	197.13	196.38	-0.9	-0.7	6.7	6.3
Scott	20	21		0.64		188.72	0.86	207.37	PVC	400	0.37	68.20	126.68	1.0	1.1	-80.69	189.72	189.45	190.12	189.85	195.70	196.20	5.6	6.4	0.99	196.38	195.70	-0.7	0.5	6.3	5.9
Scott	21	22		0.58		189.30	0.78	208.15	PVC	400	0.41	86.60	133.35	1.1	1.2	-74.80	189.47	189.17	189.87	189.57	196.20	197.10	6.3	7.5	1.00	195.70	194.84	0.5	2.3	5.8	5.3
Scott	22	23		7.50		196.80	10.13	218.28	PVC	450	0.39	45.11	178.05	1.1	1.3	-40.23	189.13	188.95	189.58	189.40	197.10	196.50	7.5	7.1	0.59	194.84	194.57	2.3	1.9	5.3	5.2
Park Street	23	24		0.00		196.80	0.00	218.28	PVC	250	0.40	42.00	37.61	0.8	0.9	-180.67	188.80	188.68	189.05	188.93	196.50	195.40	7.5	6.5	13.44	194.57	188.93	1.9	6.5	5.5	0.0

APPENDIX D

PARK STREET SPS
CAPACITY AND UPGRADE REVIEW

Municipality of Kincardine Review of Options to Increase Capacity Park St. Sewage Pumping Station

Job # :	08055
Date :	Sept. 2011
Revised :	June 2016

1.0 Introduction

The existing sanitary sewer collection system for the Park Street tributary area was constructed in the 1970's to service residential growth in Kincardine. At that time, the service area was not expected to extend east of Highway 21. The sewage pumping station was originally designed by BMROSS and constructed in 1976. The station was sized based on population values provided at the time by the upstream land developer.

The current service area includes residential development, the Davidson Centre, Commercial development along the westerly side of Hwy. 21, Two Schools, One Church, Business Park on east side of Hwy. 21 including Canadian Tire, Sobey's, Tim Horton's, Boston Pizza, a hotel, and a Bank.

2.0 Existing Sewage Pumping Station

Original Design Information:

Drainage Area:	90	Ha.	
Residential Population:	3100	p.	
Per Capita Fow:	455	L/cap/day	(100 Ipgd)
P.F.	3.43	(Harmons)	
Peak Res. Sewage:	56.0	L/s	
Infiltration:	10.0	L/s	(Based on pipe length)
Community Centre:	26.5	L/s	
Future School:	5.7	L/s	
Commercial:	0.9	L/s	
Total:	99.1	L/s	(1976 Design Flow)
Req. pump capacity:	66.1	L/s	(Based on 2/3 Calculated Flow)

The station is a drypit/wetwell configuration with 3 pumps in total (2 pumps in parallel providing the required capacity). The station pumps directly to the headworks of the Kincardine sewage treatment plant via. approximately 1,200 metres of 300mm dia. forcemain. A portion of the existing forcemain was installed under the Penetangore River.

Genset:	Detroit Diesel			100	HP
				75	kW
Existing Pumps:	Fairbanks Morse Series 5443-32, vertical dry-pit non-clog, 4" suction				
		786.0	Uspgm	49.6	L/s
		81.0	feet	24.7	m
		30.0	HP	22.4	kW

Draw-down testing to determine current pump capacities was completed in April of 2008 with the folowing results:

Pump	Flow L/s
1	60
2	59
3	55
1,2	85
2,3	82
1,3	82

Station Capacity:

Existing Firm Capacity:	82	L/s.	(2 Pumps)
Noted CofA Capacity:	99	L/s.	

2.0 Historic Sewage Flows

Historic Sewage Flow Data Summary

Year	Pumped Volume m^3	Average Day m^3/day	Recorded Max. Day m^3/day
	2011 Study Values		
2005	293752	805	3569
2006	350577	960	3177
2007	299313	820	4536
2008	392465	1075	6454
2009	326686	895	5053
	2016 Study Update		
2012	322,163	880	2294
2013	345,870	949	9012
2014	344,601	943	3121
2015	293,944	806	2234
Values	328500	900	9000

Based on the above information, a maximum day flow event was observed in 2008 (January thaw/rain event) with a value of 6454 m^3/day (75 L/s). As reported by Kincardine operators it was necessary to run 3 pumps during this event to avoid a bypass. Operation staff have noted that similar events have occurred (January 2013) where 3 pumps have not been able to keep up with the peak flow and a "bypass" results. During these "bypass" events, the recorded data does not accurately represent the max. daily flow because the wetwell transducer (during the submerged period) does not accurately record the wetwell volume during the bypass period.

For purposes of being conservative it is suggested that the peak extraneous flow experienced in 2013 be used for peak system flows.

Based on the foregoing, and given the information available related to flows, we can summarize the past data as follows:

Current Service Area:	100	Ha	
Max. Extraneous Flow	9000	m^3/day	(Based on 2013)
	104.2	L/s	

As noted above, it is very difficult to ascertain the actual peak flow to this facility. We do know, however, through discussions with staff, that the peak flow at times exceeds the capacity of three pumps operating in parallel. Based on the draw-down testing completed in April 2008 it is estimated that 3 pumps in parallel will operate at a rate of about 97 L/s which is somewhat below the estimated peak sewage flow to the station (106 L/s). For estimating purpose it is suggested that the peak flow estimate include a 10% +/- contingency.

Contingency Allowance	10	%
Resulting Flow Allowance	10.4	L/s
Total Est. Peak Sewage	**115.0**	**L/s**

3.0 Proposed Development

Kincardine is considering the development of a business park located on over 70 Hectares of property on the east side of Hwy. 21. Some of the proposed development is planned immediately adjacent to the existing commercial developments (i.e., Canadian Tire, Sobey's, Tim Hortons, Holiday Inn Express) while the majority is being proposed to the east of Millenium Way and will require full servicing of the currently vacant property. In addition to the proposed development east of Hwy. 21, there are a few areas of residential development (on the west side of Hwy. 21) which are may possibly be serviced in the future and as such will start contributing flow to the Park St. SPS.

For the purpose of staging infrastructure, the proposed development area has been divided into phases. These phases are for calculation purposes only and are subject to modifications as part of the Master Plan process:

Stage 1 - Remainder of Committed Areas + First Half of Business Park Development Areas

Stage 1A - Flows into Durham St collection system

i. New Development (West of Hwy. 21)

- Residential - R	6.4 (FD2, FD3, FD4)
- Highway Service Commercial - HSC	1.2
- Large Format Commercial - LFC	0.0
- Light Industrial - LI	0.0

Stage 1B - Flows into Russell St collection system

ii. New Development (East of Hwy. 21 to Millenium Way)

- Residential - R	0.0
- Highway Service Commercial - HSC	5.2 (Incl. N.E corner of Hwy 9/21)
- Large Format Commercial - LFC	4.3
- Light Industrial - LI	0.0

iii. New Development (East of Hwy. 21 - Business Park)

- Residential - R	2.2
- Highway Service Commercial - HSC	9.9
- Large Format Commercial - LFC	12.0
- Light Industrial - LI	0.0

Stage 1A - Summary of Areas

- Residential - R	6.4 Ha
- Highway Service Commercial - HSC	1.2 Ha
- Large Format Commercial - LFC	0.0 Ha
- Light Industrial - LI	0.0 Ha
	7.6 Ha

Stage 1B - Summary of Areas

- Residential - R	2.2 Ha
- Highway Service Commercial - HSC	15.1 Ha
- Large Format Commercial - LFC	16.3 Ha
- Light Industrial - LI	0.0 Ha
	33.6 Ha

Stage 1 - Total New Development	**41.2 Ha**

Stage 2 - Second Half of Business Park Development Areas

i. New Development (East of Hwy. 21 - Business Park)

- Residential - R	0.0
- Highway Service Commercial - HSC	9.7
- Large Format Commercial - LFC	2.2
- Light Industrial - LI	20.8

Stage 2 - Total New Development **32.7 Ha**

Stage 3 - Future Lands North of Hwy 9 - Currently outside the Official Plan area

i New Development (East of Hwy. 21 - North of County Road 9)

- Residential - R	0.0
- Highway Service Commercial - HSC	7.6 (Not in OP Area)
- Large Format Commercial - LFC	7.6 (Not in OP Area)
- Light Industrial - LI	7.6 (Not in OP Area)

Stage 3 - Total New Development **22.9 Ha**

Summary of Development Stages and Associated Land Area

Stage	Development Type (Ha)				Summary
	R	HSC	LFC	LI	
1A	6.4	1.2	0.0	0.0	7.6
1B	2.2	15.1	16.3	0.0	33.6
2	0.0	9.7	2.2	20.8	32.7
3	0.0	7.6	7.6	7.6	22.9
Total	**8.6**	**33.6**	**26.1**	**28.4**	**96.8**

4.0 Sewage Flow From New Development Areas

Design Criteria for New Development Areas (Based on MOE Guidelines)

Note:	Residential Population Density =	35 ppHa
	Residential Sewage Flow =	450 L/cap/day

Land Use	Average Sewage Flow	Peaking Factor	Infiltration Allowance
R	0.18 L/Ha/s	Harmon	0.2 L/Ha/s
HSC	0.28 L/Ha/s	2.0	0.2 L/Ha/s
LFC	0.28 L/Ha/s	2.0	0.2 L/Ha/s
LI	0.35 L/Ha/s	2.5	0.2 L/Ha/s

Stage 1A

Land Use	Area Ha	Population	Peaking Factor	Average Sewage L/s	Peak Sewage L/s	Infiltration Allowance L/s	Total Sewage L/s
R	6.4	224	4.1	1.2	4.7	1.3	6.0
HSC	1.2	N/A	2.0	0.3	0.7	0.2	0.9
LFC	0.0	N/A	2.0	0.0	0.0	0.0	0.0
LI	0.0	N/A	2.5	0.0	0.0	0.0	0.0

Total Avg Sewage Flow 3.0 L/s
Total Peak Sewage Flow 6.9 L/s

Stage 1B

Land Use	Area Ha	Population	Peaking Factor	Average Sewage L/s	Peak Sewage L/s	Infiltration Allowance L/s	Total Sewage L/s
R	2.2	77	4.3	0.4	1.7	0.4	2.1
HSC	15.1	N/A	2.0	4.2	8.5	3.0	11.5
LFC	16.3	N/A	2.0	4.6	9.1	3.3	12.4
LI	0.0	N/A	2.5	0.0	0.0	0.0	0.0

Total Avg Sewage Flow 15.9 L/s
Total Peak Sewage Flow 26.0 L/s

Stage 2

Land Use	Area Ha	Population	Peaking Factor	Average Sewage L/s	Peak Sewage L/s	Infiltration Allowance L/s	Total Sewage L/s
R	0.0	0	4.5	0.0	0.0	0.0	0.0
HSC	9.7	N/A	2.0	2.7	5.4	1.9	7.4
LFC	2.2	N/A	2.0	0.6	1.2	0.4	1.7
LI	20.8	N/A	2.5	7.3	18.2	4.2	22.4

Total Avg Sewage Flow 17.2 L/s
Total Peak Sewage Flow 31.4 L/s

Stage 3 - Currently outside the Official Plan

Land Use	Area Ha	Population	Peaking Factor	Average Sewage L/s	Peak Sewage L/s	Infiltration Allowance L/s	Total Sewage L/s
R	0.0	0	4.5	0.0	0.0	0.0	0.0
HSC	7.6	N/A	2.0	2.1	4.3	1.5	5.8
LFC	7.6	N/A	2.0	2.1	4.3	1.5	5.8
LI	7.6	N/A	2.5	2.7	6.7	1.5	8.2

Total Avg Sewage Flow 11.5 L/s
Total Peak Sewage Flow 19.8 L/s

Peak Sewage Flow Summary

	Total Additional Flow to Park St. SPS		Flow Directed to the Russell St. Sanitary	
	Incr.	Cum.	Incr.	Cum.
	L/s	L/s	L/s	L/s
Stage 1A	**7.0**	**7.0**	**0.0**	**0.0**
Stage 1B	**26.0**	**33.0**	**26.0**	**26.0**
Stage 2	**31.0**	**64.0**	**31.0**	**57.0**
Stage 3	**20.0**	**84.0**	**20.0**	**77.0**

5.0 Park Street SPS and Peak Sewage Flow

The anticipated cumulative peak sewage flow to the Park Street Station is estimated as follows:

Existing	**115.0**	**L/s**
Stage 1A	**122.0**	**L/s**
Stage 1B	**148.0**	**L/s**
Stage 2	**179.0**	**L/s**
Stage 3	**199.0**	**L/s**

Note: Stage 3 has been included in the above to review feasibility only.

6.0 Existing Pumping Station Capacity

Check Existing Forcemain and Process Pipe Capacity

From MOE design guidelines, permissible velocities in piping are as noted below:

Station piping	0.8 to 4.0 m/s
Forcemain	0.8 to 2.5 m/s

Existing Forcemain Characteristics:

Forcemain diameter:	300	mm.
Design C factor:	120	
Top waterlevel in discharge chamber at STP	201.47	m.
Low waterlevel in SPS wetwell	187.15	m.
Static Head	14.3	m.

Calculate system Curve

Pipe diameter:	250	mm.	(Process Piping)
Pipe length:	3	m.	

250mm Dia. Fitting	Quantity	k" value	Total "k"
90 deg flared elbow	1	0.05	0.05
Gate valve	2	0.06	0.12
250 x 100 reducer	1	0.38	0.38
100 x 250 increaser	1	0.71	0.71
Check Valve	1	2.00	2.00
Branch Tee	1	0.54	0.54
Total "k"			3.80

Pipe ID diameter:	296	mm.	(Forcemain)
Pipe length (scaling from site plan shows 4000'):	1219	m.	

Fitting	Quantity	k" value	Total "k"
90 deg bend	4	0.24	0.96
Gate valve	1	0.05	0.05
Tee (branch)	1	0.51	0.51
Tee (run)	1	0.09	0.09
Exit loss	1	1.00	1.00
Total "k"			2.61

Discharge (L/s)	Velocity in 250mm dia. piping (m/s)	Velocity in 300mm dia. piping (m/s)	Losses in 250mm dia. fittings (m)	Losses in 250mm dia. pipe (m)	Losses in 300mm dia. fittings (m)	Losses in 300mm dia. pipe (m)	Static Head (m)	TDH (m)
0	0.00	0.00	0.00	0.00	0.00	0.00	14.3	14.3
10	0.20	0.15	0.01	0.00	0.00	0.14	14.3	14.5
20	0.41	0.29	0.03	0.00	0.01	0.50	14.3	14.9
30	0.61	0.44	0.07	0.01	0.03	1.05	14.3	15.5
40	0.81	0.58	0.13	0.01	0.04	1.79	14.3	16.3
50	1.02	0.73	0.20	0.02	0.07	2.71	14.3	17.3
60	1.22	0.87	0.29	0.02	0.10	3.80	14.3	18.5
70	1.43	1.02	0.39	0.03	0.14	5.05	14.3	19.9
80	1.63	1.16	0.51	0.04	0.18	6.47	14.3	21.5
90	1.83	1.31	0.65	0.05	0.23	8.04	14.3	23.3
100	2.04	1.45	0.80	0.05	0.28	9.77	14.3	25.2
110	2.24	1.60	0.97	0.07	0.34	11.66	14.3	27.4
120	2.44	1.74	1.16	0.08	0.40	13.69	14.3	29.7
130	2.65	1.89	1.36	0.09	0.47	15.88	14.3	32.1
140	2.85	2.03	1.58	0.10	0.55	18.21	14.3	34.8
150	3.06	2.18	1.81	0.12	0.63	20.69	14.3	37.6
160	3.26	2.33	2.06	0.13	0.72	23.32	14.3	40.5
170	3.46	2.47	2.32	0.15	0.81	26.08	14.3	43.7
180	3.67	2.62	2.60	0.16	0.91	28.99	14.3	47.0
190	3.87	2.76	2.90	0.18	1.01	32.04	14.3	50.5
200	4.07	2.91	3.22	0.20	1.12	35.23	14.3	54.1
210	4.28	3.05	3.54	0.22	1.24	38.56	14.3	57.9
220	4.48	3.20	3.89	0.24	1.36	42.03	14.3	61.8

Maximum Capacity with Existing Forcemain

For velocities to remain close to the range recommended in the MOE Guidelines, the maximum discharge through the existing piping should be kept below around 175 L/s. This flow will result in forcemain velocities at the high end of the range provided by the MOE (i.e., 2.54 m/s).

Consider that the maximum sized pumps to be connected to the existing forcemain should not have a combined pumping rate of greater than 175 L/s @ 45.3 m TDH.

Existing Wetwell Volume

Wetwell length		6.20 m	75056B - Sht4
Wetwell width		2.44 m	75056B - Sht4
Plan area of wetwell		15.13 m^2	
Pump stop elevation		187.45 m	75056B - Sht3
Pump start elevation		188.52 m	75056B - Sht3
Operating range		1.07 m	
Operating volume		16.19 m^3	
Suggested Maximum Pump Capacity		180 L/s	
Resulting inflow resulting in mimmum pump cycle time		90 L/s	
Time to fill or empty		180 seconds	
	=	3.00 minutes	
This will result in:		10.01 cycles/hour	

This is greater than the recommended 4-6 cycles/hour and will probably require a VFD on the new pumps to allow them to match their pump rate to inflow and avoid excessive cycling.

To compare:	4 cycles/hour would limit the max. possible pump flow to	72	L/s
	6 cycles/hour would limit the max. possible pump flow to	108	L/s

7.0 Upgrade Options

There are three basic ways to increase the pumping capacity of the William St sewage pumping station:

- Replace existing pumps with larger capacity units capable of forcing more flow through the existing forcemain.

- Twin the existing forcemain to allow the existing pumps to operate at a greater capacity.

- Twin the existing forcemain and replace the existing pumps with larger capacity units.

The options are examined in greater detail below.

7.1 Option 1: Install Larger Pumps to Provide Capacity for Stage 1, Retain Existing Forcemain

- At the completion of Stage 1 Development, calculations indicate that peak sewage flow should be in the range of 155 L/s. To meet this flow with two pumps running (firm capacity), all three pumps would need to be sized for a pumping rate of about 115 L/s to provide at 29m TDH. TDH at a flow of 155 L/s will be around 39 m.

- Pumps of the required capacity from either Hydromatic (SD4T; 56 kW/75 Hp) or Flygt (NT3301HT; 63 kW/85 Hp) are available and they should fit through the openings of the drywell.

- It is not known if the existing electrical service will be adequate to power the upgraded pumps, and will have to be investigated as part of detailed design. For cost estimating purposes it is assumed that some upgrades will be required to the power supply system.

- The existing standby power system will not be adequate for the larger pumps, and will need to be replaced / upgraded with a larger unit.

- VFD control of the larger pumps will be required to avoid excessive cycling.

Costs:

Item	Total Cost
Three new pumps with a capacity of 115 L/s @ 29 m TDH	$160,000
Install new pumps, including 2 weeks of wetwell bypass pumping	$110,000
Modifications to discharge piping, valving, and inlet pipe	$60,000
New 300 kW diesel generator set	$120,000
Three new VFDs	$110,000
Power system upgrades	$30,000
Control system upgrades	$55,000
Sub Total	$645,000
30% Engineering and Contingencies	$193,500
Total Probable Cost	$838,500

7.2 Option 2: Install Larger Pumps to Max. Forcemain Capacity, Retain Existing Forcemain

- To keep flow velocities in the existing station piping and forcemain within the range recommended in the MOE design guidelines, the pump capacity should be limited to approximately 175 L/s. However, the pumping rate could be increased to meet the theoretical sewage flow requirement (at the end of Stage 2) to about 190 L/s. This would result in foremain velocities in the range of about 2.8 m/s which is not significantly beyond the maximum velocity suggested by the MOE. Under normal operating conditions the pumping rate could be controlled through a VFD (which is advisable given the existing wetwell and new pump size) to maintain forcemain velocities within the MOE suggested maximum rate. All three pumps would need to be replaced with two units in operation having at least the required capacity. Each pump would need to be sized for about 145 L/s @ 36 m TDH. Two pumps running in parallel would result in a flow rate of about 190 L/s @ 49 m TDH.

- Pumps of the required capacity from Flygt (C3300HT; 78 kW/105 Hp) are available and they should fit through the openings of the drywell.

- It is not known if the existing electrical service will be adequate to power the upgraded pumps, and will have to be investigated as part of detailed design. For cost estimating purposes it is assumed that some upgrades will be required to the power supply system.

- The existing standby power system will not be adequate for the larger pumps, and will need to be replaced / upgraded with a larger unit.

- As noted, VFD control of the larger pumps will be required to avoid excessive cycling and to maintain forcemain velocities to within the range suggested by the MOE in their guidelines.

Costs:

Item	Total Cost
Three new pumps with a capacity of 145 L/s @ 36 m TDH	$190,000
Install new pumps, including 2 weeks of wetwell bypass pumping	$110,000
Modifications to discharge piping, valving, and inlet pipe	$60,000
New 350 kW diesel generator set	$130,000
Three new VFDs	$160,000
Power system upgrades	$30,000
Control system upgrades	$55,000
Sub Total	$735,000
30% Engineering and Contingencies	$220,500
Total Probable Cost	$955,500

7.3 Option 3: Retain Existing Pumps and Twin the Forcemain

- This option involves installing a second 300mm diameter forcemain from the existing pumping station to the existing inlet structure at the lagoons. A second forcemain will allow two of the three pumps to pump through it's own forcemain. This should allow each of the pumps to deliver it's full single-pump capacity when operating in parallel. This would then give a station capacity of around 115 L/s. It is noted that twinning the forcemain alone does not provide sufficient capacity to accomodate the future business park development.

- Operation in this manner would mean that there would be no electrical or standby power upgrade requirements under this option.

- Modifications will be required to the existing bypass valve chamber and the lagoon inlet chamber to accommodate the second forcemain.

Costs:

Item		Total Cost
300 mm dia. forcemain (directionally drilled)		$500,000
Modify lagoon chamber for second inlet		$70,000
Modify bypass chamber and piping for second forcemain		$170,000
	Sub Total	$740,000
	30% Engineering and Contingencies	$222,000
	Total Probable Cost	$962,000

7.4 Option 4: Twin Existing 300 mm Diameter Forcemain; Replace Existing Pumps (Maximum Capacity)

- This is a combination of the previous options which will maximize station capacity by replacing the existing pumps with three new pumps, each having a capacity of 115 L/s, and twinning the existing forcemain. This will give a firm station capacity of 230 L/s, with one pump acting as standby.

- It is assumed that a new electrical service will be required to the pumping station, along with a new standby power unit and control system. All three pumps will be equipped with VFDs due to wetwell volume limitations.

Costs:

Item		Total Cost
Three new pumps with a capacity of 145 L/s @ 36 m TDH		$190,000
Install new pumps, including 2 weeks of wetwell bypass pumping		$110,000
Modifications to discharge piping, valving, and inlet pipe		$60,000
New 350 kW diesel generator set		$130,000
Three new VFDs		$160,000
Power system upgrades		$30,000
Control system upgrades		$55,000
300 mm dia. forcemain (directionally drilled)		$500,000
Modify lagoon chamber for second inlet		$70,000
Modify bypass chamber and piping for second forcemain		$170,000
	Sub Total	$1,475,000
	30% Engineering and Contingencies	$442,500
	Total Probable Cost	$1,917,500

8.0 Discussion

Three basic options were considered to increase the capacity of the existing Park St. sewage pumping station. These were:

- Install larger pumps in the existing wetwell and use existing forcemain
- Retain existing pumps and twin the existing forcemain
- Install larger pumps and twin the existing forcemain to maximize station capacity

These will be discussed in greater detail, below.

As noted above, current firm station capaity is about 82 L/s (two pumps in operation)

8.1 Install Larger Pumps in the Existing Wetwell and Use Existing Forcemain (Option 1,2)

Revised station capacity:	155 L/s to 190 L/s
Probable option cost:	$840,000 to $955,000

Discussion:

- This option provides about a 90% increase to a 130% increase in the existing station capacity.

- A considerable increase in discharge pressure is required to move the greater flows through the existing forcemain. This means greater power costs for operation and increased risk of forcemain failure.

- Capacity can be doubled again through twinning of forcemain and electrical/control modifications (see Option 4).

8.2 Retain Existing Pumps and Twin the Existing Forcemain (Options 3)

Revised station capacity:	115 L/s
Probable option cost:	$962,000

- This option provides a 40% increase in the existing station capacity.

- Construction of this option can be staged, depending on the degree of security/redundancy required for the pumping capacity.

- Twin forcemains will allow swabbing of the forcemains while maintaining station in operation and increases pumping station security by providing forcemain redundancy. This is important since it has been demonstrated that regular forcemain maintenance is required for this installation to maintain design pumping capacity.

- Lower friction losses in twin forcemains will result in lower energy consumption under two-pump operation when compared to pumping the same flow through a single forcemain.

- Capacity can be increased by a further 100 L/s through pump replacement (see Option 4).

8.3 Install Larger Pumps and Twin Existing Forcemain to Maximize Station Capacity (Option 4)

Revised station capacity:	230 L/s
Probable option cost:	$1,917,500

- This option provides a 180% increase in the existing station capacity.

APPENDIX E

MIDUSS INPUT PARAMETERS

MIDUSS - Input Parameters

KINCARDINE BUSINESS PARK
Municipality of Kincardine
08055

No.	Impervious				Catchment				Catch	Flow	Overland	%	Impervious	Pervious	Channel
	n	CN	Ia/S	in.ab	n	CN	Ia/S	in.ab	Area	Length	Slope	Impervious	Area	Area	Length
PRE-DEVELOPMENT MIDUSS MODEL PARAMETERS															
50	0.013	98	0.1	0.518	0.22	81	0.1	5.96	396.0	450	2.5	0.0	0.0	396.0	3000
52	0.013	98	0.1	0.518	0.25	80	0.1	6.35	196.0	250	7.0	0.0	0.0	196.0	1300
54	0.013	98	0.1	0.518	0.28	79	0.1	6.75	39.0	140	11.0	0.0	0.0	39.0	800
56	0.013	98	0.1	0.518	0.21	82	0.1	5.58	345.0	240	3.0	0.0	0.0	345.0	1300
58	0.013	98	0.1	0.518	0.23	81	0.1	5.96	82.0	140	15.0	0.0	0.0	82.0	700
59	0.013	98	0.1	0.518	0.35	76	0.1	8.02	128.0	170	18.0	0.0	0.0	128.0	1500
60	0.013	98	0.1	0.518	0.23	81	0.1	5.96	225.0	270	2.5	0.0	0.0	225.0	1800
62	0.013	98	0.1	0.518	0.25	80	0.1	6.35	95.0	160	2.5	0.0	0.0	95.0	1800
64	0.013	98	0.1	0.518	0.21	82	0.1	5.58	80.0	220	5.5	0.0	0.0	80.0	700
100	0.013	98	0.1	0.518	0.23	81	0.1	5.96	45.0	100	7.0	0.0	0.0	45.0	1500
101	0.013	98	0.1	0.518	0.28	80	0.1	6.35	11.2	50	7.0	0.0	0.0	11.2	700
201	0.013	98	0.1	0.518	0.20	82	0.1	5.58	166.0	250	3.0	0.0	0.0	166.0	1900
202	0.013	98	0.1	0.518	0.20	82	0.1	5.58	8.0	225	4.0	0.0	0.0	8.0	260
203	0.013	98	0.1	0.518	0.20	82	0.1	5.58	13.6	150	3.5	0.0	0.0	13.6	350
204	0.013	98	0.1	0.518	0.20	82	0.1	5.58	6.8	120	2.0	0.0	0.0	6.8	150
301	0.013	98	0.1	0.518	0.20	82	0.1	5.58	16.4	95	2.5	0.0	0.0	16.4	480
302	0.013	98	0.1	0.518	0.20	82	0.1	5.58	5.0	110	3.5	0.0	0.0	5.0	280
303	0.013	98	0.1	0.518	0.20	82	0.1	5.58	11.6	135	4.5	0.0	0.0	11.6	430
304	0.013	98	0.1	0.518	0.20	82	0.1	5.58	6.3	150	2.5	0.0	0.0	6.3	130
401	0.013	98	0.1	0.518	0.20	82	0.1	5.58	5.6	240	3.5	0.0	0.0	5.6	225
402	0.013	98	0.1	0.518	0.20	82	0.1	5.58	4.2	80	4.0	0.0	0.0	4.2	280
403	0.013	98	0.1	0.518	0.20	82	0.1	5.58	6.4	75	4.0	0.0	0.0	6.4	410
404	0.013	98	0.1	0.518	0.20	82	0.1	5.58	2.7	60	2.5	0.0	0.0	2.7	160
501	0.013	98	0.1	0.518	0.20	82	0.1	5.58	2.5	80	3.5	0.0	0.0	2.5	120
502	0.013	98	0.1	0.518	0.20	82	0.1	5.58	0.5	120	3.5	0.0	0.0	0.5	170
503	0.013	98	0.1	0.518	0.20	82	0.1	5.58	8.2	90	5.0	0.0	0.0	8.2	350
504	0.013	98	0.1	0.518	0.20	82	0.1	5.58	3.9	90	2.5	0.0	0.0	3.9	140
603	0.013	98	0.1	0.518	0.20	82	0.1	5.58	5.6	100	2.5	0.0	0.0	5.6	260
605	0.013	98	0.1	0.518	0.20	82	0.1	5.58	3.4	100	2.5	0.0	0.0	3.4	170
TOTAL									**1918.9**				**0.0**	**1918.9**	

No.	Impervious				Catchment				Catch Area	Flow Length	Overland Slope	% Impervious	Impervious Area	Pervious Area	Channel Length
	n	CN	Ia/S	in.ab	n	CN	Ia/S	in.ab							
POST-DEVELOPMENT MIDUSS MODEL PARAMETERS															
50	0.013	98	0.1	0.518	0.22	81	0.1	5.96	396.0	450	2.5	0.0	0.0	396.0	3000
52	0.013	98	0.1	0.518	0.25	80	0.1	6.35	196.0	250	7.0	0.0	0.0	196.0	1300
54	0.013	98	0.1	0.518	0.28	79	0.1	6.75	39.0	140	11.0	0.0	0.0	39.0	800
56	0.013	98	0.1	0.518	0.21	82	0.1	5.58	345.0	240	3.0	0.0	0.0	345.0	1300
58	0.013	98	0.1	0.518	0.23	81	0.1	5.96	82.0	140	15.0	0.0	0.0	82.0	700
59	0.013	98	0.1	0.518	0.35	76	0.1	8.02	128.0	170	18.0	0.0	0.0	128.0	1500
60	0.013	98	0.1	0.518	0.23	81	0.1	5.96	225.0	270	2.5	0.0	0.0	225.0	1800
62	0.013	98	0.1	0.518	0.25	80	0.1	6.35	95.0	160	2.5	0.0	0.0	95.0	1800
64	0.013	98	0.1	0.518	0.21	82	0.1	5.58	80.0	220	5.5	0.0	0.0	80.0	700
100	0.013	98	0.1	0.518	0.23	81	0.1	5.96	45.0	100	7.0	0.0	0.0	45.0	1500
101	0.013	98	0.1	0.518	0.28	80	0.1	6.35	11.2	50	7.0	0.0	0.0	11.2	700
201	0.013	98	0.1	0.518	0.20	82	0.1	5.58	166.0	250	3.0	0.0	0.0	166.0	1900
202	0.013	98	0.1	0.518	0.25	80	0.1	6.35	4.0	225	4.0	0.0	0.0	4.0	200
203	0.013	98	0.1	0.518	0.21	82	0.1	5.58	9.1	150	3.5	0.0	0.0	9.1	450
301	0.013	98	0.1	0.518	0.23	81	0.1	5.96	16.4	95	2.5	0.0	0.0	16.4	600
302	0.013	98	0.1	0.518	0.28	80	0.1	6.35	6.0	100	2.0	50.0	3.0	3.0	180
303	0.013	98	0.1	0.518	0.20	82	0.1	5.58	4.8	100	2.0	75.0	3.6	1.2	250
304	0.013	98	0.1	0.518	0.20	82	0.1	5.58	1.6	75	1.0	50.0	0.8	0.8	50
310	0.013	98	0.1	0.518	0.20	82	0.1	5.58	2.4	75	2.0	75.0	1.8	0.6	200
311	0.013	98	0.1	0.518	0.20	82	0.1	5.58	6.6	100	2.0	75.0	5.0	1.6	200
312	0.013	98	0.1	0.518	0.30	83	0.1	5.20	4.4	100	2.0	75.0	3.3	1.1	100
313	0.013	98	0.1	0.518	0.30	83	0.1	5.20	1.8	50	2.0	75.0	1.4	0.4	80
314	0.013	98	0.1	0.518	0.30	83	0.1	5.20	3.3	20	1.0	50.0	1.7	1.6	50
401	0.013	98	0.1	0.518	0.30	83	0.1	5.20	5.6	240	3.5	0.0	0.0	5.6	150
402	0.013	98	0.1	0.518	0.30	83	0.1	5.20	7.4	100	2.0	50.0	3.7	3.7	300
403	0.013	98	0.1	0.518	0.30	83	0.1	5.20	4.7	70	2.0	75.0	3.5	1.2	300
404	0.013	98	0.1	0.518	0.30	83	0.1	5.20	3.2	60	2.0	75.0	2.4	0.8	200
405	0.013	98	0.1	0.518	0.30	83	0.1	5.20	3.2	75	2.0	75.0	2.4	0.8	150
406	0.013	98	0.1	0.518	0.20	82	0.1	5.58	1.3	10	2.0	85.0	1.1	0.2	50
407	0.013	98	0.1	0.518	0.30	83	0.1	5.20	3.0	100	2.0	75.0	2.3	0.7	100
500	0.013	98	0.1	0.518	0.20	81	0.1	5.96	5.8	100	2.0	70.0	4.1	1.7	200
501	0.013	98	0.1	0.518	0.30	83	0.1	5.20	2.5	80	3.5	0.0	0.0	2.5	100
603	0.013	98	0.1	0.518	0.30	83	0.1	5.20	5.6	100	2.5	0.0	0.0	5.6	225
604	0.013	98	0.1	0.518	0.30	83	0.1	5.20	2.7	100	2.5	0.0	0.0	2.7	250
605	0.013	98	0.1	0.518	0.30	83	0.1	5.20	3.9	100	2.5	0.0	0.0	3.9	200
750	0.013	98	0.1	0.518	0.20	81	0.1	5.96	0.5	50	2.0	100.0	0.5	0.0	200
751	0.013	98	0.1	0.518	0.20	81	0.1	5.96	0.2	50	2.0	100.0	0.2	0.0	200
TOTAL									**1918.2**				**40.8**	**1877.4**	

(grey)	Indicates Catchment Areas that are Tributary to SWM Facility #1 (CTC Pond Area)
(yellow)	Indicates Catchment Areas that are Tributary to SWM Facility #2
(blue)	Indicates Catchment Areas that are Tributary to SWM Facility #3

Table of Curve Numbers for BC Hydrologic Soil Type

Land Use	CN Value	Mann. 'n'	Description
Meadow	71	0.40	continuous grass
Woodlot	73.5	0.40	forests
Long Grass	79	0.35	natural, not maintained
Lawns	83	0.30	maintained
Pasture	76	0.25	farm pasture or range
Crop	82	0.20	farm land
Fallow	91	0.10	idle farmland (bare)

	Area Tributary to Pond	**Imp. Area**	**% Impervious**
Pond #2	56.0	20.3	36
Pond #3	17.7	12.2	69

PRE-DEVELOPMENT MIDUSS MODEL PARAMETERS

Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture	Crop	Fallow	Total Percent.	Weighted CN	Weighted n	Perv. Area From Above
50	0%	5%	5%	0%	0%	90%	0%	100%	81	0.22	396.0
52	0%	20%	5%	0%	0%	75%	0%	100%	80	0.25	196.0
54	0%	30%	15%	0%	0%	55%	0%	100%	79	0.28	39.0
56	0%	2%	5%	0%	0%	93%	0%	100%	82	0.21	345.0
58	0%	5%	15%	0%	0%	80%	0%	100%	81	0.23	82.0
59	0%	60%	20%	0%	0%	20%	0%	100%	76	0.35	128.0
60	0%	10%	5%	0%	0%	85%	0%	100%	81	0.23	225.0
62	0%	20%	5%	0%	0%	75%	0%	100%	80	0.25	95.0
64	0%	0%	5%	0%	0%	95%	0%	100%	82	0.21	80.0
100	0%	5%	10%	0%	0%	85%	0%	100%	81	0.23	45.0
101	0%	20%	25%	0%	0%	55%	0%	100%	80	0.28	11.2
201	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	166.0
202	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	8.0
203	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	13.6
204	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	6.8
301	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	16.4
302	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	5.0
303	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	11.6
304	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	6.3
401	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	5.6
402	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	4.2

Catchment	201	202	Long Grass	204	301	302	303	Total Percent.	Weighted CN	Weighted n	Perv. Area From Above
403	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	6.4
404	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	2.7
501	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	2.5
502	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	0.5
503	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	8.2
504	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	3.9
603	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	5.6
605	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	3.4
TOTAL											**1918.9**

POST-DEVELOPMENT MIDUSS MODEL PARAMETERS											
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture	Crop	Fallow	Total Perv. Area	Weighted CN	Weighted n	Perv. Area From Above
50	0%	5%	5%	0%	0%	90%	0%	100%	81	0.22	396.0
52	0%	20%	5%	0%	0%	75%	0%	100%	80	0.25	196.0
54	0%	30%	15%	0%	0%	55%	0%	100%	79	0.28	39.0
56	0%	2%	5%	0%	0%	93%	0%	100%	82	0.21	345.0
58	0%	5%	15%	0%	0%	80%	0%	100%	81	0.23	82.0
59	0%	60%	20%	0%	0%	20%	0%	100%	76	0.35	128.0
60	0%	10%	5%	0%	0%	85%	0%	100%	81	0.23	225.0
62	0%	20%	5%	0%	0%	75%	0%	100%	80	0.25	95.0
64	0%	0%	5%	0%	0%	95%	0%	100%	82	0.21	80.0
100	0%	5%	10%	0%	0%	85%	0%	100%	81	0.23	45.0
101	0%	20%	25%	0%	0%	55%	0%	100%	80	0.28	11.2
201	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	166.0
202	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	4.0
203	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	9.1
301	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	16.4
302	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	3.0
303	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	1.2
304	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	0.8
310	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	0.6
311	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	1.6
312	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	1.1
313	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	0.4
314	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	1.6
401	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	5.6
402	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	3.7
403	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	1.2
404	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	0.8
405	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	0.8
406	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	0.2
407	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	0.7
500	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	1.7
501	0%	0%	0%	0%	0%	100%	0%	100%	82	0.20	2.5
603	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	5.6
604	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	2.7
605	0%	0%	0%	100%	0%	0%	0%	100%	83	0.30	3.9
TOTAL											**1877.4**

MIDUSS - Rainfall Intensity - IDF Curve Parameters

KINCARDINE BUSINESS PARK
Municipality of Kincardine
08055

Precipitation Data - ***Goderich*** **- SCS Type II (6 Hour)**

	Return Period			**Volume**
Return	***a***	***b***	***c***	***mm***
Period				
2-Year	1154.572	12.323	0.869	40.400
5-Year	2070.901	20.382	0.904	58.700
10-Year	2924.707	25.799	0.929	70.800
25-Year	4210.292	31.868	0.955	86.100
50-Year	5783.612	37.889	0.984	97.500
100-Year	6928.137	40.974	0.994	108.800
250-Year				285.000

(212mm with AMCIII)

Refer to July 2006 Hydrology Study in Support of Floodplain Mapping Project 2005

APPENDIX F

MIDUSS MODEL OUTPUT FILES

MIDUSS MODEL OUTPUT FILE INDEX

Miduss File	Description
08055-Pre-Existing 2 Year.out	Pre-Existing Drainage Area 2 Yr. Storm
08055-Pre- Existing 5 Year.out	Pre-Existing Drainage Area 5 Yr. Storm
08055-Pre-Existing 10 Year.out	Pre-Existing Drainage Area 10 Yr. Storm
08055-Pre-Exisitng 25 Year.out	Pre-Existing Drainage Area 25 Yr. Storm
08055-Pre-Existing 50 Year.out	Pre-Existing Drainage Area 50 Yr. Storm
08055-Pre-Existing 100 Year.out	Pre-Existing Drainage Area 100 Yr. Storm
08055-Post 2 Year.out	Developed Drainage Area 2 Yr. Storm
08055-Post 5 Year.out	Developed Drainage Area 5 Yr. Storm
08055-Post 10 Year.out	Developed Drainage Area 10 Yr. Storm
08055-Post 25 Year.out	Developed Drainage Area 25 Yr. Storm
08055-Post 50 Year.out	Developed Drainage Area 50 Yr. Storm
08055-Post 100 Year.out	Developed Drainage Area 100 Yr. Storm

Note: 1. All Miduss modelling files provided digitally on CD.
2. Highlighted modelling provided in hard copy format.

PRE-EXISTING – 5 YEAR

```
"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                         Version 2.25  rev. 465"
"               MIDUSS created                      Tuesday, February 05, 2008"
"          10   Units used:                                          ie METRIC"
"               Job folder:              C:\Users\derb\Desktop\Kincardine Miduss"
"               Output filename:                08055 - Pre-Existing 5 Year.out"
"               Licensee name:                                        EliteBook"
"               Company                                                  BMROSS"
"               Date & Time last used:                   7/14/2011 at 4:05:31 PM"
" 31          TIME PARAMETERS"
"       5.000   Time Step"
"     360.000   Max. Storm length"
"    1800.000   Max. Hydrograph"
" 32          STORM Mass Curve"
"           3   Mass Curve"
"      58.700   Rainfall depth"
"     360.000   Duration"
"          41   C:\Program Files\MIDUSS\SCS_6hr_Type2.mrd   SCS Type II - 6 hour
Distribution - Ontario"
"             Maximum intensity            45.786    mm/hr"
"             Total depth                  58.700    mm"
"           6   005hyd   Hydrograph extension used in this file"
" 81          ADD COMMENT==================================================="
"          1  Lines of comment"
"             Start of Penetangore Tributary"
" 33          CATCHMENT 50"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          50   No description"
"       0.000   % Impervious"
"     396.000   Total Area"
"     450.000   Flow length"
"       2.500   Overland Slope"
"     396.000   Pervious Area"
"     450.000   Pervious length"
"       2.500   Pervious slope"
"       0.000   Impervious Area"
"     450.000   Impervious length"
"       2.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      81.000   Pervious SCS Curve No."
"       0.422   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.958   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  10.190     0.000     0.000     0.000 c.m/sec"
"             Catchment 50           Pervious   Impervious Total Area "
"             Surface Area           396.000    0.000      396.000    hectare"
"             Time of concentration  95.354     13.283     95.354     minutes"
"             Time to Centroid       342.104    218.977    342.104    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        23.2452    0.0000     23.2452    ha-m"
"             Rainfall losses        33.937     5.504      33.937     mm"
"             Runoff depth           24.763     53.196     24.763     mm"
"             Runoff volume          9.8061     0.0000     9.8061     ha-m"
"             Runoff coefficient     0.422      0.000      0.422      "
"             Maximum flow           10.190     0.000      10.190     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  10.190    10.190     0.000     0.000"
" 52          CHANNEL DESIGN"
"      10.190   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"             Depth of flow                 1.246    metre"
"             Velocity                      1.425    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.908    metre"
" 53          ROUTE    Channel Route 3000"
"     3000.00       Channel Route 3000 Reach length   ( metre)"
"       0.406   X-factor <= 0.5"
"     315.804   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           5   No. of sub-reaches"
"             Peak outflow                 10.018    c.m/sec"
"                  10.190    10.190    10.018     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                  10.190    10.018    10.018     0.000"
" 33          CATCHMENT 52"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          52   No description"
"       0.000   % Impervious"
"     196.000   Total Area"
"     250.000   Flow length"
"       7.000   Overland Slope"
"     196.000   Pervious Area"
"     250.000   Pervious length"
"       7.000   Pervious slope"
"       0.000   Impervious Area"
"     250.000   Impervious length"
"       7.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      80.000   Pervious SCS Curve No."
"       0.403   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       6.350   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   7.959    10.018    10.018     0.000 c.m/sec"
"             Catchment 52           Pervious   Impervious Total Area "
"             Surface Area           196.000    0.000      196.000    hectare"
"             Time of concentration  49.947     6.855      49.947     minutes"
"             Time to Centroid       288.104    211.306    288.104    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        11.5052    0.0000     11.5052    ha-m"
"             Rainfall losses        35.049     6.025      35.049     mm"
"             Runoff depth           23.651     52.675     23.651     mm"
"             Runoff volume          4.6356     0.0000     4.6356     ha-m"
"             Runoff coefficient     0.403      0.000      0.403      "
"             Maximum flow           7.959      0.000      7.959      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   7.959    12.923    10.018     0.000"
" 52          CHANNEL DESIGN"
"      12.923   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.400   Gradient   %"
"             Depth of flow                 1.456    metre"
"             Velocity                      1.393    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.021    metre"
" 53          ROUTE    Channel Route 1300"
"     1300.00       Channel Route 1300 Reach length   ( metre)"
"       0.376   X-factor <= 0.5"
"     349.856   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"             Peak outflow                 12.836    c.m/sec"
"                   7.959    12.923    12.836     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                   7.959    12.836    12.836     0.000"
" 33          CATCHMENT 54"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          54   No description"
"       0.000   % Impervious"
"      39.000   Total Area"
"     140.000   Flow length"
"      11.000   Overland Slope"
"      39.000   Pervious Area"
"     140.000   Pervious length"
"      11.000   Pervious slope"
"       0.000   Impervious Area"
"     140.000   Impervious length"
"      11.000   Impervious slope"
"       0.210   Pervious Manning 'n'"
"      81.000   Pervious SCS Curve No."
"       0.422   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.958   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   2.426    12.836    12.836     0.000 c.m/sec"
"             Catchment 54           Pervious   Impervious Total Area "
"             Surface Area           39.000     0.000      39.000     hectare"
"             Time of concentration  27.329     4.227      27.329     minutes"
"             Time to Centroid       259.963    208.037    259.963    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        2.2893     0.0000     2.2893     ha-m"
"             Rainfall losses        33.953     6.167      33.953     mm"
"             Runoff depth           24.747     52.533     24.747     mm"
"             Runoff volume          9651.26    0.02       9651.28    c.m"
"             Runoff coefficient     0.422      0.000      0.422      "
"             Maximum flow           2.426      0.000      2.426      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   2.426    13.266    12.836     0.000"
" 52          CHANNEL DESIGN"
"      13.266   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.400   Gradient   %"
"             Depth of flow                 1.473    metre"
"             Velocity                      1.403    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.035    metre"
" 53          ROUTE    Channel Route 800"
"      800.00       Channel Route 800 Reach length   ( metre)"
"       0.297   X-factor <= 0.5"
"     213.864   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"             Peak outflow                 13.220    c.m/sec"
"                   2.426    13.266    13.220     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    10"
"           6   Combine "
"          10   Node #"
"               Confluence on Penetangore Tributary"
"             Maximum flow                 13.220    c.m/sec"
"             Hydrograph volume        154068.359    c.m"
"                   2.426    13.266    13.220    13.220"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   2.426     0.000    13.220    13.220"
" 33          CATCHMENT 60"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          60   No description"
"       0.000   % Impervious"
"     225.000   Total Area"
"     270.000   Flow length"
"       2.500   Overland Slope"
"     225.000   Pervious Area"
"     270.000   Pervious length"
"       2.500   Pervious slope"
"       0.000   Impervious Area"
"     270.000   Impervious length"
"       2.500   Impervious slope"
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"        0.230   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.422   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  7.768     0.000    13.220    13.220 c.m/sec"
"             Catchment 60           Pervious   Impervious Total Area "
"             Surface Area           225.000    0.000      225.000    hectare"
"             Time of concentration  66.758     9.777      66.758     minutes"
"             Time to Centroid       307.583    214.714    307.583    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        13.2075    0.0000     13.2075    ha-m"
"             Rainfall losses        33.938     5.762      33.938     mm"
"             Runoff depth           24.762     52.938     24.762     mm"
"             Runoff volume          5.5715     0.0000     5.5715     ha-m"
"             Runoff coefficient     0.422      0.000      0.422      "
"             Maximum flow           7.768      0.000      7.768      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  7.768     7.768    13.220    13.220"
" 52          CHANNEL DESIGN"
"        7.768   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"             Depth of flow                 1.159    metre"
"             Velocity                      1.223    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                0.792    metre"
" 53          ROUTE    Channel Route 1800"
"     1800.00      Channel Route 1800 Reach length   ( metre)"
"        0.390   X-factor <= 0.5"
"      367.870   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                  7.635    c.m/sec"
"                  7.768     7.768     7.635    13.220 c.m/sec"
" 40          HYDROGRAPH   Combine    10"
"            6   Combine "
"           10   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 19.506    c.m/sec"
"             Hydrograph volume        209783.594    c.m"
"                  7.768     7.768     7.635    19.506"
" 40          HYDROGRAPH   Confluence    10"
"            7   Confluence "
"           10   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 19.506    c.m/sec"
"             Hydrograph volume        209783.609    c.m"
"                  7.768    19.506     7.635     0.000"
" 52          CHANNEL DESIGN"
"       19.506   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"             Depth of flow                 1.744    metre"
"             Velocity                      1.547    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.248    metre"
" 53          ROUTE    Channel Route 2000"
"     2000.00      Channel Route 2000 Reach length   ( metre)"
"        0.358   X-factor <= 0.5"
"      323.201   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                 19.475    c.m/sec"
"                  7.768    19.506    19.475     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    11"
"            6   Combine "
"           11   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 19.475    c.m/sec"
"             Hydrograph volume        209783.500    c.m"
"                  7.768    19.506    19.475    19.475"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  7.768     0.000    19.475    19.475"
" 33          CATCHMENT 62"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           62   No description"
"        0.000   % Impervious"
"       95.000   Total Area"
"      160.000   Flow length"
"        2.500   Overland Slope"
"       95.000   Pervious Area"
"      160.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      160.000   Impervious length"
"        2.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       80.000   Pervious SCS Curve No."
"        0.403   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.350   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  3.760     0.000    19.475    19.475 c.m/sec"
"             Catchment 62           Pervious   Impervious Total Area "
"             Surface Area           95.000     0.000      95.000     hectare"
"             Time of concentration  52.044     7.142      52.044     minutes"
"             Time to Centroid       290.632    211.675    290.632    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        5.5765     0.0000     5.5765     ha-m"
"             Rainfall losses        35.050     5.748      35.050     mm"
"             Runoff depth           23.650     52.952     23.650     mm"
"             Runoff volume          2.2467     0.0000     2.2467     ha-m"
"             Runoff coefficient     0.403      0.000      0.403      "
"             Maximum flow           3.760      0.000      3.760      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  3.760     3.760    19.475    19.475"
" 52          CHANNEL DESIGN"
"        3.760   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.300   Gradient   %"
"             Depth of flow                 0.886    metre"
"             Velocity                      0.911    m/sec"
"             Channel capacity            215.995    c.m/sec"
"             Critical depth                0.542    metre"
" 53          ROUTE    Channel Route 1800"
"     1800.00      Channel Route 1800 Reach length   ( metre)"
"        0.346   X-factor <= 0.5"
"      370.426   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            4   No. of sub-reaches"
"             Peak outflow                  3.593    c.m/sec"
"                  3.760     3.760     3.593    19.475 c.m/sec"
" 40          HYDROGRAPH   Combine    11"
"            6   Combine "
"           11   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 22.226    c.m/sec"
"             Hydrograph volume        232250.453    c.m"
"                  3.760     3.760     3.593    22.226"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  3.760     0.000     3.593    22.226"
" 33          CATCHMENT 56"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           56   No description"
"        0.000   % Impervious"
"      345.000   Total Area"
"      240.000   Flow length"
"       11.000   Overland Slope"
"      345.000   Pervious Area"
"      240.000   Pervious length"
"       11.000   Pervious slope"
"        0.000   Impervious Area"
"      240.000   Impervious length"
"       15.000   Impervious slope"
"        0.280   Pervious Manning 'n'"
"       79.000   Pervious SCS Curve No."
"        0.385   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.752   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                 14.138     0.000     3.593    22.226 c.m/sec"
"             Catchment 56           Pervious   Impervious Total Area "
"             Surface Area           345.000    0.000      345.000    hectare"
"             Time of concentration  46.250     5.322      46.250     minutes"
"             Time to Centroid       284.430    209.376    284.430    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        20.2515    0.0000     20.2515    ha-m"
"             Rainfall losses        36.119     5.390      36.119     mm"
"             Runoff depth           22.581     53.310     22.581     mm"
"             Runoff volume          7.7903     0.0000     7.7903     ha-m"
"             Runoff coefficient     0.385      0.000      0.385      "
"             Maximum flow           14.138     0.000      14.138     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                 14.138    14.138     3.593    22.226"
" 52          CHANNEL DESIGN"
"       14.138   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"             Depth of flow                 1.515    metre"
"             Velocity                      1.426    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.067    metre"
" 53          ROUTE    Channel Route 1300"
"     1300.00      Channel Route 1300 Reach length   ( metre)"
"        0.372   X-factor <= 0.5"
"      341.945   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                 13.869    c.m/sec"
"                 14.138    14.138    13.869    22.226 c.m/sec"
" 40          HYDROGRAPH   Combine    11"
"            6   Combine "
"           11   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 30.912    c.m/sec"
"             Hydrograph volume        310152.906    c.m"
"                 14.138    14.138    13.869    30.912"
" 40          HYDROGRAPH   Confluence    11"
"            7   Confluence "
"           11   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 30.912    c.m/sec"
"             Hydrograph volume        310152.906    c.m"
"                 14.138    30.912    13.869     0.000"
" 52          CHANNEL DESIGN"
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"       30.912   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 2.026    metre"
"             Velocity                      1.889    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                1.552    metre"
" 53          ROUTE    Channel Route 1300"
"      1300.00      Channel Route 1300 Reach length   ( metre)"
"        0.367   X-factor <= 0.5"
"      258.058   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                 30.822    c.m/sec"
"                    14.138    30.912    30.822     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 30.822    c.m/sec"
"             Hydrograph volume        310153.156    c.m"
"                    14.138    30.912    30.822    30.822"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    14.138     0.000    30.822    30.822"
" 33          CATCHMENT 58"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           58   No description"
"        0.000   % Impervious"
"       82.000   Total Area"
"      140.000   Flow length"
"       15.000   Overland Slope"
"       82.000   Pervious Area"
"      140.000   Pervious length"
"       15.000   Pervious slope"
"        0.000   Impervious Area"
"      140.000   Impervious length"
"       15.000   Impervious slope"
"        0.230   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.422   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     5.207     0.000    30.822    30.822 c.m/sec"
"             Catchment 58           Pervious   Impervious Total Area "
"             Surface Area           82.000     0.000      82.000     hectare"
"             Time of concentration  26.297     3.851      26.297     minutes"
"             Time to Centroid       258.726    207.490    258.726    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        4.8134     0.0000     4.8134     ha-m"
"             Rainfall losses        33.952     6.563      33.952     mm"
"             Runoff depth           24.748     52.137     24.748     mm"
"             Runoff volume          2.0293     0.0000     2.0293     ha-m"
"             Runoff coefficient     0.422      0.000      0.422      "
"             Maximum flow           5.207      0.000      5.207      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     5.207     5.207    30.822    30.822"
" 52          CHANNEL DESIGN"
"        5.207   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 0.916    metre"
"             Velocity                      1.198    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.644    metre"
" 53          ROUTE    Channel Route 700"
"       700.00      Channel Route 700 Reach length   ( metre)"
"        0.377   X-factor <= 0.5"
"      219.117   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                  5.084    c.m/sec"
"                     5.207     5.207     5.084    30.822 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 32.000    c.m/sec"
"             Hydrograph volume        330446.219    c.m"
"                     5.207     5.207     5.084    32.000"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     5.207     0.000     5.084    32.000"
" 33          CATCHMENT 64"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           64   No description"
"        0.000   % Impervious"
"       80.000   Total Area"
"      220.000   Flow length"
"        5.500   Overland Slope"
"       80.000   Pervious Area"
"      220.000   Pervious length"
"        5.500   Pervious slope"
"        0.000   Impervious Area"
"      220.000   Impervious length"
"        5.500   Impervious slope"
"        0.210   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.441   Pervious Runoff coefficient"
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"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     3.970     0.000     5.084    32.000 c.m/sec"
"             Catchment 64           Pervious   Impervious Total Area "
"             Surface Area           80.000     0.000      80.000     hectare"
"             Time of concentration  43.483     6.825      43.483     minutes"
"             Time to Centroid       278.638    211.270    278.638    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        4.6960     0.0000     4.6960     ha-m"
"             Rainfall losses        32.787     6.061      32.787     mm"
"             Runoff depth           25.913     52.639     25.913     mm"
"             Runoff volume          2.0730     0.0000     2.0730     ha-m"
"             Runoff coefficient     0.441      0.000      0.441      "
"             Maximum flow           3.970      0.000      3.970      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     3.970     3.970     5.084    32.000"
" 52          CHANNEL DESIGN"
"        3.970   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 0.806    metre"
"             Velocity                      1.116    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.558    metre"
" 53          ROUTE    Channel Route 700"
"       700.00      Channel Route 700 Reach length   ( metre)"
"        0.390   X-factor <= 0.5"
"      235.253   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                  3.952    c.m/sec"
"                     3.970     3.970     3.952    32.000 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 33.877    c.m/sec"
"             Hydrograph volume        351176.438    c.m"
"                     3.970     3.970     3.952    33.877"
" 40          HYDROGRAPH   Confluence    12"
"            7   Confluence "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 33.877    c.m/sec"
"             Hydrograph volume        351176.406    c.m"
"                     3.970    33.877     3.952     0.000"
" 52          CHANNEL DESIGN"
"       33.877   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.300   Gradient   %"
"             Depth of flow                 2.347    metre"
"             Velocity                      1.597    m/sec"
"             Channel capacity            215.995    c.m/sec"
"             Critical depth                1.620    metre"
" 53          ROUTE    Channel Route 2500"
"      2500.00      Channel Route 2500 Reach length   ( metre)"
"        0.303   X-factor <= 0.5"
"      391.350   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                 33.438    c.m/sec"
"                     3.970    33.877    33.438     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1000"
"            6   Combine "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow                 33.438    c.m/sec"
"             Hydrograph volume        351176.469    c.m"
"                     3.970    33.877    33.438    33.438"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     3.970     0.000    33.438    33.438"
" 33          CATCHMENT 59"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           59   No description"
"        0.000   % Impervious"
"      128.000   Total Area"
"      170.000   Flow length"
"       18.000   Overland Slope"
"      128.000   Pervious Area"
"      170.000   Pervious length"
"       18.000   Pervious slope"
"        0.000   Impervious Area"
"      170.000   Impervious length"
"       18.000   Impervious slope"
"        0.350   Pervious Manning 'n'"
"       76.000   Pervious SCS Curve No."
"        0.334   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.021   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     5.037     0.000    33.438    33.438 c.m/sec"
"             Catchment 59           Pervious   Impervious Total Area "
"             Surface Area           128.000    0.000      128.000    hectare"
"             Time of concentration  38.873     4.097      38.873     minutes"
"             Time to Centroid       277.849    207.770    277.849    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
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"            Rainfall volume        7.5136     0.0000     7.5136     ha-m"
"            Rainfall losses        39.083     6.349      39.083     mm"
"            Runoff depth           19.617     52.351     19.617     mm"
"            Runoff volume          2.5109     0.0000     2.5110     ha-m"
"            Runoff coefficient     0.334      0.000      0.334      "
"            Maximum flow           5.037      0.000      5.037      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  5.037     5.037    33.438    33.438"
" 52         CHANNEL DESIGN"
"       5.037   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.300   Gradient   %"
"            Depth of flow                 1.015    metre"
"            Velocity                      0.983    m/sec"
"            Channel capacity            215.995    c.m/sec"
"            Critical depth                0.633    metre"
" 53         ROUTE    Channel Route 1500"
"     1500.00      Channel Route 1500 Reach length   ( metre)"
"       0.344   X-factor <= 0.5"
"     381.434   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           3   No. of sub-reaches"
"            Peak outflow                  4.776    c.m/sec"
"                  5.037     5.037     4.776    33.438 c.m/sec"
" 40         HYDROGRAPH   Combine    1000"
"           6   Combine "
"        1000   Node #"
"               Node upstream of Penetangore Culvert"
"            Maximum flow                 35.159    c.m/sec"
"            Hydrograph volume        376286.094    c.m"
"                  5.037     5.037     4.776    35.159"
" 81         ADD COMMENT==================================================="
"         1  Lines of comment"
"            End of Penetangore Tributary"
" 81         ADD COMMENT==================================================="
"         1  Lines of comment"
"            Start of Area North of Holtby Drain"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  5.037     0.000     4.776    35.159"
" 33         CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   No description"
"       0.000   % Impervious"
"     166.000   Total Area"
"     250.000   Flow length"
"       3.000   Overland Slope"
"     166.000   Pervious Area"
"     250.000   Pervious length"
"       3.000   Pervious slope"
"       0.000   Impervious Area"
"     250.000   Impervious length"
"       3.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.441   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  7.058     0.000     4.776    35.159 c.m/sec"
"            Catchment 201          Pervious   Impervious Total Area "
"            Surface Area           166.000    0.000      166.000    hectare"
"            Time of concentration  54.688     8.838      54.688     minutes"
"            Time to Centroid       292.169    213.640    292.169    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        9.7442     0.0000     9.7442     ha-m"
"            Rainfall losses        32.785     5.456      32.785     mm"
"            Runoff depth           25.915     53.244     25.915     mm"
"            Runoff volume          4.3019     0.0000     4.3019     ha-m"
"            Runoff coefficient     0.441      0.000      0.441      "
"            Maximum flow           7.058      0.000      7.058      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  7.058     7.058     4.776    35.159"
" 52         CHANNEL DESIGN"
"       7.058   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"            Depth of flow                 0.898    metre"
"            Velocity                      1.676    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                0.754    metre"
" 53         ROUTE    Channel Route 1900"
"     1900.00      Channel Route 1900 Reach length   ( metre)"
"       0.467   X-factor <= 0.5"
"     283.487   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           3   No. of sub-reaches"
"            Peak outflow                  7.014    c.m/sec"
"                  7.058     7.058     7.014    35.159 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  7.058     7.014     7.014    35.159"
" 33         CATCHMENT 202"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         202   No description"
"       0.000   % Impervious"
"       8.000   Total Area"
"     225.000   Flow length"
"       4.000   Overland Slope"
"       8.000   Pervious Area"
"     225.000   Pervious length"
"       4.000   Pervious slope"
"       0.000   Impervious Area"
"     225.000   Impervious length"
"       4.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.441   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.378     7.014     7.014    35.159 c.m/sec"
"            Catchment 202          Pervious   Impervious Total Area "
"            Surface Area           8.000      0.000      8.000      hectare"
"            Time of concentration  47.093     7.611      47.093     minutes"
"            Time to Centroid       282.996    212.199    282.996    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        4696.00    0.00       4696.00    c.m"
"            Rainfall losses        32.788     5.490      32.788     mm"
"            Runoff depth           25.912     53.210     25.912     mm"
"            Runoff volume          2072.94    0.00       2072.95    c.m"
"            Runoff coefficient     0.441      0.000      0.441      "
"            Maximum flow           0.378      0.000      0.378      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.378     7.300     7.014    35.159"
" 52         CHANNEL DESIGN"
"       7.300   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"            Depth of flow                 0.912    metre"
"            Velocity                      1.690    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                0.767    metre"
" 53         ROUTE    Channel Route 260"
"      260.00      Channel Route 260 Reach length   ( metre)"
"       0.418   X-factor <= 0.5"
"     115.359   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  7.283    c.m/sec"
"                  0.378     7.300     7.283    35.159 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.378     7.283     7.283    35.159"
" 33         CATCHMENT 203"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         203   No description"
"       0.000   % Impervious"
"      13.600   Total Area"
"     150.000   Flow length"
"       3.500   Overland Slope"
"      13.600   Pervious Area"
"     150.000   Pervious length"
"       3.500   Pervious slope"
"       0.000   Impervious Area"
"     150.000   Impervious length"
"       3.500   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.441   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.732     7.283     7.283    35.159 c.m/sec"
"            Catchment 203          Pervious   Impervious Total Area "
"            Surface Area           13.600     0.000      13.600     hectare"
"            Time of concentration  38.432     6.211      38.432     minutes"
"            Time to Centroid       272.536    210.496    272.536    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        7983.19    0.01       7983.20    c.m"
"            Rainfall losses        32.789     5.803      32.789     mm"
"            Runoff depth           25.911     52.897     25.911     mm"
"            Runoff volume          3523.95    0.01       3523.96    c.m"
"            Runoff coefficient     0.441      0.000      0.441      "
"            Maximum flow           0.732      0.000      0.732      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.732     7.710     7.283    35.159"
" 52         CHANNEL DESIGN"
"       7.710   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"            Depth of flow                 0.936    metre"
"            Velocity                      1.715    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                0.789    metre"
" 53         ROUTE    Channel Route 350"
"      350.00      Channel Route 350 Reach length   ( metre)"
"       0.438   X-factor <= 0.5"
"     153.095   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  7.647    c.m/sec"
"                  0.732     7.710     7.647    35.159 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.732     7.647     7.647    35.159"
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" 33          CATCHMENT 204"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         204   No description"
"       0.000   % Impervious"
"       6.800   Total Area"
"     120.000   Flow length"
"       2.000   Overland Slope"
"       6.800   Pervious Area"
"     120.000   Pervious length"
"       2.000   Pervious slope"
"       0.000   Impervious Area"
"     120.000   Impervious length"
"       2.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.441   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.359     7.647     7.647    35.159 c.m/sec"
"             Catchment 204          Pervious   Impervious Total Area "
"             Surface Area           6.800      0.000      6.800      hectare"
"             Time of concentration  39.762     6.426      39.761     minutes"
"             Time to Centroid       274.146    210.764    274.146    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        3991.60    0.00       3991.60    c.m"
"             Rainfall losses        32.788     5.970      32.788     mm"
"             Runoff depth           25.912     52.730     25.912     mm"
"             Runoff volume          1762.00    0.00       1762.00    c.m"
"             Runoff coefficient     0.441      0.000      0.441      "
"             Maximum flow           0.359      0.000      0.359      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.359     7.869     7.647    35.159"
" 52          CHANNEL DESIGN"
"       7.869   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"             Depth of flow                 0.944    metre"
"             Velocity                      1.724    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                0.797    metre"
" 53          ROUTE    Channel Route 150"
"      150.00      Channel Route 150 Reach length   ( metre)"
"       0.353   X-factor <= 0.5"
"      65.265   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"             Peak outflow                  7.812    c.m/sec"
"                    0.359     7.869     7.812    35.159 c.m/sec"
" 40          HYDROGRAPH   Combine    1100"
"           6   Combine "
"        1100   Node #"
"               Node taking 200 series - dumps into Holtby Drain"
"             Maximum flow                  7.812    c.m/sec"
"             Hydrograph volume         50378.371    c.m"
"                    0.359     7.869     7.812     7.812"
" 81          ADD COMMENT==================================================="
"          1  Lines of comment"
"             End of Area North of Holtby Drain"
" 40          HYDROGRAPH   Confluence    1100"
"           7   Confluence "
"        1100   Node #"
"               Node taking 200 series - dumps into Holtby Drain"
"             Maximum flow                  7.812    c.m/sec"
"             Hydrograph volume         50378.367    c.m"
"                    0.359     7.812     7.812     0.000"
" 81          ADD COMMENT==================================================="
"          1  Lines of comment"
"             Total discharge to Holtby Drain"
" 52          CHANNEL DESIGN"
"       7.812   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"             Depth of flow                 1.105    metre"
"             Velocity                      1.331    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.794    metre"
" 53          ROUTE    Channel Route 200"
"      200.00      Channel Route 200 Reach length   ( metre)"
"       0.248   X-factor <= 0.5"
"     112.711   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"             Peak outflow                  7.807    c.m/sec"
"                    0.359     7.812     7.807     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1300"
"           6   Combine "
"        1300   Node #"
"               Node at Holtby Drain"
"             Maximum flow                  7.807    c.m/sec"
"             Hydrograph volume         50378.371    c.m"
"                    0.359     7.812     7.807     7.807"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.359     0.000     7.807     7.807"
" 33          CATCHMENT 100"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         100   No description"
"       0.000   % Impervious"
"      45.000   Total Area"
"     100.000   Flow length"
"       7.000   Overland Slope"
"      45.000   Pervious Area"
"     100.000   Pervious length"
"       7.000   Pervious slope"
"       0.000   Impervious Area"
"     100.000   Impervious length"
"       7.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.441   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    3.058     0.000     7.807     7.807 c.m/sec"
"             Catchment 100          Pervious   Impervious Total Area "
"             Surface Area           45.000     0.000      45.000     hectare"
"             Time of concentration  24.476     3.956      24.476     minutes"
"             Time to Centroid       255.680    207.565    255.680    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        2.6415     0.0000     2.6415     ha-m"
"             Rainfall losses        32.802     6.485      32.802     mm"
"             Runoff depth           25.898     52.215     25.898     mm"
"             Runoff volume          1.1654     0.0000     1.1654     ha-m"
"             Runoff coefficient     0.441      0.000      0.441      "
"             Maximum flow           3.058      0.000      3.058      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    3.058     3.058     7.807     7.807"
" 52          CHANNEL DESIGN"
"       3.058   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"             Depth of flow                 0.600    metre"
"             Velocity                      1.342    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                0.484    metre"
" 53          ROUTE    Channel Route 1500"
"     1500.00      Channel Route 1500 Reach length   ( metre)"
"       0.470   X-factor <= 0.5"
"     279.420   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           3   No. of sub-reaches"
"             Peak outflow                  3.022    c.m/sec"
"                    3.058     3.058     3.022     7.807 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                    3.058     3.022     3.022     7.807"
" 33          CATCHMENT 101"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         101   No description"
"       0.000   % Impervious"
"      11.200   Total Area"
"      50.000   Flow length"
"       7.000   Overland Slope"
"      11.200   Pervious Area"
"      50.000   Pervious length"
"       7.000   Pervious slope"
"       0.000   Impervious Area"
"      50.000   Impervious length"
"       7.000   Impervious slope"
"       0.280   Pervious Manning 'n'"
"      80.000   Pervious SCS Curve No."
"       0.403   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       6.350   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.751     3.022     3.022     7.807 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           11.200     0.000      11.200     hectare"
"             Time of concentration  20.355     2.610      20.355     minutes"
"             Time to Centroid       252.367    206.029    252.367    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        6574.39    0.01       6574.40    c.m"
"             Rainfall losses        35.069     6.188      35.069     mm"
"             Runoff depth           23.631     52.512     23.631     mm"
"             Runoff volume          2646.69    0.01       2646.70    c.m"
"             Runoff coefficient     0.403      0.000      0.403      "
"             Maximum flow           0.751      0.000      0.751      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.751     3.456     3.022     7.807"
" 52          CHANNEL DESIGN"
"       3.456   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"             Depth of flow                 0.637    metre"
"             Velocity                      1.387    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                0.518    metre"
" 53          ROUTE    Channel Route 700"
"      700.00      Channel Route 700 Reach length   ( metre)"
"       0.455   X-factor <= 0.5"
"     189.250   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"             Peak outflow                  3.428    c.m/sec"
"                    0.751     3.456     3.428     7.807 c.m/sec"
" 40          HYDROGRAPH   Combine    1200"
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"           6   Combine "
"        1200   Node #"
"               Node taking 100 series for Holtby Drain"
"            Maximum flow                   3.428    c.m/sec"
"            Hydrograph volume          14300.893    c.m"
"                    0.751     3.456     3.428     3.428"
" 40         HYDROGRAPH   Confluence    1200"
"           7   Confluence "
"        1200   Node #"
"               Node taking 100 series for Holtby Drain"
"            Maximum flow                   3.428    c.m/sec"
"            Hydrograph volume          14300.893    c.m"
"                    0.751     3.428     3.428     0.000"
" 52         CHANNEL DESIGN"
"       3.428   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"            Depth of flow                  0.751    metre"
"            Velocity                       1.073    m/sec"
"            Channel capacity             278.848    c.m/sec"
"            Critical depth                 0.515    metre"
" 53         ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"       0.000   X-factor <= 0.5"
"      34.935   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.603   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                   3.403    c.m/sec"
"                    0.751     3.428     3.403     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    1300"
"           6   Combine "
"        1300   Node #"
"               Node at Holtby Drain"
"            Maximum flow                   9.945    c.m/sec"
"            Hydrograph volume          64679.262    c.m"
"                    0.751     3.428     3.403     9.945"
" 40         HYDROGRAPH   Confluence    1300"
"           7   Confluence "
"        1300   Node #"
"               Node at Holtby Drain"
"            Maximum flow                   9.945    c.m/sec"
"            Hydrograph volume          64679.254    c.m"
"                    0.751     9.945     3.403     0.000"
" 52         CHANNEL DESIGN"
"       9.945   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"            Depth of flow                  1.233    metre"
"            Velocity                       1.416    m/sec"
"            Channel capacity             278.848    c.m/sec"
"            Critical depth                 0.897    metre"
" 53         ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"       0.000   X-factor <= 0.5"
"      26.482   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.716   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                   9.927    c.m/sec"
"                    0.751     9.945     9.927     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    1000"
"           6   Combine "
"        1000   Node #"
"               Node upstream of Penetangore Culvert"
"            Maximum flow                  41.655    c.m/sec"
"            Hydrograph volume         440965.406    c.m"
"                    0.751     9.945     9.927    41.655"
" 81         ADD COMMENT==================================================="
"          2  Lines of comment"
"            Total discharge to Pipe Arch under Hwy. 21 on the "
"            Pentangore Tributary"
" 40         HYDROGRAPH   Confluence    1000"
"           7   Confluence "
"        1000   Node #"
"               Node upstream of Penetangore Culvert"
"            Maximum flow                  41.655    c.m/sec"
"            Hydrograph volume         440965.406    c.m"
"                    0.751    41.655     9.927     0.000"
" 81         ADD COMMENT==================================================="
"          2  Lines of comment"
"            Total discharge to Pipe Arch under Hwy. 21 on the "
"            Pentangore Tributary"
" 52         CHANNEL DESIGN"
"      41.655   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"            Depth of flow                  2.299    metre"
"            Velocity                       2.037    m/sec"
"            Channel capacity             278.848    c.m/sec"
"            Critical depth                 1.782    metre"
" 53         ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"       0.000   X-factor <= 0.5"
"      18.413   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.853   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  41.653    c.m/sec"
"                    0.751    41.655    41.653     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    3000"
"           6   Combine "
"        3000   Node #"
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"               Node Combining All Flow"
"            Maximum flow                  41.653    c.m/sec"
"            Hydrograph volume         440965.500    c.m"
"                    0.751    41.655    41.653    41.653"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.751     0.000    41.653    41.653"
" 33         CATCHMENT 301"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         301   No description"
"       0.000   % Impervious"
"      16.400   Total Area"
"      95.000   Flow length"
"       2.500   Overland Slope"
"      16.400   Pervious Area"
"      95.000   Pervious length"
"       2.500   Pervious slope"
"       0.000   Impervious Area"
"      95.000   Impervious length"
"       2.500   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.441   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.982     0.000    41.653    41.653 c.m/sec"
"            Catchment 301          Pervious   Impervious Total Area "
"            Surface Area           16.400     0.000      16.400     hectare"
"            Time of concentration  32.323     5.692      32.323     minutes"
"            Time to Centroid       265.155    209.787    265.154    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        9626.79    0.01       9626.80    c.m"
"            Rainfall losses        32.792     5.526      32.792     mm"
"            Runoff depth           25.908     53.174     25.908     mm"
"            Runoff volume          4248.94    0.01       4248.95    c.m"
"            Runoff coefficient     0.441      0.000      0.441      "
"            Maximum flow           0.982      0.000      0.982      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.982     0.982    41.653    41.653"
" 52         CHANNEL DESIGN"
"       0.982   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.200   Gradient   %"
"            Depth of flow                  0.319    metre"
"            Velocity                       1.042    m/sec"
"            Channel capacity             431.989    c.m/sec"
"            Critical depth                 0.254    metre"
" 53         ROUTE    Channel Route 480"
"      480.00      Channel Route 480 Reach length   ( metre)"
"       0.470   X-factor <= 0.5"
"     172.758   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                   0.975    c.m/sec"
"                    0.982     0.982     0.975    41.653 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                    0.982     0.975     0.975    41.653"
" 33         CATCHMENT 302"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         302   No description"
"       0.000   % Impervious"
"       5.000   Total Area"
"     110.000   Flow length"
"       3.500   Overland Slope"
"       5.000   Pervious Area"
"     110.000   Pervious length"
"       3.500   Pervious slope"
"       0.000   Impervious Area"
"     110.000   Impervious length"
"       3.500   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.441   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.301     0.975     0.975    41.653 c.m/sec"
"            Catchment 302          Pervious   Impervious Total Area "
"            Surface Area           5.000      0.000      5.000      hectare"
"            Time of concentration  31.906     5.619      31.906     minutes"
"            Time to Centroid       264.653    209.706    264.653    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        2935.00    0.00       2935.00    c.m"
"            Rainfall losses        32.798     5.476      32.798     mm"
"            Runoff depth           25.902     53.224     25.902     mm"
"            Runoff volume          1295.11    0.00       1295.12    c.m"
"            Runoff coefficient     0.441      0.000      0.441      "
"            Maximum flow           0.301      0.000      0.301      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.301     1.260     0.975    41.653"
" 52         CHANNEL DESIGN"
"       1.260   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.200   Gradient   %"
"            Depth of flow                  0.364    metre"
"            Velocity                       1.120    m/sec"
"            Channel capacity             431.989    c.m/sec"
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"              Critical depth                0.294    metre"
" 53           ROUTE    Channel Route 280"
"       280.00      Channel Route 280 Reach length   ( metre)"
"        0.471   X-factor <= 0.5"
"      187.498   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"              Peak outflow                  1.247    c.m/sec"
"                      0.301     1.260     1.247    41.653 c.m/sec"
" 40           HYDROGRAPH Next link "
"            5   Next link "
"                      0.301     1.247     1.247    41.653"
" 33           CATCHMENT 303"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          303   No description"
"        0.000   % Impervious"
"       11.600   Total Area"
"      135.000   Flow length"
"        4.500   Overland Slope"
"       11.600   Pervious Area"
"      135.000   Pervious length"
"        4.500   Pervious slope"
"        0.000   Impervious Area"
"      135.000   Impervious length"
"        4.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.441   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                      0.680     1.247     1.247    41.653 c.m/sec"
"              Catchment 303          Pervious   Impervious Total Area "
"              Surface Area           11.600     0.000      11.600     hectare"
"              Time of concentration  33.458     5.892      33.458     minutes"
"              Time to Centroid       266.517    210.046    266.517    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        6809.19    0.01       6809.20    c.m"
"              Rainfall losses        32.794     5.656      32.794     mm"
"              Runoff depth           25.906     53.044     25.906     mm"
"              Runoff volume          3005.05    0.01       3005.05    c.m"
"              Runoff coefficient     0.441      0.000      0.441      "
"              Maximum flow           0.680      0.000      0.680      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                      0.680     1.902     1.247    41.653"
" 52           CHANNEL DESIGN"
"        1.902   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"              Depth of flow                 0.451    metre"
"              Velocity                      1.259    m/sec"
"              Channel capacity            431.989    c.m/sec"
"              Critical depth                0.372    metre"
" 53           ROUTE    Channel Route 430"
"       430.00      Channel Route 430 Reach length   ( metre)"
"        0.478   X-factor <= 0.5"
"      256.250   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"              Peak outflow                  1.880    c.m/sec"
"                      0.680     1.902     1.880    41.653 c.m/sec"
" 40           HYDROGRAPH Next link "
"            5   Next link "
"                      0.680     1.880     1.880    41.653"
" 33           CATCHMENT 304"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          304   No description"
"        0.000   % Impervious"
"        6.300   Total Area"
"      150.000   Flow length"
"        2.500   Overland Slope"
"        6.300   Pervious Area"
"      150.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      150.000   Impervious length"
"        2.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.441   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                      0.318     1.880     1.880    41.653 c.m/sec"
"              Catchment 304          Pervious   Impervious Total Area "
"              Surface Area           6.300      0.000      6.300      hectare"
"              Time of concentration  42.514     7.487      42.514     minutes"
"              Time to Centroid       277.466    212.080    277.465    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        3698.10    0.00       3698.10    c.m"
"              Rainfall losses        32.788     5.527      32.788     mm"
"              Runoff depth           25.912     53.173     25.912     mm"
"              Runoff volume          1632.48    0.00       1632.48    c.m"
"              Runoff coefficient     0.441      0.000      0.441      "
"              Maximum flow           0.318      0.000      0.318      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                      0.318     2.192     1.880    41.653"
" 52           CHANNEL DESIGN"
"        2.192   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"              Depth of flow                 0.485    metre"
"              Velocity                      1.309    m/sec"
"              Channel capacity            431.989    c.m/sec"
"              Critical depth                0.403    metre"
" 53           ROUTE    Channel Route 130"
"       130.00      Channel Route 130 Reach length   ( metre)"
"        0.421   X-factor <= 0.5"
"       74.474   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"              Peak outflow                  2.186    c.m/sec"
"                      0.318     2.192     2.186    41.653 c.m/sec"
" 40           HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                 Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"              Maximum flow                  2.186    c.m/sec"
"              Hydrograph volume         10181.607    c.m"
"                      0.318     2.192     2.186     2.186"
" 40           HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                      0.318     0.000     2.186     2.186"
" 33           CATCHMENT 401"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          401   No description"
"        0.000   % Impervious"
"        5.600   Total Area"
"      240.000   Flow length"
"        3.500   Overland Slope"
"        5.600   Pervious Area"
"      240.000   Pervious length"
"        3.500   Pervious slope"
"        0.000   Impervious Area"
"      240.000   Impervious length"
"        3.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.441   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                      0.249     0.000     2.186     2.186 c.m/sec"
"              Catchment 401          Pervious   Impervious Total Area "
"              Surface Area           5.600      0.000      5.600      hectare"
"              Time of concentration  50.953     8.973      50.953     minutes"
"              Time to Centroid       287.659    213.763    287.659    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        3287.20    0.00       3287.20    c.m"
"              Rainfall losses        32.786     5.470      32.786     mm"
"              Runoff depth           25.914     53.230     25.914     mm"
"              Runoff volume          1451.19    0.00       1451.20    c.m"
"              Runoff coefficient     0.441      0.000      0.441      "
"              Maximum flow           0.249      0.000      0.249      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                      0.249     0.249     2.186     2.186"
" 52           CHANNEL DESIGN"
"        0.249   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"              Depth of flow                 0.149    metre"
"              Velocity                      0.681    m/sec"
"              Channel capacity            431.989    c.m/sec"
"              Critical depth                0.110    metre"
" 53           ROUTE    Channel Route 225"
"       225.00      Channel Route 225 Reach length   ( metre)"
"        0.484   X-factor <= 0.5"
"      247.644   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"              Peak outflow                  0.248    c.m/sec"
"                      0.249     0.249     0.248     2.186 c.m/sec"
" 40           HYDROGRAPH Next link "
"            5   Next link "
"                      0.249     0.248     0.248     2.186"
" 33           CATCHMENT 402"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          402   No description"
"        0.000   % Impervious"
"        4.200   Total Area"
"       80.000   Flow length"
"        4.000   Overland Slope"
"        4.200   Pervious Area"
"       80.000   Pervious length"
"        4.000   Pervious slope"
"        0.000   Impervious Area"
"       80.000   Impervious length"
"        4.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.441   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                      0.285     0.248     0.248     2.186 c.m/sec"
"              Catchment 402          Pervious   Impervious Total Area "
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"              Surface Area           4.200      0.000      4.200      hectare"
"              Time of concentration  25.322     4.459      25.322     minutes"
"              Time to Centroid       256.690    208.482    256.690    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        2465.40    0.00       2465.40    c.m"
"              Rainfall losses        32.810     5.960      32.810     mm"
"              Runoff depth           25.890     52.740     25.890     mm"
"              Runoff volume          1087.37    0.00       1087.38    c.m"
"              Runoff coefficient     0.441      0.000      0.441      "
"              Maximum flow           0.285      0.000      0.285      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.285     0.454     0.248     2.186"
" 52           CHANNEL DESIGN"
"         0.454   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         1.200   Gradient   %"
"              Depth of flow                 0.209    metre"
"              Velocity                      0.825    m/sec"
"              Channel capacity            431.989    c.m/sec"
"              Critical depth                0.160    metre"
" 53           ROUTE    Channel Route 280"
"       280.00      Channel Route 280 Reach length   ( metre)"
"         0.483   X-factor <= 0.5"
"       254.406   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       150.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.450    c.m/sec"
"                      0.285     0.454     0.450     2.186 c.m/sec"
" 40           HYDROGRAPH Next link "
"             5   Next link "
"                      0.285     0.450     0.450     2.186"
" 33           CATCHMENT 403"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           403   No description"
"         0.000   % Impervious"
"         6.400   Total Area"
"        75.000   Flow length"
"         4.000   Overland Slope"
"         6.400   Pervious Area"
"        75.000   Pervious length"
"         4.000   Pervious slope"
"         0.000   Impervious Area"
"        75.000   Impervious length"
"         4.000   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.441   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.442     0.450     0.450     2.186 c.m/sec"
"              Catchment 403          Pervious   Impervious Total Area "
"              Surface Area           6.400      0.000      6.400      hectare"
"              Time of concentration  24.360     4.290      24.360     minutes"
"              Time to Centroid       255.543    208.157    255.543    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        3756.80    0.00       3756.80    c.m"
"              Rainfall losses        32.803     6.103      32.803     mm"
"              Runoff depth           25.897     52.597     25.897     mm"
"              Runoff volume          1657.41    0.00       1657.41    c.m"
"              Runoff coefficient     0.441      0.000      0.441      "
"              Maximum flow           0.442      0.000      0.442      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.442     0.846     0.450     2.186"
" 52           CHANNEL DESIGN"
"         0.846   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         1.200   Gradient   %"
"              Depth of flow                 0.294    metre"
"              Velocity                      0.997    m/sec"
"              Channel capacity            431.989    c.m/sec"
"              Critical depth                0.233    metre"
" 53           ROUTE    Channel Route 410"
"       410.00      Channel Route 410 Reach length   ( metre)"
"         0.484   X-factor <= 0.5"
"       308.368   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       300.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.846    c.m/sec"
"                      0.442     0.846     0.846     2.186 c.m/sec"
" 40           HYDROGRAPH Next link "
"             5   Next link "
"                      0.442     0.846     0.846     2.186"
" 33           CATCHMENT 404"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           404   No description"
"         0.000   % Impervious"
"         2.700   Total Area"
"        60.000   Flow length"
"         2.500   Overland Slope"
"         2.700   Pervious Area"
"        60.000   Pervious length"
"         2.500   Pervious slope"
"         0.000   Impervious Area"
"        60.000   Impervious length"
"         2.500   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.441   Pervious Runoff coefficient"
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"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.183     0.846     0.846     2.186 c.m/sec"
"              Catchment 404          Pervious   Impervious Total Area "
"              Surface Area           2.700      0.000      2.700      hectare"
"              Time of concentration  24.534     4.321      24.534     minutes"
"              Time to Centroid       255.752    208.214    255.752    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        1584.90    0.00       1584.90    c.m"
"              Rainfall losses        32.802     6.078      32.802     mm"
"              Runoff depth           25.898     52.622     25.898     mm"
"              Runoff volume          699.26     0.00       699.26     c.m"
"              Runoff coefficient     0.441      0.000      0.441      "
"              Maximum flow           0.183      0.000      0.183      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.183     1.006     0.846     2.186"
" 52           CHANNEL DESIGN"
"         1.006   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         1.200   Gradient   %"
"              Depth of flow                 0.323    metre"
"              Velocity                      1.049    m/sec"
"              Channel capacity            431.989    c.m/sec"
"              Critical depth                0.258    metre"
" 53           ROUTE    Channel Route 160"
"       160.00      Channel Route 160 Reach length   ( metre)"
"         0.455   X-factor <= 0.5"
"       114.362   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       100.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.993    c.m/sec"
"                      0.183     1.006     0.993     2.186 c.m/sec"
" 40           HYDROGRAPH   Combine    2100"
"             6   Combine "
"          2100   Node #"
"                 Node taking 400 series - dumps into Hwy 21 Ditch"
"              Maximum flow                  0.993    c.m/sec"
"              Hydrograph volume          4895.251    c.m"
"                      0.183     1.006     0.993     0.993"
" 40           HYDROGRAPH   Confluence    2100"
"             7   Confluence "
"          2100   Node #"
"                 Node taking 400 series - dumps into Hwy 21 Ditch"
"              Maximum flow                  0.993    c.m/sec"
"              Hydrograph volume          4895.251    c.m"
"                      0.183     0.993     0.993     0.000"
" 52           CHANNEL DESIGN"
"         0.993   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         0.500   Gradient   %"
"              Depth of flow                 0.404    metre"
"              Velocity                      0.765    m/sec"
"              Channel capacity            278.848    c.m/sec"
"              Critical depth                0.256    metre"
" 53           ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"         0.080   X-factor <= 0.5"
"        48.999   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"        75.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.991    c.m/sec"
"                      0.183     0.993     0.991     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    2000"
"             6   Combine "
"          2000   Node #"
"                 Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"              Maximum flow                  3.123    c.m/sec"
"              Hydrograph volume         15076.862    c.m"
"                      0.183     0.993     0.991     3.123"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                      0.183     0.000     0.991     3.123"
" 33           CATCHMENT 501"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           501   No description"
"         0.000   % Impervious"
"         2.500   Total Area"
"        80.000   Flow length"
"         3.500   Overland Slope"
"         2.500   Pervious Area"
"        80.000   Pervious length"
"         3.500   Pervious slope"
"         0.000   Impervious Area"
"        80.000   Impervious length"
"         3.500   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.441   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.166     0.000     0.991     3.123 c.m/sec"
"              Catchment 501          Pervious   Impervious Total Area "
"              Surface Area           2.500      0.000      2.500      hectare"
"              Time of concentration  26.357     4.642      26.357     minutes"
"              Time to Centroid       257.951    208.704    257.951    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
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"              Rainfall volume        1467.50    0.00       1467.50    c.m"
"              Rainfall losses        32.796     5.719      32.796     mm"
"              Runoff depth           25.904     52.981     25.904     mm"
"              Runoff volume          647.59     0.00       647.59     c.m"
"              Runoff coefficient     0.441      0.000      0.441      "
"              Maximum flow           0.166      0.000      0.166      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.166     0.166     0.991     3.123"
" 52           CHANNEL DESIGN"
"         0.166   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         1.200   Gradient   %"
"              Depth of flow                 0.118    metre"
"              Velocity                      0.596    m/sec"
"              Channel capacity            431.989    c.m/sec"
"              Critical depth                0.085    metre"
" 53           ROUTE    Channel Route 120"
"        120.00      Channel Route 120 Reach length   ( metre)"
"         0.476   X-factor <= 0.5"
"       151.120   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       150.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.163    c.m/sec"
"                      0.166     0.166     0.163     3.123 c.m/sec"
" 40           HYDROGRAPH Next link "
"             5   Next link "
"                      0.166     0.163     0.163     3.123"
" 33           CATCHMENT 502"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           502   No description"
"         0.000   % Impervious"
"         0.500   Total Area"
"       120.000   Flow length"
"         3.500   Overland Slope"
"         0.500   Pervious Area"
"       120.000   Pervious length"
"         3.500   Pervious slope"
"         0.000   Impervious Area"
"       120.000   Impervious length"
"         3.500   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.441   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.029     0.163     0.163     3.123 c.m/sec"
"              Catchment 502          Pervious   Impervious Total Area "
"              Surface Area           0.500      0.000      0.500      hectare"
"              Time of concentration  33.616     5.920      33.616     minutes"
"              Time to Centroid       266.712    210.082    266.712    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        293.50     0.00       293.50     c.m"
"              Rainfall losses        32.794     5.672      32.794     mm"
"              Runoff depth           25.906     53.028     25.906     mm"
"              Runoff volume          129.53     0.00       129.53     c.m"
"              Runoff coefficient     0.441      0.000      0.441      "
"              Maximum flow           0.029      0.000      0.029      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.029     0.192     0.163     3.123"
" 52           CHANNEL DESIGN"
"         0.192   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         1.200   Gradient   %"
"              Depth of flow                 0.129    metre"
"              Velocity                      0.625    m/sec"
"              Channel capacity            431.989    c.m/sec"
"              Critical depth                0.093    metre"
" 53           ROUTE    Channel Route 170"
"        170.00      Channel Route 170 Reach length   ( metre)"
"         0.482   X-factor <= 0.5"
"       203.887   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       150.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.191    c.m/sec"
"                      0.029     0.192     0.191     3.123 c.m/sec"
" 40           HYDROGRAPH Next link "
"             5   Next link "
"                      0.029     0.191     0.191     3.123"
" 33           CATCHMENT 503"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           503   No description"
"         0.000   % Impervious"
"         8.200   Total Area"
"        90.000   Flow length"
"         5.000   Overland Slope"
"         8.200   Pervious Area"
"        90.000   Pervious length"
"         5.000   Pervious slope"
"         0.000   Impervious Area"
"        90.000   Impervious length"
"         5.000   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.441   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
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"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.555     0.191     0.191     3.123 c.m/sec"
"              Catchment 503          Pervious   Impervious Total Area "
"              Surface Area           8.200      0.000      8.200      hectare"
"              Time of concentration  25.417     4.476      25.417     minutes"
"              Time to Centroid       256.803    208.509    256.803    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        4813.40    0.00       4813.40    c.m"
"              Rainfall losses        32.810     5.943      32.810     mm"
"              Runoff depth           25.890     52.757     25.890     mm"
"              Runoff volume          2123.00    0.00       2123.00    c.m"
"              Runoff coefficient     0.441      0.000      0.441      "
"              Maximum flow           0.555      0.000      0.555      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.555     0.733     0.191     3.123"
" 52           CHANNEL DESIGN"
"         0.733   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         1.200   Gradient   %"
"              Depth of flow                 0.272    metre"
"              Velocity                      0.956    m/sec"
"              Channel capacity            431.989    c.m/sec"
"              Critical depth                0.214    metre"
" 53           ROUTE    Channel Route 350"
"        350.00      Channel Route 350 Reach length   ( metre)"
"         0.482   X-factor <= 0.5"
"       274.723   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       150.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.724    c.m/sec"
"                      0.555     0.733     0.724     3.123 c.m/sec"
" 40           HYDROGRAPH Next link "
"             5   Next link "
"                      0.555     0.724     0.724     3.123"
" 33           CATCHMENT 504"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           504   No description"
"         0.000   % Impervious"
"         3.900   Total Area"
"        90.000   Flow length"
"         2.500   Overland Slope"
"         3.900   Pervious Area"
"        90.000   Pervious length"
"         2.500   Pervious slope"
"         0.000   Impervious Area"
"        90.000   Impervious length"
"         2.500   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.441   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.237     0.724     0.724     3.123 c.m/sec"
"              Catchment 504          Pervious   Impervious Total Area "
"              Surface Area           3.900      0.000      3.900      hectare"
"              Time of concentration  31.292     5.511      31.291     minutes"
"              Time to Centroid       263.911    209.620    263.911    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        2289.30    0.00       2289.30    c.m"
"              Rainfall losses        32.798     5.421      32.798     mm"
"              Runoff depth           25.902     53.279     25.902     mm"
"              Runoff volume          1010.18    0.00       1010.18    c.m"
"              Runoff coefficient     0.441      0.000      0.441      "
"              Maximum flow           0.237      0.000      0.237      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.237     0.962     0.724     3.123"
" 52           CHANNEL DESIGN"
"         0.962   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         1.200   Gradient   %"
"              Depth of flow                 0.315    metre"
"              Velocity                      1.036    m/sec"
"              Channel capacity            431.989    c.m/sec"
"              Critical depth                0.251    metre"
" 53           ROUTE    Channel Route 140"
"        140.00      Channel Route 140 Reach length   ( metre)"
"         0.450   X-factor <= 0.5"
"       101.385   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       100.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.946    c.m/sec"
"                      0.237     0.962     0.946     3.123 c.m/sec"
" 40           HYDROGRAPH   Combine    2200"
"             6   Combine "
"          2200   Node #"
"                 Node taking 500 series - dumps into Hwy 21 Ditch"
"              Maximum flow                  0.946    c.m/sec"
"              Hydrograph volume          3910.304    c.m"
"                      0.237     0.962     0.946     0.946"
" 40           HYDROGRAPH   Confluence    2200"
"             7   Confluence "
"          2200   Node #"
"                 Node taking 500 series - dumps into Hwy 21 Ditch"
"              Maximum flow                  0.946    c.m/sec"
"              Hydrograph volume          3910.304    c.m"
"                      0.237     0.946     0.946     0.000"
" 52           CHANNEL DESIGN"
"         0.946   Current peak flow    c.m/sec"
```

```
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         0.500   Gradient   %"
"              Depth of flow                 0.394    metre"
"              Velocity                      0.755    m/sec"
"              Channel capacity            278.848    c.m/sec"
"              Critical depth                0.249    metre"
" 53           ROUTE    Channel Route 300"
"        300.00      Channel Route 300 Reach length   ( metre)"
"         0.431   X-factor <= 0.5"
"       298.067   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       300.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.941    c.m/sec"
"                      0.237     0.946     0.941     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    2000"
"             6   Combine "
"          2000   Node #"
"                 Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"              Maximum flow                  4.052    c.m/sec"
"              Hydrograph volume         18987.176    c.m"
"                      0.237     0.946     0.941     4.052"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                      0.237     0.000     0.941     4.052"
" 33           CATCHMENT 603"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           603   No description"
"         0.000   % Impervious"
"         5.600   Total Area"
"       100.000   Flow length"
"         2.500   Overland Slope"
"         5.600   Pervious Area"
"       100.000   Pervious length"
"         2.500   Pervious slope"
"         0.000   Impervious Area"
"       100.000   Impervious length"
"         2.500   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.441   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.329     0.000     0.941     4.052 c.m/sec"
"              Catchment 603          Pervious   Impervious Total Area "
"              Surface Area           5.600      0.000      5.600      hectare"
"              Time of concentration  33.334     5.870      33.333     minutes"
"              Time to Centroid       266.365    210.016    266.365    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        3287.20    0.00       3287.20    c.m"
"              Rainfall losses        32.795     5.642      32.795     mm"
"              Runoff depth           25.905     53.058     25.905     mm"
"              Runoff volume          1450.69    0.00       1450.69    c.m"
"              Runoff coefficient     0.441      0.000      0.441      "
"              Maximum flow           0.329      0.000      0.329      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.329     0.329     0.941     4.052"
" 52           CHANNEL DESIGN"
"         0.329   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         1.200   Gradient   %"
"              Depth of flow                 0.175    metre"
"              Velocity                      0.746    m/sec"
"              Channel capacity            431.989    c.m/sec"
"              Critical depth                0.131    metre"
" 53           ROUTE    Channel Route 260"
"        260.00      Channel Route 260 Reach length   ( metre)"
"         0.484   X-factor <= 0.5"
"       261.509   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       150.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.326    c.m/sec"
"                      0.329     0.329     0.326     4.052 c.m/sec"
" 40           HYDROGRAPH Next link "
"             5   Next link "
"                      0.329     0.326     0.326     4.052"
" 33           CATCHMENT 605"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           605   No description"
"         0.000   % Impervious"
"         3.400   Total Area"
"       100.000   Flow length"
"         2.500   Overland Slope"
"         3.400   Pervious Area"
"       100.000   Pervious length"
"         2.500   Pervious slope"
"         0.000   Impervious Area"
"       100.000   Impervious length"
"         2.500   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.441   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.200     0.326     0.326     4.052 c.m/sec"
```

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"              Catchment 605          Pervious   Impervious Total Area "
"              Surface Area           3.400      0.000      3.400      hectare"
"              Time of concentration  33.334     5.870      33.333     minutes"
"              Time to Centroid       266.364    210.016    266.364    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        1995.80    0.00       1995.80    c.m"
"              Rainfall losses        32.795     5.642      32.795     mm"
"              Runoff depth           25.905     53.058     25.905     mm"
"              Runoff volume          880.77     0.00       880.78     c.m"
"              Runoff coefficient     0.441      0.000      0.441      "
"              Maximum flow           0.200      0.000      0.200      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.200     0.518     0.326     4.052"
" 52           CHANNEL DESIGN"
"         0.518   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         1.200   Gradient   %"
"              Depth of flow                 0.225    metre"
"              Velocity                      0.860    m/sec"
"              Channel capacity            431.989    c.m/sec"
"              Critical depth                0.173    metre"
" 53           ROUTE    Channel Route 170"
"        170.00      Channel Route 170 Reach length   ( metre)"
"         0.470   X-factor <= 0.5"
"       148.278   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       150.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.517    c.m/sec"
"                      0.200     0.518     0.517     4.052 c.m/sec"
" 40           HYDROGRAPH   Combine    2300"
"             6   Combine "
"          2300   Node #"
"                 Node taking 600 series - dumps into Hwy 21 Ditch"
"              Maximum flow                  0.517    c.m/sec"
"              Hydrograph volume          2331.466    c.m"
"                      0.200     0.518     0.517     0.517"
" 40           HYDROGRAPH   Confluence    2300"
"             7   Confluence "
"          2300   Node #"
"                 Node taking 600 series - dumps into Hwy 21 Ditch"
"              Maximum flow                  0.517    c.m/sec"
"              Hydrograph volume          2331.466    c.m"
"                      0.200     0.517     0.517     0.000"
" 52           CHANNEL DESIGN"
"         0.517   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         0.500   Gradient   %"
"              Depth of flow                 0.286    metre"
"              Velocity                      0.633    m/sec"
"              Channel capacity            278.848    c.m/sec"
"              Critical depth                0.173    metre"
" 53           ROUTE    Channel Route 650"
"        650.00      Channel Route 650 Reach length   ( metre)"
"         0.429   X-factor <= 0.5"
"       256.589   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       300.000   Routing time step   ( seconds)"
"             3   No. of sub-reaches"
"              Peak outflow                  0.509    c.m/sec"
"                      0.200     0.517     0.509     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    2000"
"             6   Combine "
"          2000   Node #"
"                 Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"              Maximum flow                  4.518    c.m/sec"
"              Hydrograph volume         21318.639    c.m"
"                      0.200     0.517     0.509     4.518"
" 81           ADD COMMENT==================================================="
"             1   Lines of comment"
"              Total discharge to Hwy. 21 Ditch"
" 40           HYDROGRAPH   Confluence    2000"
"             7   Confluence "
"          2000   Node #"
"                 Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"              Maximum flow                  4.518    c.m/sec"
"              Hydrograph volume         21318.639    c.m"
"                      0.200     4.518     0.509     0.000"
" 81           ADD COMMENT==================================================="
"             1   Lines of comment"
"              Total discharge to Hwy. 21 Ditch"
" 52           CHANNEL DESIGN"
"         4.518   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         0.500   Gradient   %"
"              Depth of flow                 0.857    metre"
"              Velocity                      1.154    m/sec"
"              Channel capacity            278.848    c.m/sec"
"              Critical depth                0.597    metre"
" 53           ROUTE    Channel Route 50"
"         50.00      Channel Route 50 Reach length   ( metre)"
"         0.000   X-factor <= 0.5"
"        32.486   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.634   Beta weighting factor"
"        75.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  4.510    c.m/sec"
"                      0.200     4.518     4.510     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    3000"
"             6   Combine "
"          3000   Node #"
"                 Node Combining All Flow"
```

```
"              Maximum flow                  43.024    c.m/sec"
"              Hydrograph volume        462284.031    c.m"
"                      0.200     4.518     4.510    43.024"
" 81           ADD COMMENT================================================="
"           1  Lines of comment"
"              Total Off-site Discharge - Hwy. 21 + Penetangore Tributary"
" 40           HYDROGRAPH   Confluence    3000"
"            7   Confluence "
"          3000   Node #"
"                 Node Combining All Flow"
"              Maximum flow                  43.024    c.m/sec"
"              Hydrograph volume        462284.063    c.m"
"                      0.200    43.024     4.510     0.000"
" 81           ADD COMMENT================================================="
"           1  Lines of comment"
"              Total Off-site Discharge - Hwy. 21 + Penetangore Tributary"
" 38           START/RE-START TOTALS 3000"
"            1   Runoff Totals turned OFF"
"              Catchment area to node 3000             1918.900    hectare"
"              Impervious area to node 3000               0.002    hectare"
"              % impervious to node 3000                  0.000"
"              Peak runoff to node 3000                   0.000    c.m/sec"
"              Total volume to node 3000                    0.0    c.m"
```

PRE-EXISTING 25 YEAR

```
"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                         Version 2.25  rev. 465"
"               MIDUSS created                     Tuesday, February 05, 2008"
"          10   Units used:                                         ie METRIC"
"               Job folder:           C:\Users\derb\Desktop\Kincardine Miduss\"
"                                                                    Existing"
"               Output filename:              08055 - Pre-Existing 25 Year.out"
"               Licensee name:                                      EliteBook"
"               Company                                                BMROSS"
"               Date & Time last used:                  7/19/2011 at 4:10:16 PM"
" 31          TIME PARAMETERS"
"       5.000   Time Step"
"     360.000   Max. Storm length"
"    1800.000   Max. Hydrograph"
" 32          STORM Mass Curve"
"           3   Mass Curve"
"      86.100   Rainfall depth"
"     360.000   Duration"
"          41   C:\Program Files\MIDUSS\SCS_6hr_Type2.mrd   SCS Type II - 6 hour
Distribution - Ontario"
"             Maximum intensity            67.158    mm/hr"
"             Total depth                  86.100    mm"
"           6   025hyd   Hydrograph extension used in this file"
" 81          ADD COMMENT================================================="
"           1  Lines of comment"
"             Start of Penetangore Tributary"
" 33          CATCHMENT 50"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          50   No description"
"       0.000   % Impervious"
"     396.000   Total Area"
"     450.000   Flow length"
"       2.500   Overland Slope"
"     396.000   Pervious Area"
"     450.000   Pervious length"
"       2.500   Pervious slope"
"       0.000   Impervious Area"
"     450.000   Impervious length"
"       2.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      81.000   Pervious SCS Curve No."
"       0.534   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.958   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  23.637     0.000     0.000     0.000 c.m/sec"
"             Catchment 50           Pervious   Impervious Total Area "
"             Surface Area           396.000    0.000      396.000    hectare"
"             Time of concentration  75.983     11.366     75.983     minutes"
"             Time to Centroid       314.049    214.390    314.049    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        34.0956    0.0000     34.0956    ha-m"
"             Rainfall losses        40.137     5.520      40.137     mm"
"             Runoff depth           45.963     80.580     45.963     mm"
"             Runoff volume          18.2015    0.0000     18.2015    ha-m"
"             Runoff coefficient     0.534      0.000      0.534      "
"             Maximum flow           23.637     0.000      23.637     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  23.637    23.637     0.000     0.000"
" 52          CHANNEL DESIGN"
"      23.637   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient    %"
"             Depth of flow                 1.805    metre"
"             Velocity                      1.765    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                1.368    metre"
" 53          ROUTE    Channel Route 3000"
"     3000.00      Channel Route 3000 Reach length   ( metre)"
"       0.396   X-factor <= 0.5"
"     318.652   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           4   No. of sub-reaches"
"             Peak outflow                 23.348    c.m/sec"
"                  23.637    23.637    23.348     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                  23.637    23.348    23.348     0.000"
" 33          CATCHMENT 52"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          52   No description"
"       0.000   % Impervious"
"     196.000   Total Area"
"     250.000   Flow length"
"       7.000   Overland Slope"
"     196.000   Pervious Area"
"     250.000   Pervious length"
"       7.000   Pervious slope"
"       0.000   Impervious Area"
"     250.000   Impervious length"
"       7.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      80.000   Pervious SCS Curve No."
"       0.515   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       6.350   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  18.017    23.348    23.348     0.000 c.m/sec"
"             Catchment 52           Pervious   Impervious Total Area "
"             Surface Area           196.000    0.000      196.000    hectare"
"             Time of concentration  39.626     5.865      39.626     minutes"
"             Time to Centroid       270.855    207.757    270.855    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        16.8756    0.0000     16.8756    ha-m"
"             Rainfall losses        41.715     5.922      41.715     mm"
"             Runoff depth           44.385     80.178     44.385     mm"
"             Runoff volume          8.6994     0.0000     8.6994     ha-m"
"             Runoff coefficient     0.515      0.000      0.516      "
"             Maximum flow           18.017     0.000      18.017     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  18.017    29.299    23.348     0.000"
" 52          CHANNEL DESIGN"
"      29.299   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.400   Gradient    %"
"             Depth of flow                 2.076    metre"
"             Velocity                      1.715    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.513    metre"
" 53          ROUTE    Channel Route 1300"
"     1300.00      Channel Route 1300 Reach length   ( metre)"
"       0.330   X-factor <= 0.5"
"     284.328   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"             Peak outflow                 29.196    c.m/sec"
"                  18.017    29.299    29.196     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                  18.017    29.196    29.196     0.000"
" 33          CATCHMENT 54"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          54   No description"
"       0.000   % Impervious"
"      39.000   Total Area"
"     140.000   Flow length"
"      11.000   Overland Slope"
"      39.000   Pervious Area"
"     140.000   Pervious length"
"      11.000   Pervious slope"
"       0.000   Impervious Area"
"     140.000   Impervious length"
"      11.000   Impervious slope"
"       0.210   Pervious Manning 'n'"
"      81.000   Pervious SCS Curve No."
"       0.533   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.958   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   4.989    29.196    29.196     0.000 c.m/sec"
"             Catchment 54           Pervious   Impervious Total Area "
"             Surface Area           39.000     0.000      39.000     hectare"
"             Time of concentration  21.777     3.617      21.777     minutes"
"             Time to Centroid       248.526    204.957    248.526    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        3.3579     0.0000     3.3579     ha-m"
"             Rainfall losses        40.195     7.671      40.195     mm"
"             Runoff depth           45.905     78.429     45.905     mm"
"             Runoff volume          1.7903     0.0000     1.7903     ha-m"
"             Runoff coefficient     0.533      0.000      0.533      "
"             Maximum flow           4.989      0.000      4.989      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   4.989    30.131    29.196     0.000"
" 52          CHANNEL DESIGN"
"      30.131   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.400   Gradient    %"
"             Depth of flow                 2.101    metre"
"             Velocity                      1.727    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.533    metre"
" 53          ROUTE    Channel Route 800"
"      800.00      Channel Route 800 Reach length   ( metre)"
"       0.360   X-factor <= 0.5"
"     347.479   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"             Peak outflow                 30.050    c.m/sec"
"                   4.989    30.131    30.050     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    10"
"           6   Combine "
"          10   Node #"
"               Confluence on Penetangore Tributary"
"             Maximum flow                 30.050    c.m/sec"
"             Hydrograph volume        286911.781    c.m"
"                   4.989    30.131    30.050    30.050"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   4.989     0.000    30.050    30.050"
" 33          CATCHMENT 60"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          60   No description"
"       0.000   % Impervious"
"     225.000   Total Area"
"     270.000   Flow length"
"       2.500   Overland Slope"
"     225.000   Pervious Area"
"     270.000   Pervious length"
"       2.500   Pervious slope"
"       0.000   Impervious Area"
"     270.000   Impervious length"
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"        2.500   Impervious slope"
"        0.230   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.534   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  17.615     0.000    30.050    30.050 c.m/sec"
"             Catchment 60           Pervious   Impervious Total Area "
"             Surface Area           225.000    0.000      225.000    hectare"
"             Time of concentration  53.196     8.366      53.196     minutes"
"             Time to Centroid       286.501    210.824    286.501    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        19.3725    0.0000     19.3725    ha-m"
"             Rainfall losses        40.141     5.535      40.141     mm"
"             Runoff depth           45.959     80.565     45.959     mm"
"             Runoff volume          10.3407    0.0000     10.3407    ha-m"
"             Runoff coefficient     0.534      0.000      0.534      "
"             Maximum flow           17.615     0.000      17.615     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  17.615    17.615    30.050    30.050"
" 52          CHANNEL DESIGN"
"       17.615   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"             Depth of flow                 1.668    metre"
"             Velocity                      1.508    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.188    metre"
" 53          ROUTE    Channel Route 1800"
"      1800.00      Channel Route 1800 Reach length   ( metre)"
"        0.349   X-factor <= 0.5"
"      298.497   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                 17.265    c.m/sec"
"                  17.615    17.615    17.265    30.050 c.m/sec"
" 40          HYDROGRAPH   Combine    10"
"            6   Combine "
"           10   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 45.035    c.m/sec"
"             Hydrograph volume        390319.781    c.m"
"                  17.615    17.615    17.265    45.035"
" 40          HYDROGRAPH   Confluence    10"
"            7   Confluence "
"           10   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 45.035    c.m/sec"
"             Hydrograph volume        390319.781    c.m"
"                  17.615    45.035    17.265     0.000"
" 52          CHANNEL DESIGN"
"       45.035   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"             Depth of flow                 2.489    metre"
"             Velocity                      1.911    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.847    metre"
" 53          ROUTE    Channel Route 2000"
"      2000.00      Channel Route 2000 Reach length   ( metre)"
"        0.370   X-factor <= 0.5"
"      392.542   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                 44.774    c.m/sec"
"                  17.615    45.035    44.774     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    11"
"            6   Combine "
"           11   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 44.774    c.m/sec"
"             Hydrograph volume        390319.656    c.m"
"                  17.615    45.035    44.774    44.774"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  17.615     0.000    44.774    44.774"
" 33          CATCHMENT 62"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           62   No description"
"        0.000   % Impervious"
"       95.000   Total Area"
"      160.000   Flow length"
"        2.500   Overland Slope"
"       95.000   Pervious Area"
"      160.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      160.000   Impervious length"
"        2.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       80.000   Pervious SCS Curve No."
"        0.515   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.350   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                   8.472     0.000    44.774    44.774 c.m/sec"
"             Catchment 62           Pervious   Impervious Total Area "
"             Surface Area           95.000     0.000      95.000     hectare"
"             Time of concentration  41.289     6.112      41.289     minutes"
"             Time to Centroid       272.861    208.104    272.861    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        8.1795     0.0000     8.1795     ha-m"
"             Rainfall losses        41.720     6.094      41.720     mm"
"             Runoff depth           44.380     80.006     44.380     mm"
"             Runoff volume          4.2161     0.0000     4.2161     ha-m"
"             Runoff coefficient     0.515      0.000      0.515      "
"             Maximum flow           8.472      0.000      8.472      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   8.472     8.472    44.774    44.774"
" 52          CHANNEL DESIGN"
"        8.472   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.300   Gradient   %"
"             Depth of flow                 1.286    metre"
"             Velocity                      1.124    m/sec"
"             Channel capacity            215.995    c.m/sec"
"             Critical depth                0.827    metre"
" 53          ROUTE    Channel Route 1800"
"      1800.00      Channel Route 1800 Reach length   ( metre)"
"        0.340   X-factor <= 0.5"
"      400.376   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                  8.135    c.m/sec"
"                   8.472     8.472     8.135    44.774 c.m/sec"
" 40          HYDROGRAPH   Combine    11"
"            6   Combine "
"           11   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 50.903    c.m/sec"
"             Hydrograph volume        432480.250    c.m"
"                   8.472     8.472     8.135    50.903"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                   8.472     0.000     8.135    50.903"
" 33          CATCHMENT 56"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           56   No description"
"        0.000   % Impervious"
"      345.000   Total Area"
"      240.000   Flow length"
"       11.000   Overland Slope"
"      345.000   Pervious Area"
"      240.000   Pervious length"
"       11.000   Pervious slope"
"        0.000   Impervious Area"
"      240.000   Impervious length"
"       15.000   Impervious slope"
"        0.280   Pervious Manning 'n'"
"       79.000   Pervious SCS Curve No."
"        0.498   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.752   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  32.068     0.000     8.135    50.903 c.m/sec"
"             Catchment 56           Pervious   Impervious Total Area "
"             Surface Area           345.000    0.000      345.000    hectare"
"             Time of concentration  36.531     4.554      36.531     minutes"
"             Time to Centroid       267.854    206.382    267.853    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        29.7045    0.0000     29.7045    ha-m"
"             Rainfall losses        43.248     6.318      43.248     mm"
"             Runoff depth           42.852     79.782     42.852     mm"
"             Runoff volume          14.7839    0.0000     14.7839    ha-m"
"             Runoff coefficient     0.498      0.000      0.498      "
"             Maximum flow           32.068     0.000      32.068     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  32.068    32.068     8.135    50.903"
" 52          CHANNEL DESIGN"
"       32.068   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"             Depth of flow                 2.158    metre"
"             Velocity                      1.754    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.579    metre"
" 53          ROUTE    Channel Route 1300"
"      1300.00      Channel Route 1300 Reach length   ( metre)"
"        0.324   X-factor <= 0.5"
"      277.926   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                 31.517    c.m/sec"
"                  32.068    32.068    31.517    50.903 c.m/sec"
" 40          HYDROGRAPH   Combine    11"
"            6   Combine "
"           11   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 70.381    c.m/sec"
"             Hydrograph volume        580319.938    c.m"
"                  32.068    32.068    31.517    70.381"
" 40          HYDROGRAPH   Confluence    11"
"            7   Confluence "
"           11   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 70.381    c.m/sec"
"             Hydrograph volume        580319.875    c.m"
"                  32.068    70.381    31.517     0.000"
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" 52          CHANNEL DESIGN"
"       70.381   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 2.862    metre"
"             Velocity                      2.324    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                2.263    metre"
" 53          ROUTE    Channel Route 1300"
"      1300.00       Channel Route 1300 Reach length   ( metre)"
"        0.318   X-factor <= 0.5"
"      209.797   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                 70.253    c.m/sec"
"                    32.068    70.381    70.253     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 70.253    c.m/sec"
"             Hydrograph volume        580320.063    c.m"
"                    32.068    70.381    70.253    70.253"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    32.068     0.000    70.253    70.253"
" 33          CATCHMENT 58"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           58   No description"
"        0.000   % Impervious"
"       82.000   Total Area"
"      140.000   Flow length"
"       15.000   Overland Slope"
"       82.000   Pervious Area"
"      140.000   Pervious length"
"       15.000   Pervious slope"
"        0.000   Impervious Area"
"      140.000   Impervious length"
"       15.000   Impervious slope"
"        0.230   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.533   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    10.634     0.000    70.253    70.253 c.m/sec"
"             Catchment 58           Pervious   Impervious Total Area "
"             Surface Area           82.000     0.000      82.000     hectare"
"             Time of concentration  20.955     3.295      20.955     minutes"
"             Time to Centroid       247.521    204.757    247.521    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        7.0602     0.0000     7.0602     ha-m"
"             Rainfall losses        40.178     7.017      40.178     mm"
"             Runoff depth           45.922     79.083     45.922     mm"
"             Runoff volume          3.7656     0.0000     3.7656     ha-m"
"             Runoff coefficient     0.533      0.000      0.533      "
"             Maximum flow           10.634     0.000      10.634     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    10.634    10.634    70.253    70.253"
" 52          CHANNEL DESIGN"
"       10.634   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 1.270    metre"
"             Velocity                      1.441    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.927    metre"
" 53          ROUTE    Channel Route 700"
"       700.00       Channel Route 700 Reach length   ( metre)"
"        0.337   X-factor <= 0.5"
"      182.217   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                 10.392    c.m/sec"
"                    10.634    10.634    10.392    70.253 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 72.784    c.m/sec"
"             Hydrograph volume        617975.438    c.m"
"                    10.634    10.634    10.392    72.784"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    10.634     0.000    10.392    72.784"
" 33          CATCHMENT 64"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           64   No description"
"        0.000   % Impervious"
"       80.000   Total Area"
"      220.000   Flow length"
"        5.500   Overland Slope"
"       80.000   Pervious Area"
"      220.000   Pervious length"
"        5.500   Pervious slope"
"        0.000   Impervious Area"
"      220.000   Impervious length"
"        5.500   Impervious slope"
"        0.210   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     8.580     0.000    10.392    72.784 c.m/sec"
"             Catchment 64           Pervious   Impervious Total Area "
"             Surface Area           80.000     0.000      80.000     hectare"
"             Time of concentration  34.803     5.840      34.803     minutes"
"             Time to Centroid       263.478    207.720    263.478    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        6.8880     0.0000     6.8880     ha-m"
"             Rainfall losses        38.551     5.897      38.551     mm"
"             Runoff depth           47.549     80.203     47.549     mm"
"             Runoff volume          3.8039     0.0000     3.8039     ha-m"
"             Runoff coefficient     0.552      0.000      0.552      "
"             Maximum flow           8.580      0.000      8.580      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     8.580     8.580    10.392    72.784"
" 52          CHANNEL DESIGN"
"        8.580   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 1.153    metre"
"             Velocity                      1.363    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.833    metre"
" 53          ROUTE    Channel Route 700"
"       700.00       Channel Route 700 Reach length   ( metre)"
"        0.350   X-factor <= 0.5"
"      192.537   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                  8.497    c.m/sec"
"                     8.580     8.580     8.497    72.784 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 76.961    c.m/sec"
"             Hydrograph volume        656014.750    c.m"
"                     8.580     8.580     8.497    76.961"
" 40          HYDROGRAPH   Confluence    12"
"            7   Confluence "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 76.961    c.m/sec"
"             Hydrograph volume        656014.750    c.m"
"                     8.580    76.961     8.497     0.000"
" 52          CHANNEL DESIGN"
"       76.961   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.300   Gradient   %"
"             Depth of flow                 3.297    metre"
"             Velocity                      1.963    m/sec"
"             Channel capacity            215.995    c.m/sec"
"             Critical depth                2.356    metre"
" 53          ROUTE    Channel Route 2500"
"      2500.00       Channel Route 2500 Reach length   ( metre)"
"        0.230   X-factor <= 0.5"
"      318.467   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                 75.678    c.m/sec"
"                     8.580    76.961    75.678     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1000"
"            6   Combine "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow                 75.678    c.m/sec"
"             Hydrograph volume        656014.750    c.m"
"                     8.580    76.961    75.678    75.678"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     8.580     0.000    75.678    75.678"
" 33          CATCHMENT 59"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           59   No description"
"        0.000   % Impervious"
"      128.000   Total Area"
"      170.000   Flow length"
"       18.000   Overland Slope"
"      128.000   Pervious Area"
"      170.000   Pervious length"
"       18.000   Pervious slope"
"        0.000   Impervious Area"
"      170.000   Impervious length"
"       18.000   Impervious slope"
"        0.350   Pervious Manning 'n'"
"       76.000   Pervious SCS Curve No."
"        0.447   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.021   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    11.726     0.000    75.678    75.678 c.m/sec"
"             Catchment 59           Pervious   Impervious Total Area "
"             Surface Area           128.000    0.000      128.000    hectare"
"             Time of concentration  30.299     3.505      30.299     minutes"
"             Time to Centroid       262.475    204.855    262.475    minutes"
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"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        11.0208    0.0000     11.0208    ha-m"
"            Rainfall losses        47.606     7.396      47.606     mm"
"            Runoff depth           38.494     78.704     38.494     mm"
"            Runoff volume          4.9273     0.0000     4.9273     ha-m"
"            Runoff coefficient     0.447      0.000      0.447      "
"            Maximum flow           11.726     0.000      11.726     c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4  Add Runoff "
"                  11.726    11.726    75.678    75.678"
" 52         CHANNEL DESIGN"
"       11.726   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.300   Gradient   %"
"            Depth of flow                 1.487    metre"
"            Velocity                      1.221    m/sec"
"            Channel capacity            215.995    c.m/sec"
"            Critical depth                0.973    metre"
" 53         ROUTE    Channel Route 1500"
"      1500.00      Channel Route 1500 Reach length   ( metre)"
"        0.281   X-factor <= 0.5"
"      307.084   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"           3   No. of sub-reaches"
"            Peak outflow                11.131    c.m/sec"
"                  11.726    11.726    11.131    75.678 c.m/sec"
" 40         HYDROGRAPH   Combine    1000"
"           6   Combine "
"         1000   Node #"
"               Node upstream of Penetangore Culvert"
"            Maximum flow                79.914    c.m/sec"
"            Hydrograph volume        705287.563    c.m"
"                  11.726    11.726    11.131    79.914"
" 81         ADD COMMENT=================================================="
"          1  Lines of comment"
"            End of Penetangore Tributary"
" 81         ADD COMMENT=================================================="
"          1  Lines of comment"
"            Start of Area North of Holtby Drain"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  11.726     0.000    11.131    79.914"
" 33         CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   No description"
"        0.000   % Impervious"
"      166.000   Total Area"
"      250.000   Flow length"
"        3.000   Overland Slope"
"      166.000   Pervious Area"
"      250.000   Pervious length"
"        3.000   Pervious slope"
"        0.000   Impervious Area"
"      250.000   Impervious length"
"        3.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  15.489     0.000    11.131    79.914 c.m/sec"
"            Catchment 201          Pervious   Impervious Total Area "
"            Surface Area           166.000    0.000      166.000    hectare"
"            Time of concentration  43.771     7.563      43.771     minutes"
"            Time to Centroid       274.325    209.915    274.325    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        14.2926    0.0000     14.2926    ha-m"
"            Rainfall losses        38.537     5.756      38.537     mm"
"            Runoff depth           47.563     80.344     47.563     mm"
"            Runoff volume          7.8955     0.0000     7.8955     ha-m"
"            Runoff coefficient     0.552      0.000      0.552      "
"            Maximum flow           15.489     0.000      15.489     c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4  Add Runoff "
"                  15.489    15.489    11.131    79.914"
" 52         CHANNEL DESIGN"
"       15.489   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"            Depth of flow                 1.287    metre"
"            Velocity                      2.053    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                1.116    metre"
" 53         ROUTE    Channel Route 1900"
"      1900.00      Channel Route 1900 Reach length   ( metre)"
"        0.454   X-factor <= 0.5"
"      231.397   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"           3   No. of sub-reaches"
"            Peak outflow                15.353    c.m/sec"
"                  15.489    15.489    15.353    79.914 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  15.489    15.353    15.353    79.914"
" 33         CATCHMENT 202"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         202   No description"
"        0.000   % Impervious"
"        8.000   Total Area"
"      225.000   Flow length"
"        4.000   Overland Slope"
"        8.000   Pervious Area"
"      225.000   Pervious length"
"        4.000   Pervious slope"
"        0.000   Impervious Area"
"      225.000   Impervious length"
"        4.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                   0.817    15.353    15.353    79.914 c.m/sec"
"            Catchment 202          Pervious   Impervious Total Area "
"            Surface Area           8.000      0.000      8.000      hectare"
"            Time of concentration  37.692     6.513      37.692     minutes"
"            Time to Centroid       266.978    208.591    266.978    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        6887.99    0.01       6888.00    c.m"
"            Rainfall losses        38.542     6.520      38.542     mm"
"            Runoff depth           47.558     79.580     47.558     mm"
"            Runoff volume          3804.65    0.01       3804.66    c.m"
"            Runoff coefficient     0.552      0.000      0.552      "
"            Maximum flow           0.817      0.000      0.817      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4  Add Runoff "
"                   0.817    16.018    15.353    79.914"
" 52         CHANNEL DESIGN"
"       16.018   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"            Depth of flow                 1.307    metre"
"            Velocity                      2.070    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                1.134    metre"
" 53         ROUTE    Channel Route 260"
"       260.00      Channel Route 260 Reach length   ( metre)"
"        0.387   X-factor <= 0.5"
"       94.181   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                15.936    c.m/sec"
"                   0.817    16.018    15.936    79.914 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                   0.817    15.936    15.936    79.914"
" 33         CATCHMENT 203"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         203   No description"
"        0.000   % Impervious"
"       13.600   Total Area"
"      150.000   Flow length"
"        3.500   Overland Slope"
"       13.600   Pervious Area"
"      150.000   Pervious length"
"        3.500   Pervious slope"
"        0.000   Impervious Area"
"      150.000   Impervious length"
"        3.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                   1.552    15.936    15.936    79.914 c.m/sec"
"            Catchment 203          Pervious   Impervious Total Area "
"            Surface Area           13.600     0.000      13.600     hectare"
"            Time of concentration  30.761     5.315      30.761     minutes"
"            Time to Centroid       258.597    207.148    258.597    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        1.1710     0.0000     1.1710     ha-m"
"            Rainfall losses        38.557     5.592      38.557     mm"
"            Runoff depth           47.543     80.508     47.543     mm"
"            Runoff volume          6465.87    0.01       6465.88    c.m"
"            Runoff coefficient     0.552      0.000      0.552      "
"            Maximum flow           1.552      0.000      1.552      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4  Add Runoff "
"                   1.552    16.794    15.936    79.914"
" 52         CHANNEL DESIGN"
"       16.794   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"            Depth of flow                 1.335    metre"
"            Velocity                      2.096    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                1.161    metre"
" 53         ROUTE    Channel Route 350"
"       350.00      Channel Route 350 Reach length   ( metre)"
"        0.415   X-factor <= 0.5"
"      125.258   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                16.755    c.m/sec"
"                   1.552    16.794    16.755    79.914 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
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"                    1.552    16.755    16.755    79.914"
" 33          CATCHMENT 204"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          204   No description"
"        0.000   % Impervious"
"        6.800   Total Area"
"      120.000   Flow length"
"        2.000   Overland Slope"
"        6.800   Pervious Area"
"      120.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"      120.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.761    16.755    16.755    79.914 c.m/sec"
"             Catchment 204          Pervious   Impervious Total Area "
"             Surface Area           6.800      0.000      6.800      hectare"
"             Time of concentration  31.825     5.499      31.825     minutes"
"             Time to Centroid       259.880    207.388    259.880    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        5854.79    0.01       5854.80    c.m"
"             Rainfall losses        38.550     5.625      38.550     mm"
"             Runoff depth           47.550     80.475     47.550     mm"
"             Runoff volume          3233.38    0.01       3233.38    c.m"
"             Runoff coefficient     0.552      0.000      0.552      "
"             Maximum flow           0.761      0.000      0.761      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.761    17.175    16.755    79.914"
" 52          CHANNEL DESIGN"
"       17.175   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"             Depth of flow                 1.348    metre"
"             Velocity                      2.108    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                1.173    metre"
" 53          ROUTE    Channel Route 150"
"       150.00      Channel Route 150 Reach length   ( metre)"
"        0.300   X-factor <= 0.5"
"       53.375   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       60.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 17.144    c.m/sec"
"                    0.761    17.175    17.144    79.914 c.m/sec"
" 40          HYDROGRAPH   Combine    1100"
"            6   Combine "
"         1100   Node #"
"                Node taking 200 series - dumps into Holtby Drain"
"             Maximum flow                 17.144    c.m/sec"
"             Hydrograph volume         92458.828    c.m"
"                    0.761    17.175    17.144    17.144"
" 81          ADD COMMENT==================================================="
"          1  Lines of comment"
"             End of Area North of Holtby Drain"
" 40          HYDROGRAPH   Confluence    1100"
"            7   Confluence "
"         1100   Node #"
"                Node taking 200 series - dumps into Holtby Drain"
"             Maximum flow                 17.144    c.m/sec"
"             Hydrograph volume         92458.828    c.m"
"                    0.761    17.144    17.144     0.000"
" 81          ADD COMMENT==================================================="
"          1  Lines of comment"
"             Total discharge to Holtby Drain"
" 52          CHANNEL DESIGN"
"       17.144   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 1.570    metre"
"             Velocity                      1.627    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                1.172    metre"
" 53          ROUTE    Channel Route 200"
"       200.00      Channel Route 200 Reach length   ( metre)"
"        0.156   X-factor <= 0.5"
"       92.183   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 17.045    c.m/sec"
"                    0.761    17.144    17.045     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1300"
"            6   Combine "
"         1300   Node #"
"                Node at Holtby Drain"
"             Maximum flow                 17.045    c.m/sec"
"             Hydrograph volume         92458.789    c.m"
"                    0.761    17.144    17.045    17.045"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.761     0.000    17.045    17.045"
" 33          CATCHMENT 100"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          100   No description"
"        0.000   % Impervious"
"       45.000   Total Area"
"      100.000   Flow length"
"        7.000   Overland Slope"
"       45.000   Pervious Area"
"      100.000   Pervious length"
"        7.000   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        7.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    6.134     0.000    17.045    17.045 c.m/sec"
"             Catchment 100          Pervious   Impervious Total Area "
"             Surface Area           45.000     0.000      45.000     hectare"
"             Time of concentration  19.590     3.385      19.590     minutes"
"             Time to Centroid       245.074    204.792    245.074    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        3.8745     0.0000     3.8745     ha-m"
"             Rainfall losses        38.595     7.147      38.595     mm"
"             Runoff depth           47.505     78.953     47.505     mm"
"             Runoff volume          2.1377     0.0000     2.1377     ha-m"
"             Runoff coefficient     0.552      0.000      0.552      "
"             Maximum flow           6.134      0.000      6.134      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    6.134     6.134    17.045    17.045"
" 52          CHANNEL DESIGN"
"        6.134   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"             Depth of flow                 0.840    metre"
"             Velocity                      1.615    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                0.701    metre"
" 53          ROUTE    Channel Route 1500"
"      1500.00      Channel Route 1500 Reach length   ( metre)"
"        0.460   X-factor <= 0.5"
"      232.178   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                  6.034    c.m/sec"
"                    6.134     6.134     6.034    17.045 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                    6.134     6.034     6.034    17.045"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   No description"
"        0.000   % Impervious"
"       11.200   Total Area"
"       50.000   Flow length"
"        7.000   Overland Slope"
"       11.200   Pervious Area"
"       50.000   Pervious length"
"        7.000   Pervious slope"
"        0.000   Impervious Area"
"       50.000   Impervious length"
"        7.000   Impervious slope"
"        0.280   Pervious Manning 'n'"
"       80.000   Pervious SCS Curve No."
"        0.514   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.350   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    1.446     6.034     6.034    17.045 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           11.200     0.000      11.200     hectare"
"             Time of concentration  16.148     2.233      16.148     minutes"
"             Time to Centroid       242.477    203.345    242.477    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        9643.19    0.01       9643.20    c.m"
"             Rainfall losses        41.808     6.646      41.808     mm"
"             Runoff depth           44.292     79.454     44.292     mm"
"             Runoff volume          4960.69    0.01       4960.70    c.m"
"             Runoff coefficient     0.514      0.000      0.514      "
"             Maximum flow           1.446      0.000      1.446      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    1.446     6.859     6.034    17.045"
" 52          CHANNEL DESIGN"
"        6.859   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"             Depth of flow                 0.886    metre"
"             Velocity                      1.663    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                0.743    metre"
" 53          ROUTE    Channel Route 700"
"       700.00      Channel Route 700 Reach length   ( metre)"
"        0.470   X-factor <= 0.5"
"      315.677   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  6.850    c.m/sec"
"                    1.446     6.859     6.850    17.045 c.m/sec"
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" 40          HYDROGRAPH   Combine    1200"
"            6   Combine "
"         1200   Node #"
"                Node taking 100 series for Holtby Drain"
"             Maximum flow                  6.850    c.m/sec"
"             Hydrograph volume         26338.104    c.m"
"                    1.446     6.859     6.850     6.850"
" 40          HYDROGRAPH   Confluence    1200"
"            7   Confluence "
"         1200   Node #"
"                Node taking 100 series for Holtby Drain"
"             Maximum flow                  6.850    c.m/sec"
"             Hydrograph volume         26338.104    c.m"
"                    1.446     6.850     6.850     0.000"
" 52          CHANNEL DESIGN"
"        6.850   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 1.040    metre"
"             Velocity                      1.286    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.742    metre"
" 53          ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       29.150   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.678   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  6.839    c.m/sec"
"                    1.446     6.850     6.839     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1300"
"            6   Combine "
"         1300   Node #"
"                Node at Holtby Drain"
"             Maximum flow                 21.877    c.m/sec"
"             Hydrograph volume        118796.961    c.m"
"                    1.446     6.850     6.839    21.877"
" 40          HYDROGRAPH   Confluence    1300"
"            7   Confluence "
"         1300   Node #"
"                Node at Holtby Drain"
"             Maximum flow                 21.877    c.m/sec"
"             Hydrograph volume        118796.961    c.m"
"                    1.446    21.877     6.839     0.000"
" 52          CHANNEL DESIGN"
"       21.877   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 1.746    metre"
"             Velocity                      1.731    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                1.318    metre"
" 53          ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       21.664   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.793   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 21.856    c.m/sec"
"                    1.446    21.877    21.856     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1000"
"            6   Combine "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow                 94.559    c.m/sec"
"             Hydrograph volume        824085.063    c.m"
"                    1.446    21.877    21.856    94.559"
" 81          ADD COMMENT=================================================="
"          2  Lines of comment"
"             Total discharge to Pipe Arch under Hwy. 21 on the "
"             Pentangore Tributary"
" 40          HYDROGRAPH   Confluence    1000"
"            7   Confluence "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow                 94.559    c.m/sec"
"             Hydrograph volume        824085.063    c.m"
"                    1.446    94.559    21.856     0.000"
" 81          ADD COMMENT=================================================="
"          2  Lines of comment"
"             Total discharge to Pipe Arch under Hwy. 21 on the "
"             Pentangore Tributary"
" 52          CHANNEL DESIGN"
"       94.559   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 3.231    metre"
"             Velocity                      2.502    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                2.582    metre"
" 53          ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       14.986   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.929   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 94.556    c.m/sec"
"                    1.446    94.559    94.556     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    3000"
"            6   Combine "
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"         3000   Node #"
"                Node Combining All Flow"
"             Maximum flow                 94.556    c.m/sec"
"             Hydrograph volume        824084.688    c.m"
"                    1.446    94.559    94.556    94.556"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    1.446     0.000    94.556    94.556"
" 33          CATCHMENT 301"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          301   No description"
"        0.000   % Impervious"
"       16.400   Total Area"
"       95.000   Flow length"
"        2.500   Overland Slope"
"       16.400   Pervious Area"
"       95.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"       95.000   Impervious length"
"        2.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    2.034     0.000    94.556    94.556 c.m/sec"
"             Catchment 301          Pervious   Impervious Total Area "
"             Surface Area           16.400     0.000      16.400     hectare"
"             Time of concentration  25.871     4.871      25.871     minutes"
"             Time to Centroid       252.674    206.739    252.674    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        1.4120     0.0000     1.4120     ha-m"
"             Rainfall losses        38.556     5.741      38.556     mm"
"             Runoff depth           47.544     80.359     47.544     mm"
"             Runoff volume          7797.27    0.01       7797.28    c.m"
"             Runoff coefficient     0.552      0.000      0.552      "
"             Maximum flow           2.034      0.000      2.034      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    2.034     2.034    94.556    94.556"
" 52          CHANNEL DESIGN"
"        2.034   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"             Depth of flow                 0.467    metre"
"             Velocity                      1.282    m/sec"
"             Channel capacity            431.989    c.m/sec"
"             Critical depth                0.387    metre"
" 53          ROUTE    Channel Route 480"
"      480.00      Channel Route 480 Reach length   ( metre)"
"        0.479   X-factor <= 0.5"
"      280.748   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  2.005    c.m/sec"
"                    2.034     2.034     2.005    94.556 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                    2.034     2.005     2.005    94.556"
" 33          CATCHMENT 302"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          302   No description"
"        0.000   % Impervious"
"        5.000   Total Area"
"      110.000   Flow length"
"        3.500   Overland Slope"
"        5.000   Pervious Area"
"      110.000   Pervious length"
"        3.500   Pervious slope"
"        0.000   Impervious Area"
"      110.000   Impervious length"
"        3.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.623     2.005     2.005    94.556 c.m/sec"
"             Catchment 302          Pervious   Impervious Total Area "
"             Surface Area           5.000      0.000      5.000      hectare"
"             Time of concentration  25.537     4.808      25.537     minutes"
"             Time to Centroid       252.270    206.668    252.270    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        4305.00    0.00       4305.00    c.m"
"             Rainfall losses        38.572     5.823      38.572     mm"
"             Runoff depth           47.528     80.277     47.528     mm"
"             Runoff volume          2376.37    0.00       2376.38    c.m"
"             Runoff coefficient     0.552      0.000      0.552      "
"             Maximum flow           0.623      0.000      0.623      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.623     2.596     2.005    94.556"
" 52          CHANNEL DESIGN"
"        2.596   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"             Depth of flow                 0.528    metre"
"             Velocity                      1.372    m/sec"
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"             Channel capacity           431.989    c.m/sec"
"             Critical depth                0.443    metre"
" 53          ROUTE    Channel Route 280"
"       280.00       Channel Route 280 Reach length   ( metre)"
"        0.460   X-factor <= 0.5"
"      153.104   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  2.588    c.m/sec"
"                  0.623     2.596     2.588    94.556 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                  0.623     2.588     2.588    94.556"
" 33          CATCHMENT 303"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          303   No description"
"        0.000   % Impervious"
"       11.600   Total Area"
"      135.000   Flow length"
"        4.500   Overland Slope"
"       11.600   Pervious Area"
"      135.000   Pervious length"
"        4.500   Pervious slope"
"        0.000   Impervious Area"
"      135.000   Impervious length"
"        4.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  1.421     2.588     2.588    94.556 c.m/sec"
"             Catchment 303          Pervious   Impervious Total Area "
"             Surface Area           11.600     0.000      11.600     hectare"
"             Time of concentration  26.779     5.042      26.779     minutes"
"             Time to Centroid       253.773    206.873    253.772    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        9987.59    0.01       9987.60    c.m"
"             Rainfall losses        38.548     5.609      38.548     mm"
"             Runoff depth           47.552     80.491     47.552     mm"
"             Runoff volume          5516.08    0.01       5516.09    c.m"
"             Runoff coefficient     0.552      0.000      0.552      "
"             Maximum flow           1.421      0.000      1.421      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  1.421     3.928     2.588    94.556"
" 52          CHANNEL DESIGN"
"        3.928   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"             Depth of flow                 0.649    metre"
"             Velocity                      1.535    m/sec"
"             Channel capacity           431.989    c.m/sec"
"             Critical depth                0.554    metre"
" 53          ROUTE    Channel Route 430"
"       430.00       Channel Route 430 Reach length   ( metre)"
"        0.469   X-factor <= 0.5"
"      210.160   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  3.904    c.m/sec"
"                  1.421     3.928     3.904    94.556 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                  1.421     3.904     3.904    94.556"
" 33          CATCHMENT 304"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          304   No description"
"        0.000   % Impervious"
"        6.300   Total Area"
"      150.000   Flow length"
"        2.500   Overland Slope"
"        6.300   Pervious Area"
"      150.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      150.000   Impervious length"
"        2.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.684     3.904     3.904    94.556 c.m/sec"
"             Catchment 304          Pervious   Impervious Total Area "
"             Surface Area           6.300      0.000      6.300      hectare"
"             Time of concentration  34.028     6.407      34.028     minutes"
"             Time to Centroid       262.535    208.467    262.535    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        5424.29    0.01       5424.30    c.m"
"             Rainfall losses        38.545     6.373      38.545     mm"
"             Runoff depth           47.555     79.727     47.555     mm"
"             Runoff volume          2995.95    0.01       2995.96    c.m"
"             Runoff coefficient     0.552      0.000      0.552      "
"             Maximum flow           0.684      0.000      0.684      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  0.684     4.588     3.904    94.556"
" 52          CHANNEL DESIGN"
"        4.588   Current peak flow    c.m/sec"
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"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"             Depth of flow                 0.700    metre"
"             Velocity                      1.600    m/sec"
"             Channel capacity           431.989    c.m/sec"
"             Critical depth                0.602    metre"
" 53          ROUTE    Channel Route 130"
"       130.00       Channel Route 130 Reach length   ( metre)"
"        0.391   X-factor <= 0.5"
"       60.953   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       60.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  4.535    c.m/sec"
"                  0.684     4.588     4.535    94.556 c.m/sec"
" 40          HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"             Maximum flow                  4.535    c.m/sec"
"             Hydrograph volume         18685.695    c.m"
"                  0.684     4.588     4.535     4.535"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  0.684     0.000     4.535     4.535"
" 33          CATCHMENT 401"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          401   No description"
"        0.000   % Impervious"
"        5.600   Total Area"
"      240.000   Flow length"
"        3.500   Overland Slope"
"        5.600   Pervious Area"
"      240.000   Pervious length"
"        3.500   Pervious slope"
"        0.000   Impervious Area"
"      240.000   Impervious length"
"        3.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.546     0.000     4.535     4.535 c.m/sec"
"             Catchment 401          Pervious   Impervious Total Area "
"             Surface Area           5.600      0.000      5.600      hectare"
"             Time of concentration  40.782     7.678      40.782     minutes"
"             Time to Centroid       270.706    210.019    270.706    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        4821.59    0.00       4821.60    c.m"
"             Rainfall losses        38.542     5.716      38.542     mm"
"             Runoff depth           47.558     80.384     47.558     mm"
"             Runoff volume          2663.27    0.00       2663.27    c.m"
"             Runoff coefficient     0.552      0.000      0.552      "
"             Maximum flow           0.546      0.000      0.546      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  0.546     0.546     4.535     4.535"
" 52          CHANNEL DESIGN"
"        0.546   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"             Depth of flow                 0.232    metre"
"             Velocity                      0.874    m/sec"
"             Channel capacity           431.989    c.m/sec"
"             Critical depth                0.179    metre"
" 53          ROUTE    Channel Route 225"
"       225.00       Channel Route 225 Reach length   ( metre)"
"        0.476   X-factor <= 0.5"
"      193.099   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.539    c.m/sec"
"                  0.546     0.546     0.539     4.535 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                  0.546     0.539     0.539     4.535"
" 33          CATCHMENT 402"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          402   No description"
"        0.000   % Impervious"
"        4.200   Total Area"
"       80.000   Flow length"
"        4.000   Overland Slope"
"        4.200   Pervious Area"
"       80.000   Pervious length"
"        4.000   Pervious slope"
"        0.000   Impervious Area"
"       80.000   Impervious length"
"        4.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.568     0.539     0.539     4.535 c.m/sec"
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"            Catchment 402          Pervious   Impervious Total Area "
"            Surface Area           4.200      0.000      4.200      hectare"
"            Time of concentration  20.267     3.816      20.267     minutes"
"            Time to Centroid       245.913    205.154    245.913    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        3616.20    0.00       3616.20    c.m"
"            Rainfall losses        38.558     7.348      38.558     mm"
"            Runoff depth           47.542     78.752     47.542     mm"
"            Runoff volume          1996.78    0.00       1996.78    c.m"
"            Runoff coefficient     0.552      0.000      0.552      "
"            Maximum flow           0.568      0.000      0.568      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.568     0.989     0.539     4.535"
" 52         CHANNEL DESIGN"
"       0.989   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.200   Gradient   %"
"            Depth of flow                 0.320    metre"
"            Velocity                      1.044    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.255    metre"
" 53         ROUTE    Channel Route 280"
"      280.00       Channel Route 280 Reach length   ( metre)"
"       0.475   X-factor <= 0.5"
"     201.133   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  0.969    c.m/sec"
"                   0.568     0.989     0.969     4.535 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                   0.568     0.969     0.969     4.535"
" 33         CATCHMENT 403"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         403   No description"
"       0.000   % Impervious"
"       6.400   Total Area"
"      75.000   Flow length"
"       4.000   Overland Slope"
"       6.400   Pervious Area"
"      75.000   Pervious length"
"       4.000   Pervious slope"
"       0.000   Impervious Area"
"      75.000   Impervious length"
"       4.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.552   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.873     0.969     0.969     4.535 c.m/sec"
"            Catchment 403          Pervious   Impervious Total Area "
"            Surface Area           6.400      0.000      6.400      hectare"
"            Time of concentration  19.498     3.671      19.498     minutes"
"            Time to Centroid       244.966    204.999    244.966    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        5510.39    0.01       5510.40    c.m"
"            Rainfall losses        38.598     7.640      38.598     mm"
"            Runoff depth           47.502     78.460     47.502     mm"
"            Runoff volume          3040.13    0.01       3040.14    c.m"
"            Runoff coefficient     0.552      0.000      0.552      "
"            Maximum flow           0.873      0.000      0.873      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.873     1.757     0.969     4.535"
" 52         CHANNEL DESIGN"
"       1.757   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.200   Gradient   %"
"            Depth of flow                 0.433    metre"
"            Velocity                      1.231    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.356    metre"
" 53         ROUTE    Channel Route 410"
"      410.00       Channel Route 410 Reach length   ( metre)"
"       0.477   X-factor <= 0.5"
"     249.817   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  1.724    c.m/sec"
"                   0.873     1.757     1.724     4.535 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                   0.873     1.724     1.724     4.535"
" 33         CATCHMENT 404"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         404   No description"
"       0.000   % Impervious"
"       2.700   Total Area"
"      60.000   Flow length"
"       2.500   Overland Slope"
"       2.700   Pervious Area"
"      60.000   Pervious length"
"       2.500   Pervious slope"
"       0.000   Impervious Area"
"      60.000   Impervious length"
"       2.500   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.552   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.368     1.724     1.724     4.535 c.m/sec"
"            Catchment 404          Pervious   Impervious Total Area "
"            Surface Area           2.700      0.000      2.700      hectare"
"            Time of concentration  19.637     3.697      19.637     minutes"
"            Time to Centroid       245.129    205.030    245.129    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        2324.70    0.00       2324.70    c.m"
"            Rainfall losses        38.593     7.577      38.593     mm"
"            Runoff depth           47.507     78.523     47.507     mm"
"            Runoff volume          1282.68    0.00       1282.69    c.m"
"            Runoff coefficient     0.552      0.000      0.552      "
"            Maximum flow           0.368      0.000      0.368      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.368     2.063     1.724     4.535"
" 52         CHANNEL DESIGN"
"       2.063   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.200   Gradient   %"
"            Depth of flow                 0.470    metre"
"            Velocity                      1.287    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.390    metre"
" 53         ROUTE    Channel Route 160"
"      160.00       Channel Route 160 Reach length   ( metre)"
"       0.437   X-factor <= 0.5"
"      93.215   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  2.022    c.m/sec"
"                   0.368     2.063     2.022     4.535 c.m/sec"
" 40         HYDROGRAPH   Combine    2100"
"           6   Combine "
"        2100   Node #"
"               Node taking 400 series - dumps into Hwy 21 Ditch"
"            Maximum flow                  2.022    c.m/sec"
"            Hydrograph volume          8982.868    c.m"
"                   0.368     2.063     2.022     2.022"
" 40         HYDROGRAPH   Confluence    2100"
"           7   Confluence "
"        2100   Node #"
"               Node taking 400 series - dumps into Hwy 21 Ditch"
"            Maximum flow                  2.022    c.m/sec"
"            Hydrograph volume          8982.867    c.m"
"                   0.368     2.022     2.022     0.000"
" 52         CHANNEL DESIGN"
"       2.022   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"            Depth of flow                 0.580    metre"
"            Velocity                      0.932    m/sec"
"            Channel capacity            278.848    c.m/sec"
"            Critical depth                0.385    metre"
" 53         ROUTE    Channel Route 50"
"       50.00       Channel Route 50 Reach length   ( metre)"
"       0.000   X-factor <= 0.5"
"      40.241   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.541   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  2.004    c.m/sec"
"                   0.368     2.022     2.004     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    2000"
"           6   Combine "
"        2000   Node #"
"               Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"            Maximum flow                  6.539    c.m/sec"
"            Hydrograph volume         27668.563    c.m"
"                   0.368     2.022     2.004     6.539"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.368     0.000     2.004     6.539"
" 33         CATCHMENT 501"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         501   No description"
"       0.000   % Impervious"
"       2.500   Total Area"
"      80.000   Flow length"
"       3.500   Overland Slope"
"       2.500   Pervious Area"
"      80.000   Pervious length"
"       3.500   Pervious slope"
"       0.000   Impervious Area"
"      80.000   Impervious length"
"       3.500   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.552   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.335     0.000     2.004     6.539 c.m/sec"
"            Catchment 501          Pervious   Impervious Total Area "
"            Surface Area           2.500      0.000      2.500      hectare"
"            Time of concentration  21.096     3.972      21.096     minutes"
"            Time to Centroid       246.891    205.283    246.891    minutes"
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"           Rainfall depth          86.100     86.100     86.100     mm"
"           Rainfall volume         2152.50    0.00       2152.50    c.m"
"           Rainfall losses         38.580     7.179      38.580     mm"
"           Runoff depth            47.520     78.921     47.520     mm"
"           Runoff volume           1187.99    0.00       1187.99    c.m"
"           Runoff coefficient      0.552      0.000      0.552      "
"           Maximum flow            0.335      0.000      0.335      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"                  0.335     0.335     2.004     6.539"
" 52        CHANNEL DESIGN"
"      0.335  Current peak flow    c.m/sec"
"      0.040  Manning 'n'"
"         0.  Cross-section type: 0=trapezoidal; 1=general"
"      2.000  Basewidth    metre"
"      3.000  Left bank slope"
"      3.000  Right bank slope"
"      5.000  Channel depth    metre"
"      1.200  Gradient   %"
"           Depth of flow                  0.177    metre"
"           Velocity                       0.750    m/sec"
"           Channel capacity             431.989    c.m/sec"
"           Critical depth                 0.132    metre"
" 53        ROUTE    Channel Route 120"
"     120.00      Channel Route 120 Reach length   ( metre)"
"      0.465  X-factor <= 0.5"
"    120.001  K-lag   ( seconds)"
"      0.000  Default(0) or user spec.(1) values used"
"      0.500  X-factor <= 0.5"
"     30.000  K-lag   ( seconds)"
"      0.500  Beta weighting factor"
"    100.000  Routing time step   ( seconds)"
"          1  No. of sub-reaches"
"           Peak outflow                   0.325    c.m/sec"
"                  0.335     0.335     0.325     6.539 c.m/sec"
" 40        HYDROGRAPH Next link "
"          5  Next link "
"                  0.335     0.325     0.325     6.539"
" 33        CATCHMENT 502"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"        502  No description"
"      0.000  % Impervious"
"      0.500  Total Area"
"    120.000  Flow length"
"      3.500  Overland Slope"
"      0.500  Pervious Area"
"    120.000  Pervious length"
"      3.500  Pervious slope"
"      0.000  Impervious Area"
"    120.000  Impervious length"
"      3.500  Impervious slope"
"      0.200  Pervious Manning 'n'"
"     82.000  Pervious SCS Curve No."
"      0.552  Pervious Runoff coefficient"
"      0.100  Pervious Ia/S coefficient"
"      5.576  Pervious Initial abstraction"
"      0.015  Impervious Manning 'n'"
"     98.000  Impervious SCS Curve No."
"      0.000  Impervious Runoff coefficient"
"      0.100  Impervious Ia/S coefficient"
"      0.518  Impervious Initial abstraction"
"                  0.061     0.325     0.325     6.539 c.m/sec"
"           Catchment 502           Pervious   Impervious Total Area "
"           Surface Area            0.500      0.000      0.500      hectare"
"           Time of concentration   26.906     5.066      26.906     minutes"
"           Time to Centroid        253.923    206.894    253.923    minutes"
"           Rainfall depth          86.100     86.100     86.100     mm"
"           Rainfall volume         430.50     0.00       430.50     c.m"
"           Rainfall losses         38.553     5.600      38.553     mm"
"           Runoff depth            47.547     80.500     47.547     mm"
"           Runoff volume           237.74     0.00       237.74     c.m"
"           Runoff coefficient      0.552      0.000      0.552      "
"           Maximum flow            0.061      0.000      0.061      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"                  0.061     0.386     0.325     6.539"
" 52        CHANNEL DESIGN"
"      0.386  Current peak flow    c.m/sec"
"      0.040  Manning 'n'"
"         0.  Cross-section type: 0=trapezoidal; 1=general"
"      2.000  Basewidth    metre"
"      3.000  Left bank slope"
"      3.000  Right bank slope"
"      5.000  Channel depth    metre"
"      1.200  Gradient   %"
"           Depth of flow                  0.191    metre"
"           Velocity                       0.785    m/sec"
"           Channel capacity             431.989    c.m/sec"
"           Critical depth                 0.145    metre"
" 53        ROUTE    Channel Route 170"
"     170.00      Channel Route 170 Reach length   ( metre)"
"      0.474  X-factor <= 0.5"
"    162.523  K-lag   ( seconds)"
"      0.000  Default(0) or user spec.(1) values used"
"      0.500  X-factor <= 0.5"
"     30.000  K-lag   ( seconds)"
"      0.500  Beta weighting factor"
"    150.000  Routing time step   ( seconds)"
"          1  No. of sub-reaches"
"           Peak outflow                   0.385    c.m/sec"
"                  0.061     0.386     0.385     6.539 c.m/sec"
" 40        HYDROGRAPH Next link "
"          5  Next link "
"                  0.061     0.385     0.385     6.539"
" 33        CATCHMENT 503"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"        503  No description"
"      0.000  % Impervious"
"      8.200  Total Area"
"     90.000  Flow length"
"      5.000  Overland Slope"
"      8.200  Pervious Area"
"     90.000  Pervious length"
"      5.000  Pervious slope"
"      0.000  Impervious Area"
"     90.000  Impervious length"
"      5.000  Impervious slope"
"      0.200  Pervious Manning 'n'"
"     82.000  Pervious SCS Curve No."
"      0.552  Pervious Runoff coefficient"
"      0.100  Pervious Ia/S coefficient"
"      5.576  Pervious Initial abstraction"
"      0.015  Impervious Manning 'n'"
"     98.000  Impervious SCS Curve No."
"      0.000  Impervious Runoff coefficient"
"      0.100  Impervious Ia/S coefficient"
"      0.518  Impervious Initial abstraction"
"                  1.109     0.385     0.385     6.539 c.m/sec"
"           Catchment 503           Pervious   Impervious Total Area "
"           Surface Area            8.200      0.000      8.200      hectare"
"           Time of concentration   20.343     3.830      20.343     minutes"
"           Time to Centroid        246.009    205.162    246.009    minutes"
"           Rainfall depth          86.100     86.100     86.100     mm"
"           Rainfall volume         7060.19    0.01       7060.20    c.m"
"           Rainfall losses         38.555     7.327      38.555     mm"
"           Runoff depth            47.545     78.773     47.545     mm"
"           Runoff volume           3898.65    0.01       3898.66    c.m"
"           Runoff coefficient      0.552      0.000      0.552      "
"           Maximum flow            1.109      0.000      1.109      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"                  1.109     1.472     0.385     6.539"
" 52        CHANNEL DESIGN"
"      1.472  Current peak flow    c.m/sec"
"      0.040  Manning 'n'"
"         0.  Cross-section type: 0=trapezoidal; 1=general"
"      2.000  Basewidth    metre"
"      3.000  Left bank slope"
"      3.000  Right bank slope"
"      5.000  Channel depth    metre"
"      1.200  Gradient   %"
"           Depth of flow                  0.395    metre"
"           Velocity                       1.171    m/sec"
"           Channel capacity             431.989    c.m/sec"
"           Critical depth                 0.322    metre"
" 53        ROUTE    Channel Route 350"
"     350.00      Channel Route 350 Reach length   ( metre)"
"      0.475  X-factor <= 0.5"
"    224.188  K-lag   ( seconds)"
"      0.000  Default(0) or user spec.(1) values used"
"      0.500  X-factor <= 0.5"
"     30.000  K-lag   ( seconds)"
"      0.500  Beta weighting factor"
"    150.000  Routing time step   ( seconds)"
"          1  No. of sub-reaches"
"           Peak outflow                   1.453    c.m/sec"
"                  1.109     1.472     1.453     6.539 c.m/sec"
" 40        HYDROGRAPH Next link "
"          5  Next link "
"                  1.109     1.453     1.453     6.539"
" 33        CATCHMENT 504"
"          1  Triangular SCS"
"          1  Equal length"
"          1  SCS method"
"        504  No description"
"      0.000  % Impervious"
"      3.900  Total Area"
"     90.000  Flow length"
"      2.500  Overland Slope"
"      3.900  Pervious Area"
"     90.000  Pervious length"
"      2.500  Pervious slope"
"      0.000  Impervious Area"
"     90.000  Impervious length"
"      2.500  Impervious slope"
"      0.200  Pervious Manning 'n'"
"     82.000  Pervious SCS Curve No."
"      0.552  Pervious Runoff coefficient"
"      0.100  Pervious Ia/S coefficient"
"      5.576  Pervious Initial abstraction"
"      0.015  Impervious Manning 'n'"
"     98.000  Impervious SCS Curve No."
"      0.000  Impervious Runoff coefficient"
"      0.100  Impervious Ia/S coefficient"
"      0.518  Impervious Initial abstraction"
"                  0.489     1.453     1.453     6.539 c.m/sec"
"           Catchment 504           Pervious   Impervious Total Area "
"           Surface Area            3.900      0.000      3.900      hectare"
"           Time of concentration   25.045     4.715      25.045     minutes"
"           Time to Centroid        251.669    206.556    251.669    minutes"
"           Rainfall depth          86.100     86.100     86.100     mm"
"           Rainfall volume         3357.90    0.00       3357.90    c.m"
"           Rainfall losses         38.582     5.982      38.582     mm"
"           Runoff depth            47.518     80.118     47.518     mm"
"           Runoff volume           1853.18    0.00       1853.19    c.m"
"           Runoff coefficient      0.552      0.000      0.552      "
"           Maximum flow            0.489      0.000      0.489      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4  Add Runoff "
"                  0.489     1.942     1.453     6.539"
" 52        CHANNEL DESIGN"
"      1.942  Current peak flow    c.m/sec"
"      0.040  Manning 'n'"
"         0.  Cross-section type: 0=trapezoidal; 1=general"
"      2.000  Basewidth    metre"
"      3.000  Left bank slope"
"      3.000  Right bank slope"
"      5.000  Channel depth    metre"
"      1.200  Gradient   %"
"           Depth of flow                  0.456    metre"
"           Velocity                       1.266    m/sec"
"           Channel capacity             431.989    c.m/sec"
"           Critical depth                 0.377    metre"
" 53        ROUTE    Channel Route 140"
"     140.00      Channel Route 140 Reach length   ( metre)"
"      0.430  X-factor <= 0.5"
"     82.947  K-lag   ( seconds)"
"      0.000  Default(0) or user spec.(1) values used"
"      0.500  X-factor <= 0.5"
"     30.000  K-lag   ( seconds)"
"      0.500  Beta weighting factor"
"     75.000  Routing time step   ( seconds)"
"          1  No. of sub-reaches"
"           Peak outflow                   1.920    c.m/sec"
"                  0.489     1.942     1.920     6.539 c.m/sec"
" 40        HYDROGRAPH   Combine    2200"
"          6  Combine "
"       2200  Node #"
"              Node taking 500 series - dumps into Hwy 21 Ditch"
"           Maximum flow                   1.920    c.m/sec"
"           Hydrograph volume           7177.571    c.m"
"                  0.489     1.942     1.920     1.920"
" 40        HYDROGRAPH   Confluence    2200"
"          7  Confluence "
"       2200  Node #"
"              Node taking 500 series - dumps into Hwy 21 Ditch"
"           Maximum flow                   1.920    c.m/sec"
"           Hydrograph volume           7177.571    c.m"
"                  0.489     1.920     1.920     0.000"
" 52        CHANNEL DESIGN"
```

```
"        1.920   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"           Depth of flow                0.565    metre"
"           Velocity                     0.919    m/sec"
"           Channel capacity           278.848    c.m/sec"
"           Critical depth               0.374    metre"
" 53        ROUTE    Channel Route 300"
"      300.00      Channel Route 300 Reach length   ( metre)"
"        0.406   X-factor <= 0.5"
"      244.861   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"           Peak outflow                 1.887    c.m/sec"
"                   0.489     1.920     1.887     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"           Maximum flow                 8.427    c.m/sec"
"           Hydrograph volume        34846.121    c.m"
"                   0.489     1.920     1.887     8.427"
" 40        HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                   0.489     0.000     1.887     8.427"
" 33        CATCHMENT 603"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          603   No description"
"        0.000   % Impervious"
"        5.600   Total Area"
"      100.000   Flow length"
"        2.500   Overland Slope"
"        5.600   Pervious Area"
"      100.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        2.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                   0.687     0.000     1.887     8.427 c.m/sec"
"           Catchment 603          Pervious   Impervious Total Area "
"           Surface Area           5.600      0.000      5.600      hectare"
"           Time of concentration  26.680     5.023      26.680     minutes"
"           Time to Centroid       253.653    206.895    253.653    minutes"
"           Rainfall depth         86.100     86.100     86.100     mm"
"           Rainfall volume        4821.59    0.00       4821.60    c.m"
"           Rainfall losses        38.545     5.617      38.545     mm"
"           Runoff depth           47.555     80.483     47.555     mm"
"           Runoff volume          2663.09    0.00       2663.10    c.m"
"           Runoff coefficient     0.552      0.000      0.552      "
"           Maximum flow           0.687      0.000      0.687      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   0.687     0.687     1.887     8.427"
" 52        CHANNEL DESIGN"
"        0.687   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"           Depth of flow                0.263    metre"
"           Velocity                     0.937    m/sec"
"           Channel capacity           431.989    c.m/sec"
"           Critical depth               0.206    metre"
" 53        ROUTE    Channel Route 260"
"      260.00      Channel Route 260 Reach length   ( metre)"
"        0.477   X-factor <= 0.5"
"      208.091   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"           Peak outflow                 0.673    c.m/sec"
"                   0.687     0.687     0.673     8.427 c.m/sec"
" 40        HYDROGRAPH Next link "
"            5   Next link "
"                   0.687     0.673     0.673     8.427"
" 33        CATCHMENT 605"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          605   No description"
"        0.000   % Impervious"
"        3.400   Total Area"
"      100.000   Flow length"
"        2.500   Overland Slope"
"        3.400   Pervious Area"
"      100.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        2.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
```

```
"                   0.417     0.673     0.673     8.427 c.m/sec"
"           Catchment 605          Pervious   Impervious Total Area "
"           Surface Area           3.400      0.000      3.400      hectare"
"           Time of concentration  26.680     5.023      26.680     minutes"
"           Time to Centroid       253.653    206.895    253.653    minutes"
"           Rainfall depth         86.100     86.100     86.100     mm"
"           Rainfall volume        2927.40    0.00       2927.40    c.m"
"           Rainfall losses        38.545     5.617      38.545     mm"
"           Runoff depth           47.555     80.483     47.555     mm"
"           Runoff volume          1616.88    0.00       1616.88    c.m"
"           Runoff coefficient     0.552      0.000      0.552      "
"           Maximum flow           0.417      0.000      0.417      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   0.417     1.088     0.673     8.427"
" 52        CHANNEL DESIGN"
"        1.088   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"           Depth of flow                0.337    metre"
"           Velocity                     1.074    m/sec"
"           Channel capacity           431.989    c.m/sec"
"           Critical depth               0.270    metre"
" 53        ROUTE    Channel Route 170"
"      170.00      Channel Route 170 Reach length   ( metre)"
"        0.456   X-factor <= 0.5"
"      118.767   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"           Peak outflow                 1.074    c.m/sec"
"                   0.417     1.088     1.074     8.427 c.m/sec"
" 40        HYDROGRAPH   Combine    2300"
"            6   Combine "
"         2300   Node #"
"                Node taking 600 series - dumps into Hwy 21 Ditch"
"           Maximum flow                 1.074    c.m/sec"
"           Hydrograph volume         4279.979    c.m"
"                   0.417     1.088     1.074     1.074"
" 40        HYDROGRAPH   Confluence    2300"
"            7   Confluence "
"         2300   Node #"
"                Node taking 600 series - dumps into Hwy 21 Ditch"
"           Maximum flow                 1.074    c.m/sec"
"           Hydrograph volume         4279.979    c.m"
"                   0.417     1.074     1.074     0.000"
" 52        CHANNEL DESIGN"
"        1.074   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"           Depth of flow                0.421    metre"
"           Velocity                     0.782    m/sec"
"           Channel capacity           278.848    c.m/sec"
"           Critical depth               0.268    metre"
" 53        ROUTE    Channel Route 650"
"      650.00      Channel Route 650 Reach length   ( metre)"
"        0.433   X-factor <= 0.5"
"      311.517   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"           Peak outflow                 1.063    c.m/sec"
"                   0.417     1.074     1.063     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"           Maximum flow                 9.364    c.m/sec"
"           Hydrograph volume        39126.063    c.m"
"                   0.417     1.074     1.063     9.364"
" 81        ADD COMMENT==================================================="
"            1   Lines of comment"
"           Total discharge to Hwy. 21 Ditch"
" 40        HYDROGRAPH   Confluence    2000"
"            7   Confluence "
"         2000   Node #"
"                Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"           Maximum flow                 9.364    c.m/sec"
"           Hydrograph volume        39126.063    c.m"
"                   0.417     9.364     1.063     0.000"
" 81        ADD COMMENT==================================================="
"            1   Lines of comment"
"           Total discharge to Hwy. 21 Ditch"
" 52        CHANNEL DESIGN"
"        9.364   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"           Depth of flow                1.200    metre"
"           Velocity                     1.394    m/sec"
"           Channel capacity           278.848    c.m/sec"
"           Critical depth               0.870    metre"
" 53        ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       26.894   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.710   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"           Peak outflow                 9.312    c.m/sec"
"                   0.417     9.364     9.312     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    3000"
"            6   Combine "
"         3000   Node #"
```

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"                Node Combining All Flow"
"             Maximum flow                  97.611    c.m/sec"
"             Hydrograph volume        863211.063    c.m"
"                     0.417     9.364     9.312    97.611"
" 81          ADD COMMENT=============================================="
"          1  Lines of comment"
"             Total Off-site Discharge - Hwy. 21 + Penetangore Tributary"
" 40          HYDROGRAPH   Confluence    3000"
"            7   Confluence "
"         3000   Node #"
"                Node Combining All Flow"
"             Maximum flow                  97.611    c.m/sec"
"             Hydrograph volume        863211.063    c.m"
"                     0.417    97.611     9.312     0.000"
" 81          ADD COMMENT=============================================="
"          1  Lines of comment"
"             Total Off-site Discharge - Hwy. 21 + Penetangore Tributary"
```

PRE-EXISTING 100 YEAR

```
"              MIDUSS Output ----------------------------------------------->"
"              MIDUSS version                         Version 2.25  rev. 465"
"              MIDUSS created                     Tuesday, February 05, 2008"
"         10   Units used:                                         ie METRIC"
"              Job folder:            C:\Users\derb\Desktop\Kincardine Miduss\"
"                                                                    Existing"
"              Output filename:          08055 - Pre-Existing 100 Year.out"
"              Licensee name:                                       EliteBook"
"              Company                                                 BMROSS"
"              Date & Time last used:                  7/19/2011 at 4:29:06 PM"
" 31          TIME PARAMETERS"
"      5.000   Time Step"
"    360.000   Max. Storm length"
"   1800.000   Max. Hydrograph"
" 32          STORM Mass Curve"
"          3   Mass Curve"
"    108.800   Rainfall depth"
"    360.000   Duration"
"         41   C:\Program Files\MIDUSS\SCS_6hr_Type2.mrd   SCS Type II - 6 hour
Distribution - Ontario"
"             Maximum intensity           84.864    mm/hr"
"             Total depth                108.800    mm"
"          6   100hyd   Hydrograph extension used in this file"
" 81          ADD COMMENT==================================================="
"          1  Lines of comment"
"             Start of Penetangore Tributary"
" 33          CATCHMENT 50"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"         50   No description"
"      0.000   % Impervious"
"    396.000   Total Area"
"    450.000   Flow length"
"      2.500   Overland Slope"
"    396.000   Pervious Area"
"    450.000   Pervious length"
"      2.500   Pervious slope"
"      0.000   Impervious Area"
"    450.000   Impervious length"
"      2.500   Impervious slope"
"      0.250   Pervious Manning 'n'"
"     81.000   Pervious SCS Curve No."
"      0.598   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      5.958   Pervious Initial abstraction"
"      0.013   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.000   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                 37.770     0.000     0.000     0.000 c.m/sec"
"             Catchment 50           Pervious   Impervious Total Area "
"             Surface Area           396.000    0.000      396.000    hectare"
"             Time of concentration  66.924     10.341     66.924     minutes"
"             Time to Centroid       300.389    212.009    300.389    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        43.0848    0.0000     43.0848    ha-m"
"             Rainfall losses        43.692     5.981      43.692     mm"
"             Runoff depth           65.108     102.819    65.108     mm"
"             Runoff volume          25.7828    0.0000     25.7828    ha-m"
"             Runoff coefficient     0.598      0.000      0.598      "
"             Maximum flow           37.770     0.000      37.770     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                 37.770    37.770     0.000     0.000"
" 52          CHANNEL DESIGN"
"     37.770   Current peak flow    c.m/sec"
"      0.040   Manning 'n'"
"         0.   Cross-section type: 0=trapezoidal; 1=general"
"      2.000   Basewidth    metre"
"      3.000   Left bank slope"
"      3.000   Right bank slope"
"      5.000   Channel depth    metre"
"      0.500   Gradient   %"
"             Depth of flow                  2.206    metre"
"             Velocity                       1.987    m/sec"
"             Channel capacity             278.848    c.m/sec"
"             Critical depth                 1.704    metre"
" 53          ROUTE    Channel Route 3000"
"    3000.00      Channel Route 3000 Reach length   ( metre)"
"      0.376   X-factor <= 0.5"
"    283.088   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"     30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"    300.000   Routing time step   ( seconds)"
"          4   No. of sub-reaches"
"             Peak outflow                  37.185    c.m/sec"
"                 37.770    37.770    37.185     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"          5   Next link "
"                 37.770    37.185    37.185     0.000"
" 33          CATCHMENT 52"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"         52   No description"
"      0.000   % Impervious"
"    196.000   Total Area"
"    250.000   Flow length"
"      7.000   Overland Slope"
"    196.000   Pervious Area"
"    250.000   Pervious length"
"      7.000   Pervious slope"
"      0.000   Impervious Area"
"    250.000   Impervious length"
"      7.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"     80.000   Pervious SCS Curve No."
"      0.581   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      6.350   Pervious Initial abstraction"
"      0.013   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.000   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                 28.020    37.185    37.185     0.000 c.m/sec"
"             Catchment 52           Pervious   Impervious Total Area "
"             Surface Area           196.000    0.000      196.000    hectare"
"             Time of concentration  34.824     5.336      34.824     minutes"
"             Time to Centroid       262.294    206.023    262.293    minutes"
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"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        21.3248    0.0000     21.3248    ha-m"
"             Rainfall losses        45.592     5.703      45.592     mm"
"             Runoff depth           63.208     103.097    63.208     mm"
"             Runoff volume          12.3888    0.0000     12.3888    ha-m"
"             Runoff coefficient     0.581      0.000      0.581      "
"             Maximum flow           28.020     0.000      28.020     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                 28.020    46.374    37.185     0.000"
" 52          CHANNEL DESIGN"
"     46.374   Current peak flow    c.m/sec"
"      0.040   Manning 'n'"
"         0.   Cross-section type: 0=trapezoidal; 1=general"
"      2.000   Basewidth    metre"
"      3.000   Left bank slope"
"      3.000   Right bank slope"
"      5.000   Channel depth    metre"
"      0.400   Gradient   %"
"             Depth of flow                  2.520    metre"
"             Velocity                       1.925    m/sec"
"             Channel capacity             249.409    c.m/sec"
"             Critical depth                 1.872    metre"
" 53          ROUTE    Channel Route 1300"
"    1300.00      Channel Route 1300 Reach length   ( metre)"
"      0.297   X-factor <= 0.5"
"    253.279   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"     30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"    300.000   Routing time step   ( seconds)"
"          2   No. of sub-reaches"
"             Peak outflow                  46.162    c.m/sec"
"                 28.020    46.374    46.162     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"          5   Next link "
"                 28.020    46.162    46.162     0.000"
" 33          CATCHMENT 54"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"         54   No description"
"      0.000   % Impervious"
"     39.000   Total Area"
"    140.000   Flow length"
"     11.000   Overland Slope"
"     39.000   Pervious Area"
"    140.000   Pervious length"
"     11.000   Pervious slope"
"      0.000   Impervious Area"
"    140.000   Impervious length"
"     11.000   Impervious slope"
"      0.210   Pervious Manning 'n'"
"     81.000   Pervious SCS Curve No."
"      0.597   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      5.958   Pervious Initial abstraction"
"      0.013   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.000   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                  7.223    46.162    46.162     0.000 c.m/sec"
"             Catchment 54           Pervious   Impervious Total Area "
"             Surface Area           39.000     0.000      39.000     hectare"
"             Time of concentration  19.181     3.291      19.181     minutes"
"             Time to Centroid       242.650    203.605    242.650    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        4.2432     0.0000     4.2432     ha-m"
"             Rainfall losses        43.802     7.543      43.802     mm"
"             Runoff depth           64.998     101.257    64.998     mm"
"             Runoff volume          2.5349     0.0000     2.5349     ha-m"
"             Runoff coefficient     0.597      0.000      0.597      "
"             Maximum flow           7.223      0.000      7.223      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  7.223    47.717    46.162     0.000"
" 52          CHANNEL DESIGN"
"     47.717   Current peak flow    c.m/sec"
"      0.040   Manning 'n'"
"         0.   Cross-section type: 0=trapezoidal; 1=general"
"      2.000   Basewidth    metre"
"      3.000   Left bank slope"
"      3.000   Right bank slope"
"      5.000   Channel depth    metre"
"      0.400   Gradient   %"
"             Depth of flow                  2.550    metre"
"             Velocity                       1.939    m/sec"
"             Channel capacity             249.409    c.m/sec"
"             Critical depth                 1.897    metre"
" 53          ROUTE    Channel Route 800"
"     800.00      Channel Route 800 Reach length   ( metre)"
"      0.334   X-factor <= 0.5"
"    309.499   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"     30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"    300.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"             Peak outflow                  47.596    c.m/sec"
"                  7.223    47.717    47.596     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    10"
"          6   Combine "
"         10   Node #"
"              Confluence on Penetangore Tributary"
"             Maximum flow                  47.596    c.m/sec"
"             Hydrograph volume         407065.875    c.m"
"                  7.223    47.717    47.596    47.596"
" 40          HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                  7.223     0.000    47.596    47.596"
" 33          CATCHMENT 60"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"         60   No description"
"      0.000   % Impervious"
"    225.000   Total Area"
"    270.000   Flow length"
"      2.500   Overland Slope"
"    225.000   Pervious Area"
"    270.000   Pervious length"
"      2.500   Pervious slope"
"      0.000   Impervious Area"
"    270.000   Impervious length"
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"        2.500   Impervious slope"
"        0.230   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.598   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                 27.615     0.000    47.596    47.596 c.m/sec"
"           Catchment 60           Pervious   Impervious Total Area "
"           Surface Area           225.000    0.000      225.000    hectare"
"           Time of concentration  46.854     7.611      46.854     minutes"
"           Time to Centroid       276.114    208.803    276.113    minutes"
"           Rainfall depth         108.800    108.800    108.800    mm"
"           Rainfall volume        24.4800    0.0000     24.4800    ha-m"
"           Rainfall losses        43.706     5.897      43.706     mm"
"           Runoff depth           65.094     102.903    65.094     mm"
"           Runoff volume          14.6461    0.0000     14.6461    ha-m"
"           Runoff coefficient     0.598      0.000      0.598      "
"           Maximum flow           27.615     0.000      27.615     c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                 27.615    27.615    47.596    47.596"
" 52        CHANNEL DESIGN"
"       27.615   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"           Depth of flow                 2.025    metre"
"           Velocity                      1.689    m/sec"
"           Channel capacity            249.409    c.m/sec"
"           Critical depth                1.472    metre"
" 53        ROUTE    Channel Route 1800"
"     1800.00      Channel Route 1800 Reach length   ( metre)"
"        0.320   X-factor <= 0.5"
"      266.406   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"          3   No. of sub-reaches"
"           Peak outflow                 27.176    c.m/sec"
"                 27.615    27.615    27.176    47.596 c.m/sec"
" 40        HYDROGRAPH   Combine    10"
"          6   Combine "
"         10   Node #"
"              Confluence on Penetangore Tributary"
"           Maximum flow                 71.637    c.m/sec"
"           Hydrograph volume        553527.000    c.m"
"                 27.615    27.615    27.176    71.637"
" 40        HYDROGRAPH   Confluence    10"
"          7   Confluence "
"         10   Node #"
"              Confluence on Penetangore Tributary"
"           Maximum flow                 71.637    c.m/sec"
"           Hydrograph volume        553527.000    c.m"
"                 27.615    71.637    27.176     0.000"
" 52        CHANNEL DESIGN"
"       71.637   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"           Depth of flow                 3.018    metre"
"           Velocity                      2.147    m/sec"
"           Channel capacity            249.409    c.m/sec"
"           Critical depth                2.281    metre"
" 53        ROUTE    Channel Route 2000"
"     2000.00      Channel Route 2000 Reach length   ( metre)"
"        0.345   X-factor <= 0.5"
"      349.343   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"          2   No. of sub-reaches"
"           Peak outflow                 71.140    c.m/sec"
"                 27.615    71.637    71.140     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    11"
"          6   Combine "
"         11   Node #"
"              Confluence on Penetangore Tributary"
"           Maximum flow                 71.140    c.m/sec"
"           Hydrograph volume        553527.188    c.m"
"                 27.615    71.637    71.140    71.140"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                 27.615     0.000    71.140    71.140"
" 33        CATCHMENT 62"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"         62   No description"
"        0.000   % Impervious"
"       95.000   Total Area"
"      160.000   Flow length"
"        2.500   Overland Slope"
"       95.000   Pervious Area"
"      160.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      160.000   Impervious length"
"        2.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       80.000   Pervious SCS Curve No."
"        0.581   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.350   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                 13.275     0.000    71.140    71.140 c.m/sec"
"           Catchment 62           Pervious   Impervious Total Area "
"           Surface Area           95.000     0.000      95.000     hectare"
"           Time of concentration  36.285     5.560      36.285     minutes"
"           Time to Centroid       264.065    206.307    264.065    minutes"
"           Rainfall depth         108.800    108.800    108.800    mm"
"           Rainfall volume        10.3360    0.0000     10.3360    ha-m"
"           Rainfall losses        45.578     5.794      45.578     mm"
"           Runoff depth           63.222     103.006    63.222     mm"
"           Runoff volume          6.0061     0.0000     6.0061     ha-m"
"           Runoff coefficient     0.581      0.000      0.581      "
"           Maximum flow           13.275     0.000      13.275     c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                 13.275    13.275    71.140    71.140"
" 52        CHANNEL DESIGN"
"       13.275   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.300   Gradient   %"
"           Depth of flow                 1.570    metre"
"           Velocity                      1.260    m/sec"
"           Channel capacity            215.995    c.m/sec"
"           Critical depth                1.035    metre"
" 53        ROUTE    Channel Route 1800"
"     1800.00      Channel Route 1800 Reach length   ( metre)"
"        0.309   X-factor <= 0.5"
"      357.055   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"          3   No. of sub-reaches"
"           Peak outflow                 12.594    c.m/sec"
"                 13.275    13.275    12.594    71.140 c.m/sec"
" 40        HYDROGRAPH   Combine    11"
"          6   Combine "
"         11   Node #"
"              Confluence on Penetangore Tributary"
"           Maximum flow                 80.574    c.m/sec"
"           Hydrograph volume        613588.125    c.m"
"                 13.275    13.275    12.594    80.574"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                 13.275     0.000    12.594    80.574"
" 33        CATCHMENT 56"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"         56   No description"
"        0.000   % Impervious"
"      345.000   Total Area"
"      240.000   Flow length"
"       11.000   Overland Slope"
"      345.000   Pervious Area"
"      240.000   Pervious length"
"       11.000   Pervious slope"
"        0.000   Impervious Area"
"      240.000   Impervious length"
"       15.000   Impervious slope"
"        0.280   Pervious Manning 'n'"
"       79.000   Pervious SCS Curve No."
"        0.564   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.752   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                 49.743     0.000    12.594    80.574 c.m/sec"
"           Catchment 56           Pervious   Impervious Total Area "
"           Surface Area           345.000    0.000      345.000    hectare"
"           Time of concentration  32.032     4.143      32.032     minutes"
"           Time to Centroid       259.645    204.458    259.645    minutes"
"           Rainfall depth         108.800    108.800    108.800    mm"
"           Rainfall volume        37.5360    0.0000     37.5360    ha-m"
"           Rainfall losses        47.417     7.379      47.417     mm"
"           Runoff depth           61.383     101.421    61.383     mm"
"           Runoff volume          21.1772    0.0000     21.1772    ha-m"
"           Runoff coefficient     0.564      0.000      0.564      "
"           Maximum flow           49.743     0.000      49.743     c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                 49.743    49.743    12.594    80.574"
" 52        CHANNEL DESIGN"
"       49.743   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"           Depth of flow                 2.595    metre"
"           Velocity                      1.959    m/sec"
"           Channel capacity            249.409    c.m/sec"
"           Critical depth                1.933    metre"
" 53        ROUTE    Channel Route 1300"
"     1300.00      Channel Route 1300 Reach length   ( metre)"
"        0.292   X-factor <= 0.5"
"      248.853   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"          2   No. of sub-reaches"
"           Peak outflow                 49.013    c.m/sec"
"                 49.743    49.743    49.013    80.574 c.m/sec"
" 40        HYDROGRAPH   Combine    11"
"          6   Combine "
"         11   Node #"
"              Confluence on Penetangore Tributary"
"           Maximum flow                111.465    c.m/sec"
"           Hydrograph volume        825360.125    c.m"
"                 49.743    49.743    49.013   111.465"
" 40        HYDROGRAPH   Confluence    11"
"          7   Confluence "
"         11   Node #"
"              Confluence on Penetangore Tributary"
"           Maximum flow                111.465    c.m/sec"
"           Hydrograph volume        825360.125    c.m"
"                 49.743   111.465    49.013     0.000"
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" 52          CHANNEL DESIGN"
"      111.465   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 3.456    metre"
"             Velocity                      2.608    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                2.778    metre"
" 53          ROUTE    Channel Route 1300"
"      1300.00      Channel Route 1300 Reach length   ( metre)"
"        0.392   X-factor <= 0.5"
"      373.893   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                110.966    c.m/sec"
"                  49.743   111.465   110.966     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                110.966    c.m/sec"
"             Hydrograph volume        825359.813    c.m"
"                  49.743   111.465   110.966   110.966"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  49.743     0.000   110.966   110.966"
" 33          CATCHMENT 58"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           58   No description"
"        0.000   % Impervious"
"       82.000   Total Area"
"      140.000   Flow length"
"       15.000   Overland Slope"
"       82.000   Pervious Area"
"      140.000   Pervious length"
"       15.000   Pervious slope"
"        0.000   Impervious Area"
"      140.000   Impervious length"
"       15.000   Impervious slope"
"        0.230   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.597   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  15.202     0.000   110.966   110.966 c.m/sec"
"             Catchment 58           Pervious   Impervious Total Area "
"             Surface Area           82.000     0.000      82.000     hectare"
"             Time of concentration  18.457     2.998      18.457     minutes"
"             Time to Centroid       241.757    203.195    241.757    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        8.9216     0.0000     8.9216     ha-m"
"             Rainfall losses        43.804     7.307      43.804     mm"
"             Runoff depth           64.996     101.493    64.996     mm"
"             Runoff volume          5.3296     0.0000     5.3296     ha-m"
"             Runoff coefficient     0.597      0.000      0.597      "
"             Maximum flow           15.202     0.000      15.202     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  15.202    15.202   110.966   110.966"
" 52          CHANNEL DESIGN"
"       15.202   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 1.489    metre"
"             Velocity                      1.578    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                1.106    metre"
" 53          ROUTE    Channel Route 700"
"       700.00      Channel Route 700 Reach length   ( metre)"
"        0.406   X-factor <= 0.5"
"      332.656   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 15.044    c.m/sec"
"                  15.202    15.202    15.044   110.966 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                114.477    c.m/sec"
"             Hydrograph volume        878656.250    c.m"
"                  15.202    15.202    15.044   114.477"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  15.202     0.000    15.044   114.477"
" 33          CATCHMENT 64"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           64   No description"
"        0.000   % Impervious"
"       80.000   Total Area"
"      220.000   Flow length"
"        5.500   Overland Slope"
"       80.000   Pervious Area"
"      220.000   Pervious length"
"        5.500   Pervious slope"
"        0.000   Impervious Area"
"      220.000   Impervious length"
"        5.500   Impervious slope"
"        0.210   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.616   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  12.965     0.000    15.044   114.477 c.m/sec"
"             Catchment 64           Pervious   Impervious Total Area "
"             Surface Area           80.000     0.000      80.000     hectare"
"             Time of concentration  30.722     5.313      30.722     minutes"
"             Time to Centroid       255.861    205.988    255.861    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        8.7040     0.0000     8.7040     ha-m"
"             Rainfall losses        41.823     5.702      41.823     mm"
"             Runoff depth           66.977     103.098    66.977     mm"
"             Runoff volume          5.3582     0.0000     5.3582     ha-m"
"             Runoff coefficient     0.616      0.000      0.616      "
"             Maximum flow           12.965     0.000      12.965     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  12.965    12.965    15.044   114.477"
" 52          CHANNEL DESIGN"
"       12.965   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 1.388    metre"
"             Velocity                      1.515    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                1.023    metre"
" 53          ROUTE    Channel Route 700"
"       700.00      Channel Route 700 Reach length   ( metre)"
"        0.412   X-factor <= 0.5"
"      346.428   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 12.812    c.m/sec"
"                  12.965    12.965    12.812   114.477 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                121.166    c.m/sec"
"             Hydrograph volume        932238.250    c.m"
"                  12.965    12.965    12.812   121.166"
" 40          HYDROGRAPH   Confluence    12"
"            7   Confluence "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                121.166    c.m/sec"
"             Hydrograph volume        932238.250    c.m"
"                  12.965   121.166    12.812     0.000"
" 52          CHANNEL DESIGN"
"      121.166   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.300   Gradient   %"
"             Depth of flow                 3.965    metre"
"             Velocity                      2.199    m/sec"
"             Channel capacity            215.995    c.m/sec"
"             Critical depth                2.882    metre"
" 53          ROUTE    Channel Route 2500"
"      2500.00      Channel Route 2500 Reach length   ( metre)"
"        0.286   X-factor <= 0.5"
"      426.358   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                118.722    c.m/sec"
"                  12.965   121.166   118.722     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1000"
"            6   Combine "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow                118.722    c.m/sec"
"             Hydrograph volume        932238.375    c.m"
"                  12.965   121.166   118.722   118.722"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  12.965     0.000   118.722   118.722"
" 33          CATCHMENT 59"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           59   No description"
"        0.000   % Impervious"
"      128.000   Total Area"
"      170.000   Flow length"
"       18.000   Overland Slope"
"      128.000   Pervious Area"
"      170.000   Pervious length"
"       18.000   Pervious slope"
"        0.000   Impervious Area"
"      170.000   Impervious length"
"       18.000   Impervious slope"
"        0.350   Pervious Manning 'n'"
"       76.000   Pervious SCS Curve No."
"        0.516   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.021   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  18.574     0.000   118.722   118.722 c.m/sec"
"             Catchment 59           Pervious   Impervious Total Area "
"             Surface Area           128.000    0.000      128.000    hectare"
"             Time of concentration  26.389     3.189      26.389     minutes"
"             Time to Centroid       254.845    203.515    254.845    minutes"
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"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        13.9264    0.0000     13.9264    ha-m"
"            Rainfall losses        52.712     7.437      52.712     mm"
"            Runoff depth           56.088     101.363    56.088     mm"
"            Runoff volume          7.1792     0.0000     7.1792     ha-m"
"            Runoff coefficient     0.516      0.000      0.516      "
"            Maximum flow           18.574     0.000      18.574     c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4  Add Runoff "
"                  18.574    18.574   118.722   118.722"
" 52         CHANNEL DESIGN"
"      18.574   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.300   Gradient   %"
"            Depth of flow                 1.817    metre"
"            Velocity                      1.372    m/sec"
"            Channel capacity            215.995    c.m/sec"
"            Critical depth                1.219    metre"
" 53         ROUTE    Channel Route 1500"
"     1500.00      Channel Route 1500 Reach length   ( metre)"
"       0.326   X-factor <= 0.5"
"     409.886   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                 17.439    c.m/sec"
"                  18.574    18.574    17.439   118.722 c.m/sec"
" 40         HYDROGRAPH   Combine    1000"
"           6   Combine "
"        1000   Node #"
"               Node upstream of Penetangore Culvert"
"            Maximum flow               125.579    c.m/sec"
"            Hydrograph volume        1004030.56    c.m"
"                  18.574    18.574    17.439   125.579"
" 81         ADD COMMENT=================================================="
"          1  Lines of comment"
"            End of Penetangore Tributary"
" 81         ADD COMMENT=================================================="
"          1  Lines of comment"
"            Start of Area North of Holtby Drain"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  18.574     0.000    17.439   125.579"
" 33         CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   No description"
"       0.000   % Impervious"
"     166.000   Total Area"
"     250.000   Flow length"
"       3.000   Overland Slope"
"     166.000   Pervious Area"
"     250.000   Pervious length"
"       3.000   Pervious slope"
"       0.000   Impervious Area"
"     250.000   Impervious length"
"       3.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.616   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  23.743     0.000    17.439   125.579 c.m/sec"
"            Catchment 201          Pervious   Impervious Total Area "
"            Surface Area           166.000    0.000      166.000    hectare"
"            Time of concentration  38.638     6.881      38.638     minutes"
"            Time to Centroid       265.432    207.930    265.432    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        18.0608    0.0000     18.0608    ha-m"
"            Rainfall losses        41.801     6.917      41.801     mm"
"            Runoff depth           66.999     101.883    66.999     mm"
"            Runoff volume          11.1219    0.0000     11.1219    ha-m"
"            Runoff coefficient     0.616      0.000      0.616      "
"            Maximum flow           23.743     0.000      23.743     c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4  Add Runoff "
"                  23.743    23.743    17.439   125.579"
" 52         CHANNEL DESIGN"
"      23.743   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"            Depth of flow                 1.556    metre"
"            Velocity                      2.289    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                1.370    metre"
" 53         ROUTE    Channel Route 1900"
"     1900.00      Channel Route 1900 Reach length   ( metre)"
"       0.464   X-factor <= 0.5"
"     311.272   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                 23.609    c.m/sec"
"                  23.743    23.743    23.609   125.579 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  23.743    23.609    23.609   125.579"
" 33         CATCHMENT 202"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         202   No description"
"       0.000   % Impervious"
"       8.000   Total Area"
"     225.000   Flow length"
"       4.000   Overland Slope"
"       8.000   Pervious Area"
"     225.000   Pervious length"
"       4.000   Pervious slope"
"       0.000   Impervious Area"
"     225.000   Impervious length"
"       4.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.616   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   1.232    23.609    23.609   125.579 c.m/sec"
"            Catchment 202          Pervious   Impervious Total Area "
"            Surface Area           8.000      0.000      8.000      hectare"
"            Time of concentration  33.272     5.925      33.272     minutes"
"            Time to Centroid       258.948    206.673    258.948    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        8703.99    0.01       8704.00    c.m"
"            Rainfall losses        41.804     6.188      41.804     mm"
"            Runoff depth           66.996     102.612    66.996     mm"
"            Runoff volume          5359.67    0.01       5359.68    c.m"
"            Runoff coefficient     0.616      0.000      0.616      "
"            Maximum flow           1.232      0.000      1.232      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4  Add Runoff "
"                   1.232    24.625    23.609   125.579"
" 52         CHANNEL DESIGN"
"      24.625   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"            Depth of flow                 1.581    metre"
"            Velocity                      2.310    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                1.394    metre"
" 53         ROUTE    Channel Route 260"
"      260.00      Channel Route 260 Reach length   ( metre)"
"       0.367   X-factor <= 0.5"
"      84.404   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 24.402    c.m/sec"
"                   1.232    24.625    24.402   125.579 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                   1.232    24.402    24.402   125.579"
" 33         CATCHMENT 203"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         203   No description"
"       0.000   % Impervious"
"      13.600   Total Area"
"     150.000   Flow length"
"       3.500   Overland Slope"
"      13.600   Pervious Area"
"     150.000   Pervious length"
"       3.500   Pervious slope"
"       0.000   Impervious Area"
"     150.000   Impervious length"
"       3.500   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.616   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   2.332    24.402    24.402   125.579 c.m/sec"
"            Catchment 203          Pervious   Impervious Total Area "
"            Surface Area           13.600     0.000      13.600     hectare"
"            Time of concentration  27.153     4.836      27.153     minutes"
"            Time to Centroid       251.530    205.539    251.530    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        1.4797     0.0000     1.4797     ha-m"
"            Rainfall losses        41.827     5.970      41.827     mm"
"            Runoff depth           66.973     102.830    66.973     mm"
"            Runoff volume          9108.27    0.01       9108.28    c.m"
"            Runoff coefficient     0.616      0.000      0.616      "
"            Maximum flow           2.332      0.000      2.332      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4  Add Runoff "
"                   2.332    25.809    24.402   125.579"
" 52         CHANNEL DESIGN"
"      25.809   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"            Depth of flow                 1.614    metre"
"            Velocity                      2.338    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                1.426    metre"
" 53         ROUTE    Channel Route 350"
"      350.00      Channel Route 350 Reach length   ( metre)"
"       0.399   X-factor <= 0.5"
"     112.274   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 25.625    c.m/sec"
"                   2.332    25.809    25.625   125.579 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
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"                 2.332    25.625    25.625   125.579"
" 33          CATCHMENT 204"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          204   No description"
"        0.000   % Impervious"
"        6.800   Total Area"
"      120.000   Flow length"
"        2.000   Overland Slope"
"        6.800   Pervious Area"
"      120.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"      120.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.616   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                 1.151    25.625    25.625   125.579 c.m/sec"
"             Catchment 204          Pervious   Impervious Total Area "
"             Surface Area           6.800      0.000      6.800      hectare"
"             Time of concentration  28.092     5.003      28.092     minutes"
"             Time to Centroid       252.678    205.712    252.678    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        7398.39    0.01       7398.40    c.m"
"             Rainfall losses        41.833     5.758      41.833     mm"
"             Runoff depth           66.967     103.042    66.967     mm"
"             Runoff volume          4553.77    0.01       4553.78    c.m"
"             Runoff coefficient     0.616      0.000      0.616      "
"             Maximum flow           1.151      0.000      1.151      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                 1.151    26.217    25.625   125.579"
" 52          CHANNEL DESIGN"
"       26.217   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"             Depth of flow                 1.625    metre"
"             Velocity                      2.347    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                1.436    metre"
" 53          ROUTE    Channel Route 150"
"       150.00      Channel Route 150 Reach length   ( metre)"
"        0.264   X-factor <= 0.5"
"       47.926   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       60.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 26.213    c.m/sec"
"                 1.151    26.217    26.213   125.579 c.m/sec"
" 40          HYDROGRAPH   Combine    1100"
"            6   Combine "
"         1100   Node #"
"                Node taking 200 series - dumps into Holtby Drain"
"             Maximum flow                 26.213    c.m/sec"
"             Hydrograph volume        130240.461    c.m"
"                 1.151    26.217    26.213    26.213"
" 81          ADD COMMENT=================================================="
"          1  Lines of comment"
"             End of Area North of Holtby Drain"
" 40          HYDROGRAPH   Confluence    1100"
"            7   Confluence "
"         1100   Node #"
"                Node taking 200 series - dumps into Holtby Drain"
"             Maximum flow                 26.213    c.m/sec"
"             Hydrograph volume        130240.461    c.m"
"                 1.151    26.213    26.213     0.000"
" 81          ADD COMMENT=================================================="
"          1  Lines of comment"
"             Total discharge to Holtby Drain"
" 52          CHANNEL DESIGN"
"       26.213   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 1.888    metre"
"             Velocity                      1.812    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                1.436    metre"
" 53          ROUTE    Channel Route 200"
"       200.00      Channel Route 200 Reach length   ( metre)"
"        0.094   X-factor <= 0.5"
"       82.779   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 26.144    c.m/sec"
"                 1.151    26.213    26.144     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1300"
"            6   Combine "
"         1300   Node #"
"                Node at Holtby Drain"
"             Maximum flow                 26.144    c.m/sec"
"             Hydrograph volume        130240.414    c.m"
"                 1.151    26.213    26.144    26.144"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                 1.151     0.000    26.144    26.144"
" 33          CATCHMENT 100"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          100   No description"
"        0.000   % Impervious"
"       45.000   Total Area"
"      100.000   Flow length"
"        7.000   Overland Slope"
"       45.000   Pervious Area"
"      100.000   Pervious length"
"        7.000   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        7.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.615   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                 8.520     0.000    26.144    26.144 c.m/sec"
"             Catchment 100          Pervious   Impervious Total Area "
"             Surface Area           45.000     0.000      45.000     hectare"
"             Time of concentration  17.293     3.080      17.293     minutes"
"             Time to Centroid       239.597    203.358    239.597    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        4.8960     0.0000     4.8960     ha-m"
"             Rainfall losses        41.868     7.350      41.868     mm"
"             Runoff depth           66.932     101.450    66.932     mm"
"             Runoff volume          3.0119     0.0000     3.0120     ha-m"
"             Runoff coefficient     0.615      0.000      0.615      "
"             Maximum flow           8.520      0.000      8.520      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                 8.520     8.520    26.144    26.144"
" 52          CHANNEL DESIGN"
"        8.520   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"             Depth of flow                 0.980    metre"
"             Velocity                      1.760    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                0.830    metre"
" 53          ROUTE    Channel Route 1500"
"      1500.00      Channel Route 1500 Reach length   ( metre)"
"        0.455   X-factor <= 0.5"
"      213.100   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                  8.436    c.m/sec"
"                 8.520     8.520     8.436    26.144 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                 8.520     8.436     8.436    26.144"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   No description"
"        0.000   % Impervious"
"       11.200   Total Area"
"       50.000   Flow length"
"        7.000   Overland Slope"
"       11.200   Pervious Area"
"       50.000   Pervious length"
"        7.000   Pervious slope"
"        0.000   Impervious Area"
"       50.000   Impervious length"
"        7.000   Impervious slope"
"        0.280   Pervious Manning 'n'"
"       80.000   Pervious SCS Curve No."
"        0.580   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.350   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                 2.047     8.436     8.436    26.144 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           11.200     0.000      11.200     hectare"
"             Time of concentration  14.191     2.032      14.191     minutes"
"             Time to Centroid       237.365    202.020    237.365    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        1.2186     0.0000     1.2186     ha-m"
"             Rainfall losses        45.642     6.687      45.642     mm"
"             Runoff depth           63.158     102.113    63.158     mm"
"             Runoff volume          7073.64    0.01       7073.65    c.m"
"             Runoff coefficient     0.580      0.000      0.580      "
"             Maximum flow           2.047      0.000      2.047      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                 2.047     9.854     8.436    26.144"
" 52          CHANNEL DESIGN"
"        9.854   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"             Depth of flow                 1.048    metre"
"             Velocity                      1.827    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                0.893    metre"
" 53          ROUTE    Channel Route 700"
"       700.00      Channel Route 700 Reach length   ( metre)"
"        0.466   X-factor <= 0.5"
"      287.304   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  9.826    c.m/sec"
"                 2.047     9.854     9.826    26.144 c.m/sec"
```

```
" 40          HYDROGRAPH   Combine    1200"
"            6   Combine "
"         1200   Node #"
"                Node taking 100 series for Holtby Drain"
"             Maximum flow                   9.826    c.m/sec"
"             Hydrograph volume         37193.148    c.m"
"                     2.047     9.854     9.826     9.826"
" 40          HYDROGRAPH   Confluence    1200"
"            7   Confluence "
"         1200   Node #"
"                Node taking 100 series for Holtby Drain"
"             Maximum flow                   9.826    c.m/sec"
"             Hydrograph volume         37193.148    c.m"
"                     2.047     9.826     9.826     0.000"
" 52          CHANNEL DESIGN"
"        9.826   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                  1.226    metre"
"             Velocity                       1.412    m/sec"
"             Channel capacity             278.848    c.m/sec"
"             Critical depth                 0.891    metre"
" 53          ROUTE    Channel Route 50"
"        50.00       Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       26.564   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.715   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                   9.795    c.m/sec"
"                     2.047     9.826     9.795     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1300"
"            6   Combine "
"         1300   Node #"
"                Node at Holtby Drain"
"             Maximum flow                  33.593    c.m/sec"
"             Hydrograph volume        167433.547    c.m"
"                     2.047     9.826     9.795    33.593"
" 40          HYDROGRAPH   Confluence    1300"
"            7   Confluence "
"         1300   Node #"
"                Node at Holtby Drain"
"             Maximum flow                  33.593    c.m/sec"
"             Hydrograph volume        167433.547    c.m"
"                     2.047    33.593     9.795     0.000"
" 52          CHANNEL DESIGN"
"       33.593   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                  2.099    metre"
"             Velocity                       1.929    m/sec"
"             Channel capacity             278.848    c.m/sec"
"             Critical depth                 1.613    metre"
" 53          ROUTE    Channel Route 50"
"        50.00       Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       19.438   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.833   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  33.550    c.m/sec"
"                     2.047    33.593    33.550     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1000"
"            6   Combine "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow                 148.982    c.m/sec"
"             Hydrograph volume        1171464.37    c.m"
"                     2.047    33.593    33.550   148.982"
" 81          ADD COMMENT=================================================="
"          2  Lines of comment"
"             Total discharge to Pipe Arch under Hwy. 21 on the "
"             Pentangore Tributary"
" 40          HYDROGRAPH   Confluence    1000"
"            7   Confluence "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow                 148.982    c.m/sec"
"             Hydrograph volume        1171464.50    c.m"
"                     2.047   148.982    33.550     0.000"
" 81          ADD COMMENT=================================================="
"          2  Lines of comment"
"             Total discharge to Pipe Arch under Hwy. 21 on the "
"             Pentangore Tributary"
" 52          CHANNEL DESIGN"
"      148.982   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                  3.888    metre"
"             Velocity                       2.804    m/sec"
"             Channel capacity             278.848    c.m/sec"
"             Critical depth                 3.155    metre"
" 53          ROUTE    Channel Route 50"
"        50.00       Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       13.372   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.972   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 148.964    c.m/sec"
"                     2.047   148.982   148.964     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    3000"
"            6   Combine "
"         3000   Node #"
"                Node Combining All Flow"
"             Maximum flow                 148.964    c.m/sec"
"             Hydrograph volume        1171464.50    c.m"
"                     2.047   148.982   148.964   148.964"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     2.047     0.000   148.964   148.964"
" 33          CATCHMENT 301"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          301   No description"
"        0.000   % Impervious"
"       16.400   Total Area"
"       95.000   Flow length"
"        2.500   Overland Slope"
"       16.400   Pervious Area"
"       95.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"       95.000   Impervious length"
"        2.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.615   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     2.999     0.000   148.964   148.964 c.m/sec"
"             Catchment 301          Pervious   Impervious Total Area "
"             Surface Area           16.400     0.000      16.400     hectare"
"             Time of concentration  22.837     4.432      22.837     minutes"
"             Time to Centroid       246.332    205.003    246.332    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        1.7843     0.0000     1.7843     ha-m"
"             Rainfall losses        41.842     6.787      41.842     mm"
"             Runoff depth           66.958     102.013    66.958     mm"
"             Runoff volume          1.0981     0.0000     1.0981     ha-m"
"             Runoff coefficient     0.615      0.000      0.615      "
"             Maximum flow           2.999      0.000      2.999      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     2.999     2.999   148.964   148.964"
" 52          CHANNEL DESIGN"
"        2.999   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"             Depth of flow                  0.568    metre"
"             Velocity                       1.427    m/sec"
"             Channel capacity             431.989    c.m/sec"
"             Critical depth                 0.479    metre"
" 53          ROUTE    Channel Route 480"
"       480.00       Channel Route 480 Reach length   ( metre)"
"        0.475   X-factor <= 0.5"
"      252.327   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                   2.963    c.m/sec"
"                     2.999     2.999     2.963   148.964 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     2.999     2.963     2.963   148.964"
" 33          CATCHMENT 302"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          302   No description"
"        0.000   % Impervious"
"        5.000   Total Area"
"      110.000   Flow length"
"        3.500   Overland Slope"
"        5.000   Pervious Area"
"      110.000   Pervious length"
"        3.500   Pervious slope"
"        0.000   Impervious Area"
"      110.000   Impervious length"
"        3.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.615   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.918     2.963     2.963   148.964 c.m/sec"
"             Catchment 302          Pervious   Impervious Total Area "
"             Surface Area           5.000      0.000      5.000      hectare"
"             Time of concentration  22.543     4.374      22.543     minutes"
"             Time to Centroid       245.975    204.895    245.974    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        5440.00    0.01       5440.00    c.m"
"             Rainfall losses        41.852     6.892      41.852     mm"
"             Runoff depth           66.948     101.908    66.948     mm"
"             Runoff volume          3347.42    0.01       3347.43    c.m"
"             Runoff coefficient     0.615      0.000      0.615      "
"             Maximum flow           0.918      0.000      0.918      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.918     3.849     2.963   148.964"
" 52          CHANNEL DESIGN"
"        3.849   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"             Depth of flow                  0.642    metre"
"             Velocity                       1.526    m/sec"
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"             Channel capacity           431.989    c.m/sec"
"             Critical depth               0.548    metre"
" 53          ROUTE   Channel Route 280"
"       280.00      Channel Route 280 Reach length   ( metre)"
"        0.453   X-factor <= 0.5"
"      137.596   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 3.791    c.m/sec"
"                     0.918     3.849     3.791   148.964 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.918     3.791     3.791   148.964"
" 33          CATCHMENT 303"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          303   No description"
"        0.000   % Impervious"
"       11.600   Total Area"
"      135.000   Flow length"
"        4.500   Overland Slope"
"       11.600   Pervious Area"
"      135.000   Pervious length"
"        4.500   Pervious slope"
"        0.000   Impervious Area"
"      135.000   Impervious length"
"        4.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.616   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     2.093     3.791     3.791   148.964 c.m/sec"
"             Catchment 303          Pervious   Impervious Total Area "
"             Surface Area           11.600     0.000      11.600     hectare"
"             Time of concentration  23.639     4.587      23.639     minutes"
"             Time to Centroid       247.297    205.267    247.297    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        1.2621     0.0000     1.2621     ha-m"
"             Rainfall losses        41.827     6.590      41.827     mm"
"             Runoff depth           66.973     102.210    66.973     mm"
"             Runoff volume          7768.86    0.01       7768.87    c.m"
"             Runoff coefficient     0.616      0.000      0.616      "
"             Maximum flow           2.093      0.000      2.093      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     2.093     5.844     3.791   148.964"
" 52          CHANNEL DESIGN"
"        5.844   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"             Depth of flow                0.786    metre"
"             Velocity                     1.706    m/sec"
"             Channel capacity           431.989    c.m/sec"
"             Critical depth               0.684    metre"
" 53          ROUTE   Channel Route 430"
"       430.00      Channel Route 430 Reach length   ( metre)"
"        0.464   X-factor <= 0.5"
"      189.093   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 5.711    c.m/sec"
"                     2.093     5.844     5.711   148.964 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     2.093     5.711     5.711   148.964"
" 33          CATCHMENT 304"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          304   No description"
"        0.000   % Impervious"
"        6.300   Total Area"
"      150.000   Flow length"
"        2.500   Overland Slope"
"        6.300   Pervious Area"
"      150.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      150.000   Impervious length"
"        2.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.616   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     1.034     5.711     5.711   148.964 c.m/sec"
"             Catchment 304          Pervious   Impervious Total Area "
"             Surface Area           6.300      0.000      6.300      hectare"
"             Time of concentration  30.037     5.829      30.037     minutes"
"             Time to Centroid       255.030    206.540    255.030    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        6854.39    0.01       6854.40    c.m"
"             Rainfall losses        41.808     6.065      41.808     mm"
"             Runoff depth           66.992     102.735    66.992     mm"
"             Runoff volume          4220.52    0.01       4220.53    c.m"
"             Runoff coefficient     0.616      0.000      0.616      "
"             Maximum flow           1.034      0.000      1.034      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     1.034     6.727     5.711   148.964"
" 52          CHANNEL DESIGN"
"        6.727   Current peak flow    c.m/sec"
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"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"             Depth of flow                0.841    metre"
"             Velocity                     1.770    m/sec"
"             Channel capacity           431.989    c.m/sec"
"             Critical depth               0.735    metre"
" 53          ROUTE   Channel Route 130"
"       130.00      Channel Route 130 Reach length   ( metre)"
"        0.372   X-factor <= 0.5"
"       55.090   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       60.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 6.720    c.m/sec"
"                     1.034     6.727     6.720   148.964 c.m/sec"
" 40          HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"             Maximum flow                 6.720    c.m/sec"
"             Hydrograph volume        26317.850    c.m"
"                     1.034     6.727     6.720     6.720"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     1.034     0.000     6.720     6.720"
" 33          CATCHMENT 401"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          401   No description"
"        0.000   % Impervious"
"        5.600   Total Area"
"      240.000   Flow length"
"        3.500   Overland Slope"
"        5.600   Pervious Area"
"      240.000   Pervious length"
"        3.500   Pervious slope"
"        0.000   Impervious Area"
"      240.000   Impervious length"
"        3.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.616   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.836     0.000     6.720     6.720 c.m/sec"
"             Catchment 401          Pervious   Impervious Total Area "
"             Surface Area           5.600      0.000      5.600      hectare"
"             Time of concentration  35.999     6.986      35.999     minutes"
"             Time to Centroid       262.240    208.061    262.240    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        6092.79    0.01       6092.80    c.m"
"             Rainfall losses        41.798     6.683      41.798     mm"
"             Runoff depth           67.002     102.117    67.002     mm"
"             Runoff volume          3752.13    0.01       3752.14    c.m"
"             Runoff coefficient     0.616      0.000      0.616      "
"             Maximum flow           0.836      0.000      0.836      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.836     0.836     6.720     6.720"
" 52          CHANNEL DESIGN"
"        0.836   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"             Depth of flow                0.292    metre"
"             Velocity                     0.994    m/sec"
"             Channel capacity           431.989    c.m/sec"
"             Critical depth               0.231    metre"
" 53          ROUTE   Channel Route 225"
"       225.00      Channel Route 225 Reach length   ( metre)"
"        0.471   X-factor <= 0.5"
"      169.823   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 0.824    c.m/sec"
"                     0.836     0.836     0.824     6.720 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.836     0.824     0.824     6.720"
" 33          CATCHMENT 402"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          402   No description"
"        0.000   % Impervious"
"        4.200   Total Area"
"       80.000   Flow length"
"        4.000   Overland Slope"
"        4.200   Pervious Area"
"       80.000   Pervious length"
"        4.000   Pervious slope"
"        0.000   Impervious Area"
"       80.000   Impervious length"
"        4.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.615   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.794     0.824     0.824     6.720 c.m/sec"
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"            Catchment 402          Pervious   Impervious Total Area "
"            Surface Area           4.200      0.000      4.200      hectare"
"            Time of concentration  17.891     3.472      17.891     minutes"
"            Time to Centroid       240.348    203.675    240.348    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        4569.60    0.00       4569.60    c.m"
"            Rainfall losses        41.869     7.906      41.869     mm"
"            Runoff depth           66.931     100.894    66.931     mm"
"            Runoff volume          2811.09    0.00       2811.10    c.m"
"            Runoff coefficient     0.615      0.000      0.615      "
"            Maximum flow           0.794      0.000      0.794      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.794     1.467     0.824     6.720"
" 52         CHANNEL DESIGN"
"        1.467   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"            Depth of flow                 0.394    metre"
"            Velocity                      1.170    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.321    metre"
" 53         ROUTE    Channel Route 280"
"      280.00       Channel Route 280 Reach length   ( metre)"
"        0.469   X-factor <= 0.5"
"      179.524   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  1.461    c.m/sec"
"                   0.794     1.467     1.461     6.720 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                   0.794     1.461     1.461     6.720"
" 33         CATCHMENT 403"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         403   No description"
"        0.000   % Impervious"
"        6.400   Total Area"
"       75.000   Flow length"
"        4.000   Overland Slope"
"        6.400   Pervious Area"
"       75.000   Pervious length"
"        4.000   Pervious slope"
"        0.000   Impervious Area"
"       75.000   Impervious length"
"        4.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.615   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                   1.213     1.461     1.461     6.720 c.m/sec"
"            Catchment 403          Pervious   Impervious Total Area "
"            Surface Area           6.400      0.000      6.400      hectare"
"            Time of concentration  17.211     3.340      17.211     minutes"
"            Time to Centroid       239.495    203.637    239.494    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        6963.19    0.01       6963.20    c.m"
"            Rainfall losses        41.865     7.618      41.865     mm"
"            Runoff depth           66.935     101.182    66.935     mm"
"            Runoff volume          4283.85    0.01       4283.85    c.m"
"            Runoff coefficient     0.615      0.000      0.615      "
"            Maximum flow           1.213      0.000      1.213      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   1.213     2.585     1.461     6.720"
" 52         CHANNEL DESIGN"
"        2.585   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"            Depth of flow                 0.527    metre"
"            Velocity                      1.370    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.442    metre"
" 53         ROUTE    Channel Route 410"
"      410.00       Channel Route 410 Reach length   ( metre)"
"        0.473   X-factor <= 0.5"
"      224.449   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  2.546    c.m/sec"
"                   1.213     2.585     2.546     6.720 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                   1.213     2.546     2.546     6.720"
" 33         CATCHMENT 404"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         404   No description"
"        0.000   % Impervious"
"        2.700   Total Area"
"       60.000   Flow length"
"        2.500   Overland Slope"
"        2.700   Pervious Area"
"       60.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"       60.000   Impervious length"
"        2.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.615   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                   0.511     2.546     2.546     6.720 c.m/sec"
"            Catchment 404          Pervious   Impervious Total Area "
"            Surface Area           2.700      0.000      2.700      hectare"
"            Time of concentration  17.334     3.364      17.334     minutes"
"            Time to Centroid       239.648    203.622    239.648    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        2937.60    0.00       2937.60    c.m"
"            Rainfall losses        41.870     7.660      41.870     mm"
"            Runoff depth           66.930     101.140    66.930     mm"
"            Runoff volume          1807.10    0.00       1807.10    c.m"
"            Runoff coefficient     0.615      0.000      0.615      "
"            Maximum flow           0.511      0.000      0.511      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.511     2.974     2.546     6.720"
" 52         CHANNEL DESIGN"
"        2.974   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"            Depth of flow                 0.565    metre"
"            Velocity                      1.423    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.477    metre"
" 53         ROUTE    Channel Route 160"
"      160.00       Channel Route 160 Reach length   ( metre)"
"        0.427   X-factor <= 0.5"
"       84.301   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  2.968    c.m/sec"
"                   0.511     2.974     2.968     6.720 c.m/sec"
" 40         HYDROGRAPH   Combine    2100"
"           6   Combine "
"        2100   Node #"
"               Node taking 400 series - dumps into Hwy 21 Ditch"
"            Maximum flow                  2.968    c.m/sec"
"            Hydrograph volume         12654.184    c.m"
"                   0.511     2.974     2.968     2.968"
" 40         HYDROGRAPH   Confluence    2100"
"           7   Confluence "
"        2100   Node #"
"               Node taking 400 series - dumps into Hwy 21 Ditch"
"            Maximum flow                  2.968    c.m/sec"
"            Hydrograph volume         12654.184    c.m"
"                   0.511     2.968     2.968     0.000"
" 52         CHANNEL DESIGN"
"        2.968   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"            Depth of flow                 0.700    metre"
"            Velocity                      1.033    m/sec"
"            Channel capacity            278.848    c.m/sec"
"            Critical depth                0.476    metre"
" 53         ROUTE    Channel Route 50"
"       50.00       Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       36.298   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.587   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  2.956    c.m/sec"
"                   0.511     2.968     2.956     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    2000"
"           6   Combine "
"        2000   Node #"
"               Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"            Maximum flow                  9.579    c.m/sec"
"            Hydrograph volume         38972.008    c.m"
"                   0.511     2.968     2.956     9.579"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.511     0.000     2.956     9.579"
" 33         CATCHMENT 501"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         501   No description"
"        0.000   % Impervious"
"        2.500   Total Area"
"       80.000   Flow length"
"        3.500   Overland Slope"
"        2.500   Pervious Area"
"       80.000   Pervious length"
"        3.500   Pervious slope"
"        0.000   Impervious Area"
"       80.000   Impervious length"
"        3.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.615   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                   0.474     0.000     2.956     9.579 c.m/sec"
"            Catchment 501          Pervious   Impervious Total Area "
"            Surface Area           2.500      0.000      2.500      hectare"
"            Time of concentration  18.622     3.614      18.622     minutes"
"            Time to Centroid       241.214    203.761    241.214    minutes"
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"            Rainfall depth        108.800    108.800    108.800    mm"
"            Rainfall volume       2720.00    0.00       2720.00    c.m"
"            Rainfall losses       41.907     8.322      41.907     mm"
"            Runoff depth          66.893     100.478    66.893     mm"
"            Runoff volume         1672.33    0.00       1672.33    c.m"
"            Runoff coefficient    0.615      0.000      0.615      "
"            Maximum flow          0.474      0.000      0.474      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4  Add Runoff "
"                    0.474     0.474     2.956     9.579"
" 52         CHANNEL DESIGN"
"       0.474  Current peak flow    c.m/sec"
"       0.040  Manning 'n'"
"          0.  Cross-section type: 0=trapezoidal; 1=general"
"       2.000  Basewidth    metre"
"       3.000  Left bank slope"
"       3.000  Right bank slope"
"       5.000  Channel depth    metre"
"       1.200  Gradient   %"
"            Depth of flow                 0.214    metre"
"            Velocity                      0.837    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.164    metre"
" 53         ROUTE    Channel Route 120"
"      120.00      Channel Route 120 Reach length   ( metre)"
"       0.459  X-factor <= 0.5"
"     107.579  K-lag   ( seconds)"
"       0.000  Default(0) or user spec.(1) values used"
"       0.500  X-factor <= 0.5"
"      30.000  K-lag   ( seconds)"
"       0.500  Beta weighting factor"
"     100.000  Routing time step   ( seconds)"
"           1  No. of sub-reaches"
"            Peak outflow                  0.471    c.m/sec"
"                    0.474     0.474     0.471     9.579 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5  Next link "
"                    0.474     0.471     0.471     9.579"
" 33         CATCHMENT 502"
"           1  Triangular SCS"
"           1  Equal length"
"           1  SCS method"
"         502  No description"
"       0.000  % Impervious"
"       0.500  Total Area"
"     120.000  Flow length"
"       3.500  Overland Slope"
"       0.500  Pervious Area"
"     120.000  Pervious length"
"       3.500  Pervious slope"
"       0.000  Impervious Area"
"     120.000  Impervious length"
"       3.500  Impervious slope"
"       0.200  Pervious Manning 'n'"
"      82.000  Pervious SCS Curve No."
"       0.616  Pervious Runoff coefficient"
"       0.100  Pervious Ia/S coefficient"
"       5.576  Pervious Initial abstraction"
"       0.015  Impervious Manning 'n'"
"      98.000  Impervious SCS Curve No."
"       0.000  Impervious Runoff coefficient"
"       0.100  Impervious Ia/S coefficient"
"       0.518  Impervious Initial abstraction"
"                    0.090     0.471     0.471     9.579 c.m/sec"
"            Catchment 502         Pervious   Impervious Total Area "
"            Surface Area          0.500      0.000      0.500      hectare"
"            Time of concentration 23.751     4.609      23.751     minutes"
"            Time to Centroid      247.440    205.288    247.440    minutes"
"            Rainfall depth        108.800    108.800    108.800    mm"
"            Rainfall volume       544.00     0.00       544.00     c.m"
"            Rainfall losses       41.826     6.530      41.826     mm"
"            Runoff depth          66.974     102.270    66.974     mm"
"            Runoff volume         334.87     0.00       334.87     c.m"
"            Runoff coefficient    0.616      0.000      0.616      "
"            Maximum flow          0.090      0.000      0.090      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4  Add Runoff "
"                    0.090     0.561     0.471     9.579"
" 52         CHANNEL DESIGN"
"       0.561  Current peak flow    c.m/sec"
"       0.040  Manning 'n'"
"          0.  Cross-section type: 0=trapezoidal; 1=general"
"       2.000  Basewidth    metre"
"       3.000  Left bank slope"
"       3.000  Right bank slope"
"       5.000  Channel depth    metre"
"       1.200  Gradient   %"
"            Depth of flow                 0.235    metre"
"            Velocity                      0.881    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.182    metre"
" 53         ROUTE    Channel Route 170"
"      170.00      Channel Route 170 Reach length   ( metre)"
"       0.468  X-factor <= 0.5"
"     144.690  K-lag   ( seconds)"
"       0.000  Default(0) or user spec.(1) values used"
"       0.500  X-factor <= 0.5"
"      30.000  K-lag   ( seconds)"
"       0.500  Beta weighting factor"
"     150.000  Routing time step   ( seconds)"
"           1  No. of sub-reaches"
"            Peak outflow                  0.546    c.m/sec"
"                    0.090     0.561     0.546     9.579 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5  Next link "
"                    0.090     0.546     0.546     9.579"
" 33         CATCHMENT 503"
"           1  Triangular SCS"
"           1  Equal length"
"           1  SCS method"
"         503  No description"
"       0.000  % Impervious"
"       8.200  Total Area"
"      90.000  Flow length"
"       5.000  Overland Slope"
"       8.200  Pervious Area"
"      90.000  Pervious length"
"       5.000  Pervious slope"
"       0.000  Impervious Area"
"      90.000  Impervious length"
"       5.000  Impervious slope"
"       0.200  Pervious Manning 'n'"
"      82.000  Pervious SCS Curve No."
"       0.615  Pervious Runoff coefficient"
"       0.100  Pervious Ia/S coefficient"
"       5.576  Pervious Initial abstraction"
"       0.015  Impervious Manning 'n'"
"      98.000  Impervious SCS Curve No."
"       0.000  Impervious Runoff coefficient"
"       0.100  Impervious Ia/S coefficient"
"       0.518  Impervious Initial abstraction"
"                    1.552     0.546     0.546     9.579 c.m/sec"
"            Catchment 503         Pervious   Impervious Total Area "
"            Surface Area          8.200      0.000      8.200      hectare"
"            Time of concentration 17.957     3.485      17.957     minutes"
"            Time to Centroid      240.430    203.679    240.430    minutes"
"            Rainfall depth        108.800    108.800    108.800    mm"
"            Rainfall volume       8921.59    0.01       8921.60    c.m"
"            Rainfall losses       41.874     7.941      41.874     mm"
"            Runoff depth          66.926     100.859    66.926     mm"
"            Runoff volume         5487.91    0.01       5487.92    c.m"
"            Runoff coefficient    0.615      0.000      0.615      "
"            Maximum flow          1.552      0.000      1.552      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4  Add Runoff "
"                    1.552     2.097     0.546     9.579"
" 52         CHANNEL DESIGN"
"       2.097  Current peak flow    c.m/sec"
"       0.040  Manning 'n'"
"          0.  Cross-section type: 0=trapezoidal; 1=general"
"       2.000  Basewidth    metre"
"       3.000  Left bank slope"
"       3.000  Right bank slope"
"       5.000  Channel depth    metre"
"       1.200  Gradient   %"
"            Depth of flow                 0.474    metre"
"            Velocity                      1.293    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.393    metre"
" 53         ROUTE    Channel Route 350"
"      350.00      Channel Route 350 Reach length   ( metre)"
"       0.471  X-factor <= 0.5"
"     202.984  K-lag   ( seconds)"
"       0.000  Default(0) or user spec.(1) values used"
"       0.500  X-factor <= 0.5"
"      30.000  K-lag   ( seconds)"
"       0.500  Beta weighting factor"
"     150.000  Routing time step   ( seconds)"
"           1  No. of sub-reaches"
"            Peak outflow                  2.052    c.m/sec"
"                    1.552     2.097     2.052     9.579 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5  Next link "
"                    1.552     2.052     2.052     9.579"
" 33         CATCHMENT 504"
"           1  Triangular SCS"
"           1  Equal length"
"           1  SCS method"
"         504  No description"
"       0.000  % Impervious"
"       3.900  Total Area"
"      90.000  Flow length"
"       2.500  Overland Slope"
"       3.900  Pervious Area"
"      90.000  Pervious length"
"       2.500  Pervious slope"
"       0.000  Impervious Area"
"      90.000  Impervious length"
"       2.500  Impervious slope"
"       0.200  Pervious Manning 'n'"
"      82.000  Pervious SCS Curve No."
"       0.615  Pervious Runoff coefficient"
"       0.100  Pervious Ia/S coefficient"
"       5.576  Pervious Initial abstraction"
"       0.015  Impervious Manning 'n'"
"      98.000  Impervious SCS Curve No."
"       0.000  Impervious Runoff coefficient"
"       0.100  Impervious Ia/S coefficient"
"       0.518  Impervious Initial abstraction"
"                    0.721     2.052     2.052     9.579 c.m/sec"
"            Catchment 504         Pervious   Impervious Total Area "
"            Surface Area          3.900      0.000      3.900      hectare"
"            Time of concentration 22.108     4.290      22.108     minutes"
"            Time to Centroid      245.439    204.751    245.439    minutes"
"            Rainfall depth        108.800    108.800    108.800    mm"
"            Rainfall volume       4243.20    0.00       4243.20    c.m"
"            Rainfall losses       41.873     7.045      41.873     mm"
"            Runoff depth          66.927     101.755    66.927     mm"
"            Runoff volume         2610.15    0.00       2610.16    c.m"
"            Runoff coefficient    0.615      0.000      0.615      "
"            Maximum flow          0.721      0.000      0.721      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4  Add Runoff "
"                    0.721     2.773     2.052     9.579"
" 52         CHANNEL DESIGN"
"       2.773  Current peak flow    c.m/sec"
"       0.040  Manning 'n'"
"          0.  Cross-section type: 0=trapezoidal; 1=general"
"       2.000  Basewidth    metre"
"       3.000  Left bank slope"
"       3.000  Right bank slope"
"       5.000  Channel depth    metre"
"       1.200  Gradient   %"
"            Depth of flow                 0.546    metre"
"            Velocity                      1.397    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.459    metre"
" 53         ROUTE    Channel Route 140"
"      140.00      Channel Route 140 Reach length   ( metre)"
"       0.419  X-factor <= 0.5"
"      75.183  K-lag   ( seconds)"
"       0.000  Default(0) or user spec.(1) values used"
"       0.500  X-factor <= 0.5"
"      30.000  K-lag   ( seconds)"
"       0.500  Beta weighting factor"
"      75.000  Routing time step   ( seconds)"
"           1  No. of sub-reaches"
"            Peak outflow                  2.726    c.m/sec"
"                    0.721     2.773     2.726     9.579 c.m/sec"
" 40         HYDROGRAPH   Combine    2200"
"           6  Combine "
"        2200  Node #"
"              Node taking 500 series - dumps into Hwy 21 Ditch"
"            Maximum flow                  2.726    c.m/sec"
"            Hydrograph volume        10105.276    c.m"
"                    0.721     2.773     2.726     2.726"
" 40         HYDROGRAPH   Confluence    2200"
"           7  Confluence "
"        2200  Node #"
"              Node taking 500 series - dumps into Hwy 21 Ditch"
"            Maximum flow                  2.726    c.m/sec"
"            Hydrograph volume        10105.276    c.m"
"                    0.721     2.726     2.726     0.000"
" 52         CHANNEL DESIGN"
```

```
"        2.726   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 0.672    metre"
"             Velocity                      1.010    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.455    metre"
" 53          ROUTE    Channel Route 300"
"       300.00      Channel Route 300 Reach length   ( metre)"
"        0.391   X-factor <= 0.5"
"      222.784   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  2.702    c.m/sec"
"                     0.721     2.726     2.702     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"             Maximum flow                 12.281    c.m/sec"
"             Hydrograph volume         49077.281    c.m"
"                     0.721     2.726     2.702    12.281"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.721     0.000     2.702    12.281"
" 33          CATCHMENT 603"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          603   No description"
"        0.000   % Impervious"
"        5.600   Total Area"
"      100.000   Flow length"
"        2.500   Overland Slope"
"        5.600   Pervious Area"
"      100.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        2.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.616   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     1.012     0.000     2.702    12.281 c.m/sec"
"             Catchment 603          Pervious   Impervious Total Area "
"             Surface Area           5.600      0.000      5.600      hectare"
"             Time of concentration  23.551     4.570      23.551     minutes"
"             Time to Centroid       247.186    205.245    247.186    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        6092.79    0.01       6092.80    c.m"
"             Rainfall losses        41.829     6.620      41.829     mm"
"             Runoff depth           66.971     102.180    66.971     mm"
"             Runoff volume          3750.39    0.01       3750.40    c.m"
"             Runoff coefficient     0.616      0.000      0.616      "
"             Maximum flow           1.012      0.000      1.012      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     1.012     1.012     2.702    12.281"
" 52          CHANNEL DESIGN"
"        1.012   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"             Depth of flow                 0.324    metre"
"             Velocity                      1.051    m/sec"
"             Channel capacity            431.989    c.m/sec"
"             Critical depth                0.259    metre"
" 53          ROUTE    Channel Route 260"
"       260.00      Channel Route 260 Reach length   ( metre)"
"        0.472   X-factor <= 0.5"
"      185.515   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  1.003    c.m/sec"
"                     1.012     1.012     1.003    12.281 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     1.012     1.003     1.003    12.281"
" 33          CATCHMENT 605"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          605   No description"
"        0.000   % Impervious"
"        3.400   Total Area"
"      100.000   Flow length"
"        2.500   Overland Slope"
"        3.400   Pervious Area"
"      100.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        2.500   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.616   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
```

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"                     0.614     1.003     1.003    12.281 c.m/sec"
"             Catchment 605          Pervious   Impervious Total Area "
"             Surface Area           3.400      0.000      3.400      hectare"
"             Time of concentration  23.551     4.570      23.551     minutes"
"             Time to Centroid       247.186    205.245    247.186    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        3699.20    0.00       3699.20    c.m"
"             Rainfall losses        41.829     6.620      41.829     mm"
"             Runoff depth           66.971     102.180    66.971     mm"
"             Runoff volume          2277.02    0.00       2277.03    c.m"
"             Runoff coefficient     0.616      0.000      0.616      "
"             Maximum flow           0.614      0.000      0.614      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.614     1.605     1.003    12.281"
" 52          CHANNEL DESIGN"
"        1.605   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"             Depth of flow                 0.413    metre"
"             Velocity                      1.200    m/sec"
"             Channel capacity            431.989    c.m/sec"
"             Critical depth                0.338    metre"
" 53          ROUTE    Channel Route 170"
"       170.00      Channel Route 170 Reach length   ( metre)"
"        0.447   X-factor <= 0.5"
"      106.256   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  1.595    c.m/sec"
"                     0.614     1.605     1.595    12.281 c.m/sec"
" 40          HYDROGRAPH   Combine    2300"
"            6   Combine "
"         2300   Node #"
"                Node taking 600 series - dumps into Hwy 21 Ditch"
"             Maximum flow                  1.595    c.m/sec"
"             Hydrograph volume          6027.422    c.m"
"                     0.614     1.605     1.595     1.595"
" 40          HYDROGRAPH   Confluence    2300"
"            7   Confluence "
"         2300   Node #"
"                Node taking 600 series - dumps into Hwy 21 Ditch"
"             Maximum flow                  1.595    c.m/sec"
"             Hydrograph volume          6027.422    c.m"
"                     0.614     1.595     1.595     0.000"
" 52          CHANNEL DESIGN"
"        1.595   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 0.515    metre"
"             Velocity                      0.873    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.337    metre"
" 53          ROUTE    Channel Route 650"
"       650.00      Channel Route 650 Reach length   ( metre)"
"        0.420   X-factor <= 0.5"
"      279.063   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                  1.572    c.m/sec"
"                     0.614     1.595     1.572     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"             Maximum flow                 13.643    c.m/sec"
"             Hydrograph volume         55104.695    c.m"
"                     0.614     1.595     1.572    13.643"
" 81          ADD COMMENT==================================================="
"          1  Lines of comment"
"             Total discharge to Hwy. 21 Ditch"
" 40          HYDROGRAPH   Confluence    2000"
"            7   Confluence "
"         2000   Node #"
"                Node taking 300/400/500/600 series - dumps into Hwy 21 Ditch"
"             Maximum flow                 13.643    c.m/sec"
"             Hydrograph volume         55104.703    c.m"
"                     0.614    13.643     1.572     0.000"
" 81          ADD COMMENT==================================================="
"          1  Lines of comment"
"             Total discharge to Hwy. 21 Ditch"
" 52          CHANNEL DESIGN"
"       13.643   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 1.420    metre"
"             Velocity                      1.535    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                1.049    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       24.425   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.747   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 13.641    c.m/sec"
"                     0.614    13.643    13.641     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    3000"
"            6   Combine "
"         3000   Node #"
```

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"                Node Combining All Flow"
"             Maximum flow                153.596    c.m/sec"
"             Hydrograph volume        1226569.12    c.m"
"                     0.614    13.643    13.641   153.596"
" 81          ADD COMMENT==================================================="
"          1  Lines of comment"
"             Total Off-site Discharge - Hwy. 21 + Penetangore Tributary"
" 40          HYDROGRAPH   Confluence    3000"
"            7   Confluence "
"         3000   Node #"
"                Node Combining All Flow"
"             Maximum flow                153.596    c.m/sec"
"             Hydrograph volume        1226569.12    c.m"
"                     0.614   153.596    13.641     0.000"
" 81          ADD COMMENT==================================================="
"          1  Lines of comment"
"             Total Off-site Discharge - Hwy. 21 + Penetangore Tributary"
```

POST-DEVELOPMENT 5 YEAR

```
"              MIDUSS Output ----------------------------------------------->"
"              MIDUSS version                         Version 2.25  rev. 473"
"              MIDUSS created                        Sunday, February 7, 2010"
"         10   Units used:                                         ie METRIC"
"              Job folder:                 C:\Users\derb\Desktop\KBP - Report\"
"                              2016 Work\Appendix F - Miduss Modelling\Future"
"              Output filename:                        08055 - Post 5 Year.out"
"              Licensee name:                                    BMROSS - DLE"
"              Company                                                 BMROSS"
"              Date & Time last used:                6/25/2016 at 10:38:23 AM"
" 31         TIME PARAMETERS"
"       5.000   Time Step"
"     360.000   Max. Storm length"
"    1800.000   Max. Hydrograph"
" 32         STORM Mass Curve"
"           3   Mass Curve"
"      58.700   Rainfall depth"
"     360.000   Duration"
"          47   C:\Program Files (x86)\MIDUSS\SCS_6hr_Type2.mrd   SCS Type II - 6
hour Distribution - Ontario"
"            Maximum intensity          45.786    mm/hr"
"            Total depth                58.700    mm"
"          6   005hyd   Hydrograph extension used in this file"
" 81         ADD COMMENT==================================================="
"         1  Lines of comment"
"            Start of Penetangore Tributary"
" 33         CATCHMENT 50"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          50   No description"
"       0.000   % Impervious"
"     396.000   Total Area"
"     450.000   Flow length"
"       2.500   Overland Slope"
"     396.000   Pervious Area"
"     450.000   Pervious length"
"       2.500   Pervious slope"
"       0.000   Impervious Area"
"     450.000   Impervious length"
"       2.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      81.000   Pervious SCS Curve No."
"       0.422   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.958   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  10.190     0.000     0.000     0.000 c.m/sec"
"            Catchment 50           Pervious   Impervious Total Area "
"            Surface Area           396.000    0.000      396.000    hectare"
"            Time of concentration  95.354     13.283     95.354     minutes"
"            Time to Centroid       342.104    218.977    342.104    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        23.2452    0.0000     23.2452    ha-m"
"            Rainfall losses        33.937     5.504      33.937     mm"
"            Runoff depth           24.763     53.196     24.763     mm"
"            Runoff volume          9.8061     0.0000     9.8061     ha-m"
"            Runoff coefficient     0.422      0.000      0.422      "
"            Maximum flow           10.190     0.000      10.190     c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                 10.190    10.190     0.000     0.000"
" 52         CHANNEL DESIGN"
"      10.190   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"            Depth of flow                 1.246    metre"
"            Velocity                      1.425    m/sec"
"            Channel capacity            278.848    c.m/sec"
"            Critical depth                0.908    metre"
" 53         ROUTE    Channel Route 3000"
"     3000.00      Channel Route 3000 Reach length   ( metre)"
"       0.406   X-factor <= 0.5"
"     315.804   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           5   No. of sub-reaches"
"            Peak outflow                 10.018    c.m/sec"
"                  10.190    10.190    10.018     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  10.190    10.018    10.018     0.000"
" 33         CATCHMENT 52"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          52   No description"
"       0.000   % Impervious"
"     196.000   Total Area"
"     250.000   Flow length"
"       7.000   Overland Slope"
"     196.000   Pervious Area"
"     250.000   Pervious length"
"       7.000   Pervious slope"
"       0.000   Impervious Area"
"     250.000   Impervious length"
"       7.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      80.000   Pervious SCS Curve No."
"       0.403   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       6.350   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   7.959    10.018    10.018     0.000 c.m/sec"
"            Catchment 52           Pervious   Impervious Total Area "
"            Surface Area           196.000    0.000      196.000    hectare"
"            Time of concentration  49.947     6.855      49.947     minutes"
"            Time to Centroid       288.104    211.306    288.104    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        11.5052    0.0000     11.5052    ha-m"
"            Rainfall losses        35.049     6.025      35.049     mm"
"            Runoff depth           23.651     52.675     23.651     mm"
"            Runoff volume          4.6356     0.0000     4.6356     ha-m"
"            Runoff coefficient     0.403      0.000      0.403      "
"            Maximum flow           7.959      0.000      7.959      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   7.959    12.923    10.018     0.000"
" 52         CHANNEL DESIGN"
"      12.923   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.400   Gradient   %"
"            Depth of flow                 1.456    metre"
"            Velocity                      1.393    m/sec"
"            Channel capacity            249.409    c.m/sec"
"            Critical depth                1.021    metre"
" 53         ROUTE    Channel Route 1300"
"     1300.00      Channel Route 1300 Reach length   ( metre)"
"       0.376   X-factor <= 0.5"
"     349.856   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                 12.836    c.m/sec"
"                   7.959    12.923    12.836     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                   7.959    12.836    12.836     0.000"
" 33         CATCHMENT 54"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          54   No description"
"       0.000   % Impervious"
"      39.000   Total Area"
"     140.000   Flow length"
"      11.000   Overland Slope"
"      39.000   Pervious Area"
"     140.000   Pervious length"
"      11.000   Pervious slope"
"       0.000   Impervious Area"
"     140.000   Impervious length"
"      11.000   Impervious slope"
"       0.210   Pervious Manning 'n'"
"      81.000   Pervious SCS Curve No."
"       0.422   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.958   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   2.426    12.836    12.836     0.000 c.m/sec"
"            Catchment 54           Pervious   Impervious Total Area "
"            Surface Area           39.000     0.000      39.000     hectare"
"            Time of concentration  27.329     4.227      27.329     minutes"
"            Time to Centroid       259.963    208.037    259.963    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        2.2893     0.0000     2.2893     ha-m"
"            Rainfall losses        33.953     6.167      33.953     mm"
"            Runoff depth           24.747     52.533     24.747     mm"
"            Runoff volume          9651.26    0.02       9651.28    c.m"
"            Runoff coefficient     0.422      0.000      0.422      "
"            Maximum flow           2.426      0.000      2.426      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   2.426    13.266    12.836     0.000"
" 52         CHANNEL DESIGN"
"      13.266   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.400   Gradient   %"
"            Depth of flow                 1.473    metre"
"            Velocity                      1.403    m/sec"
"            Channel capacity            249.409    c.m/sec"
"            Critical depth                1.035    metre"
" 53         ROUTE    Channel Route 800"
"      800.00      Channel Route 800 Reach length   ( metre)"
"       0.297   X-factor <= 0.5"
"     213.864   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                 13.220    c.m/sec"
"                   2.426    13.266    13.220     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    10"
"           6   Combine "
"          10   Node #"
"               Confluence on Penetangore Tributary"
"            Maximum flow                 13.220    c.m/sec"
"            Hydrograph volume        154068.359    c.m"
"                   2.426    13.266    13.220    13.220"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   2.426     0.000    13.220    13.220"
" 33         CATCHMENT 60"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          60   No description"
"       0.000   % Impervious"
"     225.000   Total Area"
"     270.000   Flow length"
"       2.500   Overland Slope"
"     225.000   Pervious Area"
"     270.000   Pervious length"
"       2.500   Pervious slope"
"       0.000   Impervious Area"
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"       270.000   Impervious length"
"         2.500   Impervious slope"
"         0.230   Pervious Manning 'n'"
"        81.000   Pervious SCS Curve No."
"         0.422   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.958   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                       7.768     0.000    13.220    13.220 c.m/sec"
"            Catchment 60          Pervious   Impervious Total Area "
"            Surface Area          225.000    0.000      225.000    hectare"
"            Time of concentration 66.758     9.777      66.758     minutes"
"            Time to Centroid      307.583    214.714    307.583    minutes"
"            Rainfall depth        58.700     58.700     58.700     mm"
"            Rainfall volume       13.2075    0.0000     13.2075    ha-m"
"            Rainfall losses       33.938     5.762      33.938     mm"
"            Runoff depth          24.762     52.938     24.762     mm"
"            Runoff volume         5.5715     0.0000     5.5715     ha-m"
"            Runoff coefficient    0.422      0.000      0.422      "
"            Maximum flow          7.768      0.000      7.768      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                       7.768     7.768    13.220    13.220"
" 52         CHANNEL DESIGN"
"         7.768   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         0.400   Gradient   %"
"            Depth of flow                  1.159    metre"
"            Velocity                       1.223    m/sec"
"            Channel capacity             249.409    c.m/sec"
"            Critical depth                 0.792    metre"
" 53         ROUTE    Channel Route 1800"
"       1800.00       Channel Route 1800 Reach length   ( metre)"
"         0.390   X-factor <= 0.5"
"       367.870   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       300.000   Routing time step   ( seconds)"
"           3   No. of sub-reaches"
"            Peak outflow                   7.635    c.m/sec"
"                       7.768     7.768     7.635    13.220 c.m/sec"
" 40         HYDROGRAPH   Combine    10"
"           6   Combine "
"          10   Node #"
"               Confluence on Penetangore Tributary"
"            Maximum flow                  19.506    c.m/sec"
"            Hydrograph volume        209783.594    c.m"
"                       7.768     7.768     7.635    19.506"
" 40         HYDROGRAPH   Confluence    10"
"           7   Confluence "
"          10   Node #"
"               Confluence on Penetangore Tributary"
"            Maximum flow                  19.506    c.m/sec"
"            Hydrograph volume        209783.609    c.m"
"                       7.768    19.506     7.635     0.000"
" 52         CHANNEL DESIGN"
"        19.506   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         0.400   Gradient   %"
"            Depth of flow                  1.744    metre"
"            Velocity                       1.547    m/sec"
"            Channel capacity             249.409    c.m/sec"
"            Critical depth                 1.248    metre"
" 53         ROUTE    Channel Route 2000"
"       2000.00       Channel Route 2000 Reach length   ( metre)"
"         0.358   X-factor <= 0.5"
"       323.201   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       300.000   Routing time step   ( seconds)"
"           3   No. of sub-reaches"
"            Peak outflow                  19.475    c.m/sec"
"                       7.768    19.506    19.475     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    11"
"           6   Combine "
"          11   Node #"
"               Confluence on Penetangore Tributary"
"            Maximum flow                  19.475    c.m/sec"
"            Hydrograph volume        209783.500    c.m"
"                       7.768    19.506    19.475    19.475"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                       7.768     0.000    19.475    19.475"
" 33         CATCHMENT 62"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          62   No description"
"         0.000   % Impervious"
"        95.000   Total Area"
"       160.000   Flow length"
"         2.500   Overland Slope"
"        95.000   Pervious Area"
"       160.000   Pervious length"
"         2.500   Pervious slope"
"         0.000   Impervious Area"
"       160.000   Impervious length"
"         2.500   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        80.000   Pervious SCS Curve No."
"         0.403   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         6.350   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                       3.760     0.000    19.475    19.475 c.m/sec"
"            Catchment 62          Pervious   Impervious Total Area "
"            Surface Area          95.000     0.000      95.000     hectare"
"            Time of concentration 52.044     7.142      52.044     minutes"
"            Time to Centroid      290.632    211.675    290.632    minutes"
"            Rainfall depth        58.700     58.700     58.700     mm"
"            Rainfall volume       5.5765     0.0000     5.5765     ha-m"
"            Rainfall losses       35.050     5.748      35.050     mm"
"            Runoff depth          23.650     52.952     23.650     mm"
"            Runoff volume         2.2467     0.0000     2.2467     ha-m"
"            Runoff coefficient    0.403      0.000      0.403      "
"            Maximum flow          3.760      0.000      3.760      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                       3.760     3.760    19.475    19.475"
" 52         CHANNEL DESIGN"
"         3.760   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         0.300   Gradient   %"
"            Depth of flow                  0.886    metre"
"            Velocity                       0.911    m/sec"
"            Channel capacity             215.995    c.m/sec"
"            Critical depth                 0.542    metre"
" 53         ROUTE    Channel Route 1800"
"       1800.00       Channel Route 1800 Reach length   ( metre)"
"         0.346   X-factor <= 0.5"
"       370.426   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       300.000   Routing time step   ( seconds)"
"           4   No. of sub-reaches"
"            Peak outflow                   3.593    c.m/sec"
"                       3.760     3.760     3.593    19.475 c.m/sec"
" 40         HYDROGRAPH   Combine    11"
"           6   Combine "
"          11   Node #"
"               Confluence on Penetangore Tributary"
"            Maximum flow                  22.226    c.m/sec"
"            Hydrograph volume        232250.453    c.m"
"                       3.760     3.760     3.593    22.226"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                       3.760     0.000     3.593    22.226"
" 33         CATCHMENT 56"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          56   No description"
"         0.000   % Impervious"
"       345.000   Total Area"
"       240.000   Flow length"
"        11.000   Overland Slope"
"       345.000   Pervious Area"
"       240.000   Pervious length"
"        11.000   Pervious slope"
"         0.000   Impervious Area"
"       240.000   Impervious length"
"        15.000   Impervious slope"
"         0.280   Pervious Manning 'n'"
"        79.000   Pervious SCS Curve No."
"         0.385   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         6.752   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      14.138     0.000     3.593    22.226 c.m/sec"
"            Catchment 56          Pervious   Impervious Total Area "
"            Surface Area          345.000    0.000      345.000    hectare"
"            Time of concentration 46.250     5.322      46.250     minutes"
"            Time to Centroid      284.430    209.376    284.430    minutes"
"            Rainfall depth        58.700     58.700     58.700     mm"
"            Rainfall volume       20.2515    0.0000     20.2515    ha-m"
"            Rainfall losses       36.119     5.390      36.119     mm"
"            Runoff depth          22.581     53.310     22.581     mm"
"            Runoff volume         7.7903     0.0000     7.7903     ha-m"
"            Runoff coefficient    0.385      0.000      0.385      "
"            Maximum flow          14.138     0.000      14.138     c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                      14.138    14.138     3.593    22.226"
" 52         CHANNEL DESIGN"
"        14.138   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         0.400   Gradient   %"
"            Depth of flow                  1.515    metre"
"            Velocity                       1.426    m/sec"
"            Channel capacity             249.409    c.m/sec"
"            Critical depth                 1.067    metre"
" 53         ROUTE    Channel Route 1300"
"       1300.00       Channel Route 1300 Reach length   ( metre)"
"         0.372   X-factor <= 0.5"
"       341.945   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                  13.869    c.m/sec"
"                      14.138    14.138    13.869    22.226 c.m/sec"
" 40         HYDROGRAPH   Combine    11"
"           6   Combine "
"          11   Node #"
"               Confluence on Penetangore Tributary"
"            Maximum flow                  30.912    c.m/sec"
"            Hydrograph volume        310152.906    c.m"
"                      14.138    14.138    13.869    30.912"
" 40         HYDROGRAPH   Confluence    11"
"           7   Confluence "
"          11   Node #"
"               Confluence on Penetangore Tributary"
"            Maximum flow                  30.912    c.m/sec"
"            Hydrograph volume        310152.906    c.m"
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"                 14.138    30.912    13.869     0.000"
" 52          CHANNEL DESIGN"
"       30.912   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                  2.026    metre"
"             Velocity                       1.889    m/sec"
"             Channel capacity             278.848    c.m/sec"
"             Critical depth                 1.552    metre"
" 53          ROUTE    Channel Route 1300"
"      1300.00      Channel Route 1300 Reach length   ( metre)"
"        0.367   X-factor <= 0.5"
"      258.058   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                  30.822    c.m/sec"
"                 14.138    30.912    30.822     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                  30.822    c.m/sec"
"             Hydrograph volume        310153.156    c.m"
"                 14.138    30.912    30.822    30.822"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                 14.138     0.000    30.822    30.822"
" 33          CATCHMENT 58"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           58   No description"
"        0.000   % Impervious"
"       82.000   Total Area"
"      140.000   Flow length"
"       15.000   Overland Slope"
"       82.000   Pervious Area"
"      140.000   Pervious length"
"       15.000   Pervious slope"
"        0.000   Impervious Area"
"      140.000   Impervious length"
"       15.000   Impervious slope"
"        0.230   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.422   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  5.207     0.000    30.822    30.822 c.m/sec"
"             Catchment 58           Pervious   Impervious Total Area "
"             Surface Area           82.000     0.000      82.000     hectare"
"             Time of concentration  26.297     3.851      26.297     minutes"
"             Time to Centroid       258.726    207.490    258.726    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        4.8134     0.0000     4.8134     ha-m"
"             Rainfall losses        33.952     6.563      33.952     mm"
"             Runoff depth           24.748     52.137     24.748     mm"
"             Runoff volume          2.0293     0.0000     2.0293     ha-m"
"             Runoff coefficient     0.422      0.000      0.422      "
"             Maximum flow           5.207      0.000      5.207      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  5.207     5.207    30.822    30.822"
" 52          CHANNEL DESIGN"
"        5.207   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                  0.916    metre"
"             Velocity                       1.198    m/sec"
"             Channel capacity             278.848    c.m/sec"
"             Critical depth                 0.644    metre"
" 53          ROUTE    Channel Route 700"
"       700.00      Channel Route 700 Reach length   ( metre)"
"        0.377   X-factor <= 0.5"
"      219.117   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                   5.084    c.m/sec"
"                  5.207     5.207     5.084    30.822 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                  32.000    c.m/sec"
"             Hydrograph volume        330446.219    c.m"
"                  5.207     5.207     5.084    32.000"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  5.207     0.000     5.084    32.000"
" 33          CATCHMENT 64"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           64   No description"
"        0.000   % Impervious"
"       80.000   Total Area"
"      220.000   Flow length"
"        5.500   Overland Slope"
"       80.000   Pervious Area"
"      220.000   Pervious length"
"        5.500   Pervious slope"
"        0.000   Impervious Area"
"      220.000   Impervious length"
"        5.500   Impervious slope"
"        0.210   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.441   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  3.970     0.000     5.084    32.000 c.m/sec"
"             Catchment 64           Pervious   Impervious Total Area "
"             Surface Area           80.000     0.000      80.000     hectare"
"             Time of concentration  43.483     6.825      43.483     minutes"
"             Time to Centroid       278.638    211.270    278.638    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        4.6960     0.0000     4.6960     ha-m"
"             Rainfall losses        32.787     6.061      32.787     mm"
"             Runoff depth           25.913     52.639     25.913     mm"
"             Runoff volume          2.0730     0.0000     2.0730     ha-m"
"             Runoff coefficient     0.441      0.000      0.441      "
"             Maximum flow           3.970      0.000      3.970      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  3.970     3.970     5.084    32.000"
" 52          CHANNEL DESIGN"
"        3.970   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                  0.806    metre"
"             Velocity                       1.116    m/sec"
"             Channel capacity             278.848    c.m/sec"
"             Critical depth                 0.558    metre"
" 53          ROUTE    Channel Route 700"
"       700.00      Channel Route 700 Reach length   ( metre)"
"        0.390   X-factor <= 0.5"
"      235.253   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                   3.952    c.m/sec"
"                  3.970     3.970     3.952    32.000 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                  33.877    c.m/sec"
"             Hydrograph volume        351176.438    c.m"
"                  3.970     3.970     3.952    33.877"
" 40          HYDROGRAPH   Confluence    12"
"            7   Confluence "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                  33.877    c.m/sec"
"             Hydrograph volume        351176.406    c.m"
"                  3.970    33.877     3.952     0.000"
" 52          CHANNEL DESIGN"
"       33.877   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.300   Gradient   %"
"             Depth of flow                  2.347    metre"
"             Velocity                       1.597    m/sec"
"             Channel capacity             215.995    c.m/sec"
"             Critical depth                 1.620    metre"
" 53          ROUTE    Channel Route 2500"
"      2500.00      Channel Route 2500 Reach length   ( metre)"
"        0.303   X-factor <= 0.5"
"      391.350   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                  33.438    c.m/sec"
"                  3.970    33.877    33.438     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1000"
"            6   Combine "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow                  33.438    c.m/sec"
"             Hydrograph volume        351176.469    c.m"
"                  3.970    33.877    33.438    33.438"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  3.970     0.000    33.438    33.438"
" 33          CATCHMENT 59"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           59   No description"
"        0.000   % Impervious"
"      128.000   Total Area"
"      170.000   Flow length"
"       18.000   Overland Slope"
"      128.000   Pervious Area"
"      170.000   Pervious length"
"       18.000   Pervious slope"
"        0.000   Impervious Area"
"      170.000   Impervious length"
"       18.000   Impervious slope"
"        0.350   Pervious Manning 'n'"
"       76.000   Pervious SCS Curve No."
"        0.334   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.021   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  5.037     0.000    33.438    33.438 c.m/sec"
"             Catchment 59           Pervious   Impervious Total Area "
"             Surface Area           128.000    0.000      128.000    hectare"
"             Time of concentration  38.873     4.097      38.873     minutes"
```

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"           Time to Centroid       277.849    207.770    277.849    minutes"
"           Rainfall depth         58.700     58.700     58.700     mm"
"           Rainfall volume        7.5136     0.0000     7.5136     ha-m"
"           Rainfall losses        39.083     6.349      39.083     mm"
"           Runoff depth           19.617     52.351     19.617     mm"
"           Runoff volume          2.5109     0.0000     2.5110     ha-m"
"           Runoff coefficient     0.334      0.000      0.334      "
"           Maximum flow           5.037      0.000      5.037      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                 5.037     5.037    33.438    33.438"
" 52        CHANNEL DESIGN"
"       5.037   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.300   Gradient   %"
"           Depth of flow                 1.015    metre"
"           Velocity                      0.983    m/sec"
"           Channel capacity            215.995    c.m/sec"
"           Critical depth                0.633    metre"
" 53        ROUTE    Channel Route 1500"
"     1500.00      Channel Route 1500 Reach length   ( metre)"
"       0.344   X-factor <= 0.5"
"     381.434   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"          3   No. of sub-reaches"
"           Peak outflow                  4.776    c.m/sec"
"                 5.037     5.037     4.776    33.438 c.m/sec"
" 40        HYDROGRAPH   Combine    1000"
"          6   Combine "
"       1000   Node #"
"              Node upstream of Penetangore Culvert"
"           Maximum flow                 35.159    c.m/sec"
"           Hydrograph volume        376286.094    c.m"
"                 5.037     5.037     4.776    35.159"
" 81        ADD COMMENT==================================================="
"        1  Lines of comment"
"           End of Penetangore Tributary"
" 81        ADD COMMENT==================================================="
"        1  Lines of comment"
"           Start of Area North of Holtby Drain"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                 5.037     0.000     4.776    35.159"
" 33        CATCHMENT 201"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        201   No description"
"       0.000   % Impervious"
"     166.000   Total Area"
"     250.000   Flow length"
"       3.000   Overland Slope"
"     166.000   Pervious Area"
"     250.000   Pervious length"
"       3.000   Pervious slope"
"       0.000   Impervious Area"
"     250.000   Impervious length"
"       3.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.441   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                 7.058     0.000     4.776    35.159 c.m/sec"
"           Catchment 201          Pervious   Impervious Total Area "
"           Surface Area           166.000    0.000      166.000    hectare"
"           Time of concentration  54.688     8.838      54.688     minutes"
"           Time to Centroid       292.169    213.640    292.169    minutes"
"           Rainfall depth         58.700     58.700     58.700     mm"
"           Rainfall volume        9.7442     0.0000     9.7442     ha-m"
"           Rainfall losses        32.785     5.456      32.785     mm"
"           Runoff depth           25.915     53.244     25.915     mm"
"           Runoff volume          4.3019     0.0000     4.3019     ha-m"
"           Runoff coefficient     0.441      0.000      0.441      "
"           Maximum flow           7.058      0.000      7.058      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                 7.058     7.058     4.776    35.159"
" 52        CHANNEL DESIGN"
"       7.058   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"           Depth of flow                 0.898    metre"
"           Velocity                      1.676    m/sec"
"           Channel capacity            394.351    c.m/sec"
"           Critical depth                0.754    metre"
" 53        ROUTE    Channel Route 1900"
"     1900.00      Channel Route 1900 Reach length   ( metre)"
"       0.467   X-factor <= 0.5"
"     283.487   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"          3   No. of sub-reaches"
"           Peak outflow                  7.014    c.m/sec"
"                 7.058     7.058     7.014    35.159 c.m/sec"
" 40        HYDROGRAPH Next link "
"          5   Next link "
"                 7.058     7.014     7.014    35.159"
" 33        CATCHMENT 202"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        202   No description"
"       0.000   % Impervious"
"       4.000   Total Area"
"     225.000   Flow length"
"       4.000   Overland Slope"
"       4.000   Pervious Area"
"     225.000   Pervious length"
"       4.000   Pervious slope"
"       0.000   Impervious Area"
"     225.000   Impervious length"
"       4.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.441   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                 0.189     7.014     7.014    35.159 c.m/sec"
"           Catchment 202          Pervious   Impervious Total Area "
"           Surface Area           4.000      0.000      4.000      hectare"
"           Time of concentration  47.093     7.611      47.093     minutes"
"           Time to Centroid       282.996    212.199    282.996    minutes"
"           Rainfall depth         58.700     58.700     58.700     mm"
"           Rainfall volume        2348.00    0.00       2348.00    c.m"
"           Rainfall losses        32.788     5.490      32.788     mm"
"           Runoff depth           25.912     53.210     25.912     mm"
"           Runoff volume          1036.47    0.00       1036.47    c.m"
"           Runoff coefficient     0.441      0.000      0.441      "
"           Maximum flow           0.189      0.000      0.189      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                 0.189     7.157     7.014    35.159"
" 52        CHANNEL DESIGN"
"       7.157   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"           Depth of flow                 0.903    metre"
"           Velocity                      1.682    m/sec"
"           Channel capacity            394.351    c.m/sec"
"           Critical depth                0.759    metre"
" 53        ROUTE    Channel Route 200"
"      200.00      Channel Route 200 Reach length   ( metre)"
"       0.394   X-factor <= 0.5"
"      89.197   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                  7.140    c.m/sec"
"                 0.189     7.157     7.140    35.159 c.m/sec"
" 40        HYDROGRAPH Next link "
"          5   Next link "
"                 0.189     7.140     7.140    35.159"
" 33        CATCHMENT 203"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        203   No description"
"       0.000   % Impervious"
"       9.100   Total Area"
"     450.000   Flow length"
"       3.500   Overland Slope"
"       9.100   Pervious Area"
"     450.000   Pervious length"
"       3.500   Pervious slope"
"       0.000   Impervious Area"
"     450.000   Impervious length"
"       3.500   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.442   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                 0.304     7.140     7.140    35.159 c.m/sec"
"           Catchment 203          Pervious   Impervious Total Area "
"           Surface Area           9.100      0.000      9.100      hectare"
"           Time of concentration  74.297     12.008     74.297     minutes"
"           Time to Centroid       315.860    217.435    315.860    minutes"
"           Rainfall depth         58.700     58.700     58.700     mm"
"           Rainfall volume        5341.69    0.01       5341.70    c.m"
"           Rainfall losses        32.782     5.349      32.782     mm"
"           Runoff depth           25.918     53.351     25.918     mm"
"           Runoff volume          2358.50    0.00       2358.50    c.m"
"           Runoff coefficient     0.442      0.000      0.442      "
"           Maximum flow           0.304      0.000      0.304      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                 0.304     7.444     7.140    35.159"
" 52        CHANNEL DESIGN"
"       7.444   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"           Depth of flow                 0.920    metre"
"           Velocity                      1.699    m/sec"
"           Channel capacity            394.351    c.m/sec"
"           Critical depth                0.774    metre"
" 53        ROUTE    Channel Route 350"
"      350.00      Channel Route 350 Reach length   ( metre)"
"       0.438   X-factor <= 0.5"
"     154.502   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                  7.356    c.m/sec"
"                 0.304     7.444     7.356    35.159 c.m/sec"
" 40        HYDROGRAPH   Combine    1100"
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"            6   Combine "
"         1100   Node #"
"                Node taking 200 series - Bottom end of Holtby Drain"
"             Maximum flow                 7.356    c.m/sec"
"             Hydrograph volume         46414.406    c.m"
"                     0.304     7.444     7.356     7.356"
" 81          ADD COMMENT=================================================="
"          1  Lines of comment"
"             End of Area North of Holtby Drain"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.304     0.000     7.356     7.356"
" 81          ADD COMMENT=================================================="
"          1  Lines of comment"
"             Start of Holtby Drain"
" 33          CATCHMENT 100"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          100   No description"
"        0.000   % Impervious"
"       45.000   Total Area"
"      100.000   Flow length"
"        7.000   Overland Slope"
"       45.000   Pervious Area"
"      100.000   Pervious length"
"        7.000   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        7.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.441   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     3.058     0.000     7.356     7.356 c.m/sec"
"             Catchment 100          Pervious   Impervious Total Area "
"             Surface Area           45.000     0.000      45.000     hectare"
"             Time of concentration  24.476     3.956      24.476     minutes"
"             Time to Centroid       255.680    207.565    255.680    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        2.6415     0.0000     2.6415     ha-m"
"             Rainfall losses        32.802     6.485      32.802     mm"
"             Runoff depth           25.898     52.215     25.898     mm"
"             Runoff volume          1.1654     0.0000     1.1654     ha-m"
"             Runoff coefficient     0.441      0.000      0.441      "
"             Maximum flow           3.058      0.000      3.058      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     3.058     3.058     7.356     7.356"
" 52          CHANNEL DESIGN"
"        3.058   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"             Depth of flow                 0.600    metre"
"             Velocity                      1.342    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                0.484    metre"
" 53          ROUTE    Channel Route 1500"
"      1500.00       Channel Route 1500 Reach length   ( metre)"
"        0.470   X-factor <= 0.5"
"      279.420   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                  3.022    c.m/sec"
"                     3.058     3.058     3.022     7.356 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     3.058     3.022     3.022     7.356"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   No description"
"        0.000   % Impervious"
"       11.200   Total Area"
"       50.000   Flow length"
"        7.000   Overland Slope"
"       11.200   Pervious Area"
"       50.000   Pervious length"
"        7.000   Pervious slope"
"        0.000   Impervious Area"
"       50.000   Impervious length"
"        7.000   Impervious slope"
"        0.280   Pervious Manning 'n'"
"       80.000   Pervious SCS Curve No."
"        0.403   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.350   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.751     3.022     3.022     7.356 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           11.200     0.000      11.200     hectare"
"             Time of concentration  20.355     2.610      20.355     minutes"
"             Time to Centroid       252.367    206.029    252.367    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        6574.39    0.01       6574.40    c.m"
"             Rainfall losses        35.069     6.188      35.069     mm"
"             Runoff depth           23.631     52.512     23.631     mm"
"             Runoff volume          2646.69    0.01       2646.70    c.m"
"             Runoff coefficient     0.403      0.000      0.403      "
"             Maximum flow           0.751      0.000      0.751      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.751     3.456     3.022     7.356"
" 52          CHANNEL DESIGN"
"        3.456   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"             Depth of flow                 0.637    metre"
"             Velocity                      1.387    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                0.518    metre"
" 53          ROUTE    Channel Route 700"
"       700.00       Channel Route 700 Reach length   ( metre)"
"        0.455   X-factor <= 0.5"
"      189.250   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                  3.428    c.m/sec"
"                     0.751     3.456     3.428     7.356 c.m/sec"
" 40          HYDROGRAPH   Combine    1200"
"            6   Combine "
"         1200   Node #"
"                Node taking 100 series for Holtby Drain"
"             Maximum flow                  3.428    c.m/sec"
"             Hydrograph volume         14300.893    c.m"
"                     0.751     3.456     3.428     3.428"
" 81          ADD COMMENT=================================================="
"          1  Lines of comment"
"             End of Holtby Drain"
" 40          HYDROGRAPH   Confluence    1200"
"            7   Confluence "
"         1200   Node #"
"                Node taking 100 series for Holtby Drain"
"             Maximum flow                  3.428    c.m/sec"
"             Hydrograph volume         14300.893    c.m"
"                     0.751     3.428     3.428     0.000"
" 52          CHANNEL DESIGN"
"        3.428   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 0.751    metre"
"             Velocity                      1.073    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.515    metre"
" 53          ROUTE    Channel Route 50"
"        50.00       Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       34.935   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.603   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  3.403    c.m/sec"
"                     0.751     3.428     3.403     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1300"
"            6   Combine "
"         1300   Node #"
"                Node at Holtby Drain"
"             Maximum flow                  3.403    c.m/sec"
"             Hydrograph volume         14300.893    c.m"
"                     0.751     3.428     3.403     3.403"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.751     0.000     3.403     3.403"
" 33          CATCHMENT 604"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          604   No description"
"        0.000   % Impervious"
"        2.700   Total Area"
"      100.000   Flow length"
"        2.500   Overland Slope"
"        2.700   Pervious Area"
"      100.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        2.500   Impervious slope"
"        0.300   Pervious Manning 'n'"
"       83.000   Pervious SCS Curve No."
"        0.462   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.202   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.145     0.000     3.403     3.403 c.m/sec"
"             Catchment 604          Pervious   Impervious Total Area "
"             Surface Area           2.700      0.000      2.700      hectare"
"             Time of concentration  41.904     5.387      41.904     minutes"
"             Time to Centroid       275.864    209.467    275.864    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        1584.90    0.00       1584.90    c.m"
"             Rainfall losses        31.585     5.391      31.585     mm"
"             Runoff depth           27.115     53.309     27.115     mm"
"             Runoff volume          732.09     0.00       732.10     c.m"
"             Runoff coefficient     0.462      0.000      0.462      "
"             Maximum flow           0.145      0.000      0.145      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.145     0.145     3.403     3.403"
" 52          CHANNEL DESIGN"
"        0.145   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                 0.094    metre"
"             Velocity                      0.673    m/sec"
"             Channel capacity            557.696    c.m/sec"
"             Critical depth                0.078    metre"
" 53          ROUTE    Channel Route 250"
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"       250.00      Channel Route 250 Reach length   ( metre)"
"        0.495   X-factor <= 0.5"
"      278.724   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                   0.144    c.m/sec"
"                     0.145     0.145     0.144     3.403 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.145     0.144     0.144     3.403"
" 33          CATCHMENT 605"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          605   No description"
"        0.000   % Impervious"
"        3.900   Total Area"
"      100.000   Flow length"
"        2.500   Overland Slope"
"        3.900   Pervious Area"
"      100.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        2.500   Impervious slope"
"        0.300   Pervious Manning 'n'"
"       83.000   Pervious SCS Curve No."
"        0.462   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.202   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.209     0.144     0.144     3.403 c.m/sec"
"             Catchment 605          Pervious   Impervious Total Area "
"             Surface Area           3.900      0.000      3.900      hectare"
"             Time of concentration  41.904     5.387      41.904     minutes"
"             Time to Centroid       275.864    209.467    275.863    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        2289.30    0.00       2289.30    c.m"
"             Rainfall losses        31.585     5.391      31.585     mm"
"             Runoff depth           27.115     53.309     27.115     mm"
"             Runoff volume          1057.47    0.00       1057.47    c.m"
"             Runoff coefficient     0.462      0.000      0.462      "
"             Maximum flow           0.209      0.000      0.209      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.209     0.349     0.144     3.403"
" 52          CHANNEL DESIGN"
"        0.349   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                  0.156    metre"
"             Velocity                       0.904    m/sec"
"             Channel capacity             557.696    c.m/sec"
"             Critical depth                 0.136    metre"
" 53          ROUTE    Channel Route 200"
"       200.00      Channel Route 200 Reach length   ( metre)"
"        0.489   X-factor <= 0.5"
"      166.002   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                   0.348    c.m/sec"
"                     0.209     0.349     0.348     3.403 c.m/sec"
" 40          HYDROGRAPH   Combine    4000"
"            6   Combine "
"         4000   Node #"
"                 "
"             Maximum flow                   0.348    c.m/sec"
"             Hydrograph volume          1789.568    c.m"
"                     0.209     0.349     0.348     0.348"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.209     0.000     0.348     0.348"
" 33          CATCHMENT 603"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          603   No description"
"        0.000   % Impervious"
"        5.600   Total Area"
"      100.000   Flow length"
"        2.500   Overland Slope"
"        5.600   Pervious Area"
"      100.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        2.500   Impervious slope"
"        0.300   Pervious Manning 'n'"
"       83.000   Pervious SCS Curve No."
"        0.462   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.202   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.300     0.000     0.348     0.348 c.m/sec"
"             Catchment 603          Pervious   Impervious Total Area "
"             Surface Area           5.600      0.000      5.600      hectare"
"             Time of concentration  41.904     5.387      41.904     minutes"
"             Time to Centroid       275.863    209.467    275.863    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        3287.20    0.00       3287.20    c.m"
"             Rainfall losses        31.585     5.391      31.585     mm"
"             Runoff depth           27.115     53.309     27.115     mm"
"             Runoff volume          1518.42    0.00       1518.42    c.m"
"             Runoff coefficient     0.462      0.000      0.462      "
"             Maximum flow           0.300      0.000      0.300      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.300     0.300     0.348     0.348"
" 52          CHANNEL DESIGN"
"        0.300   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                  0.144    metre"
"             Velocity                       0.860    m/sec"
"             Channel capacity             557.696    c.m/sec"
"             Critical depth                 0.124    metre"
" 53          ROUTE    Channel Route 225"
"       225.00      Channel Route 225 Reach length   ( metre)"
"        0.491   X-factor <= 0.5"
"      196.220   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                   0.298    c.m/sec"
"                     0.300     0.300     0.298     0.348 c.m/sec"
" 40          HYDROGRAPH   Combine    4000"
"            6   Combine "
"         4000   Node #"
"                 "
"             Maximum flow                   0.646    c.m/sec"
"             Hydrograph volume          3307.991    c.m"
"                     0.300     0.300     0.298     0.646"
" 40          HYDROGRAPH   Confluence    4000"
"            7   Confluence "
"         4000   Node #"
"                 "
"             Maximum flow                   0.646    c.m/sec"
"             Hydrograph volume          3307.991    c.m"
"                     0.300     0.646     0.298     0.000"
" 52          CHANNEL DESIGN"
"        0.646   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                  0.322    metre"
"             Velocity                       0.676    m/sec"
"             Channel capacity             278.848    c.m/sec"
"             Critical depth                 0.198    metre"
" 53          ROUTE    Channel Route 500"
"       500.00      Channel Route 500 Reach length   ( metre)"
"        0.431   X-factor <= 0.5"
"      277.247   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                   0.641    c.m/sec"
"                     0.300     0.646     0.641     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                 Flow in Hwy. 21 Ditch"
"             Maximum flow                   0.641    c.m/sec"
"             Hydrograph volume          3307.989    c.m"
"                     0.300     0.646     0.641     0.641"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.300     0.000     0.641     0.641"
" 33          CATCHMENT 405"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          405   No description"
"       75.000   % Impervious"
"        3.200   Total Area"
"       75.000   Flow length"
"        2.000   Overland Slope"
"        0.800   Pervious Area"
"       75.000   Pervious length"
"        2.000   Pervious slope"
"        2.400   Impervious Area"
"       75.000   Impervious length"
"        2.000   Impervious slope"
"        0.300   Pervious Manning 'n'"
"       83.000   Pervious SCS Curve No."
"        0.462   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.202   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.906   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.329     0.000     0.641     0.641 c.m/sec"
"             Catchment 405          Pervious   Impervious Total Area "
"             Surface Area           0.800      2.400      3.200      hectare"
"             Time of concentration  37.702     4.847      9.617      minutes"
"             Time to Centroid       270.785    208.951    217.929    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        469.60     1408.80    1878.40    c.m"
"             Rainfall losses        31.589     5.497      12.020     mm"
"             Runoff depth           27.111     53.203     46.680     mm"
"             Runoff volume          216.89     1276.87    1493.76    c.m"
"             Runoff coefficient     0.462      0.906      0.795      "
"             Maximum flow           0.046      0.300      0.329      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.329     0.329     0.641     0.641"
" 52          CHANNEL DESIGN"
"        0.329   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                  0.063    metre"
"             Velocity                       0.941    m/sec"
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"              Channel capacity              7.740    c.m/sec"
"              Critical depth                0.075    metre"
" 53           ROUTE    Channel Route 150"
"        150.00      Channel Route 150 Reach length   ( metre)"
"         0.494   X-factor <= 0.5"
"       119.556   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       100.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.325    c.m/sec"
"                      0.329     0.329     0.325     0.641 c.m/sec"
" 40           HYDROGRAPH   Combine    4100"
"             6   Combine "
"          4100   Node #"
"                 "
"              Maximum flow                  0.325    c.m/sec"
"              Hydrograph volume          1493.758    c.m"
"                      0.329     0.329     0.325     0.325"
" 40           HYDROGRAPH   Confluence    4100"
"             7   Confluence "
"          4100   Node #"
"                 "
"              Maximum flow                  0.325    c.m/sec"
"              Hydrograph volume          1493.758    c.m"
"                      0.329     0.325     0.325     0.000"
" 52           CHANNEL DESIGN"
"         0.325   Current peak flow    c.m/sec"
"         0.020   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         4.000   Basewidth    metre"
"        50.000   Left bank slope"
"         0.000   Right bank slope"
"         0.300   Channel depth    metre"
"         2.000   Gradient   %"
"              Depth of flow                 0.062    metre"
"              Velocity                      0.937    m/sec"
"              Channel capacity              7.740    c.m/sec"
"              Critical depth                0.074    metre"
" 53           ROUTE    Channel Route 100"
"        100.00      Channel Route 100 Reach length   ( metre)"
"         0.492   X-factor <= 0.5"
"        80.000   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"        75.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.323    c.m/sec"
"                      0.329     0.325     0.323     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    4200"
"             6   Combine "
"          4200   Node #"
"                 "
"              Maximum flow                  0.323    c.m/sec"
"              Hydrograph volume          1493.758    c.m"
"                      0.329     0.325     0.323     0.323"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                      0.329     0.000     0.323     0.323"
" 33           CATCHMENT 406"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           406   No description"
"        85.000   % Impervious"
"         1.300   Total Area"
"        10.000   Flow length"
"         2.000   Overland Slope"
"         0.195   Pervious Area"
"        10.000   Pervious length"
"         2.000   Pervious slope"
"         1.105   Impervious Area"
"        10.000   Impervious length"
"         2.000   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.439   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.890   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.150     0.000     0.323     0.323 c.m/sec"
"              Catchment 406          Pervious   Impervious Total Area "
"              Surface Area           0.195      1.105      1.300      hectare"
"              Time of concentration  8.953      1.447      2.049      minutes"
"              Time to Centroid       236.991    204.102    206.739    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        114.46     648.64     763.10     c.m"
"              Rainfall losses        32.902     6.474      10.438     mm"
"              Runoff depth           25.798     52.226     48.262     mm"
"              Runoff volume          50.31      577.10     627.41     c.m"
"              Runoff coefficient     0.439      0.890      0.822      "
"              Maximum flow           0.015      0.136      0.150      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.150     0.150     0.323     0.323"
" 52           CHANNEL DESIGN"
"         0.150   Current peak flow    c.m/sec"
"         0.020   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         4.000   Basewidth    metre"
"        50.000   Left bank slope"
"         0.000   Right bank slope"
"         0.300   Channel depth    metre"
"         2.000   Gradient   %"
"              Depth of flow                 0.041    metre"
"              Velocity                      0.736    m/sec"
"              Channel capacity              7.740    c.m/sec"
"              Critical depth                0.047    metre"
" 53           ROUTE    Channel Route 50"
"         50.00      Channel Route 50 Reach length   ( metre)"
"         0.489   X-factor <= 0.5"
"        50.965   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"        50.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.150    c.m/sec"
"                      0.150     0.150     0.150     0.323 c.m/sec"
" 40           HYDROGRAPH   Combine    4200"
"             6   Combine "
"          4200   Node #"
"                 "
"              Maximum flow                  0.473    c.m/sec"
"              Hydrograph volume          2121.165    c.m"
"                      0.150     0.150     0.150     0.473"
" 40           HYDROGRAPH   Confluence    4200"
"             7   Confluence "
"          4200   Node #"
"                 "
"              Maximum flow                  0.473    c.m/sec"
"              Hydrograph volume          2121.165    c.m"
"                      0.150     0.473     0.150     0.000"
" 52           CHANNEL DESIGN"
"         0.473   Current peak flow    c.m/sec"
"         0.020   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         4.000   Basewidth    metre"
"        50.000   Left bank slope"
"         0.000   Right bank slope"
"         0.300   Channel depth    metre"
"         2.000   Gradient   %"
"              Depth of flow                 0.076    metre"
"              Velocity                      1.049    m/sec"
"              Channel capacity              7.740    c.m/sec"
"              Critical depth                0.092    metre"
" 53           ROUTE    Channel Route 150"
"        150.00      Channel Route 150 Reach length   ( metre)"
"         0.493   X-factor <= 0.5"
"       107.257   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       100.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.470    c.m/sec"
"                      0.150     0.473     0.470     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    4300"
"             6   Combine "
"          4300   Node #"
"                 Node Upstream of CTC Pond"
"              Maximum flow                  0.470    c.m/sec"
"              Hydrograph volume          2121.166    c.m"
"                      0.150     0.473     0.470     0.470"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                      0.150     0.000     0.470     0.470"
" 33           CATCHMENT 500"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           500   No description"
"        70.000   % Impervious"
"         5.800   Total Area"
"       100.000   Flow length"
"         2.000   Overland Slope"
"         1.740   Pervious Area"
"       100.000   Pervious length"
"         2.000   Pervious slope"
"         4.060   Impervious Area"
"       100.000   Impervious length"
"         2.000   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        81.000   Pervious SCS Curve No."
"         0.422   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.958   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.905   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.564     0.000     0.470     0.470 c.m/sec"
"              Catchment 500          Pervious   Impervious Total Area "
"              Surface Area           1.740      4.060      5.800      hectare"
"              Time of concentration  36.169     5.760      10.822     minutes"
"              Time to Centroid       270.646    209.866    219.983    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        1021.38    2383.22    3404.60    c.m"
"              Rainfall losses        33.946     5.576      14.087     mm"
"              Runoff depth           24.754     53.124     44.613     mm"
"              Runoff volume          430.72     2156.83    2587.54    c.m"
"              Runoff coefficient     0.422      0.905      0.760      "
"              Maximum flow           0.092      0.520      0.564      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.564     0.564     0.470     0.470"
" 52           CHANNEL DESIGN"
"         0.564   Current peak flow    c.m/sec"
"         0.020   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         4.000   Basewidth    metre"
"        50.000   Left bank slope"
"         0.000   Right bank slope"
"         0.300   Channel depth    metre"
"         2.000   Gradient   %"
"              Depth of flow                 0.084    metre"
"              Velocity                      1.104    m/sec"
"              Channel capacity              7.740    c.m/sec"
"              Critical depth                0.102    metre"
" 53           ROUTE    Channel Route 150"
"        150.00      Channel Route 150 Reach length   ( metre)"
"         0.493   X-factor <= 0.5"
"       101.869   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       100.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.558    c.m/sec"
"                      0.564     0.564     0.558     0.470 c.m/sec"
" 40           HYDROGRAPH   Combine    4300"
"             6   Combine "
"          4300   Node #"
"                 Node Upstream of CTC Pond"
"              Maximum flow                  1.027    c.m/sec"
"              Hydrograph volume          4708.711    c.m"
"                      0.564     0.564     0.558     1.027"
" 40           HYDROGRAPH   Confluence    4300"
"             7   Confluence "
"          4300   Node #"
"                 Node Upstream of CTC Pond"
"              Maximum flow                  1.027    c.m/sec"
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"            Hydrograph volume         4708.711    c.m"
"                  0.564     1.027     0.558     0.000"
" 52         CHANNEL DESIGN"
"       1.027   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient    %"
"            Depth of flow                  0.114    metre"
"            Velocity                       1.310    m/sec"
"            Channel capacity               7.740    c.m/sec"
"            Critical depth                 0.141    metre"
" 53         ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"       0.471   X-factor <= 0.5"
"      28.626   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      30.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                   1.025    c.m/sec"
"                  0.564     1.027     1.025     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.564     1.025     1.025     0.000"
" 81         ADD COMMENT=================================================="
"         1  Lines of comment"
"            EXISTING POND - DRY POND - CTC SITE"
" 54         POND DESIGN"
"       1.025   Current peak flow    c.m/sec"
"       0.635   Target outflow    c.m/sec"
"      4708.7   Hydrograph volume    c.m"
"         15.   Number of stages"
"       0.000   Minimum water level    metre"
"       1.400   Maximum water level    metre"
"       0.000   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"                 0.000     0.000     0.000"
"                0.1000   0.00276   124.985"
"                0.2000   0.00477   256.026"
"                0.3000   0.00616   393.250"
"                0.4000   0.00729   536.786"
"                0.5000   0.00827   686.761"
"                0.6000   0.00914   843.304"
"                0.7000   0.00994  1006.543"
"                0.8000   0.01068  1176.605"
"                0.9000    0.2200  1353.618"
"                 1.000    0.6243  1537.711"
"                 1.100     1.178  1729.012"
"                 1.200     1.871  1927.648"
"                 1.300     2.698  2133.748"
"                 1.400     3.658  2347.440"
"          1.   WEIRS"
"                 Crest      Weir     Crest      Left     Right"
"             elevation coefficie   breadth sideslope sideslope"
"                 0.800     0.980     3.800     2.000     2.000"
"          1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                 0.000     0.630    0.0750     1.000"
"          2.   LAYERS"
"                Bottom    Aspect    Bottom       Top   Average"
"                  area     ratio elevation elevation sideslope"
"              1220.000     2.000     0.000     1.400     4.000"
"              2175.299     1.688     1.400     1.400     4.000"
"            Peak outflow                   0.956    c.m/sec"
"            Maximum level                  1.060    metre"
"            Maximum storage             1652.806    c.m"
"            Centroidal lag                10.237    hours"
"                 0.564     1.025     0.956     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.564     0.956     0.956     0.000"
" 52         CHANNEL DESIGN"
"       0.956   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient    %"
"            Depth of flow                  0.396    metre"
"            Velocity                       0.757    m/sec"
"            Channel capacity             278.848    c.m/sec"
"            Critical depth                 0.250    metre"
" 53         ROUTE    Channel Route 220"
"      220.00      Channel Route 220 Reach length   ( metre)"
"       0.406   X-factor <= 0.5"
"     217.931   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                   0.934    c.m/sec"
"                  0.564     0.956     0.934     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    2000"
"           6   Combine "
"        2000   Node #"
"               Flow in Hwy. 21 Ditch"
"            Maximum flow                   1.217    c.m/sec"
"            Hydrograph volume           7538.245    c.m"
"                  0.564     0.956     0.934     1.217"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.564     0.000     0.934     1.217"
" 33         CATCHMENT 750"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         750   No description"
"     100.000   % Impervious"
"       0.500   Total Area"
"      50.000   Flow length"
"       2.000   Overland Slope"
"       0.000   Pervious Area"
"      50.000   Pervious length"
"       2.000   Pervious slope"
"       0.500   Impervious Area"
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"      50.000   Impervious length"
"       2.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      81.000   Pervious SCS Curve No."
"       0.000   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.958   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.887   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.062     0.000     0.934     1.217 c.m/sec"
"            Catchment 750          Pervious   Impervious Total Area "
"            Surface Area           0.000      0.500      0.500      hectare"
"            Time of concentration  23.863     3.800      3.800      minutes"
"            Time to Centroid       255.789    207.443    207.443    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        0.00       293.50     293.50     c.m"
"            Rainfall losses        33.956     6.612      6.612      mm"
"            Runoff depth           24.744     52.088     52.088     mm"
"            Runoff volume          0.00       260.44     260.44     c.m"
"            Runoff coefficient     0.000      0.887      0.887      "
"            Maximum flow           0.000      0.062      0.062      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.062     0.062     0.934     1.217"
" 81         ADD COMMENT=================================================="
"         1  Lines of comment"
"            EXISTING POND - ROOFTOP STORAGE - CTC SITE"
" 54         POND DESIGN"
"       0.062   Current peak flow    c.m/sec"
"       0.020   Target outflow    c.m/sec"
"       260.4   Hydrograph volume    c.m"
"          9.   Number of stages"
"       0.000   Minimum water level    metre"
"       0.200   Maximum water level    metre"
"       0.000   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"                 0.000     0.000     0.000"
"               0.02500   0.00112    72.969"
"               0.05000   0.00386   146.876"
"               0.07500   0.01047   221.724"
"                0.1000   0.01422   297.514"
"                0.1250   0.01716   374.249"
"                0.1500   0.01967   451.931"
"                0.1750   0.02190   530.562"
"                0.2000   0.02391   610.142"
"          1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                 0.000     0.630    0.0680     6.000"
"          2.   LAYERS"
"                Bottom    Aspect    Bottom       Top   Average"
"                  area     ratio elevation elevation sideslope"
"              2900.000    10.000     0.000     0.200     4.000"
"              3085.338     1.960     0.200     0.200     4.000"
"            Peak outflow                   0.008    c.m/sec"
"            Maximum level                  0.065    metre"
"            Maximum storage              191.788    c.m"
"            Centroidal lag                14.796    hours"
"                 0.062     0.062     0.008     1.217 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.062     0.008     0.008     1.217"
" 52         CHANNEL DESIGN"
"       0.008   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient    %"
"            Depth of flow                  0.026    metre"
"            Velocity                       0.150    m/sec"
"            Channel capacity             278.848    c.m/sec"
"            Critical depth                 0.012    metre"
" 53         ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"       0.469   X-factor <= 0.5"
"     250.222   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                   0.008    c.m/sec"
"                  0.062     0.008     0.008     1.217 c.m/sec"
" 40         HYDROGRAPH   Combine    2000"
"           6   Combine "
"        2000   Node #"
"               Flow in Hwy. 21 Ditch"
"            Maximum flow                   1.223    c.m/sec"
"            Hydrograph volume           7762.368    c.m"
"                  0.062     0.008     0.008     1.223"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.062     0.000     0.008     1.223"
" 33         CATCHMENT 751"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         751   No description"
"     100.000   % Impervious"
"       0.200   Total Area"
"      50.000   Flow length"
"       2.000   Overland Slope"
"       0.000   Pervious Area"
"      50.000   Pervious length"
"       2.000   Pervious slope"
"       0.200   Impervious Area"
"      50.000   Impervious length"
"       2.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      81.000   Pervious SCS Curve No."
"       0.000   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.958   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.887   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.025     0.000     0.008     1.223 c.m/sec"
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"            Catchment 751          Pervious   Impervious Total Area "
"            Surface Area           0.000      0.200      0.200      hectare"
"            Time of concentration  23.863     3.800      3.800      minutes"
"            Time to Centroid       255.790    207.443    207.443    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        0.00       117.40     117.40     c.m"
"            Rainfall losses        33.956     6.612      6.612      mm"
"            Runoff depth           24.744     52.088     52.088     mm"
"            Runoff volume          0.00       104.18     104.18     c.m"
"            Runoff coefficient     0.000      0.887      0.887      "
"            Maximum flow           0.000      0.025      0.025      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.025     0.025     0.008     1.223"
" 81         ADD COMMENT==================================================="
"         1  Lines of comment"
"            EXISTING POND - PARKING LOT STORAGE - CTC SITE"
" 54         POND DESIGN"
"       0.025   Current peak flow    c.m/sec"
"       0.020   Target outflow    c.m/sec"
"       104.2   Hydrograph volume    c.m"
"          5.   Number of stages"
"       0.000   Minimum water level    metre"
"       0.700   Maximum water level    metre"
"       0.000   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"                 0.000     0.000     0.000"
"                0.1750   0.01148    16.645"
"                0.3500   0.03242    39.036"
"                0.5250   0.04289    67.860"
"                0.7000   0.05126   103.803"
"          1.   ORIFICES"
"               Orifice   Orifice   Orifice Number of"
"                invert coefficie  diameter  orifices"
"                 0.000     0.630    0.1750     1.000"
"          1.   LAYERS"
"                Bottom    Aspect    Bottom       Top   Average"
"                  area     ratio elevation elevation sideslope"
"                80.000     3.000     0.000     0.700     4.000"
"            Peak outflow                 0.019    c.m/sec"
"            Maximum level                0.243    metre"
"            Maximum storage             25.361    c.m"
"            Centroidal lag               3.848   hours"
"                 0.025     0.025     0.019     1.223 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.025     0.019     0.019     1.223"
" 52         CHANNEL DESIGN"
"       0.019   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"            Depth of flow                0.043    metre"
"            Velocity                     0.208    m/sec"
"            Channel capacity           278.848    c.m/sec"
"            Critical depth               0.021    metre"
" 53         ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"       0.449   X-factor <= 0.5"
"     180.560   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 0.019    c.m/sec"
"                  0.025     0.019     0.019     1.223 c.m/sec"
" 40         HYDROGRAPH   Combine    2000"
"           6   Combine "
"        2000   Node #"
"               Flow in Hwy. 21 Ditch"
"            Maximum flow                 1.241    c.m/sec"
"            Hydrograph volume         7866.554    c.m"
"                  0.025     0.019     0.019     1.241"
" 81         ADD COMMENT==================================================="
"         1  Lines of comment"
"            Total discharge to Hwy. 21 Ditch"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.025     0.000     0.019     1.241"
" 33         CATCHMENT 301"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         301   No description"
"       0.000   % Impervious"
"      16.400   Total Area"
"      95.000   Flow length"
"       2.500   Overland Slope"
"      16.400   Pervious Area"
"      95.000   Pervious length"
"       2.500   Pervious slope"
"       0.000   Impervious Area"
"      95.000   Impervious length"
"       2.500   Impervious slope"
"       0.230   Pervious Manning 'n'"
"      81.000   Pervious SCS Curve No."
"       0.422   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.958   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.877     0.000     0.019     1.241 c.m/sec"
"            Catchment 301          Pervious   Impervious Total Area "
"            Surface Area           16.400     0.000      16.400     hectare"
"            Time of concentration  35.671     5.224      35.671     minutes"
"            Time to Centroid       270.049    209.250    270.048    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        9626.79    0.01       9626.80    c.m"
"            Rainfall losses        33.943     5.395      33.943     mm"
"            Runoff depth           24.757     53.305     24.757     mm"
"            Runoff volume          4060.16    0.01       4060.17    c.m"
"            Runoff coefficient     0.422      0.000      0.422      "
"            Maximum flow           0.877      0.000      0.877      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.877     0.877     0.019     1.241"
" 52         CHANNEL DESIGN"
"       0.877   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.200   Gradient   %"
"            Depth of flow                0.300    metre"
"            Velocity                     1.008    m/sec"
"            Channel capacity           431.989    c.m/sec"
"            Critical depth               0.238    metre"
" 53         ROUTE    Channel Route 600"
"      600.00      Channel Route 600 Reach length   ( metre)"
"       0.478   X-factor <= 0.5"
"     223.247   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                 0.877    c.m/sec"
"                  0.877     0.877     0.877     1.241 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.877     0.877     0.877     1.241"
" 33         CATCHMENT 401"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         401   No description"
"       0.000   % Impervious"
"       5.600   Total Area"
"     340.000   Flow length"
"       3.500   Overland Slope"
"       5.600   Pervious Area"
"     340.000   Pervious length"
"       3.500   Pervious slope"
"       0.000   Impervious Area"
"     340.000   Impervious length"
"       3.500   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.462   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.188     0.877     0.877     1.241 c.m/sec"
"            Catchment 401          Pervious   Impervious Total Area "
"            Surface Area           5.600      0.000      5.600      hectare"
"            Time of concentration  78.942     10.149     78.942     minutes"
"            Time to Centroid       320.625    215.162    320.625    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        3287.20    0.00       3287.20    c.m"
"            Rainfall losses        31.581     5.631      31.581     mm"
"            Runoff depth           27.119     53.069     27.119     mm"
"            Runoff volume          1518.68    0.00       1518.68    c.m"
"            Runoff coefficient     0.462      0.000      0.462      "
"            Maximum flow           0.188      0.000      0.188      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.188     1.017     0.877     1.241"
" 52         CHANNEL DESIGN"
"       1.017   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.200   Gradient   %"
"            Depth of flow                0.325    metre"
"            Velocity                     1.053    m/sec"
"            Channel capacity           431.989    c.m/sec"
"            Critical depth               0.260    metre"
" 53         ROUTE    Channel Route 150"
"      150.00      Channel Route 150 Reach length   ( metre)"
"       0.452   X-factor <= 0.5"
"     106.874   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 1.004    c.m/sec"
"                  0.188     1.017     1.004     1.241 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.188     1.004     1.004     1.241"
" 33         CATCHMENT 402"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         402   No description"
"      50.000   % Impervious"
"       7.400   Total Area"
"     100.000   Flow length"
"       2.000   Overland Slope"
"       3.700   Pervious Area"
"     100.000   Pervious length"
"       2.000   Pervious slope"
"       3.700   Impervious Area"
"     100.000   Impervious length"
"       2.000   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.462   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.905   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.558     1.004     1.004     1.241 c.m/sec"
"            Catchment 402          Pervious   Impervious Total Area "
"            Surface Area           3.700      3.700      7.400      hectare"
"            Time of concentration  44.806     5.760      18.954     minutes"
"            Time to Centroid       279.367    209.866    233.351    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        2171.90    2171.90    4343.80    c.m"
```

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"            Rainfall losses        31.587     5.576      18.581     mm"
"            Runoff depth           27.113     53.124     40.119     mm"
"            Runoff volume          1003.20    1965.58    2968.78    c.m"
"            Runoff coefficient     0.462      0.905      0.683      "
"            Maximum flow           0.189      0.474      0.558      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.558     1.322     1.004     1.241"
" 52         CHANNEL DESIGN"
"       1.322   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"            Depth of flow                 0.130    metre"
"            Velocity                      1.405    m/sec"
"            Channel capacity              7.740    c.m/sec"
"            Critical depth                0.161    metre"
" 53         ROUTE    Channel Route 200"
"      200.00       Channel Route 200 Reach length   ( metre)"
"       0.492   X-factor <= 0.5"
"     106.762   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  1.315    c.m/sec"
"                    0.558     1.322     1.315     1.241 c.m/sec"
" 40         HYDROGRAPH   Combine    6000"
"           6   Combine "
"        6000   Node #"
"               "
"            Maximum flow                  1.315    c.m/sec"
"            Hydrograph volume          8547.629    c.m"
"                    0.558     1.322     1.315     1.315"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.558     0.000     1.315     1.315"
" 33         CATCHMENT 501"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         501   No description"
"       0.000   % Impervious"
"       2.500   Total Area"
"      80.000   Flow length"
"       3.500   Overland Slope"
"       2.500   Pervious Area"
"      80.000   Pervious length"
"       3.500   Pervious slope"
"       0.000   Impervious Area"
"      80.000   Impervious length"
"       3.500   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.462   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.153     0.000     1.315     1.315 c.m/sec"
"            Catchment 501          Pervious   Impervious Total Area "
"            Surface Area           2.500      0.000      2.500      hectare"
"            Time of concentration  33.134     4.260      33.134     minutes"
"            Time to Centroid       265.254    208.101    265.254    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        1467.50    0.00       1467.50    c.m"
"            Rainfall losses        31.591     6.131      31.591     mm"
"            Runoff depth           27.109     52.569     27.109     mm"
"            Runoff volume          677.72     0.00       677.72     c.m"
"            Runoff coefficient     0.462      0.000      0.462      "
"            Maximum flow           0.153      0.000      0.153      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.153     0.153     1.315     1.315"
" 52         CHANNEL DESIGN"
"       0.153   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.200   Gradient   %"
"            Depth of flow                 0.113    metre"
"            Velocity                      0.579    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.081    metre"
" 53         ROUTE    Channel Route 100"
"      100.00       Channel Route 100 Reach length   ( metre)"
"       0.473   X-factor <= 0.5"
"     129.456   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  0.152    c.m/sec"
"                    0.153     0.153     0.152     1.315 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                    0.153     0.152     0.152     1.315"
" 33         CATCHMENT 403"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         403   No description"
"      75.000   % Impervious"
"       4.700   Total Area"
"      70.000   Flow length"
"       2.000   Overland Slope"
"       1.175   Pervious Area"
"      70.000   Pervious length"
"       2.000   Pervious slope"
"       3.525   Impervious Area"
"      70.000   Impervious length"
"       2.000   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.462   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.903   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.484     0.152     0.152     1.315 c.m/sec"
"            Catchment 403          Pervious   Impervious Total Area "
"            Surface Area           1.175      3.525      4.700      hectare"
"            Time of concentration  36.174     4.651      9.243      minutes"
"            Time to Centroid       268.934    208.713    217.487    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        689.72     2069.18    2758.90    c.m"
"            Rainfall losses        31.587     5.708      12.178     mm"
"            Runoff depth           27.113     52.992     46.522     mm"
"            Runoff volume          318.58     1867.98    2186.55    c.m"
"            Runoff coefficient     0.462      0.903      0.793      "
"            Maximum flow           0.069      0.439      0.484      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.484     0.581     0.152     1.315"
" 52         CHANNEL DESIGN"
"       0.581   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"            Depth of flow                 0.085    metre"
"            Velocity                      1.114    m/sec"
"            Channel capacity              7.740    c.m/sec"
"            Critical depth                0.103    metre"
" 53         ROUTE    Channel Route 300"
"      300.00       Channel Route 300 Reach length   ( metre)"
"       0.496   X-factor <= 0.5"
"     201.987   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  0.552    c.m/sec"
"                    0.484     0.581     0.552     1.315 c.m/sec"
" 40         HYDROGRAPH   Combine    6000"
"           6   Combine "
"        6000   Node #"
"               "
"            Maximum flow                  1.639    c.m/sec"
"            Hydrograph volume         11411.906    c.m"
"                    0.484     0.581     0.552     1.639"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.484     0.000     0.552     1.639"
" 33         CATCHMENT 404"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         404   No description"
"      75.000   % Impervious"
"       3.200   Total Area"
"      60.000   Flow length"
"       2.000   Overland Slope"
"       0.800   Pervious Area"
"      60.000   Pervious length"
"       2.000   Pervious slope"
"       2.400   Impervious Area"
"      60.000   Impervious length"
"       2.000   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.462   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.895   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.330     0.000     0.552     1.639 c.m/sec"
"            Catchment 404          Pervious   Impervious Total Area "
"            Surface Area           0.800      2.400      3.200      hectare"
"            Time of concentration  32.978     4.240      8.457      minutes"
"            Time to Centroid       265.070    208.062    216.427    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        469.60     1408.80    1878.40    c.m"
"            Rainfall losses        31.590     6.152      12.512     mm"
"            Runoff depth           27.110     52.548     46.188     mm"
"            Runoff volume          216.88     1261.15    1478.03    c.m"
"            Runoff coefficient     0.462      0.895      0.787      "
"            Maximum flow           0.049      0.295      0.330      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.330     0.330     0.552     1.639"
" 52         CHANNEL DESIGN"
"       0.330   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"            Depth of flow                 0.063    metre"
"            Velocity                      0.942    m/sec"
"            Channel capacity              7.740    c.m/sec"
"            Critical depth                0.075    metre"
" 53         ROUTE    Channel Route 100"
"      100.00       Channel Route 100 Reach length   ( metre)"
"       0.491   X-factor <= 0.5"
"      79.631   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  0.327    c.m/sec"
"                    0.330     0.330     0.327     1.639 c.m/sec"
" 40         HYDROGRAPH   Combine    6000"
"           6   Combine "
"        6000   Node #"
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"              "
"           Maximum flow                 1.766    c.m/sec"
"           Hydrograph volume        12889.928    c.m"
"                   0.330     0.330     0.327     1.766"
" 40        HYDROGRAPH   Confluence    6000"
"          7   Confluence "
"       6000   Node #"
"              "
"           Maximum flow                 1.766    c.m/sec"
"           Hydrograph volume        12889.927    c.m"
"                   0.330     1.766     0.327     0.000"
" 52        CHANNEL DESIGN"
"      1.766   Current peak flow    c.m/sec"
"      0.020   Manning 'n'"
"         0.   Cross-section type: 0=trapezoidal; 1=general"
"      4.000   Basewidth    metre"
"     50.000   Left bank slope"
"      0.000   Right bank slope"
"      0.300   Channel depth    metre"
"      2.000   Gradient   %"
"           Depth of flow                0.150    metre"
"           Velocity                     1.521    m/sec"
"           Channel capacity             7.740    c.m/sec"
"           Critical depth               0.187    metre"
" 53        ROUTE    Channel Route 200"
"     200.00      Channel Route 200 Reach length   ( metre)"
"      0.491   X-factor <= 0.5"
"     98.647   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"     30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"    100.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                 1.758    c.m/sec"
"                   0.330     1.766     1.758     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    6100"
"          6   Combine "
"       6100   Node #"
"              "
"           Maximum flow                 1.758    c.m/sec"
"           Hydrograph volume        12889.932    c.m"
"                   0.330     1.766     1.758     1.758"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                   0.330     0.000     1.758     1.758"
" 33        CATCHMENT 302"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        302   No description"
"     50.000   % Impervious"
"      6.000   Total Area"
"    100.000   Flow length"
"      2.000   Overland Slope"
"      3.000   Pervious Area"
"    100.000   Pervious length"
"      2.000   Pervious slope"
"      3.000   Impervious Area"
"    100.000   Impervious length"
"      2.000   Impervious slope"
"      0.280   Pervious Manning 'n'"
"     80.000   Pervious SCS Curve No."
"      0.403   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      6.350   Pervious Initial abstraction"
"      0.013   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.905   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                   0.437     0.000     1.758     1.758 c.m/sec"
"           Catchment 302          Pervious   Impervious Total Area "
"           Surface Area           3.000      3.000      6.000      hectare"
"           Time of concentration  44.926     5.760      17.825     minutes"
"           Time to Centroid       282.036    209.866    232.097    minutes"
"           Rainfall depth         58.700     58.700     58.700     mm"
"           Rainfall volume        1761.00    1761.00    3522.00    c.m"
"           Rainfall losses        35.051     5.576      20.314     mm"
"           Runoff depth           23.649     53.124     38.386     mm"
"           Runoff volume          709.46     1593.72    2303.18    c.m"
"           Runoff coefficient     0.403      0.905      0.654      "
"           Maximum flow           0.131      0.384      0.437      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                   0.437     0.437     1.758     1.758"
" 52        CHANNEL DESIGN"
"      0.437   Current peak flow    c.m/sec"
"      0.020   Manning 'n'"
"         0.   Cross-section type: 0=trapezoidal; 1=general"
"      4.000   Basewidth    metre"
"     50.000   Left bank slope"
"      0.000   Right bank slope"
"      0.300   Channel depth    metre"
"      2.000   Gradient   %"
"           Depth of flow                0.073    metre"
"           Velocity                     1.025    m/sec"
"           Channel capacity             7.740    c.m/sec"
"           Critical depth               0.088    metre"
" 53        ROUTE    Channel Route 180"
"     180.00      Channel Route 180 Reach length   ( metre)"
"      0.495   X-factor <= 0.5"
"    131.757   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"     30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"    100.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                 0.428    c.m/sec"
"                   0.437     0.437     0.428     1.758 c.m/sec"
" 40        HYDROGRAPH Next link "
"          5   Next link "
"                   0.437     0.428     0.428     1.758"
" 33        CATCHMENT 303"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        303   No description"
"     75.000   % Impervious"
"      4.800   Total Area"
"    100.000   Flow length"
"      2.000   Overland Slope"
"      1.200   Pervious Area"
"    100.000   Pervious length"
"      2.000   Pervious slope"
"      3.600   Impervious Area"
"    100.000   Impervious length"
"      2.000   Impervious slope"
"      0.280   Pervious Manning 'n'"
"     82.000   Pervious SCS Curve No."
"      0.441   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      5.576   Pervious Initial abstraction"
"      0.013   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.905   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                   0.480     0.428     0.428     1.758 c.m/sec"
"           Catchment 303          Pervious   Impervious Total Area "
"           Surface Area           1.200      3.600      4.800      hectare"
"           Time of concentration  43.615     5.760      11.054     minutes"
"           Time to Centroid       278.798    209.866    219.505    minutes"
"           Rainfall depth         58.700     58.700     58.700     mm"
"           Rainfall volume        704.40     2113.20    2817.60    c.m"
"           Rainfall losses        32.787     5.576      12.379     mm"
"           Runoff depth           25.913     53.124     46.321     mm"
"           Runoff volume          310.95     1912.46    2223.41    c.m"
"           Runoff coefficient     0.441      0.905      0.789      "
"           Maximum flow           0.059      0.461      0.480      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                   0.480     0.907     0.428     1.758"
" 52        CHANNEL DESIGN"
"      0.907   Current peak flow    c.m/sec"
"      0.020   Manning 'n'"
"         0.   Cross-section type: 0=trapezoidal; 1=general"
"      4.000   Basewidth    metre"
"     50.000   Left bank slope"
"      0.000   Right bank slope"
"      0.300   Channel depth    metre"
"      2.000   Gradient   %"
"           Depth of flow                0.107    metre"
"           Velocity                     1.265    m/sec"
"           Channel capacity             7.740    c.m/sec"
"           Critical depth               0.132    metre"
" 53        ROUTE    Channel Route 250"
"     250.00      Channel Route 250 Reach length   ( metre)"
"      0.494   X-factor <= 0.5"
"    148.203   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"     30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"    100.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                 0.893    c.m/sec"
"                   0.480     0.907     0.893     1.758 c.m/sec"
" 40        HYDROGRAPH   Combine    6100"
"          6   Combine "
"       6100   Node #"
"              "
"           Maximum flow                 2.594    c.m/sec"
"           Hydrograph volume        17416.518    c.m"
"                   0.480     0.907     0.893     2.594"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                   0.480     0.000     0.893     2.594"
" 33        CATCHMENT 407"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        407   No description"
"     75.000   % Impervious"
"      3.000   Total Area"
"    100.000   Flow length"
"      2.000   Overland Slope"
"      0.750   Pervious Area"
"    100.000   Pervious length"
"      2.000   Pervious slope"
"      2.250   Impervious Area"
"    100.000   Impervious length"
"      2.000   Impervious slope"
"      0.300   Pervious Manning 'n'"
"     83.000   Pervious SCS Curve No."
"      0.462   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      5.202   Pervious Initial abstraction"
"      0.013   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.905   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                   0.300     0.000     0.893     2.594 c.m/sec"
"           Catchment 407          Pervious   Impervious Total Area "
"           Surface Area           0.750      2.250      3.000      hectare"
"           Time of concentration  44.806     5.760      11.437     minutes"
"           Time to Centroid       279.367    209.866    219.971    minutes"
"           Rainfall depth         58.700     58.700     58.700     mm"
"           Rainfall volume        440.25     1320.75    1761.00    c.m"
"           Rainfall losses        31.587     5.576      12.079     mm"
"           Runoff depth           27.113     53.124     46.621     mm"
"           Runoff volume          203.35     1195.29    1398.64    c.m"
"           Runoff coefficient     0.462      0.905      0.794      "
"           Maximum flow           0.038      0.288      0.300      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                   0.300     0.300     0.893     2.594"
" 52        CHANNEL DESIGN"
"      0.300   Current peak flow    c.m/sec"
"      0.020   Manning 'n'"
"         0.   Cross-section type: 0=trapezoidal; 1=general"
"      4.000   Basewidth    metre"
"     50.000   Left bank slope"
"      0.000   Right bank slope"
"      0.300   Channel depth    metre"
"      2.000   Gradient   %"
"           Depth of flow                0.060    metre"
"           Velocity                     0.915    m/sec"
"           Channel capacity             7.740    c.m/sec"
"           Critical depth               0.071    metre"
" 53        ROUTE    Channel Route 100"
"     100.00      Channel Route 100 Reach length   ( metre)"
"      0.492   X-factor <= 0.5"
"     81.975   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"     30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"     75.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                 0.298    c.m/sec"
"                   0.300     0.300     0.298     2.594 c.m/sec"
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" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.300     0.298     0.298     2.594"
" 33          CATCHMENT 310"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          310   No description"
"       75.000   % Impervious"
"        2.400   Total Area"
"       75.000   Flow length"
"        2.000   Overland Slope"
"        0.600   Pervious Area"
"       75.000   Pervious length"
"        2.000   Pervious slope"
"        1.800   Impervious Area"
"       75.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.441   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.906   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.253     0.298     0.298     2.594 c.m/sec"
"             Catchment 310          Pervious   Impervious Total Area "
"             Surface Area           0.600      1.800      2.400      hectare"
"             Time of concentration  29.991     4.847      8.359      minutes"
"             Time to Centroid       262.344    208.951    216.407    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        352.20     1056.60    1408.80    c.m"
"             Rainfall losses        32.790     5.497      12.320     mm"
"             Runoff depth           25.910     53.203     46.380     mm"
"             Runoff volume          155.46     957.65     1113.11    c.m"
"             Runoff coefficient     0.441      0.906      0.790      "
"             Maximum flow           0.037      0.225      0.253      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.253     0.551     0.298     2.594"
" 52          CHANNEL DESIGN"
"        0.551   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                  0.202    metre"
"             Velocity                       1.045    m/sec"
"             Channel capacity             557.696    c.m/sec"
"             Critical depth                 0.180    metre"
" 53          ROUTE    Channel Route 200"
"       200.00      Channel Route 200 Reach length   ( metre)"
"        0.486   X-factor <= 0.5"
"      143.500   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                   0.545    c.m/sec"
"                     0.253     0.551     0.545     2.594 c.m/sec"
" 40          HYDROGRAPH   Combine    6100"
"            6   Combine "
"         6100   Node #"
"                "
"             Maximum flow                   3.096    c.m/sec"
"             Hydrograph volume          19928.240    c.m"
"                     0.253     0.551     0.545     3.096"
" 40          HYDROGRAPH   Confluence    6100"
"            7   Confluence "
"         6100   Node #"
"                "
"             Maximum flow                   3.096    c.m/sec"
"             Hydrograph volume          19928.240    c.m"
"                     0.253     3.096     0.545     0.000"
" 52          CHANNEL DESIGN"
"        3.096   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                  0.507    metre"
"             Velocity                       1.733    m/sec"
"             Channel capacity             557.696    c.m/sec"
"             Critical depth                 0.488    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.372   X-factor <= 0.5"
"       21.644   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       25.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                   3.096    c.m/sec"
"                     0.253     3.096     3.096     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.253     3.096     3.096     0.000"
" 81          ADD COMMENT==================================================="
"          1  Lines of comment"
"             PROPOSED POND #2"
" 54          POND DESIGN"
"        3.096   Current peak flow    c.m/sec"
"        4.007   Target outflow    c.m/sec"
"      19928.2   Hydrograph volume    c.m"
"          25.   Number of stages"
"        0.000   Minimum water level    metre"
"        2.300   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                  0.000     0.000     0.000"
"                0.09583   0.00452   875.671"
"                 0.1917   0.01493  1778.243"
"                 0.2875   0.03442  2706.844"
"                 0.3833   0.04383  3662.299"
"                 0.4792   0.05156  4645.824"
"                 0.5750   0.05826  5655.543"
"                 0.6708   0.06427  6692.645"
"                 0.7667   0.06977  7758.431"
"                 0.8625   0.07486  8850.853"
"                 0.9583   0.07963  9971.185"
"                  1.054   0.08412  11118.39"
"                  1.150   0.08840  12297.52"
"                  1.246    0.2294  13505.21"
"                  1.342    0.4837  14741.64"
"                  1.438    0.8116  16006.97"
"                  1.533     1.195  17287.76"
"                  1.629     1.633  18611.14"
"                  1.725     2.118  19963.96"
"                  1.821     2.644  21346.39"
"                  1.917     3.209  22758.63"
"                  2.013     3.811  24200.82"
"                  2.108     5.348  25657.67"
"                  2.204     7.723  27160.03"
"                  2.300    10.675  28692.88"
"          2.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
"               elevation coefficie   breadth sideslope sideslope"
"                  1.150     0.900     3.000     0.000     0.000"
"                  2.013     0.900    20.000     3.000     3.000"
"          1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                  0.000     0.630    0.2000     1.000"
"          2.   LAYERS"
"                 Bottom    Aspect    Bottom       Top   Average"
"                   area     ratio elevation elevation sideslope"
"               9000.000     7.000     0.000     2.000     5.000"
"              15137.096     4.852     2.000     2.300     5.000"
"             Peak outflow                   0.540    c.m/sec"
"             Maximum level                  1.358    metre"
"             Maximum storage            14957.616    c.m"
"             Centroidal lag                25.115    hours"
"                     0.253     3.096     0.540     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.253     0.540     0.540     0.000"
" 52          CHANNEL DESIGN"
"        0.540   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                  0.200    metre"
"             Velocity                       1.039    m/sec"
"             Channel capacity             557.696    c.m/sec"
"             Critical depth                 0.178    metre"
" 53          ROUTE    Channel Route 250"
"       250.00      Channel Route 250 Reach length   ( metre)"
"        0.489   X-factor <= 0.5"
"      180.512   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                   0.539    c.m/sec"
"                     0.253     0.540     0.539     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                Flow in Hwy. 21 Ditch"
"             Maximum flow                   1.309    c.m/sec"
"             Hydrograph volume          20858.201    c.m"
"                     0.253     0.540     0.539     1.309"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.253     0.000     0.539     1.309"
" 33          CATCHMENT 311"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          311   No description"
"       75.000   % Impervious"
"        6.600   Total Area"
"      100.000   Flow length"
"        2.000   Overland Slope"
"        1.650   Pervious Area"
"      100.000   Pervious length"
"        2.000   Pervious slope"
"        4.950   Impervious Area"
"      100.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.441   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.905   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.677     0.000     0.539     1.309 c.m/sec"
"             Catchment 311          Pervious   Impervious Total Area "
"             Surface Area           1.650      4.950      6.600      hectare"
"             Time of concentration  35.641     5.760      9.939      minutes"
"             Time to Centroid       269.165    209.866    218.158    minutes"
"             Rainfall depth         58.700     58.700     58.700     mm"
"             Rainfall volume        968.55     2905.65    3874.20    c.m"
"             Rainfall losses        32.788     5.576      12.379     mm"
"             Runoff depth           25.912     53.124     46.321     mm"
"             Runoff volume          427.55     2629.63    3057.18    c.m"
"             Runoff coefficient     0.441      0.905      0.789      "
"             Maximum flow           0.093      0.634      0.677      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.677     0.677     0.539     1.309"
" 52          CHANNEL DESIGN"
"        0.677   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
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"              Depth of flow                 0.092    metre"
"              Velocity                      1.164    m/sec"
"              Channel capacity              7.740    c.m/sec"
"              Critical depth                0.112    metre"
" 53           ROUTE    Channel Route 200"
"        200.00       Channel Route 200 Reach length   ( metre)"
"         0.494   X-factor <= 0.5"
"       128.842   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       100.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.669    c.m/sec"
"                      0.677     0.677     0.669     1.309 c.m/sec"
" 40           HYDROGRAPH Next link "
"             5   Next link "
"                      0.677     0.669     0.669     1.309"
" 33           CATCHMENT 314"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           314   No description"
"        50.000   % Impervious"
"         3.300   Total Area"
"        20.000   Flow length"
"         1.000   Overland Slope"
"         1.650   Pervious Area"
"        20.000   Pervious length"
"         1.000   Pervious slope"
"         1.650   Impervious Area"
"        20.000   Impervious length"
"         1.000   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.441   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.894   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.327     0.669     0.669     1.309 c.m/sec"
"              Catchment 314          Pervious   Impervious Total Area "
"              Surface Area           1.650      1.650      3.300      hectare"
"              Time of concentration  16.706     2.700      7.327      minutes"
"              Time to Centroid       246.295    206.081    219.365    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        968.55     968.55     1937.10    c.m"
"              Rainfall losses        32.809     6.209      19.509     mm"
"              Runoff depth           25.891     52.491     39.191     mm"
"              Runoff volume          427.21     866.10     1293.31    c.m"
"              Runoff coefficient     0.441      0.894      0.668      "
"              Maximum flow           0.127      0.204      0.327      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.327     0.996     0.669     1.309"
" 52           CHANNEL DESIGN"
"         0.996   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         2.000   Gradient   %"
"              Depth of flow                 0.280    metre"
"              Velocity                      1.253    m/sec"
"              Channel capacity            557.696    c.m/sec"
"              Critical depth                0.256    metre"
" 53           ROUTE    Channel Route 80"
"         80.00       Channel Route 80 Reach length   ( metre)"
"         0.453   X-factor <= 0.5"
"        47.901   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"        50.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.990    c.m/sec"
"                      0.327     0.996     0.990     1.309 c.m/sec"
" 40           HYDROGRAPH   Combine    7000"
"             6   Combine "
"          7000   Node #"
"                 "
"              Maximum flow                  0.990    c.m/sec"
"              Hydrograph volume          4350.491    c.m"
"                      0.327     0.996     0.990     0.990"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                      0.327     0.000     0.990     0.990"
" 33           CATCHMENT 312"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           312   No description"
"        75.000   % Impervious"
"         4.400   Total Area"
"       100.000   Flow length"
"         2.000   Overland Slope"
"         1.100   Pervious Area"
"       100.000   Pervious length"
"         2.000   Pervious slope"
"         3.300   Impervious Area"
"       100.000   Impervious length"
"         2.000   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.441   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.905   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.452     0.000     0.990     0.990 c.m/sec"
"              Catchment 312          Pervious   Impervious Total Area "
"              Surface Area           1.100      3.300      4.400      hectare"
"              Time of concentration  35.641     5.760      9.939      minutes"
"              Time to Centroid       269.164    209.866    218.158    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        645.70     1937.10    2582.80    c.m"
"              Rainfall losses        32.788     5.576      12.379     mm"
"              Runoff depth           25.912     53.124     46.321     mm"
"              Runoff volume          285.04     1753.09    2038.12    c.m"
"              Runoff coefficient     0.441      0.905      0.789      "
"              Maximum flow           0.062      0.423      0.452      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.452     0.452     0.990     0.990"
" 52           CHANNEL DESIGN"
"         0.452   Current peak flow    c.m/sec"
"         0.020   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         4.000   Basewidth    metre"
"        50.000   Left bank slope"
"         0.000   Right bank slope"
"         0.300   Channel depth    metre"
"         2.000   Gradient   %"
"              Depth of flow                 0.074    metre"
"              Velocity                      1.035    m/sec"
"              Channel capacity              7.740    c.m/sec"
"              Critical depth                0.090    metre"
" 53           ROUTE    Channel Route 100"
"        100.00       Channel Route 100 Reach length   ( metre)"
"         0.490   X-factor <= 0.5"
"        72.470   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"        60.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.448    c.m/sec"
"                      0.452     0.452     0.448     0.990 c.m/sec"
" 40           HYDROGRAPH   Combine    7000"
"             6   Combine "
"          7000   Node #"
"                 "
"              Maximum flow                  1.439    c.m/sec"
"              Hydrograph volume          6388.617    c.m"
"                      0.452     0.452     0.448     1.439"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                      0.452     0.000     0.448     1.439"
" 33           CATCHMENT 304"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           304   No description"
"        50.000   % Impervious"
"         1.600   Total Area"
"        75.000   Flow length"
"         2.000   Overland Slope"
"         0.800   Pervious Area"
"        75.000   Pervious length"
"         2.000   Pervious slope"
"         0.800   Impervious Area"
"        75.000   Impervious length"
"         2.000   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.441   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.906   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.137     0.000     0.448     1.439 c.m/sec"
"              Catchment 304          Pervious   Impervious Total Area "
"              Surface Area           0.800      0.800      1.600      hectare"
"              Time of concentration  29.991     4.847      13.082     minutes"
"              Time to Centroid       262.344    208.951    226.437    minutes"
"              Rainfall depth         58.700     58.700     58.700     mm"
"              Rainfall volume        469.60     469.60     939.20     c.m"
"              Rainfall losses        32.790     5.497      19.144     mm"
"              Runoff depth           25.910     53.203     39.556     mm"
"              Runoff volume          207.28     425.62     632.90     c.m"
"              Runoff coefficient     0.441      0.906      0.674      "
"              Maximum flow           0.049      0.100      0.137      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.137     0.137     0.448     1.439"
" 52           CHANNEL DESIGN"
"         0.137   Current peak flow    c.m/sec"
"         0.020   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         4.000   Basewidth    metre"
"        50.000   Left bank slope"
"         0.000   Right bank slope"
"         0.600   Channel depth    metre"
"         2.000   Gradient   %"
"              Depth of flow                 0.039    metre"
"              Velocity                      0.714    m/sec"
"              Channel capacity             38.450    c.m/sec"
"              Critical depth                0.045    metre"
" 53           ROUTE    Channel Route 50"
"         50.00       Channel Route 50 Reach length   ( metre)"
"         0.489   X-factor <= 0.5"
"        52.485   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"        50.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.136    c.m/sec"
"                      0.137     0.137     0.136     1.439 c.m/sec"
" 40           HYDROGRAPH Next link "
"             5   Next link "
"                      0.137     0.136     0.136     1.439"
" 33           CATCHMENT 313"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           313   No description"
"        75.000   % Impervious"
"         1.800   Total Area"
"        50.000   Flow length"
"         2.000   Overland Slope"
"         0.450   Pervious Area"
"        50.000   Pervious length"
"         2.000   Pervious slope"
"         1.350   Impervious Area"
"        50.000   Impervious length"
"         2.000   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
```

```
"        0.441   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.887   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                0.188     0.136     0.136     1.439 c.m/sec"
"            Catchment 313          Pervious   Impervious Total Area "
"            Surface Area           0.450      1.350      1.800      hectare"
"            Time of concentration  23.515     3.800      6.603      minutes"
"            Time to Centroid       254.524    207.443    214.135    minutes"
"            Rainfall depth         58.700     58.700     58.700     mm"
"            Rainfall volume        264.15     792.45     1056.60    c.m"
"            Rainfall losses        32.803     6.612      13.160     mm"
"            Runoff depth           25.897     52.088     45.540     mm"
"            Runoff volume          116.54     703.19     819.72     c.m"
"            Runoff coefficient     0.441      0.887      0.776      "
"            Maximum flow           0.031      0.166      0.188      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                0.188     0.323     0.136     1.439"
" 52         CHANNEL DESIGN"
"        0.323   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"            Depth of flow                0.062    metre"
"            Velocity                     0.936    m/sec"
"            Channel capacity             7.740    c.m/sec"
"            Critical depth               0.074    metre"
" 53         ROUTE    Channel Route 200"
"       200.00      Channel Route 200 Reach length   ( metre)"
"        0.496   X-factor <= 0.5"
"      160.301   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 0.315    c.m/sec"
"                0.188     0.323     0.315     1.439 c.m/sec"
" 40         HYDROGRAPH   Combine    7000"
"           6   Combine "
"         7000   Node #"
"                "
"            Maximum flow                 1.754    c.m/sec"
"            Hydrograph volume         7841.237    c.m"
"                0.188     0.323     0.315     1.754"
" 40         HYDROGRAPH   Confluence    7000"
"           7   Confluence "
"         7000   Node #"
"                "
"            Maximum flow                 1.754    c.m/sec"
"            Hydrograph volume         7841.237    c.m"
"                0.188     1.754     0.315     0.000"
" 52         CHANNEL DESIGN"
"        1.754   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"            Depth of flow                0.379    metre"
"            Velocity                     1.477    m/sec"
"            Channel capacity           557.696    c.m/sec"
"            Critical depth               0.356    metre"
" 53         ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.401   X-factor <= 0.5"
"       25.381   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       30.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 1.749    c.m/sec"
"                0.188     1.754     1.749     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                0.188     1.749     1.749     0.000"
" 81         ADD COMMENT=================================================="
"         1  Lines of comment"
"            PROPOSED POND #3"
" 54         POND DESIGN"
"        1.749   Current peak flow    c.m/sec"
"        2.000   Target outflow    c.m/sec"
"       7841.2   Hydrograph volume    c.m"
"          21.   Number of stages"
"        0.000   Minimum water level    metre"
"        2.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"                 0.000     0.000     0.000"
"                0.1000   0.00487   607.388"
"                0.2000   0.01603  1237.688"
"                0.3000   0.03579  1891.097"
"                0.4000   0.04527  2567.818"
"                0.5000   0.05309  3268.049"
"                0.6000   0.05989  3991.990"
"                0.7000   0.06599  4739.842"
"                0.8000   0.07158  5511.804"
"                0.9000   0.07676  6308.077"
"                 1.000   0.08161  7128.861"
"                 1.100   0.08619  7974.355"
"                 1.200   0.09054  8844.760"
"                 1.300    0.1190  9740.274"
"                 1.400    0.1673  10661.10"
"                 1.500    0.2286  11607.44"
"                 1.600    0.3003  12579.48"
"                 1.700    0.3810  13577.44"
"                 1.800     1.208  14601.51"
"                 1.900     2.686  15651.89"
"                 2.000     4.619  16728.78"
"          2.   WEIRS"
"                 Crest      Weir     Crest      Left     Right"
"             elevation coefficie   breadth sideslope sideslope"
"                 1.200     0.900     0.500     0.000     0.000"
"                 1.700     0.900    15.000     3.000     3.000"
"          1.   ORIFICES"
"               Orifice   Orifice   Orifice Number of"
"                invert coefficie  diameter  orifices"
"                 0.000     0.630    0.2000     1.000"
"          2.   LAYERS"
"                Bottom    Aspect    Bottom       Top   Average"
"                  area     ratio elevation elevation sideslope"
"              5960.000     6.500     0.000     2.000     5.000"
"             10902.110     4.312     2.000     2.000     4.000"
"            Peak outflow                 0.080    c.m/sec"
"            Maximum level                0.966    metre"
"            Maximum storage           6847.172    c.m"
"            Centroidal lag              21.014   hours"
"                0.188     1.749     0.080     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                0.188     0.080     0.080     0.000"
" 52         CHANNEL DESIGN"
"        0.080   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"            Depth of flow                0.082    metre"
"            Velocity                     0.436    m/sec"
"            Channel capacity           394.351    c.m/sec"
"            Critical depth               0.053    metre"
" 53         ROUTE    Channel Route 300"
"       300.00      Channel Route 300 Reach length   ( metre)"
"        0.484   X-factor <= 0.5"
"      257.919   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                 0.080    c.m/sec"
"                0.188     0.080     0.080     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    1100"
"           6   Combine "
"         1100   Node #"
"               Node taking 200 series - Bottom end of Holtby Drain"
"            Maximum flow                 7.429    c.m/sec"
"            Hydrograph volume        52318.445    c.m"
"                0.188     0.080     0.080     7.429"
" 81         ADD COMMENT=================================================="
"         1  Lines of comment"
"            Total to Holtby Drain"
" 40         HYDROGRAPH   Confluence    1100"
"           7   Confluence "
"         1100   Node #"
"               Node taking 200 series - Bottom end of Holtby Drain"
"            Maximum flow                 7.429    c.m/sec"
"            Hydrograph volume        52318.445    c.m"
"                0.188     7.429     0.080     0.000"
" 81         ADD COMMENT=================================================="
"         1  Lines of comment"
"            Total to Holtby Drain"
" 52         CHANNEL DESIGN"
"        7.429   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"            Depth of flow                1.080    metre"
"            Velocity                     1.314    m/sec"
"            Channel capacity           278.848    c.m/sec"
"            Critical depth               0.774    metre"
" 53         ROUTE    Channel Route 200"
"       200.00      Channel Route 200 Reach length   ( metre)"
"        0.253   X-factor <= 0.5"
"      114.182   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 7.428    c.m/sec"
"                0.188     7.429     7.428     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    1300"
"           6   Combine "
"         1300   Node #"
"               Node at Holtby Drain"
"            Maximum flow                 9.510    c.m/sec"
"            Hydrograph volume        66615.258    c.m"
"                0.188     7.429     7.428     9.510"
" 40         HYDROGRAPH   Confluence    1300"
"           7   Confluence "
"         1300   Node #"
"               Node at Holtby Drain"
"            Maximum flow                 9.510    c.m/sec"
"            Hydrograph volume        66615.250    c.m"
"                0.188     9.510     7.428     0.000"
" 52         CHANNEL DESIGN"
"        9.510   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"            Depth of flow                1.208    metre"
"            Velocity                     1.400    m/sec"
"            Channel capacity           278.848    c.m/sec"
"            Critical depth               0.877    metre"
" 53         ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       26.787   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.711   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 9.485    c.m/sec"
```

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"                    0.188     9.510     9.485     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    1000"
"           6   Combine "
"        1000   Node #"
"               Node upstream of Penetangore Culvert"
"            Maximum flow                 41.475    c.m/sec"
"            Hydrograph volume        442900.500    c.m"
"                    0.188     9.510     9.485    41.475"
" 81         ADD COMMENT==================================================="
"          2  Lines of comment"
"            Total discharge to Pipe Arch under Hwy. 21 on the "
"            Pentangore Tributary"
" 40         HYDROGRAPH   Confluence    1000"
"           7   Confluence "
"        1000   Node #"
"               Node upstream of Penetangore Culvert"
"            Maximum flow                 41.475    c.m/sec"
"            Hydrograph volume        442900.531    c.m"
"                    0.188    41.475     9.485     0.000"
" 81         ADD COMMENT==================================================="
"          2  Lines of comment"
"            Total discharge to Pipe Arch under Hwy. 21 on the "
"            Pentangore Tributary"
" 52         CHANNEL DESIGN"
"      41.475   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"            Depth of flow                 2.295    metre"
"            Velocity                      2.034    m/sec"
"            Channel capacity            278.848    c.m/sec"
"            Critical depth                1.779    metre"
" 53         ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"       0.000   X-factor <= 0.5"
"      18.433   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.853   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 41.471    c.m/sec"
"                    0.188    41.475    41.471     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    3000"
"           6   Combine "
"        3000   Node #"
"               Node Combining All Flow"
"            Maximum flow                 41.471    c.m/sec"
"            Hydrograph volume        442899.656    c.m"
"                    0.188    41.475    41.471    41.471"
" 81         ADD COMMENT==================================================="
"          1  Lines of comment"
"            Total Off-site Discharge - Hwy. 21 + Penetangore Tributary"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.188     0.000    41.471    41.471"
" 40         HYDROGRAPH   Confluence    2000"
"           7   Confluence "
"        2000   Node #"
"               Flow in Hwy. 21 Ditch"
"            Maximum flow                  1.309    c.m/sec"
"            Hydrograph volume         20858.201    c.m"
"                    0.188     1.309    41.471     0.000"
" 81         ADD COMMENT==================================================="
"          1  Lines of comment"
"            Total discharge to Hwy. 21 Ditch"
" 52         CHANNEL DESIGN"
"       1.309   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"            Depth of flow                 0.466    metre"
"            Velocity                      0.827    m/sec"
"            Channel capacity            278.848    c.m/sec"
"            Critical depth                0.301    metre"
" 53         ROUTE    Channel Route 100"
"      100.00      Channel Route 100 Reach length   ( metre)"
"       0.262   X-factor <= 0.5"
"      90.687   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  1.303    c.m/sec"
"                    0.188     1.309     1.303     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    3000"
"           6   Combine "
"        3000   Node #"
"               Node Combining All Flow"
"            Maximum flow                 42.294    c.m/sec"
"            Hydrograph volume        463751.063    c.m"
"                    0.188     1.309     1.303    42.294"
" 40         HYDROGRAPH   Confluence    3000"
"           7   Confluence "
"        3000   Node #"
"               Node Combining All Flow"
"            Maximum flow                 42.294    c.m/sec"
"            Hydrograph volume        463751.125    c.m"
"                    0.188    42.294     1.303     0.000"
" 81         ADD COMMENT==================================================="
"          1  Lines of comment"
"            Total Off-site Discharge - Hwy. 21 + Penetangore Tributary"
" 52         CHANNEL DESIGN"
"      42.294   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"            Depth of flow                 2.314    metre"
"            Velocity                      2.044    m/sec"
"            Channel capacity            278.848    c.m/sec"
"            Critical depth                1.795    metre"
" 53         ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"       0.000   X-factor <= 0.5"
"      18.342   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.854   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 42.290    c.m/sec"
"                    0.188    42.294    42.290     0.000 c.m/sec"
" 38         START/RE-START TOTALS 3000"
"           1   Runoff Totals turned OFF"
"            Catchment area to node 3000            1918.200    hectare"
"            Impervious area to node 3000             40.592    hectare"
"            % impervious to node 3000                 0.000"
"            Peak runoff to node 3000                  0.000    c.m/sec"
"            Total volume to node 3000                   0.0    c.m"
" 38         START/RE-START TOTALS 3000"
"           1   Runoff Totals turned ON"
"            Catchment area to node 3000            1918.200    hectare"
"            Impervious area to node 3000             40.592    hectare"
"            % impervious to node 3000                 2.116"
"            Peak runoff to node 3000                 66.106    c.m/sec"
"            Total volume to node 3000              473152.0    c.m"
```

POST DEVELOPMENT 25 YEAR

```
"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                        Sunday, February 7, 2010"
"           10  Units used:                                          ie METRIC"
"               Job folder:                    C:\Users\derb\Desktop\KBP - Report\"
"                               2016 Work\Appendix F - Miduss Modelling\Future"
"               Output filename:                        08055 - Post 25 Year.out"
"               Licensee name:                                    BMROSS - DLE"
"               Company                                                 BMROSS"
"               Date & Time last used:                 6/25/2016 at 10:18:23 AM"
" 31         TIME PARAMETERS"
"        5.000  Time Step"
"      360.000  Max. Storm length"
"     1800.000  Max. Hydrograph"
" 32         STORM Mass Curve"
"            3  Mass Curve"
"       86.100  Rainfall depth"
"      360.000  Duration"
"           47  C:\Program Files (x86)\MIDUSS\SCS_6hr_Type2.mrd   SCS Type II - 6
hour Distribution - Ontario"
"            Maximum intensity          67.158    mm/hr"
"            Total depth                86.100    mm"
"           6   025hyd   Hydrograph extension used in this file"
" 81         ADD COMMENT==================================================="
"          1  Lines of comment"
"            Start of Penetangore Tributary"
" 33         CATCHMENT 50"
"            1  Triangular SCS"
"            1  Equal length"
"            1  SCS method"
"           50  No description"
"        0.000  % Impervious"
"      396.000  Total Area"
"      450.000  Flow length"
"        2.500  Overland Slope"
"      396.000  Pervious Area"
"      450.000  Pervious length"
"        2.500  Pervious slope"
"        0.000  Impervious Area"
"      450.000  Impervious length"
"        2.500  Impervious slope"
"        0.250  Pervious Manning 'n'"
"       81.000  Pervious SCS Curve No."
"        0.534  Pervious Runoff coefficient"
"        0.100  Pervious Ia/S coefficient"
"        5.958  Pervious Initial abstraction"
"        0.013  Impervious Manning 'n'"
"       98.000  Impervious SCS Curve No."
"        0.000  Impervious Runoff coefficient"
"        0.100  Impervious Ia/S coefficient"
"        0.518  Impervious Initial abstraction"
"                   23.637     0.000     0.000     0.000 c.m/sec"
"            Catchment 50          Pervious   Impervious Total Area "
"            Surface Area          396.000    0.000      396.000    hectare"
"            Time of concentration 75.983     11.366     75.983     minutes"
"            Time to Centroid      314.049    214.390    314.049    minutes"
"            Rainfall depth        86.100     86.100     86.100     mm"
"            Rainfall volume       34.0956    0.0000     34.0956    ha-m"
"            Rainfall losses       40.137     5.520      40.137     mm"
"            Runoff depth          45.963     80.580     45.963     mm"
"            Runoff volume         18.2015    0.0000     18.2015    ha-m"
"            Runoff coefficient    0.534      0.000      0.534      "
"            Maximum flow          23.637     0.000      23.637     c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4  Add Runoff "
"                   23.637    23.637     0.000     0.000"
" 52         CHANNEL DESIGN"
"       23.637  Current peak flow    c.m/sec"
"        0.040  Manning 'n'"
"           0.  Cross-section type: 0=trapezoidal; 1=general"
"        2.000  Basewidth    metre"
"        3.000  Left bank slope"
"        3.000  Right bank slope"
"        5.000  Channel depth    metre"
"        0.500  Gradient   %"
"            Depth of flow                1.805    metre"
"            Velocity                     1.765    m/sec"
"            Channel capacity           278.848    c.m/sec"
"            Critical depth               1.368    metre"
" 53         ROUTE    Channel Route 3000"
"      3000.00      Channel Route 3000 Reach length   ( metre)"
"        0.396  X-factor <= 0.5"
"      318.652  K-lag   ( seconds)"
"        0.000  Default(0) or user spec.(1) values used"
"        0.500  X-factor <= 0.5"
"       30.000  K-lag   ( seconds)"
"        0.500  Beta weighting factor"
"      300.000  Routing time step   ( seconds)"
"            4  No. of sub-reaches"
"            Peak outflow                23.348    c.m/sec"
"                   23.637    23.637    23.348     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"            5  Next link "
"                   23.637    23.348    23.348     0.000"
" 33         CATCHMENT 52"
"            1  Triangular SCS"
"            1  Equal length"
"            1  SCS method"
"           52  No description"
"        0.000  % Impervious"
"      196.000  Total Area"
"      250.000  Flow length"
"        7.000  Overland Slope"
"      196.000  Pervious Area"
"      250.000  Pervious length"
"        7.000  Pervious slope"
"        0.000  Impervious Area"
"      250.000  Impervious length"
"        7.000  Impervious slope"
"        0.250  Pervious Manning 'n'"
"       80.000  Pervious SCS Curve No."
"        0.515  Pervious Runoff coefficient"
"        0.100  Pervious Ia/S coefficient"
"        6.350  Pervious Initial abstraction"
"        0.013  Impervious Manning 'n'"
"       98.000  Impervious SCS Curve No."
"        0.000  Impervious Runoff coefficient"
"        0.100  Impervious Ia/S coefficient"
"        0.518  Impervious Initial abstraction"
"                   18.017    23.348    23.348     0.000 c.m/sec"
"            Catchment 52          Pervious   Impervious Total Area "
"            Surface Area          196.000    0.000      196.000    hectare"
"            Time of concentration 39.626     5.865      39.626     minutes"
"            Time to Centroid      270.855    207.757    270.855    minutes"
"            Rainfall depth        86.100     86.100     86.100     mm"
"            Rainfall volume       16.8756    0.0000     16.8756    ha-m"
"            Rainfall losses       41.715     5.922      41.715     mm"
"            Runoff depth          44.385     80.178     44.385     mm"
"            Runoff volume         8.6994     0.0000     8.6994     ha-m"
"            Runoff coefficient    0.515      0.000      0.516      "
"            Maximum flow          18.017     0.000      18.017     c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4  Add Runoff "
"                   18.017    29.299    23.348     0.000"
" 52         CHANNEL DESIGN"
"       29.299  Current peak flow    c.m/sec"
"        0.040  Manning 'n'"
"           0.  Cross-section type: 0=trapezoidal; 1=general"
"        2.000  Basewidth    metre"
"        3.000  Left bank slope"
"        3.000  Right bank slope"
"        5.000  Channel depth    metre"
"        0.400  Gradient   %"
"            Depth of flow                2.076    metre"
"            Velocity                     1.715    m/sec"
"            Channel capacity           249.409    c.m/sec"
"            Critical depth               1.513    metre"
" 53         ROUTE    Channel Route 1300"
"      1300.00      Channel Route 1300 Reach length   ( metre)"
"        0.330  X-factor <= 0.5"
"      284.328  K-lag   ( seconds)"
"        0.000  Default(0) or user spec.(1) values used"
"        0.500  X-factor <= 0.5"
"       30.000  K-lag   ( seconds)"
"        0.500  Beta weighting factor"
"      300.000  Routing time step   ( seconds)"
"            2  No. of sub-reaches"
"            Peak outflow                29.196    c.m/sec"
"                   18.017    29.299    29.196     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"            5  Next link "
"                   18.017    29.196    29.196     0.000"
" 33         CATCHMENT 54"
"            1  Triangular SCS"
"            1  Equal length"
"            1  SCS method"
"           54  No description"
"        0.000  % Impervious"
"       39.000  Total Area"
"      140.000  Flow length"
"       11.000  Overland Slope"
"       39.000  Pervious Area"
"      140.000  Pervious length"
"       11.000  Pervious slope"
"        0.000  Impervious Area"
"      140.000  Impervious length"
"       11.000  Impervious slope"
"        0.210  Pervious Manning 'n'"
"       81.000  Pervious SCS Curve No."
"        0.533  Pervious Runoff coefficient"
"        0.100  Pervious Ia/S coefficient"
"        5.958  Pervious Initial abstraction"
"        0.013  Impervious Manning 'n'"
"       98.000  Impervious SCS Curve No."
"        0.000  Impervious Runoff coefficient"
"        0.100  Impervious Ia/S coefficient"
"        0.518  Impervious Initial abstraction"
"                    4.989    29.196    29.196     0.000 c.m/sec"
"            Catchment 54          Pervious   Impervious Total Area "
"            Surface Area          39.000     0.000      39.000     hectare"
"            Time of concentration 21.777     3.617      21.777     minutes"
"            Time to Centroid      248.526    204.957    248.526    minutes"
"            Rainfall depth        86.100     86.100     86.100     mm"
"            Rainfall volume       3.3579     0.0000     3.3579     ha-m"
"            Rainfall losses       40.195     7.671      40.195     mm"
"            Runoff depth          45.905     78.429     45.905     mm"
"            Runoff volume         1.7903     0.0000     1.7903     ha-m"
"            Runoff coefficient    0.533      0.000      0.533      "
"            Maximum flow          4.989      0.000      4.989      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4  Add Runoff "
"                    4.989    30.131    29.196     0.000"
" 52         CHANNEL DESIGN"
"       30.131  Current peak flow    c.m/sec"
"        0.040  Manning 'n'"
"           0.  Cross-section type: 0=trapezoidal; 1=general"
"        2.000  Basewidth    metre"
"        3.000  Left bank slope"
"        3.000  Right bank slope"
"        5.000  Channel depth    metre"
"        0.400  Gradient   %"
"            Depth of flow                2.101    metre"
"            Velocity                     1.727    m/sec"
"            Channel capacity           249.409    c.m/sec"
"            Critical depth               1.533    metre"
" 53         ROUTE    Channel Route 800"
"       800.00      Channel Route 800 Reach length   ( metre)"
"        0.360  X-factor <= 0.5"
"      347.479  K-lag   ( seconds)"
"        0.000  Default(0) or user spec.(1) values used"
"        0.500  X-factor <= 0.5"
"       30.000  K-lag   ( seconds)"
"        0.500  Beta weighting factor"
"      300.000  Routing time step   ( seconds)"
"            1  No. of sub-reaches"
"            Peak outflow                30.050    c.m/sec"
"                    4.989    30.131    30.050     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    10"
"            6  Combine "
"           10  Node #"
"               Confluence on Penetangore Tributary"
"            Maximum flow                30.050    c.m/sec"
"            Hydrograph volume       286911.781    c.m"
"                    4.989    30.131    30.050    30.050"
" 40         HYDROGRAPH Start - New Tributary"
"            2  Start - New Tributary"
"                    4.989     0.000    30.050    30.050"
" 33         CATCHMENT 60"
"            1  Triangular SCS"
"            1  Equal length"
"            1  SCS method"
"           60  No description"
"        0.000  % Impervious"
"      225.000  Total Area"
"      270.000  Flow length"
"        2.500  Overland Slope"
"      225.000  Pervious Area"
"      270.000  Pervious length"
"        2.500  Pervious slope"
"        0.000  Impervious Area"
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"      270.000   Impervious length"
"        2.500   Impervious slope"
"        0.230   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.534   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    17.615     0.000    30.050    30.050 c.m/sec"
"             Catchment 60           Pervious   Impervious Total Area "
"             Surface Area           225.000    0.000      225.000    hectare"
"             Time of concentration  53.196     8.366      53.196     minutes"
"             Time to Centroid       286.501    210.824    286.501    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        19.3725    0.0000     19.3725    ha-m"
"             Rainfall losses        40.141     5.535      40.141     mm"
"             Runoff depth           45.959     80.565     45.959     mm"
"             Runoff volume          10.3407    0.0000     10.3407    ha-m"
"             Runoff coefficient     0.534      0.000      0.534      "
"             Maximum flow           17.615     0.000      17.615     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   17.615    17.615    30.050    30.050"
" 52          CHANNEL DESIGN"
"       17.615   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"             Depth of flow                 1.668    metre"
"             Velocity                      1.508    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.188    metre"
" 53          ROUTE    Channel Route 1800"
"      1800.00      Channel Route 1800 Reach length   ( metre)"
"        0.349   X-factor <= 0.5"
"      298.497   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                 17.265    c.m/sec"
"                   17.615    17.615    17.265    30.050 c.m/sec"
" 40          HYDROGRAPH   Combine    10"
"            6   Combine "
"           10   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 45.035    c.m/sec"
"             Hydrograph volume        390319.781    c.m"
"                   17.615    17.615    17.265    45.035"
" 40          HYDROGRAPH   Confluence    10"
"            7   Confluence "
"           10   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 45.035    c.m/sec"
"             Hydrograph volume        390319.781    c.m"
"                   17.615    45.035    17.265     0.000"
" 52          CHANNEL DESIGN"
"       45.035   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"             Depth of flow                 2.489    metre"
"             Velocity                      1.911    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.847    metre"
" 53          ROUTE    Channel Route 2000"
"      2000.00      Channel Route 2000 Reach length   ( metre)"
"        0.370   X-factor <= 0.5"
"      392.542   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                 44.774    c.m/sec"
"                   17.615    45.035    44.774     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    11"
"            6   Combine "
"           11   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 44.774    c.m/sec"
"             Hydrograph volume        390319.656    c.m"
"                   17.615    45.035    44.774    44.774"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                   17.615     0.000    44.774    44.774"
" 33          CATCHMENT 62"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           62   No description"
"        0.000   % Impervious"
"       95.000   Total Area"
"      160.000   Flow length"
"        2.500   Overland Slope"
"       95.000   Pervious Area"
"      160.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      160.000   Impervious length"
"        2.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       80.000   Pervious SCS Curve No."
"        0.515   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.350   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     8.472     0.000    44.774    44.774 c.m/sec"
"             Catchment 62           Pervious   Impervious Total Area "
"             Surface Area           95.000     0.000      95.000     hectare"
"             Time of concentration  41.289     6.112      41.289     minutes"
"             Time to Centroid       272.861    208.104    272.861    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        8.1795     0.0000     8.1795     ha-m"
"             Rainfall losses        41.720     6.094      41.720     mm"
"             Runoff depth           44.380     80.006     44.380     mm"
"             Runoff volume          4.2161     0.0000     4.2161     ha-m"
"             Runoff coefficient     0.515      0.000      0.515      "
"             Maximum flow           8.472      0.000      8.472      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    8.472     8.472    44.774    44.774"
" 52          CHANNEL DESIGN"
"        8.472   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.300   Gradient   %"
"             Depth of flow                 1.286    metre"
"             Velocity                      1.124    m/sec"
"             Channel capacity            215.995    c.m/sec"
"             Critical depth                0.827    metre"
" 53          ROUTE    Channel Route 1800"
"      1800.00      Channel Route 1800 Reach length   ( metre)"
"        0.340   X-factor <= 0.5"
"      400.376   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                  8.135    c.m/sec"
"                    8.472     8.472     8.135    44.774 c.m/sec"
" 40          HYDROGRAPH   Combine    11"
"            6   Combine "
"           11   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 50.903    c.m/sec"
"             Hydrograph volume        432480.250    c.m"
"                    8.472     8.472     8.135    50.903"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    8.472     0.000     8.135    50.903"
" 33          CATCHMENT 56"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           56   No description"
"        0.000   % Impervious"
"      345.000   Total Area"
"      240.000   Flow length"
"       11.000   Overland Slope"
"      345.000   Pervious Area"
"      240.000   Pervious length"
"       11.000   Pervious slope"
"        0.000   Impervious Area"
"      240.000   Impervious length"
"       15.000   Impervious slope"
"        0.280   Pervious Manning 'n'"
"       79.000   Pervious SCS Curve No."
"        0.498   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.752   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                   32.068     0.000     8.135    50.903 c.m/sec"
"             Catchment 56           Pervious   Impervious Total Area "
"             Surface Area           345.000    0.000      345.000    hectare"
"             Time of concentration  36.531     4.554      36.531     minutes"
"             Time to Centroid       267.854    206.382    267.853    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        29.7045    0.0000     29.7045    ha-m"
"             Rainfall losses        43.248     6.318      43.248     mm"
"             Runoff depth           42.852     79.782     42.852     mm"
"             Runoff volume          14.7839    0.0000     14.7839    ha-m"
"             Runoff coefficient     0.498      0.000      0.498      "
"             Maximum flow           32.068     0.000      32.068     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   32.068    32.068     8.135    50.903"
" 52          CHANNEL DESIGN"
"       32.068   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"             Depth of flow                 2.158    metre"
"             Velocity                      1.754    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.579    metre"
" 53          ROUTE    Channel Route 1300"
"      1300.00      Channel Route 1300 Reach length   ( metre)"
"        0.324   X-factor <= 0.5"
"      277.926   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                 31.517    c.m/sec"
"                   32.068    32.068    31.517    50.903 c.m/sec"
" 40          HYDROGRAPH   Combine    11"
"            6   Combine "
"           11   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 70.381    c.m/sec"
"             Hydrograph volume        580319.938    c.m"
"                   32.068    32.068    31.517    70.381"
" 40          HYDROGRAPH   Confluence    11"
"            7   Confluence "
"           11   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 70.381    c.m/sec"
"             Hydrograph volume        580319.875    c.m"
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"                  32.068    70.381    31.517     0.000"
" 52          CHANNEL DESIGN"
"      70.381   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"             Depth of flow                 2.862    metre"
"             Velocity                      2.324    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                2.263    metre"
" 53          ROUTE    Channel Route 1300"
"     1300.00      Channel Route 1300 Reach length   ( metre)"
"       0.318   X-factor <= 0.5"
"     209.797   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"             Peak outflow                 70.253    c.m/sec"
"                  32.068    70.381    70.253     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"           6   Combine "
"          12   Node #"
"               Confluence on Penetangore Tributary"
"             Maximum flow                 70.253    c.m/sec"
"             Hydrograph volume        580320.063    c.m"
"                  32.068    70.381    70.253    70.253"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  32.068     0.000    70.253    70.253"
" 33          CATCHMENT 58"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          58   No description"
"       0.000   % Impervious"
"      82.000   Total Area"
"     140.000   Flow length"
"      15.000   Overland Slope"
"      82.000   Pervious Area"
"     140.000   Pervious length"
"      15.000   Pervious slope"
"       0.000   Impervious Area"
"     140.000   Impervious length"
"      15.000   Impervious slope"
"       0.230   Pervious Manning 'n'"
"      81.000   Pervious SCS Curve No."
"       0.533   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.958   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  10.634     0.000    70.253     70.253 c.m/sec"
"             Catchment 58          Pervious   Impervious Total Area "
"             Surface Area          82.000     0.000      82.000     hectare"
"             Time of concentration 20.955     3.295      20.955     minutes"
"             Time to Centroid      247.521    204.757    247.521    minutes"
"             Rainfall depth        86.100     86.100     86.100     mm"
"             Rainfall volume       7.0602     0.0000     7.0602     ha-m"
"             Rainfall losses       40.178     7.017      40.178     mm"
"             Runoff depth          45.922     79.083     45.922     mm"
"             Runoff volume         3.7656     0.0000     3.7656     ha-m"
"             Runoff coefficient    0.533      0.000      0.533      "
"             Maximum flow          10.634     0.000      10.634     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  10.634    10.634    70.253    70.253"
" 52          CHANNEL DESIGN"
"      10.634   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"             Depth of flow                 1.270    metre"
"             Velocity                      1.441    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.927    metre"
" 53          ROUTE    Channel Route 700"
"      700.00      Channel Route 700 Reach length   ( metre)"
"       0.337   X-factor <= 0.5"
"     182.217   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"             Peak outflow                 10.392    c.m/sec"
"                  10.634    10.634    10.392    70.253 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"           6   Combine "
"          12   Node #"
"               Confluence on Penetangore Tributary"
"             Maximum flow                 72.784    c.m/sec"
"             Hydrograph volume        617975.438    c.m"
"                  10.634    10.634    10.392    72.784"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  10.634     0.000    10.392    72.784"
" 33          CATCHMENT 64"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          64   No description"
"       0.000   % Impervious"
"      80.000   Total Area"
"     220.000   Flow length"
"       5.500   Overland Slope"
"      80.000   Pervious Area"
"     220.000   Pervious length"
"       5.500   Pervious slope"
"       0.000   Impervious Area"
"     220.000   Impervious length"
"       5.500   Impervious slope"
"       0.210   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.552   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   8.580     0.000    10.392    72.784 c.m/sec"
"             Catchment 64          Pervious   Impervious Total Area "
"             Surface Area          80.000     0.000      80.000     hectare"
"             Time of concentration 34.803     5.840      34.803     minutes"
"             Time to Centroid      263.478    207.720    263.478    minutes"
"             Rainfall depth        86.100     86.100     86.100     mm"
"             Rainfall volume       6.8880     0.0000     6.8880     ha-m"
"             Rainfall losses       38.551     5.897      38.551     mm"
"             Runoff depth          47.549     80.203     47.549     mm"
"             Runoff volume         3.8039     0.0000     3.8039     ha-m"
"             Runoff coefficient    0.552      0.000      0.552      "
"             Maximum flow          8.580      0.000      8.580      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   8.580     8.580    10.392    72.784"
" 52          CHANNEL DESIGN"
"       8.580   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"             Depth of flow                 1.153    metre"
"             Velocity                      1.363    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.833    metre"
" 53          ROUTE    Channel Route 700"
"      700.00      Channel Route 700 Reach length   ( metre)"
"       0.350   X-factor <= 0.5"
"     192.537   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"             Peak outflow                  8.497    c.m/sec"
"                   8.580     8.580     8.497    72.784 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"           6   Combine "
"          12   Node #"
"               Confluence on Penetangore Tributary"
"             Maximum flow                 76.961    c.m/sec"
"             Hydrograph volume        656014.750    c.m"
"                   8.580     8.580     8.497    76.961"
" 40          HYDROGRAPH   Confluence    12"
"           7   Confluence "
"          12   Node #"
"               Confluence on Penetangore Tributary"
"             Maximum flow                 76.961    c.m/sec"
"             Hydrograph volume        656014.750    c.m"
"                   8.580    76.961     8.497     0.000"
" 52          CHANNEL DESIGN"
"      76.961   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.300   Gradient   %"
"             Depth of flow                 3.297    metre"
"             Velocity                      1.963    m/sec"
"             Channel capacity            215.995    c.m/sec"
"             Critical depth                2.356    metre"
" 53          ROUTE    Channel Route 2500"
"     2500.00      Channel Route 2500 Reach length   ( metre)"
"       0.230   X-factor <= 0.5"
"     318.467   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           3   No. of sub-reaches"
"             Peak outflow                 75.678    c.m/sec"
"                   8.580    76.961    75.678     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1000"
"           6   Combine "
"        1000   Node #"
"               Node upstream of Penetangore Culvert"
"             Maximum flow                 75.678    c.m/sec"
"             Hydrograph volume        656014.750    c.m"
"                   8.580    76.961    75.678    75.678"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   8.580     0.000    75.678    75.678"
" 33          CATCHMENT 59"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          59   No description"
"       0.000   % Impervious"
"     128.000   Total Area"
"     170.000   Flow length"
"      18.000   Overland Slope"
"     128.000   Pervious Area"
"     170.000   Pervious length"
"      18.000   Pervious slope"
"       0.000   Impervious Area"
"     170.000   Impervious length"
"      18.000   Impervious slope"
"       0.350   Pervious Manning 'n'"
"      76.000   Pervious SCS Curve No."
"       0.447   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.021   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  11.726     0.000    75.678    75.678 c.m/sec"
"             Catchment 59          Pervious   Impervious Total Area "
"             Surface Area          128.000    0.000      128.000    hectare"
"             Time of concentration 30.299     3.505      30.299     minutes"
```

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"           Time to Centroid       262.475    204.855    262.475    minutes"
"           Rainfall depth         86.100     86.100     86.100     mm"
"           Rainfall volume        11.0208    0.0000     11.0208    ha-m"
"           Rainfall losses        47.606     7.396      47.606     mm"
"           Runoff depth           38.494     78.704     38.494     mm"
"           Runoff volume          4.9273     0.0000     4.9273     ha-m"
"           Runoff coefficient     0.447      0.000      0.447      "
"           Maximum flow           11.726     0.000      11.726     c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  11.726    11.726    75.678    75.678"
" 52        CHANNEL DESIGN"
"      11.726   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.300   Gradient   %"
"           Depth of flow                 1.487    metre"
"           Velocity                      1.221    m/sec"
"           Channel capacity            215.995    c.m/sec"
"           Critical depth                0.973    metre"
" 53        ROUTE    Channel Route 1500"
"     1500.00      Channel Route 1500 Reach length   ( metre)"
"       0.281   X-factor <= 0.5"
"     307.084   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"          3   No. of sub-reaches"
"           Peak outflow                 11.131    c.m/sec"
"                  11.726    11.726    11.131    75.678 c.m/sec"
" 40        HYDROGRAPH   Combine    1000"
"          6   Combine "
"       1000   Node #"
"              Node upstream of Penetangore Culvert"
"           Maximum flow                 79.914    c.m/sec"
"           Hydrograph volume        705287.563    c.m"
"                  11.726    11.726    11.131    79.914"
" 81        ADD COMMENT==================================================="
"        1  Lines of comment"
"           End of Penetangore Tributary"
" 81        ADD COMMENT==================================================="
"        1  Lines of comment"
"           Start of Area North of Holtby Drain"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                  11.726     0.000    11.131    79.914"
" 33        CATCHMENT 201"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        201   No description"
"       0.000   % Impervious"
"     166.000   Total Area"
"     250.000   Flow length"
"       3.000   Overland Slope"
"     166.000   Pervious Area"
"     250.000   Pervious length"
"       3.000   Pervious slope"
"       0.000   Impervious Area"
"     250.000   Impervious length"
"       3.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.552   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  15.489     0.000    11.131    79.914 c.m/sec"
"           Catchment 201          Pervious   Impervious Total Area "
"           Surface Area           166.000    0.000      166.000    hectare"
"           Time of concentration  43.771     7.563      43.771     minutes"
"           Time to Centroid       274.325    209.915    274.325    minutes"
"           Rainfall depth         86.100     86.100     86.100     mm"
"           Rainfall volume        14.2926    0.0000     14.2926    ha-m"
"           Rainfall losses        38.537     5.756      38.537     mm"
"           Runoff depth           47.563     80.344     47.563     mm"
"           Runoff volume          7.8955     0.0000     7.8955     ha-m"
"           Runoff coefficient     0.552      0.000      0.552      "
"           Maximum flow           15.489     0.000      15.489     c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  15.489    15.489    11.131    79.914"
" 52        CHANNEL DESIGN"
"      15.489   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"           Depth of flow                 1.287    metre"
"           Velocity                      2.053    m/sec"
"           Channel capacity            394.351    c.m/sec"
"           Critical depth                1.116    metre"
" 53        ROUTE    Channel Route 1900"
"     1900.00      Channel Route 1900 Reach length   ( metre)"
"       0.454   X-factor <= 0.5"
"     231.397   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"          3   No. of sub-reaches"
"           Peak outflow                 15.353    c.m/sec"
"                  15.489    15.489    15.353    79.914 c.m/sec"
" 40        HYDROGRAPH Next link "
"          5   Next link "
"                  15.489    15.353    15.353    79.914"
" 33        CATCHMENT 202"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        202   No description"
"       0.000   % Impervious"
"       4.000   Total Area"
"     225.000   Flow length"
"       4.000   Overland Slope"
"       4.000   Pervious Area"
"     225.000   Pervious length"
"       4.000   Pervious slope"
"       0.000   Impervious Area"
"     225.000   Impervious length"
"       4.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.552   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.409    15.353    15.353    79.914 c.m/sec"
"           Catchment 202          Pervious   Impervious Total Area "
"           Surface Area           4.000      0.000      4.000      hectare"
"           Time of concentration  37.692     6.513      37.692     minutes"
"           Time to Centroid       266.978    208.591    266.978    minutes"
"           Rainfall depth         86.100     86.100     86.100     mm"
"           Rainfall volume        3444.00    0.00       3444.00    c.m"
"           Rainfall losses        38.542     6.520      38.542     mm"
"           Runoff depth           47.558     79.580     47.558     mm"
"           Runoff volume          1902.33    0.00       1902.33    c.m"
"           Runoff coefficient     0.552      0.000      0.552      "
"           Maximum flow           0.409      0.000      0.409      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                   0.409    15.685    15.353    79.914"
" 52        CHANNEL DESIGN"
"      15.685   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"           Depth of flow                 1.295    metre"
"           Velocity                      2.059    m/sec"
"           Channel capacity            394.351    c.m/sec"
"           Critical depth                1.123    metre"
" 53        ROUTE    Channel Route 200"
"      200.00      Channel Route 200 Reach length   ( metre)"
"       0.355   X-factor <= 0.5"
"      72.838   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                 15.625    c.m/sec"
"                   0.409    15.685    15.625    79.914 c.m/sec"
" 40        HYDROGRAPH Next link "
"          5   Next link "
"                   0.409    15.625    15.625    79.914"
" 33        CATCHMENT 203"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        203   No description"
"       0.000   % Impervious"
"       9.100   Total Area"
"     450.000   Flow length"
"       3.500   Overland Slope"
"       9.100   Pervious Area"
"     450.000   Pervious length"
"       3.500   Pervious slope"
"       0.000   Impervious Area"
"     450.000   Impervious length"
"       3.500   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.552   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.685    15.625    15.625    79.914 c.m/sec"
"           Catchment 203          Pervious   Impervious Total Area "
"           Surface Area           9.100      0.000      9.100      hectare"
"           Time of concentration  59.466     10.275     59.466     minutes"
"           Time to Centroid       293.301    213.064    293.301    minutes"
"           Rainfall depth         86.100     86.100     86.100     mm"
"           Rainfall volume        7835.09    0.01       7835.10    c.m"
"           Rainfall losses        38.530     5.863      38.530     mm"
"           Runoff depth           47.570     80.237     47.570     mm"
"           Runoff volume          4328.86    0.01       4328.86    c.m"
"           Runoff coefficient     0.552      0.000      0.552      "
"           Maximum flow           0.685      0.000      0.685      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                   0.685    16.303    15.625    79.914"
" 52        CHANNEL DESIGN"
"      16.303   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"           Depth of flow                 1.317    metre"
"           Velocity                      2.080    m/sec"
"           Channel capacity            394.351    c.m/sec"
"           Critical depth                1.144    metre"
" 53        ROUTE    Channel Route 350"
"      350.00      Channel Route 350 Reach length   ( metre)"
"       0.416   X-factor <= 0.5"
"     126.212   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                 16.254    c.m/sec"
"                   0.685    16.303    16.254    79.914 c.m/sec"
" 40        HYDROGRAPH   Combine    1100"
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"            6   Combine "
"         1100   Node #"
"                Node taking 200 series - Bottom end of Holtby Drain"
"              Maximum flow              16.254    c.m/sec"
"              Hydrograph volume         85186.055    c.m"
"                    0.685    16.303    16.254    16.254"
" 81          ADD COMMENT===================================================="
"          1  Lines of comment"
"              End of Area North of Holtby Drain"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.685     0.000    16.254    16.254"
" 81          ADD COMMENT===================================================="
"          1  Lines of comment"
"              Start of Holtby Drain"
" 33          CATCHMENT 100"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          100   No description"
"        0.000   % Impervious"
"       45.000   Total Area"
"      100.000   Flow length"
"        7.000   Overland Slope"
"       45.000   Pervious Area"
"      100.000   Pervious length"
"        7.000   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        7.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    6.134     0.000    16.254    16.254 c.m/sec"
"              Catchment 100          Pervious   Impervious Total Area "
"              Surface Area           45.000     0.000      45.000     hectare"
"              Time of concentration  19.590     3.385      19.590     minutes"
"              Time to Centroid       245.074    204.792    245.074    minutes"
"              Rainfall depth         86.100     86.100     86.100     mm"
"              Rainfall volume        3.8745     0.0000     3.8745     ha-m"
"              Rainfall losses        38.595     7.147      38.595     mm"
"              Runoff depth           47.505     78.953     47.505     mm"
"              Runoff volume          2.1377     0.0000     2.1377     ha-m"
"              Runoff coefficient     0.552      0.000      0.552      "
"              Maximum flow           6.134      0.000      6.134      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    6.134     6.134    16.254    16.254"
" 52          CHANNEL DESIGN"
"        6.134   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"              Depth of flow                0.840    metre"
"              Velocity                     1.615    m/sec"
"              Channel capacity           394.351    c.m/sec"
"              Critical depth               0.701    metre"
" 53          ROUTE    Channel Route 1500"
"      1500.00      Channel Route 1500 Reach length   ( metre)"
"        0.460   X-factor <= 0.5"
"      232.178   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"              Peak outflow                 6.034    c.m/sec"
"                    6.134     6.134     6.034    16.254 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                    6.134     6.034     6.034    16.254"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   No description"
"        0.000   % Impervious"
"       11.200   Total Area"
"       50.000   Flow length"
"        7.000   Overland Slope"
"       11.200   Pervious Area"
"       50.000   Pervious length"
"        7.000   Pervious slope"
"        0.000   Impervious Area"
"       50.000   Impervious length"
"        7.000   Impervious slope"
"        0.280   Pervious Manning 'n'"
"       80.000   Pervious SCS Curve No."
"        0.514   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.350   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    1.446     6.034    16.254 c.m/sec"
"              Catchment 101          Pervious   Impervious Total Area "
"              Surface Area           11.200     0.000      11.200     hectare"
"              Time of concentration  16.148     2.233      16.148     minutes"
"              Time to Centroid       242.477    203.345    242.477    minutes"
"              Rainfall depth         86.100     86.100     86.100     mm"
"              Rainfall volume        9643.19    0.01       9643.20    c.m"
"              Rainfall losses        41.808     6.646      41.808     mm"
"              Runoff depth           44.292     79.454     44.292     mm"
"              Runoff volume          4960.69    0.01       4960.70    c.m"
"              Runoff coefficient     0.514      0.000      0.514      "
"              Maximum flow           1.446      0.000      1.446      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    1.446     6.859     6.034    16.254"
" 52          CHANNEL DESIGN"
"        6.859   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"              Depth of flow                0.886    metre"
"              Velocity                     1.663    m/sec"
"              Channel capacity           394.351    c.m/sec"
"              Critical depth               0.743    metre"
" 53          ROUTE    Channel Route 700"
"       700.00      Channel Route 700 Reach length   ( metre)"
"        0.470   X-factor <= 0.5"
"      315.677   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"              Peak outflow                 6.850    c.m/sec"
"                    1.446     6.859     6.850    16.254 c.m/sec"
" 40          HYDROGRAPH   Combine    1200"
"            6   Combine "
"         1200   Node #"
"                Node taking 100 series for Holtby Drain"
"              Maximum flow                 6.850    c.m/sec"
"              Hydrograph volume         26338.104    c.m"
"                    1.446     6.859     6.850     6.850"
" 81          ADD COMMENT===================================================="
"          1  Lines of comment"
"              End of Holtby Drain"
" 40          HYDROGRAPH   Confluence    1200"
"            7   Confluence "
"         1200   Node #"
"                Node taking 100 series for Holtby Drain"
"              Maximum flow                 6.850    c.m/sec"
"              Hydrograph volume         26338.104    c.m"
"                    1.446     6.850     6.850     0.000"
" 52          CHANNEL DESIGN"
"        6.850   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"              Depth of flow                1.040    metre"
"              Velocity                     1.286    m/sec"
"              Channel capacity           278.848    c.m/sec"
"              Critical depth               0.742    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       29.150   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.678   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"              Peak outflow                 6.839    c.m/sec"
"                    1.446     6.850     6.839     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1300"
"            6   Combine "
"         1300   Node #"
"                Node at Holtby Drain"
"              Maximum flow                 6.839    c.m/sec"
"              Hydrograph volume         26338.102    c.m"
"                    1.446     6.850     6.839     6.839"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    1.446     0.000     6.839     6.839"
" 33          CATCHMENT 604"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          604   No description"
"        0.000   % Impervious"
"        2.700   Total Area"
"      100.000   Flow length"
"        2.500   Overland Slope"
"        2.700   Pervious Area"
"      100.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        2.500   Impervious slope"
"        0.300   Pervious Manning 'n'"
"       83.000   Pervious SCS Curve No."
"        0.572   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.202   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.305     0.000     6.839     6.839 c.m/sec"
"              Catchment 604          Pervious   Impervious Total Area "
"              Surface Area           2.700      0.000      2.700      hectare"
"              Time of concentration  33.688     4.610      33.688     minutes"
"              Time to Centroid       261.328    206.442    261.328    minutes"
"              Rainfall depth         86.100     86.100     86.100     mm"
"              Rainfall volume        2324.70    0.00       2324.70    c.m"
"              Rainfall losses        36.890     6.203      36.890     mm"
"              Runoff depth           49.210     79.897     49.210     mm"
"              Runoff volume          1328.66    0.00       1328.67    c.m"
"              Runoff coefficient     0.572      0.000      0.572      "
"              Maximum flow           0.305      0.000      0.305      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.305     0.305     6.839     6.839"
" 52          CHANNEL DESIGN"
"        0.305   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"              Depth of flow                0.145    metre"
"              Velocity                     0.865    m/sec"
"              Channel capacity           557.696    c.m/sec"
"              Critical depth               0.125    metre"
" 53          ROUTE    Channel Route 250"
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"      250.00      Channel Route 250 Reach length   ( metre)"
"       0.492   X-factor <= 0.5"
"     216.841   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 0.301    c.m/sec"
"                    0.305     0.305     0.301     6.839 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                    0.305     0.301     0.301     6.839"
" 33         CATCHMENT 605"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         605   No description"
"       0.000   % Impervious"
"       3.900   Total Area"
"     100.000   Flow length"
"       2.500   Overland Slope"
"       3.900   Pervious Area"
"     100.000   Pervious length"
"       2.500   Pervious slope"
"       0.000   Impervious Area"
"     100.000   Impervious length"
"       2.500   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.572   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.441     0.301     0.301     6.839 c.m/sec"
"            Catchment 605          Pervious   Impervious Total Area "
"            Surface Area           3.900      0.000      3.900      hectare"
"            Time of concentration  33.688     4.610      33.688     minutes"
"            Time to Centroid       261.329    206.442    261.328    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        3357.90    0.00       3357.90    c.m"
"            Rainfall losses        36.890     6.203      36.890     mm"
"            Runoff depth           49.210     79.897     49.210     mm"
"            Runoff volume          1919.18    0.00       1919.18    c.m"
"            Runoff coefficient     0.572      0.000      0.572      "
"            Maximum flow           0.441      0.000      0.441      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.441     0.742     0.301     6.839"
" 52         CHANNEL DESIGN"
"       0.742   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       2.000   Gradient   %"
"            Depth of flow                0.238    metre"
"            Velocity                     1.146    m/sec"
"            Channel capacity           557.696    c.m/sec"
"            Critical depth               0.215    metre"
" 53         ROUTE    Channel Route 200"
"      200.00      Channel Route 200 Reach length   ( metre)"
"       0.484   X-factor <= 0.5"
"     130.882   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 0.730    c.m/sec"
"                    0.441     0.742     0.730     6.839 c.m/sec"
" 40         HYDROGRAPH   Combine    4000"
"           6   Combine "
"        4000   Node #"
"               "
"            Maximum flow                 0.730    c.m/sec"
"            Hydrograph volume         3247.852    c.m"
"                    0.441     0.742     0.730     0.730"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.441     0.000     0.730     0.730"
" 33         CATCHMENT 603"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         603   No description"
"       0.000   % Impervious"
"       5.600   Total Area"
"     100.000   Flow length"
"       2.500   Overland Slope"
"       5.600   Pervious Area"
"     100.000   Pervious length"
"       2.500   Pervious slope"
"       0.000   Impervious Area"
"     100.000   Impervious length"
"       2.500   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.572   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.633     0.000     0.730     0.730 c.m/sec"
"            Catchment 603          Pervious   Impervious Total Area "
"            Surface Area           5.600      0.000      5.600      hectare"
"            Time of concentration  33.688     4.610      33.688     minutes"
"            Time to Centroid       261.328    206.442    261.328    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        4821.59    0.00       4821.60    c.m"
"            Rainfall losses        36.890     6.203      36.890     mm"
"            Runoff depth           49.210     79.897     49.210     mm"
"            Runoff volume          2755.75    0.00       2755.75    c.m"
"            Runoff coefficient     0.572      0.000      0.572      "
"            Maximum flow           0.633      0.000      0.633      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.633     0.633     0.730     0.730"
" 52         CHANNEL DESIGN"
"       0.633   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       2.000   Gradient   %"
"            Depth of flow                0.218    metre"
"            Velocity                     1.091    m/sec"
"            Channel capacity           557.696    c.m/sec"
"            Critical depth               0.196    metre"
" 53         ROUTE    Channel Route 225"
"      225.00      Channel Route 225 Reach length   ( metre)"
"       0.487   X-factor <= 0.5"
"     154.614   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 0.628    c.m/sec"
"                    0.633     0.633     0.628     0.730 c.m/sec"
" 40         HYDROGRAPH   Combine    4000"
"           6   Combine "
"        4000   Node #"
"               "
"            Maximum flow                 1.358    c.m/sec"
"            Hydrograph volume         6003.606    c.m"
"                    0.633     0.633     0.628     1.358"
" 40         HYDROGRAPH   Confluence    4000"
"           7   Confluence "
"        4000   Node #"
"               "
"            Maximum flow                 1.358    c.m/sec"
"            Hydrograph volume         6003.607    c.m"
"                    0.633     1.358     0.628     0.000"
" 52         CHANNEL DESIGN"
"       1.358   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"            Depth of flow                0.475    metre"
"            Velocity                     0.836    m/sec"
"            Channel capacity           278.848    c.m/sec"
"            Critical depth               0.307    metre"
" 53         ROUTE    Channel Route 500"
"      500.00      Channel Route 500 Reach length   ( metre)"
"       0.403   X-factor <= 0.5"
"     224.414   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                 1.353    c.m/sec"
"                    0.633     1.358     1.353     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    2000"
"           6   Combine "
"        2000   Node #"
"               Flow in Hwy. 21 Ditch"
"            Maximum flow                 1.353    c.m/sec"
"            Hydrograph volume         6003.605    c.m"
"                    0.633     1.358     1.353     1.353"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.633     0.000     1.353     1.353"
" 33         CATCHMENT 405"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         405   No description"
"      75.000   % Impervious"
"       3.200   Total Area"
"      75.000   Flow length"
"       2.000   Overland Slope"
"       0.800   Pervious Area"
"      75.000   Pervious length"
"       2.000   Pervious slope"
"       2.400   Impervious Area"
"      75.000   Impervious length"
"       2.000   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.572   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.920   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.511     0.000     1.353     1.353 c.m/sec"
"            Catchment 405          Pervious   Impervious Total Area "
"            Surface Area           0.800      2.400      3.200      hectare"
"            Time of concentration  30.310     4.148      8.637      minutes"
"            Time to Centroid       257.241    205.640    214.494    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        688.80     2066.40    2755.20    c.m"
"            Rainfall losses        36.891     6.902      14.399     mm"
"            Runoff depth           49.209     79.198     71.701     mm"
"            Runoff volume          393.68     1900.74    2294.42    c.m"
"            Runoff coefficient     0.572      0.920      0.833      "
"            Maximum flow           0.096      0.435      0.511      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.511     0.511     1.353     1.353"
" 52         CHANNEL DESIGN"
"       0.511   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"            Depth of flow                0.080    metre"
"            Velocity                     1.073    m/sec"
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"             Channel capacity              7.740    c.m/sec"
"             Critical depth                0.096    metre"
" 53          ROUTE   Channel Route 150"
"       150.00      Channel Route 150 Reach length   ( metre)"
"        0.493   X-factor <= 0.5"
"      104.847   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.505    c.m/sec"
"                     0.511     0.511     0.505     1.353 c.m/sec"
" 40          HYDROGRAPH   Combine    4100"
"            6   Combine "
"         4100   Node #"
"                "
"             Maximum flow                  0.505    c.m/sec"
"             Hydrograph volume          2294.417    c.m"
"                     0.511     0.511     0.505     0.505"
" 40          HYDROGRAPH   Confluence    4100"
"            7   Confluence "
"         4100   Node #"
"                "
"             Maximum flow                  0.505    c.m/sec"
"             Hydrograph volume          2294.417    c.m"
"                     0.511     0.505     0.505     0.000"
" 52          CHANNEL DESIGN"
"        0.505   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                 0.079    metre"
"             Velocity                      1.069    m/sec"
"             Channel capacity              7.740    c.m/sec"
"             Critical depth                0.096    metre"
" 53          ROUTE   Channel Route 100"
"       100.00      Channel Route 100 Reach length   ( metre)"
"        0.490   X-factor <= 0.5"
"       70.141   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       60.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.500    c.m/sec"
"                     0.511     0.505     0.500     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    4200"
"            6   Combine "
"         4200   Node #"
"                "
"             Maximum flow                  0.500    c.m/sec"
"             Hydrograph volume          2294.418    c.m"
"                     0.511     0.505     0.500     0.500"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.511     0.000     0.500     0.500"
" 33          CATCHMENT 406"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          406   No description"
"       85.000   % Impervious"
"        1.300   Total Area"
"       10.000   Flow length"
"        2.000   Overland Slope"
"        0.195   Pervious Area"
"       10.000   Pervious length"
"        2.000   Pervious slope"
"        1.105   Impervious Area"
"       10.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.549   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.914   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.223     0.000     0.500     0.500 c.m/sec"
"             Catchment 406          Pervious   Impervious Total Area "
"             Surface Area           0.195      1.105      1.300      hectare"
"             Time of concentration  7.166      1.238      1.807      minutes"
"             Time to Centroid       230.185    201.886    204.600    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        167.89     951.41     1119.30    c.m"
"             Rainfall losses        38.798     7.407      12.116     mm"
"             Runoff depth           47.302     78.693     73.984     mm"
"             Runoff volume          92.24      869.55     961.79     c.m"
"             Runoff coefficient     0.549      0.914      0.859      "
"             Maximum flow           0.026      0.197      0.223      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.223     0.223     0.500     0.500"
" 52          CHANNEL DESIGN"
"        0.223   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                 0.051    metre"
"             Velocity                      0.835    m/sec"
"             Channel capacity              7.740    c.m/sec"
"             Critical depth                0.060    metre"
" 53          ROUTE   Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.486   X-factor <= 0.5"
"       44.925   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       42.857   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.223    c.m/sec"
"                     0.223     0.223     0.223     0.500 c.m/sec"
" 40          HYDROGRAPH   Combine    4200"
"            6   Combine "
"         4200   Node #"
"                "
"             Maximum flow                  0.723    c.m/sec"
"             Hydrograph volume          3256.206    c.m"
"                     0.223     0.223     0.223     0.723"
" 40          HYDROGRAPH   Confluence    4200"
"            7   Confluence "
"         4200   Node #"
"                "
"             Maximum flow                  0.723    c.m/sec"
"             Hydrograph volume          3256.206    c.m"
"                     0.223     0.723     0.223     0.000"
" 52          CHANNEL DESIGN"
"        0.723   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                 0.095    metre"
"             Velocity                      1.186    m/sec"
"             Channel capacity              7.740    c.m/sec"
"             Critical depth                0.117    metre"
" 53          ROUTE   Channel Route 150"
"       150.00      Channel Route 150 Reach length   ( metre)"
"        0.492   X-factor <= 0.5"
"       94.828   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.717    c.m/sec"
"                     0.223     0.723     0.717     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    4300"
"            6   Combine "
"         4300   Node #"
"                Node Upstream of CTC Pond"
"             Maximum flow                  0.717    c.m/sec"
"             Hydrograph volume          3256.205    c.m"
"                     0.223     0.723     0.717     0.717"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.223     0.000     0.717     0.717"
" 33          CATCHMENT 500"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          500   No description"
"       70.000   % Impervious"
"        5.800   Total Area"
"      100.000   Flow length"
"        2.000   Overland Slope"
"        1.740   Pervious Area"
"      100.000   Pervious length"
"        2.000   Pervious slope"
"        4.060   Impervious Area"
"      100.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.533   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.934   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.913     0.000     0.717     0.717 c.m/sec"
"             Catchment 500          Pervious   Impervious Total Area "
"             Surface Area           1.740      4.060      5.800      hectare"
"             Time of concentration  28.822     4.929      9.627      minutes"
"             Time to Centroid       257.024    206.801    216.677    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        1498.14    3495.66    4993.80    c.m"
"             Rainfall losses        40.170     5.681      16.028     mm"
"             Runoff depth           45.930     80.419     70.072     mm"
"             Runoff volume          799.18     3265.00    4064.18    c.m"
"             Runoff coefficient     0.533      0.934      0.814      "
"             Maximum flow           0.199      0.757      0.913      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.913     0.913     0.717     0.717"
" 52          CHANNEL DESIGN"
"        0.913   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                 0.108    metre"
"             Velocity                      1.268    m/sec"
"             Channel capacity              7.740    c.m/sec"
"             Critical depth                0.132    metre"
" 53          ROUTE   Channel Route 150"
"       150.00      Channel Route 150 Reach length   ( metre)"
"        0.491   X-factor <= 0.5"
"       88.757   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.903    c.m/sec"
"                     0.913     0.913     0.903     0.717 c.m/sec"
" 40          HYDROGRAPH   Combine    4300"
"            6   Combine "
"         4300   Node #"
"                Node Upstream of CTC Pond"
"             Maximum flow                  1.620    c.m/sec"
"             Hydrograph volume          7320.388    c.m"
"                     0.913     0.913     0.903     1.620"
" 40          HYDROGRAPH   Confluence    4300"
"            7   Confluence "
"         4300   Node #"
"                Node Upstream of CTC Pond"
"             Maximum flow                  1.620    c.m/sec"
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"             Hydrograph volume          7320.387    c.m"
"                  0.913     1.620     0.903     0.000"
" 52          CHANNEL DESIGN"
"        1.620   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                 0.144    metre"
"             Velocity                      1.485    m/sec"
"             Channel capacity              7.740    c.m/sec"
"             Critical depth                0.179    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.465   X-factor <= 0.5"
"       25.246   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       25.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  1.615    c.m/sec"
"                  0.913     1.620     1.615     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                  0.913     1.615     1.615     0.000"
" 81          ADD COMMENT=================================================="
"          1  Lines of comment"
"             EXISTING POND - DRY POND - CTC SITE"
" 54          POND DESIGN"
"        1.615   Current peak flow    c.m/sec"
"        0.635   Target outflow    c.m/sec"
"       7320.4   Hydrograph volume    c.m"
"          15.   Number of stages"
"        0.000   Minimum water level    metre"
"        1.400   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                  0.000     0.000     0.000"
"                 0.1000   0.00276   124.985"
"                 0.2000   0.00477   256.026"
"                 0.3000   0.00616   393.250"
"                 0.4000   0.00729   536.786"
"                 0.5000   0.00827   686.761"
"                 0.6000   0.00914   843.304"
"                 0.7000   0.00994  1006.543"
"                 0.8000   0.01068  1176.605"
"                 0.9000    0.2200  1353.618"
"                  1.000    0.6243  1537.711"
"                  1.100     1.178  1729.012"
"                  1.200     1.871  1927.648"
"                  1.300     2.698  2133.748"
"                  1.400     3.658  2347.440"
"           1.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
"              elevation coefficie   breadth sideslope sideslope"
"                  0.800     0.980     3.800     2.000     2.000"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                  0.000     0.630    0.0750     1.000"
"           2.   LAYERS"
"                 Bottom    Aspect    Bottom       Top   Average"
"                   area     ratio elevation elevation sideslope"
"               1220.000     2.000     0.000     1.400     4.000"
"               2175.299     1.688     1.400     1.400     4.000"
"             Peak outflow                  1.547    c.m/sec"
"             Maximum level                 1.154    metre"
"             Maximum storage            1837.095    c.m"
"             Centroidal lag                7.872    hours"
"                  0.913     1.615     1.547     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                  0.913     1.547     1.547     0.000"
" 52          CHANNEL DESIGN"
"        1.547   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 0.507    metre"
"             Velocity                      0.866    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.331    metre"
" 53          ROUTE    Channel Route 220"
"       220.00      Channel Route 220 Reach length   ( metre)"
"        0.383   X-factor <= 0.5"
"      190.498   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  1.533    c.m/sec"
"                  0.913     1.547     1.533     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                Flow in Hwy. 21 Ditch"
"             Maximum flow                  2.433    c.m/sec"
"             Hydrograph volume         12856.608    c.m"
"                  0.913     1.547     1.533     2.433"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  0.913     0.000     1.533     2.433"
" 33          CATCHMENT 750"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          750   No description"
"      100.000   % Impervious"
"        0.500   Total Area"
"       50.000   Flow length"
"        2.000   Overland Slope"
"        0.000   Pervious Area"
"       50.000   Pervious length"
"        2.000   Pervious slope"
"        0.500   Impervious Area"
"       50.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.000   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.919   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.093     0.000     1.533     2.433 c.m/sec"
"             Catchment 750          Pervious   Impervious Total Area "
"             Surface Area           0.000      0.500      0.500      hectare"
"             Time of concentration  19.015     3.252      3.252      minutes"
"             Time to Centroid       245.172    204.723    204.723    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        0.00       430.50     430.50     c.m"
"             Rainfall losses        40.215     6.972      6.972      mm"
"             Runoff depth           45.885     79.128     79.128     mm"
"             Runoff volume          0.00       395.64     395.64     c.m"
"             Runoff coefficient     0.000      0.919      0.919      "
"             Maximum flow           0.000      0.093      0.093      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  0.093     0.093     1.533     2.433"
" 81          ADD COMMENT=================================================="
"          1  Lines of comment"
"             EXISTING POND - ROOFTOP STORAGE - CTC SITE"
" 54          POND DESIGN"
"        0.093   Current peak flow    c.m/sec"
"        0.020   Target outflow    c.m/sec"
"        395.6   Hydrograph volume    c.m"
"           9.   Number of stages"
"        0.000   Minimum water level    metre"
"        0.200   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                  0.000     0.000     0.000"
"                0.02500   0.00112    72.969"
"                0.05000   0.00386   146.876"
"                0.07500   0.01047   221.724"
"                 0.1000   0.01422   297.514"
"                 0.1250   0.01716   374.249"
"                 0.1500   0.01967   451.931"
"                 0.1750   0.02190   530.562"
"                 0.2000   0.02391   610.142"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                  0.000     0.630    0.0680     6.000"
"           2.   LAYERS"
"                 Bottom    Aspect    Bottom       Top   Average"
"                   area     ratio elevation elevation sideslope"
"               2900.000    10.000     0.000     0.200     4.000"
"               3085.338     1.960     0.200     0.200     4.000"
"             Peak outflow                  0.013    c.m/sec"
"             Maximum level                 0.095    metre"
"             Maximum storage             282.400    c.m"
"             Centroidal lag               12.676    hours"
"                  0.093     0.093     0.013     2.433 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                  0.093     0.013     0.013     2.433"
" 52          CHANNEL DESIGN"
"        0.013   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 0.034    metre"
"             Velocity                      0.180    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.016    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.459   X-factor <= 0.5"
"      208.115   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.013    c.m/sec"
"                  0.093     0.013     0.013     2.433 c.m/sec"
" 40          HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                Flow in Hwy. 21 Ditch"
"             Maximum flow                  2.445    c.m/sec"
"             Hydrograph volume         13211.491    c.m"
"                  0.093     0.013     0.013     2.445"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  0.093     0.000     0.013     2.445"
" 33          CATCHMENT 751"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          751   No description"
"      100.000   % Impervious"
"        0.200   Total Area"
"       50.000   Flow length"
"        2.000   Overland Slope"
"        0.000   Pervious Area"
"       50.000   Pervious length"
"        2.000   Pervious slope"
"        0.200   Impervious Area"
"       50.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.000   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.919   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.037     0.000     0.013     2.445 c.m/sec"
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"            Catchment 751          Pervious   Impervious Total Area "
"            Surface Area           0.000      0.200      0.200      hectare"
"            Time of concentration  19.015     3.252      3.252      minutes"
"            Time to Centroid       245.172    204.723    204.723    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        0.00       172.20     172.20     c.m"
"            Rainfall losses        40.215     6.972      6.972      mm"
"            Runoff depth           45.885     79.128     79.128     mm"
"            Runoff volume          0.00       158.26     158.26     c.m"
"            Runoff coefficient     0.000      0.919      0.919      "
"            Maximum flow           0.000      0.037      0.037      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.037     0.037     0.013     2.445"
" 81         ADD COMMENT================================================="
"         1  Lines of comment"
"            EXISTING POND - PARKING LOT STORAGE - CTC SITE"
" 54         POND DESIGN"
"       0.037   Current peak flow    c.m/sec"
"       0.020   Target outflow    c.m/sec"
"       158.3   Hydrograph volume    c.m"
"          5.   Number of stages"
"       0.000   Minimum water level    metre"
"       0.700   Maximum water level    metre"
"       0.000   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                Level Discharge    Volume"
"                0.000     0.000     0.000"
"               0.1750   0.01148    16.645"
"               0.3500   0.03242    39.036"
"               0.5250   0.04289    67.860"
"               0.7000   0.05126   103.803"
"          1.   ORIFICES"
"              Orifice   Orifice   Orifice Number of"
"               invert coefficie  diameter  orifices"
"                0.000     0.630    0.1750     1.000"
"          1.   LAYERS"
"               Bottom    Aspect    Bottom       Top   Average"
"                 area     ratio elevation elevation sideslope"
"               80.000     3.000     0.000     0.700     4.000"
"            Peak outflow                  0.030    c.m/sec"
"            Maximum level                 0.329    metre"
"            Maximum storage              36.413    c.m"
"            Centroidal lag                3.789   hours"
"                 0.037     0.037     0.030     2.445 c.m/sec"
" 40         HYDROGRAPH Next link "
"            5   Next link "
"                    0.037     0.030     0.030     2.445"
" 52         CHANNEL DESIGN"
"       0.030   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.500   Gradient   %"
"            Depth of flow                 0.056    metre"
"            Velocity                      0.246    m/sec"
"            Channel capacity            278.848    c.m/sec"
"            Critical depth                0.028    metre"
" 53         ROUTE    Channel Route 50"
"      50.00      Channel Route 50 Reach length   ( metre)"
"       0.434   X-factor <= 0.5"
"     152.616   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  0.029    c.m/sec"
"                    0.037     0.030     0.029     2.445 c.m/sec"
" 40         HYDROGRAPH   Combine    2000"
"            6   Combine "
"        2000   Node #"
"               Flow in Hwy. 21 Ditch"
"            Maximum flow                  2.473    c.m/sec"
"            Hydrograph volume         13369.757    c.m"
"                    0.037     0.030     0.029     2.473"
" 81         ADD COMMENT================================================="
"         1  Lines of comment"
"            Total discharge to Hwy. 21 Ditch"
" 40         HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.037     0.000     0.029     2.473"
" 33         CATCHMENT 301"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         301   No description"
"       0.000   % Impervious"
"      16.400   Total Area"
"      95.000   Flow length"
"       2.500   Overland Slope"
"      16.400   Pervious Area"
"      95.000   Pervious length"
"       2.500   Pervious slope"
"       0.000   Impervious Area"
"      95.000   Impervious length"
"       2.500   Impervious slope"
"       0.230   Pervious Manning 'n'"
"      81.000   Pervious SCS Curve No."
"       0.533   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.958   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    1.886     0.000     0.029     2.473 c.m/sec"
"            Catchment 301          Pervious   Impervious Total Area "
"            Surface Area           16.400     0.000      16.400     hectare"
"            Time of concentration  28.425     4.470      28.425     minutes"
"            Time to Centroid       256.550    206.240    256.550    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        1.4120     0.0000     1.4120     ha-m"
"            Rainfall losses        40.168     6.401      40.168     mm"
"            Runoff depth           45.932     79.699     45.932     mm"
"            Runoff volume          7532.80    0.01       7532.81    c.m"
"            Runoff coefficient     0.533      0.000      0.533      "
"            Maximum flow           1.886      0.000      1.886      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    1.886     1.886     0.029     2.473"
" 52         CHANNEL DESIGN"
"       1.886   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.200   Gradient   %"
"            Depth of flow                 0.449    metre"
"            Velocity                      1.256    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.370    metre"
" 53         ROUTE    Channel Route 600"
"      600.00      Channel Route 600 Reach length   ( metre)"
"       0.468   X-factor <= 0.5"
"     179.202   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                  1.876    c.m/sec"
"                    1.886     1.886     1.876     2.473 c.m/sec"
" 40         HYDROGRAPH Next link "
"            5   Next link "
"                    1.886     1.876     1.876     2.473"
" 33         CATCHMENT 401"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         401   No description"
"       0.000   % Impervious"
"       5.600   Total Area"
"     340.000   Flow length"
"       3.500   Overland Slope"
"       5.600   Pervious Area"
"     340.000   Pervious length"
"       3.500   Pervious slope"
"       0.000   Impervious Area"
"     340.000   Impervious length"
"       3.500   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.572   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.418     1.876     1.876     2.473 c.m/sec"
"            Catchment 401          Pervious   Impervious Total Area "
"            Surface Area           5.600      0.000      5.600      hectare"
"            Time of concentration  63.464     8.684      63.464     minutes"
"            Time to Centroid       297.336    211.233    297.336    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        4821.59    0.00       4821.60    c.m"
"            Rainfall losses        36.873     5.641      36.873     mm"
"            Runoff depth           49.227     80.459     49.227     mm"
"            Runoff volume          2756.73    0.00       2756.73    c.m"
"            Runoff coefficient     0.572      0.000      0.572      "
"            Maximum flow           0.418      0.000      0.418      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.418     2.204     1.876     2.473"
" 52         CHANNEL DESIGN"
"       2.204   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.200   Gradient   %"
"            Depth of flow                 0.486    metre"
"            Velocity                      1.311    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.404    metre"
" 53         ROUTE    Channel Route 150"
"      150.00      Channel Route 150 Reach length   ( metre)"
"       0.431   X-factor <= 0.5"
"      85.802   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  2.198    c.m/sec"
"                    0.418     2.204     2.198     2.473 c.m/sec"
" 40         HYDROGRAPH Next link "
"            5   Next link "
"                    0.418     2.198     2.198     2.473"
" 33         CATCHMENT 402"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         402   No description"
"      50.000   % Impervious"
"       7.400   Total Area"
"     100.000   Flow length"
"       2.000   Overland Slope"
"       3.700   Pervious Area"
"     100.000   Pervious length"
"       2.000   Pervious slope"
"       3.700   Impervious Area"
"     100.000   Impervious length"
"       2.000   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.572   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.934   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.975     2.198     2.198     2.473 c.m/sec"
"            Catchment 402          Pervious   Impervious Total Area "
"            Surface Area           3.700      3.700      7.400      hectare"
"            Time of concentration  36.021     4.929      16.733     minutes"
"            Time to Centroid       264.150    206.801    228.574    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        3185.70    3185.70    6371.40    c.m"
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"            Rainfall losses        36.883     5.681      21.282     mm"
"            Runoff depth           49.217     80.419     64.818     mm"
"            Runoff volume          1821.02    2975.49    4796.52    c.m"
"            Runoff coefficient     0.572      0.934      0.753      "
"            Maximum flow           0.404      0.690      0.975      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.975     2.785     2.198     2.473"
" 52         CHANNEL DESIGN"
"       2.785   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"            Depth of flow                  0.187    metre"
"            Velocity                       1.718    m/sec"
"            Channel capacity               7.740    c.m/sec"
"            Critical depth                 0.235    metre"
" 53         ROUTE    Channel Route 200"
"      200.00       Channel Route 200 Reach length   ( metre)"
"       0.489   X-factor <= 0.5"
"      87.306   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                   2.764    c.m/sec"
"                    0.975     2.785     2.764     2.473 c.m/sec"
" 40         HYDROGRAPH   Combine    6000"
"           6   Combine "
"        6000   Node #"
"               "
"            Maximum flow                   2.764    c.m/sec"
"            Hydrograph volume         15086.021    c.m"
"                    0.975     2.785     2.764     2.764"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.975     0.000     2.764     2.764"
" 33         CATCHMENT 501"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         501   No description"
"       0.000   % Impervious"
"       2.500   Total Area"
"      80.000   Flow length"
"       3.500   Overland Slope"
"       2.500   Pervious Area"
"      80.000   Pervious length"
"       3.500   Pervious slope"
"       0.000   Impervious Area"
"      80.000   Impervious length"
"       3.500   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.572   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.318     0.000     2.764     2.764 c.m/sec"
"            Catchment 501          Pervious   Impervious Total Area "
"            Surface Area           2.500      0.000      2.500      hectare"
"            Time of concentration  26.638     3.645      26.638     minutes"
"            Time to Centroid       252.796    204.985    252.796    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        2152.50    0.00       2152.50    c.m"
"            Rainfall losses        36.890     7.707      36.890     mm"
"            Runoff depth           49.210     78.393     49.210     mm"
"            Runoff volume          1230.24    0.00       1230.24    c.m"
"            Runoff coefficient     0.572      0.000      0.572      "
"            Maximum flow           0.318      0.000      0.318      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.318     0.318     2.764     2.764"
" 52         CHANNEL DESIGN"
"       0.318   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.200   Gradient   %"
"            Depth of flow                  0.171    metre"
"            Velocity                       0.738    m/sec"
"            Channel capacity             431.989    c.m/sec"
"            Critical depth                 0.128    metre"
" 53         ROUTE    Channel Route 100"
"      100.00       Channel Route 100 Reach length   ( metre)"
"       0.460   X-factor <= 0.5"
"     101.682   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                   0.315    c.m/sec"
"                    0.318     0.318     0.315     2.764 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                    0.318     0.315     0.315     2.764"
" 33         CATCHMENT 403"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         403   No description"
"      75.000   % Impervious"
"       4.700   Total Area"
"      70.000   Flow length"
"       2.000   Overland Slope"
"       1.175   Pervious Area"
"      70.000   Pervious length"
"       2.000   Pervious slope"
"       3.525   Impervious Area"
"      70.000   Impervious length"
"       2.000   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.571   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.917   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.749     0.315     0.315     2.764 c.m/sec"
"            Catchment 403          Pervious   Impervious Total Area "
"            Surface Area           1.175      3.525      4.700      hectare"
"            Time of concentration  29.081     3.979      8.298      minutes"
"            Time to Centroid       255.746    205.289    213.970    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        1011.67    3035.02    4046.70    c.m"
"            Rainfall losses        36.900     7.175      14.606     mm"
"            Runoff depth           49.200     78.925     71.494     mm"
"            Runoff volume          578.10     2782.12    3360.22    c.m"
"            Runoff coefficient     0.571      0.917      0.830      "
"            Maximum flow           0.144      0.644      0.749      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.749     1.006     0.315     2.764"
" 52         CHANNEL DESIGN"
"       1.006   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"            Depth of flow                  0.113    metre"
"            Velocity                       1.302    m/sec"
"            Channel capacity               7.740    c.m/sec"
"            Critical depth                 0.139    metre"
" 53         ROUTE    Channel Route 300"
"      300.00       Channel Route 300 Reach length   ( metre)"
"       0.495   X-factor <= 0.5"
"     172.748   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                   0.960    c.m/sec"
"                    0.749     1.006     0.960     2.764 c.m/sec"
" 40         HYDROGRAPH   Combine    6000"
"           6   Combine "
"        6000   Node #"
"               "
"            Maximum flow                   3.364    c.m/sec"
"            Hydrograph volume         19676.484    c.m"
"                    0.749     1.006     0.960     3.364"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.749     0.000     0.960     3.364"
" 33         CATCHMENT 404"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         404   No description"
"      75.000   % Impervious"
"       3.200   Total Area"
"      60.000   Flow length"
"       2.000   Overland Slope"
"       0.800   Pervious Area"
"      60.000   Pervious length"
"       2.000   Pervious slope"
"       2.400   Impervious Area"
"      60.000   Impervious length"
"       2.000   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.572   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.911   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.505     0.000     0.960     3.364 c.m/sec"
"            Catchment 404          Pervious   Impervious Total Area "
"            Surface Area           0.800      2.400      3.200      hectare"
"            Time of concentration  26.512     3.628      7.587      minutes"
"            Time to Centroid       252.644    204.969    213.218    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        688.80     2066.40    2755.20    c.m"
"            Rainfall losses        36.891     7.698      14.996     mm"
"            Runoff depth           49.209     78.402     71.104     mm"
"            Runoff volume          393.67     1881.65    2275.33    c.m"
"            Runoff coefficient     0.572      0.911      0.826      "
"            Maximum flow           0.102      0.444      0.505      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.505     0.505     0.960     3.364"
" 52         CHANNEL DESIGN"
"       0.505   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"            Depth of flow                  0.079    metre"
"            Velocity                       1.069    m/sec"
"            Channel capacity               7.740    c.m/sec"
"            Critical depth                 0.096    metre"
" 53         ROUTE    Channel Route 100"
"      100.00       Channel Route 100 Reach length   ( metre)"
"       0.490   X-factor <= 0.5"
"      70.141   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      60.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                   0.501    c.m/sec"
"                    0.505     0.505     0.501     3.364 c.m/sec"
" 40         HYDROGRAPH   Combine    6000"
"           6   Combine "
"        6000   Node #"
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"              "
"           Maximum flow                  3.679    c.m/sec"
"           Hydrograph volume         21951.813    c.m"
"                   0.505     0.505     0.501     3.679"
" 40        HYDROGRAPH   Confluence    6000"
"          7   Confluence "
"       6000   Node #"
"              "
"           Maximum flow                  3.679    c.m/sec"
"           Hydrograph volume         21951.813    c.m"
"                   0.505     3.679     0.501     0.000"
" 52        CHANNEL DESIGN"
"       3.679   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"           Depth of flow                 0.213    metre"
"           Velocity                      1.849    m/sec"
"           Channel capacity              7.740    c.m/sec"
"           Critical depth                0.269    metre"
" 53        ROUTE    Channel Route 200"
"      200.00      Channel Route 200 Reach length   ( metre)"
"       0.487   X-factor <= 0.5"
"      81.117   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                  3.630    c.m/sec"
"                   0.505     3.679     3.630     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    6100"
"          6   Combine "
"       6100   Node #"
"              "
"           Maximum flow                  3.630    c.m/sec"
"           Hydrograph volume         21951.820    c.m"
"                   0.505     3.679     3.630     3.630"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                   0.505     0.000     3.630     3.630"
" 33        CATCHMENT 302"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        302   No description"
"      50.000   % Impervious"
"       6.000   Total Area"
"     100.000   Flow length"
"       2.000   Overland Slope"
"       3.000   Pervious Area"
"     100.000   Pervious length"
"       2.000   Pervious slope"
"       3.000   Impervious Area"
"     100.000   Impervious length"
"       2.000   Impervious slope"
"       0.280   Pervious Manning 'n'"
"      80.000   Pervious SCS Curve No."
"       0.515   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       6.350   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.934   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.760     0.000     3.630     3.630 c.m/sec"
"           Catchment 302          Pervious   Impervious Total Area "
"           Surface Area           3.000      3.000      6.000      hectare"
"           Time of concentration  35.642     4.929      15.850     minutes"
"           Time to Centroid       266.035    206.801    227.863    minutes"
"           Rainfall depth         86.100     86.100     86.100     mm"
"           Rainfall volume        2583.00    2583.00    5166.00    c.m"
"           Rainfall losses        41.724     5.681      23.703     mm"
"           Runoff depth           44.376     80.419     62.397     mm"
"           Runoff volume          1331.29    2412.56    3743.85    c.m"
"           Runoff coefficient     0.515      0.934      0.725      "
"           Maximum flow           0.294      0.560      0.760      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                   0.760     0.760     3.630     3.630"
" 52        CHANNEL DESIGN"
"       0.760   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"           Depth of flow                 0.098    metre"
"           Velocity                      1.203    m/sec"
"           Channel capacity              7.740    c.m/sec"
"           Critical depth                0.120    metre"
" 53        ROUTE    Channel Route 180"
"      180.00      Channel Route 180 Reach length   ( metre)"
"       0.493   X-factor <= 0.5"
"     112.185   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                  0.738    c.m/sec"
"                   0.760     0.760     0.738     3.630 c.m/sec"
" 40        HYDROGRAPH Next link "
"          5   Next link "
"                   0.760     0.738     0.738     3.630"
" 33        CATCHMENT 303"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        303   No description"
"      75.000   % Impervious"
"       4.800   Total Area"
"     100.000   Flow length"
"       2.000   Overland Slope"
"       1.200   Pervious Area"
"     100.000   Pervious length"
"       2.000   Pervious slope"
"       3.600   Impervious Area"
"     100.000   Impervious length"
"       2.000   Impervious slope"
"       0.280   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.552   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.934   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.759     0.738     0.738     3.630 c.m/sec"
"           Catchment 303          Pervious   Impervious Total Area "
"           Surface Area           1.200      3.600      4.800      hectare"
"           Time of concentration  34.908     4.929      9.865      minutes"
"           Time to Centroid       263.605    206.801    216.153    minutes"
"           Rainfall depth         86.100     86.100     86.100     mm"
"           Rainfall volume        1033.20    3099.60    4132.80    c.m"
"           Rainfall losses        38.550     5.681      13.898     mm"
"           Runoff depth           47.550     80.419     72.202     mm"
"           Runoff volume          570.60     2895.07    3465.67    c.m"
"           Runoff coefficient     0.552      0.934      0.839      "
"           Maximum flow           0.128      0.671      0.759      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                   0.759     1.497     0.738     3.630"
" 52        CHANNEL DESIGN"
"       1.497   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"           Depth of flow                 0.138    metre"
"           Velocity                      1.454    m/sec"
"           Channel capacity              7.740    c.m/sec"
"           Critical depth                0.172    metre"
" 53        ROUTE    Channel Route 250"
"      250.00      Channel Route 250 Reach length   ( metre)"
"       0.493   X-factor <= 0.5"
"     128.980   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                  1.463    c.m/sec"
"                   0.759     1.497     1.463     3.630 c.m/sec"
" 40        HYDROGRAPH   Combine    6100"
"          6   Combine "
"       6100   Node #"
"              "
"           Maximum flow                  5.006    c.m/sec"
"           Hydrograph volume         29161.334    c.m"
"                   0.759     1.497     1.463     5.006"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                   0.759     0.000     1.463     5.006"
" 33        CATCHMENT 407"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        407   No description"
"      75.000   % Impervious"
"       3.000   Total Area"
"     100.000   Flow length"
"       2.000   Overland Slope"
"       0.750   Pervious Area"
"     100.000   Pervious length"
"       2.000   Pervious slope"
"       2.250   Impervious Area"
"     100.000   Impervious length"
"       2.000   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.572   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.934   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.475     0.000     1.463     5.006 c.m/sec"
"           Catchment 407          Pervious   Impervious Total Area "
"           Surface Area           0.750      2.250      3.000      hectare"
"           Time of concentration  36.021     4.929      10.197     minutes"
"           Time to Centroid       264.150    206.801    216.518    minutes"
"           Rainfall depth         86.100     86.100     86.100     mm"
"           Rainfall volume        645.75     1937.25    2583.00    c.m"
"           Rainfall losses        36.883     5.681      13.482     mm"
"           Runoff depth           49.217     80.419     72.618     mm"
"           Runoff volume          369.13     1809.42    2178.55    c.m"
"           Runoff coefficient     0.572      0.934      0.843      "
"           Maximum flow           0.082      0.420      0.475      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                   0.475     0.475     1.463     5.006"
" 52        CHANNEL DESIGN"
"       0.475   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"           Depth of flow                 0.076    metre"
"           Velocity                      1.050    m/sec"
"           Channel capacity              7.740    c.m/sec"
"           Critical depth                0.092    metre"
" 53        ROUTE    Channel Route 100"
"      100.00      Channel Route 100 Reach length   ( metre)"
"       0.490   X-factor <= 0.5"
"      71.416   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      60.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                  0.471    c.m/sec"
"                   0.475     0.475     0.471     5.006 c.m/sec"
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" 40          HYDROGRAPH Next link "
"           5   Next link "
"                   0.475     0.471     0.471     5.006"
" 33          CATCHMENT 310"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         310   No description"
"      75.000   % Impervious"
"       2.400   Total Area"
"      75.000   Flow length"
"       2.000   Overland Slope"
"       0.600   Pervious Area"
"      75.000   Pervious length"
"       2.000   Pervious slope"
"       1.800   Impervious Area"
"      75.000   Impervious length"
"       2.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.552   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.920   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.393     0.471     0.471     5.006 c.m/sec"
"           Catchment 310          Pervious   Impervious Total Area "
"           Surface Area           0.600      1.800      2.400      hectare"
"           Time of concentration  24.004     4.148      7.459      minutes"
"           Time to Centroid       250.434    205.640    213.109    minutes"
"           Rainfall depth         86.100     86.100     86.100     mm"
"           Rainfall volume        516.60     1549.80    2066.40    c.m"
"           Rainfall losses        38.555     6.902      14.815     mm"
"           Runoff depth           47.545     79.198     71.285     mm"
"           Runoff volume          285.27     1425.56    1710.83    c.m"
"           Runoff coefficient     0.552      0.920      0.828      "
"           Maximum flow           0.076      0.326      0.393      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.393     0.864     0.471     5.006"
" 52          CHANNEL DESIGN"
"       0.864   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       2.000   Gradient   %"
"           Depth of flow                0.259    metre"
"           Velocity                     1.200    m/sec"
"           Channel capacity           557.696    c.m/sec"
"           Critical depth               0.236    metre"
" 53          ROUTE    Channel Route 200"
"      200.00      Channel Route 200 Reach length   ( metre)"
"       0.482   X-factor <= 0.5"
"     124.972   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"           Peak outflow                 0.853    c.m/sec"
"                   0.393     0.864     0.853     5.006 c.m/sec"
" 40          HYDROGRAPH   Combine    6100"
"           6   Combine "
"        6100   Node #"
"               "
"           Maximum flow                 5.767    c.m/sec"
"           Hydrograph volume        33050.715    c.m"
"                   0.393     0.864     0.853     5.767"
" 40          HYDROGRAPH   Confluence    6100"
"           7   Confluence "
"        6100   Node #"
"               "
"           Maximum flow                 5.767    c.m/sec"
"           Hydrograph volume        33050.715    c.m"
"                   0.393     5.767     0.853     0.000"
" 52          CHANNEL DESIGN"
"       5.767   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       2.000   Gradient   %"
"           Depth of flow                0.691    metre"
"           Velocity                     2.050    m/sec"
"           Channel capacity           557.696    c.m/sec"
"           Critical depth               0.679    metre"
" 53          ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"       0.332   X-factor <= 0.5"
"      18.289   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      23.077   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"           Peak outflow                 5.762    c.m/sec"
"                   0.393     5.767     5.762     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                   0.393     5.762     5.762     0.000"
" 81          ADD COMMENT==================================================="
"        1  Lines of comment"
"           PROPOSED POND #2"
" 54          POND DESIGN"
"       5.762   Current peak flow    c.m/sec"
"       4.007   Target outflow    c.m/sec"
"     33050.7   Hydrograph volume    c.m"
"         25.   Number of stages"
"       0.000   Minimum water level    metre"
"       2.300   Maximum water level    metre"
"       0.000   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"                 0.000     0.000     0.000"
"               0.09583   0.00452   875.671"
"                0.1917   0.01493  1778.243"
"                0.2875   0.03442  2706.844"
"                0.3833   0.04383  3662.299"
"                0.4792   0.05156  4645.824"
"                0.5750   0.05826  5655.543"
"                0.6708   0.06427  6692.645"
"                0.7667   0.06977  7758.431"
"                0.8625   0.07486  8850.853"
"                0.9583   0.07963  9971.185"
"                 1.054   0.08412  11118.39"
"                 1.150   0.08840  12297.52"
"                 1.246    0.2294  13505.21"
"                 1.342    0.4837  14741.64"
"                 1.438    0.8116  16006.97"
"                 1.533     1.195  17287.76"
"                 1.629     1.633  18611.14"
"                 1.725     2.118  19963.96"
"                 1.821     2.644  21346.39"
"                 1.917     3.209  22758.63"
"                 2.013     3.811  24200.82"
"                 2.108     5.348  25657.67"
"                 2.204     7.723  27160.03"
"                 2.300    10.675  28692.88"
"          2.   WEIRS"
"                 Crest      Weir     Crest      Left     Right"
"             elevation coefficie   breadth sideslope sideslope"
"                 1.150     0.900     3.000     0.000     0.000"
"                 2.013     0.900    20.000     3.000     3.000"
"          1.   ORIFICES"
"               Orifice   Orifice   Orifice Number of"
"                invert coefficie  diameter  orifices"
"                 0.000     0.630    0.2000     1.000"
"          2.   LAYERS"
"                Bottom    Aspect    Bottom       Top   Average"
"                  area     ratio elevation elevation sideslope"
"              9000.000     7.000     0.000     2.000     5.000"
"             15137.096     4.852     2.000     2.300     5.000"
"           Peak outflow                 2.080    c.m/sec"
"           Maximum level                1.718    metre"
"           Maximum storage          19859.102    c.m"
"           Centroidal lag              17.374   hours"
"                   0.393     5.762     2.080     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                   0.393     2.080     2.080     0.000"
" 52          CHANNEL DESIGN"
"       2.080   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       2.000   Gradient   %"
"           Depth of flow                0.414    metre"
"           Velocity                     1.551    m/sec"
"           Channel capacity           557.696    c.m/sec"
"           Critical depth               0.391    metre"
" 53          ROUTE    Channel Route 250"
"      250.00      Channel Route 250 Reach length   ( metre)"
"       0.479   X-factor <= 0.5"
"     120.906   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"           Peak outflow                 2.073    c.m/sec"
"                   0.393     2.080     2.073     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    2000"
"           6   Combine "
"        2000   Node #"
"               Flow in Hwy. 21 Ditch"
"           Maximum flow                 3.546    c.m/sec"
"           Hydrograph volume        39391.145    c.m"
"                   0.393     2.080     2.073     3.546"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.393     0.000     2.073     3.546"
" 33          CATCHMENT 311"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         311   No description"
"      75.000   % Impervious"
"       6.600   Total Area"
"     100.000   Flow length"
"       2.000   Overland Slope"
"       1.650   Pervious Area"
"     100.000   Pervious length"
"       2.000   Pervious slope"
"       4.950   Impervious Area"
"     100.000   Impervious length"
"       2.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.552   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.934   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   1.079     0.000     2.073     3.546 c.m/sec"
"           Catchment 311          Pervious   Impervious Total Area "
"           Surface Area           1.650      4.950      6.600      hectare"
"           Time of concentration  28.527     4.929      8.813      minutes"
"           Time to Centroid       255.889    206.801    214.881    minutes"
"           Rainfall depth         86.100     86.100     86.100     mm"
"           Rainfall volume        1420.65    4261.95    5682.60    c.m"
"           Rainfall losses        38.560     5.681      13.901     mm"
"           Runoff depth           47.540     80.419     72.199     mm"
"           Runoff volume          784.41     3980.72    4765.13    c.m"
"           Runoff coefficient     0.552      0.934      0.839      "
"           Maximum flow           0.196      0.923      1.079      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   1.079     1.079     2.073     3.546"
" 52          CHANNEL DESIGN"
"       1.079   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
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"             Depth of flow                  0.117    metre"
"             Velocity                       1.328    m/sec"
"             Channel capacity               7.740    c.m/sec"
"             Critical depth                 0.145    metre"
" 53          ROUTE    Channel Route 200"
"        200.00       Channel Route 200 Reach length   ( metre)"
"         0.493   X-factor <= 0.5"
"       112.936   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       100.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                   1.065    c.m/sec"
"                    1.079     1.079     1.065     3.546 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                    1.079     1.065     1.065     3.546"
" 33          CATCHMENT 314"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          314   No description"
"        50.000   % Impervious"
"         3.300   Total Area"
"        20.000   Flow length"
"         1.000   Overland Slope"
"         1.650   Pervious Area"
"        20.000   Pervious length"
"         1.000   Pervious slope"
"         1.650   Impervious Area"
"        20.000   Impervious length"
"         1.000   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.551   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.922   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.533     1.065     1.065     3.546 c.m/sec"
"             Catchment 314          Pervious   Impervious Total Area "
"             Surface Area           1.650      1.650      3.300      hectare"
"             Time of concentration  13.372     2.310      6.448      minutes"
"             Time to Centroid       237.551    203.437    216.199    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        1420.65    1420.65    2841.30    c.m"
"             Rainfall losses        38.630     6.678      22.654     mm"
"             Runoff depth           47.470     79.422     63.446     mm"
"             Runoff volume          783.25     1310.46    2093.71    c.m"
"             Runoff coefficient     0.551      0.922      0.737      "
"             Maximum flow           0.228      0.305      0.533      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.533     1.599     1.065     3.546"
" 52          CHANNEL DESIGN"
"         1.599   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         2.000   Gradient   %"
"             Depth of flow                  0.361    metre"
"             Velocity                       1.439    m/sec"
"             Channel capacity             557.696    c.m/sec"
"             Critical depth                 0.337    metre"
" 53          ROUTE    Channel Route 80"
"         80.00       Channel Route 80 Reach length   ( metre)"
"         0.441   X-factor <= 0.5"
"        41.701   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"        42.857   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                   1.592    c.m/sec"
"                    0.533     1.599     1.592     3.546 c.m/sec"
" 40          HYDROGRAPH   Combine    7000"
"            6   Combine "
"         7000   Node #"
"                "
"             Maximum flow                   1.592    c.m/sec"
"             Hydrograph volume           6858.837    c.m"
"                    0.533     1.599     1.592     1.592"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.533     0.000     1.592     1.592"
" 33          CATCHMENT 312"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          312   No description"
"        75.000   % Impervious"
"         4.400   Total Area"
"       100.000   Flow length"
"         2.000   Overland Slope"
"         1.100   Pervious Area"
"       100.000   Pervious length"
"         2.000   Pervious slope"
"         3.300   Impervious Area"
"       100.000   Impervious length"
"         2.000   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.552   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.934   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.719     0.000     1.592     1.592 c.m/sec"
"             Catchment 312          Pervious   Impervious Total Area "
"             Surface Area           1.100      3.300      4.400      hectare"
"             Time of concentration  28.527     4.929      8.813      minutes"
"             Time to Centroid       255.889    206.801    214.881    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        947.10     2841.30    3788.40    c.m"
"             Rainfall losses        38.560     5.681      13.901     mm"
"             Runoff depth           47.540     80.419     72.199     mm"
"             Runoff volume          522.94     2653.82    3176.75    c.m"
"             Runoff coefficient     0.552      0.934      0.839      "
"             Maximum flow           0.131      0.615      0.719      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.719     0.719     1.592     1.592"
" 52          CHANNEL DESIGN"
"         0.719   Current peak flow    c.m/sec"
"         0.020   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         4.000   Basewidth    metre"
"        50.000   Left bank slope"
"         0.000   Right bank slope"
"         0.300   Channel depth    metre"
"         2.000   Gradient   %"
"             Depth of flow                  0.095    metre"
"             Velocity                       1.184    m/sec"
"             Channel capacity               7.740    c.m/sec"
"             Critical depth                 0.116    metre"
" 53          ROUTE    Channel Route 100"
"        100.00       Channel Route 100 Reach length   ( metre)"
"         0.488   X-factor <= 0.5"
"        63.319   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"        60.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                   0.714    c.m/sec"
"                    0.719     0.719     0.714     1.592 c.m/sec"
" 40          HYDROGRAPH   Combine    7000"
"            6   Combine "
"         7000   Node #"
"                "
"             Maximum flow                   2.306    c.m/sec"
"             Hydrograph volume          10035.589    c.m"
"                    0.719     0.719     0.714     2.306"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.719     0.000     0.714     2.306"
" 33          CATCHMENT 304"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          304   No description"
"        50.000   % Impervious"
"         1.600   Total Area"
"        75.000   Flow length"
"         2.000   Overland Slope"
"         0.800   Pervious Area"
"        75.000   Pervious length"
"         2.000   Pervious slope"
"         0.800   Impervious Area"
"        75.000   Impervious length"
"         2.000   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
"         0.552   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.576   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.920   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.235     0.000     0.714     2.306 c.m/sec"
"             Catchment 304          Pervious   Impervious Total Area "
"             Surface Area           0.800      0.800      1.600      hectare"
"             Time of concentration  24.004     4.148      11.596     minutes"
"             Time to Centroid       250.434    205.640    222.444    minutes"
"             Rainfall depth         86.100     86.100     86.100     mm"
"             Rainfall volume        688.80     688.80     1377.60    c.m"
"             Rainfall losses        38.555     6.902      22.729     mm"
"             Runoff depth           47.545     79.198     63.371     mm"
"             Runoff volume          380.36     633.58     1013.94    c.m"
"             Runoff coefficient     0.552      0.920      0.736      "
"             Maximum flow           0.101      0.145      0.235      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.235     0.235     0.714     2.306"
" 52          CHANNEL DESIGN"
"         0.235   Current peak flow    c.m/sec"
"         0.020   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         4.000   Basewidth    metre"
"        50.000   Left bank slope"
"         0.000   Right bank slope"
"         0.600   Channel depth    metre"
"         2.000   Gradient   %"
"             Depth of flow                  0.052    metre"
"             Velocity                       0.848    m/sec"
"             Channel capacity              38.450    c.m/sec"
"             Critical depth                 0.062    metre"
" 53          ROUTE    Channel Route 50"
"         50.00       Channel Route 50 Reach length   ( metre)"
"         0.486   X-factor <= 0.5"
"        44.196   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"        42.857   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                   0.232    c.m/sec"
"                    0.235     0.235     0.232     2.306 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                    0.235     0.232     0.232     2.306"
" 33          CATCHMENT 313"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          313   No description"
"        75.000   % Impervious"
"         1.800   Total Area"
"        50.000   Flow length"
"         2.000   Overland Slope"
"         0.450   Pervious Area"
"        50.000   Pervious length"
"         2.000   Pervious slope"
"         1.350   Impervious Area"
"        50.000   Impervious length"
"         2.000   Impervious slope"
"         0.200   Pervious Manning 'n'"
"        82.000   Pervious SCS Curve No."
```

```
"        0.552   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.919   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                0.299     0.232     0.232     2.306 c.m/sec"
"            Catchment 313          Pervious   Impervious Total Area "
"            Surface Area           0.450      1.350      1.800      hectare"
"            Time of concentration  18.821     3.252      5.847      minutes"
"            Time to Centroid       244.145    204.723    211.295    minutes"
"            Rainfall depth         86.100     86.100     86.100     mm"
"            Rainfall volume        387.45     1162.35    1549.80    c.m"
"            Rainfall losses        38.606     6.972      14.881     mm"
"            Runoff depth           47.494     79.128     71.219     mm"
"            Runoff volume          213.73     1068.22    1281.95    c.m"
"            Runoff coefficient     0.552      0.919      0.827      "
"            Maximum flow           0.062      0.251      0.299      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                0.299     0.532     0.232     2.306"
" 52         CHANNEL DESIGN"
"        0.532   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"            Depth of flow                 0.081    metre"
"            Velocity                      1.086    m/sec"
"            Channel capacity              7.740    c.m/sec"
"            Critical depth                0.098    metre"
" 53         ROUTE    Channel Route 200"
"       200.00      Channel Route 200 Reach length   ( metre)"
"        0.495   X-factor <= 0.5"
"      138.158   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  0.521    c.m/sec"
"                0.299     0.532     0.521     2.306 c.m/sec"
" 40         HYDROGRAPH   Combine    7000"
"           6   Combine "
"         7000   Node #"
"                 "
"            Maximum flow                  2.827    c.m/sec"
"            Hydrograph volume         12331.485    c.m"
"                0.299     0.532     0.521     2.827"
" 40         HYDROGRAPH   Confluence    7000"
"           7   Confluence "
"         7000   Node #"
"                 "
"            Maximum flow                  2.827    c.m/sec"
"            Hydrograph volume         12331.485    c.m"
"                0.299     2.827     0.521     0.000"
" 52         CHANNEL DESIGN"
"        2.827   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"            Depth of flow                 0.484    metre"
"            Velocity                      1.690    m/sec"
"            Channel capacity            557.696    c.m/sec"
"            Critical depth                0.464    metre"
" 53         ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.377   X-factor <= 0.5"
"       22.194   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       27.273   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  2.819    c.m/sec"
"                0.299     2.827     2.819     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                0.299     2.819     2.819     0.000"
" 81         ADD COMMENT=================================================="
"         1  Lines of comment"
"            PROPOSED POND #3"
" 54         POND DESIGN"
"        2.819   Current peak flow    c.m/sec"
"        2.000   Target outflow    c.m/sec"
"      12331.5   Hydrograph volume    c.m"
"          21.   Number of stages"
"        0.000   Minimum water level    metre"
"        2.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"           0    Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                  0.000     0.000     0.000"
"                 0.1000   0.00487   607.388"
"                 0.2000   0.01603  1237.688"
"                 0.3000   0.03579  1891.097"
"                 0.4000   0.04527  2567.818"
"                 0.5000   0.05309  3268.049"
"                 0.6000   0.05989  3991.990"
"                 0.7000   0.06599  4739.842"
"                 0.8000   0.07158  5511.804"
"                 0.9000   0.07676  6308.077"
"                  1.000   0.08161  7128.861"
"                  1.100   0.08619  7974.355"
"                  1.200   0.09054  8844.760"
"                  1.300    0.1190  9740.274"
"                  1.400    0.1673  10661.10"
"                  1.500    0.2286  11607.44"
"                  1.600    0.3003  12579.48"
"                  1.700    0.3810  13577.44"
"                  1.800     1.208  14601.51"
"                  1.900     2.686  15651.89"
"                  2.000     4.619  16728.78"
"          2.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
"             elevation coefficie   breadth sideslope sideslope"
"                1.200     0.900     0.500     0.000     0.000"
"                1.700     0.900    15.000     3.000     3.000"
"          1.   ORIFICES"
"               Orifice   Orifice   Orifice Number of"
"                invert coefficie  diameter  orifices"
"                 0.000     0.630    0.2000     1.000"
"          2.   LAYERS"
"                Bottom    Aspect    Bottom       Top   Average"
"                  area     ratio elevation elevation sideslope"
"             5960.000     6.500     0.000     2.000     5.000"
"            10902.110     4.312     2.000     2.000     4.000"
"            Peak outflow                  0.168    c.m/sec"
"            Maximum level                 1.402    metre"
"            Maximum storage           10679.215    c.m"
"            Centroidal lag               22.716   hours"
"                0.299     2.819     0.168     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                0.299     0.168     0.168     0.000"
" 52         CHANNEL DESIGN"
"        0.168   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"            Depth of flow                 0.126    metre"
"            Velocity                      0.563    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                0.086    metre"
" 53         ROUTE    Channel Route 300"
"       300.00      Channel Route 300 Reach length   ( metre)"
"        0.476   X-factor <= 0.5"
"      199.882   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                  0.168    c.m/sec"
"                0.299     0.168     0.168     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    1100"
"           6   Combine "
"         1100   Node #"
"               Node taking 200 series - Bottom end of Holtby Drain"
"            Maximum flow                 16.345    c.m/sec"
"            Hydrograph volume         93803.180    c.m"
"                0.299     0.168     0.168    16.345"
" 81         ADD COMMENT=================================================="
"         1  Lines of comment"
"            Total to Holtby Drain"
" 40         HYDROGRAPH   Confluence    1100"
"           7   Confluence "
"         1100   Node #"
"               Node taking 200 series - Bottom end of Holtby Drain"
"            Maximum flow                 16.345    c.m/sec"
"            Hydrograph volume         93803.172    c.m"
"                0.299    16.345     0.168     0.000"
" 81         ADD COMMENT=================================================="
"         1  Lines of comment"
"            Total to Holtby Drain"
" 52         CHANNEL DESIGN"
"       16.345   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"            Depth of flow                 1.538    metre"
"            Velocity                      1.608    m/sec"
"            Channel capacity            278.848    c.m/sec"
"            Critical depth                1.146    metre"
" 53         ROUTE    Channel Route 200"
"       200.00      Channel Route 200 Reach length   ( metre)"
"        0.162   X-factor <= 0.5"
"       93.308   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 16.201    c.m/sec"
"                0.299    16.345    16.201     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    1300"
"           6   Combine "
"         1300   Node #"
"               Node at Holtby Drain"
"            Maximum flow                 20.879    c.m/sec"
"            Hydrograph volume        120136.023    c.m"
"                0.299    16.345    16.201    20.879"
" 40         HYDROGRAPH   Confluence    1300"
"           7   Confluence "
"         1300   Node #"
"               Node at Holtby Drain"
"            Maximum flow                 20.879    c.m/sec"
"            Hydrograph volume        120136.008    c.m"
"                0.299    20.879    16.201     0.000"
" 52         CHANNEL DESIGN"
"       20.879   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"            Depth of flow                 1.711    metre"
"            Velocity                      1.711    m/sec"
"            Channel capacity            278.848    c.m/sec"
"            Critical depth                1.289    metre"
" 53         ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       21.922   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.788   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 20.843    c.m/sec"
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"                    0.299    20.879    20.843     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1000"
"            6   Combine "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow                 94.112    c.m/sec"
"             Hydrograph volume        825422.625    c.m"
"                    0.299    20.879    20.843    94.112"
" 81          ADD COMMENT==================================================="
"           2  Lines of comment"
"             Total discharge to Pipe Arch under Hwy. 21 on the "
"             Pentangore Tributary"
" 40          HYDROGRAPH   Confluence    1000"
"            7   Confluence "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow                 94.112    c.m/sec"
"             Hydrograph volume        825422.625    c.m"
"                    0.299    94.112    20.843     0.000"
" 81          ADD COMMENT==================================================="
"           2  Lines of comment"
"             Total discharge to Pipe Arch under Hwy. 21 on the "
"             Pentangore Tributary"
" 52          CHANNEL DESIGN"
"       94.112   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 3.225    metre"
"             Velocity                      2.499    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                2.577    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       15.004   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.929   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 94.104    c.m/sec"
"                    0.299    94.112    94.104     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    3000"
"            6   Combine "
"         3000   Node #"
"                Node Combining All Flow"
"             Maximum flow                 94.104    c.m/sec"
"             Hydrograph volume        825421.875    c.m"
"                    0.299    94.112    94.104    94.104"
" 81          ADD COMMENT==================================================="
"           1  Lines of comment"
"             Total Off-site Discharge - Hwy. 21 + Penetangore Tributary"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.299     0.000    94.104    94.104"
" 40          HYDROGRAPH   Confluence    2000"
"            7   Confluence "
"         2000   Node #"
"                Flow in Hwy. 21 Ditch"
"             Maximum flow                  3.546    c.m/sec"
"             Hydrograph volume         39391.148    c.m"
"                    0.299     3.546    94.104     0.000"
" 81          ADD COMMENT==================================================="
"           1  Lines of comment"
"             Total discharge to Hwy. 21 Ditch"
" 52          CHANNEL DESIGN"
"        3.546   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 0.763    metre"
"             Velocity                      1.083    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.525    metre"
" 53          ROUTE    Channel Route 100"
"       100.00      Channel Route 100 Reach length   ( metre)"
"        0.134   X-factor <= 0.5"
"       69.248   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  3.530    c.m/sec"
"                    0.299     3.546     3.530     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    3000"
"            6   Combine "
"         3000   Node #"
"                Node Combining All Flow"
"             Maximum flow                 97.161    c.m/sec"
"             Hydrograph volume        864808.313    c.m"
"                    0.299     3.546     3.530    97.161"
" 40          HYDROGRAPH   Confluence    3000"
"            7   Confluence "
"         3000   Node #"
"                Node Combining All Flow"
"             Maximum flow                 97.161    c.m/sec"
"             Hydrograph volume        864808.250    c.m"
"                    0.299    97.161     3.530     0.000"
" 81          ADD COMMENT==================================================="
"           1  Lines of comment"
"             Total Off-site Discharge - Hwy. 21 + Penetangore Tributary"
" 52          CHANNEL DESIGN"
"       97.161   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 3.267    metre"
"             Velocity                      2.519    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                2.614    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       14.884   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.932   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 97.160    c.m/sec"
"                    0.299    97.161    97.160     0.000 c.m/sec"
" 38          START/RE-START TOTALS 3000"
"            1   Runoff Totals turned OFF"
"             Catchment area to node 3000            1918.200    hectare"
"             Impervious area to node 3000             40.592    hectare"
"             % impervious to node 3000                 0.000"
"             Peak runoff to node 3000                  0.000    c.m/sec"
"             Total volume to node 3000                   0.0    c.m"
" 38          START/RE-START TOTALS 3000"
"            1   Runoff Totals turned ON"
"             Catchment area to node 3000            1918.200    hectare"
"             Impervious area to node 3000             40.592    hectare"
"             % impervious to node 3000                 2.116"
"             Peak runoff to node 3000                149.139    c.m/sec"
"             Total volume to node 3000              876072.6    c.m"
```

POST DEVELOPMENT 100 YEAR

```
"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                        Sunday, February 7, 2010"
"           10  Units used:                                        ie METRIC"
"               Job folder:                     C:\Users\derb\Desktop\KBP - Report\"
"                                        2016 Work\Appendix F - Miduss Modelling"
"               Output filename:                       08055 - Post 100 Year.out"
"               Licensee name:                                    BMROSS - DLE"
"               Company                                                 BMROSS"
"               Date & Time last used:                  6/25/2016 at 9:35:43 AM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      360.000   Max. Storm length"
"     1800.000   Max. Hydrograph"
" 32          STORM Mass Curve"
"            3   Mass Curve"
"      108.800   Rainfall depth"
"      360.000   Duration"
"           47   C:\Program Files (x86)\MIDUSS\SCS_6hr_Type2.mrd   SCS Type II - 6
hour Distribution - Ontario"
"             Maximum intensity            84.864    mm/hr"
"             Total depth                 108.800    mm"
"            6   100hyd   Hydrograph extension used in this file"
" 81          ADD COMMENT==================================================="
"          1  Lines of comment"
"             Start of Penetangore Tributary"
" 33          CATCHMENT 50"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           50   No description"
"        0.000   % Impervious"
"      396.000   Total Area"
"      450.000   Flow length"
"        2.500   Overland Slope"
"      396.000   Pervious Area"
"      450.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      450.000   Impervious length"
"        2.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.598   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    37.770     0.000     0.000     0.000 c.m/sec"
"             Catchment 50           Pervious   Impervious Total Area "
"             Surface Area           396.000    0.000      396.000    hectare"
"             Time of concentration  66.924     10.341     66.924     minutes"
"             Time to Centroid       300.389    212.009    300.389    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        43.0848    0.0000     43.0848    ha-m"
"             Rainfall losses        43.692     5.981      43.692     mm"
"             Runoff depth           65.108     102.819    65.108     mm"
"             Runoff volume          25.7828    0.0000     25.7828    ha-m"
"             Runoff coefficient     0.598      0.000      0.598      "
"             Maximum flow           37.770     0.000      37.770     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  37.770    37.770     0.000     0.000"
" 52          CHANNEL DESIGN"
"       37.770   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 2.206    metre"
"             Velocity                      1.987    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                1.704    metre"
" 53          ROUTE    Channel Route 3000"
"      3000.00      Channel Route 3000 Reach length   ( metre)"
"        0.376   X-factor <= 0.5"
"      283.088   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            4   No. of sub-reaches"
"             Peak outflow                 37.185    c.m/sec"
"                  37.770    37.770    37.185     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                  37.770    37.185    37.185     0.000"
" 33          CATCHMENT 52"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           52   No description"
"        0.000   % Impervious"
"      196.000   Total Area"
"      250.000   Flow length"
"        7.000   Overland Slope"
"      196.000   Pervious Area"
"      250.000   Pervious length"
"        7.000   Pervious slope"
"        0.000   Impervious Area"
"      250.000   Impervious length"
"        7.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       80.000   Pervious SCS Curve No."
"        0.581   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.350   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    28.020    37.185    37.185     0.000 c.m/sec"
"             Catchment 52           Pervious   Impervious Total Area "
"             Surface Area           196.000    0.000      196.000    hectare"
"             Time of concentration  34.824     5.336      34.824     minutes"
"             Time to Centroid       262.294    206.023    262.293    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        21.3248    0.0000     21.3248    ha-m"
"             Rainfall losses        45.592     5.703      45.592     mm"
"             Runoff depth           63.208     103.097    63.208     mm"
"             Runoff volume          12.3888    0.0000     12.3888    ha-m"
"             Runoff coefficient     0.581      0.000      0.581      "
"             Maximum flow           28.020     0.000      28.020     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  28.020    46.374    37.185     0.000"
" 52          CHANNEL DESIGN"
"       46.374   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"             Depth of flow                 2.520    metre"
"             Velocity                      1.925    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.872    metre"
" 53          ROUTE    Channel Route 1300"
"      1300.00      Channel Route 1300 Reach length   ( metre)"
"        0.297   X-factor <= 0.5"
"      253.279   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                 46.162    c.m/sec"
"                  28.020    46.374    46.162     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                  28.020    46.162    46.162     0.000"
" 33          CATCHMENT 54"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           54   No description"
"        0.000   % Impervious"
"       39.000   Total Area"
"      140.000   Flow length"
"       11.000   Overland Slope"
"       39.000   Pervious Area"
"      140.000   Pervious length"
"       11.000   Pervious slope"
"        0.000   Impervious Area"
"      140.000   Impervious length"
"       11.000   Impervious slope"
"        0.210   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.597   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     7.223    46.162    46.162     0.000 c.m/sec"
"             Catchment 54           Pervious   Impervious Total Area "
"             Surface Area           39.000     0.000      39.000     hectare"
"             Time of concentration  19.181     3.291      19.181     minutes"
"             Time to Centroid       242.650    203.605    242.650    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        4.2432     0.0000     4.2432     ha-m"
"             Rainfall losses        43.802     7.543      43.802     mm"
"             Runoff depth           64.998     101.257    64.998     mm"
"             Runoff volume          2.5349     0.0000     2.5349     ha-m"
"             Runoff coefficient     0.597      0.000      0.597      "
"             Maximum flow           7.223      0.000      7.223      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   7.223    47.717    46.162     0.000"
" 52          CHANNEL DESIGN"
"       47.717   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.400   Gradient   %"
"             Depth of flow                 2.550    metre"
"             Velocity                      1.939    m/sec"
"             Channel capacity            249.409    c.m/sec"
"             Critical depth                1.897    metre"
" 53          ROUTE    Channel Route 800"
"       800.00      Channel Route 800 Reach length   ( metre)"
"        0.334   X-factor <= 0.5"
"      309.499   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 47.596    c.m/sec"
"                   7.223    47.717    47.596     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    10"
"            6   Combine "
"           10   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow                 47.596    c.m/sec"
"             Hydrograph volume        407065.875    c.m"
"                   7.223    47.717    47.596    47.596"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                   7.223     0.000    47.596    47.596"
" 33          CATCHMENT 60"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           60   No description"
"        0.000   % Impervious"
"      225.000   Total Area"
"      270.000   Flow length"
"        2.500   Overland Slope"
"      225.000   Pervious Area"
"      270.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
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"       270.000   Impervious length"
"         2.500   Impervious slope"
"         0.230   Pervious Manning 'n'"
"        81.000   Pervious SCS Curve No."
"         0.598   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         5.958   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                     27.615     0.000    47.596    47.596 c.m/sec"
"              Catchment 60           Pervious   Impervious Total Area "
"              Surface Area           225.000    0.000      225.000    hectare"
"              Time of concentration  46.854     7.611      46.854     minutes"
"              Time to Centroid       276.114    208.803    276.113    minutes"
"              Rainfall depth         108.800    108.800    108.800    mm"
"              Rainfall volume        24.4800    0.0000     24.4800    ha-m"
"              Rainfall losses        43.706     5.897      43.706     mm"
"              Runoff depth           65.094     102.903    65.094     mm"
"              Runoff volume          14.6461    0.0000     14.6461    ha-m"
"              Runoff coefficient     0.598      0.000      0.598      "
"              Maximum flow           27.615     0.000      27.615     c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                     27.615    27.615    47.596    47.596"
" 52           CHANNEL DESIGN"
"        27.615   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         0.400   Gradient   %"
"              Depth of flow                 2.025    metre"
"              Velocity                      1.689    m/sec"
"              Channel capacity            249.409    c.m/sec"
"              Critical depth                1.472    metre"
" 53           ROUTE    Channel Route 1800"
"       1800.00       Channel Route 1800 Reach length   ( metre)"
"         0.320   X-factor <= 0.5"
"       266.406   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       300.000   Routing time step   ( seconds)"
"             3   No. of sub-reaches"
"              Peak outflow                 27.176    c.m/sec"
"                     27.615    27.615    27.176    47.596 c.m/sec"
" 40           HYDROGRAPH   Combine    10"
"             6   Combine "
"            10   Node #"
"                 Confluence on Penetangore Tributary"
"              Maximum flow                 71.637    c.m/sec"
"              Hydrograph volume        553527.000    c.m"
"                     27.615    27.615    27.176    71.637"
" 40           HYDROGRAPH   Confluence    10"
"             7   Confluence "
"            10   Node #"
"                 Confluence on Penetangore Tributary"
"              Maximum flow                 71.637    c.m/sec"
"              Hydrograph volume        553527.000    c.m"
"                     27.615    71.637    27.176     0.000"
" 52           CHANNEL DESIGN"
"        71.637   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         0.400   Gradient   %"
"              Depth of flow                 3.018    metre"
"              Velocity                      2.147    m/sec"
"              Channel capacity            249.409    c.m/sec"
"              Critical depth                2.281    metre"
" 53           ROUTE    Channel Route 2000"
"       2000.00       Channel Route 2000 Reach length   ( metre)"
"         0.345   X-factor <= 0.5"
"       349.343   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       300.000   Routing time step   ( seconds)"
"             2   No. of sub-reaches"
"              Peak outflow                 71.140    c.m/sec"
"                     27.615    71.637    71.140     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    11"
"             6   Combine "
"            11   Node #"
"                 Confluence on Penetangore Tributary"
"              Maximum flow                 71.140    c.m/sec"
"              Hydrograph volume        553527.188    c.m"
"                     27.615    71.637    71.140    71.140"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                     27.615     0.000    71.140    71.140"
" 33           CATCHMENT 62"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"            62   No description"
"         0.000   % Impervious"
"        95.000   Total Area"
"       160.000   Flow length"
"         2.500   Overland Slope"
"        95.000   Pervious Area"
"       160.000   Pervious length"
"         2.500   Pervious slope"
"         0.000   Impervious Area"
"       160.000   Impervious length"
"         2.500   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        80.000   Pervious SCS Curve No."
"         0.581   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         6.350   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                     13.275     0.000    71.140    71.140 c.m/sec"
"              Catchment 62           Pervious   Impervious Total Area "
"              Surface Area           95.000     0.000      95.000     hectare"
"              Time of concentration  36.285     5.560      36.285     minutes"
"              Time to Centroid       264.065    206.307    264.065    minutes"
"              Rainfall depth         108.800    108.800    108.800    mm"
"              Rainfall volume        10.3360    0.0000     10.3360    ha-m"
"              Rainfall losses        45.578     5.794      45.578     mm"
"              Runoff depth           63.222     103.006    63.222     mm"
"              Runoff volume          6.0061     0.0000     6.0061     ha-m"
"              Runoff coefficient     0.581      0.000      0.581      "
"              Maximum flow           13.275     0.000      13.275     c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                     13.275    13.275    71.140    71.140"
" 52           CHANNEL DESIGN"
"        13.275   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         0.300   Gradient   %"
"              Depth of flow                 1.570    metre"
"              Velocity                      1.260    m/sec"
"              Channel capacity            215.995    c.m/sec"
"              Critical depth                1.035    metre"
" 53           ROUTE    Channel Route 1800"
"       1800.00       Channel Route 1800 Reach length   ( metre)"
"         0.309   X-factor <= 0.5"
"       357.055   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       300.000   Routing time step   ( seconds)"
"             3   No. of sub-reaches"
"              Peak outflow                 12.594    c.m/sec"
"                     13.275    13.275    12.594    71.140 c.m/sec"
" 40           HYDROGRAPH   Combine    11"
"             6   Combine "
"            11   Node #"
"                 Confluence on Penetangore Tributary"
"              Maximum flow                 80.574    c.m/sec"
"              Hydrograph volume        613588.125    c.m"
"                     13.275    13.275    12.594    80.574"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                     13.275     0.000    12.594    80.574"
" 33           CATCHMENT 56"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"            56   No description"
"         0.000   % Impervious"
"       345.000   Total Area"
"       240.000   Flow length"
"        11.000   Overland Slope"
"       345.000   Pervious Area"
"       240.000   Pervious length"
"        11.000   Pervious slope"
"         0.000   Impervious Area"
"       240.000   Impervious length"
"        15.000   Impervious slope"
"         0.280   Pervious Manning 'n'"
"        79.000   Pervious SCS Curve No."
"         0.564   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         6.752   Pervious Initial abstraction"
"         0.013   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                     49.743     0.000    12.594    80.574 c.m/sec"
"              Catchment 56           Pervious   Impervious Total Area "
"              Surface Area           345.000    0.000      345.000    hectare"
"              Time of concentration  32.032     4.143      32.032     minutes"
"              Time to Centroid       259.645    204.458    259.645    minutes"
"              Rainfall depth         108.800    108.800    108.800    mm"
"              Rainfall volume        37.5360    0.0000     37.5360    ha-m"
"              Rainfall losses        47.417     7.379      47.417     mm"
"              Runoff depth           61.383     101.421    61.383     mm"
"              Runoff volume          21.1772    0.0000     21.1772    ha-m"
"              Runoff coefficient     0.564      0.000      0.564      "
"              Maximum flow           49.743     0.000      49.743     c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                     49.743    49.743    12.594    80.574"
" 52           CHANNEL DESIGN"
"        49.743   Current peak flow    c.m/sec"
"         0.040   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"         2.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         5.000   Channel depth    metre"
"         0.400   Gradient   %"
"              Depth of flow                 2.595    metre"
"              Velocity                      1.959    m/sec"
"              Channel capacity            249.409    c.m/sec"
"              Critical depth                1.933    metre"
" 53           ROUTE    Channel Route 1300"
"       1300.00       Channel Route 1300 Reach length   ( metre)"
"         0.292   X-factor <= 0.5"
"       248.853   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       300.000   Routing time step   ( seconds)"
"             2   No. of sub-reaches"
"              Peak outflow                 49.013    c.m/sec"
"                     49.743    49.743    49.013    80.574 c.m/sec"
" 40           HYDROGRAPH   Combine    11"
"             6   Combine "
"            11   Node #"
"                 Confluence on Penetangore Tributary"
"              Maximum flow                111.465    c.m/sec"
"              Hydrograph volume        825360.125    c.m"
"                     49.743    49.743    49.013   111.465"
" 40           HYDROGRAPH   Confluence    11"
"             7   Confluence "
"            11   Node #"
"                 Confluence on Penetangore Tributary"
"              Maximum flow                111.465    c.m/sec"
"              Hydrograph volume        825360.125    c.m"
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"                 49.743   111.465    49.013     0.000"
" 52          CHANNEL DESIGN"
"      111.465   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 3.456    metre"
"             Velocity                      2.608    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                2.778    metre"
" 53          ROUTE   Channel Route 1300"
"      1300.00      Channel Route 1300 Reach length   ( metre)"
"        0.392   X-factor <= 0.5"
"      373.893   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                110.966    c.m/sec"
"                 49.743   111.465   110.966     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow               110.966    c.m/sec"
"             Hydrograph volume        825359.813    c.m"
"                 49.743   111.465   110.966   110.966"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                 49.743     0.000   110.966   110.966"
" 33          CATCHMENT 58"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           58   No description"
"        0.000   % Impervious"
"       82.000   Total Area"
"      140.000   Flow length"
"       15.000   Overland Slope"
"       82.000   Pervious Area"
"      140.000   Pervious length"
"       15.000   Pervious slope"
"        0.000   Impervious Area"
"      140.000   Impervious length"
"       15.000   Impervious slope"
"        0.230   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.597   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                 15.202     0.000   110.966   110.966 c.m/sec"
"             Catchment 58           Pervious   Impervious Total Area "
"             Surface Area           82.000     0.000      82.000     hectare"
"             Time of concentration  18.457     2.998      18.457     minutes"
"             Time to Centroid       241.757    203.195    241.757    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        8.9216     0.0000     8.9216     ha-m"
"             Rainfall losses        43.804     7.307      43.804     mm"
"             Runoff depth           64.996     101.493    64.996     mm"
"             Runoff volume          5.3296     0.0000     5.3296     ha-m"
"             Runoff coefficient     0.597      0.000      0.597      "
"             Maximum flow           15.202     0.000      15.202     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                 15.202    15.202   110.966   110.966"
" 52          CHANNEL DESIGN"
"       15.202   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 1.489    metre"
"             Velocity                      1.578    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                1.106    metre"
" 53          ROUTE   Channel Route 700"
"       700.00      Channel Route 700 Reach length   ( metre)"
"        0.406   X-factor <= 0.5"
"      332.656   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 15.044    c.m/sec"
"                 15.202    15.202    15.044   110.966 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow               114.477    c.m/sec"
"             Hydrograph volume        878656.250    c.m"
"                 15.202    15.202    15.044   114.477"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                 15.202     0.000    15.044   114.477"
" 33          CATCHMENT 64"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           64   No description"
"        0.000   % Impervious"
"       80.000   Total Area"
"      220.000   Flow length"
"        5.500   Overland Slope"
"       80.000   Pervious Area"
"      220.000   Pervious length"
"        5.500   Pervious slope"
"        0.000   Impervious Area"
"      220.000   Impervious length"
"        5.500   Impervious slope"
"        0.210   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.616   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                 12.965     0.000    15.044   114.477 c.m/sec"
"             Catchment 64           Pervious   Impervious Total Area "
"             Surface Area           80.000     0.000      80.000     hectare"
"             Time of concentration  30.722     5.313      30.722     minutes"
"             Time to Centroid       255.861    205.988    255.861    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        8.7040     0.0000     8.7040     ha-m"
"             Rainfall losses        41.823     5.702      41.823     mm"
"             Runoff depth           66.977     103.098    66.977     mm"
"             Runoff volume          5.3582     0.0000     5.3582     ha-m"
"             Runoff coefficient     0.616      0.000      0.616      "
"             Maximum flow           12.965     0.000      12.965     c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                 12.965    12.965    15.044   114.477"
" 52          CHANNEL DESIGN"
"       12.965   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 1.388    metre"
"             Velocity                      1.515    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                1.023    metre"
" 53          ROUTE   Channel Route 700"
"       700.00      Channel Route 700 Reach length   ( metre)"
"        0.412   X-factor <= 0.5"
"      346.428   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 12.812    c.m/sec"
"                 12.965    12.965    12.812   114.477 c.m/sec"
" 40          HYDROGRAPH   Combine    12"
"            6   Combine "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow               121.166    c.m/sec"
"             Hydrograph volume        932238.250    c.m"
"                 12.965    12.965    12.812   121.166"
" 40          HYDROGRAPH   Confluence    12"
"            7   Confluence "
"           12   Node #"
"                Confluence on Penetangore Tributary"
"             Maximum flow               121.166    c.m/sec"
"             Hydrograph volume        932238.250    c.m"
"                 12.965   121.166    12.812     0.000"
" 52          CHANNEL DESIGN"
"      121.166   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.300   Gradient   %"
"             Depth of flow                 3.965    metre"
"             Velocity                      2.199    m/sec"
"             Channel capacity            215.995    c.m/sec"
"             Critical depth                2.882    metre"
" 53          ROUTE   Channel Route 2500"
"      2500.00      Channel Route 2500 Reach length   ( metre)"
"        0.286   X-factor <= 0.5"
"      426.358   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                118.722    c.m/sec"
"                 12.965   121.166   118.722     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1000"
"            6   Combine "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow               118.722    c.m/sec"
"             Hydrograph volume        932238.375    c.m"
"                 12.965   121.166   118.722   118.722"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                 12.965     0.000   118.722   118.722"
" 33          CATCHMENT 59"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           59   No description"
"        0.000   % Impervious"
"      128.000   Total Area"
"      170.000   Flow length"
"       18.000   Overland Slope"
"      128.000   Pervious Area"
"      170.000   Pervious length"
"       18.000   Pervious slope"
"        0.000   Impervious Area"
"      170.000   Impervious length"
"       18.000   Impervious slope"
"        0.350   Pervious Manning 'n'"
"       76.000   Pervious SCS Curve No."
"        0.516   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.021   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                 18.574     0.000   118.722   118.722 c.m/sec"
"             Catchment 59           Pervious   Impervious Total Area "
"             Surface Area           128.000    0.000      128.000    hectare"
"             Time of concentration  26.389     3.189      26.389     minutes"
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"            Time to Centroid       254.845    203.515    254.845    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        13.9264    0.0000     13.9264    ha-m"
"            Rainfall losses        52.712     7.437      52.712     mm"
"            Runoff depth           56.088     101.363    56.088     mm"
"            Runoff volume          7.1792     0.0000     7.1792     ha-m"
"            Runoff coefficient     0.516      0.000      0.516      "
"            Maximum flow           18.574     0.000      18.574     c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                18.574    18.574   118.722   118.722"
" 52         CHANNEL DESIGN"
"      18.574   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       0.300   Gradient   %"
"            Depth of flow                 1.817    metre"
"            Velocity                      1.372    m/sec"
"            Channel capacity            215.995    c.m/sec"
"            Critical depth                1.219    metre"
" 53         ROUTE    Channel Route 1500"
"     1500.00      Channel Route 1500 Reach length   ( metre)"
"       0.326   X-factor <= 0.5"
"     409.886   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                 17.439    c.m/sec"
"                18.574    18.574    17.439   118.722 c.m/sec"
" 40         HYDROGRAPH   Combine    1000"
"           6   Combine "
"        1000   Node #"
"               Node upstream of Penetangore Culvert"
"            Maximum flow                125.579    c.m/sec"
"            Hydrograph volume        1004030.56    c.m"
"                18.574    18.574    17.439   125.579"
" 81         ADD COMMENT=================================================="
"         1  Lines of comment"
"            End of Penetangore Tributary"
" 81         ADD COMMENT=================================================="
"         1  Lines of comment"
"            Start of Area North of Holtby Drain"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                18.574     0.000    17.439   125.579"
" 33         CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   No description"
"       0.000   % Impervious"
"     166.000   Total Area"
"     250.000   Flow length"
"       3.000   Overland Slope"
"     166.000   Pervious Area"
"     250.000   Pervious length"
"       3.000   Pervious slope"
"       0.000   Impervious Area"
"     250.000   Impervious length"
"       3.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.616   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                23.743     0.000    17.439   125.579 c.m/sec"
"            Catchment 201          Pervious   Impervious Total Area "
"            Surface Area           166.000    0.000      166.000    hectare"
"            Time of concentration  38.638     6.881      38.638     minutes"
"            Time to Centroid       265.432    207.930    265.432    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        18.0608    0.0000     18.0608    ha-m"
"            Rainfall losses        41.801     6.917      41.801     mm"
"            Runoff depth           66.999     101.883    66.999     mm"
"            Runoff volume          11.1219    0.0000     11.1219    ha-m"
"            Runoff coefficient     0.616      0.000      0.616      "
"            Maximum flow           23.743     0.000      23.743     c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                23.743    23.743    17.439   125.579"
" 52         CHANNEL DESIGN"
"      23.743   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"            Depth of flow                 1.556    metre"
"            Velocity                      2.289    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                1.370    metre"
" 53         ROUTE    Channel Route 1900"
"     1900.00      Channel Route 1900 Reach length   ( metre)"
"       0.464   X-factor <= 0.5"
"     311.272   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                 23.609    c.m/sec"
"                23.743    23.743    23.609   125.579 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                23.743    23.609    23.609   125.579"
" 33         CATCHMENT 202"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         202   No description"
"       0.000   % Impervious"
"       4.000   Total Area"
"     225.000   Flow length"
"       4.000   Overland Slope"
"       4.000   Pervious Area"
"     225.000   Pervious length"
"       4.000   Pervious slope"
"       0.000   Impervious Area"
"     225.000   Impervious length"
"       4.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.616   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                 0.616    23.609    23.609   125.579 c.m/sec"
"            Catchment 202          Pervious   Impervious Total Area "
"            Surface Area           4.000      0.000      4.000      hectare"
"            Time of concentration  33.272     5.925      33.272     minutes"
"            Time to Centroid       258.948    206.673    258.948    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        4352.00    0.00       4352.00    c.m"
"            Rainfall losses        41.804     6.188      41.804     mm"
"            Runoff depth           66.996     102.612    66.996     mm"
"            Runoff volume          2679.83    0.00       2679.84    c.m"
"            Runoff coefficient     0.616      0.000      0.616      "
"            Maximum flow           0.616      0.000      0.616      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                 0.616    24.117    23.609   125.579"
" 52         CHANNEL DESIGN"
"      24.117   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"            Depth of flow                 1.566    metre"
"            Velocity                      2.298    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                1.381    metre"
" 53         ROUTE    Channel Route 200"
"      200.00      Channel Route 200 Reach length   ( metre)"
"       0.328   X-factor <= 0.5"
"      65.271   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 23.934    c.m/sec"
"                 0.616    24.117    23.934   125.579 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                 0.616    23.934    23.934   125.579"
" 33         CATCHMENT 203"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         203   No description"
"       0.000   % Impervious"
"       9.100   Total Area"
"     450.000   Flow length"
"       3.500   Overland Slope"
"       9.100   Pervious Area"
"     450.000   Pervious length"
"       3.500   Pervious slope"
"       0.000   Impervious Area"
"     450.000   Impervious length"
"       3.500   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.616   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                 1.072    23.934    23.934   125.579 c.m/sec"
"            Catchment 203          Pervious   Impervious Total Area "
"            Surface Area           9.100      0.000      9.100      hectare"
"            Time of concentration  52.492     9.348      52.492     minutes"
"            Time to Centroid       282.188    210.834    282.187    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        9900.79    0.01       9900.80    c.m"
"            Rainfall losses        41.791     5.994      41.791     mm"
"            Runoff depth           67.009     102.806    67.009     mm"
"            Runoff volume          6097.79    0.01       6097.80    c.m"
"            Runoff coefficient     0.616      0.000      0.616      "
"            Maximum flow           1.072      0.000      1.072      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                 1.072    24.991    23.934   125.579"
" 52         CHANNEL DESIGN"
"      24.991   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       1.000   Gradient   %"
"            Depth of flow                 1.591    metre"
"            Velocity                      2.319    m/sec"
"            Channel capacity            394.351    c.m/sec"
"            Critical depth                1.404    metre"
" 53         ROUTE    Channel Route 350"
"      350.00      Channel Route 350 Reach length   ( metre)"
"       0.401   X-factor <= 0.5"
"     113.196   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 24.977    c.m/sec"
"                 1.072    24.991    24.977   125.579 c.m/sec"
" 40         HYDROGRAPH   Combine    1100"
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"            6   Combine "
"         1100   Node #"
"                Node taking 200 series - Bottom end of Holtby Drain"
"             Maximum flow                 24.977    c.m/sec"
"             Hydrograph volume        119996.328    c.m"
"                     1.072    24.991    24.977    24.977"
" 81          ADD COMMENT=================================================="
"          1  Lines of comment"
"             End of Area North of Holtby Drain"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     1.072     0.000    24.977    24.977"
" 81          ADD COMMENT=================================================="
"          1  Lines of comment"
"             Start of Holtby Drain"
" 33          CATCHMENT 100"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          100   No description"
"        0.000   % Impervious"
"       45.000   Total Area"
"      100.000   Flow length"
"        7.000   Overland Slope"
"       45.000   Pervious Area"
"      100.000   Pervious length"
"        7.000   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        7.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.615   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     8.520     0.000    24.977    24.977 c.m/sec"
"             Catchment 100          Pervious   Impervious Total Area "
"             Surface Area           45.000     0.000      45.000     hectare"
"             Time of concentration  17.293     3.080      17.293     minutes"
"             Time to Centroid       239.597    203.358    239.597    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        4.8960     0.0000     4.8960     ha-m"
"             Rainfall losses        41.868     7.350      41.868     mm"
"             Runoff depth           66.932     101.450    66.932     mm"
"             Runoff volume          3.0119     0.0000     3.0120     ha-m"
"             Runoff coefficient     0.615      0.000      0.615      "
"             Maximum flow           8.520      0.000      8.520      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     8.520     8.520    24.977    24.977"
" 52          CHANNEL DESIGN"
"        8.520   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"             Depth of flow                 0.980    metre"
"             Velocity                      1.760    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                0.830    metre"
" 53          ROUTE    Channel Route 1500"
"      1500.00      Channel Route 1500 Reach length   ( metre)"
"        0.455   X-factor <= 0.5"
"      213.100   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            3   No. of sub-reaches"
"             Peak outflow                  8.436    c.m/sec"
"                     8.520     8.520     8.436    24.977 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     8.520     8.436     8.436    24.977"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   No description"
"        0.000   % Impervious"
"       11.200   Total Area"
"       50.000   Flow length"
"        7.000   Overland Slope"
"       11.200   Pervious Area"
"       50.000   Pervious length"
"        7.000   Pervious slope"
"        0.000   Impervious Area"
"       50.000   Impervious length"
"        7.000   Impervious slope"
"        0.280   Pervious Manning 'n'"
"       80.000   Pervious SCS Curve No."
"        0.580   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        6.350   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     2.047     8.436    24.977 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           11.200     0.000      11.200     hectare"
"             Time of concentration  14.191     2.032      14.191     minutes"
"             Time to Centroid       237.365    202.020    237.365    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        1.2186     0.0000     1.2186     ha-m"
"             Rainfall losses        45.642     6.687      45.642     mm"
"             Runoff depth           63.158     102.113    63.158     mm"
"             Runoff volume          7073.64    0.01       7073.65    c.m"
"             Runoff coefficient     0.580      0.000      0.580      "
"             Maximum flow           2.047      0.000      2.047      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     2.047     9.854     8.436    24.977"
" 52          CHANNEL DESIGN"
"        9.854   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"             Depth of flow                 1.048    metre"
"             Velocity                      1.827    m/sec"
"             Channel capacity            394.351    c.m/sec"
"             Critical depth                0.893    metre"
" 53          ROUTE    Channel Route 700"
"       700.00      Channel Route 700 Reach length   ( metre)"
"        0.466   X-factor <= 0.5"
"      287.304   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  9.826    c.m/sec"
"                     2.047     9.854     9.826    24.977 c.m/sec"
" 40          HYDROGRAPH   Combine    1200"
"            6   Combine "
"         1200   Node #"
"                Node taking 100 series for Holtby Drain"
"             Maximum flow                  9.826    c.m/sec"
"             Hydrograph volume         37193.148    c.m"
"                     2.047     9.854     9.826     9.826"
" 81          ADD COMMENT=================================================="
"          1  Lines of comment"
"             End of Holtby Drain"
" 40          HYDROGRAPH   Confluence    1200"
"            7   Confluence "
"         1200   Node #"
"                Node taking 100 series for Holtby Drain"
"             Maximum flow                  9.826    c.m/sec"
"             Hydrograph volume         37193.148    c.m"
"                     2.047     9.826     9.826     0.000"
" 52          CHANNEL DESIGN"
"        9.826   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 1.226    metre"
"             Velocity                      1.412    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.891    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       26.564   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.715   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  9.795    c.m/sec"
"                     2.047     9.826     9.795     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1300"
"            6   Combine "
"         1300   Node #"
"                Node at Holtby Drain"
"             Maximum flow                  9.795    c.m/sec"
"             Hydrograph volume         37193.152    c.m"
"                     2.047     9.826     9.795     9.795"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     2.047     0.000     9.795     9.795"
" 33          CATCHMENT 604"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          604   No description"
"        0.000   % Impervious"
"        2.700   Total Area"
"      100.000   Flow length"
"        2.500   Overland Slope"
"        2.700   Pervious Area"
"      100.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        2.500   Impervious slope"
"        0.300   Pervious Manning 'n'"
"       83.000   Pervious SCS Curve No."
"        0.634   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.202   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.458     0.000     9.795     9.795 c.m/sec"
"             Catchment 604          Pervious   Impervious Total Area "
"             Surface Area           2.700      0.000      2.700      hectare"
"             Time of concentration  29.804     4.194      29.804     minutes"
"             Time to Centroid       253.973    204.572    253.973    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        2937.60    0.00       2937.60    c.m"
"             Rainfall losses        39.869     7.255      39.869     mm"
"             Runoff depth           68.931     101.545    68.931     mm"
"             Runoff volume          1861.15    0.00       1861.15    c.m"
"             Runoff coefficient     0.634      0.000      0.634      "
"             Maximum flow           0.458      0.000      0.458      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.458     0.458     9.795     9.795"
" 52          CHANNEL DESIGN"
"        0.458   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                 0.182    metre"
"             Velocity                      0.986    m/sec"
"             Channel capacity            557.696    c.m/sec"
"             Critical depth                0.161    metre"
" 53          ROUTE    Channel Route 250"
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"       250.00      Channel Route 250 Reach length   ( metre)"
"        0.490   X-factor <= 0.5"
"      190.146   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"           Peak outflow                  0.453    c.m/sec"
"                   0.458     0.458     0.453     9.795 c.m/sec"
" 40         HYDROGRAPH Next link "
"            5   Next link "
"                   0.458     0.453     0.453     9.795"
" 33         CATCHMENT 605"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          605   No description"
"        0.000   % Impervious"
"        3.900   Total Area"
"      100.000   Flow length"
"        2.500   Overland Slope"
"        3.900   Pervious Area"
"      100.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        2.500   Impervious slope"
"        0.300   Pervious Manning 'n'"
"       83.000   Pervious SCS Curve No."
"        0.634   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.202   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                   0.662     0.453     0.453     9.795 c.m/sec"
"           Catchment 605          Pervious   Impervious Total Area "
"           Surface Area           3.900      0.000      3.900      hectare"
"           Time of concentration  29.804     4.194      29.804     minutes"
"           Time to Centroid       253.973    204.572    253.973    minutes"
"           Rainfall depth         108.800    108.800    108.800    mm"
"           Rainfall volume        4243.20    0.00       4243.20    c.m"
"           Rainfall losses        39.869     7.255      39.869     mm"
"           Runoff depth           68.931     101.545    68.931     mm"
"           Runoff volume          2688.32    0.00       2688.33    c.m"
"           Runoff coefficient     0.634      0.000      0.634      "
"           Maximum flow           0.662      0.000      0.662      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   0.662     1.107     0.453     9.795"
" 52         CHANNEL DESIGN"
"        1.107   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"           Depth of flow                 0.296    metre"
"           Velocity                      1.293    m/sec"
"           Channel capacity            557.696    c.m/sec"
"           Critical depth                0.273    metre"
" 53         ROUTE    Channel Route 200"
"       200.00      Channel Route 200 Reach length   ( metre)"
"        0.480   X-factor <= 0.5"
"      116.054   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"           Peak outflow                  1.099    c.m/sec"
"                   0.662     1.107     1.099     9.795 c.m/sec"
" 40         HYDROGRAPH   Combine    4000"
"            6   Combine "
"         4000   Node #"
"                 "
"           Maximum flow                  1.099    c.m/sec"
"           Hydrograph volume          4549.473    c.m"
"                   0.662     1.107     1.099     1.099"
" 40         HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                   0.662     0.000     1.099     1.099"
" 33         CATCHMENT 603"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          603   No description"
"        0.000   % Impervious"
"        5.600   Total Area"
"      100.000   Flow length"
"        2.500   Overland Slope"
"        5.600   Pervious Area"
"      100.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"      100.000   Impervious length"
"        2.500   Impervious slope"
"        0.300   Pervious Manning 'n'"
"       83.000   Pervious SCS Curve No."
"        0.634   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.202   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                   0.950     0.000     1.099     1.099 c.m/sec"
"           Catchment 603          Pervious   Impervious Total Area "
"           Surface Area           5.600      0.000      5.600      hectare"
"           Time of concentration  29.804     4.194      29.804     minutes"
"           Time to Centroid       253.973    204.572    253.973    minutes"
"           Rainfall depth         108.800    108.800    108.800    mm"
"           Rainfall volume        6092.79    0.01       6092.80    c.m"
"           Rainfall losses        39.869     7.255      39.869     mm"
"           Runoff depth           68.931     101.545    68.931     mm"
"           Runoff volume          3860.15    0.01       3860.16    c.m"
"           Runoff coefficient     0.634      0.000      0.634      "
"           Maximum flow           0.950      0.000      0.950      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   0.950     0.950     1.099     1.099"
" 52         CHANNEL DESIGN"
"        0.950   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"           Depth of flow                 0.273    metre"
"           Velocity                      1.235    m/sec"
"           Channel capacity            557.696    c.m/sec"
"           Critical depth                0.249    metre"
" 53         ROUTE    Channel Route 225"
"       225.00      Channel Route 225 Reach length   ( metre)"
"        0.484   X-factor <= 0.5"
"      136.640   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"           Peak outflow                  0.934    c.m/sec"
"                   0.950     0.950     0.934     1.099 c.m/sec"
" 40         HYDROGRAPH   Combine    4000"
"            6   Combine "
"         4000   Node #"
"                 "
"           Maximum flow                  2.033    c.m/sec"
"           Hydrograph volume          8409.629    c.m"
"                   0.950     0.950     0.934     2.033"
" 40         HYDROGRAPH   Confluence    4000"
"            7   Confluence "
"         4000   Node #"
"                 "
"           Maximum flow                  2.033    c.m/sec"
"           Hydrograph volume          8409.629    c.m"
"                   0.950     2.033     0.934     0.000"
" 52         CHANNEL DESIGN"
"        2.033   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"           Depth of flow                 0.582    metre"
"           Velocity                      0.933    m/sec"
"           Channel capacity            278.848    c.m/sec"
"           Critical depth                0.386    metre"
" 53         ROUTE    Channel Route 500"
"       500.00      Channel Route 500 Reach length   ( metre)"
"        0.384   X-factor <= 0.5"
"      200.907   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"           Peak outflow                  2.026    c.m/sec"
"                   0.950     2.033     2.026     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                 Flow in Hwy. 21 Ditch"
"           Maximum flow                  2.026    c.m/sec"
"           Hydrograph volume          8409.625    c.m"
"                   0.950     2.033     2.026     2.026"
" 40         HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                   0.950     0.000     2.026     2.026"
" 33         CATCHMENT 405"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          405   No description"
"       75.000   % Impervious"
"        3.200   Total Area"
"       75.000   Flow length"
"        2.000   Overland Slope"
"        0.800   Pervious Area"
"       75.000   Pervious length"
"        2.000   Pervious slope"
"        2.400   Impervious Area"
"       75.000   Impervious length"
"        2.000   Impervious slope"
"        0.300   Pervious Manning 'n'"
"       83.000   Pervious SCS Curve No."
"        0.633   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.202   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.926   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                   0.659     0.000     2.026     2.026 c.m/sec"
"           Catchment 405          Pervious   Impervious Total Area "
"           Surface Area           0.800      2.400      3.200      hectare"
"           Time of concentration  26.815     3.773      8.050      minutes"
"           Time to Centroid       250.348    203.918    212.537    minutes"
"           Rainfall depth         108.800    108.800    108.800    mm"
"           Rainfall volume        870.40     2611.20    3481.60    c.m"
"           Rainfall losses        39.886     8.015      15.983     mm"
"           Runoff depth           68.914     100.785    92.817     mm"
"           Runoff volume          551.31     2418.84    2970.15    c.m"
"           Runoff coefficient     0.633      0.926      0.853      "
"           Maximum flow           0.142      0.562      0.659      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   0.659     0.659     2.026     2.026"
" 52         CHANNEL DESIGN"
"        0.659   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"           Depth of flow                 0.091    metre"
"           Velocity                      1.155    m/sec"
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"             Channel capacity              7.740    c.m/sec"
"             Critical depth                0.111    metre"
" 53          ROUTE    Channel Route 150"
"       150.00       Channel Route 150 Reach length   ( metre)"
"        0.492   X-factor <= 0.5"
"       97.383   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.652    c.m/sec"
"                     0.659     0.659     0.652     2.026 c.m/sec"
" 40          HYDROGRAPH   Combine    4100"
"            6   Combine "
"         4100   Node #"
"                "
"             Maximum flow                  0.652    c.m/sec"
"             Hydrograph volume          2970.148    c.m"
"                     0.659     0.659     0.652     0.652"
" 40          HYDROGRAPH   Confluence    4100"
"            7   Confluence "
"         4100   Node #"
"                "
"             Maximum flow                  0.652    c.m/sec"
"             Hydrograph volume          2970.147    c.m"
"                     0.659     0.652     0.652     0.000"
" 52          CHANNEL DESIGN"
"        0.652   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                 0.090    metre"
"             Velocity                      1.152    m/sec"
"             Channel capacity              7.740    c.m/sec"
"             Critical depth                0.110    metre"
" 53          ROUTE    Channel Route 100"
"       100.00       Channel Route 100 Reach length   ( metre)"
"        0.488   X-factor <= 0.5"
"       65.122   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       60.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.647    c.m/sec"
"                     0.659     0.652     0.647     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    4200"
"            6   Combine "
"         4200   Node #"
"                "
"             Maximum flow                  0.647    c.m/sec"
"             Hydrograph volume          2970.147    c.m"
"                     0.659     0.652     0.647     0.647"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.659     0.000     0.647     0.647"
" 33          CATCHMENT 406"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          406   No description"
"       85.000   % Impervious"
"        1.300   Total Area"
"       10.000   Flow length"
"        2.000   Overland Slope"
"        0.195   Pervious Area"
"       10.000   Pervious length"
"        2.000   Pervious slope"
"        1.105   Impervious Area"
"       10.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.608   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.923   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.281     0.000     0.647     0.647 c.m/sec"
"             Catchment 406          Pervious   Impervious Total Area "
"             Surface Area           0.195      1.105      1.300      hectare"
"             Time of concentration  6.325      1.126      1.668      minutes"
"             Time to Centroid       226.549    200.865    203.541    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        212.16     1202.24    1414.40    c.m"
"             Rainfall losses        42.649     8.430      13.563     mm"
"             Runoff depth           66.151     100.370    95.237     mm"
"             Runoff volume          128.99     1109.08    1238.08    c.m"
"             Runoff coefficient     0.608      0.923      0.875      "
"             Maximum flow           0.035      0.246      0.281      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.281     0.281     0.647     0.647"
" 52          CHANNEL DESIGN"
"        0.281   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                 0.058    metre"
"             Velocity                      0.897    m/sec"
"             Channel capacity              7.740    c.m/sec"
"             Critical depth                0.068    metre"
" 53          ROUTE    Channel Route 50"
"        50.00       Channel Route 50 Reach length   ( metre)"
"        0.484   X-factor <= 0.5"
"       41.817   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       42.857   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.281    c.m/sec"
"                     0.281     0.281     0.281     0.647 c.m/sec"
" 40          HYDROGRAPH   Combine    4200"
"            6   Combine "
"         4200   Node #"
"                "
"             Maximum flow                  0.928    c.m/sec"
"             Hydrograph volume          4208.226    c.m"
"                     0.281     0.281     0.281     0.928"
" 40          HYDROGRAPH   Confluence    4200"
"            7   Confluence "
"         4200   Node #"
"                "
"             Maximum flow                  0.928    c.m/sec"
"             Hydrograph volume          4208.226    c.m"
"                     0.281     0.928     0.281     0.000"
" 52          CHANNEL DESIGN"
"        0.928   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                 0.109    metre"
"             Velocity                      1.273    m/sec"
"             Channel capacity              7.740    c.m/sec"
"             Critical depth                0.133    metre"
" 53          ROUTE    Channel Route 150"
"       150.00       Channel Route 150 Reach length   ( metre)"
"        0.491   X-factor <= 0.5"
"       88.351   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.921    c.m/sec"
"                     0.281     0.928     0.921     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    4300"
"            6   Combine "
"         4300   Node #"
"                Node Upstream of CTC Pond"
"             Maximum flow                  0.921    c.m/sec"
"             Hydrograph volume          4208.226    c.m"
"                     0.281     0.928     0.921     0.921"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.281     0.000     0.921     0.921"
" 33          CATCHMENT 500"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          500   No description"
"       70.000   % Impervious"
"        5.800   Total Area"
"      100.000   Flow length"
"        2.000   Overland Slope"
"        1.740   Pervious Area"
"      100.000   Pervious length"
"        2.000   Pervious slope"
"        4.060   Impervious Area"
"      100.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.598   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.938   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     1.207     0.000     0.921     0.921 c.m/sec"
"             Catchment 500          Pervious   Impervious Total Area "
"             Surface Area           1.740      4.060      5.800      hectare"
"             Time of concentration  25.385     4.484      8.967      minutes"
"             Time to Centroid       250.146    205.099    214.761    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        1893.12    4417.28    6310.40    c.m"
"             Rainfall losses        43.760     6.711      17.825     mm"
"             Runoff depth           65.040     102.089    90.975     mm"
"             Runoff volume          1131.70    4144.83    5276.52    c.m"
"             Runoff coefficient     0.598      0.938      0.836      "
"             Maximum flow           0.296      0.942      1.207      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     1.207     1.207     0.921     0.921"
" 52          CHANNEL DESIGN"
"        1.207   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                 0.124    metre"
"             Velocity                      1.370    m/sec"
"             Channel capacity              7.740    c.m/sec"
"             Critical depth                0.153    metre"
" 53          ROUTE    Channel Route 150"
"       150.00       Channel Route 150 Reach length   ( metre)"
"        0.490   X-factor <= 0.5"
"       82.107   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  1.195    c.m/sec"
"                     1.207     1.207     1.195     0.921 c.m/sec"
" 40          HYDROGRAPH   Combine    4300"
"            6   Combine "
"         4300   Node #"
"                Node Upstream of CTC Pond"
"             Maximum flow                  2.116    c.m/sec"
"             Hydrograph volume          9484.755    c.m"
"                     1.207     1.207     1.195     2.116"
" 40          HYDROGRAPH   Confluence    4300"
"            7   Confluence "
"         4300   Node #"
"                Node Upstream of CTC Pond"
"             Maximum flow                  2.116    c.m/sec"
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"             Hydrograph volume          9484.756    c.m"
"                     1.207     2.116     1.195     0.000"
" 52          CHANNEL DESIGN"
"        2.116   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"             Depth of flow                 0.164    metre"
"             Velocity                      1.597    m/sec"
"             Channel capacity              7.740    c.m/sec"
"             Critical depth                0.205    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.460   X-factor <= 0.5"
"       23.488   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       25.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  2.110    c.m/sec"
"                     1.207     2.116     2.110     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     1.207     2.110     2.110     0.000"
" 81          ADD COMMENT=================================================="
"          1  Lines of comment"
"             EXISTING POND - DRY POND - CTC SITE"
" 54          POND DESIGN"
"        2.110   Current peak flow    c.m/sec"
"        0.635   Target outflow    c.m/sec"
"       9484.8   Hydrograph volume    c.m"
"          15.   Number of stages"
"        0.000   Minimum water level    metre"
"        1.400   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                  0.000     0.000     0.000"
"                 0.1000   0.00276   124.985"
"                 0.2000   0.00477   256.026"
"                 0.3000   0.00616   393.250"
"                 0.4000   0.00729   536.786"
"                 0.5000   0.00827   686.761"
"                 0.6000   0.00914   843.304"
"                 0.7000   0.00994  1006.543"
"                 0.8000   0.01068  1176.605"
"                 0.9000    0.2200  1353.618"
"                  1.000    0.6243  1537.711"
"                  1.100     1.178  1729.012"
"                  1.200     1.871  1927.648"
"                  1.300     2.698  2133.748"
"                  1.400     3.658  2347.440"
"           1.   WEIRS"
"                  Crest      Weir     Crest      Left     Right"
"              elevation coefficie   breadth sideslope sideslope"
"                  0.800     0.980     3.800     2.000     2.000"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                  0.000     0.630    0.0750     1.000"
"           2.   LAYERS"
"                 Bottom    Aspect    Bottom       Top   Average"
"                   area     ratio elevation elevation sideslope"
"               1220.000     2.000     0.000     1.400     4.000"
"               2175.299     1.688     1.400     1.400     4.000"
"             Peak outflow                  2.035    c.m/sec"
"             Maximum level                 1.220    metre"
"             Maximum storage            1968.814    c.m"
"             Centroidal lag                6.941    hours"
"                  1.207     2.110     2.035     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     1.207     2.035     2.035     0.000"
" 52          CHANNEL DESIGN"
"        2.035   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 0.582    metre"
"             Velocity                      0.934    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.387    metre"
" 53          ROUTE    Channel Route 220"
"       220.00      Channel Route 220 Reach length   ( metre)"
"        0.368   X-factor <= 0.5"
"      176.751   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  2.004    c.m/sec"
"                     1.207     2.035     2.004     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                Flow in Hwy. 21 Ditch"
"             Maximum flow                  3.579    c.m/sec"
"             Hydrograph volume         17424.738    c.m"
"                     1.207     2.035     2.004     3.579"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     1.207     0.000     2.004     3.579"
" 33          CATCHMENT 750"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          750   No description"
"      100.000   % Impervious"
"        0.500   Total Area"
"       50.000   Flow length"
"        2.000   Overland Slope"
"        0.000   Pervious Area"
"       50.000   Pervious length"
"        2.000   Pervious slope"
"        0.500   Impervious Area"
"       50.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.000   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.933   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.118     0.000     2.004     3.579 c.m/sec"
"             Catchment 750          Pervious   Impervious Total Area "
"             Surface Area           0.000      0.500      0.500      hectare"
"             Time of concentration  16.748     2.959      2.959      minutes"
"             Time to Centroid       239.708    203.134    203.134    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        0.00       544.00     544.00     c.m"
"             Rainfall losses        43.750     7.287      7.288      mm"
"             Runoff depth           65.050     101.513    101.512    mm"
"             Runoff volume          0.00       507.56     507.56     c.m"
"             Runoff coefficient     0.000      0.933      0.933      "
"             Maximum flow           0.000      0.118      0.118      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.118     0.118     2.004     3.579"
" 81          ADD COMMENT=================================================="
"          1  Lines of comment"
"             EXISTING POND - ROOFTOP STORAGE - CTC SITE"
" 54          POND DESIGN"
"        0.118   Current peak flow    c.m/sec"
"        0.020   Target outflow    c.m/sec"
"        507.6   Hydrograph volume    c.m"
"           9.   Number of stages"
"        0.000   Minimum water level    metre"
"        0.200   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                  0.000     0.000     0.000"
"                0.02500   0.00112    72.969"
"                0.05000   0.00386   146.876"
"                0.07500   0.01047   221.724"
"                 0.1000   0.01422   297.514"
"                 0.1250   0.01716   374.249"
"                 0.1500   0.01967   451.931"
"                 0.1750   0.02190   530.562"
"                 0.2000   0.02391   610.142"
"           1.   ORIFICES"
"                Orifice   Orifice   Orifice Number of"
"                 invert coefficie  diameter  orifices"
"                  0.000     0.630    0.0680     6.000"
"           2.   LAYERS"
"                 Bottom    Aspect    Bottom       Top   Average"
"                   area     ratio elevation elevation sideslope"
"               2900.000    10.000     0.000     0.200     4.000"
"               3085.338     1.960     0.200     0.200     4.000"
"             Peak outflow                  0.017    c.m/sec"
"             Maximum level                 0.121    metre"
"             Maximum storage             362.324    c.m"
"             Centroidal lag               11.910    hours"
"                  0.118     0.118     0.017     3.579 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.118     0.017     0.017     3.579"
" 52          CHANNEL DESIGN"
"        0.017   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 0.040    metre"
"             Velocity                      0.199    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.019    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.452   X-factor <= 0.5"
"      188.197   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.017    c.m/sec"
"                     0.118     0.017     0.017     3.579 c.m/sec"
" 40          HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                Flow in Hwy. 21 Ditch"
"             Maximum flow                  3.594    c.m/sec"
"             Hydrograph volume         17888.156    c.m"
"                     0.118     0.017     0.017     3.594"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.118     0.000     0.017     3.594"
" 33          CATCHMENT 751"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          751   No description"
"      100.000   % Impervious"
"        0.200   Total Area"
"       50.000   Flow length"
"        2.000   Overland Slope"
"        0.000   Pervious Area"
"       50.000   Pervious length"
"        2.000   Pervious slope"
"        0.200   Impervious Area"
"       50.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.000   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.933   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.047     0.000     0.017     3.594 c.m/sec"
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"            Catchment 751          Pervious   Impervious Total Area "
"            Surface Area           0.000      0.200      0.200      hectare"
"            Time of concentration  16.748     2.959      2.959      minutes"
"            Time to Centroid       239.708    203.134    203.134    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        0.00       217.60     217.60     c.m"
"            Rainfall losses        43.750     7.287      7.288      mm"
"            Runoff depth           65.050     101.513    101.512    mm"
"            Runoff volume          0.00       203.02     203.03     c.m"
"            Runoff coefficient     0.000      0.933      0.933      "
"            Maximum flow           0.000      0.047      0.047      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.047     0.047     0.017     3.594"
" 81         ADD COMMENT==================================================="
"          1  Lines of comment"
"            EXISTING POND - PARKING LOT STORAGE - CTC SITE"
" 54         POND DESIGN"
"        0.047   Current peak flow    c.m/sec"
"        0.020   Target outflow    c.m/sec"
"        203.0   Hydrograph volume    c.m"
"          5.   Number of stages"
"        0.000   Minimum water level    metre"
"        0.700   Maximum water level    metre"
"        0.000   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"               Level Discharge    Volume"
"               0.000     0.000     0.000"
"              0.1750   0.01148    16.645"
"              0.3500   0.03242    39.036"
"              0.5250   0.04289    67.860"
"              0.7000   0.05126   103.803"
"          1.   ORIFICES"
"              Orifice   Orifice   Orifice Number of"
"               invert coefficie  diameter  orifices"
"               0.000     0.630    0.1750     1.000"
"          1.   LAYERS"
"              Bottom    Aspect    Bottom       Top   Average"
"                area     ratio elevation elevation sideslope"
"              80.000     3.000     0.000     0.700     4.000"
"            Peak outflow                  0.035    c.m/sec"
"            Maximum level                 0.401    metre"
"            Maximum storage              47.359    c.m"
"            Centroidal lag                3.760   hours"
"               0.047     0.047     0.035     3.594 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.047     0.035     0.035     3.594"
" 52         CHANNEL DESIGN"
"        0.035   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"            Depth of flow                 0.062    metre"
"            Velocity                      0.260    m/sec"
"            Channel capacity            278.848    c.m/sec"
"            Critical depth                0.031    metre"
" 53         ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.427   X-factor <= 0.5"
"      144.311   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  0.035    c.m/sec"
"                  0.047     0.035     0.035     3.594 c.m/sec"
" 40         HYDROGRAPH   Combine    2000"
"           6   Combine "
"         2000   Node #"
"               Flow in Hwy. 21 Ditch"
"            Maximum flow                  3.629    c.m/sec"
"            Hydrograph volume         18091.137    c.m"
"                  0.047     0.035     0.035     3.629"
" 81         ADD COMMENT==================================================="
"          1  Lines of comment"
"            Total discharge to Hwy. 21 Ditch"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.047     0.000     0.035     3.629"
" 33         CATCHMENT 301"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          301   No description"
"        0.000   % Impervious"
"       16.400   Total Area"
"       95.000   Flow length"
"        2.500   Overland Slope"
"       16.400   Pervious Area"
"       95.000   Pervious length"
"        2.500   Pervious slope"
"        0.000   Impervious Area"
"       95.000   Impervious length"
"        2.500   Impervious slope"
"        0.230   Pervious Manning 'n'"
"       81.000   Pervious SCS Curve No."
"        0.598   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.958   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  2.801     0.000     0.035     3.629 c.m/sec"
"            Catchment 301          Pervious   Impervious Total Area "
"            Surface Area           16.400     0.000      16.400     hectare"
"            Time of concentration  25.036     4.067      25.036     minutes"
"            Time to Centroid       249.717    204.274    249.717    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        1.7843     0.0000     1.7843     ha-m"
"            Rainfall losses        43.763     7.558      43.763     mm"
"            Runoff depth           65.037     101.242    65.037     mm"
"            Runoff volume          1.0666     0.0000     1.0666     ha-m"
"            Runoff coefficient     0.598      0.000      0.598      "
"            Maximum flow           2.801      0.000      2.801      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  2.801     2.801     0.035     3.629"
" 52         CHANNEL DESIGN"
"        2.801   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"            Depth of flow                 0.549    metre"
"            Velocity                      1.400    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.462    metre"
" 53         ROUTE    Channel Route 600"
"       600.00      Channel Route 600 Reach length   ( metre)"
"        0.462   X-factor <= 0.5"
"      160.666   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                  2.801    c.m/sec"
"                  2.801     2.801     2.801     3.629 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  2.801     2.801     2.801     3.629"
" 33         CATCHMENT 401"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          401   No description"
"        0.000   % Impervious"
"        5.600   Total Area"
"      340.000   Flow length"
"        3.500   Overland Slope"
"        5.600   Pervious Area"
"      340.000   Pervious length"
"        3.500   Pervious slope"
"        0.000   Impervious Area"
"      340.000   Impervious length"
"        3.500   Impervious slope"
"        0.300   Pervious Manning 'n'"
"       83.000   Pervious SCS Curve No."
"        0.634   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.202   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.648     2.801     2.801     3.629 c.m/sec"
"            Catchment 401          Pervious   Impervious Total Area "
"            Surface Area           5.600      0.000      5.600      hectare"
"            Time of concentration  56.146     7.901      56.146     minutes"
"            Time to Centroid       285.821    209.131    285.821    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        6092.79    0.01       6092.80    c.m"
"            Rainfall losses        39.852     5.770      39.852     mm"
"            Runoff depth           68.948     103.030    68.948     mm"
"            Runoff volume          3861.07    0.01       3861.08    c.m"
"            Runoff coefficient     0.634      0.000      0.634      "
"            Maximum flow           0.648      0.000      0.648      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.648     3.361     2.801     3.629"
" 52         CHANNEL DESIGN"
"        3.361   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.200   Gradient   %"
"            Depth of flow                 0.601    metre"
"            Velocity                      1.471    m/sec"
"            Channel capacity            431.989    c.m/sec"
"            Critical depth                0.510    metre"
" 53         ROUTE    Channel Route 150"
"       150.00      Channel Route 150 Reach length   ( metre)"
"        0.417   X-factor <= 0.5"
"       76.454   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                  3.332    c.m/sec"
"                  0.648     3.361     3.332     3.629 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.648     3.332     3.332     3.629"
" 33         CATCHMENT 402"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          402   No description"
"       50.000   % Impervious"
"        7.400   Total Area"
"      100.000   Flow length"
"        2.000   Overland Slope"
"        3.700   Pervious Area"
"      100.000   Pervious length"
"        2.000   Pervious slope"
"        3.700   Impervious Area"
"      100.000   Impervious length"
"        2.000   Impervious slope"
"        0.300   Pervious Manning 'n'"
"       83.000   Pervious SCS Curve No."
"        0.633   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.202   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.938   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  1.347     3.332     3.332     3.629 c.m/sec"
"            Catchment 402          Pervious   Impervious Total Area "
"            Surface Area           3.700      3.700      7.400      hectare"
"            Time of concentration  31.867     4.484      15.520     minutes"
"            Time to Centroid       256.479    205.099    225.808    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        4025.60    4025.60    8051.20    c.m"
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"           Rainfall losses        39.877     6.711      23.294     mm"
"           Runoff depth           68.923     102.089    85.506     mm"
"           Runoff volume          2550.15    3777.31    6327.44    c.m"
"           Runoff coefficient     0.633      0.938      0.786      "
"           Maximum flow           0.605      0.859      1.347      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  1.347     4.162     3.332     3.629"
" 52        CHANNEL DESIGN"
"      4.162   Current peak flow    c.m/sec"
"      0.020   Manning 'n'"
"         0.   Cross-section type: 0=trapezoidal; 1=general"
"      4.000   Basewidth    metre"
"     50.000   Left bank slope"
"      0.000   Right bank slope"
"      0.300   Channel depth    metre"
"      2.000   Gradient   %"
"           Depth of flow                 0.226    metre"
"           Velocity                      1.910    m/sec"
"           Channel capacity              7.740    c.m/sec"
"           Critical depth                0.286    metre"
" 53        ROUTE    Channel Route 200"
"     200.00      Channel Route 200 Reach length   ( metre)"
"      0.487   X-factor <= 0.5"
"     78.534   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"     30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"     75.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                  4.125    c.m/sec"
"                  1.347     4.162     4.125     3.629 c.m/sec"
" 40        HYDROGRAPH   Combine    6000"
"          6   Combine "
"       6000   Node #"
"              "
"           Maximum flow                  4.125    c.m/sec"
"           Hydrograph volume         20854.529    c.m"
"                  1.347     4.162     4.125     4.125"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                  1.347     0.000     4.125     4.125"
" 33        CATCHMENT 501"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        501   No description"
"      0.000   % Impervious"
"      2.500   Total Area"
"     80.000   Flow length"
"      3.500   Overland Slope"
"      2.500   Pervious Area"
"     80.000   Pervious length"
"      3.500   Pervious slope"
"      0.000   Impervious Area"
"     80.000   Impervious length"
"      3.500   Impervious slope"
"      0.300   Pervious Manning 'n'"
"     83.000   Pervious SCS Curve No."
"      0.633   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      5.202   Pervious Initial abstraction"
"      0.013   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.000   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                  0.464     0.000     4.125     4.125 c.m/sec"
"           Catchment 501          Pervious   Impervious Total Area "
"           Surface Area           2.500      0.000      2.500      hectare"
"           Time of concentration  23.566     3.316      23.566     minutes"
"           Time to Centroid       246.432    203.623    246.432    minutes"
"           Rainfall depth         108.800    108.800    108.800    mm"
"           Rainfall volume        2720.00    0.00       2720.00    c.m"
"           Rainfall losses        39.885     7.581      39.885     mm"
"           Runoff depth           68.915     101.219    68.915     mm"
"           Runoff volume          1722.88    0.00       1722.88    c.m"
"           Runoff coefficient     0.633      0.000      0.633      "
"           Maximum flow           0.464      0.000      0.464      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.464     0.464     4.125     4.125"
" 52        CHANNEL DESIGN"
"      0.464   Current peak flow    c.m/sec"
"      0.040   Manning 'n'"
"         0.   Cross-section type: 0=trapezoidal; 1=general"
"      2.000   Basewidth    metre"
"      3.000   Left bank slope"
"      3.000   Right bank slope"
"      5.000   Channel depth    metre"
"      1.200   Gradient   %"
"           Depth of flow                 0.212    metre"
"           Velocity                      0.831    m/sec"
"           Channel capacity            431.989    c.m/sec"
"           Critical depth                0.162    metre"
" 53        ROUTE    Channel Route 100"
"     100.00      Channel Route 100 Reach length   ( metre)"
"      0.451   X-factor <= 0.5"
"     90.245   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"     30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"     75.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                  0.457    c.m/sec"
"                  0.464     0.464     0.457     4.125 c.m/sec"
" 40        HYDROGRAPH Next link "
"          5   Next link "
"                  0.464     0.457     0.457     4.125"
" 33        CATCHMENT 403"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        403   No description"
"     75.000   % Impervious"
"      4.700   Total Area"
"     70.000   Flow length"
"      2.000   Overland Slope"
"      1.175   Pervious Area"
"     70.000   Pervious length"
"      2.000   Pervious slope"
"      3.525   Impervious Area"
"     70.000   Impervious length"
"      2.000   Impervious slope"
"      0.300   Pervious Manning 'n'"
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"     83.000   Pervious SCS Curve No."
"      0.633   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      5.202   Pervious Initial abstraction"
"      0.013   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.923   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                  0.966     0.457     0.457     4.125 c.m/sec"
"           Catchment 403          Pervious   Impervious Total Area "
"           Surface Area           1.175      3.525      4.700      hectare"
"           Time of concentration  25.728     3.620      7.735      minutes"
"           Time to Centroid       249.036    203.768    212.193    minutes"
"           Rainfall depth         108.800    108.800    108.800    mm"
"           Rainfall volume        1278.40    3835.20    5113.60    c.m"
"           Rainfall losses        39.893     8.344      16.231     mm"
"           Runoff depth           68.907     100.456    92.569     mm"
"           Runoff volume          809.65     3541.08    4350.72    c.m"
"           Runoff coefficient     0.633      0.923      0.851      "
"           Maximum flow           0.210      0.828      0.966      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.966     1.375     0.457     4.125"
" 52        CHANNEL DESIGN"
"      1.375   Current peak flow    c.m/sec"
"      0.020   Manning 'n'"
"         0.   Cross-section type: 0=trapezoidal; 1=general"
"      4.000   Basewidth    metre"
"     50.000   Left bank slope"
"      0.000   Right bank slope"
"      0.300   Channel depth    metre"
"      2.000   Gradient   %"
"           Depth of flow                 0.132    metre"
"           Velocity                      1.420    m/sec"
"           Channel capacity              7.740    c.m/sec"
"           Critical depth                0.164    metre"
" 53        ROUTE    Channel Route 300"
"     300.00      Channel Route 300 Reach length   ( metre)"
"      0.494   X-factor <= 0.5"
"    158.423   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"     30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"    150.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                  1.321    c.m/sec"
"                  0.966     1.375     1.321     4.125 c.m/sec"
" 40        HYDROGRAPH   Combine    6000"
"          6   Combine "
"       6000   Node #"
"              "
"           Maximum flow                  5.086    c.m/sec"
"           Hydrograph volume         26928.145    c.m"
"                  0.966     1.375     1.321     5.086"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                  0.966     0.000     1.321     5.086"
" 33        CATCHMENT 404"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        404   No description"
"     75.000   % Impervious"
"      3.200   Total Area"
"     60.000   Flow length"
"      2.000   Overland Slope"
"      0.800   Pervious Area"
"     60.000   Pervious length"
"      2.000   Pervious slope"
"      2.400   Impervious Area"
"     60.000   Impervious length"
"      2.000   Impervious slope"
"      0.300   Pervious Manning 'n'"
"     83.000   Pervious SCS Curve No."
"      0.633   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      5.202   Pervious Initial abstraction"
"      0.013   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.931   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                  0.677     0.000     1.321     5.086 c.m/sec"
"           Catchment 404          Pervious   Impervious Total Area "
"           Surface Area           0.800      2.400      3.200      hectare"
"           Time of concentration  23.455     3.301      7.028      minutes"
"           Time to Centroid       246.293    203.612    211.505    minutes"
"           Rainfall depth         108.800    108.800    108.800    mm"
"           Rainfall volume        870.40     2611.20    3481.60    c.m"
"           Rainfall losses        39.890     7.558      15.641     mm"
"           Runoff depth           68.910     101.242    93.159     mm"
"           Runoff volume          551.28     2429.82    2981.10    c.m"
"           Runoff coefficient     0.633      0.931      0.856      "
"           Maximum flow           0.149      0.567      0.677      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.677     0.677     1.321     5.086"
" 52        CHANNEL DESIGN"
"      0.677   Current peak flow    c.m/sec"
"      0.020   Manning 'n'"
"         0.   Cross-section type: 0=trapezoidal; 1=general"
"      4.000   Basewidth    metre"
"     50.000   Left bank slope"
"      0.000   Right bank slope"
"      0.300   Channel depth    metre"
"      2.000   Gradient   %"
"           Depth of flow                 0.092    metre"
"           Velocity                      1.164    m/sec"
"           Channel capacity              7.740    c.m/sec"
"           Critical depth                0.112    metre"
" 53        ROUTE    Channel Route 100"
"     100.00      Channel Route 100 Reach length   ( metre)"
"      0.488   X-factor <= 0.5"
"     64.421   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"     30.000   K-lag   ( seconds)"
"      0.500   Beta weighting factor"
"     60.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                  0.672    c.m/sec"
"                  0.677     0.677     0.672     5.086 c.m/sec"
" 40        HYDROGRAPH   Combine    6000"
"          6   Combine "
"       6000   Node #"
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"              "
"           Maximum flow                 5.602    c.m/sec"
"           Hydrograph volume         29909.250    c.m"
"                   0.677     0.677     0.672     5.602"
" 40        HYDROGRAPH   Confluence    6000"
"          7   Confluence "
"       6000   Node #"
"              "
"           Maximum flow                 5.602    c.m/sec"
"           Hydrograph volume         29909.248    c.m"
"                   0.677     5.602     0.672     0.000"
" 52        CHANNEL DESIGN"
"       5.602   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"           Depth of flow                0.259    metre"
"           Velocity                     2.064    m/sec"
"           Channel capacity             7.740    c.m/sec"
"           Critical depth               0.329    metre"
" 53        ROUTE    Channel Route 200"
"      200.00      Channel Route 200 Reach length   ( metre)"
"       0.485   X-factor <= 0.5"
"      72.683   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      60.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                 5.548    c.m/sec"
"                   0.677     5.602     5.548     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    6100"
"          6   Combine "
"       6100   Node #"
"              "
"           Maximum flow                 5.548    c.m/sec"
"           Hydrograph volume         29909.258    c.m"
"                   0.677     5.602     5.548     5.548"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                   0.677     0.000     5.548     5.548"
" 33        CATCHMENT 302"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        302   No description"
"      50.000   % Impervious"
"       6.000   Total Area"
"     100.000   Flow length"
"       2.000   Overland Slope"
"       3.000   Pervious Area"
"     100.000   Pervious length"
"       2.000   Pervious slope"
"       3.000   Impervious Area"
"     100.000   Impervious length"
"       2.000   Impervious slope"
"       0.280   Pervious Manning 'n'"
"      80.000   Pervious SCS Curve No."
"       0.581   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       6.350   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.938   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   1.056     0.000     5.548     5.548 c.m/sec"
"           Catchment 302          Pervious   Impervious Total Area "
"           Surface Area           3.000      3.000      6.000      hectare"
"           Time of concentration  31.323     4.484      14.746     minutes"
"           Time to Centroid       258.059    205.099    225.349    minutes"
"           Rainfall depth         108.800    108.800    108.800    mm"
"           Rainfall volume        3264.00    3264.00    6528.00    c.m"
"           Rainfall losses        45.606     6.711      26.158     mm"
"           Runoff depth           63.194     102.089    82.642     mm"
"           Runoff volume          1895.82    3062.68    4958.50    c.m"
"           Runoff coefficient     0.581      0.938      0.760      "
"           Maximum flow           0.452      0.696      1.056      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                   1.056     1.056     5.548     5.548"
" 52        CHANNEL DESIGN"
"       1.056   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"           Depth of flow                0.116    metre"
"           Velocity                     1.320    m/sec"
"           Channel capacity             7.740    c.m/sec"
"           Critical depth               0.143    metre"
" 53        ROUTE    Channel Route 180"
"      180.00      Channel Route 180 Reach length   ( metre)"
"       0.492   X-factor <= 0.5"
"     102.255   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                 1.029    c.m/sec"
"                   1.056     1.056     1.029     5.548 c.m/sec"
" 40        HYDROGRAPH Next link "
"          5   Next link "
"                   1.056     1.029     1.029     5.548"
" 33        CATCHMENT 303"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        303   No description"
"      75.000   % Impervious"
"       4.800   Total Area"
"     100.000   Flow length"
"       2.000   Overland Slope"
"       1.200   Pervious Area"
"     100.000   Pervious length"
"       2.000   Pervious slope"
"       3.600   Impervious Area"
"     100.000   Impervious length"
"       2.000   Impervious slope"
"       0.280   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.616   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.938   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.995     1.029     1.029     5.548 c.m/sec"
"           Catchment 303          Pervious   Impervious Total Area "
"           Surface Area           1.200      3.600      4.800      hectare"
"           Time of concentration  30.815     4.484      9.209      minutes"
"           Time to Centroid       255.972    205.099    214.228    minutes"
"           Rainfall depth         108.800    108.800    108.800    mm"
"           Rainfall volume        1305.60    3916.80    5222.40    c.m"
"           Rainfall losses        41.826     6.711      15.490     mm"
"           Runoff depth           66.974     102.089    93.310     mm"
"           Runoff volume          803.68     3675.22    4478.90    c.m"
"           Runoff coefficient     0.616      0.938      0.858      "
"           Maximum flow           0.194      0.835      0.995      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                   0.995     2.024     1.029     5.548"
" 52        CHANNEL DESIGN"
"       2.024   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"           Depth of flow                0.160    metre"
"           Velocity                     1.578    m/sec"
"           Channel capacity             7.740    c.m/sec"
"           Critical depth               0.200    metre"
" 53        ROUTE    Channel Route 250"
"      250.00      Channel Route 250 Reach length   ( metre)"
"       0.492   X-factor <= 0.5"
"     118.851   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                 1.979    c.m/sec"
"                   0.995     2.024     1.979     5.548 c.m/sec"
" 40        HYDROGRAPH   Combine    6100"
"          6   Combine "
"       6100   Node #"
"              "
"           Maximum flow                 7.386    c.m/sec"
"           Hydrograph volume         39346.617    c.m"
"                   0.995     2.024     1.979     7.386"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                   0.995     0.000     1.979     7.386"
" 33        CATCHMENT 407"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        407   No description"
"      75.000   % Impervious"
"       3.000   Total Area"
"     100.000   Flow length"
"       2.000   Overland Slope"
"       0.750   Pervious Area"
"     100.000   Pervious length"
"       2.000   Pervious slope"
"       2.250   Impervious Area"
"     100.000   Impervious length"
"       2.000   Impervious slope"
"       0.300   Pervious Manning 'n'"
"      83.000   Pervious SCS Curve No."
"       0.633   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.202   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.938   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.621     0.000     1.979     7.386 c.m/sec"
"           Catchment 407          Pervious   Impervious Total Area "
"           Surface Area           0.750      2.250      3.000      hectare"
"           Time of concentration  31.867     4.484      9.515      minutes"
"           Time to Centroid       256.479    205.099    214.538    minutes"
"           Rainfall depth         108.800    108.800    108.800    mm"
"           Rainfall volume        816.00     2448.00    3264.00    c.m"
"           Rainfall losses        39.877     6.711      15.002     mm"
"           Runoff depth           68.923     102.089    93.798     mm"
"           Runoff volume          516.92     2297.01    2813.93    c.m"
"           Runoff coefficient     0.633      0.938      0.862      "
"           Maximum flow           0.123      0.522      0.621      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                   0.621     0.621     1.979     7.386"
" 52        CHANNEL DESIGN"
"       0.621   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"           Depth of flow                0.088    metre"
"           Velocity                     1.136    m/sec"
"           Channel capacity             7.740    c.m/sec"
"           Critical depth               0.107    metre"
" 53        ROUTE    Channel Route 100"
"      100.00      Channel Route 100 Reach length   ( metre)"
"       0.488   X-factor <= 0.5"
"      66.043   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      60.000   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"           Peak outflow                 0.617    c.m/sec"
"                   0.621     0.621     0.617     7.386 c.m/sec"
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" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.621     0.617     0.617     7.386"
" 33          CATCHMENT 310"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          310   No description"
"       75.000   % Impervious"
"        2.400   Total Area"
"       75.000   Flow length"
"        2.000   Overland Slope"
"        0.600   Pervious Area"
"       75.000   Pervious length"
"        2.000   Pervious slope"
"        1.800   Impervious Area"
"       75.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.615   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.926   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.507     0.617     0.617     7.386 c.m/sec"
"             Catchment 310          Pervious   Impervious Total Area "
"             Surface Area           0.600      1.800      2.400      hectare"
"             Time of concentration  21.189     3.773      6.930      minutes"
"             Time to Centroid       244.317    203.918    211.240    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        652.80     1958.40    2611.20    c.m"
"             Rainfall losses        41.871     8.015      16.479     mm"
"             Runoff depth           66.929     100.785    92.321     mm"
"             Runoff volume          401.57     1814.13    2215.70    c.m"
"             Runoff coefficient     0.615      0.926      0.849      "
"             Maximum flow           0.112      0.421      0.507      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.507     1.123     0.617     7.386"
" 52          CHANNEL DESIGN"
"        1.123   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient    %"
"             Depth of flow                0.299    metre"
"             Velocity                     1.298    m/sec"
"             Channel capacity           557.696    c.m/sec"
"             Critical depth               0.275    metre"
" 53          ROUTE    Channel Route 200"
"       200.00      Channel Route 200 Reach length   ( metre)"
"        0.480   X-factor <= 0.5"
"      115.562   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 1.110    c.m/sec"
"                     0.507     1.123     1.110     7.386 c.m/sec"
" 40          HYDROGRAPH   Combine    6100"
"            6   Combine "
"         6100   Node #"
"                "
"             Maximum flow                 8.355    c.m/sec"
"             Hydrograph volume        44376.262    c.m"
"                     0.507     1.123     1.110     8.355"
" 40          HYDROGRAPH   Confluence    6100"
"            7   Confluence "
"         6100   Node #"
"                "
"             Maximum flow                 8.355    c.m/sec"
"             Hydrograph volume        44376.266    c.m"
"                     0.507     8.355     1.110     0.000"
" 52          CHANNEL DESIGN"
"        8.355   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient    %"
"             Depth of flow                0.825    metre"
"             Velocity                     2.262    m/sec"
"             Channel capacity           557.696    c.m/sec"
"             Critical depth               0.821    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.304   X-factor <= 0.5"
"       16.580   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       21.429   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 8.351    c.m/sec"
"                     0.507     8.355     8.351     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.507     8.351     8.351     0.000"
" 81          ADD COMMENT==================================================="
"            1   Lines of comment"
"             PROPOSED POND #2"
" 54          POND DESIGN"
"        8.351   Current peak flow    c.m/sec"
"        4.007   Target outflow    c.m/sec"
"      44376.3   Hydrograph volume    c.m"
"          25.   Number of stages"
"        0.000   Minimum water level    metre"
"        2.300   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                  0.000     0.000     0.000"
"                0.09583   0.00452   875.671"
"                 0.1917   0.01493  1778.243"
"                 0.2875   0.03442  2706.844"
"                 0.3833   0.04383  3662.299"
"                 0.4792   0.05156  4645.824"
"                 0.5750   0.05826  5655.543"
"                 0.6708   0.06427  6692.645"
"                 0.7667   0.06977  7758.431"
"                 0.8625   0.07486  8850.853"
"                 0.9583   0.07963  9971.185"
"                  1.054   0.08412  11118.39"
"                  1.150   0.08840  12297.52"
"                  1.246    0.2294  13505.21"
"                  1.342    0.4837  14741.64"
"                  1.438    0.8116  16006.97"
"                  1.533     1.195  17287.76"
"                  1.629     1.633  18611.14"
"                  1.725     2.118  19963.96"
"                  1.821     2.644  21346.39"
"                  1.917     3.209  22758.63"
"                  2.013     3.811  24200.82"
"                  2.108     5.348  25657.67"
"                  2.204     7.723  27160.03"
"                  2.300    10.675  28692.88"
"           2.   WEIRS"
"                Crest      Weir     Crest      Left     Right"
"             elevation coefficie   breadth sideslope sideslope"
"                 1.150     0.900     3.000     0.000     0.000"
"                 2.013     0.900    20.000     3.000     3.000"
"           1.   ORIFICES"
"               Orifice   Orifice   Orifice Number of"
"                invert coefficie  diameter  orifices"
"                 0.000     0.630    0.2000     1.000"
"           2.   LAYERS"
"                Bottom    Aspect    Bottom       Top   Average"
"                  area     ratio elevation elevation sideslope"
"              9000.000     7.000     0.000     2.000     5.000"
"             15137.096     4.852     2.000     2.300     5.000"
"             Peak outflow                 3.779    c.m/sec"
"             Maximum level                2.008    metre"
"             Maximum storage          24124.971    c.m"
"             Centroidal lag              14.202   hours"
"                 0.507     8.351     3.779     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                     0.507     3.779     3.779     0.000"
" 52          CHANNEL DESIGN"
"        3.779   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient    %"
"             Depth of flow                0.561    metre"
"             Velocity                     1.830    m/sec"
"             Channel capacity           557.696    c.m/sec"
"             Critical depth               0.543    metre"
" 53          ROUTE    Channel Route 250"
"       250.00      Channel Route 250 Reach length   ( metre)"
"        0.472   X-factor <= 0.5"
"      102.471   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                 3.765    c.m/sec"
"                     0.507     3.779     3.765     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    2000"
"            6   Combine "
"         2000   Node #"
"                Flow in Hwy. 21 Ditch"
"             Maximum flow                 6.137    c.m/sec"
"             Hydrograph volume        55406.535    c.m"
"                     0.507     3.779     3.765     6.137"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.507     0.000     3.765     6.137"
" 33          CATCHMENT 311"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          311   No description"
"       75.000   % Impervious"
"        6.600   Total Area"
"      100.000   Flow length"
"        2.000   Overland Slope"
"        1.650   Pervious Area"
"      100.000   Pervious length"
"        2.000   Pervious slope"
"        4.950   Impervious Area"
"      100.000   Impervious length"
"        2.000   Impervious slope"
"        0.200   Pervious Manning 'n'"
"       82.000   Pervious SCS Curve No."
"        0.615   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.938   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     1.411     0.000     3.765     6.137 c.m/sec"
"             Catchment 311          Pervious   Impervious Total Area "
"             Surface Area           1.650      4.950      6.600      hectare"
"             Time of concentration  25.181     4.484      8.197      minutes"
"             Time to Centroid       249.147    205.099    213.000    minutes"
"             Rainfall depth         108.800    108.800    108.800    mm"
"             Rainfall volume        1795.20    5385.60    7180.80    c.m"
"             Rainfall losses        41.862     6.711      15.498     mm"
"             Runoff depth           66.938     102.089    93.302     mm"
"             Runoff volume          1104.48    5053.43    6157.91    c.m"
"             Runoff coefficient     0.615      0.938      0.858      "
"             Maximum flow           0.289      1.149      1.411      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     1.411     1.411     3.765     6.137"
" 52          CHANNEL DESIGN"
"        1.411   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient    %"
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"            Depth of flow                0.134    metre"
"            Velocity                     1.430    m/sec"
"            Channel capacity             7.740    c.m/sec"
"            Critical depth               0.166    metre"
" 53         ROUTE    Channel Route 200"
"      200.00      Channel Route 200 Reach length   ( metre)"
"       0.492   X-factor <= 0.5"
"     104.869   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"     100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 1.395    c.m/sec"
"                  1.411     1.411     1.395     6.137 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  1.411     1.395     1.395     6.137"
" 33         CATCHMENT 314"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         314   No description"
"      50.000   % Impervious"
"       3.300   Total Area"
"      20.000   Flow length"
"       1.000   Overland Slope"
"       1.650   Pervious Area"
"      20.000   Pervious length"
"       1.000   Pervious slope"
"       1.650   Impervious Area"
"      20.000   Impervious length"
"       1.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.614   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.937   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.694     1.395     1.395     6.137 c.m/sec"
"            Catchment 314          Pervious   Impervious Total Area "
"            Surface Area           1.650      1.650      3.300      hectare"
"            Time of concentration  11.803     2.102      5.940      minutes"
"            Time to Centroid       232.929    202.091    214.292    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        1795.20    1795.20    3590.40    c.m"
"            Rainfall losses        42.035     6.813      24.424     mm"
"            Runoff depth           66.765     101.987    84.376     mm"
"            Runoff volume          1101.62    1682.79    2784.41    c.m"
"            Runoff coefficient     0.614      0.937      0.776      "
"            Maximum flow           0.306      0.387      0.694      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.694     2.089     1.395     6.137"
" 52         CHANNEL DESIGN"
"       2.089   Current peak flow    c.m/sec"
"       0.040   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       2.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       5.000   Channel depth    metre"
"       2.000   Gradient   %"
"            Depth of flow                0.415    metre"
"            Velocity                     1.553    m/sec"
"            Channel capacity           557.696    c.m/sec"
"            Critical depth               0.392    metre"
" 53         ROUTE    Channel Route 80"
"       80.00      Channel Route 80 Reach length   ( metre)"
"       0.433   X-factor <= 0.5"
"      38.643   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      42.857   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 2.083    c.m/sec"
"                  0.694     2.089     2.083     6.137 c.m/sec"
" 40         HYDROGRAPH   Combine    7000"
"           6   Combine "
"        7000   Node #"
"               "
"            Maximum flow                 2.083    c.m/sec"
"            Hydrograph volume         8942.320    c.m"
"                  0.694     2.089     2.083     2.083"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.694     0.000     2.083     2.083"
" 33         CATCHMENT 312"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         312   No description"
"      75.000   % Impervious"
"       4.400   Total Area"
"     100.000   Flow length"
"       2.000   Overland Slope"
"       1.100   Pervious Area"
"     100.000   Pervious length"
"       2.000   Pervious slope"
"       3.300   Impervious Area"
"     100.000   Impervious length"
"       2.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.615   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.938   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.940     0.000     2.083     2.083 c.m/sec"
"            Catchment 312          Pervious   Impervious Total Area "
"            Surface Area           1.100      3.300      4.400      hectare"
"            Time of concentration  25.181     4.484      8.197      minutes"
"            Time to Centroid       249.147    205.099    213.000    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        1196.80    3590.40    4787.20    c.m"
"            Rainfall losses        41.862     6.711      15.498     mm"
"            Runoff depth           66.938     102.089    93.302     mm"
"            Runoff volume          736.32     3368.95    4105.27    c.m"
"            Runoff coefficient     0.615      0.938      0.858      "
"            Maximum flow           0.193      0.766      0.940      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.940     0.940     2.083     2.083"
" 52         CHANNEL DESIGN"
"       0.940   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.300   Channel depth    metre"
"       2.000   Gradient   %"
"            Depth of flow                0.109    metre"
"            Velocity                     1.278    m/sec"
"            Channel capacity             7.740    c.m/sec"
"            Critical depth               0.134    metre"
" 53         ROUTE    Channel Route 100"
"      100.00      Channel Route 100 Reach length   ( metre)"
"       0.486   X-factor <= 0.5"
"      58.688   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      60.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 0.935    c.m/sec"
"                  0.940     0.940     0.935     2.083 c.m/sec"
" 40         HYDROGRAPH   Combine    7000"
"           6   Combine "
"        7000   Node #"
"               "
"            Maximum flow                 3.017    c.m/sec"
"            Hydrograph volume        13047.581    c.m"
"                  0.940     0.940     0.935     3.017"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.940     0.000     0.935     3.017"
" 33         CATCHMENT 304"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         304   No description"
"      50.000   % Impervious"
"       1.600   Total Area"
"      75.000   Flow length"
"       2.000   Overland Slope"
"       0.800   Pervious Area"
"      75.000   Pervious length"
"       2.000   Pervious slope"
"       0.800   Impervious Area"
"      75.000   Impervious length"
"       2.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
"       0.615   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       5.576   Pervious Initial abstraction"
"       0.013   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.926   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.319     0.000     0.935     3.017 c.m/sec"
"            Catchment 304          Pervious   Impervious Total Area "
"            Surface Area           0.800      0.800      1.600      hectare"
"            Time of concentration  21.189     3.773      10.724     minutes"
"            Time to Centroid       244.317    203.918    220.040    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        870.40     870.40     1740.80    c.m"
"            Rainfall losses        41.871     8.015      24.943     mm"
"            Runoff depth           66.929     100.785    83.857     mm"
"            Runoff volume          535.43     806.28     1341.71    c.m"
"            Runoff coefficient     0.615      0.926      0.771      "
"            Maximum flow           0.150      0.187      0.319      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.319     0.319     0.935     3.017"
" 52         CHANNEL DESIGN"
"       0.319   Current peak flow    c.m/sec"
"       0.020   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"       4.000   Basewidth    metre"
"      50.000   Left bank slope"
"       0.000   Right bank slope"
"       0.600   Channel depth    metre"
"       2.000   Gradient   %"
"            Depth of flow                0.062    metre"
"            Velocity                     0.932    m/sec"
"            Channel capacity            38.450    c.m/sec"
"            Critical depth               0.074    metre"
" 53         ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"       0.483   X-factor <= 0.5"
"      40.227   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      37.500   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 0.317    c.m/sec"
"                  0.319     0.319     0.317     3.017 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.319     0.317     0.317     3.017"
" 33         CATCHMENT 313"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         313   No description"
"      75.000   % Impervious"
"       1.800   Total Area"
"      50.000   Flow length"
"       2.000   Overland Slope"
"       0.450   Pervious Area"
"      50.000   Pervious length"
"       2.000   Pervious slope"
"       1.350   Impervious Area"
"      50.000   Impervious length"
"       2.000   Impervious slope"
"       0.200   Pervious Manning 'n'"
"      82.000   Pervious SCS Curve No."
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"        0.615   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        5.576   Pervious Initial abstraction"
"        0.013   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.933   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.395     0.317     0.317     3.017 c.m/sec"
"            Catchment 313          Pervious   Impervious Total Area "
"            Surface Area           0.450      1.350      1.800      hectare"
"            Time of concentration  16.614     2.959      5.419      minutes"
"            Time to Centroid       238.809    203.134    209.564    minutes"
"            Rainfall depth         108.800    108.800    108.800    mm"
"            Rainfall volume        489.60     1468.80    1958.40    c.m"
"            Rainfall losses        41.851     7.287      15.928     mm"
"            Runoff depth           66.949     101.513    92.872     mm"
"            Runoff volume          301.27     1370.42    1671.69    c.m"
"            Runoff coefficient     0.615      0.933      0.854      "
"            Maximum flow           0.086      0.319      0.395      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.395     0.712     0.317     3.017"
" 52         CHANNEL DESIGN"
"        0.712   Current peak flow    c.m/sec"
"        0.020   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        4.000   Basewidth    metre"
"       50.000   Left bank slope"
"        0.000   Right bank slope"
"        0.300   Channel depth    metre"
"        2.000   Gradient   %"
"            Depth of flow                0.095    metre"
"            Velocity                     1.181    m/sec"
"            Channel capacity             7.740    c.m/sec"
"            Critical depth               0.116    metre"
" 53         ROUTE    Channel Route 200"
"       200.00      Channel Route 200 Reach length   ( metre)"
"        0.494   X-factor <= 0.5"
"      126.993   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 0.700    c.m/sec"
"                    0.395     0.712     0.700     3.017 c.m/sec"
" 40         HYDROGRAPH   Combine    7000"
"           6   Combine "
"         7000   Node #"
"               "
"            Maximum flow                 3.717    c.m/sec"
"            Hydrograph volume        16060.994    c.m"
"                    0.395     0.712     0.700     3.717"
" 40         HYDROGRAPH   Confluence    7000"
"           7   Confluence "
"         7000   Node #"
"               "
"            Maximum flow                 3.717    c.m/sec"
"            Hydrograph volume        16060.994    c.m"
"                    0.395     3.717     0.700     0.000"
" 52         CHANNEL DESIGN"
"        3.717   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        2.000   Gradient   %"
"            Depth of flow                0.556    metre"
"            Velocity                     1.822    m/sec"
"            Channel capacity           557.696    c.m/sec"
"            Critical depth               0.538    metre"
" 53         ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.361   X-factor <= 0.5"
"       20.587   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       25.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                 3.709    c.m/sec"
"                    0.395     3.717     3.709     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                    0.395     3.709     3.709     0.000"
" 81         ADD COMMENT=================================================="
"          1  Lines of comment"
"            PROPOSED POND #3"
" 54         POND DESIGN"
"        3.709   Current peak flow    c.m/sec"
"        2.000   Target outflow    c.m/sec"
"      16061.0   Hydrograph volume    c.m"
"          21.   Number of stages"
"        0.000   Minimum water level    metre"
"        2.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"                 0.000     0.000     0.000"
"                0.1000   0.00487   607.388"
"                0.2000   0.01603  1237.688"
"                0.3000   0.03579  1891.097"
"                0.4000   0.04527  2567.818"
"                0.5000   0.05309  3268.049"
"                0.6000   0.05989  3991.990"
"                0.7000   0.06599  4739.842"
"                0.8000   0.07158  5511.804"
"                0.9000   0.07676  6308.077"
"                 1.000   0.08161  7128.861"
"                 1.100   0.08619  7974.355"
"                 1.200   0.09054  8844.760"
"                 1.300    0.1190  9740.274"
"                 1.400    0.1673  10661.10"
"                 1.500    0.2286  11607.44"
"                 1.600    0.3003  12579.48"
"                 1.700    0.3810  13577.44"
"                 1.800     1.208  14601.51"
"                 1.900     2.686  15651.89"
"                 2.000     4.619  16728.78"
"          2.   WEIRS"
"                 Crest      Weir     Crest      Left     Right"
"             elevation coefficie   breadth sideslope sideslope"
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"                 1.200     0.900     0.500     0.000     0.000"
"                 1.700     0.900    15.000     3.000     3.000"
"          1.   ORIFICES"
"               Orifice   Orifice   Orifice Number of"
"                invert coefficie  diameter  orifices"
"                 0.000     0.630    0.2000     1.000"
"          2.   LAYERS"
"                Bottom    Aspect    Bottom       Top   Average"
"                  area     ratio elevation elevation sideslope"
"              5960.000     6.500     0.000     2.000     5.000"
"             10902.110     4.312     2.000     2.000     4.000"
"            Peak outflow                 0.325    c.m/sec"
"            Maximum level                1.631    metre"
"            Maximum storage          12886.288    c.m"
"            Centroidal lag              20.543   hours"
"                 0.395     3.709     0.325     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                    0.395     0.325     0.325     0.000"
" 52         CHANNEL DESIGN"
"        0.325   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        1.000   Gradient   %"
"            Depth of flow                0.183    metre"
"            Velocity                     0.698    m/sec"
"            Channel capacity           394.351    c.m/sec"
"            Critical depth               0.130    metre"
" 53         ROUTE    Channel Route 300"
"       300.00      Channel Route 300 Reach length   ( metre)"
"        0.466   X-factor <= 0.5"
"      161.164   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"           2   No. of sub-reaches"
"            Peak outflow                 0.325    c.m/sec"
"                    0.395     0.325     0.325     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    1100"
"           6   Combine "
"         1100   Node #"
"               Node taking 200 series - Bottom end of Holtby Drain"
"            Maximum flow                25.184    c.m/sec"
"            Hydrograph volume       131820.375    c.m"
"                    0.395     0.325     0.325    25.184"
" 81         ADD COMMENT=================================================="
"          1  Lines of comment"
"            Total to Holtby Drain"
" 40         HYDROGRAPH   Confluence    1100"
"           7   Confluence "
"         1100   Node #"
"               Node taking 200 series - Bottom end of Holtby Drain"
"            Maximum flow                25.184    c.m/sec"
"            Hydrograph volume       131820.375    c.m"
"                    0.395    25.184     0.325     0.000"
" 81         ADD COMMENT=================================================="
"          1  Lines of comment"
"            Total to Holtby Drain"
" 52         CHANNEL DESIGN"
"       25.184   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"            Depth of flow                1.855    metre"
"            Velocity                     1.794    m/sec"
"            Channel capacity           278.848    c.m/sec"
"            Critical depth               1.409    metre"
" 53         ROUTE    Channel Route 200"
"       200.00      Channel Route 200 Reach length   ( metre)"
"        0.101   X-factor <= 0.5"
"       83.622   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      150.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                25.025    c.m/sec"
"                    0.395    25.184    25.025     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    1300"
"           6   Combine "
"         1300   Node #"
"               Node at Holtby Drain"
"            Maximum flow                32.131    c.m/sec"
"            Hydrograph volume       169008.359    c.m"
"                    0.395    25.184    25.025    32.131"
" 40         HYDROGRAPH   Confluence    1300"
"           7   Confluence "
"         1300   Node #"
"               Node at Holtby Drain"
"            Maximum flow                32.131    c.m/sec"
"            Hydrograph volume       169008.328    c.m"
"                    0.395    32.131    25.025     0.000"
" 52         CHANNEL DESIGN"
"       32.131   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"            Depth of flow                2.059    metre"
"            Velocity                     1.908    m/sec"
"            Channel capacity           278.848    c.m/sec"
"            Critical depth               1.580    metre"
" 53         ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       19.658   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.829   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                32.065    c.m/sec"
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"                    0.395    32.131    32.065     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    1000"
"            6   Combine "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow                148.381    c.m/sec"
"             Hydrograph volume        1173038.00    c.m"
"                    0.395    32.131    32.065   148.381"
" 81          ADD COMMENT==================================================="
"           2  Lines of comment"
"             Total discharge to Pipe Arch under Hwy. 21 on the "
"             Pentangore Tributary"
" 40          HYDROGRAPH   Confluence    1000"
"            7   Confluence "
"         1000   Node #"
"                Node upstream of Penetangore Culvert"
"             Maximum flow                148.381    c.m/sec"
"             Hydrograph volume        1173038.00    c.m"
"                    0.395   148.381    32.065     0.000"
" 81          ADD COMMENT==================================================="
"           2  Lines of comment"
"             Total discharge to Pipe Arch under Hwy. 21 on the "
"             Pentangore Tributary"
" 52          CHANNEL DESIGN"
"      148.381   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 3.882    metre"
"             Velocity                      2.801    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                3.150    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       13.386   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.971   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                148.357    c.m/sec"
"                    0.395   148.381   148.357     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    3000"
"            6   Combine "
"         3000   Node #"
"                Node Combining All Flow"
"             Maximum flow                148.357    c.m/sec"
"             Hydrograph volume        1173036.87    c.m"
"                    0.395   148.381   148.357   148.357"
" 81          ADD COMMENT==================================================="
"           1  Lines of comment"
"             Total Off-site Discharge - Hwy. 21 + Penetangore Tributary"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.395     0.000   148.357   148.357"
" 40          HYDROGRAPH   Confluence    2000"
"            7   Confluence "
"         2000   Node #"
"                Flow in Hwy. 21 Ditch"
"             Maximum flow                  6.137    c.m/sec"
"             Hydrograph volume         55406.535    c.m"
"                    0.395     6.137   148.357     0.000"
" 81          ADD COMMENT==================================================="
"           1  Lines of comment"
"             Total discharge to Hwy. 21 Ditch"
" 52          CHANNEL DESIGN"
"        6.137   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 0.988    metre"
"             Velocity                      1.250    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                0.701    metre"
" 53          ROUTE    Channel Route 100"
"       100.00      Channel Route 100 Reach length   ( metre)"
"        0.042   X-factor <= 0.5"
"       59.985   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      100.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  6.133    c.m/sec"
"                    0.395     6.137     6.133     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    3000"
"            6   Combine "
"         3000   Node #"
"                Node Combining All Flow"
"             Maximum flow                153.706    c.m/sec"
"             Hydrograph volume        1228439.12    c.m"
"                    0.395     6.137     6.133   153.706"
" 40          HYDROGRAPH   Confluence    3000"
"            7   Confluence "
"         3000   Node #"
"                Node Combining All Flow"
"             Maximum flow                153.706    c.m/sec"
"             Hydrograph volume        1228439.12    c.m"
"                    0.395   153.706     6.133     0.000"
" 81          ADD COMMENT==================================================="
"           1  Lines of comment"
"             Total Off-site Discharge - Hwy. 21 + Penetangore Tributary"
" 52          CHANNEL DESIGN"
"      153.706   Current peak flow    c.m/sec"
"        0.040   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"        2.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        5.000   Channel depth    metre"
"        0.500   Gradient   %"
"             Depth of flow                 3.937    metre"
"             Velocity                      2.826    m/sec"
"             Channel capacity            278.848    c.m/sec"
"             Critical depth                3.199    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.000   X-factor <= 0.5"
"       13.268   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.974   Beta weighting factor"
"       75.000   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                153.694    c.m/sec"
"                    0.395   153.706   153.694     0.000 c.m/sec"
" 38          START/RE-START TOTALS 3000"
"            1   Runoff Totals turned OFF"
"             Catchment area to node 3000            1918.200    hectare"
"             Impervious area to node 3000             40.592    hectare"
"             % impervious to node 3000                 0.000"
"             Peak runoff to node 3000                  0.000    c.m/sec"
"             Total volume to node 3000                   0.0    c.m"
" 38          START/RE-START TOTALS 3000"
"            1   Runoff Totals turned ON"
"             Catchment area to node 3000            1918.200    hectare"
"             Impervious area to node 3000             40.592    hectare"
"             % impervious to node 3000                 2.116"
"             Peak runoff to node 3000                231.535    c.m/sec"
"             Total volume to node 3000             1240259.9    c.m"
```

APPENDIX G

SURFACE WATER MANAGEMENT FACILITY DESIGN AND RELATED CALCULATIONS

SWM Facility Design Calculations
Wet Pond SWM Facility Configuration and Water Quality Requirements

Water Quality Volume Requirements for a Wet Pond as per MOE Stormwater Management Planning and Design Manual, Table 3.2.

SWM Facility Requirements

		Pond #2	**Pond #3**
Protection Level	=	Enhanced (Level 1)	Enhanced (Level 1)
Total Drainage Area	=	56.00 ha	17.70 ha
Total Impervious Area	=	20.30 ha	12.20 ha
% Impervious	=	36.0 %	69.0 %
Required Wet Pond Storage Req. for Impervious Level (MOE Design Manual - Table 3.2)	=	143 m^3/ha	223 m^3/ha
Required Water Quality Volume, Wet Pond	=	7,980 m^3	3,941 m^3
Permanent Pool Volume Required	=	5,740 m^3	3,233 m^3
Extended Detention Volume Required	=	2,240 m^3	708 m^3

Table 3.2 - MOE Guidelines

Storage Volume for Percent Impervious - Enhanced					
Imp	35	55	70	85	%
Volume	140	190	225	250	m^3/Ha
Calculated Storage Volume =			143 m^3/Ha		Pond #2
Requirements			223 m^3/Ha		Pond #3

Pond Dimensions

			Pond #2		Pond #3	
			Length (m)	Width (m)	Length (m)	Width (m)
- Forebay	Bottom of Pond	=	81.0	25.0	65.0	5.0
	Top of Permanent Pool	=	90.0	35.0	75.0	12.0
	Top of Pond	=	100.0	55.0	95.0	32.0
- Main Pond	Bottom of Pond	=	131.0	30.0	78.0	47.0
	Top of Permanent Pool	=	141.0	44.0	88.0	57.0
	Top of Pond	=	160.0	65.0	100.0	77.0

Length to Width Ratio

		Pond #2	Pond #3
- Forebay	=	2.6 :1	6.3 :1
- Overall	=	5.3 :1	2.9 :1

Elevation Details

		Pond #2	Pond #3
- Pond Bottom Elevation	=	0.00 m	0.00 m
- Permanent Pool Depth	=	1.00 m	1.00 m
- Top of Permanent Pool Depth	=	1.00 m	1.00 m
- Total Pond Depth	=	3.30 m	3.00 m
- Top of Pond Elevation	=	3.30 m	3.00 m
- Water Quality Extended Detention Depth	=	0.45 m	0.37 m
- Water Quality E.D. Elevation	=	1.45 m	1.37 m
- Permanent Pool Side Slopes	=	5 :1	5 :1
- Extended Detention Side Slopes	=	5 :1	5 :1

Pond Volumes

		Volumes (m^3)		Volumes (m^3)	
		Actual	Req.d	Actual	Req.d
- Total Pond Volume Available - Water Quality	=	11775	7980	7342	3941.2
- Total Permanent Pool Volume	=	7450	5740	4900	3233.2
- Total Extended Detention Volume - Water Quality	=	4325	2240	2442	708

Surface Areas Provided in the SWM Facility at Various Water Levels

	Pond #2		Pond #3	
	Main	Forebay	Main	Forebay
	m^2	m^2	m^2	m^2
- Bottom	4,100	1,900	3,400	400
- Top Permanent Pool	5,850	3,050	4,650	1,350
- Extended Detention	6,588	3,590	5,168	1,720
- 0.50m height above Permanent Pool	6,670	3,650	5,350	1,850
- 1.0m height above Permanent Pool	7,750	4,250	6,100	2,300
- 1.50m height above Permanent Pool	8,650	4,900	6,800	2,700
- 2.0m height above Permanent Pool	9,750	5,650	7,600	3,200

Ponding Volumes Provided in the SWM Facility at Various Water Levels Above the Permanent Pool
(Active Storage Only - Permanent Pool Volume Not Included)

Pond #2

	Main m^3	Forebay m^3	Incr. Total m^3	Cum. Total m^3
- Top Permanent Pool	0	0	0	0
- 0.50m height above Permanent Pool	3,130	1,675	4,805	4,805
- 1.0m height above Permanent Pool	3,605	1,975	5,580	10,385
- 1.50m height above Permanent Pool	4,100	2,288	6,388	16,773
- 2.0m height above Permanent Pool	4,600	2,638	7,238	24,010

Pond #3

	Main m^3	Forebay m^3	Incr. Total m^3	Cum. Total m^3
- Top Permanent Pool	0	0	0	0
- 0.50m height above Permanent Pool	2,500	800	3,300	3,300
- 1.0m height above Permanent Pool	2,863	1,038	3,900	7,200
- 1.50m height above Permanent Pool	3,225	1,250	4,475	11,675
- 2.0m height above Permanent Pool	3,600	1,475	5,075	16,750

SWM Wet Pond Forebay Sizing

Forebay sizing as per MOE Stormwater Management Planning and Design Manual

Surface Area

Forebay surface area to be < 33% of total pond surface area.

Pond #2

Total pond surface area @ extended detention elevation	=	10178	m^2
Forebay surface area @ extended detention elevation	=	3590	m^2
Forebay area as a % of total pond area	=	35	%

Pond #3

Total pond surface area @ extended detention elevation	=	6888	m^2
Forebay surface area @ extended detention elevation	=	1720	m^2
Forebay area as a % of total pond area	=	25	%

Settling

Settling Distance = $(rQp/V_s)^{1/2}$

where:
- r = L to W ratio average
- Qp = Peak Flow Rate from the pond - 25mm storm
- V_s = settling velocity for 0.15m particles (0.003 m/s)

Pond #2

r	=	2.6	
Qp	=	0.08	m^3/s
V_s	=	0.0003	m/s

Therefore,

Settling Distance = 26.3 m **Actual =** 35 m

Pond #3

r	=	6.3	
Qp	=	0.043	m^3/s
V_s	=	0.0003	m/s

Therefore,

Settling Distance = 30.0 m **Actual =** 75 m

Dispersion Length

Dispersion Length = $8Q/DV_f$

where:
- Q = inlet flow (m^3/s) - Quality Storm
- d = depth of permanent pool in forebay (m), (Assume min. depth of 0.8m)

Pond #2

Q	=	0.937	m^3/s
d	=	0.8	m
V_f	=	0.5	m/s

Therefore,

Dispersion Length = 18.7 m **Actual =** 35 m

Pond #3

Q	=	0.662	m^3/s
d	=	0.8	m
V_f	=	0.5	m/s

Therefore,

Dispersion Length = 13.2 m **Actual =** 75 m

Cleanout Frequency

Cleanout Frequency = Vol / (Load)(A sed.)(eff.)

where:

Vol 1	=	Volume of allowable sediment
Load	=	sediment loading (m^3/ha)
eff.	=	Removal Efficiency (60%)

Pond #2

Allowable Sediment Depth	=	0.2	m
Actual Forebay Length	=	90	m
Actual Forebay Width	=	55	m
Side Slopes	=	5	
Contributing Area	=	56.00	ha
Volume of Allowable Sediment	=	1019	m^3
Sediment Loading	=	1.90	m^3/ha

Therefore,

Cleanout Frequency = 16.0 years

Pond #3

Allowable Sediment Depth	=	0.2	m
Actual Forebay Length	=	75	m
Actual Forebay Width	=	12	m
Side Slopes	=	5	
Contributing Area	=	17.70	ha
Volume of Allowable Sediment	=	197	m^3
Sediment Loading	=	2.80	m^3/ha

Therefore,

Cleanout Frequency = 6.6 years

Detention Time

$$\text{Detention Time} = \frac{2\,A_p}{CA_o(2g)^{0.50}}(h_1-h_2)^{0.50}$$

where:

A_o	=	cross-sectional area of orifice
A_p	=	surface area of pond at storage level (permanent pool)
C	=	discharge coefficient (0.65)
h_1	=	starting water elevation above orifice
h_2	=	ending water elevation above orifice

Pond #2

A_o	=	0.0314	m^2	200 mm
A_p	=	8900	m^2	
C	=	0.65		
h_1	=	0.45	m	
h_2	=	0	m	

Therefore, t = 132,079 secs.

= 37 hrs.

Pond #3

A_o	=	0.0314	m^2	200 mm
A_p	=	6000	m^2	
C	=	0.65		
h_1	=	0.37	m	
h_2	=	0	m	

Therefore, t = 80,740 secs.

= 22 hrs.

Stage Storage Relationship for Proposed Stormwater Management Facilties (Pond #2 and Pond #3)

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POND #2							
Pond Control Structure (Orifice / Weir) Rating Calculations							
Height Above PP	Elev	Pond Volume	Calculated Discharge				Total Miduss Discharge
			Orifice 1	Control Weir	Overflow Weir	TOTAL	
m	m	m^3	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
-1.00	0.00	-	-	-	-	-	-
-0.90	0.10	-	-	-	-	-	-
-0.80	0.20	-	-	-	-	-	-
-0.70	0.30	-	-	-	-	-	-
-0.60	0.40	-	-	-	-	-	-
-0.50	0.50	-	-	-	-	-	-
-0.40	0.60	-	-	-	-	-	-
-0.30	0.70	-	-	-	-	-	-
-0.20	0.80	-	-	-	-	-	-
-0.10	0.90	-	-	-	-	-	-
0.00	1.00	0	0.000	-	-	0.000	0.000
0.10	1.10	876	0.004	-	-	0.004	0.004
0.19	1.19	1778	0.014	-	-	0.014	0.015
0.29	1.29	2707	0.037	-	-	0.037	0.034
0.38	1.38	3662	0.045	-	-	0.045	0.043
0.48	1.48	4645	0.052	-	-	0.052	0.052
0.57	1.57	5655	0.058	-	-	0.058	0.058
0.67	1.67	6692	0.064	-	-	0.064	0.064
0.77	1.77	7758	0.069	-	-	0.069	0.069
0.86	1.86	8850	0.074	-	-	0.074	0.074
0.96	1.96	9971	0.079	-	-	0.079	0.080
1.05	2.05	11118	0.083	-	-	0.083	0.084
1.15	2.15	12297	0.087	0.000	-	0.087	0.088
1.25	2.25	13505	0.091	0.136	-	0.226	0.229
1.34	2.34	14741	0.095	0.380	-	0.475	0.483
1.44	2.44	16006	0.098	0.697	-	0.795	0.811
1.53	2.53	17287	0.102	1.072	-	1.174	1.195
1.63	2.63	18611	0.105	1.497	-	1.602	1.633
1.72	2.72	19963	0.108	1.967	-	2.075	2.118
1.82	2.82	21346	0.111	2.478	-	2.589	2.644
1.92	2.92	22758	0.114	3.026	-	3.141	3.209
2.01	3.01	24200	0.117	3.610	0.042	3.769	3.811
2.11	3.11	25657	0.120	4.228	1.069	5.417	5.348
2.20	3.20	27160	0.123	4.877	2.766	7.766	7.723
2.30	3.30	28692	0.126	5.556	4.928	10.610	10.675

Discharge Structure	Height to Inv.	Dia/Length	Area	Coefficient
	m	mm	m^2	
Orifice 1	0.00	200	0.03140	0.61
Control Weir	1.15	3000	n/a	1.50
Overflow Weir	2.00	20000	n/a	1.50

POND #3							
Pond Control Structure (Orifice / Weir) Rating Calculations							
Height	Elev	Pond	Calculated Discharge				Total Miduss
Above PP		Volume	Orifice 1	Control Weir	Overflow Weir	TOTAL	Discharge
m	m	m^3	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
-1.00	0.00	-	-	-	-	-	-
-0.90	0.10	-	-	-	-	-	-
-0.80	0.20	-	-	-	-	-	-
-0.70	0.30	-	-	-	-	-	-
-0.60	0.40	-	-	-	-	-	-
-0.50	0.50	-	-	-	-	-	-
-0.40	0.60	-	-	-	-	-	-
-0.30	0.70	-	-	-	-	-	-
-0.20	0.80	-	-	-	-	-	-
-0.10	0.90	-	-	-	-	-	-
0.00	1.00	0	0.000	-	-	0.000	0.000
0.10	1.10	607	0.005	-	-	0.005	0.005
0.20	1.20	1238	0.016	-	-	0.016	0.016
0.30	1.30	1891	0.038	-	-	0.038	0.036
0.40	1.40	2568	0.046	-	-	0.046	0.045
0.50	1.50	3268	0.054	-	-	0.054	0.053
0.60	1.60	3992	0.060	-	-	0.060	0.060
0.70	1.70	4740	0.066	-	-	0.066	0.066
0.80	1.80	5511	0.071	-	-	0.071	0.072
0.90	1.90	6308	0.076	-	-	0.076	0.077
1.00	2.00	7129	0.080	-	-	0.080	0.082
1.10	2.10	7975	0.085	-	-	0.085	0.086
1.20	2.20	8845	0.089	0.000	-	0.089	0.091
1.30	2.30	9740	0.093	0.024	-	0.117	0.119
1.40	2.40	10661	0.097	0.068	-	0.164	0.167
1.50	2.50	11607	0.100	0.124	-	0.224	0.229
1.60	2.60	12580	0.104	0.191	-	0.295	0.300
1.70	2.70	13577	0.107	0.267	0.000	0.374	0.381
1.80	2.80	14602	0.111	0.351	0.762	1.224	1.208
1.90	2.90	15652	0.114	0.442	2.156	2.712	2.686
2.00	3.00	16729	0.117	0.540	3.961	4.618	4.619

Discharge Structure	Height to Inv.	Dia/Length	Area	Coefficient
	m	mm	m^2	
Orifice 1	0.00	200	0.03140	0.61
Control Weir	1.20	500	n/a	1.51
Overflow Weir	1.70	15000	n/a	1.61

Comparison of Pre to Post Flow Results
at Various Locations

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PRE-EXISTING CONDITIONS FLOW SUMMARY (m^3/s)				
Storm Event	**Holtby Drain at Confluence with Pen. Tributary (Confluence 1100)**	**A 1500mm CSP under Hwy. 21 (Confluence 2000)**	**B Multi-Plate Arch under Hwy. 21 (Confluence 1000)**	**A+B Combined at Hwy. 21 (Confluence 3000)**
2	3.3	1.9	16.9	17.4
5	7.8	4.5	41.7	43.0
10	11.6	6.6	63.0	65.0
25	17.1	9.4	94.6	97.6
50	21.5	11.6	120.8	124.7
100	26.2	13.6	149.0	153.6

POST DEVELOPMENT CONDITIONS FLOW SUMMARY (m^3/s)				
Storm Event	**Holtby Drain at Confluence with Pen. Tributary (Confluence 1100)**	**A 1500mm CSP under Hwy. 21 (Confluence 2000)**	**B Multi-Plate Arch under Hwy. 21 (Confluence 1000)**	**A+B Combined at Hwy. 21 (Confluence 3000)**
2	3.1	0.6	16.8	17.1
5	7.4	1.3	41.5	42.3
10	11.1	2.0	62.7	64.4
25	16.3	3.6	94.1	97.2
50	20.5	4.8	120.2	124.5
100	25.5	6.1	148.4	153.7

FLOW COMPARISON % CHANGE				
Storm Event	**Holtby Drain at Confluence with Pen. Tributary (Confluence 1100)**	**A 1500mm CSP under Hwy. 21 (Confluence 2000)**	**B Multi-Plate Arch under Hwy. 21 (Confluence 1000)**	**A+B Combined at Hwy. 21 (Confluence 3000)**
2	-4.9	-69.1	-0.3	-2.0
5	-5.3	-71.2	-0.4	-1.7
10	-4.6	-69.7	-0.5	-1.0
25	-4.9	-61.6	-0.5	-0.4
50	-4.8	-58.5	-0.5	-0.2
100	-2.7	-55.3	-0.4	0.1

APPENDIX H

MAINTENANCE REPORT ON EROSION PROTECTION

MAINTENANCE REPORT ON EROSION PROTECTION
KINCARDINE BUSINESS PARK
STORMWATER MANAGEMENT FACILITIES

Date	Inspector	Status of Control Measures		Comments	
		Silt Fence	Catchbasin Sumps	Action to be Taken	Action Verified

This report to be kept on file and available for review.
Completion inspection to be undertaken monthly and after a significant rainfall event.
Action required on erosion control unit must be relayed to owner of development.

APPENDIX I
PROBABLE COST WORKSHEETS

SUMMARY - PROJECT COSTS

SERVICING COMPONENT	COST			
	Items	Engineering	Contingency	Total
Internal Servicing				
Roads	$3,077,000	$462,000	$462,000	$4,001,000
Storm Sewer	$1,491,000	$224,000	$224,000	$1,939,000
Stormwater Management	$528,000	$79,000	$79,000	$686,000
Sanitary Sewer	$739,000	$111,000	$111,000	$961,000
Watermain	$836,000	$125,000	$125,000	$1,086,000
TOTAL - Internal Servicing	**$6,671,000**	**$1,001,000**	**$1,001,000**	**$8,673,000**
External / Other Servicing				
Russell Street Sanitary Sewer	$510,000	$41,000	$76,000	$627,000
Park Street Pumping Station Upgrades	$730,000	$110,000	$110,000	$950,000
Hwy. 21 Improvements	$475,000	$71,000	$71,000	$617,000
Water Booster Station	$615,000	$92,000	$92,000	$799,000
TOTAL - External / Other Servicing	**$2,330,000**	**$314,000**	**$349,000**	**$2,993,000**
TOTAL - PROJECT COSTS	**$9,001,000**	**$1,315,000**	**$1,350,000**	**$11,666,000**

		MUNICIPALITY OF KINCARDINE					08055
		BMROSS JOB No. 08055					June 2016
		PHASE 1 SERVICING					DLE
		PRELIMINARY PROBABLE COST ESTIMATE					
Item		**Description**	**Qty./Unit**		**Price**	**Amount**	**Rounded**
ROADS							
1	a)	8.5m Road Width	320	m	$1,130	$361,600	$362,000
	b)	10.5m Road Width	370	m	$1,270	$469,900	$470,000
		Sub-Total -- Roads				**$831,500**	**$832,000**
		Engineering	15	%		$124,725	$125,000
		Contingency	15	%		$124,725	$125,000
		Total -- Roads				**$1,080,950**	**$1,082,000**
STORM SEWER							
1	a)	300mm Pipe	140	m	$185	$25,900	$26,000
	b)	375mm Pipe		m	$200	$0	$0
	c)	450mm Pipe	235	m	$240	$56,400	$56,000
	d)	525mm Pipe	180	m	$250	$45,000	$45,000
	e)	600mm Pipe	265	m	$280	$74,200	$74,000
	f)	675mm Pipe	170	m	$430	$73,100	$73,000
	g)	750mm Pipe	90	m	$470	$42,300	$42,000
	h)	825mm Pipe	100	m	$480	$48,000	$48,000
	i)	900mm Pipe	100	m	$500	$50,000	$50,000
	j)	975mm Pipe		m	$600	$0	$0
	k)	1050mm Pipe		m	$750	$0	$0
	l)	1200mm Pipe		m	$800	$0	$0
2	a)	1200mm MH	6	Ea.	$3,600	$21,600	$22,000
	b)	1500mm MH	6	Ea.	$5,500	$33,000	$33,000
	c)	1800mm MH		Ea.	$7,900	$0	$0
	d)	2400mm MH	2	Ea.	$10,000	$20,000	$20,000
	e)	3000mm MH		Ea.	$19,000	$0	$0
							$0
3	a)	Catchbasins	21	Ea.	$1,800	$37,800	$38,000
	b)	300mm Pipe	105	m	$185	$19,425	$19,000
		Sub-Total -- Storm Sewer				**$546,725**	**$546,000**
		Engineering	15	%		$82,009	$82,000
		Contingency	15	%		$82,009	$82,000
		Total -- Storm Sewer				**$710,743**	**$710,000**
STORMWATER MANAGEMENT (SWM)							
1		Clearing and Grubbing	1	LS	$10,000	$10,000	$10,000
2		Stripping	15000	m^3	$3	$37,500	$38,000
3		Earthwork	35000	m^3	$5	$157,500	$158,000
4		Topsoil	20000	m^2	$1	$15,000	$15,000

5		Seed and Mulch	20000	m^3	$1	$10,000	$10,000
6		Discharge Structure and Outlet Pipe	1	LS	$35,000	$35,000	$35,000
7		Pond Subdrain	250	m	$20	$5,000	$5,000
8		Rip-Rap Protection	1	LS	$15,000	$15,000	$15,000
9		Cable Concrete Entry Lane and Granular Forebay Bottom	1	LS	$10,000	$10,000	$10,000
		Sub-Total -- Stormwater Management				**$295,000**	**$296,000**
		Engineering	15	%		$44,250	$44,000
		Contingency	15	%		$44,250	$44,000
		Total -- Stormwater Management				**$383,500**	**$384,000**

SANITARY

1	a)	200mm Pipe	0	m	$200	$0	$0
	b)	250mm Pipe	140	m	$200	$28,000	$28,000
	c)	300mm Pipe	860	m	$230	$197,800	$198,000
2		1200mm MH	11	Ea.	$4,400	$48,400	$48,000
3	a)	Services	11	Ea.	$1,900	$20,900	$21,000
	b)	Cleanouts	11	Ea.	$400	$4,400	$4,000
		Sub-Total -- Sanitary Sewer				**$299,500**	**$299,000**
		Engineering	15	%		$44,925	$45,000
		Contingency	15	%		$44,925	$45,000
		Total -- Sanitary Sewer				**$389,350**	**$389,000**

WATERMAIN

1	a)	150mm Pipe	75	m	$140	$10,500	$11,000
	b)	200mm Pipe	0	m	$190	$0	$0
	c)	250mm Pipe	0	m	$200	$0	$0
	c)	300mm Pipe	1100	m	$250	$275,000	$275,000
2		Highway No. 21 Jack and Bore and Casing Pipe	30	m	$1,500	$45,000	$45,000
3		Hydrant Assemblies	6	Ea.	$5,000	$30,000	$30,000
4	a)	Tees	6	Ea.	$1,500	$9,000	$9,000
	b)	Valves	6	Ea.	$2,500	$15,000	$15,000
		Sub-Total -- Watermain				**$384,500**	**$385,000**
		Engineering	15	%		$57,675	$58,000
		Contingency	15	%		$57,675	$58,000
		Total -- Watermain				**$499,850**	**$501,000**

EXTERNAL / OTHER

1	Russell Street Sanitary Sewer	1 LS	$509,500	$509,500	$510,000
	Engineering	8 %		$40,760	$41,000
	Contingency	15 %		$76,425	$76,000
	Sub-Total -- Russell Street Sanitary			**$626,685**	**$627,000**
2	Park Street Pumping Station Upgrades	1 LS	$730,000	$730,000	$730,000
	Engineering	15 %		$109,500	$110,000
	Contingency	15 %		$109,500	$110,000
	Sub-Total -- Park Street Pumping Station			**$949,000**	**$950,000**
	Total -- External / Other			**$1,575,685**	**$1,577,000**

SUMMARY - PHASE 1 COSTS

SERVICING COMPONENT	**COST**			
	Items	**Engineering**	**Contingency**	**Total**
Internal Servicing				
Roads	$832,000	$125,000	$125,000	$1,082,000
Storm Sewer	$546,000	$82,000	$82,000	$710,000
Stormwater Management	$296,000	$44,000	$44,000	$384,000
Sanitary Sewer	$299,000	$45,000	$45,000	$389,000
Watermain	$385,000	$58,000	$58,000	$501,000
TOTAL - Internal Servicing	**$2,358,000**	**$354,000**	**$354,000**	**$3,066,000**
External / Other Servicing				
Russell Street Sanitary	$510,000	$41,000	$76,000	$627,000
Park Street Pumping Station	$730,000	$110,000	$110,000	$950,000
TOTAL - External / Other Servicing	**$1,240,000**	**$151,000**	**$186,000**	**$1,577,000**
TOTAL - PHASE 1 COSTS	**$3,598,000**	**$505,000**	**$540,000**	**$4,643,000**

		MUNICIPALITY OF KINCARDINE **BMROSS JOB No. 08055** **PHASE 2 SERVICING** **PRELIMINARY PROBABLE COST ESTIMATE**				08055 June 2016 DLE
Item		**Description**	**Qty./Unit**	**Price**	**Amount**	**Rounded**
ROADS						
1	a)	8.5m Road Width	850 m	$1,130	$960,500	$961,000
	b)	10.5m Road Width	300 m	$1,270	$381,000	$381,000
		Sub-Total -- Roads			**$1,341,500**	**$1,342,000**
		Engineering	15 %		$201,225	$201,000
		Contingency	15 %		$201,225	$201,000
		Total -- Roads			**$1,743,950**	**$1,744,000**
STORM SEWER						
1	a)	300mm Pipe	60 m	$185	$11,100	$11,000
	b)	375mm Pipe	75 m	$200	$15,000	$15,000
	c)	450mm Pipe	190 m	$240	$45,600	$46,000
	d)	525mm Pipe	0 m	$250	$0	$0
	e)	600mm Pipe	110 m	$280	$30,800	$31,000
	f)	675mm Pipe	0 m	$430	$0	$0
	g)	750mm Pipe	240 m	$470	$112,800	$113,000
	h)	825mm Pipe	20 m	$480	$9,600	$10,000
	i)	900mm Pipe	70 m	$500	$35,000	$35,000
	j)	975mm Pipe	0 m	$600	$0	$0
	k)	1050mm Pipe	0 m	$750	$0	$0
	l)	1200mm Pipe	300 m	$800	$240,000	$240,000
2	a)	1200mm MH	6 Ea.	$3,600	$21,600	$22,000
	b)	1500mm MH	3 Ea.	$5,500	$16,500	$17,000
	c)	1800mm MH	1 Ea.	$7,900	$7,900	$8,000
	d)	2400mm MH	3 Ea.	$10,000	$30,000	$30,000
	e)	3000mm MH	2 Ea.	$19,000	$38,000	$38,000
						$0
3	a)	Catchbasins	22.5 Ea.	$1,800	$40,500	$41,000
	b)	300mm Pipe	112.5 m	$185	$20,813	$21,000
		Sub-Total -- Storm Sewer			**$675,213**	**$678,000**
		Engineering	15 %		$101,282	$101,000
		Contingency	15 %		$101,282	$101,000
		Total -- Storm Sewer			**$877,776**	**$880,000**
STORMWATER MANAGEMENT (SWM)						
1		Clearing and Grubbing	1 LS	$10,000	$10,000	$10,000
2		Stripping	12000 m^3	$3	$30,000	$30,000
3		Earthwork	24000 m^3	$5	$108,000	$108,000
4		Topsoil	16000 m^2	$1	$12,000	$12,000

5		Seed and Mulch	16000	m^3	$1	$8,000	$8,000
6		Discharge Structure and Outlet Pipe	1	LS	$35,000	$35,000	$35,000
7		Pond Subdrain	200	m	$20	$4,000	$4,000
8		Rip-Rap Protection	1	LS	$15,000	$15,000	$15,000
9		Cable Concrete Entry Lane and Granular Forebay Bottom	1	LS	$10,000	$10,000	$10,000
		Sub-Total -- Stormwater Management				**$232,000**	**$232,000**
		Engineering	15	%		$34,800	$35,000
		Contingency	15	%		$34,800	$35,000
		Total -- Stormwater Management				**$301,600**	**$302,000**

SANITARY

1	a)	200mm Pipe	220	m	$200	$44,000	$44,000
	b)	250mm Pipe	590	m	$200	$118,000	$118,000
	c)	300mm Pipe	60	m	$230	$13,800	$14,000
2		1200mm MH	10	Ea.	$4,400	$44,000	$44,000
3	a)	Services	10	Ea.	$1,900	$19,000	$19,000
	b)	Cleanouts	10	Ea.	$400	$4,000	$4,000
		Sub-Total -- Sanitary Sewer				**$242,800**	**$243,000**
		Engineering	15	%		$36,420	$36,000
		Contingency	15	%		$36,420	$36,000
		Total -- Sanitary Sewer				**$315,640**	**$315,000**

WATERMAIN

1	a)	150mm Pipe	130	m	$140	$18,200	$18,000
	b)	200mm Pipe	270	m	$190	$51,300	$51,000
	c)	250mm Pipe	600	m	$200	$120,000	$120,000
	c)	300mm Pipe	100	m	$250	$25,000	$25,000
2		Hydrant Assemblies	6	Ea.	$5,000	$30,000	$30,000
3	a)	Tees	6	Ea.	$1,500	$9,000	$9,000
	b)	Valves	6	Ea.	$2,500	$15,000	$15,000
		Sub-Total -- Watermain				**$268,500**	**$268,000**
		Engineering	15	%		$40,275	$40,000
		Contingency	15	%		$40,275	$40,000
		Total -- Watermain				**$349,050**	**$348,000**

EXTERNAL / OTHER

1	Hwy. 21 Improvements	1 LS	$475,000	$475,000	$475,000
	Engineering	15 %		$71,250	$71,000
	Contingency	15 %		$71,250	$71,000
	Sub-Total -- Highway 21 Improvements			**$617,500**	**$617,000**
2	Water Booster Station	1 LS	$615,000	$615,000	$615,000
	Engineering	15 %		$92,250	$92,000
	Contingency	15 %		$92,250	$92,000
	Sub-Total -- Water Booster Station			**$799,500**	**$799,000**
	Total -- External / Other			**$1,417,000**	**$1,416,000**

SUMMARY - PHASE 2 COSTS

SERVICING COMPONENT	COST			
	Items	Engineering	Contingency	Total
Internal Servicing				
Roads	$1,342,000	$201,000	$201,000	$1,744,000
Storm Sewer	$678,000	$101,000	$101,000	$880,000
Stormwater Management	$232,000	$35,000	$35,000	$302,000
Sanitary Sewer	$243,000	$36,000	$36,000	$315,000
Watermain	$268,000	$40,000	$40,000	$348,000
TOTAL - Internal Servicing	**$2,763,000**	**$413,000**	**$413,000**	**$3,589,000**
External / Other Servicing				
Hwy. 21 Improvements	$475,000	$71,000	$71,000	$617,000
Water Booster Station	$615,000	$92,000	$92,000	$799,000
TOTAL - External / Other Servicing	**$1,090,000**	**$163,000**	**$163,000**	**$1,416,000**
TOTAL - PHASE 2 COSTS	**$3,853,000**	**$576,000**	**$576,000**	**$5,005,000**

						08055
MUNICIPALITY OF KINCARDINE						June 2016
BMROSS JOB No. 08055						DLE
PHASE 3 SERVICING						
PRELIMINARY PROBABLE COST ESTIMATE						

Item		**Description**	**Qty./Unit**	**Price**	**Amount**	**Rounded**
ROADS						
1	a)	8.5m Road Width	800 m	$1,130	$904,000	$904,000
	b)	10.5m Road Width	0 m	$1,270	$0	$0
		Sub-Total -- Roads			**$904,000**	**$904,000**
		Engineering	15 %		$135,600	$136,000
		Contingency	15 %		$135,600	$136,000
		Total -- Roads			**$1,175,200**	**$1,176,000**
STORM SEWER						
1	a)	300mm Pipe	100 m	$185	$18,500	$19,000
	b)	375mm Pipe	0 m	$200	$0	$0
	c)	450mm Pipe	270 m	$240	$64,800	$65,000
	d)	525mm Pipe	0 m	$250	$0	$0
	e)	600mm Pipe	110 m	$280	$30,800	$31,000
	f)	675mm Pipe	0 m	$430	$0	$0
	g)	750mm Pipe	90 m	$470	$42,300	$42,000
	h)	825mm Pipe	110 m	$480	$52,800	$53,000
	i)	900mm Pipe	0 m	$500	$0	$0
	j)	975mm Pipe	0 m	$600	$0	$0
	k)	1050mm Pipe	0 m	$750	$0	$0
	l)	1200mm Pipe	0 m	$800	$0	$0
2	a)	1200mm MH	5 Ea.	$3,600	$18,000	$18,000
	b)	1500mm MH	1 Ea.	$5,500	$5,500	$6,000
	c)	1800mm MH	1 Ea.	$7,900	$7,900	$8,000
	d)	2400mm MH	0 Ea.	$10,000	$0	$0
	e)	3000mm MH	0 Ea.	$19,000	$0	$0
						$0
3	a)	Catchbasins	11 Ea.	$1,800	$19,800	$20,000
	b)	300mm Pipe	55 m	$185	$10,175	$10,000
		Sub-Total -- Storm Sewer			**$270,575**	**$272,000**
		Engineering	15 %		$40,586	$41,000
		Contingency	15 %		$40,586	$41,000
		Total -- Storm Sewer			**$351,748**	**$354,000**
STORMWATER MANAGEMENT (SWM)						
1		Clearing and Grubbing	0 LS	$10,000	$0	$0
2		Stripping	0 m^3	$3	$0	$0
3		Earthwork	0 m^3	$5	$0	$0
4		Topsoil	0 m^2	$1	$0	$0

5		Seed and Mulch	0	m^3	$1	$0	$0
6		Discharge Structure and Outlet Pipe	0	LS	$35,000	$0	$0
7		Pond Subdrain	0	m	$20	$0	$0
8		Rip-Rap Protection	0	LS	$15,000	$0	$0
9		Cable Concrete Entry Lane and Granular Forebay Bottom	0	LS	$10,000	$0	$0
		Sub-Total -- Stormwater Management				**$0**	**$0**
		Engineering	15	%		$0	$0
		Contingency	15	%		$0	$0
		Total -- Stormwater Management				**$0**	**$0**

SANITARY

1	a)	200mm Pipe	650	m	$200	$130,000	$130,000
	b)	250mm Pipe	100	m	$200	$20,000	$20,000
	c)	300mm Pipe	0	m	$230	$0	$0
2		1200mm MH	7	Ea.	$4,400	$30,800	$31,000
3	a)	Services	7	Ea.	$1,900	$13,300	$13,000
	b)	Cleanouts	7	Ea.	$400	$2,800	$3,000
		Sub-Total -- Sanitary Sewer				**$196,900**	**$197,000**
		Engineering	15	%		$29,535	$30,000
		Contingency	15	%		$29,535	$30,000
		Total -- Sanitary Sewer				**$255,970**	**$257,000**

WATERMAIN

1	a)	150mm Pipe	0	m	$140	$0	$0
	b)	200mm Pipe	320	m	$190	$60,800	$61,000
	c)	250mm Pipe	430	m	$200	$86,000	$86,000
	c)	300mm Pipe	0	m	$250	$0	$0
2		Hydrant Assemblies	4	Ea.	$5,000	$20,000	$20,000
3	a)	Tees	4	Ea.	$1,500	$6,000	$6,000
	b)	Valves	4	Ea.	$2,500	$10,000	$10,000
		Sub-Total -- Watermain				**$182,800**	**$183,000**
		Engineering	15	%		$27,420	$27,000
		Contingency	15	%		$27,420	$27,000
		Total -- Watermain				**$237,640**	**$237,000**

EXTERNAL / OTHER

1	Nil	0 LS	$275,000	$0	$0
	Engineering	15 %		$0	$0
	Contingency	15 %		$0	$0
	Sub-Total --			**$0**	**$0**
2	Nil	0 LS	$550,000	$0	$0
	Engineering	15 %		$0	$0
	Contingency	15 %		$0	$0
	Sub-Total --			**$0**	**$0**
	Total -- External / Other			**$0**	**$0**

SUMMARY - PHASE 3 COSTS

SERVICING COMPONENT	**COST**			
	Items	**Engineering**	**Contingency**	**Total**
Internal Servicing				
Roads	$904,000	$136,000	$136,000	$1,176,000
Storm Sewer	$272,000	$41,000	$41,000	$354,000
Stormwater Management	$0	$0	$0	$0
Sanitary Sewer	$197,000	$30,000	$30,000	$257,000
Watermain	$183,000	$27,000	$27,000	$237,000
TOTAL - Internal Servicing	**$1,556,000**	**$234,000**	**$234,000**	**$2,024,000**
External / Other Servicing				
	$0	$0	$0	$0
	$0	$0	$0	$0
TOTAL - External / Other Servicing	**$0**	**$0**	**$0**	**$0**
TOTAL - PHASE 3 COSTS	**$1,556,000**	**$234,000**	**$234,000**	**$2,024,000**

		MUNICIPALITY OF KINCARDINE				08055
		BMROSS JOB No. 08055				June 2016
		COMPLETE SERVICING				DLE
		PRELIMINARY PROBABLE COST ESTIMATE				
Item		**Description**	**Qty./Unit**	**Price**	**Amount**	**Rounded**
ROADS						
1	a)	8.5m Road Width	1970 m	$1,130	$2,226,100	$2,226,000
	b)	10.5m Road Width	670 m	$1,270	$850,900	$851,000
		Sub-Total -- Roads			**$3,077,000**	**$3,077,000**
		Engineering	15 %		$461,550	$462,000
		Contingency	15 %		$461,550	$462,000
		Total -- Roads			**$4,000,100**	**$4,001,000**
STORM SEWER						
1	a)	300mm Pipe	300 m	$185	$55,500	$56,000
	b)	375mm Pipe	75 m	$200	$15,000	$15,000
	c)	450mm Pipe	695 m	$240	$166,800	$167,000
	d)	525mm Pipe	180 m	$250	$45,000	$45,000
	e)	600mm Pipe	485 m	$280	$135,800	$136,000
	f)	675mm Pipe	170 m	$430	$73,100	$73,000
	g)	750mm Pipe	420 m	$470	$197,400	$197,000
	h)	825mm Pipe	230 m	$480	$110,400	$110,000
	i)	900mm Pipe	170 m	$500	$85,000	$85,000
	j)	975mm Pipe	0 m	$600	$0	$0
	k)	1050mm Pipe	0 m	$750	$0	$0
	l)	1200mm Pipe	300 m	$800	$240,000	$240,000
2	a)	1200mm MH	17 Ea.	$3,600	$61,200	$61,000
	b)	1500mm MH	10 Ea.	$5,500	$55,000	$55,000
	c)	1800mm MH	2 Ea.	$7,900	$15,800	$16,000
	d)	2400mm MH	5 Ea.	$10,000	$50,000	$50,000
	e)	3000mm MH	2 Ea.	$19,000	$38,000	$38,000
						$0
3	a)	Catchbasins	54 Ea.	$1,800	$97,200	$97,000
	b)	300mm Pipe	270 m	$185	$49,950	$50,000
		Sub-Total -- Storm Sewer			**$1,491,150**	**$1,491,000**
		Engineering	15 %		$223,673	$224,000
		Contingency	15 %		$223,673	$224,000
		Total -- Storm Sewer			**$1,938,495**	**$1,939,000**
STORMWATER MANAGEMENT (SWM)						
1		Clearing and Grubbing	2 LS	$10,000	$20,000	$20,000
2		Stripping	27000 m^3	$3	$67,500	$68,000
3		Earthwork	59000 m^3	$5	$265,500	$266,000
4		Topsoil	36000 m^2	$1	$27,000	$27,000

5		Seed and Mulch	36000	m^3	$1	$18,000	$18,000
6		Discharge Structure and Outlet Pipe	2	LS	$35,000	$70,000	$70,000
7		Pond Subdrain	450	m	$20	$9,000	$9,000
8		Rip-Rap Protection	2	LS	$15,000	$30,000	$30,000
9		Cable Concrete Entry Lane and Granular Forebay Bottom	2	LS	$10,000	$20,000	$20,000
		Sub-Total -- Stormwater Management				**$527,000**	**$528,000**
		Engineering	15	%		$79,050	$79,000
		Contingency	15	%		$79,050	$79,000
		Total -- Stormwater Management				**$685,100**	**$686,000**
SANITARY							
1	a)	200mm Pipe	870	m	$200	$174,000	$174,000
	b)	250mm Pipe	830	m	$200	$166,000	$166,000
	c)	300mm Pipe	920	m	$230	$211,600	$212,000
2		1200mm MH	28	Ea.	$4,400	$123,200	$123,000
3	a)	Services	28	Ea.	$1,900	$53,200	$53,000
	b)	Cleanouts	28	Ea.	$400	$11,200	$11,000
		Sub-Total -- Sanitary Sewer				**$739,200**	**$739,000**
		Engineering	15	%		$110,880	$111,000
		Contingency	15	%		$110,880	$111,000
		Total -- Sanitary Sewer				**$960,960**	**$961,000**
WATERMAIN							
1	a)	150mm Pipe	205	m	$140	$28,700	$29,000
	b)	200mm Pipe	590	m	$190	$112,100	$112,000
	c)	250mm Pipe	1030	m	$200	$206,000	$206,000
	c)	300mm Pipe	1200	m	$250	$300,000	$300,000
2		Highway No. 21 Jack and Bore and Casing Pipe	30	m	$1,500	$45,000	$45,000
3		Hydrant Assemblies	16	Ea.	$5,000	$80,000	$80,000
4	a)	Tees	16	Ea.	$1,500	$24,000	$24,000
	b)	Valves	16	Ea.	$2,500	$40,000	$40,000
		Sub-Total -- Watermain				**$835,800**	**$836,000**
		Engineering	15	%		$125,370	$125,000
		Contingency	15	%		$125,370	$125,000
		Total -- Watermain				**$1,086,540**	**$1,086,000**

EXTERNAL / OTHER

1	Russell Street Sanitary Sewer	1 LS	$509,500	$509,500	$510,000
	Engineering	8 %		$40,760	$41,000
	Contingency	15 %		$76,425	$76,000
	Sub-Total -- Russell Street Sanitary			**$626,685**	**$627,000**
2	Park Street Pumping Station Upgrades	1 LS	$730,000	$730,000	$730,000
	Engineering	15 %		$109,500	$110,000
	Contingency	15 %		$109,500	$110,000
	Sub-Total -- Park Street Pumping Station			**$949,000**	**$950,000**
3	Hwy. 21 Improvements	1 LS	$475,000	$475,000	$475,000
	Engineering	15 %		$71,250	$71,000
	Contingency	15 %		$71,250	$71,000
	Sub-Total -- Highway 21 Improvements			**$617,500**	**$617,000**
4	Water Booster Station	1 LS	$615,000	$615,000	$615,000
	Engineering	15 %		$92,250	$92,000
	Contingency	15 %		$92,250	$92,000
	Sub-Total -- Water Booster Station			**$799,500**	**$799,000**
	Total -- External / Other			**$2,992,685**	**$2,993,000**

APPENDIX 3

CONSULTATION

MUNICIPALITY OF KINCARDINE

KINCARDINE BUSINESS PARK MASTER PLAN
NOTICE OF PUBLIC OPEN HOUSE

NOTICE OF STUDY COMMENCEMENT

THE PROJECT:

The Municipality of Kincardine is undertaking a Master Plan process to identify infrastructure requirements associated with development of the Kincardine Business Park. The study is being conducted in accordance with the requirements of Phases 1 & 2 of the Municipal Class Environmental Assessment process which is an approved planning process under the Environmental Assessment Act.

The Master Plan study process will involve a detailed investigation of the existing roads, water supply, storm drainage and sanitary sewage collection infrastructure components present in the vicinity of the Business Park and identify future infrastructure needs required to service the remainder of the Business Park footprint. Impacts to existing infrastructure will also be assessed. Upon completion, the study will establish a plan to integrate the remainder of the Business Park land base into an expanded municipal service area. The study will also identify strategies to coordinate the construction of roads, watermains, sanitary and storm sewer facilities within the study area with other municipal infrastructure improvement projects.

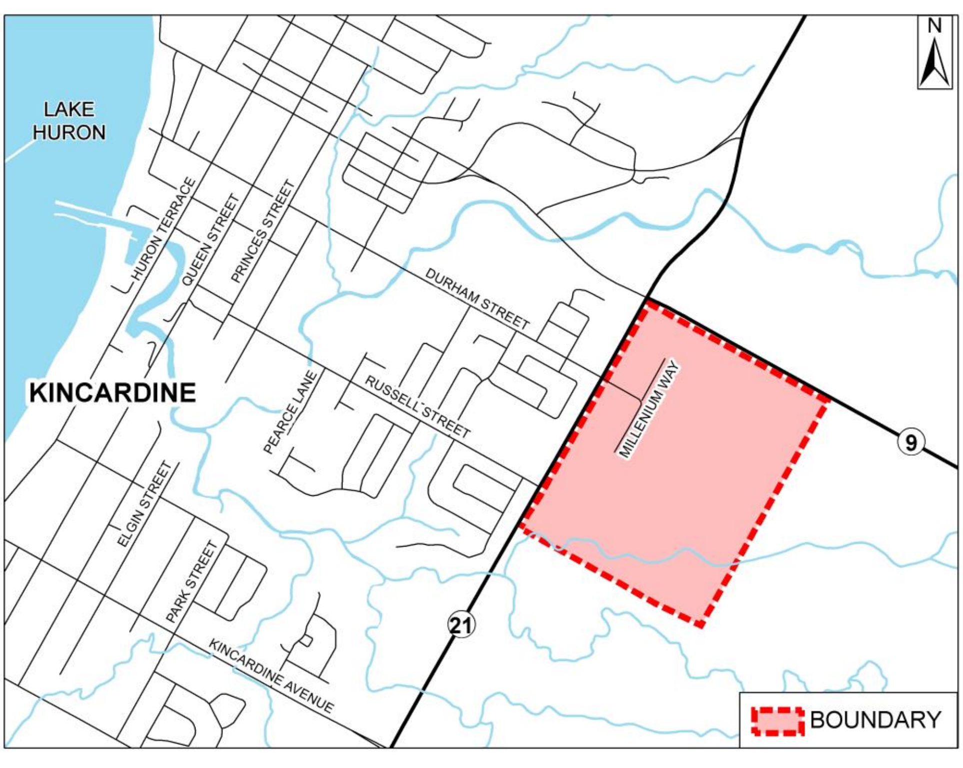
THE ENVIRONMENTAL ASSESSMENT PROCESS:

The investigation is being planned as a Master Plan project under the Municipal Class Environmental Assessment document, dated October 2000, as amended in 2007. Master Plan projects incorporate Phases 1 & 2 of the Class EA process and also include consultation with the general public, government review agencies and affected property owners.

PUBLIC INVOLVEMENT:

Public consultation is a key component of this study. The proposed consultation plan provides for a public open house to be held in the spring of 2011 to review alternative servicing solutions and to give interested parties an opportunity to provide input into the project. Details regarding the date and location of the Public Open House will be announced in a future notice. The study area is shown on the attached key plan.

For further information on this project, or to review the Master Plan process, please contact the consulting engineers: B.M. Ross and Associates: 62 North Street, Goderich, Ontario, N7A 2T4. Telephone: (519) 524-2641. Fax: (519) 524-4403. Lisa Courtney, Environmental Planner (e-mail: lcourtney@bmross.net).



Michele Barr, Building and Planning Manager
Municipality of Kincardine

This Notice issued January 25th, 2011

MUNICIPALITY OF KINCARDINE

SERVICING MASTER PLAN
KINCARDINE BUSINESS PARK

REVIEW AGENCY CIRCULATION LIST

REVIEW AGENCY	**INVOLVEMENT**
Ministry of the Environment (London) - EA Co-ordinator	Mandatory Contact
Ministry of Natural Resources Midhurst	Potential Impact on Natural Features
Ministry of Culture	Toronto
Ministry of Municipal Affairs	General Information (London)
Ministry of Transportation	Planning and Design Review (London)
Ministry of Infrastructure	General Information (Toronto)
OMAFRA	General Information (Guelph)
OPP	General Information (South Bruce Detachment)
County of Bruce - Administration Department - Planning & Development Department - Emergency Medical Services	- General Information - Implications for Long-Term Development
Saugeen Valley Conservation Authority	Potential Impact on Natural Features
Municipality of Kincardine	Proponent
Grey-Bruce Health Unit Owen Sound	General Information
Kincardine Fire Department	General Information

B. M. ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 • f. (519) 524-4403
www.bmross.net

File No. 08055

January 26, 2011

Agency

RE: Municipality of Kincardine
Kincardine Business Park Servicing Master Plan

The Municipality of Kincardine is undertaking a Master Plan process to identify infrastructure requirements associated with the development of the Kincardine Business Park (refer to Figure No.1, attached) over the next 20 – 25 years. The study is being conducted in accordance with the requirements of Phases 1 and 2 of the Municipal Class Environmental Assessment (EA) process which is an approved planning process under the Environmental Assessment Act.

The Master Plan study process will include a detailed investigation of existing roads, water supply, stormwater drainage and sanitary sewage collection infrastructure present in the vicinity of the Business Park. Additionally, the study will identify future infrastructure needs required to service the remainder of the Business Park. The impacts of future development on existing services will also be assessed. The Master Plan will establish a plan to integrate the remainder of the Business Park into an expanded municipal service area, while identifying appropriate strategies to coordinate construction of roads, watermains, sanitary and storm sewer facilities within the study area with other municipal infrastructure improvement projects.

Historically, lands within the Kincardine Business Park have been subject to a number of individual Class Environmental Assessments related to localized servicing and development issues. To ensure that the remainder of the Business Park is developed in comprehensive and coordinated manner, the Master Plan will examine the following components relating to sanitary and storm water sewers, water servicing and transportation:

Sanitary and Stormwater Collection

- Determine existing and future need for these services over the entire study area;
- Review topography of the study area;
- Identify facilities required to service the entire Business Park, pipe sizing, cost estimates and any additional EA requirements, including the impact on existing infrastructure that would connect the Park to existing municipal facilities;
- Determine possible timing scenarios for development.

Water Services

- Assess the feasibility of servicing the eastern-most portion of the Business Park with regards to topographic challenges;

- Modeling of the existing distribution network to ensure adequate pipe capacity and storage.

Transportation

- Assess the viability of the current transportation network;
- Define the need for additional collector and secondary road construction;
- Establish timing scenarios, coordinating the needs of property owners and the construction of other servicing components.

Public consultation is a key component of the Master Plan process and this study. A public open house, at a date yet to be determined, will provide an opportunity for the public and interested parties to provide input and review alternative solutions for servicing the Business Park. The consultation plan for this study also includes consultation with stakeholders and government review agencies.

Your organization has been identified as possibly having an interest in this project and we are soliciting your input. To facilitate comments, we have enclosed further information regarding the Kincardine Business Park (see list of enclosures). Please forward your response to our office by March 23, 2011. If you have any questions or require further information on this project, please contact the undersigned.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per ___________________________________

Lisa J. Courtney, M.Sc.
Environmental Planner

LJC:es

Encl: Kincardine Business Park – Major Tasks
Kincardine Business Park – Study Schedule
Kincardine Business Park – Previous Studies
Kincardine Business Park – Figure 1: Preliminary Servicing Network Design
Kincardine Business Park – Figure 2: Kincardine Business Park Study Area

SERVICING MASTER PLAN – KINCARDINE BUSINESS PARK
STUDY SCHEDULE

Timing	Task	Task Detail
Fall 2010	Initial Stakeholders Meeting	Property owners and Municipality
Winter 2011	Notice of Study Commencement	Notice published in local papers for two consecutive weeks
	Circulation to Review Agencies for Comment	Agencies include: MOE, MNR, MTO, MOC, OMAFRA, MOI, MOMA, First Nations and Métis, Saugeen Valley Conservation Authority, Local Fire/Police/Emergency Services
	Review Input	Review comments from property owners, review agencies, interested parties and the public
Spring 2011	Inventory of the Environment	Natural, Social and Economic Environment
	Engineering Studies	Review of existing sanitary and stormwater sewer designs, define future sewage and water flows, review water supply and booster pumping needs, review water supply and sewage treatment capacities, conduct traffic study
	Identify Alternative Solutions and Mitigating Measures	Evaluate all reasonable alternatives and identify mitigation methods
	Consult with the Public and Interested Parties	Public Meeting with notice in local papers for two consecutive weeks
Summer 2011	Prepare Draft Master Plan Document	Identify preferred solution
	Review Draft Master Plan Document	Circulate to agencies and interested parties. Make available to the public
Early Fall 2011	Finalize Master Plan Document	Subject to approval by Municipality.

SERVICING MASTER PLAN – KINCARDINE BUSINESS PARK
PREVIOUS STUDIES

A number of studies have been completed relating to the development and expansion of municipal services (roads, water supply, sanitary and storm sewers) in the Kincardine Business Park. A brief summary of each study follows below. The studies are listed by date initiated, in ascending order.

1998 – Durham Street Extension

- For the extension of Durham Street and servicing of the Canadian Tire Corporation (CTC) site in the Business Park, the Municipality completed a Stormwater Management Design Report that:
  - Outlines stormwater management criteria for development of the CTC site and future lands in the Business Park within the same drainage area.
  - Addresses concerns expressed by the Ministry of Environment (MOE) and Saugeen Valley Conservation Authority and follows the design guidelines of the MOE.
  - Addresses stormwater quality and quality impacts, and sediment and erosion concerns.

2005 – Class Environmental Assessment (EA) for the Extension of Russell Street

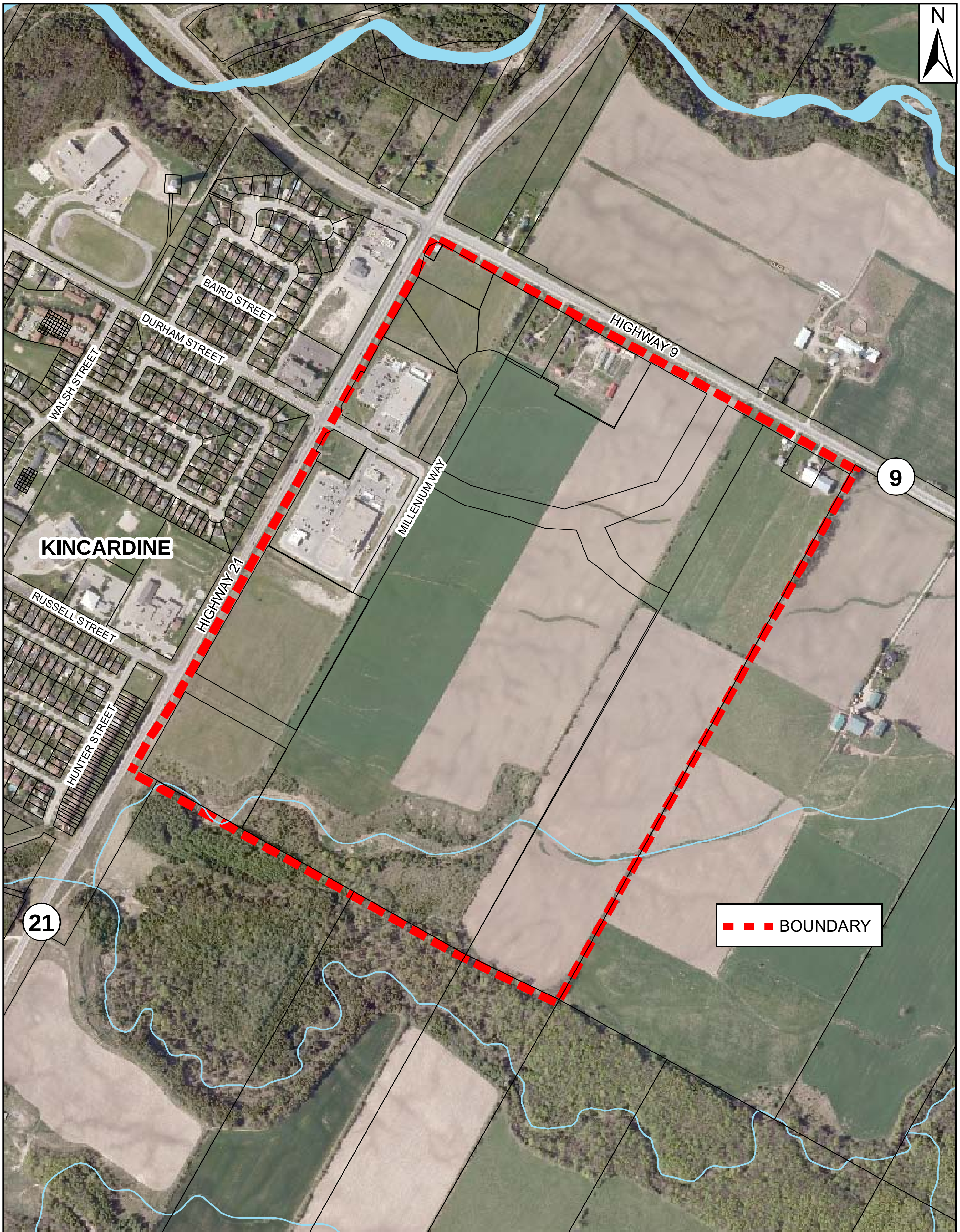
- To investigate the potential impacts of extending Russell Street east of Highway No. 21, extending full municipal servicing within the Russell Street road allowance and an adjacent stormwater management facility, a Class EA was completed.
- The Class EA included a Traffic Impact Study completed by Paradigm Transportation Solutions Limited that recommended:
  - Upgrades to intersection of Russell Street and Highway No. 21, with design for traffic control signals
  - Provision of sidewalks on both sides of Russell and Durham Street from Highway No. 21
- The EA review period concluded September 17, 2005; however, the extension of Russell Street has not been constructed.

2006 – Class Environmental Assessment for the Extension of Millennium Way

- To investigate the potential impacts of the extension of Millennium Way north of Durham Street and extension of full municipal services within the planned road allowance, the Municipality completed a Class EA.
- The Class EA included Stage 1 and 2 archaeological assessments. Stage 2 investigation revealed the project area contained no material of archaeological significance.
- The EA review period concluded October 15, 2006. The extension of Millennium Way and associated municipal services was constructed subsequently.

SERVICING MASTER PLAN – KINCARDINE BUSINESS PARK
MAJOR TASKS

- Review existing sanitary and storm water drainage designs;
- Review sanitary sewage and storm water drainage catchments through topographic mapping review and field confirmation;
- Forecast future development and servicing needs based on Official Plan designations, environmental constraints, and consultations with property owners. Base development densities on County of Bruce Official Plan and density assumptions.
- Define future sewage and water flows based on MOE Guidelines;
- Review water supply and Booster Pumping needs;
- Review water supply and sewage treatment capacities and identify constraints and future needs, including facilities, pipe sizing, pipe capacity and storage, and costs;
- Evaluate the viability of current transportation network with a traffic study and define need for additional collector and secondary road construction;
- Identify any additional EA requirements;
- Conduct public consultation with property owners, municipal residents and government review agencies, including information mail-outs and a public information meeting;
- Identify potential environmental impacts and mitigating measures;
- Determine an environmentally and cost efficient strategy for providing municipal servicing;
- Preparation of a Master Plan document which identifies the preferred servicing strategy for the subject lands, identifies required facilities, provides an estimate of potential costs and cost allocation and provides an expected timeline for implementation of new works and expansion of existing facilities;
- Circulation of the Master Plan to the public and review agencies.



BMROSS engineering better communities

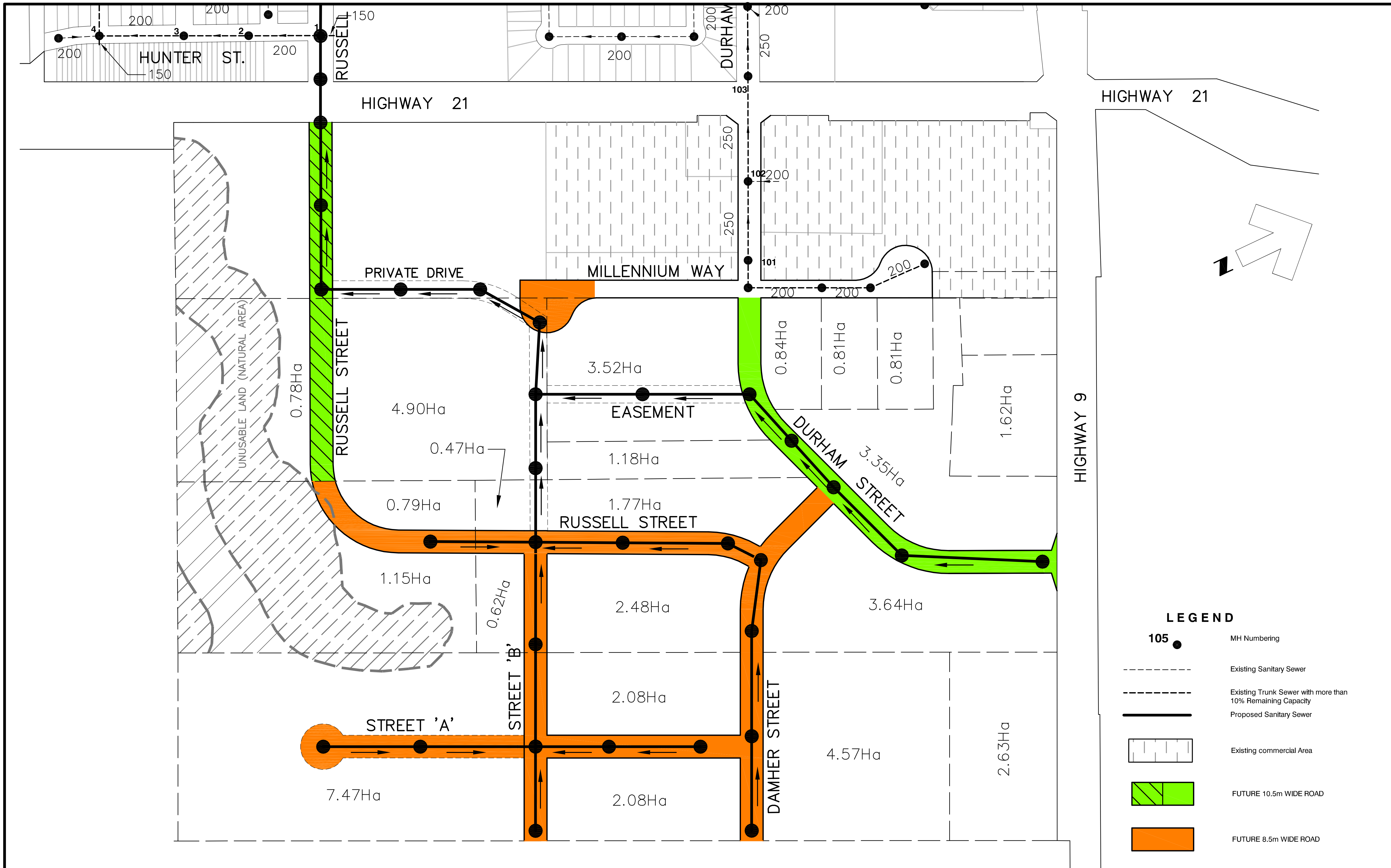
MUNICIPALITY OF KINCARDINE
SERVICING MASTER PLAN FOR KINCARDINE BUSINSS PARK
(COMMUNITY OF KINCARDINE)
PROJECT STUDY AREA

DATE
JAN. 19, 2011

SCALE
1: 8 000

PROJECT No.
08055

FIGURE No.
1



BMROSS engineering better communities

Municipality of Kincardine
Business Park Development Area
Full Development
Roads and Sanitary Sewer

DATE	PROJECT No.
JAN. 19, 2011	08055
SCALE	FIGURE
N.T.S.	2

MUNICIPALITY OF KINCARDINE

SERVICING MASTER PLAN
KINCARDINE BUSINESS PARK

FIRST NATIONS CIRCULATION LIST

FIRST NATION	CONTACT
Indian and Northern Affairs Canada	Franklin Roy, Director General Litigation Portfolio Operations Indian and Northern Affairs Canada Eastern Litigation Directorate 10 Wellington Street Gatineau, QC K1A 0H4
	Ralph Brant, Direction General, Specific Claims Branch Indian and Northern Affairs Canada 10 Wellington Street Gatineau, QC K1A 0H4
	Lynn Bernard, Direction General, Indian and Northern Affairs Canada Negotiations - East 10 Wellington Street Gatineau, QC K1A 0H4
Ministry of Aboriginal Affairs	Pam Wheaton, Director Aboriginal and Ministry Relationships Branch Ministry of Aboriginal Affairs 160 Bloor Street East, 9th Floor Toronto, ON M7A 2E6
Métis Nation of Ontario	Métis Nation of Ontario 500 Old St. Patrick Street, Unit D Ottawa, ON K1N 9G4
Chippewas of Saugeen	Chippewas of Saugeen RR 1 Southampton, ON N0H 2L0
Chippewas of Nawash	Chief Ralph Akiwenzie Chippewas of Nawash Unceded First Nation R.R. #5 Wiarton ON N0H 2T0
Grey-Bruce Peninsula Métis Council	Ray Raciot, President Grey Bruce Penninsula Metis Council 380 9th Street East Owen Sound ON N4K 1P1
Historic Saugeen Métis	Historic Saugeen Métis 204 High Street, Box 1492 Southampton ON N0H 2L0

B. M. ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 • f. (519) 524-4403
www.bmross.net

File No. 08055

January 26, 2011

First Nation and Métis Community

**RE: Kincardine Business Park Servicing Master Plan
Municipality of Kincardine**

The Municipality of Kincardine is undertaking a Master Plan process to identify infrastructure requirements associated with the development of the Kincardine Business Park (refer to Figure No.1, attached) over the next 20 – 25 years. The study is being conducted in accordance with the requirements of Phases 1 and 2 of the Municipal Class Environmental Assessment (EA) process which is an approved planning process under the Environmental Assessment Act.

The Master Plan study process will include a detailed investigation of existing roads, water supply, stormwater drainage and sanitary sewage collection infrastructure present in the vicinity of the Business Park. Additionally, the study will identify future infrastructure needs required to service the remainder of the Business Park. The impacts of future development on existing services will also be assessed. The Master Plan will establish a plan to integrate the remainder of the Business Park into an expanded municipal service area, while identifying appropriate strategies to coordinate construction of roads, watermains, sanitary and storm sewer facilities within the study area with other municipal infrastructure improvement projects.

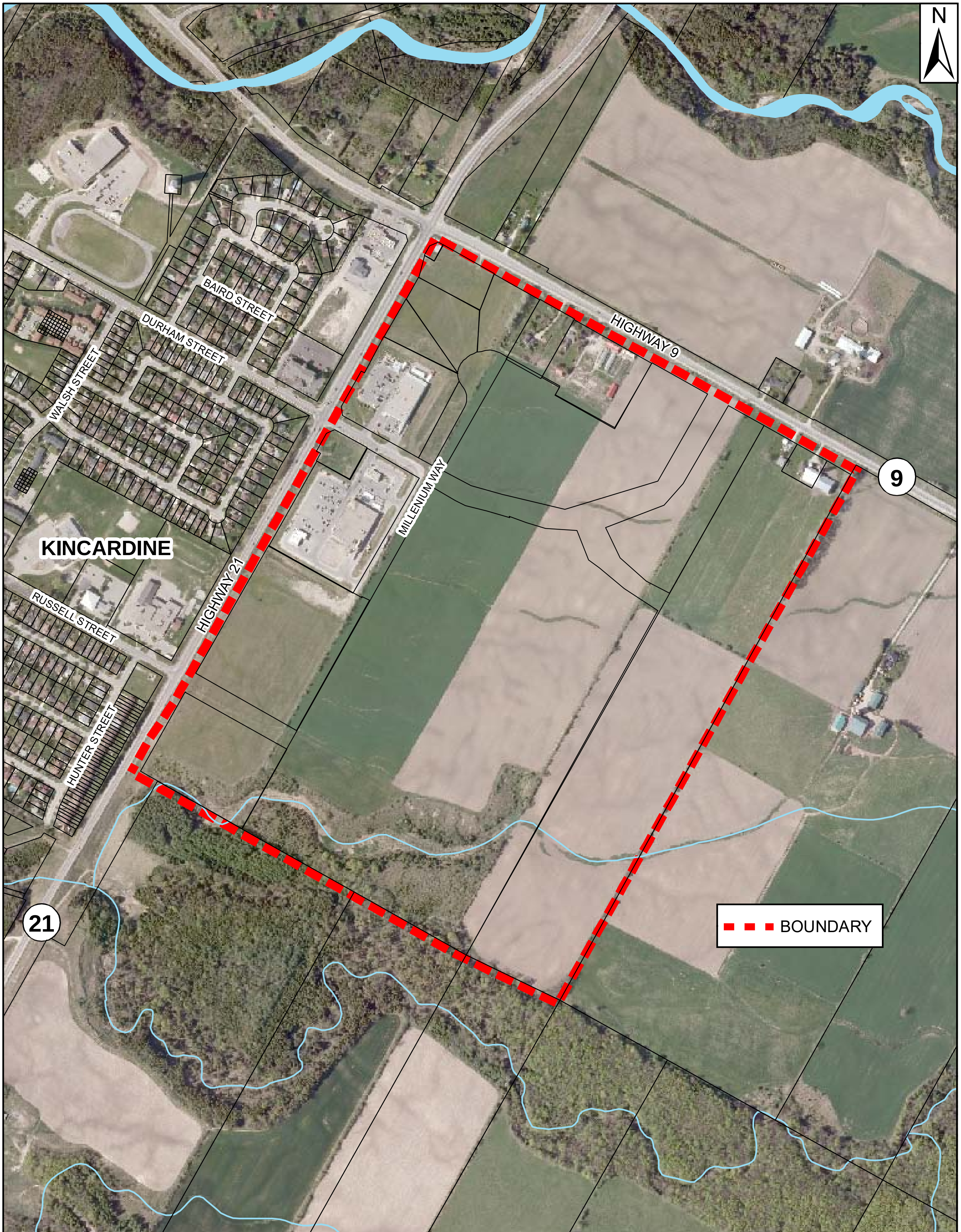
Your organization has been identified as possibly having an interest in this project and we are soliciting your input. If you have any questions or require further information on this project, please contact the undersigned at 519-524-2641 or by e-mail at lcourtney@bmross.net.

Yours very truly,

B. M. ROSS AND ASSOCIATES LIMITED

Per ______________________________
Lisa J. Courtney, M.Sc.
Environmental Planner

LJC:es
Encl.



BMROSS
engineering better communities

MUNICIPALITY OF KINCARDINE
SERVICING MASTER PLAN FOR KINCARDINE BUSINSS PARK
(COMMUNITY OF KINCARDINE)
PROJECT STUDY AREA

DATE JAN. 19, 2011	PROJECT No. 08055
SCALE 1: 8 000	FIGURE No. 1

Ministry of the Environment
733 Exeter Road
London ON N6E 1L3
Tel: 519 873-5000
Fax: 519 873-5020

Ministère de l'Environnement
733, rue Exeter
London ON N6E 1L3
Tél.: 519 873-5000
Téléc.: 519 873-5020

Ontario

BY FAX ONLY

February 4, 2011

Lisa J. Courtney, M.Sc
B. M. Ross & Associates
62 North Street
Goderich, Ontario
N7A 2T4

Dear Ms Courtney:

RE: Kincardine Business Park Servicing Master Plan

This acknowledges receipt of your notice that a master plan for servicing of the Kincardine Business Park has begun following the MEA Municipal Class Environment Assessment and your invitation to provide input.

At this early stage in the master planning process we are unable to identify detailed issues or concerns beyond:

- expressing an interest in understanding how the proposed development may impact the watercourse which flows through the southerly portion of the property (mainly stormwater management in this context) and

- noting that present flows to the municipal sewage treatment facility are approaching 80% of its approved capacity and therefore the implications of the development of the business park upon near term available capacity and potentially the need for expansion in the near-term

If questions arise or if clarification is needed please contact the undersigned at (519) 873-5013 or via email at bill.armstrong@ontario.ca.

Yours truly,

W. Armstrong, M.E.S, RPP
Regional Environmental Planner
Southwestern Region

cc. J. Bromley

Ministry of
Municipal Affairs
and Housing

Municipal Services Office -
Western

659 Exeter Road, 2nd Floor
London ON N6E 1L3
Tel. (519) 873-4020
Toll Free 1-800-265-4736
Fax (519) 873-4018

Ministère des
Affaires municipales
et du Logement

Bureau des services aux municipalités -
région de l'Ouest

659, rue Exeter, 2e étage
London ON N6E 1L3
Tél. (519) 873-4020
Sans frais 1 800 265-4736
Téléc (519) 873-4018

Ontario

RECEIVED
FEB 28 2011
B.M. ROSS & ASSOC. LTD.

February 24, 2011

Ms. Lisa Courtney
Environmental Planner
BM Ross and Associates Limited
62 North Street
Goderich, ON N7A 2T4

Dear Ms. Courtney:

Re: **Municipal Class Environmental Assessment**
Kincardine Business Park Servicing Master Plan
Municipality of Kincardine, County of Bruce

Thank you for your recent circulation of the above-noted matter. In this regard, we offer the following comments for your consideration.

It is understood the Municipality of Kincardine is undertaking a Master Plan process to identify infrastructure requirements associated with the development of the Kincardine Business Park over the next 20-25 years. The Master Plan study process will include a detailed investigation of existing roads, water supply, stormwater drainage and sanitary sewage collection infrastructure present in the vicinity of the Business Park. Further, it is understood the study will identify future infrastructure needs required to service the remainder of the Business Park and impacts of future development on existing services will also be addressed. It is also understood the Master Plan will establish a plan to integrate the remainder of the Business Park into an expanded municipal service area, while identifying appropriate strategies to coordinate construction of roads, watermains, sanitary and storm sewer facilities within the study area with other municipal infrastructure improvement projects.

This office provides access to provincial services on municipal government, finance and administration, as well as land use planning and development issues covered under the *Planning Act*. Section 2 of the *Planning Act* speaks to matters of provincial interest. This section directs decision-making bodies (whether it is a council of a municipality, a local board, a planning board, a minister of the Crown and a ministry, board, commission or agency of the government, or the Ontario Municipal Board) to be consistent with the policy statements issued under Section 3 of the *Planning Act* in exercising any authority that affects a planning matter.

The current policy on land use planning matters for the County of Bruce is the Provincial Policy Statement, 2005 (PPS). The PPS speaks to issues such as the promotion of efficient, cost-effective development and land use patterns, and the proper consideration of the various resources of this province as well as matters dealing with public health and safety.

The requirements of the *Planning Act* apply to applications for planning approvals under this legislation; these applications include official plan amendments and zoning bylaw amendments. From our review of this particular matter, it appears no such approvals are being sought at this time. However, we recommend that you consider the Provincial Policy Statement policies in their entirety in developing the proposed Master Plan.

Environmental Assessment Studies that examine water supply, stormwater drainage and sanitary sewage collection should ensure that these systems are provided in a manner that: 1) are of an appropriate size and type to accommodate present and future requirements; 2) can be sustained by the water resources upon which these services rely; 3) are located and designed in accordance with provincial standards; 4) are financially viable and comply with all other regulatory requirements; 5) promote water conservation and water use efficiency; and 6) protects human health and the natural environment. Additionally, you should ensure that the Municipality of Kincardine and Bruce County's Official Plan policies regarding water supply, stormwater drainage and sanitary sewage collection are integrated into the Master Plan process.

Further, the portion of this Environmental Assessment Study that examines transportation systems (including existing roads), should ensure these systems are: (1) safe, energy efficient and facilitate the movement of people and goods; (2) appropriate to address projected needs; (3) use existing and planned infrastructure efficiently; (4) integrate transportation and land use considerations at all stages of the planning process; and (5) connectivity within and among transportation systems and modes is maintained. Additionally, you should ensure that the Municipality of Kincardine and Bruce County Official Plan policies regarding transportation are integrated into the Master Plan process.

Additionally, and as you are aware, the Ministry of Transportation has been discussing the proposed road network for the Kincardine Business Park with the Municipality of Kincardine and the County of Bruce since 2007. The Ministry of Transportation (MTO) has received a copy of the 'Notice' for this project and we understand MTO will be providing comments on the proposed undertaking. If you have not received comments from the Ministry of Transportation by your requested deadline date (March 23, 2011), please contact Ian Smyth, Planner, Corridor Management, Ministry of Transportation (London office) at (519) 873-4598.

Finally, our comments on this undertaking should not be considered as approval for any other related applications under the *Planning Act* or other provincial legislation that may be required, may be related to, or may result from this project.

Please keep us on your circulation list for this project. If you have any questions or comments, please telephone me at (519) 873-4695 or by email at: Dwayne.Evans@ontario.ca.

Yours truly,

Dwayne Evans

Dwayne Evans, M.A., MCIP, RPP
Planner
Municipal Services Office – Western

March 21, 2011

B.M. Ross and Associates Limited
Consulting Engineers
62 North Street, Goderich, ON N7A 2T4

Dear Lisa Courtney:

RE: Municipality of Kincardine
Kincardine Business Park Servicing Master Plan

The Grey Bruce Health Unit is mandated by the Ontario Public Health Standards to work with Municipalities to create healthy built environments. This provincial direction allows health units to support the intentions of the Provincial Policy Statement, especially with regard to endorsement of land use planning principles that support healthy, liveable communities, protection of our natural heritage and resources, and bolstering public health and safety. The Public Health goal for creating and supporting healthy communities is also in alignment with the goals and objectives of the Bruce County Official Plan, which calls for "quality of life" and "sustainable communities."

Within this framework, please review the following considerations for the development of the Kincardine Business Park:

1) Environment
   a) Ensure the proposed development is compatible with neighbouring uses from a community health perspective including industrial and commercial emissions, nuisance noise and odour impacts.
      Rationale: The close proximity of residential neighbourhoods to the proposed development, if uses are non-compatible, could result in adverse health effects.
      - Exposure to noise can introduce or aggravate stress-related health outcomes, including those on the cardiovascular system, immune system, sleep, behaviour, and mental health.
      - Periods of odour nuisance often go together with headache, nausea, sleep disturbances, a loss of appetite and stress.

   b) Ensure the proposed development is designed to improve rather than diminish air and water quality for the community through the preservation of green space.
      Rationale: The preservation of green space minimizes the effects of heat islands, which drive up cooling and refrigeration-related energy consumption and generation.

- Trees can reduce air temperature thereby reducing ozone formation and removing air pollutants.
- Green spaces protect water quality by providing opportunity for water absorption and filtration.
- Research suggests a positive impact on the psychological well-being of people who are able to interact with the natural environment, particularly green space.

c) Promote sustainable green building and development approaches (e.g. LEED standards) to reduce reliance on traditional energy systems, conserve energy and protect air quality.
Rationale: The most significant sources of air pollution in Ontario are energy generation and transportation.
    - Electricity generation produces a significant share of nitrogen oxides and sulphur dioxide emissions, which contribute to the reduction in air and water quality.
    - Numerous studies show that poor air quality contributes to premature death, cardiovascular disease, cancer, stroke, asthma and other respiratory diseases.

d) Ensure the transportation network prioritizes active modes of transportation (e.g. walking, cycling) to decrease use of single occupancy motor vehicles and reduce motor vehicle trips.
Rationale: Transportation is the primary contributor to air pollution.
    - Health impacts from air pollution include respiratory problems, asthma and increased risk of heart attack.

2) Physical Activity and Injury Prevention
    a) Design the transportation network in a way that ensures access for all modes of transportation, with specific attention to active transportation and pedestrian needs.
    Rationale: Moderately intense physical activity such as walking and cycling increases health benefits and has the potential to reduce cardiovascular disease by as much as 50 percent.
        - Communities and neighbourhoods that are designed with an active transportation infrastructure that prioritizes the pedestrian and cyclist while reducing automobile dependency support daily physical activity.
        - Active transportation can also lead to economic and environmental sustainability.

    b) Ensure the provision of active transportation infrastructure that is safe, accessible, barrier-free, and aesthetically pleasing, and that is connected to the street system with direct and convenient links to adjacent uses, residential, commercial, and recreational spaces.

Rationale: The more people travel by car the greater potential for motor vehicle-related injury for vehicle users and pedestrians.

- Concentrating uses, increasing density, and reducing distances between place of employment, recreation and residency reduces the need for vehicle travel and make active transportation options more viable.
- Road design affects the physical form and walkability of neighbourhoods as well as the placement, viability and safety of active transportation infrastructure. Road design influences the behaviour of all transportation users; safe road design results in lower rates of vehicle-pedestrian collisions.

3) Social Cohesion and Quality of Life
   a) Provide green spaces for people to meet and congregate
   Rationale: Creating public spaces within a neighbourhood/community allows individuals to meet and congregate, providing opportunities for social interaction.
   - Research shows that people with strong social networks live longer.
   - Research also shows that exposure to the natural environment is associated with feelings of well-being in individuals.
   - Designing neighbourhoods where people have access to green space can result in physical and mental health benefits.

The Grey Bruce Health Unit is pleased to be working in partnership with municipalities and counties in developing policies and environments to support healthy communities. Should further questions arise, do not hesitate to contact Jennifer Croft or Jason Weppler at the Owen Sound office.

Sincerely,

J. Croft.

Jennifer Croft
Health Promoter
Grey Bruce Health Unit
519-376-9420 ext 1469

Jason Weppler

Jason Weppler
Health Promoter
Grey Bruce Health Unit
519-376-9420 ext 1408

Reference:

Simcoe Muskoka District Health Unit. (2010). Healthy communities design: Policy statements for official plans. Barrie, Ontario.

SAUGEEN CONSERVATION

1078 Bruce Rd. 12
P.O. Box 150
Formosa, Ontario
N0G 1W0

Tel 519-367-3040
Fax 519-367-3041
www.svca.on.ca
publicinfo@svca.on.ca

BY REGULAR MAIL AND FAX: 519-524-4403

RECEIVED
MAR 28 2011
B.M. ROSS & ASSOC. LTD.

March 23rd, 2011

B.M. Ross and Associates Limited
62 North Street, Goderich
ON N7A 2T4

Attention: Lisa J. Courtney, Environmental Planner

RE: "Kincardine Business Park Servicing Master Plan"
(Your Project File No. 08055)
Geographic Town of Kincardine
Municipality of Kincardine

Thank you for the opportunity to comment on the proposed Kincardine Business Park Servicing Master Plan. The Saugeen Valley Conservation Authority (SVCA) offers the following comments based on the information package received from B.M. Ross dated January 26th, 2011.

Subject Area

The subject area is approximately 50 ha in size and includes a portion of Environmental Protection (EP) which is labeled as "Unusable Land (Natural Area)" on Figure 2. Located within the EP lands is a municipal drain known as the "Holtby Drain". The Holtby Drain is included in the Town of Kincardine Floodplain as an area which would flood under a Regulatory event (Hurricane Hazel Flood event). Mapping is available from the SVCA for the subject property.

SVCA Regulation

Please be advised that portions of the area are subject to the SVCA's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation (Ontario Regulation 169/06). Regulated Area mapping is available which generally identifies those areas in which the SVCA's Regulation applies.

This Regulation requires that a person obtain the written permission of the SVCA prior to any "development" in the Regulated Area or "alteration" to a watercourse or wetland. As such, the written permission of the SVCA will be required prior to the commencement of any site alteration or development related to this proposal, within SVCA's Regulated Area.

Conservation Through Cooperation

A MEMBER OF
Conservation ONTARIO
Natural Champions

As preliminary construction plans become available, they should be forwarded to the SVCA for review. The SVCA will continue to review this file with respect to Ontario Regulation 169/06 as well as on behalf of the Federal Department of Fisheries and Oceans (DFO) with regard to potential harmful alteration, disruption or destruction of fish habitat. The harmful alteration, disruption or destruction of fish is prohibited unless authorized by the DFO pursuant to Section 35(2) of the *Fisheries Act.* If the SVCA determines that fish habitat may be altered, disrupted or destroyed as a result of this project, the file will be referred to the DFO. The decision, by the SVCA, to involve the DFO will be determined as further information is submitted to this office for review.

Review of the Preliminary Servicing Network Design

Road Locations

The proposed location and extension of Russell Street appears to be adjacent the Natural Area (EP). As the current plans are still preliminary the SVCA would comment that the subject area appears to be adjacent to a natural slope for the Holtby Drain. Design and location of the road should ensure that the road is not affected by the hazard, nor does it create or aggravate an existing hazard. The SVCA may require a permit for the proposed road construction.

Street 'A' appears to bisect a portion of the Holtby Drain floodplain. Initial comments from the Conservation Authority would be that no negative effect upstream or downstream on the floodplain of the Holtby Drain be created due to the placement and instillation of the roads. The extended floodplain does not appear to have been captured in Figure 2. Further details and engineered floodplain mapping on the extent of the floodplain is available from the Conservation Authority.

Stormwater

While it is anticipated that further details on the design and routing of stormwater shall be addressed further in the study, the SVCA would comment that should an outlet to the Holtby Drain be a required a permit from the Authority will be required. Location of any future stormwater management facilities (ie. Stormwater pond) should maintain an appropriate setback from the top of the slope adjacent to the Holtby Drain to ensure that slope stability is not affected. Water quality and quantity should also be reviewed and addressed as part of future studies and reports.

Sanitary and Water Services

At this time SVCA staff do not foresee any concerns over the proposed routing of the sanitary services. Routing for the proposed water services has not yet be submitted; however, the SVCA staff do not foresee any concerns should the services follow the approximate location of the sanitary locations.

The SVCA will continue review of this project when further information is received by this office.

We trust that the above information is helpful. If any questions arise, please contact this office.

Yours sincerely,

Nathan Garland
Regulations Officer

NG/##G

cc: Ron Coristine, Director, SVCA (via e-mail)
Mike Leggett, Director, SVCA (via e-mail)

Historic Saugeen Metis:
Lands and Resources Department
204 High Street
P.O. Box 1492
Southampton Ontario
N0H 2L0
Phone: 519-483-4001 Fax 519-483-4002
Email: saugeenmetisadmin@bmts.com

Fax

To:	B.M Ross and Associated Ltd. (Municipality of Kincardine)	**From:**	Historic Saugeen Metis (LRCC)
Fax:	(519)524-4403	**Pages:**	1
Phone:	(519)524-2641	**Date:**	04 February 2011
Re:	File#08055	**CC:**	

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

• **Comments:**

HMS Lands and Resources Dept. would like to request any copies of all archaeological studies that take place relating to the Kincardine Business Park during the various stages of the development process.

Thank you for the information already provided.

Audrey Erin Holden
Lands and Resources Consultation Coordinator
Historic Saugeen Metis
204 High Street
Southampton, Ontario, N0H 2L0

B. M. ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 • f. (519) 524-4403
www.bmross.net

KINCARDINE BUSINESS PARK
SERVICING MASTER PLAN

INITIAL STAKEHOLDERS MEETING
22 - OCTOBER – 2010

AGENDA

1. **Introductions**

2. **Subject Area** - *go over the area being considered*

3. **Master Plan Process** - *describe the Master Plan process; components/timeline*

4. **History of the Area** - *describe past development and projects and what is being considered at this time*

5. **Questions & Discussions** - *have owners describe their plans and ideas for their properties*

Materials

- **Handout s**
  - Agenda
  - Project description
  - Site plan with road pattern
  - Airphoto of subject area
  - Master Plan task list/schedule

- **Display Boards**
  - Site plan with road pattern
  - Master Plan task list/schedule

THE MASTER PLAN PROCESS

Initial Stakeholders Meeting	• Land Owners • Municipality	**Fall 2010**
Notice of Study Commencement	• Notice published in local papers for 2 consecutive weeks	
Circulation to Review Agencies for Comment	• Agencies include: MNR, MOE, MOC, MTO, OMAFRA, MOI, SVCA, Fire/Police/Ambulance, First Nations	
Review Input	• Comments from Municipality, Adjacent Property Owners, BIA, Agencies, Public	**Winter 2010-Spring 2011**
Inventory of the Environment	• Natural, Social and Economic	
Engineering Studies	• Review of existing sanitary and stormwater sewer designs, define future sewage and water flows, review water supply and booster pumping needs, review water supply and sewage treatment capacities, conduct traffic study	
Identify Alternative Solutions and Mitigating Measures	• Evaluate reasonable alternatives and identify mitigation methods	**Spring 2011**
Consult with the Public and Interest Parties	• Public Meeting – with notice in local papers • Present possible alternatives	
Prepare Draft Master Plan document	• Identify preferred solution	**Summer 2011**
Review Draft Master Plan document	• Circulate to Agencies and Interested Parties and make available to the Public • Notice in local papers	
Finalize Master Plan document	• Approval by Municipality	**Fall 2011**

File: 08055

MUNICIPALITY OF KINCARDINE
KINCARDINE BUSINESS PARK
SERVICING MASTER PLAN

PUBLIC INFORMATION MEETING

March 27, 2013

ATTENDANCE LIST
(PLEASE PRINT)

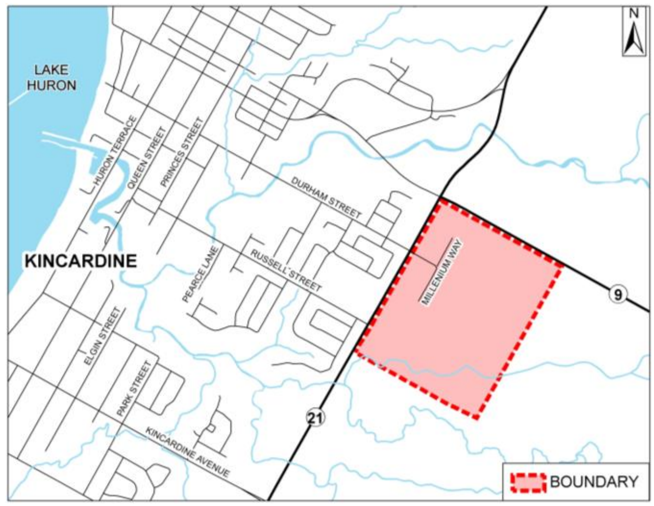
Name	Address
LINDA BOWERS	817 MacKendrick Dr - Kincardine
ARIF ISMAIL	LHMD INC.
GARY PILKINGTON	3625 DUFFERIN ST TORONTO.
GERRY TAYLOR	PRAPC
JOHN SATOSGIC	884 DURHAM ST
Robert Cottrill	PREDC
Glenn R. Sutton	527 STORNOWAY, KINCARDINE ONT.
Bruce Stickney	County of Bruce Planning
Mark Eplett c/o Otis Group	3338 Dufferin St Toronto M6A 3A4
SARAH SUTTER / KIN NEWS	

MUNICIPALITY OF KINCARDINE

KINCARDINE BUSINESS PARK MASTER PLAN
NOTICE OF PUBLIC OPEN HOUSE

PUBLIC COMMENT INVITED

THE PROJECT:



The Municipality of Kincardine is undertaking a Master Plan process to identify infrastructure requirements associated with development of the Kincardine Business Park. The study is being conducted in accordance with the requirements of Phases 1 & 2 of the Municipal Class Environmental Assessment process which is an approved planning process under the Environmental Assessment Act.

The Master Plan study process will involve a detailed investigation of the existing roads, water supply, storm drainage and sanitary sewage collection infrastructure components present in the vicinity of the Business Park and identify future infrastructure needs required to service the remainder of the Business Park footprint. Impacts to existing infrastructure will also be assessed. Upon completion, the study will establish a plan to integrate the remainder of the Business Park land base into an expanded municipal service area. The study will also identify strategies to coordinate the construction of roads, watermains, sanitary and storm sewer facilities within the study area with other municipal infrastructure improvement projects.

THE ENVIRONMENTAL ASSESSMENT PROCESS:

The investigation is being planned as a Master Plan project under the Municipal Class Environmental Assessment document, dated October 2000, as amended in 2007. Master Plan projects incorporate Phases 1 & 2 of the Class EA process and also include consultation with the general public, government review agencies and affected property owners.

PUBLIC INVOLVEMENT:

Public consultation is a key component of this study. The proposed consultation plan provides for a public open house and presentation to be held to review servicing solutions and to give interested parties an opportunity to provide input into the project. Details regarding the date and location of the Public Open House are as follows:

Date: Wednesday March 27th, 2013
Time: Open House: 7:00 – 9:00 PM, Presentation at 7:30 PM
Location: Municipality of Kincardine Municipal Administration Centre
1475 Concession 5, R.R. 5 Kincardine, ON N2Z 2X6

For further information on this project, or to review the Master Plan process, please contact the consulting engineers: B.M. Ross and Associates: 62 North Street, Goderich, Ontario, N7A 2T4. Telephone: (519) 524-2641. Fax: (519) 524-4403. Lisa Courtney, Environmental Planner (e-mail: lcourtney@bmross.net).

Michele Barr, Director of Building and Planning
Municipality of Kincardine

This Notice issued March 13th, 2013

Municipality of Kincardine
Kincardine Business Park (KBP)
Servicing Master Plan

Public Meeting and Open-House

March 27, 2013

KINCARDINE

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KBP – Servicing Master Plan
Agenda

- The Master Plan Process
- History of the Area
- Draft Servicing Strategy
- Next Steps
- Questions and Comments

KINCARDINE

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KBP – Servicing Master Plan
General Location

KINCARDINE

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KBP – Servicing Master Plan
Master Plan Process

- What is a Master Plan
- Official Plan Information
- Study Limits for the Business Park

KINCARDINE

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KBP – Servicing Master Plan
Master Plan Process

Initial Stakeholders Meeting	• Land Owners • Municipality
Notice of Study Commencement	• Notice published in local papers for 2 consecutive weeks
Circulation to Review Agencies for Comment	• Agencies include: MNR, MOE, MOC, MTO, OMAFRA, MOI, SVCA, Fire/Police/Ambulance, First Nations
Review Input	• Comments from Municipality, Adjacent Property Owners, BIA, Agencies, Public
Engineering Studies	• Review of existing sanitary and stormwater sewer designs, define future sewage and water flows, review water supply and booster pumping needs, review water supply and sewage treatment capacities, conduct traffic study
Inventory of the Environment	• Natural, Social and Economic
Identify Alternative Solutions and Mitigating Measures	• Evaluate reasonable alternatives and identify mitigation methods
Consult with the Public and Interest Parties	• Public Meeting – with notice in local papers • Present possible alternatives
Prepare Draft Master Plan document	• Identify preferred solution
Review Draft Master Plan document	• Circulate to Agencies and Interested Parties and make available to the Public • Notice in local papers
Finalize Master Plan document	• Approval by Municipality

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KBP – Servicing Master Plan
Study Limits

KINCARDINE

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KBP – Servicing Master Plan
History

- Extent of Existing Servicing and Development
  - Water
  - Sanitary
  - Storm Drainage
- Access to Highway 9 and MTO

KINCARDINE

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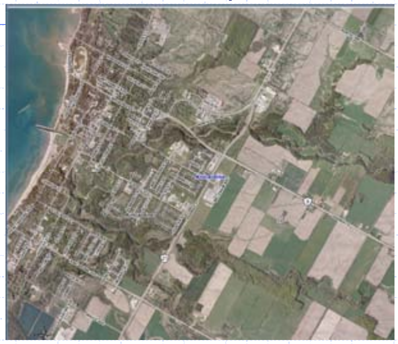
KBP – Servicing Master Plan History



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KBP – Servicing Master Plan Draft Servicing Strategy

- Transportation and Roads Pattern
- Water Servicing
- Sanitary Servicing
- Storm Water Management
- Phasing
- Costs

10

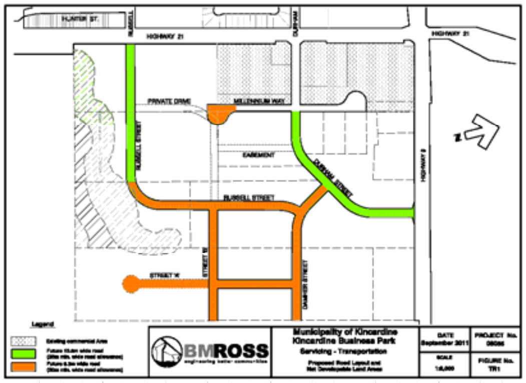
KBP – Servicing Master Plan Transportation and Roads Pattern

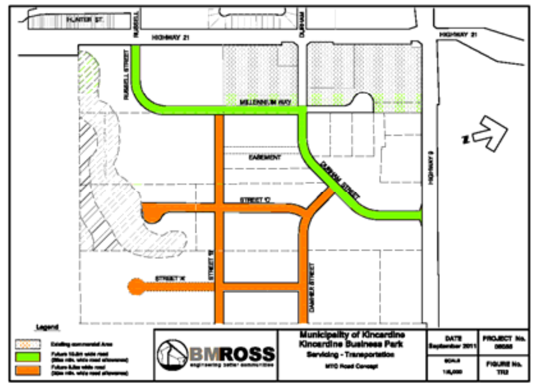
- Theoretical Landuse and Road Pattern
- Typical Cross Sections
- Traffic Impact Study – Possible External Improvements

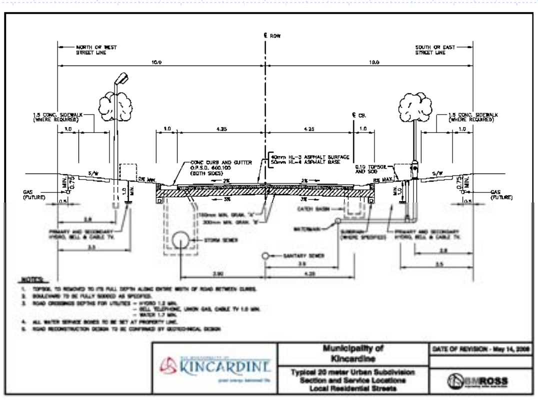
11

KBP – Servicing Master Plan Conceptual Land Use

12





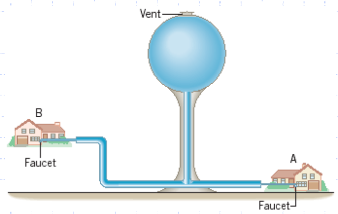


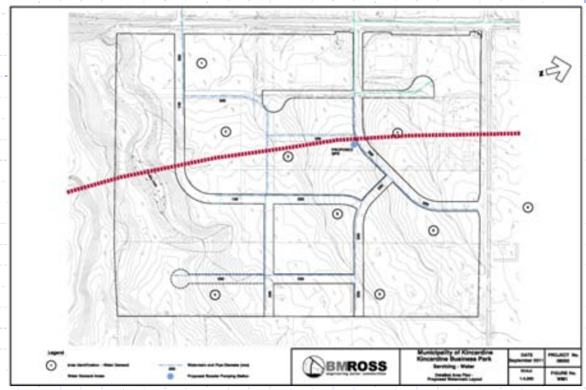
KBP – Servicing Master Plan
Water Servicing

- Existing System and Constraints
- Available Outlet Locations
- Proposed Distribution
- Booster Pumping Station

KBP – Servicing Master Plan
Water Servicing

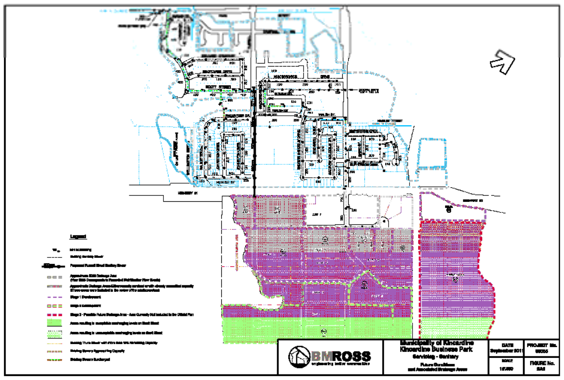
- Supply Pressure and Demand





KBP – Servicing Master Plan
Sanitary Servicing

- Existing System and Constraints
- Available Connection Locations
- Proposed Sanitary System
- Park Street Pumping Station Upgrades



KINCARDINE

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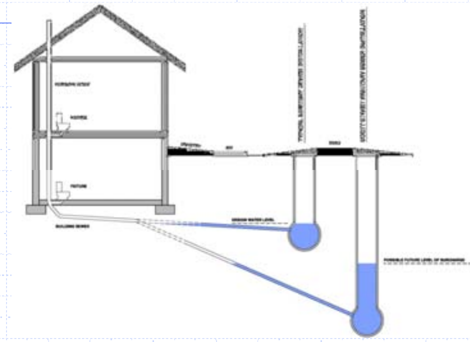
KBP – Servicing Master Plan
Surcharging



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KBP – Servicing Master Plan
Park Street Sewage Pumping Station

- Existing Station
- Forcemain to Lagoons
- Upgrade Possibilities

KINCARDINE

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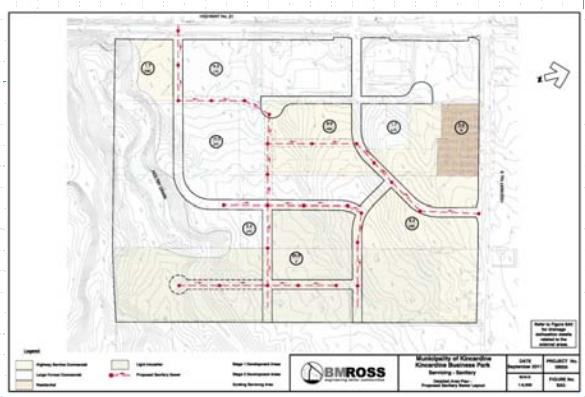

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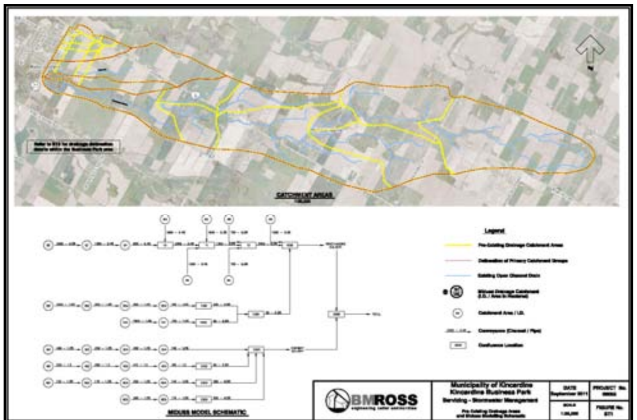
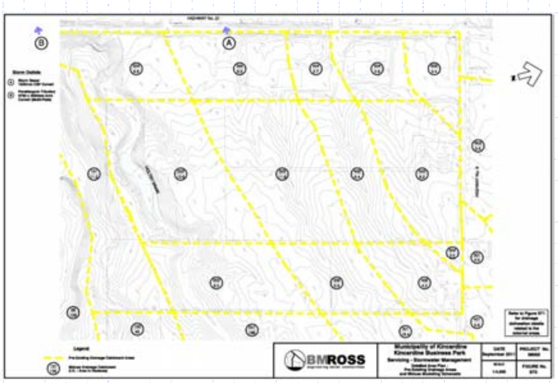
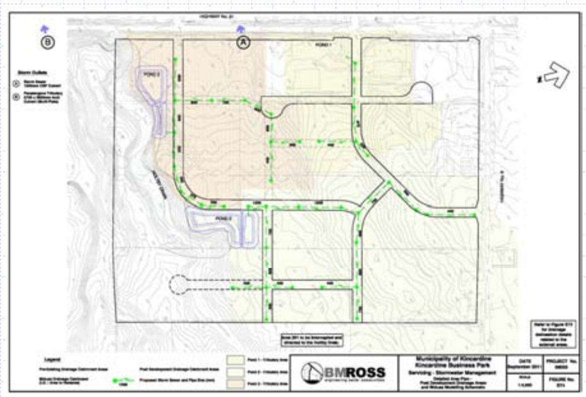
KBP – Servicing Master Plan
Storm Water Management (SWM)

- Existing Conditions and Existing Drainage Outlets
- Proposed Storm Sewer System
- Individual Ponds vs. Communal/Regional
- Proposed SWM Facilities







KBP – Servicing Master Plan Phasing

- Possible Initial Phases
  - West to East with Extension of Services
- Development Interests

KINCARDINE

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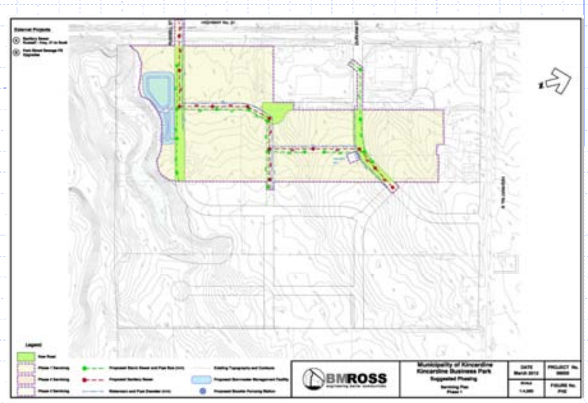

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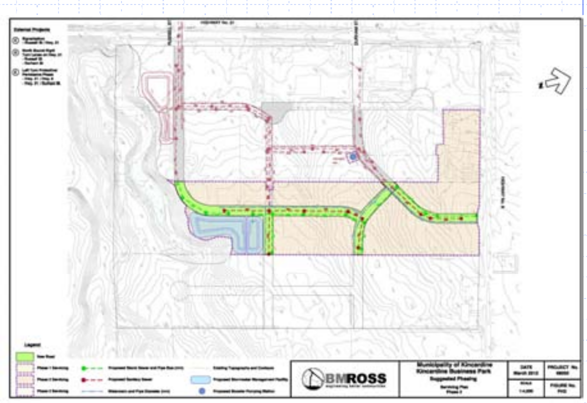

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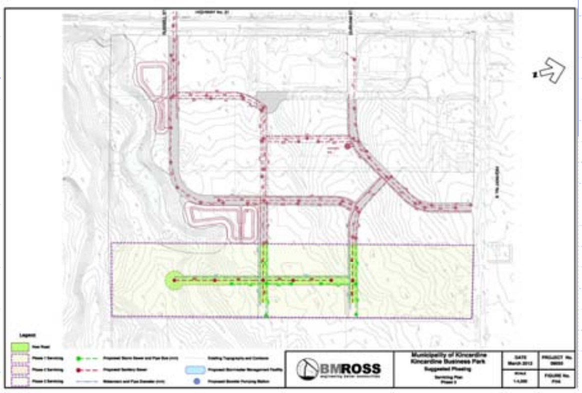

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KBP – Servicing Master Plan Costs

- Total Costs
- Recovery Strategies

35

Work Item	Estimated Cost
External Servicing	
Park Street Pumping Station Upgrades	850,000
Russell St. Sanitary Sewer – Hwy 21 to Scott St.	500,000
Transportation Improvements – Miscellaneous	350,000
Internal Servicing	
Sanitary Collection System	850,000
Water Distribution System	950,000
Water Booster Station	700,000
Storm Collection System	1,550,000
Stormwater Management Facilities	550,000
Road	3,700,000
TOTAL	**$10,000,000**
Approx. Cost per Developable Hectare	**$200,000**
(Cost per Acre)	**$80,000**

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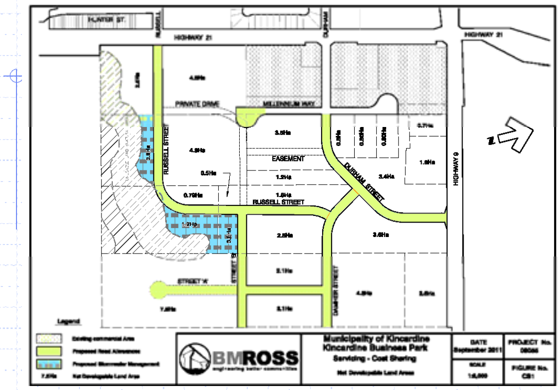
KBP – Servicing Master Plan
Comparison Costs – 1st Farm Lot

- Total Cost = $1,600,000
- Cost per Hectare = $150,000 ($60,000 per Acre)

- Above costs have not been adjusted to present day dollars.
- Costs are construction and engineering related only.



KBP – Servicing Master Plan
Recovery Methods

- Area Rating By-law
- Development Charges
- Combination of the Two

KBP – Servicing Master Plan
Summary

- Master Plan Area
- Transportation and Roads Pattern
- Water Servicing
- Sanitary Servicing
- Storm Water Management
- Phasing
- Costs
- Cost Recovery Strategies

KBP – Servicing Master Plan
Next Steps

- Receive and Review Comments from Public and Agencies and considered in the Master Plan
- Prepare Master Plan Report
- Review with Council
- Proceed with Environmental Assessment for Sewage Pumping Station and Water Booster Station

KINCARDINE 41 BMROSS

KBP – Servicing Master Plan

Questions and Comments

KINCARDINE 42 BMROSS

File: 08055

MUNICIPALITY OF KINCARDINE
KINCARDINE BUSINESS PARK
SERVICING MASTER PLAN

PUBLIC INFORMATION MEETING

March 27, 2013

COMMENTS

Name: ____

Address: ____

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PLEASE HAND IN, MAIL, OR FAX COMMNETS BY APRIL 12, 2013 TO:

B. M. ROSS AND ASSOCIATES LIMITED
Consulting Engineers
62 North Street
Goderich, Ontario
N7A 2T4

Phone: (519) 524-2641 Fax: (519) 524-4403
E-mail: lcourtney@bmross.net
Attention: Lisa Courtney, Environmental Planner

Comments and Information collected by B.M. Ross & Associates Limited on behalf of the Municipality of Kincardine will assist in decision making pertaining to the Master Plan. Comments and opinions will be kept on file but will not be included in study documentation made available for public review. Under the Freedom of Information and Protection Act (1987) personal information provided to the Municipality of Kincardine will remain confidential unless prior consent is obtained.

Ministry of Transportation

Engineering Office
Corridor Management Section
West Region

659 Exeter Road
London, Ontario N6E 1L3
Telephone: (519) 873-4598
Facsimile: (519) 873-4228

Ministère des Transports

Bureau du génie
Section de gestion des couloirs routiers
Région de l'Ouest

659, chemin Exeter
London (Ontario) N6E 1L3
Téléphone: (519) 873-4598
Télécopieur: (519) 873-4228

April 23, 2013

By email: derb@bmross.net

Dale Erb, P. Eng
B. M. Ross and Associates Limited
Engineers and Planners
62 North Street
Goderich, ON
N7A 1L3

RE: Applicant: Municipality of Kincardine
Submission No.: Kincardine Business Park Servicing Plan
Lots 1 & 2, Concession 1 South of Durham Road
Municipality of Kincardine, County of Bruce – Highways 21 and 9

The Ministry of Transportation has completed its review of the above noted Servicing Plan. The Servicing Plan has been considered and reviewed in accordance with the requirements of our highway access policies and criteria, and the permit requirements of the *Public Transportation and Highway Improvement Act*. The following outlines our comments and requirements.

1. Use a 2% growth rate for the purpose of this study

2. The report indicates completion of the first phase of the proposed development by 2016 and the second phase by 2021. An analysis for each major phase of development and the 5, 10 year horizons beyond full build-out of the site are required as per Ministry of Transportation Guidelines for the Preparation of Traffic Impact Studies.

3. The Durham Street distance between Highway 21 and Millennium Way is approximately 150 meters and contains three access points serving the Canadian Tire store, Sobeys and Tim Horton's. The proposed site traffic assignment along this link road may cause traffic operational problems for intersections and site access. The consultant is to identify other viable option(s) to reduce site traffic through this link.

4. The Highway 21 distance between Highway 9 and Durham Street is approximately 325 meters long. This distance is not adequate for single back-to-back left-turn lanes to serve projected left-turning traffic volumes. The consultant is to identify any required geometric improvements or other viable option(s) to accommodate future left-turning traffic volume.

5. The private drive, access point with Russel Street indicated in the site plan is in close proximity to Highway 21, and may cause traffic operational problems for the intersection

…/2

of Highway 21@Russel Street. We recommend the consultant consider relocating the access point to Russel Street of this private drive.

6. The report assessed the requirement for traffic signal installation as a result of the proposed development at the intersection of Highway 21 and Russell Street. The consultant is to include any required geometric improvements resulting from the signal installation at this intersection in the revised report.

7. The consultant should assess the geometric improvement requirements for existing signalized intersections. The consultant should calculate the required storage lanes using the Geometric Design Standards for Ontario Highways and/or Ontario Traffic Manual Book 12 (March 2012 Edition) methodologies.

8. Synchro input/output:
   I. Existing traffic signal cycle length is approximately 90 sec. for the intersection of Highway 21 @ Highway 9 and approximately 100 sec. for the intersection of Highway 21 @ Durham Street. The need for additional advanced or protected phases will result in longer cycle lengths.
   II. We recommend the consultant using existing signal timing splits for analysis in this study rather than Synchro optimization.
   III. We recommend the consultant justify the requirement for protective-permissive left-turn phase using methodology described in the Ontario Traffic Manual Book 12.
   IV. Highway 9 link speed is 80 km/hr.

9. We request that the consultant provide the electronic Synchro files for our review.

10. Provisions must be in place to protect all of the highway ditches, if necessary during construction, and at the developers expense.

11. The developer must obtain all necessary approvals including the Municipality, the Conservation Authority, Ministry of Environment, Ministry of Natural Resources and Ministry of Transportation.

12. The Ministry of Transportation requires analysis for the storm events for both the pre-development and post-development conditions showing no increase in flow towards either Highway 21 or Highway 9 drainage systems after post-development.

13. The report must demonstrate that there will be no negative impacts upstream or downstream to the Highway 21 and Highway 9 drainage systems (up to and including the 100yr storm event) because of this development or because of the failure of the proposed drainage works.

14. The Ministry of Transportation does not recognize any benefit from the attenuation of stormwater runoff using parking lot or rooftop storage where the control is achieved by orifice devices.

…/3

15. The report indicates that Business Park development may be done in phases but no indication of stormwater control during the development and if not all phases developed at the same time is there efficient stormwater management in place?

16. The owner's consultant in preparing the Traffic Impact Study should refer to the Ministry of Transportation's website for a comprehensive set of traffic related documentation requirements to assist in preparing their report: http://www.mto.gov.on.ca/english/engineering/management/corridor/TIS_Guidelines_EN.pdf. The owner should be aware that any highway improvements identified from to the Ministry of Transportation's review and analysis of the Traffic Impact Study will be the responsibility, financial and otherwise, of the owner.

17. The owner's consultant in preparing the Stormwater Management Report should refer to the Ministry of Transportation's website for a comprehensive set of ministry drainage related documentation requirements to assist in preparing their report: http://www.mto.gov.on.ca/english/engineering/drainage/index.shtml

18. Under the *Public Transportation and Highway Improvement Act*, Ministry of Transportation permits are required for all grading/construction located within 800 m of the Highway 21 and Highway 9 highway (property) limits. The Ministry of Transportation will require that all new residential structures be setback a minimum of 8.0 m from the Highway 21 and Highway 9 highway (property) limits. The Ministry of Transportation will require that all new commercial buildings and structures, both above and below ground, including stormwater management ponds/facilities, be setback a minimum of 14.0 m from the Highway 21 and Highway 9 highway (property) limits.

19. Under the *Public Transportation and Highway Improvement Act*, Ministry of Transportation permits are required for all visible signs proposed to be located within 400 m of the Highway 21 and Highway 9 highway (property) limits.

20. Under the *Public Transportation and Highway Improvement Act*, Ministry of Transportation permits are required for all access points to Highway 21 and Highway 9.

21. Under the *Public Transportation and Highway Improvement Act*, Ministry of Transportation permits are required for all encroachments proposed to be located, both above and below ground within the Highway 21 and Highway 9 highway (property) limits.

Should you have any questions, please contact our office.

Chris Dixon
Corridor Management Planner
Corridor Management Section
MTO - West Region, London

c. Jessica Pegelo, Corridor Management Officer, Ministry of Transportation
Michelle Bar, Director of Building and Planning, Municipality of Kincardine

B. M. ROSS AND ASSOCIATES LIMITED
Engineers and Planners
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 • f. (519) 524-4403
www.bmross.net

Transmittal Record

From: Lisa Courtney
lcourtney@bmross.net

☑ Regular Mail ☐ Courier ☐ Hand Delivered

To:
Audrey Holden, Historic Saugeen Métis

Re:
Kincardine Business Park – Stage 1 Archaeology Assessment

Date: April 23, 2014

File #: 08055

We enclose:

- 1 copy of the Stage 1 Archaeological Assessment for the Kincardine Business Park Servicing Master Plan by Timmins Martelle Heritage Consultants Inc.

SAUGEEN CONSERVATION

1078 Bruce Road 12, P.O. Box 150, Formosa ON Canada N0G 1W0
Tel 519-367-3040, Fax 519-367-3041, publicinfo@svca.on.ca, www.svca.on.ca

Sent via email and regular mail

B.M. Ross and Associates Limited
62 North Street,
Goderich, ON
N7A 2T4

October 28, 2016

ATTENTION: Dale Erb, P.Eng.

Dear Mr. Erb:

RE: Kincardine Business Park Servicing Plan
Part Lots 1-4, Concession 1 SDR
Southeast Corner of Highway 9 and Highway 21
Geographic Township of Kincardine
Municipality of Kincardine (Kincardine Business Park Expansion)

The Saugeen Valley Conservation Authority (SVCA) has reviewed this proposed servicing plan in accordance with the SVCA's mandate and policies. The proposed Kincardine Business Park Servicing Plan would facilitate the creation of a commercial development area and a new roadway network complete with servicing and stormwater management.

Details to the proposed servicing with sanitary, water, roadways, and stormwater management have been provided to the SVCA December 3, 2013 and September 6, 2016. The SVCA has reviewed the Servicing Plan dated September 19, 2011, revised June 29, 2016. The proposed development will be subject to an Environmental Assessment review process that the SVCA will have opportunity to review and comment on. The SVCA offers the following comments.

1. It appears the proposed stormwater pond in the southwest corner of the property may be located within the SVCA's Regulated Area, and potentially within the valley slope setback of the Holtby Municipal Drain. The extension east of Russel street may also intersect this area, and street 'A' may be within the floodplain of the Holtby Drain. These proposals would require permission from the SVCA in the form of an SVCA permit to Alter a Regulated Area or Watercourse.
   - i) Alterations to the valley of a watercourse may not be acceptable to SVCA staff.
   - ii) Alterations to the floodplain of a watercourse may not be acceptable to SVCA staff.
   - iii) Alterations within the slope setback of a steep slope many not be acceptable to SVCA staff.
   - iv) Please confirm access for maintenance purposes to the Holtby Drain is available with the proposed southwest pond design and roadways.

2. There has been a new stormwater pond constructed associated with new development in the area in part lot 2, concession 1 SDR associated with a new hotel. Has this pond been considered in this

report?

3. The drainage characteristics of lands that the ponds will be installed upon are being altered as a part of this proposal and will need to be accounted for by the report (permeability, runoff, etc.).

4. The area, or a portion of the area, appears to have existing agricultural field tile installed. During works on site, for various phases any encountered filed tiles should be appropriately outlet. Have these field tile outlets been factored into the stormwater plan, pre and post development? Phasing of development may impact these tiles if present.

5. Please clarify the allowable proposed impervious area of the proposed development areas. The SVCA is not clear how the impervious roadway surfaces, ponds, boulevards, etc. have factored into the allowable impermeable calculations for the developable lands.

6. A portion of the southwest Stormwater Management pond is not within Phase 1 servicing lands.

7. The central proposed pond is shared between two phases of the proposed development. The pond would need to be part of one phase or another the SVCA suggests (Phase 1 appropriate the SVCA recommends).

8. The SVCA is aware that in nearby stormwater ponds there has been local interest to provide habitat in these features compared with a typical dry pond design. The Municipality appears to proposed wet pond design. Could habitat enhancement components be added to the proposed ponds?

9. Additional details are needed with regards to lot grading and sediment control as the process proceeds for SVCA review.

10. Proposed roadways are indicating development lands will extend to the east in the future. No development potential has been taken into consideration upstream of lot 4. Perhaps a drainage route, or capacity for that future development, can be included in the proposed.

11. The SVCA notices there are proposed watermains to cross the valley and watercourse to the south (Holtby Drain). While not necessarily unacceptable permission will be required from the SVCA and these features would need to be designed to not impact the watercourse and be done in the appropriate time of year.

The SVCA will continue our review upon clarifications and/or revisions being provided to the SVCA. Generally this proposal is acceptable to the SVCA provided the above comments are addressed. The SVCA will be involved with the Environmental Assessment review process and will provide additional review comments when more detailed plans are provided for review.

If you have any questions on the above, please do not hesitate to contact this office.

Sincerely,

Erik Downing
Manager, Environmental Planning and Regulations
Saugeen Conservation

ED/

cc: Maureen Couture, Authority Member, SVCA, via e-mail
Andrew White, Authority Member, SVCA, via e-mail
Donna MacDougall, Clerk, Municipality of Kincardine, 1475 Con. 5 R.R#5, Kincardine, ON N2Z 2X6

Ministry of Transportation

Engineering Office
Planning and Design Section
Southwestern Region

659 Exeter Road
London, Ontario N6E 1L3
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Ministère des Transports

Bureau du génie
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Dale Erb,

January 23, 2017

B. M. Ross and Associates Limited
Engineers and Planners
62 North Street
Goderich, ON N7A 2T4

RE: Kincardine Business Park – 2016 Document Review

Submission No.: 2016
Lot 2 & 3, Concession 1 SDR
County of Bruce
Municipality of Kincardine - Highway 21

Further to our meeting on December 20, 2016 regarding the subject proposed development lands, the following summarize our comments:

Documents Reviewed

- Municipality of Kincardine – Kincardine Business Park – Servicing Plan – File No. 08055 – Revised June 29, 2016.

<u>Traffic Impact Study</u>

- Turning movements that were conducted in 2012 and 2013, some of the development was built between the years 2008 and 2012. The 2012 turning movement counts may not have all of the new traffic from the development that was built between these years. We suggest that the consultant use more current volumes to reflect current conditions. This update can be by addendum of the TIS.

<u>Stormwater Management Report</u>

- The MTO requires at set back of 14m from property line with no fixed structures in that designated area (headwalls, retaining walls, berms etc.).

- The report must demonstrate that there will be no negative impacts upstream or downstream to the Highway 21 drainage system (up to and including the 100yr storm event) because of this development or because of the failure of the proposed drainage works.

- The Ministry requires analysis for a full range of storm events for both the pre-development and post development conditions showing no increase in flows for all storm events.

…/2

- Provisions must be in place to protect the highway ditch, if necessary during construction, at the developer's expense.

- The rainfall data and IDF curve information should be taken from the MTO drainage website.

- The Rational method should be used for areas under 100ha.

- The ministry does not allow the use of orifice plates as a means of control. A section of reducer pipe with an inside diameter equivalent to the inside diameter of the orifice design is acceptable.

- The indication is that the ponds (2 & 3) are going to outlet into our Highway 21 ditch and the Holtby Drain respectively how is this being accomplished, pond 2 is located in the middle of the industrial park.

<u>Proposed Road Layout</u>

- In regards to the configuration of the municipal road network that connects to the provincial highway network, MTO wants to ensure that there is adequate setback for entrances and municipal road intersections. The configuration shown should consider adequate spacing for future warranted turning lanes and other traffic impact mitigation measures for any entrance or intersection that is expected to intensify.

- In review of the municipal road network configurations detailed in TR1 and TR2, for the reason noted above, MTO's preference would be TR1 because this configuration would allow for more future traffic mitigation measures when the developments intensify and also to protect the highway intersection for additional future traffic mitigation measures (turning lanes/storage etc.) when warranted by increase demand from population growth and development intensification.

    - As a note regarding the private drive shown in Figure TR1, MTO provided comments in the past (April 23, 2013) recommending the reconsideration of this access point. MTO would like to reiterate this comment as any access point that is in close proximity to the intersection will limit the future traffic mitigation measures such as turning lanes.

<u>Municipal Services</u>

In review of Figure WM1 and Figure SA3 which show proposed utility extensions crossing Highway 21, MTO has the following comments:

- MTO will require further detail of the proposed crossing locations including construction method, Geotechnical details, depth (and location) of crossing, casing detail and impacts to highway traffic. As municipal utilities are not identified under the Public Service Works on Highways Act, MTO may require the municipality to enter into a legal agreement (with MTO) to address items such as (but not limited to) relocation responsibilities and indemnification.

<u>Visibility Triangles</u>

- That prior to final approval, MTO will require a review of all of the access points in the Kincardine Business Park to ensure the visibility triangles are designed to meet the minimum

…/3

dimensions in accordance with the *Geometric Design Standards Manual for Ontario Highways.* All visibility triangles shall be dedicated as public highway under the owner's certificate on the final plan. A draft of the final Plan of Subdivision must be submitted to MTO for review.

<u>0.3m Reserve</u>

- That prior to final approval, a 0.3 m reserve extended across the entire highway frontage including the visibility triangles (with the exception of the street opening(s)) be conveyed by deed to the MTO. All reserves by deed must be free and clear of all mortgages, liens, and encumbrances. The reserve must be illustrated as Blocks on the Plan of Subdivision. A draft of the final Plan of Subdivision must be submitted to MTO for review. A draft of the transfer of deed and certification of title conveying the Blocks to the MTO must be submitted for review and approval prior to being registered.

Please feel free to contact me for further information, clarity or discussion.

Regards,

Zsolt Katzirz
Corridor Management Planner
Corridor Management Section

c. *Bruce Potter – B.M. Ross – email only (bpotter@bmross.net)*
Michele Barr – Municipality of Kincardine – email only (mbarr@kincardine.net)

BMROSS
engineering better communities

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File No. 08055

November 7, 2008

John deRosenroll, CAO
Municipality of Kincardine
1475 Concession 5, R. R. 5
Kincardine, ON N2Z 2X6

via email

Dear Sir:

RE: Business Park Servicing

On April 30, 2008 we presented our notes dated April 28th on a potential cost sharing approach for the balance of the business park to a group of interested developers. A copy of that presentation is attached in PDF format.

The purpose of that presentation was to determine how the costs of servicing for road extensions and trunk sanitary sewers could be shared amongst the developers of the balance of the business park.

It was noted that 21 Russ had purchased the balance of farm lot 1, with the exception of a small portion to be set aside for a Municipal tourist information booth, and would develop that land being fully responsible for all servicing and improvements related to that development. 21 Russ has also purchased that portion of farm lot 2 immediately behind their lot 1 property and a further portion of farm lot 3. BMROSS were instructed to consider the development on lot 2 which is proposed to be continuous with the lot 1 development in a similar manner. All costs of constructing roads and servicing for the 21 Ross lands on farm lots 1 and 2 were excluded from the cost sharing as was the developer's acreage for this portion of the development.

The County of Bruce Planning Department had provided suggestions for a proposed ultimate road pattern and following comments and revisions by municipal staff, that pattern was included as Figure 1 of the April 28th document. Based upon discussions with adjacent developers it is now proposed to delete that portion of Millenium Way between the 21 Russ and Dalron sites. The attached amended road pattern is shown on Figure 1A. Whether the cul-de-sac shown is constructed in the manner illustrated will be based on the final configurations of the site plans for the adjacent developments.

The Municipality's position on the business park expansion is that the developers should pay for the servicing costs. Within the assumptions provided in the April 28th document, the Municipality assumed that they would take the responsibility for any expansion or upgrades to the Park Street Sewer Pumping Station. It is acknowledged that the final development of the four farm lots to their fullest potential will take a great number of years. With this in mind, the Municipality presented a possible initial servicing scheme would result in the following being constructed initially:

- Russell Street extension to easterly limit of lot 2
- Durham Street extension to Highway 9
- Trunk sanitary sewer construction on Russell Street, through the 21 Russ and Dalron lands, and along the Durham Street extension.

Attached as Figure 2A is an amended drawing showing this interim development.

It is noted that the downstream sewers in the adjacent residential subdivision have little surplus capacity and this has resulted in a proposal that a new trunk sanitary sewer be constructed from Scott Street easterly on Russell to service the balance of the business park lands. While the Municipality may allow sanitary service sewer connections either on a permanent or interim basis to the existing Durham Street sanitary sewer, it is the intent that all properties on the remaining three farm lots would participate in cost sharing for the installation of the trunk sewer. The location of the sewer shown on the attached sketch on the Dalron site is in a location compatible with the most recent draft site plans received by the Municipality. This sewer can be moved to a more appropriate location if needed.

Servicing costs were presented in the April 28th report based upon a preliminary estimate of the cost of the trunk sewer and based upon per lineal meter estimates for the road construction and the associated Municipality facilities. No costs were included for communal stormwater management facilities (not being considered) or an expected booster pumping station to boost water pressure to service portions of the remaining development (portions of lots 2, 3, and 4). A cost sharing proposal was provided for comment to the developers.

Following the initial presentation, the Municipality received written comments from three of the developers.

The comments from Dalron included the following:

- The road along the south side of the Dalron property is not needed.
- The cul-de-sac at the south end of Millennium Way could be replaced with other "traffic calming" measures.
- The location of the sanitary sewer through the Dalron site may need to be amended to revised site layout.
- They are anxious for the sewer to be completed.
- They would like the cost sharing to be partially based upon frontage.
- They would like the Municipality to pay for the road extension.

One of the proposals noted above suggested that cost sharing should be based upon frontage on Municipal roads. In reviewing the many parcels currently existing and proposed, municipal staff noted that there are a number of irregular shaped parcels which would be impacted very differently if a frontage method was used. It was decided to continue to pursue the cost sharing by the development area method.

A letter from DHC was received following the April meeting. In that letter, they expressed concern that the termination of roads with temporary or permanent cul-de-sacs was problematic and encouraged the Municipality to attempt to provide through roads where possible.

The Municipality also received a draft letter from 21 Russ dated August 25, 2008. Within that letter 21 Russ proposed that the cost sharing be amended from the Municipality's assumptions in the following manners:

- Hydro relocation costs on their lands on farm lot 1 be shared with the Municipality. --- The Municipal position is that this is a responsibility of 21 Russ.
- That the Municipality participate in servicing costs for the tourist booth. --- The Municipality acknowledges responsibility for participating in the site service costs for this facility.
- That the Municipality pay oversizing costs for the sanitary sewer through lot 1. --- It is the Municipality's position that this is the responsibility of 21 Russ.
- That roads, utilities, and the sanitary trunk extension through lot 2 should be paid for by the balance of the lands. --- If the Municipality is to consider this option, then the acreage for this section of the 21 Russ parcel should be included in the cost sharing as well.

In a subsequent meeting with 21 Russ they asked that the Municipality look at sharing the cost based upon:

- The maximum square metres of entitlement of development for each parcel of lands based upon zoning, and/or
- The corresponding potential traffic volume predicted for development for each site based upon the ITE Trip Generation Manual (Institute of Transportation Engineers).

BMROSS completed a number of calculations of potential cost sharing scenarios based upon the points above. The extent of the development assumed on individual parcels was based upon the proposed development scheme provided by the County of Bruce Planning Department. It is noted that the maximum amount of development is far less than the zoning bylaw allowable maximums because of needs for parking and other site facilities. From our calculations, we are of the opinion that assuming a potential development scenario for each individual parcel is subject to great discretion. We met with staff of the Municipality and the Planning Department and reviewed the outcome of some of these calculations. It was agreed by all that these methods were not an appropriate way to share the costs on the full development because of the great discretion in the development schemes that might be considered on individual sites.

Based upon the discussions at our meeting with staff and the planning department on August 5th, we were instructed to provide an updated cost sharing schedule in a similar format to that presented in April. Attached, as Table 2A is that schedule. This document is based upon the slightly revised interim servicing scheme and presents possible cost estimates for the works. Included in these estimates are allowances for construction, engineering and some contingencies. No detailed design has been completed. Excluded from these costs are improvements to the Park St. Pumping Station, any communal SWM works, and the construction of a water booster pumping station. Trunk sewer costs are proposed to be shared amongst all of the development properties and the initial road costs are proposed to be shared amongst the developers that will receive the initial benefits. The costs for the completion of the balance of the servicing in the future would be expected to be shared amongst the remaining lands.

It is important that the Municipality establish the level of commitment of each of the developers and their expected timing for their development so that a detailed servicing schedule can be established.

Should you have any questions on the above, please contact me.

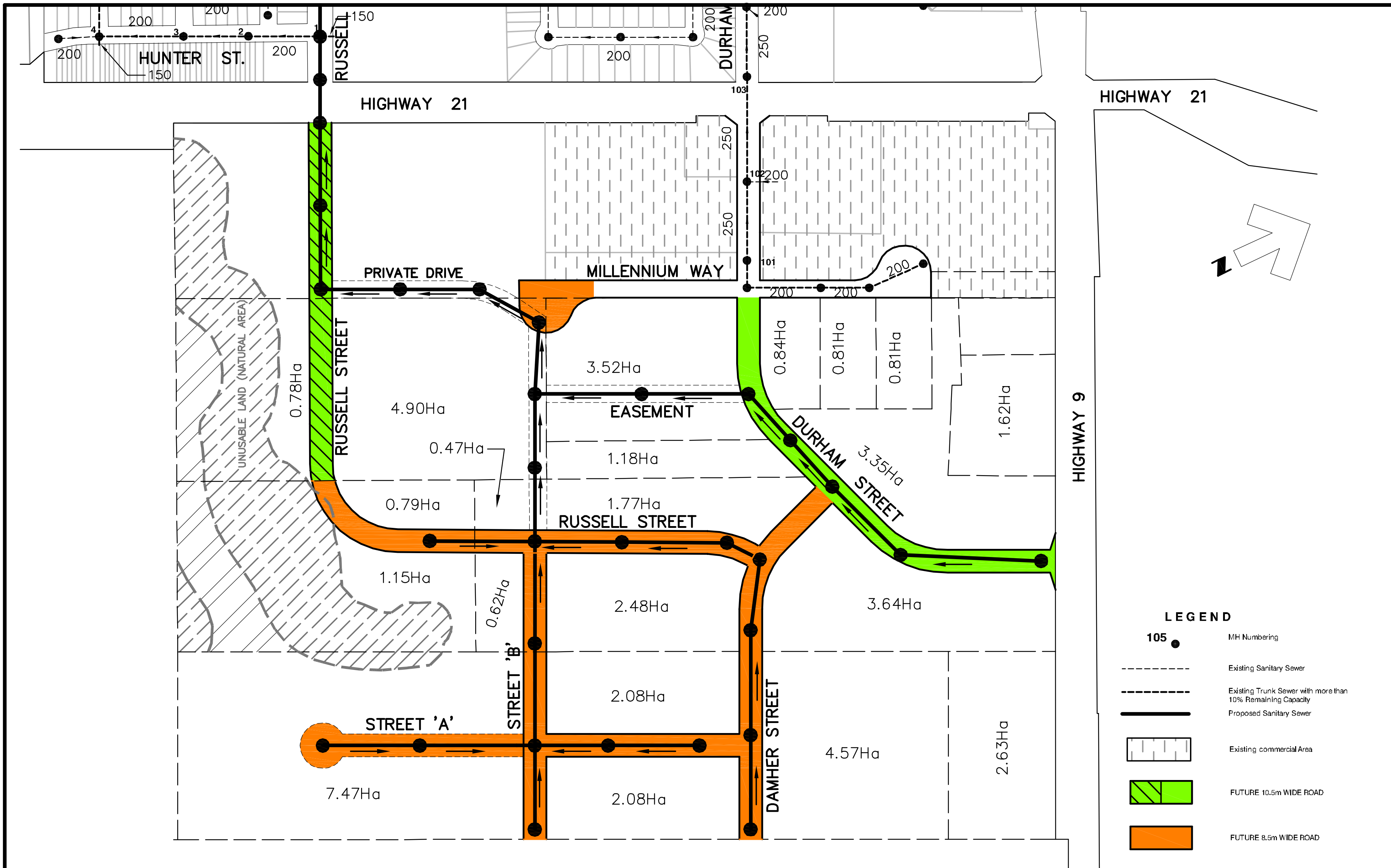
Yours very truly,

B. M. ROSS AND ASSOCIATES LIMITED

Per ______________________________
B. W. Potter, P. Eng.

BWP:es

c.c. Jim O'Rourke
Michelle Barr
Bill Hollo, County of Bruce, Planning Department



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Municipality of Kincardine

Business Park Development Area

Full Development
Roads and Sanitary Sewer

DATE	PROJECT No.
Nov. 7, 2008	08055
SCALE	FIGURE
N.T.S.	1A

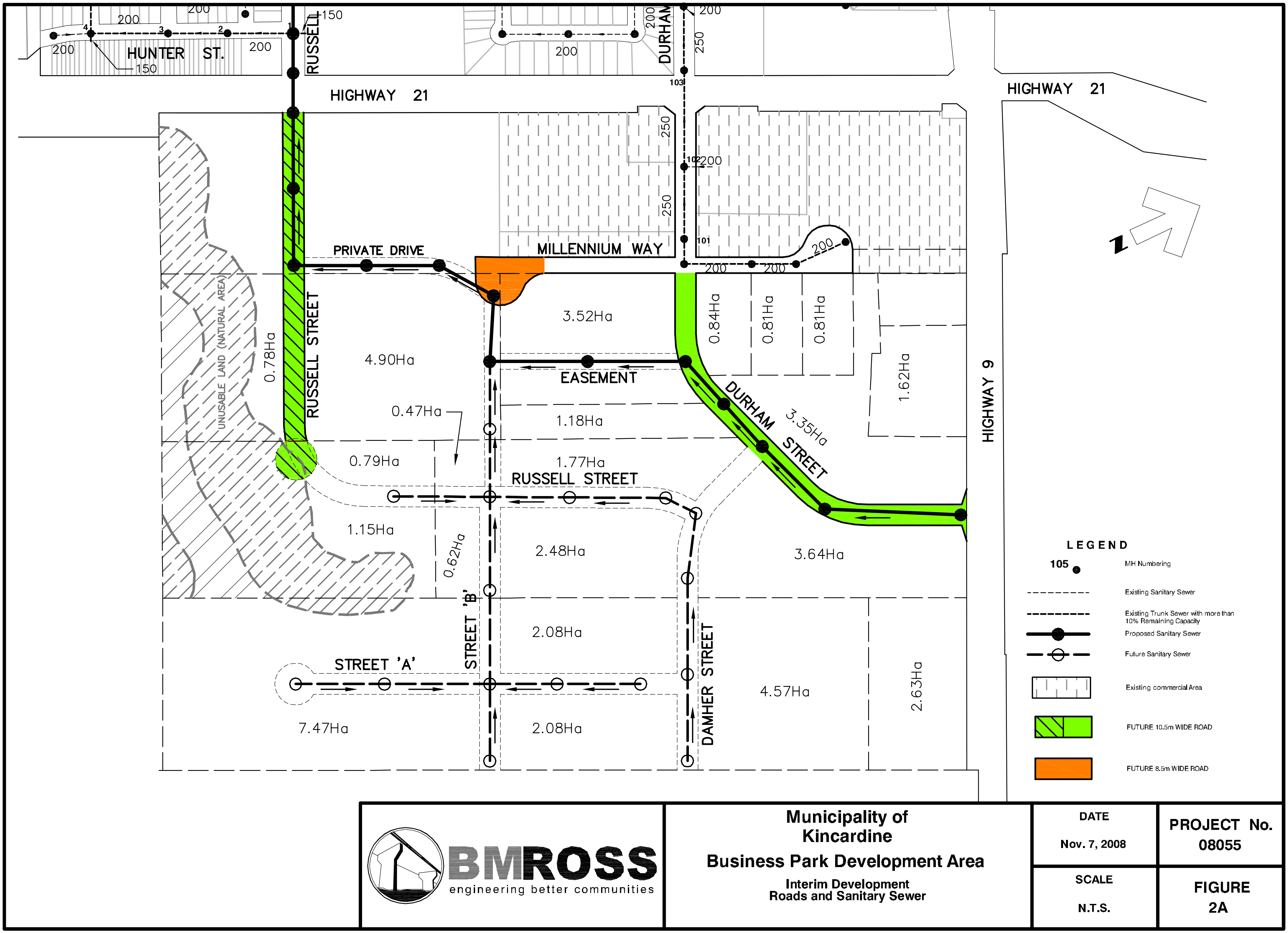
HUNTER ST.
RUSSELL
DURHAM
HIGHWAY 21
HIGHWAY 9
PRIVATE DRIVE
MILLENNIUM WAY
RUSSELL STREET
EASEMENT
DURHAM STREET
DAMHER STREET
STREET 'A'
STREET 'B'
UNUSABLE LAND (NATURAL AREA)
0.78Ha
4.90Ha
0.47Ha
0.79Ha
1.15Ha
0.62Ha
7.47Ha
3.52Ha
1.18Ha
1.77Ha
2.48Ha
2.08Ha
2.08Ha
0.84Ha
0.81Ha
0.81Ha
1.62Ha
3.35Ha
3.64Ha
4.57Ha
2.63Ha
N
LEGEND
105 MH Numbering
Existing Sanitary Sewer
Existing Trunk Sewer with more than 10% Remaining Capacity
Proposed Sanitary Sewer
Future Sanitary Sewer
Existing commercial Area
FUTURE 10.5m WIDE ROAD
FUTURE 8.5m WIDE ROAD
BMROSS
engineering better communities
Municipality of Kincardine
Business Park Development Area
Interim Development
Roads and Sanitary Sewer
DATE
Nov. 7, 2008
SCALE
N.T.S.
PROJECT No.
08055
FIGURE
2A

Table 2A

08/11/2008

Suggested Cost Sharing

Interim development:

Parcel/Owner	Approx. Developable for Trunk Sewer Area (ha.)	Cost Sharing Trunk Sewer per ha.	Approx. Developable for Roads Area (ha.)	Percent of Total	Cost Sharing Roads	Total
DHC:						
Former Quinn lands	1.62	12,811	1.62	10.31%	149,495	162,306
Part 1 (Bawa)	0.81	6,405	0.81	5.15%	74,675	81,080
Part 2	0.81	6,405	0.81	5.15%	74,675	81,080
Part 3	0.84	6,643	0.84	5.34%	77,430	84,073
Part 8	3.64	28,785	3.64	23.16%	335,820	364,605
Part 9	3.35	26,492	3.35	21.31%	308,995	335,487
Sub-Total	11.07	87,541	11.07	0.7042	1,021,090	1,108,631
Dalron:						
Part 4, 6	4.65	36,772	4.65	29.58%	428,910	465,682
21 Russ:						
Part 5 (21Russ)	1.94	15,342			-	15,342
Stewart:						
Part 7	5.34	42,229			-	42,229
Farrell:						
Lot 4	16.2	128,110			-	128,110
Total	39.2	309,994.00	15.72	1	1,450,000	1,759,994

Trunk Sewer Costs to be shared:	$ 310,000.00	$ 7,908.00	per ha.
Road and sewer servicing costs to be shared:	$ 1,450,000.00		
Total	$ 1,760,000.00		

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File No. 08055
April 28, 2008

MUNICIPALITY OF KINCARDINE
BUSINESS PARK
DEVELOPMENT COST SHARING

1.0 PURPOSE

The Municipality of Kincardine wishes to determine how the costs of the road extensions and trunk sanitary sewers would be shared for the development of the balance of the Business Park. The Municipality has asked B. M. Ross and Associates to prepare this draft document to commence discussions with developers on that cost sharing.

2.0 BACKGROUND/HISTORY

Four farm lots were designated as Business Park in the Municipality's official plan.

The first lot was purchased by Kincardine. Kincardine became the developer of this parcel and for the northerly two thirds of the lot completed all services and sold parcels as serviced land.

The construction of Durham Street, Highway 9 and 21 improvements and the associated services were completed by Kincardine. This includes the Millennium Way extension to the north which has serviced the lands north of the Canadian Tire property.

The proposed sale to 21 Russ on the southerly portion of Lot 1 is contingent on that developer doing all of the servicing which includes:

- Road improvements on Highway 21.
- Construction of Russell Street extension and improvements.
- Water and sewer extensions from Hunter through their site.
- Storm water management for their site and a review of how the balance might be incorporated.
- Provisions for easements, access for traffic, site services and utilities through the site.
- Provision is to be left for the tourist information booth.

The final layout of the 21 Russ site is subject to discussions with the MTO and the outcome of their traffic study.

3.0 CURRENT DEVELOPMENT PROPOSALS

The following current development proposals are being considered or discussed:

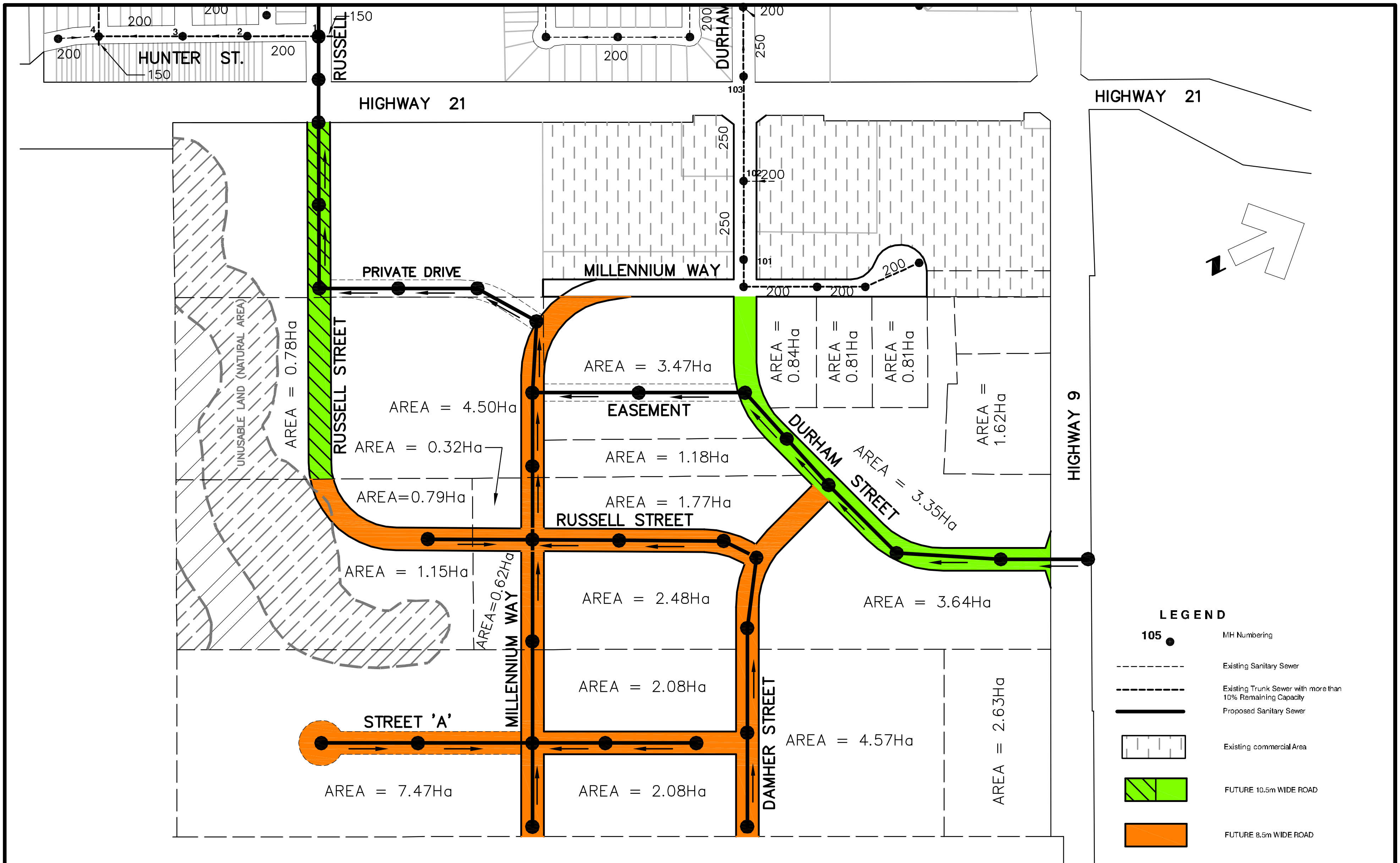
- A site plan agreement has been completed with DHC for the lands on Lot 1at the north end of Millennium Way.
- The Canadian Tire lands on Lot 1 immediately north of the existing store are vacant.
- The developer of the carwash site on Lot 1, behind Canadian Tire would appear to be staring to proceed with his development.
- The Municipality has had preliminary discussions with respect to the proposed Bawa development.
- There have been discussions on the proposed Dalron site concerning the installation of commercial facilities.
- It is understood that a developer has purchased all of the lands north of the Durham Street extension and north of Damher Street.
- There has been a desire from some of the developers to have their sanitary sewer discharge to the existing Durham Street sewer.

4.0 SERVICING AND ROADS PATTERN

The County of Bruce Planning Department has completed a recommended pattern for development and installation of new roads through the development area. This road pattern, as slightly modified by BMROSS is shown on the attached sketch. It is anticipated these roads will be constructed as development progresses. It is also anticipated by the Municipality that the remaining development land should be assessed a share of the cost of the construction of the Russell Street trunk sewer together with a share of the cost of the various development roads.

Figure 1 shows that road pattern.

A review of anticipated ownership of the properties has been completed based upon a sketch completed by Ron Dore O.L.S. This is summarized below in Table 1.



BMROSS engineering better communities

Municipality of Kincardine

Business Park Development Area

Full Development Roads and Sanitary Sewer

DATE	PROJECT No.
April 28, 2008	08055
SCALE	FIGURE
N.T.S.	1

Table 1

Parcel/Owner	Approx. Developable Area (ha.)	Percent of Total
Former Quinn lands	1.62	4.15%
Part 1 (Bawa)	0.81	2.07%
Part 2	0.81	2.07%
Part 3	0.84	2.15%
Part 8	3.64	9.32%
Part 9	3.35	8.58%
Part 4, 6 (Dalron)	4.65	11.91%
Part 5 (21Russ)	1.94	4.97%
Part 7	5.19	13.29%
Lot 4	16.2	41.49%
Total	39.05	100%

The 21 Russ lands on lot 2 are assumed to have similar responsibilities with respect to servicing as those lands on lot 1 and the cost of services across their property and the cost of the Russell Street extension to the rear of lot 2 has been excluded. That area is excluded from the chart above.

5.0 PRELIMINARY ESTIMATED COSTS

Preliminary estimated costs of the road construction have been presented based upon recent tenders of similar works. All costs include allowances for local sanitary collection, water distribution, storm water collection, road construction complete with curb and gutter, sidewalk, engineering, contingencies and GST. No allowance for communal Storm Water Management or the construction of a water booster pumping station is included.

For the purposes of this initial proposal, two types of road have been considered and the estimated cost per metre of construction is as follows:

- Durham Street extension and Russell Street extension to rear of lot 2 (green on attached sketch) -- $2,250
- Remaining service roads. -- $2,000

The trunk Sanitary Sewer from Hunter through the 21Russ lands is the responsibility of that developer. The sewer from Scott to Hunter has a preliminary estimated cost of $290,000. It is proposed that this cost should be shared by all of the development lands.

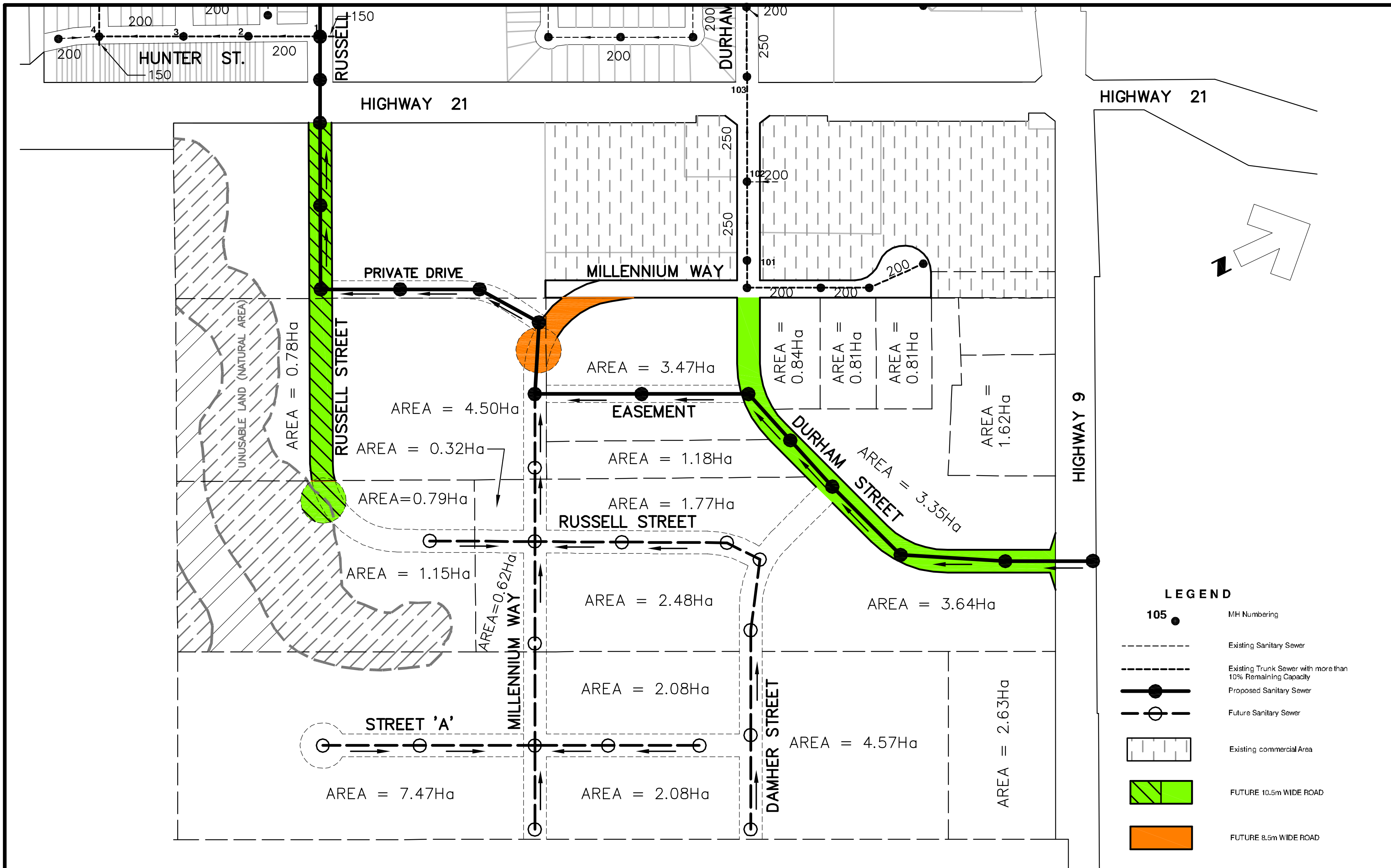
It is anticipated by the municipality that the completion of the development of the business park will take a number of years. It is assumed that initially development may be limited to the lands on the Durham St. extension and the 21 Russ lands.

The extent of this assumed interim development is shown on Figure 2. Based upon the preliminary submission for the Dalron development, a sewer easement through their property is proposed.

For that extent of development to proceed, the Durham Street extension and portions of the trunk sewer need to be constructed as shown on Figure 2. Preliminary cost sharing proposals for that extent of development are attached as Table 2.

6.0 SUMMARY

This document provides the basis for discussion for the sharing of costs for the development of the balance of the business park. The municipality and developers must reach some consensus as to how the services on the balance of the Business Park will be funded.



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Municipality of Kincardine

Business Park Development Area

Interim Development Roads and Sanitary Sewer

DATE	PROJECT No.
April 25, 2008	08055
SCALE	FIGURE
N.T.S.	2

Table 2

Parcel/Owner	Approx. Developable for Trunk Sewer Area (ha.)	Cost Sharing Trunk Sewer per ha.	Approx. Developable for Roads Area (ha.)	Percent of Total	Cost Sharing Roads	Total	
Former Quinn lands	1.62	12,000	1.62	10.31%	150,600	162,602	
Part 1 (Bawa)	0.81	6,000	0.81	5.15%	75,200	81,201	
Part 2	0.81	6,000	0.81	5.15%	75,200	81,201	
Part 3	0.84	6,200	0.84	5.34%	78,000	84,201	
Part 8	3.64	27,000	3.64	23.16%	338,400	365,404	
Part 9	3.35	24,900	3.35	21.31%	311,300	336,204	1,110,812
Part 4, 6 (Dalron)	4.65	34,500	4.65	29.58%	432,200	466,705	
Part 5 (21Russ)	1.94	14,400			-	14,400	
Part 7	5.19	38,500			-	38,500	
Lot 4	16.2	120,300			-	120,300	
Total	39.05	289,800	15.72	100%	1,460,900	1,750,717	

Trunk Sewer Costs to be shared:	$ 290,000.00	$ 7,426.38	/ha.

Road and sewer servicing costs to be shared:

Sewer Extension	$ 95,000.00
Road Costs	$ 1,366,000.00
Total	$ 1,461,000.00

Length of 10.5 m. wide road	536	2,250	1,206,000
Length of 8.5 m wide road	80	2,000	160,000
Total	616		1,366,000

APPENDIX 4

2008 Cost Sharing Memo by BMROSS

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File No. 08055

November 7, 2008

John deRosenroll, CAO
Municipality of Kincardine
1475 Concession 5, R. R. 5
Kincardine, ON N2Z 2X6

via email

Dear Sir:

RE: Business Park Servicing

On April 30, 2008 we presented our notes dated April 28th on a potential cost sharing approach for the balance of the business park to a group of interested developers. A copy of that presentation is attached in PDF format.

The purpose of that presentation was to determine how the costs of servicing for road extensions and trunk sanitary sewers could be shared amongst the developers of the balance of the business park.

It was noted that 21 Russ had purchased the balance of farm lot 1, with the exception of a small portion to be set aside for a Municipal tourist information booth, and would develop that land being fully responsible for all servicing and improvements related to that development. 21 Russ has also purchased that portion of farm lot 2 immediately behind their lot 1 property and a further portion of farm lot 3. BMROSS were instructed to consider the development on lot 2 which is proposed to be continuous with the lot 1 development in a similar manner. All costs of constructing roads and servicing for the 21 Ross lands on farm lots 1 and 2 were excluded from the cost sharing as was the developer's acreage for this portion of the development.

The County of Bruce Planning Department had provided suggestions for a proposed ultimate road pattern and following comments and revisions by municipal staff, that pattern was included as Figure 1 of the April 28th document. Based upon discussions with adjacent developers it is now proposed to delete that portion of Millenium Way between the 21 Russ and Dalron sites. The attached amended road pattern is shown on Figure 1A. Whether the cul-de-sac shown is constructed in the manner illustrated will be based on the final configurations of the site plans for the adjacent developments.

The Municipality's position on the business park expansion is that the developers should pay for the servicing costs. Within the assumptions provided in the April 28th document, the Municipality assumed that they would take the responsibility for any expansion or upgrades to the Park Street Sewer Pumping Station. It is acknowledged that the final development of the four farm lots to their fullest potential will take a great number of years. With this in mind, the Municipality presented a possible initial servicing scheme would result in the following being constructed initially:

- Russell Street extension to easterly limit of lot 2
- Durham Street extension to Highway 9
- Trunk sanitary sewer construction on Russell Street, through the 21 Russ and Dalron lands, and along the Durham Street extension.

Attached as Figure 2A is an amended drawing showing this interim development.

It is noted that the downstream sewers in the adjacent residential subdivision have little surplus capacity and this has resulted in a proposal that a new trunk sanitary sewer be constructed from Scott Street easterly on Russell to service the balance of the business park lands. While the Municipality may allow sanitary service sewer connections either on a permanent or interim basis to the existing Durham Street sanitary sewer, it is the intent that all properties on the remaining three farm lots would participate in cost sharing for the installation of the trunk sewer. The location of the sewer shown on the attached sketch on the Dalron site is in a location compatible with the most recent draft site plans received by the Municipality. This sewer can be moved to a more appropriate location if needed.

Servicing costs were presented in the April 28th report based upon a preliminary estimate of the cost of the trunk sewer and based upon per lineal meter estimates for the road construction and the associated Municipality facilities. No costs were included for communal stormwater management facilities (not being considered) or an expected booster pumping station to boost water pressure to service portions of the remaining development (portions of lots 2, 3, and 4). A cost sharing proposal was provided for comment to the developers.

Following the initial presentation, the Municipality received written comments from three of the developers.

The comments from Dalron included the following:

- The road along the south side of the Dalron property is not needed.
- The cul-de-sac at the south end of Millennium Way could be replaced with other "traffic calming" measures.
- The location of the sanitary sewer through the Dalron site may need to be amended to revised site layout.
- They are anxious for the sewer to be completed.
- They would like the cost sharing to be partially based upon frontage.
- They would like the Municipality to pay for the road extension.

One of the proposals noted above suggested that cost sharing should be based upon frontage on Municipal roads. In reviewing the many parcels currently existing and proposed, municipal staff noted that there are a number of irregular shaped parcels which would be impacted very differently if a frontage method was used. It was decided to continue to pursue the cost sharing by the development area method.

A letter from DHC was received following the April meeting. In that letter, they expressed concern that the termination of roads with temporary or permanent cul-de-sacs was problematic and encouraged the Municipality to attempt to provide through roads where possible.

The Municipality also received a draft letter from 21 Russ dated August 25, 2008. Within that letter 21 Russ proposed that the cost sharing be amended from the Municipality's assumptions in the following manners:

- Hydro relocation costs on their lands on farm lot 1 be shared with the Municipality. --- The Municipal position is that this is a responsibility of 21 Russ.
- That the Municipality participate in servicing costs for the tourist booth. --- The Municipality acknowledges responsibility for participating in the site service costs for this facility.
- That the Municipality pay oversizing costs for the sanitary sewer through lot 1. --- It is the Municipality's position that this is the responsibility of 21 Russ.
- That roads, utilities, and the sanitary trunk extension through lot 2 should be paid for by the balance of the lands. --- If the Municipality is to consider this option, then the acreage for this section of the 21 Russ parcel should be included in the cost sharing as well.

In a subsequent meeting with 21 Russ they asked that the Municipality look at sharing the cost based upon:

- The maximum square metres of entitlement of development for each parcel of lands based upon zoning, and/or
- The corresponding potential traffic volume predicted for development for each site based upon the ITE Trip Generation Manual (Institute of Transportation Engineers).

BMROSS completed a number of calculations of potential cost sharing scenarios based upon the points above. The extent of the development assumed on individual parcels was based upon the proposed development scheme provided by the County of Bruce Planning Department. It is noted that the maximum amount of development is far less than the zoning bylaw allowable maximums because of needs for parking and other site facilities. From our calculations, we are of the opinion that assuming a potential development scenario for each individual parcel is subject to great discretion. We met with staff of the Municipality and the Planning Department and reviewed the outcome of some of these calculations. It was agreed by all that these methods were not an appropriate way to share the costs on the full development because of the great discretion in the development schemes that might be considered on individual sites.

Based upon the discussions at our meeting with staff and the planning department on August 5th, we were instructed to provide an updated cost sharing schedule in a similar format to that presented in April. Attached, as Table 2A is that schedule. This document is based upon the slightly revised interim servicing scheme and presents possible cost estimates for the works. Included in these estimates are allowances for construction, engineering and some contingencies. No detailed design has been completed. Excluded from these costs are improvements to the Park St. Pumping Station, any communal SWM works, and the construction of a water booster pumping station. Trunk sewer costs are proposed to be shared amongst all of the development properties and the initial road costs are proposed to be shared amongst the developers that will receive the initial benefits. The costs for the completion of the balance of the servicing in the future would be expected to be shared amongst the remaining lands.

It is important that the Municipality establish the level of commitment of each of the developers and their expected timing for their development so that a detailed servicing schedule can be established.

Should you have any questions on the above, please contact me.

Yours very truly,

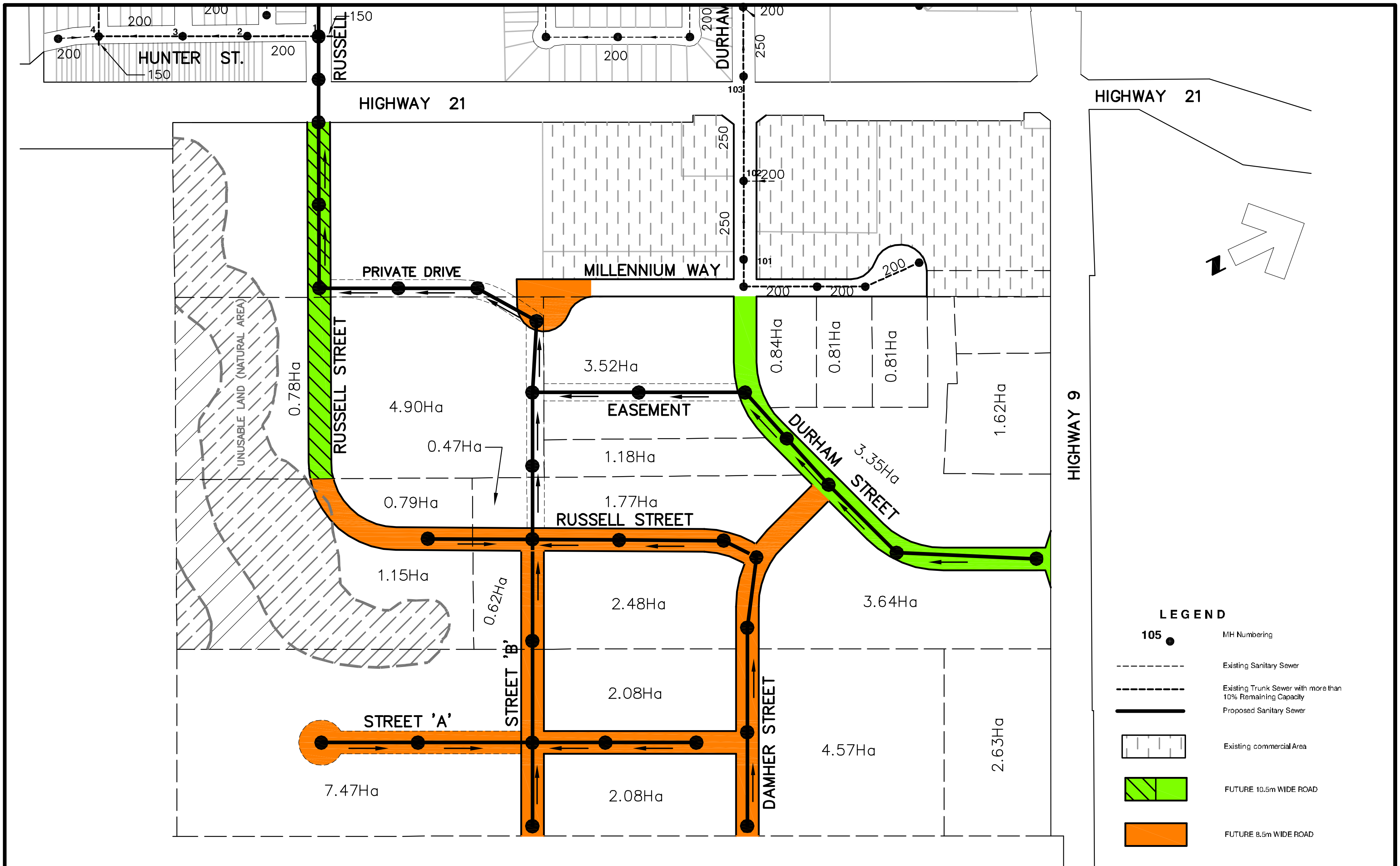
B. M. ROSS AND ASSOCIATES LIMITED

Per ______________________

B. W. Potter, P. Eng.

BWP:es

c.c. Jim O'Rourke
Michelle Barr
Bill Hollo, County of Bruce, Planning Department



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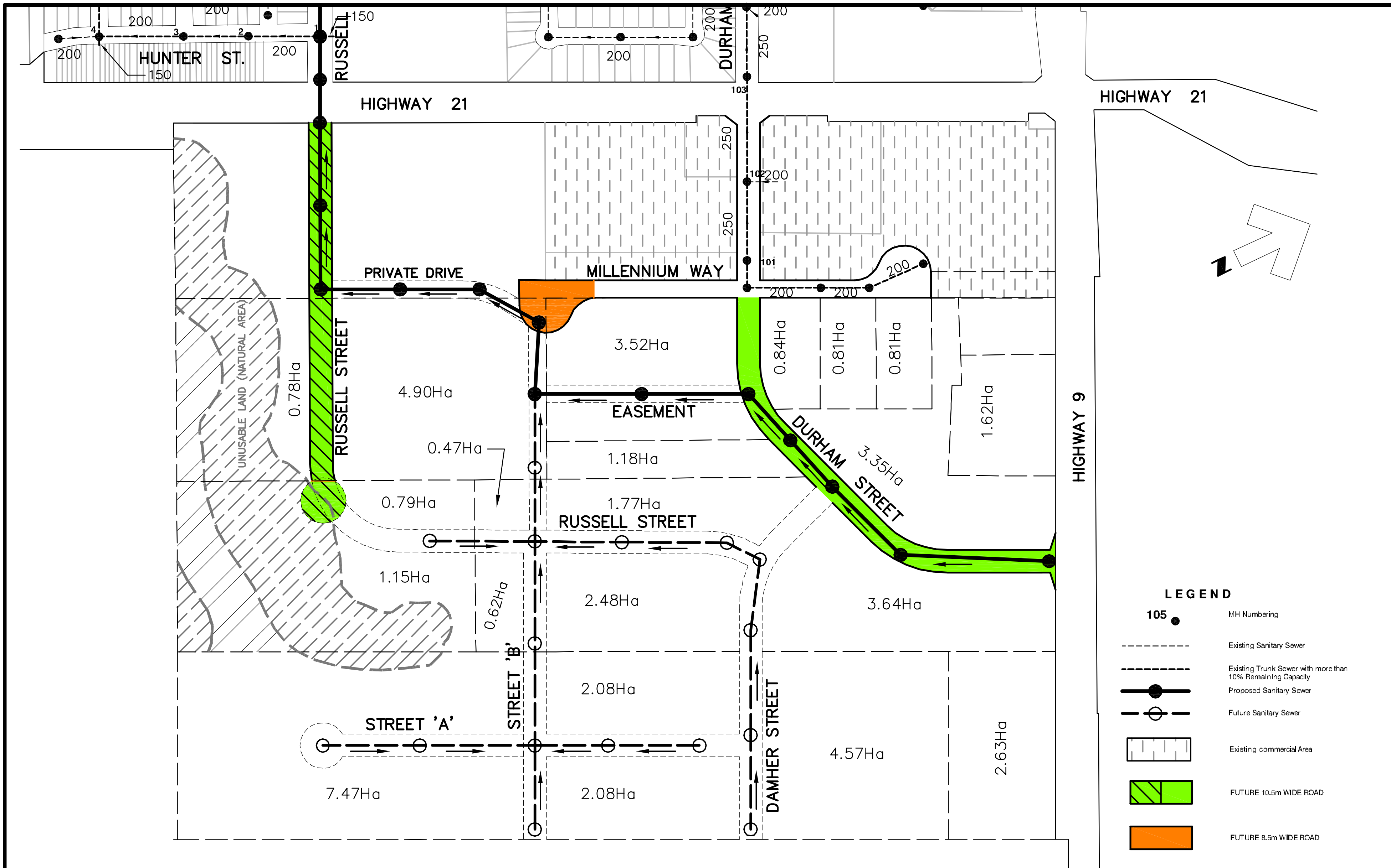
Municipality of Kincardine

Business Park Development Area

Full Development
Roads and Sanitary Sewer

DATE	PROJECT No.
Nov. 7, 2008	08055
SCALE	FIGURE
N.T.S.	1A



BMROSS engineering better communities	**Municipality of Kincardine** **Business Park Development Area** Interim Development Roads and Sanitary Sewer	DATE Nov. 7, 2008 SCALE N.T.S.	PROJECT No. 08055 FIGURE 2A

Table 2A

08/11/2008

Suggested Cost Sharing

Interim development:

Parcel/Owner	Approx. Developable for Trunk Sewer Area (ha.)	Cost Sharing Trunk Sewer per ha.	Approx. Developable for Roads Area (ha.)	Percent of Total	Cost Sharing Roads	Total
DHC:						
Former Quinn lands	1.62	12,811	1.62	10.31%	149,495	162,306
Part 1 (Bawa)	0.81	6,405	0.81	5.15%	74,675	81,080
Part 2	0.81	6,405	0.81	5.15%	74,675	81,080
Part 3	0.84	6,643	0.84	5.34%	77,430	84,073
Part 8	3.64	28,785	3.64	23.16%	335,820	364,605
Part 9	3.35	26,492	3.35	21.31%	308,995	335,487
Sub-Total	11.07	87,541	11.07	0.7042	1,021,090	1,108,631
Dalron:						
Part 4, 6	4.65	36,772	4.65	29.58%	428,910	465,682
21 Russ:						
Part 5 (21Russ)	1.94	15,342			-	15,342
Stewart:						
Part 7	5.34	42,229			-	42,229
Farrell:						
Lot 4	16.2	128,110			-	128,110
Total	39.2	309,994.00	15.72	1	1,450,000	1,759,994

Trunk Sewer Costs to be shared:	$ 310,000.00	$ 7,908.00	per ha.
Road and sewer servicing costs to be shared:	$ 1,450,000.00		
Total	$ 1,760,000.00		

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File No. 08055
April 28, 2008

MUNICIPALITY OF KINCARDINE
BUSINESS PARK
DEVELOPMENT COST SHARING

1.0 PURPOSE

The Municipality of Kincardine wishes to determine how the costs of the road extensions and trunk sanitary sewers would be shared for the development of the balance of the Business Park. The Municipality has asked B. M. Ross and Associates to prepare this draft document to commence discussions with developers on that cost sharing.

2.0 BACKGROUND/HISTORY

Four farm lots were designated as Business Park in the Municipality's official plan.

The first lot was purchased by Kincardine. Kincardine became the developer of this parcel and for the northerly two thirds of the lot completed all services and sold parcels as serviced land.

The construction of Durham Street, Highway 9 and 21 improvements and the associated services were completed by Kincardine. This includes the Millennium Way extension to the north which has serviced the lands north of the Canadian Tire property.

The proposed sale to 21 Russ on the southerly portion of Lot 1 is contingent on that developer doing all of the servicing which includes:

- Road improvements on Highway 21.
- Construction of Russell Street extension and improvements.
- Water and sewer extensions from Hunter through their site.
- Storm water management for their site and a review of how the balance might be incorporated.
- Provisions for easements, access for traffic, site services and utilities through the site.
- Provision is to be left for the tourist information booth.

The final layout of the 21 Russ site is subject to discussions with the MTO and the outcome of their traffic study.

3.0 CURRENT DEVELOPMENT PROPOSALS

The following current development proposals are being considered or discussed:

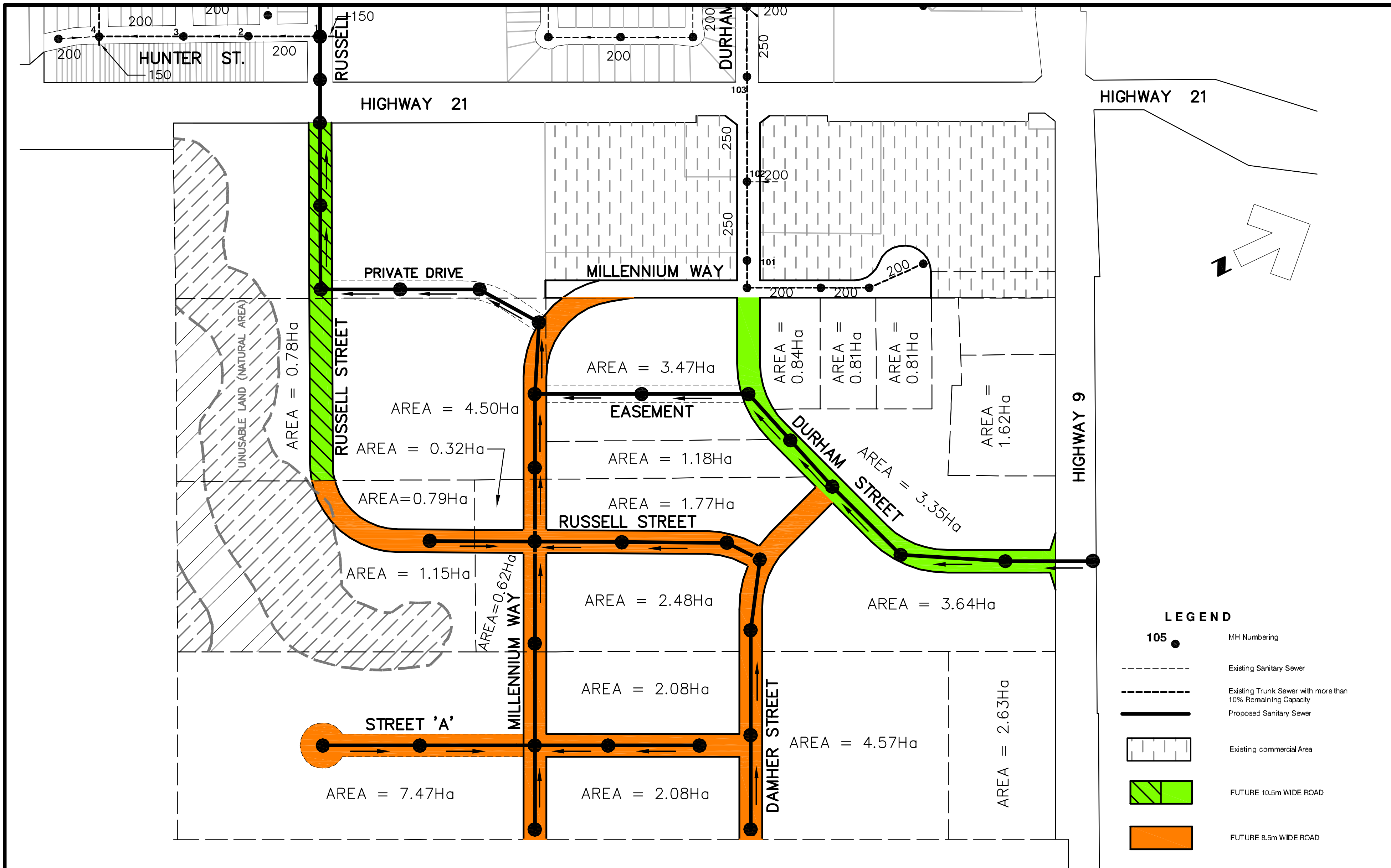
- A site plan agreement has been completed with DHC for the lands on Lot 1at the north end of Millennium Way.
- The Canadian Tire lands on Lot 1 immediately north of the existing store are vacant.
- The developer of the carwash site on Lot 1, behind Canadian Tire would appear to be staring to proceed with his development.
- The Municipality has had preliminary discussions with respect to the proposed Bawa development.
- There have been discussions on the proposed Dalron site concerning the installation of commercial facilities.
- It is understood that a developer has purchased all of the lands north of the Durham Street extension and north of Damher Street.
- There has been a desire from some of the developers to have their sanitary sewer discharge to the existing Durham Street sewer.

4.0 SERVICING AND ROADS PATTERN

The County of Bruce Planning Department has completed a recommended pattern for development and installation of new roads through the development area. This road pattern, as slightly modified by BMROSS is shown on the attached sketch. It is anticipated these roads will be constructed as development progresses. It is also anticipated by the Municipality that the remaining development land should be assessed a share of the cost of the construction of the Russell Street trunk sewer together with a share of the cost of the various development roads.

Figure 1 shows that road pattern.

A review of anticipated ownership of the properties has been completed based upon a sketch completed by Ron Dore O.L.S. This is summarized below in Table 1.



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Municipality of Kincardine

Business Park Development Area

Full Development Roads and Sanitary Sewer

DATE	PROJECT No.
April 28, 2008	08055
SCALE	FIGURE
N.T.S.	1

Table 1

Parcel/Owner	Approx. Developable Area (ha.)	Percent of Total
Former Quinn lands	1.62	4.15%
Part 1 (Bawa)	0.81	2.07%
Part 2	0.81	2.07%
Part 3	0.84	2.15%
Part 8	3.64	9.32%
Part 9	3.35	8.58%
Part 4, 6 (Dalron)	4.65	11.91%
Part 5 (21Russ)	1.94	4.97%
Part 7	5.19	13.29%
Lot 4	16.2	41.49%
Total	39.05	100%

The 21 Russ lands on lot 2 are assumed to have similar responsibilities with respect to servicing as those lands on lot 1 and the cost of services across their property and the cost of the Russell Street extension to the rear of lot 2 has been excluded. That area is excluded from the chart above.

5.0 PRELIMINARY ESTIMATED COSTS

Preliminary estimated costs of the road construction have been presented based upon recent tenders of similar works. All costs include allowances for local sanitary collection, water distribution, storm water collection, road construction complete with curb and gutter, sidewalk, engineering, contingencies and GST. No allowance for communal Storm Water Management or the construction of a water booster pumping station is included.

For the purposes of this initial proposal, two types of road have been considered and the estimated cost per metre of construction is as follows:

- Durham Street extension and Russell Street extension to rear of lot 2 (green on attached sketch) -- $2,250
- Remaining service roads. -- $2,000

The trunk Sanitary Sewer from Hunter through the 21Russ lands is the responsibility of that developer. The sewer from Scott to Hunter has a preliminary estimated cost of $290,000. It is proposed that this cost should be shared by all of the development lands.

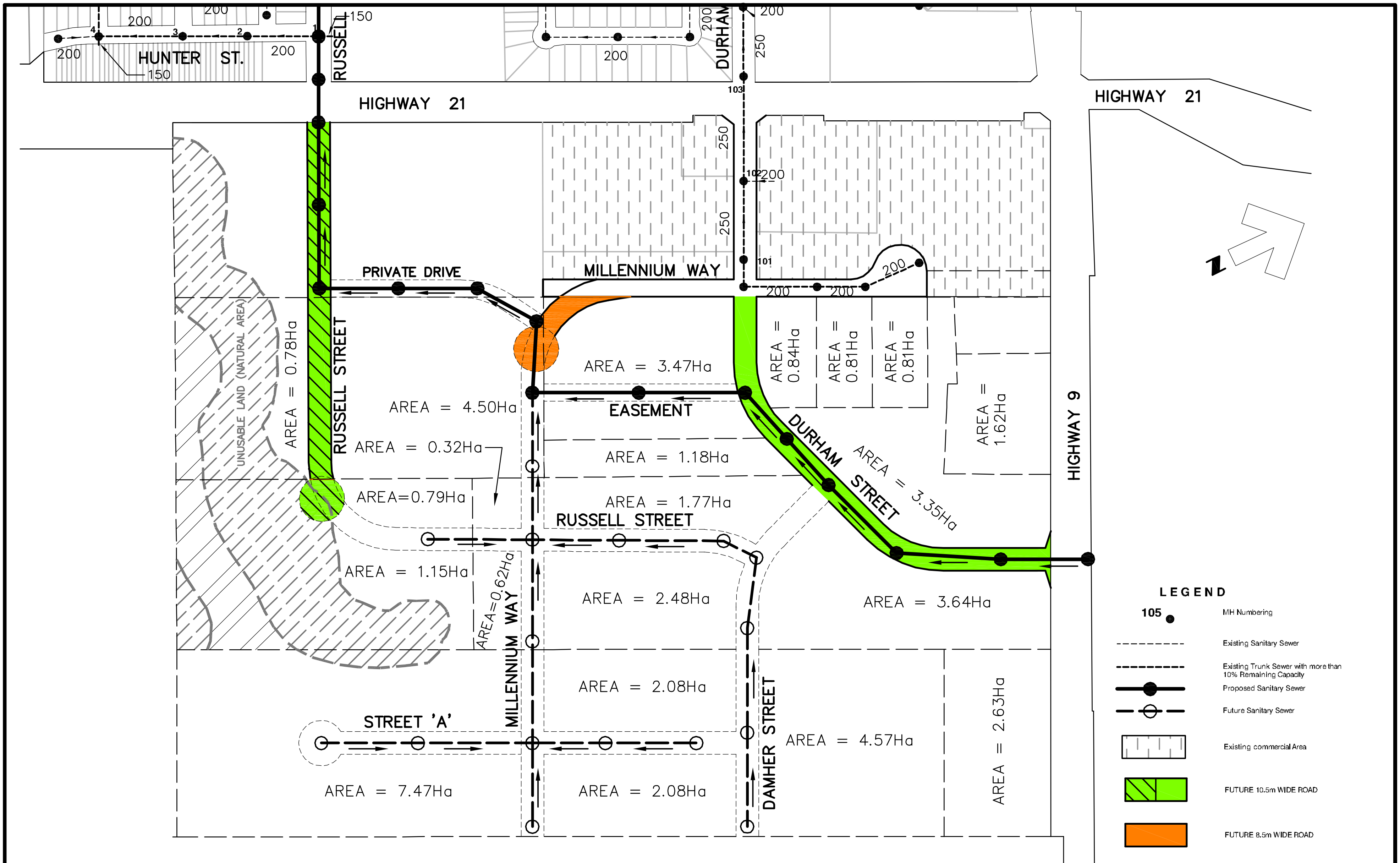
It is anticipated by the municipality that the completion of the development of the business park will take a number of years. It is assumed that initially development may be limited to the lands on the Durham St. extension and the 21 Russ lands.

The extent of this assumed interim development is shown on Figure 2. Based upon the preliminary submission for the Dalron development, a sewer easement through their property is proposed.

For that extent of development to proceed, the Durham Street extension and portions of the trunk sewer need to be constructed as shown on Figure 2. Preliminary cost sharing proposals for that extent of development are attached as Table 2.

6.0 SUMMARY

This document provides the basis for discussion for the sharing of costs for the development of the balance of the business park. The municipality and developers must reach some consensus as to how the services on the balance of the Business Park will be funded.



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Municipality of Kincardine

Business Park Development Area

Interim Development Roads and Sanitary Sewer

DATE	PROJECT No.
April 25, 2008	08055
SCALE	FIGURE
N.T.S.	2

Table 2

Parcel/Owner	Approx. Developable for Trunk Sewer Area (ha.)	Cost Sharing Trunk Sewer per ha.	Approx. Developable for Roads Area (ha.)	Percent of Total	Cost Sharing Roads	Total	
Former Quinn lands	1.62	12,000	1.62	10.31%	150,600	162,602	
Part 1 (Bawa)	0.81	6,000	0.81	5.15%	75,200	81,201	
Part 2	0.81	6,000	0.81	5.15%	75,200	81,201	
Part 3	0.84	6,200	0.84	5.34%	78,000	84,201	
Part 8	3.64	27,000	3.64	23.16%	338,400	365,404	
Part 9	3.35	24,900	3.35	21.31%	311,300	336,204	1,110,812
Part 4, 6 (Dalron)	4.65	34,500	4.65	29.58%	432,200	466,705	
Part 5 (21Russ)	1.94	14,400			-	14,400	
Part 7	5.19	38,500			-	38,500	
Lot 4	16.2	120,300			-	120,300	
Total	39.05	289,800	15.72	100%	1,460,900	1,750,717	

Trunk Sewer Costs to be shared:	$ 290,000.00	$ 7,426.38	/ha.

Road and sewer servicing costs to be shared:

Sewer Extension	$ 95,000.00
Road Costs	$ 1,366,000.00
Total	$ 1,461,000.00

Length of 10.5 m. wide road	536	2,250	1,206,000
Length of 8.5 m wide road	80	2,000	160,000
Total	616		1,366,000