North Fergus Property
950 – 960 St. David Street North

Functional Servicing and Stormwater Management Report

Proposed Zoning By-Law Amendment Submission

May 2022

Prepared for:
Reid's Heritage Homes
R.R.#2
6783 Wellington Road #34
Cambridge, ON N3C 2V4

Prepared by:
Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo ON N2L 0A4
Tel: (519) 579-4410
Fax: (519) 579-6733

Project Number: 1614-14172

Sign-off Sheet

This document entitled North Fergus Property, 950 – 960 St. David Street North, Fergus, Functional Servicing and Stormwater Management Report was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Reid's Heritage Homes (the "Client") to support the permitting process for Client's application for a Zoning By-Law Amendment Submission (the "Application") for the North Fergus Property (the "Project"). In connection thereto, this document may be reviewed and used by the provincial and municipal government agencies participating in the permitting process in the normal course of their duties. Except as set forth in the previous sentence, any reliance on this document by any third party for any other purpose is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by: _____
(signature)

Jackie Bellemare, EIT
Project Coordinator

Stormwater Management Prepared by: _____
(signature)

Maximilian Ornat
Water Resources Specialist

Reviewed by: _____
(signature)

Trevor Fraser, P.Eng
Project Manager, Community Development

Stormwater Management Reviewed by: _____
(signature)

Kate Macnaughton, P.Eng
Water Resources Engineer

Table of Contents

LIST OF FIGURES AND DRAWINGS

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

Stantec Consulting Ltd. was retained by Reid's Heritage Homes (Reid's) to complete a Functional Servicing Report (FSR) in support of a Zoning By-law Amendment (ZBA) application related to the lands municipally known as 950 and 960 St. David Street North, Fergus, Township of Centre Wellington (the "subject lands"). The 1.97 ha area is currently occupied by a commercial development complete with asphalt surface and parking lot on the south portion (950 St. David Street North) and vacant grassed area and agricultural area on the north portion (960 St. David Street North). The lands are bound by St. David Street North (Highway 6) to the south, agricultural land to the west, open space protected environmental area to the north, and an existing mid-rise residential development to the east. Refer to Figure 1 for the Site Location Plan.

The proposed ZBA application is required to permit the development of the subject lands. The lands are proposed to be developed into a 1.30 ha residential townhouse development (the "site") complete with 112 stacked townhouses and a common amenity area to the north and a 0.67 ha commercial development (the "commercial property") fronting St. David Street North. Access to the site will be provided by a private access road along the east side of the property, also providing vehicular access to the proposed commercial property. The proposed development is illustrated on the Concept Plan prepared by Stantec Consulting Ltd., dated April 27, 2022, located in Appendix A.

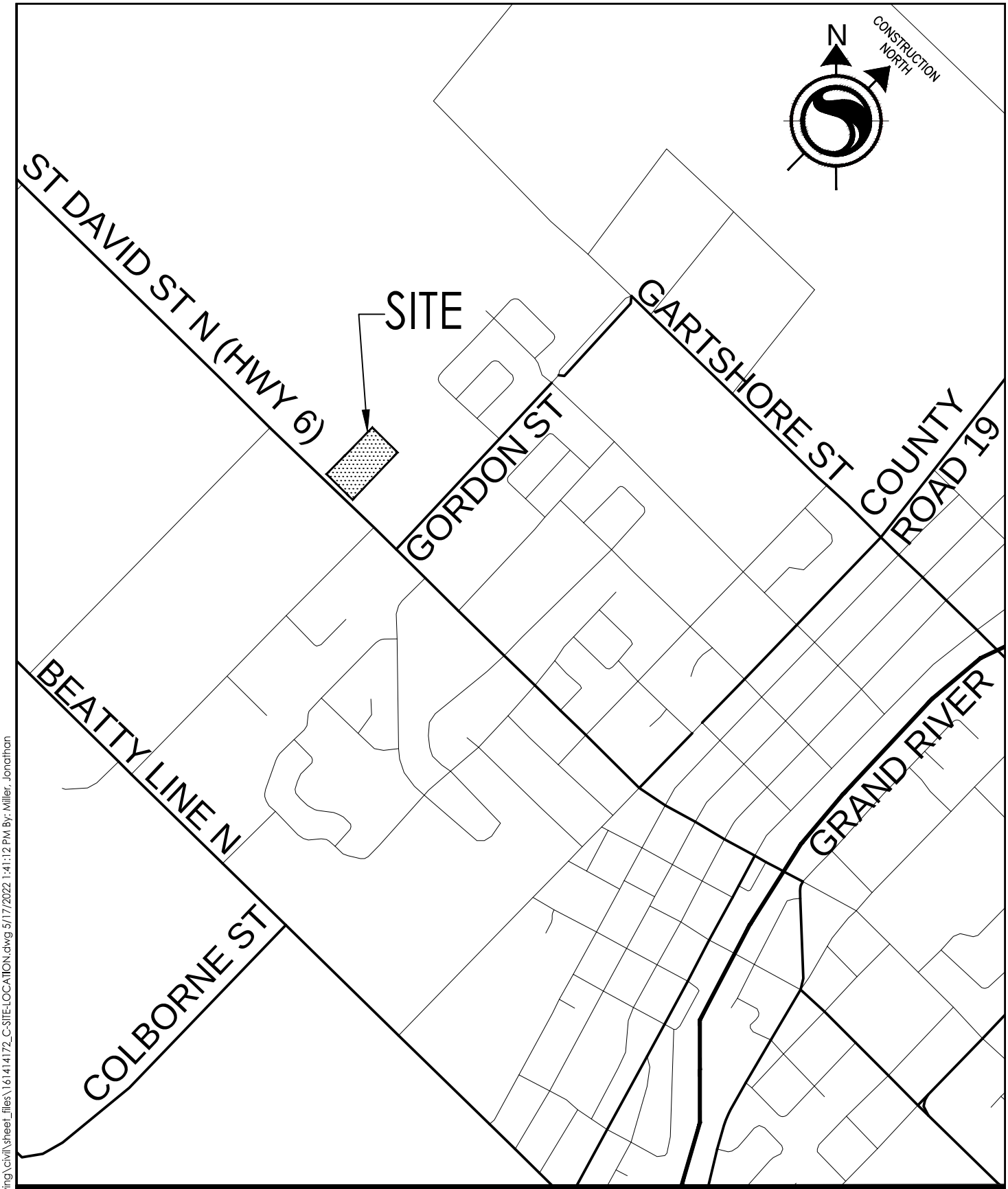
The purpose of this FSR is to outline how the subject lands can be developed with adequate municipal services including sanitary, domestic water, stormwater management (SWM) and utilities in support of the ZBA application.

1.1 BACKGROUND REPORTS AND DOCUMENTATION

Supplementary reports that should be read in conjunction with this report include:

- Preliminary Geotechnical Investigation – 950 – 960 St. David Street North, Fergus, Ontario dated December 17, 2021 – prepared by Stantec Consulting Ltd.

The servicing strategies presented in the report are preliminary. Detailed engineering drawings and a final SWM Report will be submitted as part of the engineering detailed design process, once the subject lands have received ZBA approval.



Stantec

Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo ON N2L 0A4
Tel: (519) 579-4410
www.stantec.com

Client/Project
REID'S HERITAGE HOMES

NORTH FERGUS PROPERTY
950-960 ST. DAVID ST N

Fergus, ON

Project No.
161414172

Title
SITE LOCATION PLAN

Revision

Date
MAY 2022

Reference Sheet

Figure No.
1

V:\01614\active\161414172\design\drawing\civil\sheet_files\161414172_C-SITE-LOCATION.dwg 5/17/2022 1:41:12 PM By: Miller, Jonathan

2.0 OVERALL GRADING AND DRAINAGE

2.1 EXISTING SITE TOPOGRAPHY AND LAND USE

The subject lands are currently occupied by an existing commercial property complete with an asphalt parking lot fronting St. David Street N and an agricultural area on the north half of the property. A swale is located in the middle of the subject lands directing drainage to the east. The subject lands are currently zoned Highway Commercial (C2) area. Open space zoned Environmentally Protected is located directly north and east of the property containing an existing wetland.

The subject lands are generally flat with bounding elevations of approximately 422.0 m above mean sea level (ASL) at St. David Street North and along the west property line, and 421.0 m ASL at along the east property line. The lands slope gently from St. David Street towards the northeast corner of the property. The majority of runoff is therefore directed to the east/rear of site and discharging to the existing wetland/ agricultural drain, on Township owned lands.

The Existing Conditions Plan (C-050) is provided in Appendix A.

2.2 AREA GRADING AND ROAD PROFILE DESIGN CONSTRAINTS

Based on the proposed Concept Plan, the following design constraints and criteria were used in the preliminary grading design:

- Match existing road elevations (i.e., St. David Street North)
- Match existing boundary grades around the perimeter of property
- Match existing grades, where possible, to minimize grading and cut/fill quantities and minimize changes to the surface hydrology and hydrogeology of the area
- Satisfy the Township of Centre Wellington's requirements for minimum and maximum road grades
- Ensure a 1.0 m separation above high groundwater to the underside elevation of proposed infiltration facilities
- Ensure 0.5 m separation from high groundwater to proposed finished floor elevations
- Maintain adequate cover over storm and sanitary sewers, and watermains
- Meet AODA standards for site accessibility
- Provide a major overland flow route for emergency overflow runoff (i.e., greater than the 100-year rainfall event)

2.3 PROPOSED GRADING

The proposed preliminary grading has been completed in accordance with the design constraints outlined in Section 2.2 in order to match existing grades along adjacent roadways and property lines. Where matching to adjacent properties could not be achieved via 3:1 transition slopes, retaining walls have been proposed. Retaining walls are currently proposed along the majority of the property limits and will be eliminated or reduced in height where possible at detailed engineering design. The site is generally proposed to be built-up in elevation from the property boundaries sloping upwards to the stacked townhouse units. A proposed central low-lying area will collect overland runoff for minor storm events.

In general, the residential site is proposed to be raised an average of 1-3 m to provide sufficient clearance from the highest recorded high groundwater level in the development area to allow for infiltration facilities to be feasible. The proposed commercial development will be raised 1-2 m to allow for blending to both St. David Street North and the proposed residential site. An ongoing hydrogeological investigation is being completed to confirm high groundwater levels and any engineering design revisions will be completed by Stantec through the site plan approval process.

The proposed grading generally ranges from 2.0% to 5.0% slopes. The proposed internal road profiles are relatively smooth with grades ranging from a minimum of 0.5% to a maximum of 5.0%. This proposed grading allows for the majority of runoff to be collected and directed via storm sewers and overland flow to the on-site infiltration galleries. The major overland flow route is located within the roadway and spills over the retaining wall at the northeast corner of site to the existing wetland/ agricultural drain on Township owned land.

A proposed trail through the site is intended to connect the site to the existing park to the north of the site. Due to the limitations of the site grades, an 8% slope or steps will be required along the trail at the rear of the site between the two blocks of townhomes as shown on GP-1. If possible, this slope will be reduced at detailed design in an effort to remain less than 5% to meet AODA requirements.

The Grading Plan is illustrated on drawing GP-1 located in Appendix A.

3.0 SANITARY SERVICING

Sanitary servicing for the site will be provided via the existing 300 mm diameter municipal sanitary sewer located on St. David Street North. The sanitary service connection will be complete with a manhole and drop structure at the intersection of St David Street North and the site access, from which a 200 mm diameter sanitary sewer service will extend along the site access road and service the 112 proposed townhouse units. The proposed sewer will be located within the private site access road at an approximate depth of 3.0 – 4.0 m ensuring sanitary service connections maintain a 2% slope to the buildings per OBC/Township requirements.

The redevelopment of the commercial property is set to commence after the residential development at an undetermined future date. As such, during servicing of the residential parcel, the existing sanitary sewer lateral servicing the commercial property directly from St. David Street N will remain. It is anticipated that a new sanitary service will be required and constructed at the time of the commercial redevelopment and will be confirmed during the future Site Plan Application process for the commercial property. Provision may be made for the future commercial development to be serviced from the proposed sanitary sewer branch extending to the townhouse development within the private site access road. A second option is to upgrade the capacity of the existing services and maintain their current locations. A preferred option will be presented at detailed engineering design of the residential property with input from Township staff.

Preliminary sanitary peak flow demands were estimated for the development. The peak demands were calculated in accordance with the Township of Centre Wellington Development Manual with a residential flow of 0.004 l/s/c and commercial flow of 0.6 l/s/ha. Infiltration was accounted for at 0.15 L/s/ha. The residential population was calculated with an assumed density of 2.5 people per townhouse unit. The peak sanitary flow discharge was calculated to be approximately 5.4 L/s for the entire subject lands.

The preliminary sanitary servicing plan is illustrated on drawing C-100 in Appendix A, and the preliminary design calculations are provided in Appendix B.

4.0 WATER SERVICING

4.1 WATER SERVICING STRATEGY

Water servicing for the site will be provided via connection to the existing 300 mm diameter municipal watermain on St. David Street North. An appropriately sized watermain will be extended to the site to service the proposed townhouse development. 25mm diameter service laterals will service the individual townhouse units.

The closest fire hydrant to the site is located on St. David Street North approximately 65 m south of the site. The proposed townhouse development does not fall completely within the service radius of existing hydrants and as such, fire protection for the site will be provided from proposed fire hydrants to service the townhouse development. Specific hydrant locations within the site will be provided at Site Plan Approval.

Water demand requirements are presented in Section 4.2, and the proposed water servicing strategy is illustrated on Drawing C-100 in Appendix A.

4.2 DOMESTIC USE

Based on the domestic water demand calculations completed for the proposed townhouse development included in Appendix B, full occupancy is expected to have an average day demand of 63,000 L/day (0.73 L/s), a maximum day demand of 126,000 L/day (1.46 L/s), and a peak hour demand of approximately 189,000 L/day (2.19 L/s). The projected domestic water demand is calculated based on the following criteria for the proposed development:

- Townhouse Development: Projected population of 280 persons for 112 townhouse units at a population density of 2.5 persons/household
- An average day water demand rate of 225 L/cap/day
- A maximum day demand factor of 2.0, and a peak hour factor of 3.0.

It is understood that the Township will review and confirm the above-noted criteria or advise of any necessary revisions. It should be noted that the water demand projections are considered preliminary at this stage and will be refined through detailed engineering design and upon confirmation of the design criteria by the Township.

4.3 FIRE FLOW REQUIREMENTS

Per the Township of Centre Wellington design criteria, the fire flow requirements for any development shall be determined in accordance with the Fire Underwriters Survey (FUS) methodology. Accordingly, the fire flow demand for the proposed development is determined using the *Water Supply for Public Fire Protection, A Guide to Recommended Practice (1999), Fire Underwriter's Survey (FUS)*. Based on the FUS manual, the required fire flows are as follows:

- Modern semi and detached home > 3 m separation – 4,000 L/min (67 L/s)
- Modern semi and detached home < 3 m separation – 6,000 L/min (100 L/s)
- High-density, contiguous multi-block homes – 8,000 L/min (133 L/s)

The proposed townhouse development area is projected to have a fire flow requirement of 133 L/s per the above-noted criteria. It is understood that the township will review and confirm the above-noted criteria or advise of any necessary revisions.

We trust the above-noted preliminary domestic demands and fire flow requirements will allow the Township of Centre Wellington to confirm adequate flow and pressure exist in the existing water distribution system.

5.0 STORM DRAINAGE

The proposed grading strategy for the subject lands generally conveys all stormwater runoff to on-site infiltration facilities via storm sewers and overland flow grading strategies. Details of the SWM strategy are discussed in Section 8 of this report. Rooftop runoff from both the proposed residential units and proposed commercial building is to be directed to clean water collector pipes and ultimately to on-site infiltration facilities per Township recommendation. The system has been sized for the 25 mm rainfall event. “Dirty” stormwater runoff will be collected from the roadways and conveyed to on-site oil-grit separator (OGS) units for quality control. For the residential site, treated drainage will then discharge to the proposed SWM storage facility for on-site attenuation before discharging via storm sewers to the outlet at the northeast corner of site. From there, stormwater flows will enter the existing wetland to the north of site, similar to existing conditions. For the commercial site, following stormwater quality treatment, runoff will discharge to the east, similar to existing conditions. A culvert is proposed to span underneath the private access at the entrance to site in order to maintain existing ditch flows along St. David Street North.

The storm sewers/clean water collection system will be constructed on-site such to pick-up and convey all runoff to the at-source infiltration locations on-site where possible. Sewers and a clean water collection system will be installed generally underneath the private roadway and will be sized appropriately throughout detailed design.

Allowance will be made for sump pumps to discharge to grade or provision may be made to pump directly to infiltration facilities if possible.

Appropriately sized storm sewers are proposed on the commercial property to convey the majority of the runoff to the existing swale east of site and ultimately discharging to the stream to the north.

The preliminary storm servicing plan is illustrated in the Conceptual Servicing Plan located in Appendix A.

6.0 HYDROGEOLOGY

A hydrogeological assessment was conducted by Stantec to assess the baseline geological and groundwater conditions on-site and evaluate how the proposed development may impact the existing hydrogeological regime of the development area. Where necessary, potential mitigation strategies are recommended to ensure post-development groundwater functions mimic pre-development conditions.

It was found that shallow overburden soil across the site generally consists of native silty sand to sandy silt interpreted as Grand River Outwash (AFA2) deposits overlying glacial tills consisting of silty sand to sandy silt till interpreted as Port Stanley Till (ATB1), and clayey silt to silty clay till interpreted as Maryhill Till and Glaciolacustrine Sediments (ATB3). Bedrock was not encountered during the investigation. Regional mapping indicates top of bedrock surface occurs about 40 m to 50 m below ground surface (BGS) in the area.

Groundwater monitoring was conducted from November 2021 to March 2022 and it was found that the depth to groundwater in the monitoring wells across the site ranged from approximately 0.05 m above ground surface to 1.74 m BGS corresponding to elevations ranging from approximately 419.27 m AMSL to 421.62 m AMSL. It was noted that the water table is likely to be higher beneath the site during the traditionally wetter periods of the year (e.g., April to May) than what was recorded during the investigation. Continuous groundwater level monitoring within the existing on-site monitoring wells has commenced and is scheduled to continue to confirm the seasonal high groundwater condition in support of the future redevelopment plan for the site.

Shallow groundwater flow at the site is interpreted to be easterly toward the adjacent unnamed stream, and the site is located within a groundwater recharge area. As such, it is recommended that the suitability of using Low Impact Development (LID) stormwater management strategies for the site be evaluated to assist in achieving the maximum groundwater recharge possible under the post-development conditions. Preliminary estimates of infiltration rates for the overburden soils encountered at depths between 1.2 m and 9.1 m BGS ranged from 29 mm/hour to 52 mm/hour for sand / silt / sandy silt till deposits (AFA2 / ATB1), and from 8 mm/hour to 10 mm/hour for silty clay till deposits (ATB3).

Private supply wells are present on nearby properties. The nearby overburden private supply wells are predominantly shallow installations, constructed to depths less than 10 m BGS. Based on overburden conditions observed beneath the site and surrounding area, there is potential for well interference with shallow overburden supply wells nearby the site. The need for and extent of private well monitoring near areas where on-site excavation is required should be confirmed as part of the supporting documentation for any PTTW application/EASR registration. High dewatering volumes are anticipated for excavations extending below the water table on-site, however excavations on-site are not expected to extend below the water table.

The site is located within WHPA-C with a vulnerability score of 6. The Source Protection Plan (SPP) for the Township of Centre Wellington includes policies related chemicals and DNAPL storage/handling activities which apply to WHPA-C with vulnerability scores of 6. However, Stantec understands these actives are not expected as part of the future redevelopment plan for the site. The site is also located within WHPA-Q assigned a risk level of significant. As such, Stantec anticipates that the Township of Centre Wellington may require the completion of a water balance as part of Site Plan approvals and expect that pre-development infiltration volumes at the site be maintained under the post-development conditions.

Portions of the Site intercept a SGRA and IPZ-3, with assigned low and/or moderate vulnerability scores. No protection policies are specified in the SPP for SGRA and IPZ-3 and, subsequently, such policies will not be applicable to the future development of the Site.

7.0 STORMWATER MANAGEMENT

7.1 OVERVIEW

The subject lands are 1.97 ha and are located within the Township of Centre Wellington (Township), as illustrated on Figure 1. Note that the attached figures show an arrow indicating true north, but for the purposes of this memo, all directional discussion is in reference to “construction” north, which is considered to be the back of the residential property (i.e., furthest property line from Highway 6 (Hwy 6)), and Hwy 6 at “construction” south. The lands are bounded by St. David Street North (Hwy 6) to the south, agricultural and farmland to the north and west, and multi-residential buildings to the east. The lands are under the jurisdiction of the Grand River Conservation Authority (GRCA) and is located within the West Montrose - Grand River Watershed.

7.1.1 Adjacent Commercial Property Consideration

The commercial property, immediately to the south of the site (commercial property) will be redeveloped in the near future, likely following development of the townhouse development. This ZBA application is for the entire property, both residential and commercial, and as such, existing and future drainage for the commercial property has been considered and a conceptual assessment of SWM measures has been identified and sized based upon a preliminary site plan that has been provided for that property.

7.1.2 Design Approach

The preliminary SWM plan ensures that the proposed development includes the necessary controls to protect the hydrology of the receiving water systems and meets the design criteria established through consultation with Township staff.

The approach employed in completing the SWM design for this development is summarized in the following tasks:

- Preliminary assessment of available information, previous reports, comments provided by the Township, and existing field conditions to identify grading and drainage constraints.
- Completion of hydrologic models for the existing and proposed conditions to determine runoff volumes and peak flow rates to downstream areas.
- Preliminary design of the SWM infrastructure that will control runoff from the site and the commercial property in a manner that will mitigate potential impacts resulting from the proposed development.
- Assessment of erosion potential and provision of a preliminary Erosion and Sediment Control (ESC) Plan.

7.1.3 Background Information

The following studies, drawings, and correspondence have been reviewed in conjunction with this study:

- Hydrogeological summary – email to/from Trevor Fraser/Nicole Semper, Stantec, April 29, 2022.
- Preliminary Geotechnical Investigation – 950-960 St. David Street North, Fergus, Ontario. Memo to Mr. Kevin Fergin (Reid's Heritage Homes), Stantec, December 17, 2021
- Erosion and Sediment Control Guidelines for Urban Construction Toronto and Region Conservation Authority, 2019.
- Draft Development Manual, Township of Centre Wellington, March 2018
- Gordon Grove Estates Stormwater Management Facility and Typical Details (Sheets 12 and 13 of 14), As Constructed drawings, Philips Planning and Engineering Ltd., May 2001.

7.2 STORMWATER MANAGEMENT CRITERIA

Based on discussions with Township staff and typical GRCA requirements, the following stormwater management criteria have been assumed for the site.

Water Quality – Provide an Enhanced level of water quality control (i.e., 80% removal of total suspended solids - TSS).

Water Quantity – Control post-development flow rates to pre-development flow rates for all storm events up to and including the 100-year event. Provide conveyance for storms greater than the 100-year event.

Infiltration – Infiltration of rooftop runoff is to be provided where possible.

7.3 EXISTING DRAINAGE CONDITIONS AND ENVIRONMENTAL FEATURES

The proposed residential site is currently used primarily for agricultural purposes. Site access to Hwy 6 is asphalt and hard-packed gravel and currently used by the existing business on the Commercial property. The Commercial property is primarily asphalt and hard-packed gravel with some meadow along the northern limit.

7.3.1 Topography and Existing Surface Drainage

Existing topography across both the site and the commercial property is generally flat with elevations ranging from approximately 420.3 mASL to 422.0 mASL, and slopes ranging from 0% to 2%.

Runoff from most of the site is directed northward by a combination of sheet flow and an existing swale immediately east of the site to an agricultural drain on Township owned lands located approximately 55 m north of the site. Small portions of the site drain via sheet flow westward to adjacent agricultural lands and southward to the Hwy 6 roadside ditch.

Runoff from the commercial property is conveyed via sheet flow and conveyed almost equally to agricultural lands to the west, the Hwy 6 roadside ditch, and across the site to the swale immediately east of the Site.

Existing drainage conditions are discussed in greater detail in Section 4, below.

7.3.2 Soils and Hydrogeology

The Preliminary Geotechnical Investigation identified site soils as fill and / or topsoil overlying native deposits of silt and sand, which in turn were underlain by glacial till. Preliminary estimates of infiltration rates for the overburden soils encountered at depths between 1.2 m and 9.1 m below ground surface, ranged from 29 mm/hour to 52 mm/hour for sand / silt / sandy silt till deposits, and from 8 mm/hour to 10 mm/hour for silty clay till deposits. For the purposes of this study, an infiltration rate of 15 mm/hour has been assumed for both the site and the commercial property.

Groundwater levels range from approximately 419.27 mASL to 421.62 mASL. The water table is likely to be higher beneath the site during the traditionally wetter periods of the year (e.g., April to May) than what has been recorded during the investigation and therefore continuous groundwater monitoring has been initiated to confirm the seasonal high groundwater condition in support of future development.

7.4 STORMWATER MANAGEMENT DESIGN

The following sections discuss existing and proposed drainage conditions and the proposed SWM measures that will be implemented to meet the quality, quantity and infiltration criteria for the Site and the Commercial property.

7.4.1 Hydrologic Modeling

The modelling software SWMHYMO was used to predict flows for the existing and proposed development conditions and to estimate the required storage volumes for the SWM system. To address the criteria, existing and proposed development conditions were modeled for the following rainfall events:

- The 25 mm, 4-hour Chicago distribution derived from City of Guelph IDF parameters
- The 5- and 100-year, 3-hour Chicago distributions derived from Shand Dam (Belwood) IDF parameters (per Township instruction)
- The 48-hour Regional event (Hurricane Hazel)

Table 1: Rainfall Events and Parameters

Return Period	A	B	C	Depth (mm)
	City Of Guelph IDF Parameters			
25 mm, 4-hour	509	6	0.799	25.0
	Shand Dam (Belwood) IDF Parameters			
5-year, 3-hour	547.5	0.938	0.7025	42.75
100-year, 3-hour	907.5	0.1250	0.7025	70.85
Hurricane Hazel				285

7.4.1.1 Hydrologic Modeling Assumptions

The following assumptions were made to complete the hydrologic analyses:

- Northward flowing runoff from the site ultimately reaches the existing agricultural drain on Township owned lands to the north.
- A legal outlet can be provided/constructed within the property immediately north of the site. This may include construction of a new swale that would convey runoff to the existing agricultural drain, north of the site. It has further been assumed that existing grades north of the site allow for positive drainage from the proposed swale to the agricultural drain.
- The agricultural drain to the north can be utilized as the ultimate discharge location for runoff from the site and that quantity control requirements will not be more stringent than those identified above.
- Highway 6 does not have a viable storm sewer outlet for site discharge.
- The existing swale along the eastern site limit is a free-flowing outlet, flows northward, and ultimately discharges to the existing agricultural drain to the north.
- The existing swale along the eastern site limit can be used as an outlet following development.
- The neighboring commercial property will be developed after site development and will primarily drain eastward, to the existing swale along the eastern site limit.
- SWM requirements and criteria for the commercial property are the same as those identified for the site.

7.4.1.2 Existing Conditions

Existing conditions drainage catchments are illustrated on Figure 2 and summarized as follows:

Catchment 100 (Residential site) – 1.19 ha of agricultural land draining northward via sheet flow.

Catchment 102 (Residential site) – 0.22 ha of agricultural land draining east via an existing agricultural swale and/or tile drain to the northward running swale, immediately east of the site. The swale east of the site ultimately discharges to the existing agricultural drain, north of the site.

Catchment 104 (Residential site) – 0.07 ha of existing asphalt and gravel area, draining east via sheet flow to the existing northward running swale, immediately east of the site.

Catchment 110 (Residential site)– 0.07 ha of agricultural land draining westward via sheet flow.

Catchment 120 (Residential site)– 0.06 ha of asphalt and gravel parking area, draining south toward the Hwy 6 roadside ditch.

Catchment 200 (Commercial site) – 0.26 ha of asphalt, gravel, meadow, and rooftop draining via sheet flow onto the site (Catchment 102) and then via swale and/or tile drain north to the existing swale, immediately east of the site.

Catchment 210 (Commercial site) – 0.19 ha of asphalt, gravel, and grassed area draining westward via sheet flow.

Catchment 220 (Commercial site)– 0.22 ha of asphalt and rooftop draining southward via sheet flow to the Hwy 6 roadside ditch.

CONSTRUCTION NORTH

N

AGRICULTURAL DRAIN
C/L OF DITCH
TOP OF SLOPE
TOP OF SLOPE
TOP OF SLOPE
420.0
420.0

BUSH

PIN 71129 - 0444(LT)
PIN 71129 - 0446(LT)
0032(LT)
0046(LT)
0043(LT)
0041(LT)
0042(LT)
0002(LT)

WESTERLY ANGLE BLOCK 44, REG. PLAN 61M-20
SIB, DISTURBED SET SSIB
N45°22'55"W (P2,P3&SET) (BEARING REFERENCE)
101.85 (P2&SET)
N45°22'55"W (P6&MEAS) 101.85
SIB(1155)
IB (375) WIT
N43°22'25"E 0.09
FENCE 0.1SE 0.25W
0.26 DIA
MW 01-21
MW 02-21
MW 03-21
MW 04-21
MW 05-21
BH4
421.98
420.31
421.68
421.52
422.86

PART 1 PLAN 61R - 3734
PART 2 PLAN 61R - 3734

100 A=0.88
110 A=0.07
102 A=0.22
200 A=0.26
210 A=0.19
104 A=0.07
120 A=0.06
220 A=0.22

SWALE
SWALE
SWALE
SWALE
TOP OF SLOPE
BOTTOM OF SLOPE
FENCE ON LINE
LOT LINE
LOT LINE
(P2&SET) 194.18
0.8 DIA
0.26 DIA
0.15 DIA CLUSTER
0.30 DIA CLUSTER
0.15 DIA CLUSTER
P & W F
P & W F FENCE 0.5SE
CROWN OF 4 CON TREES
4 STOREY BRICK MUTI UNIT BUILDING
FENCE 0.4SE
FENCE 0.5SE
CONCRETE WALK
ASPHALT EDGE
ASPHALT
FRAME SHED
CORNER 0.05SE
CORNER 0.50NW
BRICK & METAL CLAD BUILDING No. 950
2 STOREY
1 STOREY
GAS METER
LANDSCAPED AREAS
PAVING STONES
UNKNOWN SERVICE VALVE
PORTABLE BUILDING
CORNER 0.33SE
4LS (BASE ONLY)
LS
80.25
113.96 (P2&MEAS)
N43°30'10"E (P1,P2&MEAS)
N43°22'25"E (P6&MEAS)
39.46
40.13
43.04
42.24
22.89
421.94
422.08
422.69
100mmø PVC SAN(P5)
32mmø WATER SERVICE(P5)
600 mmø CSP
900 mmø CSP
WATERMAIN
GAS
SAN MH
SIGN
PYLON SIGN
UGB
WV
GUY
GUYS
HP
TJB
P/A
C/L OF DITCH
C/L OF ROAD
EDGE OF ASPHALT ROAD

DEDICATED BY LAND PLAN P-1942-15, DEPOSITED AS PLAN 187
DEDICATED BY LAND PLAN P-1942-44, DEPOSITED AS INST. No. MS21512
N45°29'55"W(P1,P2&SET) 0.54 (P1,P2&SET)
LIMIT OF THE KING'S HIGHWAY No. 6 AS WIDENED BY PLAN No. MS21512 (P-1942-44)

THE KING'S HIGHWAY No. 6

Legend

- 100 / A=0.24 — AREA I.D. / CATCHMENT AREA
- MAJOR OVERLAND FLOOD ROUTE
- DRAINAGE BOUNDARY
- EXISTING SWALE DIRECTION

1:1000 0 10 30 50m

Stantec

Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo ON N2L 0A4
Tel: (519) 579-4410
www.stantec.com

Notes

Client/Project
REID'S HERITAGE HOMES

NORTH FERGUS
950-960 ST. DAVID ST

Project No.
161414172

Title
DRAINAGE AREA PLAN
PRE DEVELOPMENT

Revision

Date
2022.04.19

Reference Sheet

Figure No.
2

V:\01614\active\161414172\design\drawing\civil\sheet_files\SWM\161414172_C-SD-PRE.dwg
5/17/2022 1:41:29 PM By: Miller, Jonathan

7.4.1.3 Proposed Conditions

Under proposed conditions, the site will include 5 stacked townhouse blocks (112 units), paved entrance, a paved parking lot, and landscaped amenity area. It is understood that the site will be raised by an average of 1 m to 3 m and grades will range from 2% to 5% with 3:1 transition sloping where required at the limits of the property. With the exception of 0.07 ha that will drain to the Hwy 6 roadside ditch, runoff from the entire site will be directed to the agricultural drain, north of the site, via the existing swale immediately east of the site and a new swale to be constructed at the northern site limit.

For the purposes of this study, it has been assumed that runoff from the impervious areas of the commercial property will be directed to the swale immediately east of the site. The commercial area will be redeveloped complete with a proposed commercial/ retail building, loading area and parking in the future. Landscaped areas of the commercial property will drain westward and southward to agricultural lands and the Hwy 6 roadside ditch.

Proposed conditions drainage catchments are illustrated on Figure 3 (attached) and summarized as follows:

Catchment 300 (Residential site) – 0.07 ha of paved entranceway will drain uncontrolled to the Hwy 6 roadside ditch.

Catchment 305 (Residential site) – 0.09 ha of paved entranceway, will be conveyed along the surface to a catchbasin manhole at the low point and then discharged, uncontrolled to the existing swale immediately east of the Site. This swale ultimately discharges to the agricultural drain, north of the site.

Catchment 310 (Residential site) – 0.11 ha of landscaped area. Runoff from all storms up to and including the 100-year event will be infiltrated. Excess runoff (i.e. greater than 100-year event) will be conveyed westward to agricultural lands via sheet flow.

Catchment 320 (Residential site) – 0.09 ha of landscaped area will drain northward, uncontrolled, via sheet flow towards the existing agricultural drain to the north.

Catchment 340 (Residential site) – 0.08 ha of landscaped area. Runoff from all storms up to and including the 100-year event will be infiltrated. Excess runoff (i.e. greater than 100-year event) will be conveyed eastward to the existing swale immediately east of the site.

Catchment 350 (Residential site) – 0.59 ha of parking lot and landscaped amenity area. All runoff will be collected within catchbasins and directed to an underground storage facility before discharging to the new swale at the northern site limit.

Catchment 360 to 395 (Residential site) – 0.27 ha of townhouse rooftop areas. 25 mm storm event will be directed to infiltration facilities. Excess runoff will be directed to the parking lot, then to an underground storage facility before discharging to the new swale at the northern site limit.

Catchment 400 (Commercial site) – 0.05 ha of landscaped area will be directed to the commercial parking lot, underground storage, and to the existing swale immediately east of the site.

Catchment 410 (Commercial site) – 0.31 ha of parking lot for the commercial property. All runoff will be collected within catchbasins and directed to an underground storage facility before discharging to the existing swale immediately east of the site.

Catchment 420 (Commercial site) – 0.13 ha of landscaped area will drain uncontrolled to the Hwy 6 roadside ditch.

Catchment 430 (Commercial site) – 0.14 ha of rooftop area. 25 mm storm event will be directed to an infiltration facility. Excess runoff will be directed to the commercial parking lot, then to an underground storage facility and discharged to the existing swale immediately east of the site.

Catchment 440 (Commercial site) – 0.04 ha of landscaped area will drain westward to agricultural lands, uncontrolled.

CONSTRUCTION NORTH

AGRICULTURAL DRAIN
C/L OF DITCH
TOP OF SLOPE
TOP OF SLOPE
TOP OF SLOPE

BUSH

PROPOSED SWALE TO EXISTING AGRICULTURAL DRAIN ON TOWNSHIP LANDS

320 A=0.09
390 A=0.08
395 A=0.06
380 A=0.04
350 A=0.59
360 A=0.05
370 A=0.04
340 A=0.08
310 A=0.11
440 A=0.04
400 A=0.05
305 A=0.09
410 A=0.31
430 A=0.14
300 A=0.07
420 A=0.13

TOP OF SLOPE
BOTTOM OF SLOPE
P & W F
4 STOREY BRICK MUTI UNIT BUILDING
CONCRETE WALK

HP
SAN MH
C/L OF DITCH
GUYS
UGB
GAS
WM
WV
800 mm CSP
ASPHALT
EDGE OF ASPHALT ROAD
Ex. 300mm WM
Ex. 300x300 TEE
Ex. HYD. SET
GUY
TJB
900 mm CSP
Ex. 300x300 TEE
SIGN
EDGE OF

THE KING'S HIGHWAY No. 6
C/L OF ROAD
EDGE OF ASPHALT ROAD

Legend

- 330 / A=0.59 — AREA I.D. CATCHMENT AREA
- MAJOR OVERLAND FLOOD ROUTE
- DRAINAGE BOUNDARY
- STORM SEWER SYSTEM
- CLEAN WATER COLLECTOR

1:1000 0 10 30 50m

Stantec

Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo ON N2L 0A4
Tel: (519) 579-4410
www.stantec.com

Notes

Client/Project
REID'S HERITAGE HOMES

NORTH FERGUS
950-960 ST. DAVID ST

Project No.
161414172

Title
DRANAGE AREA PLAN
POST DEVELOPMENT

Revision

Date
2022.05.03

Reference Sheet

Figure No.
3

V:\01614\active\161414172\design\drawing\civil\sheet_files\SWM\161414172_C-SD-POST.dwg
5/17/2022 1:42:11 PM By: Miller, Jonathan

7.4.2 Proposed SWM Strategy

The following sections discuss the proposed SWM measures for the site and the commercial property to meet the criteria discussed in Section 2, above. The two properties will have separate owners in the future and it is assumed they will not be developed simultaneously. As such, SWM measures have been proposed for each site individually; however, the measures will work in tandem to ensure that individual and combined peak flow rates of either site can be effectively attenuated. SWM measures are illustrated on the Preliminary Servicing Plan located in Appendix A.

7.4.2.1 Water Quality Control

Enhanced water quality control for the site and the commercial property will be provided by a combination of catchbasin shields, oil and grit separators (OGS), and grassed swales, as discussed in the following sections. All OGS units have been sized to provide Enhanced (i.e. 80% TSS removal) water quality control (see attached sizing documents).

7.4.2.1.1 Site Water Quality Control

- **Flows to existing swale immediately east of the site**
    - Catchment 305 (Site entrance) - all runoff will be collected by a catchbasin and conveyed, along with runoff from the Commercial property parking area, through an OGS (ADS FD-4HC or approved equivalent) prior to discharging to the existing swale immediately east of the site, which will provide additional cleansing of runoff.
- **Flows to the Hwy 6 roadside ditch**
    - Catchment 300 (Site entrance) - as previously discussed, the site entrance at Hwy 6 is similar to existing Catchment 120 in both size and imperviousness and no quality control will be provided on-site. Flows from this area will discharge to the Hwy 6 roadside ditch, which is vegetated and at a shallow slope and will therefore provide some measure of cleansing of runoff as per existing conditions.
- **Flows to new swale and agricultural drain, north of site**
    - Catchment 350 (parking) – all runoff will be conveyed to an OGS (ADS FD-4HC or approved equivalent) located immediately downstream of the underground storage facility.
    - Catchments 360-395 (rooftop) - although considered clean and not requiring quality control, due to the proposed storm sewer configuration, all rooftop runoff (Catchments 360 to 395) in excess of the 25 mm storm event will also be conveyed through the parking lot OGS.
    - The OGS will discharge to a new vegetated swale that will provide further cleansing of runoff before discharging to the agricultural drain to the north.

- **Landscaped areas**
    - Catchments 310, 320, 340 - No quality control is required for the site landscaped areas.

7.4.2.1.2 Commercial Property Water Quality Control

- **Flows to existing swale immediately east of the site**
    - Catchment 410 (parking) – all runoff will be conveyed to an OGS (ADS FD-4HC or approved equivalent) located downstream of the Commercial property underground storage.
    - Catchment 430 (rooftop) - although considered clean and not requiring quality control, all rooftop runoff (Catchment 430) in excess of the 25 mm storm event will also be conveyed through the OGS due to the proposed storm sewer configuration.
    - The OGS will discharge to the existing swale immediately east of the site, which will provide additional cleansing of runoff.
- **Landscaped areas**
    - Catchments 400, 420, 440 - no quality control is required for the site landscaped areas, however due to the proposed final grading configuration, it is likely that runoff from Catchment 400 will be conveyed through the OGS.

7.4.2.2 Water Quantity Control

As mentioned above, the two properties will have separate owners and are not anticipated to be developed simultaneously. As such, SWM measures have been proposed for each site individually; however, as shown in Table 2, the measures will ultimately work in tandem to ensure that individual and combined peak storm flow rates from the site will not exceed existing rates for all storms up to and including the Regional event (this exceeds the requirement to match flows up to the 100-year event).

7.4.2.3 Site Water Quantity Control

Post development flows from the site will be controlled to existing peak rates through a combination of underground storage and infiltration as illustrated on the Preliminary Servicing Plan and as follows:

- **Flows to existing swale immediately east of the site**
    - Catchment 305 (Site entrance) – runoff will be collected within a DCBMH and discharged uncontrolled to the swale east of the site, as under existing conditions.
    - Catchment 340 (landscaped) – all runoff up to and including the 100-year event will be captured and infiltrated within an infiltration facility. Excess runoff will be conveyed via sheet flow to the existing swale, east of the site.

- **Flows to the existing Hwy 6 roadside ditch**
    - Catchment 300 (Site entrance) – these flows will be discharged, uncontrolled via sheet flow, to the existing Hwy 6 roadside ditch, as under existing conditions.
- **Flows to agricultural lands to the west**
    - Catchment 310 (landscaped) - all runoff up to and including the 100-year event will be captured and infiltrated within an infiltration facility. Excess runoff will be conveyed via sheet flow to the agricultural lands to the west.
- **Flows to new swale and agricultural drain, north of site**
    - Catchment 350 (parking) – all runoff will be captured and conveyed to the underground storage facility for quantity control and then discharged at a reduced rate to the proposed swale north of the site that will convey flows to the existing agricultural drain on Township owned Lands.
    - Catchments 360-395 (rooftop) – Runoff from the 25 mm storm event will be captured and infiltrated within infiltration facilities. Excess runoff will be directed to the parking lot and conveyed to the underground storage facility and then to the proposed swale north of the site and ultimately to the agricultural drain on Township owned Lands.

7.4.2.4 Commercial Property Water Quantity Control

- **Flows to existing swale immediately east of the site**
    - Catchment 410 (parking) – all runoff will be captured and conveyed to an underground storage facility for quantity control and then discharged at a reduced rate to the existing swale, east of the site.
    - Catchment 430 (rooftop) – Runoff from the 25 mm storm event will be captured and infiltrated within an infiltration facility. Excess runoff will be directed to the parking lot and conveyed to the underground storage facility for quantity control and ultimately to the existing swale, east of the site.
- **Flows to the Hwy 6 roadside ditch**
    - Catchment 420 (landscaped) – all runoff will be conveyed via uncontrolled sheet flow to the existing Hwy 6 roadside ditch.
- **Flows to agricultural lands to the west**
    - Catchment 440 (landscaped) - all runoff will be conveyed via uncontrolled sheet flow to the existing agricultural lands to the west.

Table 2: Flow Summary

Storm Event	*25 mm*		*5-Year*		*100-Year*		*Regional*	
	Flow (m^3/s)							
Location	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
Flow to existing agricultural drain to the north								
Site = Total North	0.02	0.01	0.04	0.02	0.09	0.05	0.12	0.07
Flow to existing swale immediately east of site – ultimately conveyed to agricultural drain north of site								
Site	0.01	0.01	0.03	0.03	0.06	0.06	0.04	0.01
Commercial	0.01	0.01	0.04	0.03	0.10	0.05	0.04	**0.05**
Total	0.02	0.02	0.07	0.05	0.15	0.10	0.08	0.06
Combined flow from north and east to agricultural drain north of site								
Site	0.02	0.02	0.05	0.05	0.11	0.11	0.16	0.08
Commercial	0.01	0.01	0.04	0.03	0.10	0.05	0.04	**0.05**
Total	0.03	0.03	0.07	0.07	0.17	0.15	0.20	0.13
Flow to agricultural lands to the west								
Site	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00
Commercial	0.02	0.00	0.05	0.04	0.10	0.10	0.03	0.01
Total	0.02	0.00	0.05	0.04	0.10	0.10	0.04	0.01
Flow to Hwy 6 roadside ditch								
Site	0.01	0.01	0.02	0.02	0.04	**0.05**	0.01	0.01
Commercial	0.04	0.00	0.10	0.01	0.16	0.03	0.03	0.02
Total	0.05	0.01	0.12	0.04	0.21	0.07	0.04	0.03
*Note: **Bold** values exceed existing*								

As shown in Table 2, with only two exceptions, the proposed quantity controls will attenuate flows at all outlets to rates less than existing rates for all storm events. There is a slight increase in proposed flows from the commercial property to the existing swale east of the site during the Regional event, however the proposed total flow to this outlet (i.e., residential and commercial property combined) is considerably less than under existing conditions and hence the exceedance is considered acceptable. Similarly, proposed flows from the site to the Hwy 6 roadside ditch slightly exceed existing rates during the 100-year event. Again, the proposed combined flow is less than the combined existing rate and the exceedance is considered acceptable.

Note that the SWMHYMO modeling indicates that timing of the proposed condition hydrograph peak flows to the existing swale to the east and the proposed swale to the north property will coincide. As such, it was necessary to over-control proposed flows (i.e., provide additional storage to allow for a further reduction in discharge rates) to meet the total combined flow from the north and east to the agricultural drain. As only a small change in imperviousness will occur as a result of redevelopment of the commercial property, the bulk of the additional storage requirement was assigned to the site (i.e., the increase in storage was assigned 95% to the site and 5% to the commercial property). Required attenuation storage volumes for each property are listed in Table 3.

Table 3: Underground Attenuation Storage Characteristics

Location	**Storage (m^3)**			**Peak Discharge Rate (m^3/s)**
	Required to Match Existing 100-year from Each Property Separately	Additional Required to Match 100-year Total Combined to Agricultural Drain	Total Required	
Site	185	48	233	0.035
Commercial Property	80	3	88	0.055

7.4.2.5 Infiltration

Two (2) infiltration facilities are proposed for the residential site and one (1) for the commercial property, as illustrated on Preliminary Servicing Plan. Preliminary sizing has been completed by ADS and is attached. The designs allow for a separation of at least 1.0 m above groundwater elevations. As discussed above, an infiltration rate of 15 mm/hr has been assumed for both the site and the commercial property. Infiltration volumes and drawdown times are listed in Table 4.

Table 4: Infiltration Facility Characteristics

Infiltration Facility	**Footprint (m^2)**	**Volume (m^3)**	**Drawdown Time (hrs)**
Site East	92	54	39
Site West	121	77	42
Commercial Property	98	35	24
Note: Drawdown time assumes infiltration rate of 15 mm/hr			

7.5 DETAILED DESIGN CONSIDERATIONS

The following additional considerations may be required at the detailed design stage which may affect the results and conclusions of the preceding analyses. A summary of additional considerations that may be required are included below:

Legal Outlets

It has been assumed that a legal outlet is provided within the lands immediately north and east of the Site given it is Township owned lands and regulated by the GRCA. This outlet will include construction of a new proposed swale from the site to the agricultural drain to the north.

Additional Consultation with Regulatory Authorities

Formal pre-consultation with the regulatory authorities may revise criteria from those assumed. Preliminary discussions have been underway with the GRCA, provided in Appendix E.

Rooftop and/or Parking Lot Storage

No allowance for rooftop and/or parking lot storage has been assumed in the calculations. The addition of rooftop and/or parking lot storage will likely result in a reduced footprint requirement for the storage facilities.

Additional Information

This assessment was completed as a conceptual analysis with available information provided at the time of the study. As additional information on the subject site is obtained, site criteria may be revised, or results of the preceding analyses may no longer be relevant.

Detailed Design

Other considerations to be confirmed at detailed design may include; orifice sizing for underground storage facilities and swale sizing/configuration from the site to the agricultural drain.

8.0 EROSION AND SEDIMENT CONTROL PLAN

An erosion and sediment control strategy will be developed during detailed design and implemented during the construction process in order to minimize the potential for off-site discharge of sediment and the associated negative environmental impacts.

Though subject to refinement in conjunction with final design activities, the following preliminary strategy has been developed to outline the anticipated approach. Most of the various construction activities will result in the disturbance of at-surface soils to various extents, ranging from construction traffic to topsoil stripping and/or grading activities involving cutting or filling, all of which expose the underlying earth to potential erosion and sediment transport to off-site locations. In all instances where the potential for erosion is identified, a series of control measures should be implemented that may include:

- Erect silt fence before grading begins around the perimeter of site to protect the downstream lands from potential sediment transport that may be entrained in overland flows.
- Erect silt fencing around perimeter of all infiltration facilities to act as construction barrier.
- Install silt fencing and silt socks around, and siltsacks in, all catchbasins directly connected to infiltration facilities.
- Install erosion control matting on all steep (>3:1) slopes.
- Provide a construction entrance feature (“mud mat”) at all site entrances to minimize the transport of sediment on construction vehicle tires.
- Direct runoff via swales and erosion control berms (where necessary) to sediment control measures to ensure that no untreated runoff is discharged from the Site.
- Install temporary rock check dams in swales where appropriate to help attenuate flows, reduce erosive velocities, and encourage sediment deposition.
- During construction, all catchbasins are to be sealed until roads are paved to prevent sediment deposition in the catchbasin sumps and conveyance of silt to the infiltration galleries.
- Immediately stabilize all disturbed areas not subject to construction activities within 30 days, according to OPSS 572.

9.0 UTILITIES

Utility Groups were contacted by requesting information outlining servicing capabilities for the site. There is significant existing overhead and underground utility infrastructure on St David Street North. The following information has been obtained from the various utility companies. Coordination with the companies will continue throughout the design process to determine distribution systems for the site.

9.1 CW HYDRO

There is significant existing hydro infrastructure surrounding the site and servicing the existing homes within the development area. Correspondence is ongoing with CW Hydro to confirm the servicing capacities within the existing system and provide a detailed scope of work for servicing the site.

9.2 ENBRIDGE GAS

Enbridge Gas has existing infrastructure along the St David Street north boulevard fronting the site. Enbridge has confirmed that the existing system has capacity to service the development at this time.

9.3 BELL CANADA

Bell Canada has two existing non encased ducts fronting the property on St David Street North, as well as a long haul fiber cable. No servicing conflicts were noted at this time.

9.4 ROGERS CABLE

Rogers is not servicing Fergus at this time, and has advised that the project would require assessment to determine if Rogers will provide servicing.

Hydro, telecommunications and Enbridge lines will be buried in a joint trench where possible within the proposed townhouse development. Utility Correspondence is provided in Appendix D.

10.0 CONCLUSIONS AND RECOMMENDATIONS

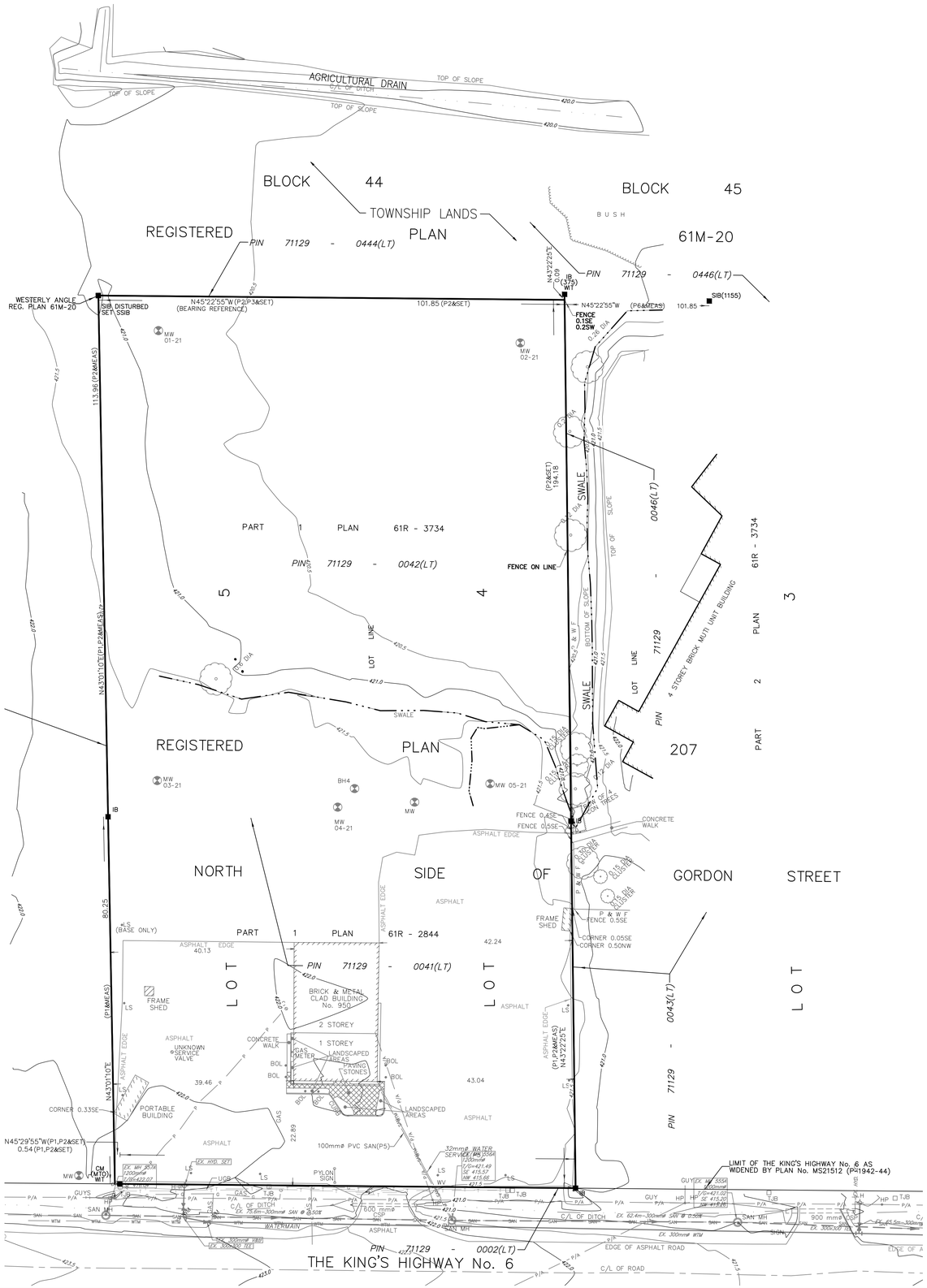
Based on the findings of this report, it is concluded that:

- The proposed residential site and future commercial redevelopment can be adequately serviced with municipal sewage, water services and utilities;
- Municipal servicing and roadworks can be provided in accordance with the Township of Centre Wellington guidelines;
- Quality and quantity control stormwater management requirements are achieved by way OGS units, multiple infiltration galleries, and end of pipe storage;
- The development can be serviced with Hydro, Gas, and telecommunications extended from existing facilities surrounding the site; and

It is further recommended that:

- A detailed dewatering assessment be conducted during detailed engineering design to assess any requirement for construction groundwater dewatering and any associated volumes and attain any required water taking permits.
- The current hydrogeological investigation be continued through 2022 to better understand the high groundwater levels on-site.
- The report be circulated to the municipalities and various approval agencies in support of the Zoning By-Law Amendment for the site.
- Detailed grading and servicing design drawings be prepared, and a Final Stormwater Management Report and Erosion and Sediment Control Plan be completed in support of Site Plan Approval following approval of the zoning bylaw amendment application.
- The preliminary engineering design be approved to support Zoning Bylaw Amendment application.

Appendix A
Drawings



Stantec

Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo ON N2L 0A4
Tel: (519) 579-4410
www.stantec.com

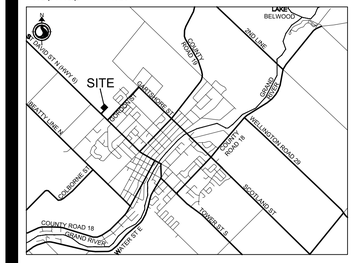
Copyright Reserved

The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.
The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.

Notes

1. SITE PLAN PREPARED BY STANTEC CONSULTING LTD., DATED APRIL 27, 2022.
2. TOPOGRAPHICAL SURVEY PREPARED BY BSR&D, DATED MARCH 29, 2022.

Key Map NTS.



Legend

Revision	By	Appd	YYYY.MM.DD
0. ISSUED FOR ZBA	JBM	TAHF	2022.05.17

File Name: 161414172_C-050DP	Dwn.	Chkd.	Dsgn.
	JBM	JBM	TAHF 2022.05.17 YY.MM.DD

Permit-Seal

PRELIMINARY NOT FOR CONSTRUCTION

Not for permits, pricing or other official purposes. This document has not been completed or checked and is for general information or comment only.

Client/Project
REID'S HERITAGE HOMES

NORTH FERGUS
950-960 ST. DAVID ST

Fergus, ON

Title
EXISTING CONDITIONS PLAN

Project No. 161414172

Scale 1:500 (0 5 15 25m)

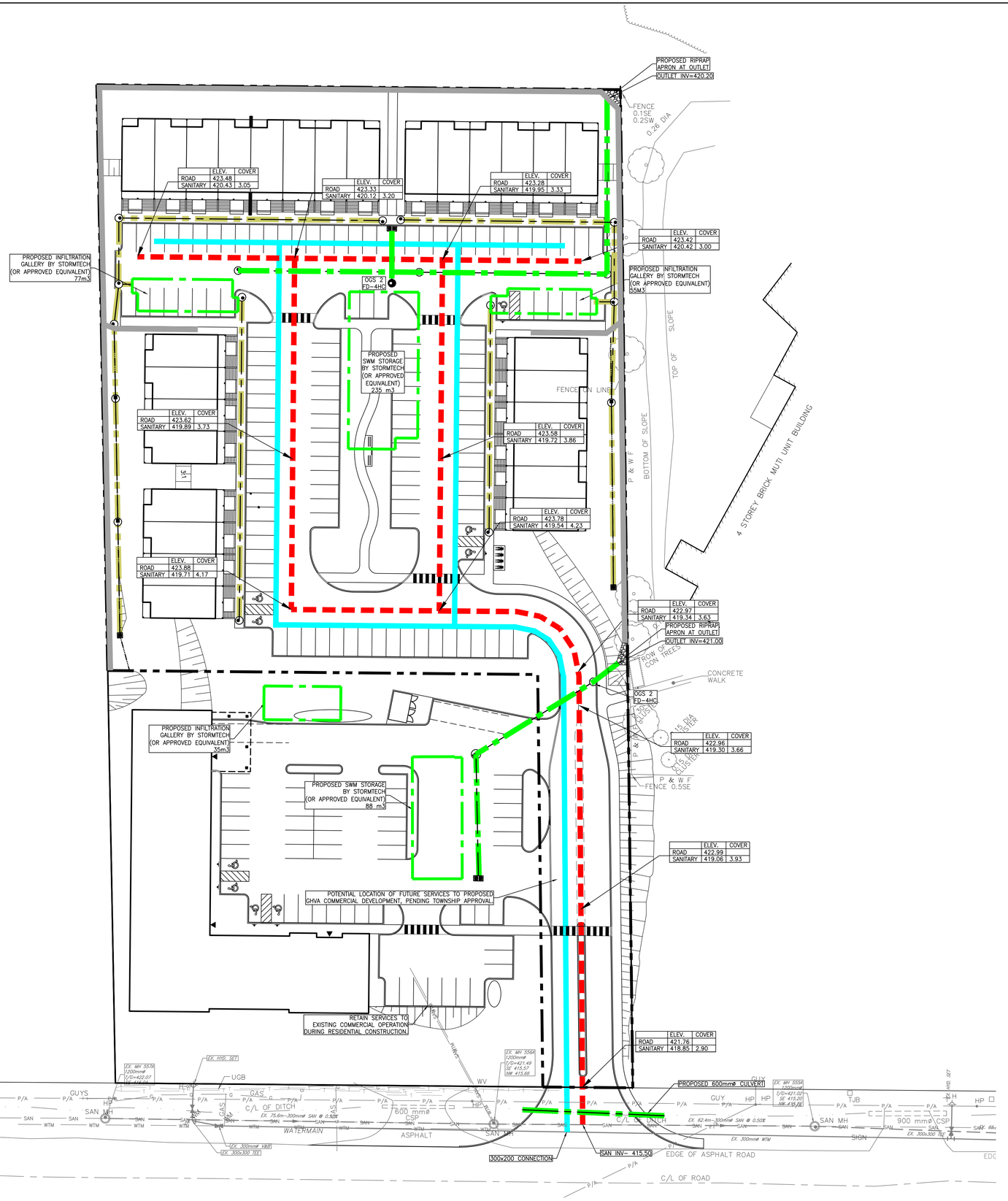
Revision 0

Sheet 1 of 4

Drawing No. **C050**

V:\161414\active\161414172\design\drawing\xrefs\xref_files\161414172_C-050DP.dwg
01.17.2022 3:43:27 PM By: Miller, Jonathon

ORIGINAL SHEET - ARCH D



Stantec

Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo ON N2L 0A4
Tel: (519) 579-4410
www.stantec.com

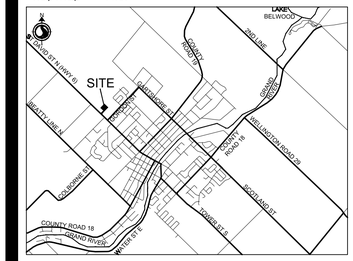
Copyright Reserved

The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.
The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.

Notes

1. SITE PLAN PREPARED BY STANTEC CONSULTING LTD., DATED APRIL 27, 2022.
2. TOPOGRAPHICAL SURVEY PREPARED BY BSR&D, DATED MARCH 29, 2022.

Key Map NTS.



Legend

- RETAINING WALL
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED SANITARY MANHOLE
- PROPOSED VALVE & BOX
- PROPOSED HYDRANT
- PROPOSED STORM SEWER
- PROPOSED CLEAN WATER COLLECTOR
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- PROPOSED SLOPE (3:1 UNLESS NOTED OTHERWISE)

Revision	By	Appd	YYYY.MM.DD
0. ISSUED FOR ZBA	JBM	TAHF	2022.05.17

File Name: 161414172_C-100UG	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	JBM	JBM	TAHF	2022.05.17

Permit-Seal

PRELIMINARY NOT FOR CONSTRUCTION

Not for permits, pricing or other official purposes. This document has not been completed or checked and is for general information or comment only.

Client/Project
REID'S HERITAGE HOMES

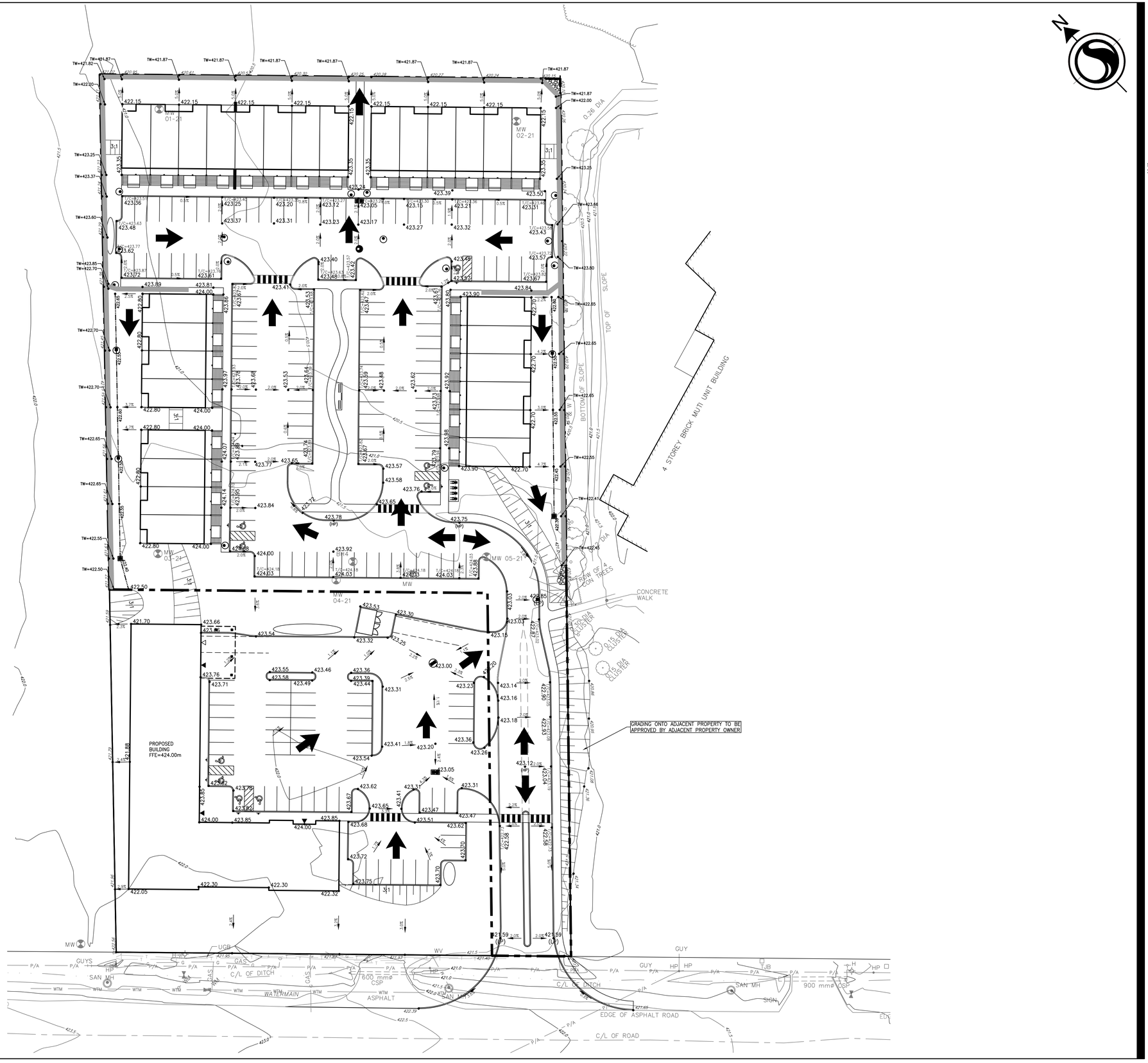
NORTH FERGUS
950-960 ST. DAVID ST

Fergus, ON

Title
PRELIMINARY SERVICING PLAN

Project No. 161414172
Scale 1:400 (0, 4, 12, 20m)
Revision 0
Sheet 2 of 4
Drawing No. C100

V:\161414\Active\161414172\design\drawing\civil\sheet_files\161414172_C-100UG.dwg
07/7/2022 3:14:58 PM By: Miller, Jonathan
ORIGINAL SHEET - ARCH D



Stantec

Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo ON N2L 0A4
Tel: (519) 579-4410
www.stantec.com

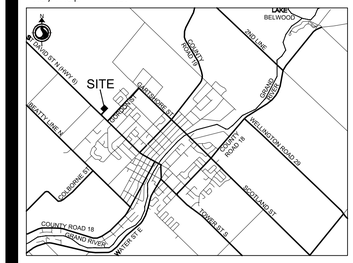
Copyright Reserved

The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.
The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.

Notes

1. SITE PLAN PREPARED BY STANTEC CONSULTING LTD., DATED APRIL 27, 2022.
2. TOPOGRAPHICAL SURVEY PREPARED BY BSR&D, DATED MARCH 29, 2022.

Key Map NTS.



Legend

352.82	EXISTING ELEVATION
352.92	PROPOSED ELEVATION
2.0% 2.0%	FLOW DIRECTION
	PROPOSED DRAINAGE SWALE
349.00	EXISTING CONTOUR
	RETAINING WALL
	PROPOSED STORM MANHOLE
	PROPOSED STORM CATCHBASIN MANHOLE
	PROPOSED CATCHBASIN
	PROPOSED SANITARY MANHOLE
	PROPOSED VALVE & BOX
	PROPOSED HYDRANT
	PROPOSED SLOPE (3:1 UNLESS NOTED OTHERWISE)
	OVERLAND FLOW DIRECTION

Revision	By	Appd	YYYY.MM.DD
0. ISSUED FOR ZBA	JBM	TAHF	2022.05.17

File Name: 161414172_C-400GP	Dwn.	Chkd.	Dsgn.
	JBM	JBM	TAHF
			2022.05.17 YY.MM.DD

Permit-Seal

PRELIMINARY NOT FOR CONSTRUCTION

Not for permits, pricing or other official purposes. This document has not been completed or checked and is for general information or comment only.

Client/Project
REID'S HERITAGE HOMES

NORTH FERGUS
950-960 ST. DAVID ST

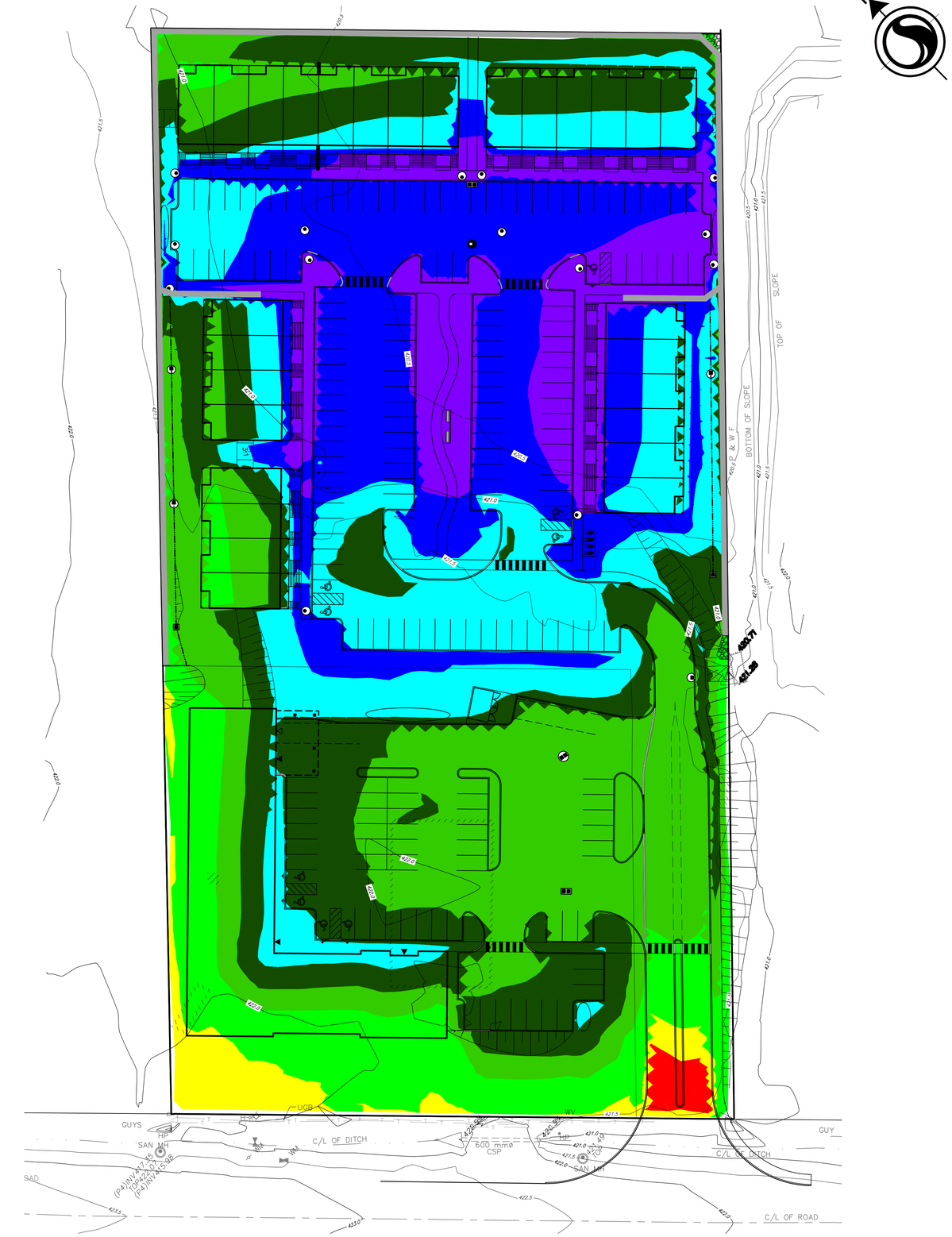
Fergus, ON

Title
PRELIMINARY GRADING PLAN

Project No. 161414172
Scale 1:400 (0 4 12 20m)
Revision 0
Sheet 3 of 4
Drawing No. **C400**

V:\2161\Active\161414172\design\drawing\civil\sheet_files\161414172_C-400GP.dwg
5/17/2022 3:53:46 PM By: ABDI, JONATHON

ORIGINAL SHEET - ARCH D



Elevations Table				
Number	Minimum Elevation	Maximum Elevation	Area	Color
1	−0.25	0.00	104.10	
2	0.00	0.25	89.71	
3	0.25	1.00	519.68	
4	1.00	1.50	1717.56	
5	1.50	2.00	2032.02	
6	2.00	2.50	2755.88	
7	2.50	3.00	3470.26	
8	3.00	3.82	1864.79	

Stantec

EARTHWORKS

North Fergus

NOTES

1 Results from modeling dated May 02 2022
2 Negative number indicates shortage of material.

Allowance for Shrinkage on Compaction **10%**

Area ID	Area	Depth	TOPSOIL Stripping	TOPSOIL Restoration	TOPSOIL Balance	Pregrade Depth	EARTHWORKS Cut	EARTHWORKS Fill Earth	EARTHWORKS Fill Topsoil	EARTHWORKS Balance
	m2	m	m3	m3	m3	m	m3	m3	m3	m3
COM_BLDG	1,390	0.50	680	0	680	0.30	0	1,869		(1,869)
COM_PRKG	2,792	0.50	1,396	0	1,396	0.70	0	4,406		(4,406)
COM_LNDSCP	2,576	0.50	1,288	618	670	0.30	0	3,197		(3,197)
RES_BLDG A	396	0.50	198	0	198	1.00	0	569		(569)
RES_BLDG B	396	0.50	198	0	198	1.00	0	848		(548)
RES_BLDG C	792	0.50	396	0	396	1.00	0	1,427		(1,427)
RES_BLDG D	580	0.50	290	0	290	1.00	0	1,264		(1,264)
RES_BLDG E	596	0.50	298	0	298	1.00	0	1,619		(1,619)
RES_LNDSCP_CNTR	740	0.50	370	200	170	0.30	0	2,501		(2,501)
RES_PRKG	5,172	0.50	2,586	0	2,586	0.70	9	12,779		(12,770)
RES_LNDSCP_2	56	0.50	28	15	13	0.30	0	58		(58)
RES_LNDSCP	4,164	0.50	2,082	999	1,083	0.30	0	10,112	7,252	(2,860)
					7,977			40,649	7,252	
Total			**9,810**	**1,833**	**0**		**9**	**33,397**	**7,252**	**(33,388)**

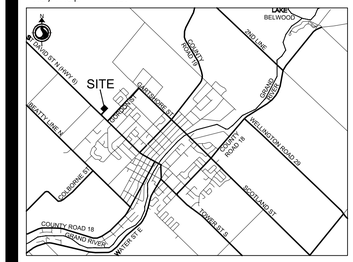
Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo ON N2L 0A4
Tel: (519) 579-4410
www.stantec.com

Copyright Reserved
The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.
The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.

Notes

1. SITE PLAN PREPARED BY STANTEC CONSULTING LTD., DATED APRIL 27, 2022.
2. TOPOGRAPHICAL SURVEY PREPARED BY BSR&D, DATED MARCH 29, 2022.

Key Map NTS.



Legend

Revision	By	Appd	
0. ISSUED FOR ZBA	JBM	TAHF	2022.05.17

File Name: 161414172_C-450SO	Dwn.	Chkd.	Dsgn.	
	JBM	JBM	TAHF	2022.05.13

Permit-Seal

PRELIMINARY NOT FOR CONSTRUCTION

Not for permits, pricing or other official purposes. This document has not been completed or checked and is for general information or comment only.

Client/Project
REID'S HERITAGE HOMES

NORTH FERGUS
950-960 ST. DAVID ST

Fergus, ON

Title
PRELIMINARY EARTHWORKS PLAN

Project No. 161414172
Scale 1:400 (0 4 12 20m)
Revision 0
Sheet 4 of 4
Drawing No. **C450**

V:\2161\Active\161414172\Design\Civil\Sheet_files\161414172_C-450SO.dwg
5/17/2022 2:14:40 PM By: Abbie, Jonathon

ORIGINAL SHEET - ARCH D

Appendix B
Sanitary and Water Design Calculations

Stantec

SUBDIVISION
90-960 St David Street North, Fergus

SANITARY SEWER

DESIGN SHEET

DATE: 5/3/2022
DESIGNED BY: JB
CHECKED BY:

FILE NUMBERS:
PROJECT NUMBER: 161414172

May 3, 2022

Township of Centre Wellington

AVERAGE DAILY FLOW
PER PERSON = 350 l/c/day

MINIMUM VELOCITY = 0.800 m/s
n = 0.013
MAX PEAK FAC.= 4.500
MIN PEAK FAC.= 1.500

DESIGN PARAMETERS

RESIDENTIAL: 0.0041 l/s/c
COMMERCIAL: 0.6000 l/s/ha
INDUSTRIAL: 0.0000 l/s/ha
INSTITUTIONAL: 0.0000 l/s/ha
INFILTRATION: 0.1500 l/s/ha
RESIDENTIAL HARMON PEAKING FACTOR

LOCATION			RESIDENTIAL AREA AND POPULATION						COMM		INDUST		INSTIT		C+I+I	INFILTRATION			TOTAL FLOW	PIPE					
STREET	FROM M.H.	TO M.H.	AREA (ha)	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	(l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
950-960 St David Street North	St. David Street North		1.30	280	1.30	280	4.091	4.696	0.67	0.67					0.402	1.97	1.97	0.296	**5.394**						

Domestic Water Demand Projections

Usage Description	Residential Population Density [1]	Residential Population	Average Day Water Demand Criteria	Average Day Demand (ADD)		Maximum Day Demand (MDD) @ MDD factor = 2.0		Peak Hour Demand (PHD) @ PHD factor = 3.0	
	ppu	persons		L/s	L/day	L/s	L/day	L/s	L/day
Staked Townhouses: 112 Townhouse Units	2.5	280	225 L/cap/day	0.729	63,000	1.458	126,000	2.187	189,000
Total Development				**0.73**	**63,000**	**1.46**	**126,000**	**2.19**	**189,000**

Note 1: Residential population densities based on City of Guelph Development Charges Background Study dated February 2019 prepared by Watson and Associates Ltd.

Appendix C
Stormwater Management

Subject: **CN Calculation**
Project: **Fergus SWM Design**
Project No.: **1614-14172**
Client: **Reid's Heritage Homes**
Date: **05/03/22**

TABLE OF CURVE NUMBERS (CN's)									Source
Land Use		Hydrologic Soil Type							
		A	AB	B	BC	C	CD	D	
Meadow	"Good"	30	44	58	65	71	75	78	USDA
Woodlot	"Fair"	36	48	60	67	73	76	79	USDA
Lawns	"Good"	39	50	61	68	74	77	80	USDA
Pasture/Range		58	62	65	71	76	79	81	USDA
Crop - SR = CR	"Good"	64	70	75	79	82	84	85	USDA
Gravel		76	81	85	87	89	90	91	USDA
Scarified Soil		69	74	78	81	83	85	87	USDA
Wetland/Lake		100	100	100	100	100	100	100	USDA
Impervious		98	98	98	98	98	98	98	USDA

MTO - Ministry of Transportation Ontario Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
USDA - United States Department of Agriculture (2004), National Engineering Handbook, Part 630 Hydrology, Chapter 9 Hydrologic Soil Cover Complexes

HYDROLOGIC SOIL TYPE (%) - Existing Conditions								
	Hydrologic Soil Type							
Catchment	A	AB	B	BC	C	CD	D	TOTAL
100						100		100
102						100		100
104						100		100
110						100		100
120						100		100
200						100		100
210						100		100
220						100		100

LAND USE (%) - Existing Conditions									
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Bare Soil	Gravel	Impervious	Total
100					90			10	100
102					98		2		100
104							2	98	100
110					100				100
120					8			92	100
200	20						15	65	100
210	20						8	72	100
220			2					98	100

Note: Where STANDHYD command used (shaded), impervious fraction is not considered in CN determination, since %Imp directly input in STANDHYD command

CURVE NUMBER (CN) - Existing Conditions										
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Bare Soil	Gravel	Impervious	Weighted CN w/ imp area	Weighted CN w/o imp area
100					75			10	85	84
102					82		2		84	84
104							2	96	98	90
110					84				84	84
120					7			90	97	84
200	15						14	64	92	81
210	15						7	71	93	79
220			2					96	98	77
									0	NA
										NA
										NA
										NA
										NA

Subject: **CN Calculation**
Project: **Fergus SWM Design**
Project No.: **1614-14172**
Client: **Reid's Heritage Homes**
Date: **05/03/22**

TABLE OF CURVE NUMBERS (CN's)									Source
Land Use		Hydrologic Soil Type							
		A	AB	B	BC	C	CD	D	
Meadow	"Good"	30	44	58	65	71	75	78	USDA
Woodlot	"Fair"	36	48	60	67	73	76	79	USDA
Lawns	"Good"	39	50	61	68	74	77	80	USDA
Pasture/Range		58	62	65	71	76	79	81	USDA
Crop - SR = CR	"Good"	64	70	75	79	82	84	85	USDA
Gravel		76	81	85	87	89	90	91	USDA
Scarified Soil		69	74	78	81	83	85	87	USDA
Wetland/Lake		100	100	100	100	100	100	100	USDA
Impervious		98	98	98	98	98	98	98	USDA

MTO - Ministry of Transportation Ontario Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
USDA - United States Department of Agriculture (2004), National Engineering Handbook, Part 630 Hydrology, Chapter 9 Hydrologic Soil Cover Complexes

HYDROLOGIC SOIL TYPE (%) - Existing Conditions								
	Hydrologic Soil Type							
Catchment	A	AB	B	BC	C	CD	D	TOTAL
300						100		100
305						100		100
310						100		100
320						100		100
330						100		100
340						100		100
350						100		100
360						100		100
370						100		100
380						100		100
390						100		100
395						100		100
400						100		100
410						100		100
420						100		100
430						100		100
440						100		100

LAND USE (%) - Existing Conditions									
Catchment	Meadow	Woodlot	Lawns	Pasture	Crop	Bare Soil	Gravel	Impervious	Total
300			15					85	100
305			35					65	100
310			100					0	100
320			100					0	100
330			100					0	100
340			100					0	100
350			15					85	100
360							1	99	100
370							1	99	100
380							1	99	100
390							1	99	100
395							1	99	100
400			100						100
410			10					90	100
420			100						100
430							1	99	100
440			100						100

Note: Where STANDHYD command used, impervious fraction is not considered in CN determination, since %Imp directly input in STANDHYD command

CURVE NUMBER (CN) - Existing Conditions										
Catchment	Meadow	Woodlot	Lawns	Pasture range	Crop	Bare Soil	Gravel	Impervious	Weighted CN w/ imp area	Weighted CN w/o imp area
300			12					83	95	77
305			27					64	91	77
310			77						77	NA
320			77						77	NA
330			77						77	NA
340			77						77	NA
350			12					83	95	77
360							1	97	98	90
370							1	97	98	90
380							1	97	98	90
390							1	97	98	90
395							1	97	98	90
400			77						77	NA
410			8					88	96	77
420			77						77	NA
430							1	97	98	90
440			77						77	NA

Subject: SWMHYMO Parameters
Project: Fergus SWM Design
Project No.: 1614-14172
Client: Reid's Heritage Homes
Date: 5/3/2022

Existing Conditions

Area Description	Catchment Number	SWMHYMO Command	Area (ha)	CN	TIMP	XIMP	Slope (%)	Length (m)	Tc (hrs)	Tp (hrs)
Agricultural - drains northeast	100	DESIGN NASHYD	0.88	85	N/A	N/A	0.25	76	0.56	0.34
Agricultural - drains east	102	DESIGN NASHYD	0.22	84	N/A	N/A	0.25	107	0.67	0.40
Site entrance - asphalt - drains east	104	DESIGN STANDHYD	0.07	90	0.98	0.10	2.00	22	0.15	0.09
Agricultural - drains southwest	110	DESIGN NASHYD	0.07	84	N/A	N/A	0.25	21	0.30	0.18
Existing asphalt - drains to Highway 6	120	DESIGN STANDHYD	0.06	84	0.93	0.10	2.00	20	0.14	0.09
Existing commercial - drains through site	200	DESIGN STANDHYD	0.26	81	0.65	0.10	2.00	42	0.21	0.13
Existing commercial - drains east	210	DESIGN STANDHYD	0.19	79	0.81	0.10	2.00	36	0.19	0.12
Existing commercial - drains to Hwy 6	220	DESIGN STANDHYD	0.22	77	0.98	0.10	2.00	38	0.20	0.12
Total			**1.96**							

Proposed Conditions

Area Description	Catchment Number	SWMHYMO Command	Area (ha)	CN	TIMP	XIMP	Slope (%)	Length (m)	Tc (hrs)	Tp (hrs)
Proposed site entrance - drains uncontrolled to Hwy 6	300	DESIGN STANDHYD	0.07	77	0.90	0.10	2.00	30	0.18	0.11
Proposed Driveway - drains drains east	305	DESIGN STANDHYD	0.09	77	0.90	0.10	2.00	30	0.18	0.11
Landscaped area - drains west, uncontrolled	310	DESIGN NASHYD	0.11	77	N/A	N/A	5.00	8	0.07	0.04
Landscaped area - drains north, uncontrolled	320	DESIGN NASHYD	0.09	77	N/A	N/A	5.00	8	0.07	0.04
Landscaped area - drains west, uncontrolled	340	DESIGN NASHYD	0.08	77	N/A	N/A	5.00	8	0.07	0.04
Landscaped and parking areas - Drains North, controlled	350	DESIGN STANDHYD	0.59	77	0.70	0.65	2.00	15	0.13	0.08
Rooftop - infiltrated	360	DESIGN STANDHYD	0.05	90	0.99	0.01	30.00	5	0.03	0.02
Rooftop - infiltrated	370	DESIGN STANDHYD	0.04	90	0.99	0.01	30.00	5	0.03	0.02
Rooftop - infiltrated	380	DESIGN STANDHYD	0.04	90	0.99	0.01	30.00	5	0.03	0.02
Rooftop - infiltrated	390	DESIGN STANDHYD	0.08	90	0.99	0.01	30.00	5	0.03	0.02
Rooftop - infiltrated	395	DESIGN STANDHYD	0.06	90	0.99	0.01	30.00	5	0.03	0.02
Landscaped - Drains west, uncontrolled	400	DESIGN NASHYD	0.05	77	NA	NA	5.00	10	0.08	0.05
Parking area - drains east, controlled	410	DESIGN STANDHYD	0.31	77	0.90	0.80	2.00	15	0.13	0.08
Landscaped - Drains to Hwy 6, uncontrolled	420	DESIGN NASHYD	0.13	77	NA	NA	5.00	15	0.09	0.06
Rooftop - infiltrated	430	DESIGN STANDHYD	0.14	90	0.99	0.01	2.00	10	0.10	0.06
Landscaped - Drains west, uncontrolled	440	DESIGN NASHYD	0.04	77	NA	NA	5.00	5	0.05	0.03
Total			**1.97**							

Notes:

CN calculated for pervious areas only for DESIGN STANDHYD. CN is a weighed average for DESIGN NASHYD

TIMP ..... *Total percent impervious*

XIMP ..... *Percent impervious directly connected*

Time of Concentration calculated using the Airport Method ..... $Tc = [\ 3.26\ (1.1-C)\ L^{0.5}\ ] / S^{0.33}$

Where: *C = Runoff Coefficient = 0.35 for undeveloped areas (0.6 gravelled areas)*
L = Length of Overland Flow (m)
= (Area/1.5)^0.5
S = Slope (%)

Time to Peak ..... $Tp = 0.6Tc$

Minors = all storms up to and including the 2 year event
Majors = all storms greater than the 2 year event

```
2     Metric units
*#*************************************************************************
*#  Project Name: [Fergus]  Project Number: [161414172]
*#  Date        : April. 12, 2022
*#  Modeller    : [M. Ornat]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   :  4730904
*#*************************************************************************
*#  Existing conditions model 5, 100 Year and Regional Storm Events
*#
*#  Per Centre Wellington Design Standards(<-CONFIRM?) - Fergus IDF Parameters
*#
*#  Soil type based on Geotechnical Investigation (Dec 2021);
*#     hydrologic soil type CD (Assumed).
*#
*#*************************************************************************
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[001]
*#                    ["GU-25mm.stm"] <--storm filename, one per line for NSTORM
*%-----------------|-------------------------------------------------------|
READ STORM          STORM_FILENAME=["STORM.001"]

*#*************************************************************************
*#
*#***************    DRAINAGE within site boundary   *****************
*#
*#*************************************************************************
*#-------------------
*#    Catchment 100 - Largest portion of site draining northeast
*#
*#-------------------
DESIGN NASHYD       ID=[1], NHYD=["100"], DT=[1]min, AREA=[0.88](ha),
                    DWF=[0](cms), CN/C=[85], TP=[0.34]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*#-------------------
*#    Catchment 102 - Agricultural portion of site draining east
*#-------------------
DESIGN NASHYD       ID=[2], NHYD=["102"], DT=[1]min, AREA=[0.22](ha),
                    DWF=[0](cms), CN/C=[84], TP=[0.40]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*#-------------------
*#    Catchment 104 - Portion of Future site access, currently paved, drains eas
*#-------------------
DESIGN STANDHYD     ID=[3],NHYD=["104"], DT=[1]min, AREA=[0.07](ha),
                    XIMP=[0.1], TIMP=[0.98], DWF=[0](cms), LOSS=[2], CN=[90],
                    SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
*#-------------------
*#    Catchment 110 - Small Western portion of site draining west
*#-------------------
DESIGN NASHYD       ID=[4],NHYD=["110"], DT=[1]min, AREA=[0.07](ha),
                    DWF=[0 ](cms), CN/C=[84], TP=[.18]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*#-------------------
*#    Catchment 120 - Future site access, currently paved, drains to hwy 6
*#-------------------
DESIGN STANDHYD     ID=[5],NHYD=["120"], DT=[1]min, AREA=[0.06](ha),
                    XIMP=[0.10], TIMP=[0.93], DWF=[0](cms), LOSS=[2], CN=[84],
                    SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
*#*****************************************************
*#    Total Flow draining east from Reid's (102 + 104)
*#*****************************************************
ADD HYD             IDsum=[10], NHYD=["R-east"], IDs to add=[2,3]
*#*****************************************************
*#    Total Combined East and North Flow from Reid's (100 + 102 + 104)
*#*****************************************************
ADD HYD             IDsum=[9], NHYD=["Rcombo"], IDs to add=[2,3,1]

*#*************************************************************************
*#
*#***********  DRAINAGE FROM OUTSIDE SITE BOUNDARY  *************
*#
*#*************************************************************************

*#-------------------
*#    Catchment 200 - Existing Commercial Area. Drains east through site
*#-------------------
DESIGN STANDHYD     ID=[6], NHYD=["200"], DT=[1]min, AREA=[0.26](ha),
                    XIMP=[0.10], TIMP=[0.65], DWF=[0](cms), LOSS=[2], CN=[79],
                    SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
*#-------------------
*#    Catchment 210 - Existing Commercial Area draining west
*#-------------------
DESIGN STANDHYD     ID=[7], NHYD=["210"], DT=[1]min, AREA=[0.19](ha),
                    XIMP=[0.10], TIMP=[0.81], DWF=[0](cms), LOSS=[2], CN=[79],
                    SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
*#-------------------
*#    Catchment 220 - Existing Commercial Area draining to Hwy 6
*#-------------------
DESIGN STANDHYD     ID=[8], NHYD=["220"], DT=[1]min, AREA=[0.22](ha),
                    XIMP=[0.10], TIMP=[0.98], DWF=[0](cms), LOSS=[2], CN=[77],
                    SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
*#*****************************************************
*#    Total Flow draining east (200 + 102 + 104)
*#*****************************************************
ADD HYD             IDsum=[2], NHYD=["Qeast"], IDs to add=[10,6]
*#*****************************************************
*#    Total Combined north and east (200 + 100 + 102 + 104)
*#*****************************************************
ADD HYD             IDsum=[3], NHYD=["Qcombo"], IDs to add=[9,6]

*#*****************************************************
*#    Total Flow draining West (110 + 210)
*#*****************************************************
ADD HYD             IDsum=[10], NHYD=["Qwest"], IDs to add=[4,7]

*#*****************************************************
*#    Total Flow draining to Hwy 6 (120 + 220)
*#*****************************************************
ADD HYD             IDsum=[2], NHYD=["Qhwy6"], IDs to add=[5,8]

*%-------------------------------------------------------------------------
*%-------------------------------------------------------------------------
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*#                    ["Fer5yr.stm"] <--storm filename, one per line for NSTORM
*%-------------------------------------------------------------------------
START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*#                    ["Fer100y.stm"] <--storm filename, one per line for NSTORM
*%-------------------------------------------------------------------------
START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*#                    ["hurhaz48.stm"] <--storm filename, one per line for NSTORM
*%-------------------------------------------------------------------------

FINISH
```

```
================================================================================

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
       S  W W W  M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO            9      9   =========
                                                         9   9  9   9   # 4730904
        StormWater Management HYdrologic Model           999    999    =========

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

 ************************************************************************
 ********* Licensed user: Stantec Consulting Ltd. (Kitchener)          *********
 *********                Kitchener            SERIAL#:4730904        *********
 ************************************************************************

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


 *********************   D E T A I L E D   O U T P U T   *********************
 ************************************************************************
 *         DATE: 2022-05-04     TIME: 11:28:15     RUN COUNTER: 000522      *
 ************************************************************************
 * Input   filename: C:\PROGRA~2\SWMHYMO\Projects\Fergus\ExKM5.dat          *
 * Output  filename: C:\PROGRA~2\SWMHYMO\Projects\Fergus\ExKM5.out          *
 * Summary filename: C:\PROGRA~2\SWMHYMO\Projects\Fergus\ExKM5.sum          *
 * User comments:                                                          *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 ************************************************************************

--------------------------------------------------------------------------------
001:0001--------------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: [Fergus]  Project Number: [161414172]
*#  Date        : April. 12, 2022
*#  Modeller    : [M. Ornat]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   :  4730904
*#**************************************************************************
*#  Existing conditions model 5, 100 Year and Regional Storm Events
*#
*#  Per Centre Wellington Design Standards(<-CONFIRM?) - Fergus IDF Parameters
*#
*#  Soil type based on Geotechnical Investigation (Dec 2021);
*#     hydrologic soil type CD (Assumed).
*#
*#**************************************************************************
--------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
--------------------  Rainfall dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
           #  1=GU-25mm.stm
--------------------------------------------------------------------------------
001:0002--------------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 25-mm, 4-hr, Chicago Storm, Guelph (a=50
| Ptotal=  25.02 mm|    Comments: 25-mm, 4-hr, Chicago Storm, Guelph (a=50
--------------------
             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .08   1.466 |   1.08   4.028 |   2.08   5.770 |   3.08   2.077
              .17   1.542 |   1.17   4.819 |   2.17   4.974 |   3.17   1.979
              .25   1.626 |   1.25   6.031 |   2.25   4.379 |   3.25   1.891
              .33   1.722 |   1.33   8.122 |   2.33   3.917 |   3.33   1.811
              .42   1.831 |   1.42  12.538 |   2.42   3.549 |   3.42   1.739
              .50   1.957 |   1.50  27.224 |   2.50   3.248 |   3.50   1.672
              .58   2.103 |   1.58  74.928 |   2.58   2.997 |   3.58   1.611
              .67   2.276 |   1.67  31.441 |   2.67   2.785 |   3.67   1.555
              .75   2.484 |   1.75  16.835 |   2.75   2.603 |   3.75   1.503
              .83   2.739 |   1.83  11.368 |   2.83   2.446 |   3.83   1.454
              .92   3.058 |   1.92   8.571 |   2.92   2.307 |   3.92   1.409
             1.00   3.471 |   2.00   6.888 |   3.00   2.185 |   4.00   1.367

--------------------------------------------------------------------------------
001:0003--------------------------------------------------------------------------
*#**************************************************************************
*#
*#****************    DRAINAGE within site boundary   ******************
*#
*#**************************************************************************
*#--------------------
*#    Catchment 100 - Largest portion of site draining northeast
*#
*#--------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=     .88   Curve Number    (CN)=85.00
| 01:100    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .340

     Unit Hyd Qpeak  (cms)=     .099

     PEAK FLOW       (cms)=     .017 (i)
     TIME TO PEAK    (hrs)=    2.000
     RUNOFF VOLUME    (mm)=    8.097
     TOTAL RAINFALL   (mm)=   25.025
     RUNOFF COEFFICIENT   =     .324

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

--------------------------------------------------------------------------------
001:0004--------------------------------------------------------------------------
*#--------------------
*#    Catchment 102 - Agricultural portion of site draining east
*#--------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=     .22   Curve Number    (CN)=84.00
| 02:102    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .400

     Unit Hyd Qpeak  (cms)=     .021

     PEAK FLOW       (cms)=     .004 (i)
     TIME TO PEAK    (hrs)=    2.083
     RUNOFF VOLUME    (mm)=    7.693
     TOTAL RAINFALL   (mm)=   25.025
     RUNOFF COEFFICIENT   =     .307

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

--------------------------------------------------------------------------------
001:0005--------------------------------------------------------------------------
*#--------------------
*#    Catchment 104 - Portion of Future site access, currently paved, drains eas
*#--------------------
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .07
| 03:104    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   10.00
----------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .07          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      21.60        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      74.93      3362.92
               over (min)        1.00         3.00
     Storage Coeff.  (min)=        .93 (ii)    2.66 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.12          .41
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .01          .012 (iii)
     TIME TO PEAK    (hrs)=       1.58         1.60         1.583
     RUNOFF VOLUME    (mm)=      24.22        24.38        24.364
     TOTAL RAINFALL   (mm)=      25.02        25.02        25.025
     RUNOFF COEFFICIENT   =        .97          .97          .974

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  90.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0006--------------------------------------------------------------------------
*#--------------------
*#    Catchment 110 - Small Western portion of site draining west
*#--------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=     .07   Curve Number    (CN)=84.00
| 04:110    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .180

     Unit Hyd Qpeak  (cms)=     .015

     PEAK FLOW       (cms)=     .002 (i)
     TIME TO PEAK    (hrs)=    1.783
     RUNOFF VOLUME    (mm)=    7.691
     TOTAL RAINFALL   (mm)=   25.025
     RUNOFF COEFFICIENT   =     .307

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

--------------------------------------------------------------------------------
001:0007--------------------------------------------------------------------------
*#--------------------
*#    Catchment 120 - Future site access, currently paved, drains to hwy 6
*#--------------------
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .06
| 05:120    DT= 1.00 |   Total Imp(%)=   93.00   Dir. Conn.(%)=   10.00
----------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .06          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      20.00        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      74.93       899.37
               over (min)        1.00         4.00
     Storage Coeff.  (min)=        .89 (ii)    3.82 (ii)
     Unit Hyd. Tpeak (min)=       1.00         4.00
     Unit Hyd. peak  (cms)=       1.15          .29
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .01          .008 (iii)
     TIME TO PEAK    (hrs)=       1.58         1.62         1.600
     RUNOFF VOLUME    (mm)=      24.22        21.64        21.897
     TOTAL RAINFALL   (mm)=      25.02        25.02        25.025
     RUNOFF COEFFICIENT   =        .97          .86          .875

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0008--------------------------------------------------------------------------
*#**************************************************
*#    Total Flow draining east from Reid's (102 + 104)
*#**************************************************
------------------------
```

```
| ADD HYD (R-east    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 02:102             .22      .004    2.08   7.69    .000
                    +ID2 03:104             .07      .012    1.58  24.36    .000
                     ==========================================================
                     SUM 10:R-east          .29      .013    1.58  11.72    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0009------------------------------------------------------------------------
*#*************************************************
*#    Total Combined East and North Flow from Reid's (100 + 102 + 104)
*#*************************************************
------------------------
| ADD HYD (Rcombo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 02:102             .22      .004    2.08   7.69    .000
                    +ID2 03:104             .07      .012    1.58  24.36    .000
                    +ID3 01:100             .88      .017    2.00   8.10    .000
                     ==========================================================
                     SUM 09:Rcombo         1.17      .022    2.00   8.99    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0010------------------------------------------------------------------------
*#*************************************************************************
*#
*#***********  DRAINAGE FROM OUTSIDE SITE BOUNDARY  *************
*#
*#*************************************************************************
*#-------------------
*#    Catchment 200 - Existing Commercial Area. Drains east through site
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .26
| 06:200    DT= 1.00 |   Total Imp(%)=   65.00   Dir. Conn.(%)=   10.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .17          .09
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     41.63        40.00
     Mannings n            =      .013         .250

     Max.eff.Inten.(mm/hr)=     74.93        68.85
               over (min)        1.00        10.00
     Storage Coeff.  (min)=     1.38 (ii)    9.57 (ii)
     Unit Hyd. Tpeak (min)=     1.00        10.00
     Unit Hyd. peak  (cms)=      .88          .12
                                                      *TOTALS*
     PEAK FLOW       (cms)=      .01          .01          .012 (iii)
     TIME TO PEAK    (hrs)=     1.58         1.73         1.733
     RUNOFF VOLUME    (mm)=    24.22        11.78        13.027
     TOTAL RAINFALL   (mm)=    25.02        25.02        25.025
     RUNOFF COEFFICIENT   =      .97          .47          .521

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0011------------------------------------------------------------------------
*#-------------------
*#    Catchment 210 - Existing Commercial Area draining west
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .19
| 07:210    DT= 1.00 |   Total Imp(%)=   81.00   Dir. Conn.(%)=   10.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .15          .04
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     35.59        40.00
     Mannings n            =      .013         .250

     Max.eff.Inten.(mm/hr)=     74.93       197.75
               over (min)        1.00         7.00
     Storage Coeff.  (min)=     1.25 (ii)    6.63 (ii)
     Unit Hyd. Tpeak (min)=     1.00         7.00
     Unit Hyd. peak  (cms)=      .93          .17
                                                      *TOTALS*
     PEAK FLOW       (cms)=      .00          .01          .015 (iii)
     TIME TO PEAK    (hrs)=     1.58         1.67         1.667
     RUNOFF VOLUME    (mm)=    24.22        15.67        16.524
     TOTAL RAINFALL   (mm)=    25.02        25.02        25.025
     RUNOFF COEFFICIENT   =      .97          .63          .660

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0012------------------------------------------------------------------------
*#-------------------
*#    Catchment 220 - Existing Commercial Area draining to Hwy 6
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .22
| 08:220    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   10.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .22          .00
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     38.30        40.00
     Mannings n            =      .013         .250

     Max.eff.Inten.(mm/hr)=     74.93      3317.69
               over (min)        1.00         3.00
     Storage Coeff.  (min)=     1.31 (ii)    3.05 (ii)
     Unit Hyd. Tpeak (min)=     1.00         3.00
     Unit Hyd. peak  (cms)=      .91          .37
                                                      *TOTALS*
     PEAK FLOW       (cms)=      .00          .03          .037 (iii)
     TIME TO PEAK    (hrs)=     1.58         1.60         1.583
     RUNOFF VOLUME    (mm)=    24.22        23.41        23.493
     TOTAL RAINFALL   (mm)=    25.02        25.02        25.025
     RUNOFF COEFFICIENT   =      .97          .94          .939

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0013------------------------------------------------------------------------
*#*************************************************
*#    Total Flow draining east (200 + 102 + 104)
*#*************************************************
------------------------
| ADD HYD (Qeast     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 10:R-east          .29      .013    1.58  11.72    .000
                    +ID2 06:200             .26      .012    1.73  13.03    .000
                     ==========================================================
                     SUM 02:Qeast           .55      .023    1.58  12.34    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0014------------------------------------------------------------------------
*#*************************************************
*#    Total Combined north and east (200 + 100 + 102 + 104)
*#*************************************************
------------------------
| ADD HYD (Qcombo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 09:Rcombo         1.17      .022    2.00   8.99    .000
                    +ID2 06:200             .26      .012    1.73  13.03    .000
                     ==========================================================
                     SUM 03:Qcombo         1.43      .030    1.83   9.73    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0015------------------------------------------------------------------------
*#*************************************************
*#    Total Flow draining West (110 + 210)
*#*************************************************
------------------------
| ADD HYD (Qwest     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 04:110             .07      .002    1.78   7.69    .000
                    +ID2 07:210             .19      .015    1.67  16.52    .000
                     ==========================================================
                     SUM 10:Qwest           .26      .017    1.67  14.15    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0016------------------------------------------------------------------------
*#*************************************************
*#    Total Flow draining to Hwy 6 (120 + 220)
*#*************************************************
------------------------
| ADD HYD (Qhwy6     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 05:120             .06      .008    1.60  21.90    .000
                    +ID2 08:220             .22      .037    1.58  23.49    .000
                     ==========================================================
                     SUM 02:Qhwy6           .28      .045    1.58  23.15    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0017------------------------------------------------------------------------
  ** END OF RUN :   1

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




--------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
-------------------  Rainfall dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 002
    NSTORM=   1
           #  1=Fer5yr.stm
------------------------------------------------------------------------------
002:0002------------------------------------------------------------------------
*#*************************************************************************
*#  Project Name: [Fergus]  Project Number: [161414172]
*#  Date        : April. 12, 2022
*#  Modeller    : [M. Ornat]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   :  4730904
*#*************************************************************************
*#  Existing conditions model 5, 100 Year and Regional Storm Events
*#
*#  Per Centre Wellington Design Standards(<-CONFIRM?) - Fergus IDF Parameters
*#
*#  Soil type based on Geotechnical Investigation (Dec 2021);
*#     hydrologic soil type CD (Assumed).
*#
*#*************************************************************************
------------------------------------------------------------------------------
002:0002------------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 5-yr, 3hr Chicago Storm â€“ Shand Dam ID
| Ptotal=  42.75 mm|    Comments: 5-yr, 3hr Chicago Storm â€“ Shand Dam ID
--------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
```

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
.08	4.561	.83	16.206	1.58	9.956	2.33	5.609
.17	4.883	.92	30.537	1.67	9.078	2.42	5.377
.25	5.266	1.00	174.456	1.75	8.367	2.50	5.167
.33	5.732	1.08	37.648	1.83	7.777	2.58	4.975
.42	6.312	1.17	23.457	1.92	7.279	2.67	4.800
.50	7.059	1.25	17.808	2.00	6.852	2.75	4.640
.58	8.064	1.33	14.631	2.08	6.481	2.83	4.491
.67	9.508	1.42	12.554	2.17	6.156	2.92	4.354
.75	11.803	1.50	11.074	2.25	5.867	3.00	4.227

002:0003

*# DRAINAGE within site boundary

*# Catchment 100 - Largest portion of site draining northeast

DESIGN NASHYD	Area (ha)= .88	Curve Number (CN)=85.00
01:100 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .340	

Unit Hyd Qpeak (cms)= .099

PEAK FLOW (cms)= .041 (i)
TIME TO PEAK (hrs)= 1.400
RUNOFF VOLUME (mm)= 19.769
TOTAL RAINFALL (mm)= 42.751
RUNOFF COEFFICIENT = .462

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

002:0004

*# Catchment 102 - Agricultural portion of site draining east

DESIGN NASHYD	Area (ha)= .22	Curve Number (CN)=84.00
02:102 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .400	

Unit Hyd Qpeak (cms)= .021

PEAK FLOW (cms)= .009 (i)
TIME TO PEAK (hrs)= 1.483
RUNOFF VOLUME (mm)= 18.983
TOTAL RAINFALL (mm)= 42.751
RUNOFF COEFFICIENT = .444

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

002:0005

*# Catchment 104 - Portion of Future site access, currently paved, drains eas

DESIGN STANDHYD	Area (ha)= .07	
03:104 DT= 1.00	Total Imp(%)= 98.00	Dir. Conn.(%)= 10.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	.07	.00	
Dep. Storage (mm)=	.80	1.50	
Average Slope (%)=	2.00	2.00	
Length (m)=	21.60	40.00	
Mannings n =	.013	.250	
Max.eff.Inten.(mm/hr)=	174.46	7843.67	
over (min)	1.00	2.00	
Storage Coeff. (min)=	.66 (ii)	1.90 (ii)	
Unit Hyd. Tpeak (min)=	1.00	2.00	
Unit Hyd. peak (cms)=	1.32	.58	
			TOTALS
PEAK FLOW (cms)=	.00	.03	.031 (iii)
TIME TO PEAK (hrs)=	1.00	1.00	1.000
RUNOFF VOLUME (mm)=	41.95	42.10	42.085
TOTAL RAINFALL (mm)=	42.75	42.75	42.751
RUNOFF COEFFICIENT =	.98	.98	.984

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 90.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

002:0006

*# Catchment 110 - Small Western portion of site draining west

DESIGN NASHYD	Area (ha)= .07	Curve Number (CN)=84.00
04:110 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .180	

Unit Hyd Qpeak (cms)= .015

PEAK FLOW (cms)= .005 (i)
TIME TO PEAK (hrs)= 1.183
RUNOFF VOLUME (mm)= 18.980
TOTAL RAINFALL (mm)= 42.751
RUNOFF COEFFICIENT = .444

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

002:0007

*# Catchment 120 - Future site access, currently paved, drains to hwy 6

DESIGN STANDHYD	Area (ha)= .06	
05:120 DT= 1.00	Total Imp(%)= 93.00	Dir. Conn.(%)= 10.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	.06	.00	
Dep. Storage (mm)=	.80	1.50	
Average Slope (%)=	2.00	2.00	
Length (m)=	20.00	40.00	
Mannings n =	.013	.250	
Max.eff.Inten.(mm/hr)=	174.46	2180.64	
over (min)	1.00	3.00	
Storage Coeff. (min)=	.63 (ii)	2.69 (ii)	
Unit Hyd. Tpeak (min)=	1.00	3.00	
Unit Hyd. peak (cms)=	1.35	.40	
			TOTALS
PEAK FLOW (cms)=	.00	.02	.023 (iii)
TIME TO PEAK (hrs)=	1.00	1.02	1.000
RUNOFF VOLUME (mm)=	41.95	39.18	39.454
TOTAL RAINFALL (mm)=	42.75	42.75	42.751
RUNOFF COEFFICIENT =	.98	.92	.923

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 84.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

002:0008

*# Total Flow draining east from Reid's (102 + 104)

ADD HYD (R-east)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 02:102	.22	.009	1.48	18.98	.000
	+ID2 03:104	.07	.031	1.00	42.08	.000
	SUM 10:R-east	.29	.032	1.00	24.56	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

002:0009

*# Total Combined East and North Flow from Reid's (100 + 102 + 104)

ADD HYD (Rcombo)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 02:102	.22	.009	1.48	18.98	.000
	+ID2 03:104	.07	.031	1.00	42.08	.000
	+ID3 01:100	.88	.041	1.40	19.77	.000
	SUM 09:Rcombo	1.17	.052	1.40	20.96	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

002:0010

*# DRAINAGE FROM OUTSIDE SITE BOUNDARY

*# Catchment 200 - Existing Commercial Area. Drains east through site

DESIGN STANDHYD	Area (ha)= .26	
06:200 DT= 1.00	Total Imp(%)= 65.00	Dir. Conn.(%)= 10.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	.17	.09	
Dep. Storage (mm)=	.80	1.50	
Average Slope (%)=	2.00	2.00	
Length (m)=	41.63	40.00	
Mannings n =	.013	.250	
Max.eff.Inten.(mm/hr)=	174.46	235.61	
over (min)	1.00	6.00	
Storage Coeff. (min)=	.98 (ii)	5.99 (ii)	
Unit Hyd. Tpeak (min)=	1.00	6.00	
Unit Hyd. peak (cms)=	1.09	.19	
			TOTALS
PEAK FLOW (cms)=	.01	.04	.039 (iii)
TIME TO PEAK (hrs)=	1.00	1.07	1.067
RUNOFF VOLUME (mm)=	41.95	25.99	27.583
TOTAL RAINFALL (mm)=	42.75	42.75	42.751
RUNOFF COEFFICIENT =	.98	.61	.645

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

002:0011

*# Catchment 210 - Existing Commercial Area draining west

DESIGN STANDHYD	Area (ha)= .19	
07:210 DT= 1.00	Total Imp(%)= 81.00	Dir. Conn.(%)= 10.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.15	.04
Dep. Storage (mm)=	.80	1.50
Average Slope (%)=	2.00	2.00
Length (m)=	35.59	40.00
Mannings n =	.013	.250
Max.eff.Inten.(mm/hr)=	174.46	654.83
over (min)	1.00	4.00
Storage Coeff. (min)=	.89 (ii)	4.22 (ii)

```
     Unit Hyd. Tpeak (min)=       1.00          4.00
     Unit Hyd. peak  (cms)=       1.14           .27
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .01           .04          .045 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.03         1.000
     RUNOFF VOLUME    (mm)=      41.95         31.76        32.783
     TOTAL RAINFALL   (mm)=      42.75         42.75        42.751
     RUNOFF COEFFICIENT   =        .98           .74          .767

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
002:0012----------------------------------------------------------------------
*#------------------
*#    Catchment 220 - Existing Commercial Area draining to Hwy 6
*#------------------
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .22
| 08:220    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   10.00
---------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .22          .00
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     38.30        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    174.46      7805.49
               over (min)        1.00         2.00
     Storage Coeff.  (min)=       .93 (ii)    2.17 (ii)
     Unit Hyd. Tpeak (min)=       1.00         2.00
     Unit Hyd. peak  (cms)=       1.12          .53
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .01          .08          .095 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00         1.000
     RUNOFF VOLUME    (mm)=      41.95        41.10        41.181
     TOTAL RAINFALL   (mm)=      42.75        42.75        42.751
     RUNOFF COEFFICIENT   =        .98          .96          .963

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
002:0013----------------------------------------------------------------------
*#*****************************************************
*#    Total Flow draining east (200 + 102 + 104)
*#*****************************************************
------------------------
| ADD HYD (Qeast     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 10:R-east        .29     .032    1.00  24.56    .000
                       +ID2 06:200           .26     .039    1.07  27.58    .000
                        ==========================================================
                        SUM 02:Qeast         .55     .067    1.00  25.99    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0014----------------------------------------------------------------------
*#*****************************************************
*#    Total Combined north and east (200 + 100 + 102 + 104)
*#*****************************************************
------------------------
| ADD HYD (Qcombo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 09:Rcombo       1.17     .052    1.40  20.96    .000
                       +ID2 06:200           .26     .039    1.07  27.58    .000
                        ==========================================================
                        SUM 03:Qcombo       1.43     .072    1.00  22.16    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0015----------------------------------------------------------------------
*#*****************************************************
*#    Total Flow draining West (110 + 210)
*#*****************************************************
------------------------
| ADD HYD (Qwest     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 04:110           .07     .005    1.18  18.98    .000
                       +ID2 07:210           .19     .045    1.00  32.78    .000
                        ==========================================================
                        SUM 10:Qwest          .26     .047    1.03  29.07    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0016----------------------------------------------------------------------
*#*****************************************************
*#    Total Flow draining to Hwy 6 (120 + 220)
*#*****************************************************
------------------------
| ADD HYD (Qhwy6     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 05:120           .06     .023    1.00  39.45    .000
                       +ID2 08:220           .22     .095    1.00  41.18    .000
                        ==========================================================
                        SUM 02:Qhwy6          .28     .118    1.00  40.81    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0017----------------------------------------------------------------------
--------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
  ** END OF RUN :   2

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

```
--------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
--------------------  Rainfall dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 003
    NSTORM=   1
          #  1=Fer100y.stm
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [Fergus]  Project Number: [161414172]
*#  Date        : April. 12, 2022
*#  Modeller    : [M. Ornat]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   :  4730904
*#*****************************************************************************
*#  Existing conditions model 5, 100 Year and Regional Storm Events
*#
*#  Per Centre Wellington Design Standards(<-CONFIRM?) - Fergus IDF Parameters
*#
*#  Soil type based on Geotechnical Investigation (Dec 2021);
*#     hydrologic soil type CD (Assumed).
*#
*#*****************************************************************************
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 100-yr, 3hr Chicago Storm â€" Shand Dam
| Ptotal=  70.85 mm|    Comments: 100-yr, 3hr Chicago Storm â€" Shand Dam
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   7.562 |    .83  26.913 |   1.58  16.519 |   2.33   9.301
               .17   8.096 |    .92  50.868 |   1.67  15.060 |   2.42   8.916
               .25   8.733 |   1.00 287.930 |   1.75  13.879 |   2.50   8.567
               .33   9.505 |   1.08  62.785 |   1.83  12.900 |   2.58   8.250
               .42  10.468 |   1.17  39.004 |   1.92  12.073 |   2.67   7.960
               .50  11.707 |   1.25  29.581 |   2.00  11.364 |   2.75   7.693
               .58  13.376 |   1.33  24.292 |   2.08  10.749 |   2.83   7.447
               .67  15.774 |   1.42  20.837 |   2.17  10.208 |   2.92   7.219
               .75  19.588 |   1.50  18.376 |   2.25   9.729 |   3.00   7.008

--------------------------------------------------------------------------------
003:0003----------------------------------------------------------------------
*#*****************************************************************************
*#
*#****************    DRAINAGE within site boundary   ******************
*#
*#*****************************************************************************
*#------------------
*#    Catchment 100 - Largest portion of site draining northeast
*#
*#------------------
---------------------
| DESIGN NASHYD      |   Area    (ha)=     .88   Curve Number   (CN)=85.00
| 01:100    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=    .340

     Unit Hyd Qpeak  (cms)=     .099

     PEAK FLOW       (cms)=     .091 (i)
     TIME TO PEAK    (hrs)=    1.383
     RUNOFF VOLUME    (mm)=   42.126
     TOTAL RAINFALL   (mm)=   70.853
     RUNOFF COEFFICIENT   =     .595

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

--------------------------------------------------------------------------------
003:0004----------------------------------------------------------------------
*#------------------
*#    Catchment 102 - Agricultural portion of site draining east
*#------------------
---------------------
| DESIGN NASHYD      |   Area    (ha)=     .22   Curve Number   (CN)=84.00
| 02:102    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=    .400

     Unit Hyd Qpeak  (cms)=     .021

     PEAK FLOW       (cms)=     .020 (i)
     TIME TO PEAK    (hrs)=    1.467
     RUNOFF VOLUME    (mm)=   40.852
     TOTAL RAINFALL   (mm)=   70.853
     RUNOFF COEFFICIENT   =     .577

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

--------------------------------------------------------------------------------
003:0005----------------------------------------------------------------------
*#------------------
*#    Catchment 104 - Portion of Future site access, currently paved, drains eas
*#------------------
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .07
| 03:104    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   10.00
---------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .07          .00
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     21.60        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    287.93     12952.62
               over (min)        1.00         2.00
     Storage Coeff.  (min)=       .54 (ii)    1.55 (ii)
     Unit Hyd. Tpeak (min)=       1.00         2.00
     Unit Hyd. peak  (cms)=       1.43          .65
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .01          .05          .053 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00         1.000
```

```
     RUNOFF VOLUME    (mm)=      70.05        70.20         70.183
     TOTAL RAINFALL   (mm)=      70.85        70.85         70.853
     RUNOFF COEFFICIENT   =        .99          .99           .991

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  90.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
003:0006----------------------------------------------------------------------
*#------------------
*#    Catchment 110 - Small Western portion of site draining west
*#------------------
---------------------
| DESIGN NASHYD      |   Area    (ha)=     .07   Curve Number   (CN)=84.00
| 04:110    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .180

     Unit Hyd Qpeak  (cms)=     .015

     PEAK FLOW       (cms)=     .011 (i)
     TIME TO PEAK    (hrs)=    1.167
     RUNOFF VOLUME    (mm)=   40.849
     TOTAL RAINFALL   (mm)=   70.853
     RUNOFF COEFFICIENT   =     .577

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

--------------------------------------------------------------------------------
003:0007----------------------------------------------------------------------
*#------------------
*#    Catchment 120 - Future site access, currently paved, drains to hwy 6
*#------------------
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .06
| 05:120    DT= 1.00 |   Total Imp(%)=   93.00   Dir. Conn.(%)=   10.00
---------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .06          .00
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     20.00        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    287.93      3665.18
               over (min)        1.00         2.00
     Storage Coeff.  (min)=       .52 (ii)    2.19 (ii)
     Unit Hyd. Tpeak (min)=      1.00         2.00
     Unit Hyd. peak  (cms)=      1.45          .53
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .00          .04          .043 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.00         1.000
     RUNOFF VOLUME    (mm)=     70.05        67.16        67.452
     TOTAL RAINFALL   (mm)=     70.85        70.85        70.853
     RUNOFF COEFFICIENT   =       .99          .95          .952

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
003:0008----------------------------------------------------------------------
*#*****************************************************
*#    Total Flow draining east from Reid's (102 + 104)
*#*****************************************************
----------------------
| ADD HYD (R-east    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 02:102            .22      .020    1.47  40.85    .000
                     +ID2 03:104            .07      .053    1.00  70.18    .000
                      ========================================================
                      SUM 10:R-east         .29      .056    1.00  47.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0009----------------------------------------------------------------------
*#*****************************************************
*#    Total Combined East and North Flow from Reid's (100 + 102 + 104)
*#*****************************************************
----------------------
| ADD HYD (Rcombo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 02:102            .22      .020    1.47  40.85    .000
                     +ID2 03:104            .07      .053    1.00  70.18    .000
                     +ID3 01:100            .88      .091    1.38  42.13    .000
                      ========================================================
                      SUM 09:Rcombo         1.17     .114    1.38  43.57    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0010----------------------------------------------------------------------
*#*****************************************************************************
*#
*#***********  DRAINAGE FROM OUTSIDE SITE BOUNDARY  ************
*#
*#*****************************************************************************
*#------------------
*#    Catchment 200 - Existing Commercial Area. Drains east through site
*#------------------
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .26
| 06:200    DT= 1.00 |   Total Imp(%)=   65.00   Dir. Conn.(%)=   10.00
---------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .17          .09
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     41.63        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    287.93       568.20
               over (min)        1.00         4.00
     Storage Coeff.  (min)=       .80 (ii)    4.33 (ii)
     Unit Hyd. Tpeak (min)=      1.00         4.00
     Unit Hyd. peak  (cms)=      1.21          .27
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .02          .09          .098 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.03         1.000
     RUNOFF VOLUME    (mm)=     70.05        51.15        53.045
     TOTAL RAINFALL   (mm)=     70.85        70.85        70.853
     RUNOFF COEFFICIENT   =       .99          .72          .749

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
003:0011----------------------------------------------------------------------
*#------------------
*#    Catchment 210 - Existing Commercial Area draining west
*#------------------
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .19
| 07:210    DT= 1.00 |   Total Imp(%)=   81.00   Dir. Conn.(%)=   10.00
---------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .15          .04
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     35.59        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    287.93      1229.33
               over (min)        1.00         3.00
     Storage Coeff.  (min)=       .73 (ii)    3.32 (ii)
     Unit Hyd. Tpeak (min)=      1.00         3.00
     Unit Hyd. peak  (cms)=      1.27          .35
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .02          .09          .101 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.02         1.000
     RUNOFF VOLUME    (mm)=     70.05        58.68        59.816
     TOTAL RAINFALL   (mm)=     70.85        70.85        70.853
     RUNOFF COEFFICIENT   =       .99          .83          .844

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
003:0012----------------------------------------------------------------------
*#------------------
*#    Catchment 220 - Existing Commercial Area draining to Hwy 6
*#------------------
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .22
| 08:220    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   10.00
---------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .22          .00
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     38.30        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    287.93     12928.03
               over (min)        1.00         2.00
     Storage Coeff.  (min)=       .76 (ii)    1.77 (ii)
     Unit Hyd. Tpeak (min)=      1.00         2.00
     Unit Hyd. peak  (cms)=      1.24          .60
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .02          .15          .164 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.00         1.000
     RUNOFF VOLUME    (mm)=     70.05        69.17        69.261
     TOTAL RAINFALL   (mm)=     70.85        70.85        70.853
     RUNOFF COEFFICIENT   =       .99          .98          .978

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
003:0013----------------------------------------------------------------------
*#*****************************************************
*#    Total Flow draining east (200 + 102 + 104)
*#*****************************************************
----------------------
| ADD HYD (Qeast     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 10:R-east         .29      .056    1.00  47.93    .000
                     +ID2 06:200            .26      .098    1.00  53.04    .000
                      ========================================================
                      SUM 02:Qeast          .55      .154    1.00  50.35    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0014----------------------------------------------------------------------
*#*****************************************************
*#    Total Combined north and east (200 + 100 + 102 + 104)
*#*****************************************************
----------------------
| ADD HYD (Qcombo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 09:Rcombo         1.17     .114    1.38  43.57    .000
                     +ID2 06:200            .26      .098    1.00  53.04    .000
                      ========================================================
                      SUM 03:Qcombo         1.43     .169    1.00  45.29    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0015----------------------------------------------------------------------
```

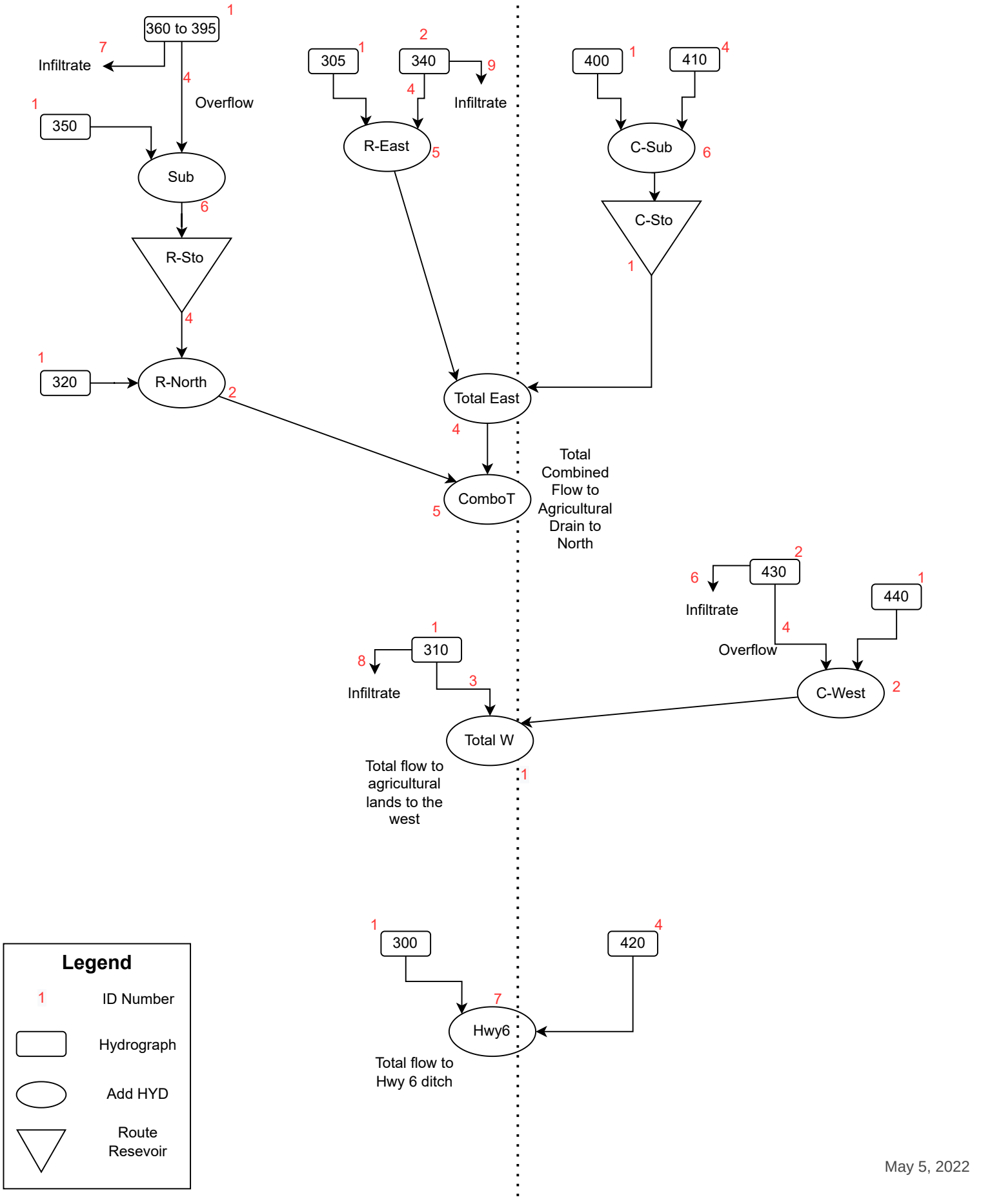
```
*#*****************************************************
*#    Total Flow draining West (110 + 210)
*#*****************************************************
------------------------
| ADD HYD (Qwest     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 04:110           .07      .011    1.17  40.85    .000
                      +ID2 07:210           .19      .101    1.00  59.82    .000
                       ==========================================================
                       SUM 10:Qwest         .26      .104    1.00  54.71    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0016----------------------------------------------------------------------
*#*****************************************************
*#    Total Flow draining to Hwy 6 (120 + 220)
*#*****************************************************
------------------------
| ADD HYD (Qhwy6     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 05:120           .06      .043    1.00  67.45    .000
                      +ID2 08:220           .22      .164    1.00  69.26    .000
                       ==========================================================
                       SUM 02:Qhwy6         .28      .207    1.00  68.87    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0017----------------------------------------------------------------------
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
  ** END OF RUN :   3

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




--------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
--------------------  Rainfall dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 004
    NSTORM=   1
          #  1=hurhaz48.stm
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [Fergus]  Project Number: [161414172]
*#  Date        : April. 12, 2022
*#  Modeller    : [M. Ornat]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   :  4730904
*#*****************************************************************************
*#  Existing conditions model 5, 100 Year and Regional Storm Events
*#
*#  Per Centre Wellington Design Standards(<-CONFIRM?) - Fergus IDF Parameters
*#
*#  Soil type based on Geotechnical Investigation (Dec 2021);
*#     hydrologic soil type CD (Assumed).
*#
*#*****************************************************************************
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: REGIONAL STORM
| Ptotal= 285.00 mm|    Comments: REGIONAL STORM
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	2.000	12.25	2.000	24.25	2.000	36.25	6.000
.50	2.000	12.50	2.000	24.50	2.000	36.50	6.000
.75	2.000	12.75	2.000	24.75	2.000	36.75	6.000
1.00	2.000	13.00	2.000	25.00	2.000	37.00	6.000
1.25	2.000	13.25	2.000	25.25	2.000	37.25	4.000
1.50	2.000	13.50	2.000	25.50	2.000	37.50	4.000
1.75	2.000	13.75	2.000	25.75	2.000	37.75	4.000
2.00	2.000	14.00	2.000	26.00	2.000	38.00	4.000
2.25	2.000	14.25	2.000	26.25	2.000	38.25	6.000
2.50	2.000	14.50	2.000	26.50	2.000	38.50	6.000
2.75	2.000	14.75	2.000	26.75	2.000	38.75	6.000
3.00	2.000	15.00	2.000	27.00	2.000	39.00	6.000
3.25	2.000	15.25	2.000	27.25	2.000	39.25	13.000
3.50	2.000	15.50	2.000	27.50	2.000	39.50	13.000
3.75	2.000	15.75	2.000	27.75	2.000	39.75	13.000
4.00	2.000	16.00	2.000	28.00	2.000	40.00	13.000
4.25	2.000	16.25	2.000	28.25	2.000	40.25	17.000
4.50	2.000	16.50	2.000	28.50	2.000	40.50	17.000
4.75	2.000	16.75	2.000	28.75	2.000	40.75	17.000
5.00	2.000	17.00	2.000	29.00	2.000	41.00	17.000
5.25	2.000	17.25	2.000	29.25	2.000	41.25	13.000
5.50	2.000	17.50	2.000	29.50	2.000	41.50	13.000
5.75	2.000	17.75	2.000	29.75	2.000	41.75	13.000
6.00	2.000	18.00	2.000	30.00	2.000	42.00	13.000
6.25	2.000	18.25	2.000	30.25	2.000	42.25	23.000
6.50	2.000	18.50	2.000	30.50	2.000	42.50	23.000
6.75	2.000	18.75	2.000	30.75	2.000	42.75	23.000
7.00	2.000	19.00	2.000	31.00	2.000	43.00	23.000
7.25	2.000	19.25	2.000	31.25	2.000	43.25	13.000
7.50	2.000	19.50	2.000	31.50	2.000	43.50	13.000
7.75	2.000	19.75	2.000	31.75	2.000	43.75	13.000
8.00	2.000	20.00	2.000	32.00	2.000	44.00	13.000
8.25	2.000	20.25	2.000	32.25	2.000	44.25	13.000
8.50	2.000	20.50	2.000	32.50	2.000	44.50	13.000
8.75	2.000	20.75	2.000	32.75	2.000	44.75	13.000
9.00	2.000	21.00	2.000	33.00	2.000	45.00	13.000
9.25	2.000	21.25	2.000	33.25	2.000	45.25	53.000
9.50	2.000	21.50	2.000	33.50	2.000	45.50	53.000
9.75	2.000	21.75	2.000	33.75	2.000	45.75	53.000
10.00	2.000	22.00	2.000	34.00	2.000	46.00	53.000
10.25	2.000	22.25	2.000	34.25	2.000	46.25	38.000
10.50	2.000	22.50	2.000	34.50	2.000	46.50	38.000
10.75	2.000	22.75	2.000	34.75	2.000	46.75	38.000
11.00	2.000	23.00	2.000	35.00	2.000	47.00	38.000
11.25	2.000	23.25	2.000	35.25	3.000	47.25	13.000
11.50	2.000	23.50	2.000	35.50	3.000	47.50	13.000
11.75	2.000	23.75	2.000	35.75	3.000	47.75	13.000
12.00	2.000	24.00	2.000	36.00	3.000	48.00	13.000

```
--------------------------------------------------------------------------------
004:0003----------------------------------------------------------------------
*#*****************************************************************************
*#
*#****************    DRAINAGE within site boundary   ******************
*#
*#*****************************************************************************
*#--------------------
*#    Catchment 100 - Largest portion of site draining northeast
*#
*#--------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .88   Curve Number   (CN)=85.00
| 01:100    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .340

     Unit Hyd Qpeak  (cms)=     .099

     PEAK FLOW       (cms)=     .121 (i)
     TIME TO PEAK    (hrs)=   46.083
     RUNOFF VOLUME    (mm)=  244.796
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .859

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

--------------------------------------------------------------------------------
004:0004----------------------------------------------------------------------
*#--------------------
*#    Catchment 102 - Agricultural portion of site draining east
*#--------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .22   Curve Number   (CN)=84.00
| 02:102    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .400

     Unit Hyd Qpeak  (cms)=     .021

     PEAK FLOW       (cms)=     .029 (i)
     TIME TO PEAK    (hrs)=   46.150
     RUNOFF VOLUME    (mm)=  242.171
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .850

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

--------------------------------------------------------------------------------
004:0005----------------------------------------------------------------------
*#--------------------
*#    Catchment 104 - Portion of Future site access, currently paved, drains eas
*#--------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .07
| 03:104    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   10.00
----------------------

                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .07          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      21.60        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00      2385.00
               over (min)        1.00         3.00
     Storage Coeff.  (min)=       1.07 (ii)    3.05 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.03          .37
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .01          .010 (iii)
     TIME TO PEAK    (hrs)=      45.20        45.97        45.983
     RUNOFF VOLUME    (mm)=     284.19       284.34       284.330
     TOTAL RAINFALL   (mm)=     285.00       285.00       285.000
     RUNOFF COEFFICIENT   =       1.00         1.00          .998

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  90.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
004:0006----------------------------------------------------------------------
*#--------------------
*#    Catchment 110 - Small Western portion of site draining west
*#--------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .07   Curve Number   (CN)=84.00
| 04:110    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .180

     Unit Hyd Qpeak  (cms)=     .015

     PEAK FLOW       (cms)=     .010 (i)
     TIME TO PEAK    (hrs)=   46.000
     RUNOFF VOLUME    (mm)=  242.168
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .850

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

--------------------------------------------------------------------------------
004:0007----------------------------------------------------------------------
*#--------------------
*#    Catchment 120 - Future site access, currently paved, drains to hwy 6
*#--------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .06
| 05:120    DT= 1.00 |   Total Imp(%)=   93.00   Dir. Conn.(%)=   10.00
----------------------

                            IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=        .06          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      20.00        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00       681.25
               over (min)        1.00         4.00
     Storage Coeff.  (min)=      1.02 (ii)    4.29 (ii)
     Unit Hyd. Tpeak (min)=      1.00         4.00
     Unit Hyd. peak  (cms)=      1.06          .27
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .00          .01          .009 (iii)
     TIME TO PEAK    (hrs)=     45.18        46.00        46.000
     RUNOFF VOLUME    (mm)=    284.20       281.17       281.471
     TOTAL RAINFALL   (mm)=    285.00       285.00       285.000
     RUNOFF COEFFICIENT   =      1.00          .99          .988

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  84.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
004:0008----------------------------------------------------------------------
*#*****************************************************
*#    Total Flow draining east from Reid's (102 + 104)
*#*****************************************************
----------------------
| ADD HYD (R-east    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 02:102             .22      .029   46.15 242.17    .000
                    +ID2 03:104             .07      .010   45.98 284.33    .000
                     =====================================================
                     SUM 10:R-east          .29      .039   46.00 252.35    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0009----------------------------------------------------------------------
*#*****************************************************
*#    Total Combined East and North Flow from Reid's (100 + 102 + 104)
*#*****************************************************
----------------------
| ADD HYD (Rcombo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 02:102             .22      .029   46.15 242.17    .000
                    +ID2 03:104             .07      .010   45.98 284.33    .000
                    +ID3 01:100             .88      .121   46.08 244.80    .000
                     =====================================================
                     SUM 09:Rcombo         1.17      .158   46.03 246.67    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0010----------------------------------------------------------------------
*#*****************************************************************************
*#
*#***********  DRAINAGE FROM OUTSIDE SITE BOUNDARY  *************
*#
*#*****************************************************************************
*#-------------------
*#    Catchment 200 - Existing Commercial Area. Drains east through site
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .26
| 06:200    DT= 1.00 |   Total Imp(%)=   65.00   Dir. Conn.(%)=   10.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .17          .09
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      41.63        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00       134.85
               over (min)        2.00         8.00
     Storage Coeff.  (min)=      1.58 (ii)    7.84 (ii)
     Unit Hyd. Tpeak (min)=      2.00         8.00
     Unit Hyd. peak  (cms)=       .65          .14
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .00          .03          .038 (iii)
     TIME TO PEAK    (hrs)=     45.32        46.00        46.000
     RUNOFF VOLUME    (mm)=    284.20       260.35       262.761
     TOTAL RAINFALL   (mm)=    285.00       285.00       285.000
     RUNOFF COEFFICIENT   =      1.00          .91          .922

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
004:0011----------------------------------------------------------------------
*#-------------------
*#    Catchment 210 - Existing Commercial Area draining west
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .19
| 07:210    DT= 1.00 |   Total Imp(%)=   81.00   Dir. Conn.(%)=   10.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .15          .04
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      35.59        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00       250.21
               over (min)        1.00         6.00
     Storage Coeff.  (min)=      1.44 (ii)    6.33 (ii)
     Unit Hyd. Tpeak (min)=      1.00         6.00
     Unit Hyd. peak  (cms)=       .85          .18
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .00          .03          .028 (iii)
     TIME TO PEAK    (hrs)=     45.28        46.00        46.000
     RUNOFF VOLUME    (mm)=    284.19       271.09       272.416
     TOTAL RAINFALL   (mm)=    285.00       285.00       285.000
     RUNOFF COEFFICIENT   =      1.00          .95          .956

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
004:0012----------------------------------------------------------------------
*#-------------------
*#    Catchment 220 - Existing Commercial Area draining to Hwy 6
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .22
| 08:220    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   10.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .22          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      38.30        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00      2384.89
               over (min)        2.00         3.00
     Storage Coeff.  (min)=      1.50 (ii)    3.49 (ii)
     Unit Hyd. Tpeak (min)=      2.00         3.00
     Unit Hyd. peak  (cms)=       .66          .34
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .00          .03          .032 (iii)
     TIME TO PEAK    (hrs)=     45.30        45.97        45.967
     RUNOFF VOLUME    (mm)=    284.19       283.30       283.377
     TOTAL RAINFALL   (mm)=    285.00       285.00       285.000
     RUNOFF COEFFICIENT   =      1.00          .99          .994

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
004:0013----------------------------------------------------------------------
*#*****************************************************
*#    Total Flow draining east (200 + 102 + 104)
*#*****************************************************
----------------------
| ADD HYD (Qeast     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 10:R-east          .29      .039   46.00 252.35    .000
                    +ID2 06:200             .26      .038   46.00 262.76    .000
                     =====================================================
                     SUM 02:Qeast           .55      .077   46.00 257.27    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0014----------------------------------------------------------------------
*#*****************************************************
*#    Total Combined north and east (200 + 100 + 102 + 104)
*#*****************************************************
----------------------
| ADD HYD (Qcombo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 09:Rcombo         1.17      .158   46.03 246.67    .000
                    +ID2 06:200             .26      .038   46.00 262.76    .000
                     =====================================================
                     SUM 03:Qcombo         1.43      .196   46.00 249.59    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0015----------------------------------------------------------------------
*#*****************************************************
*#    Total Flow draining West (110 + 210)
*#*****************************************************
----------------------
| ADD HYD (Qwest     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 04:110             .07      .010   46.00 242.17    .000
                    +ID2 07:210             .19      .028   46.00 272.42    .000
                     =====================================================
                     SUM 10:Qwest           .26      .038   46.00 264.27    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0016----------------------------------------------------------------------
*#*****************************************************
*#    Total Flow draining to Hwy 6 (120 + 220)
*#*****************************************************
----------------------
| ADD HYD (Qhwy6     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 05:120             .06      .009   46.00 281.47    .000
                    +ID2 08:220             .22      .032   45.97 283.38    .000
                     =====================================================
                     SUM 02:Qhwy6           .28      .041   46.00 282.97    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0017----------------------------------------------------------------------
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
     FINISH
--------------------------------------------------------------------------------
*******************************************************************************
     WARNINGS / ERRORS / NOTES
```

Simulation ended on 2022-05-04 at 11:28:17
==========


Reid's Site
Commercial Site
360 to 395
Infiltrate
Overflow
350
Sub
R-Sto
320
R-North
305
340
Infiltrate
R-East
400
410
C-Sub
C-Sto
Total East
ComboT
Total Combined Flow to Agricultural Drain to North
430
Infiltrate
440
Overflow
C-West
310
Infiltrate
Total W
Total flow to agricultural lands to the west
300
420
Hwy6
Total flow to Hwy 6 ditch
Legend
ID Number
Hydrograph
Add HYD
Route Resevoir
May 5, 2022

```
2     Metric units
*#*************************************************************************
*#  Project Name: [Fergus]  Project Number: [161414172]
*#  Date        : April. 21, 2022
*#  Modeller    : [K. Macnaughton]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   :  4730904
*#*************************************************************************
*#  Proposed conditions model 25 mm, 5-year, 100-year, and Regional Storm Events
*#
*#  Per Centre Wellington Design Standards(<-CONFIRM?)
*#           Fergus Shand Dam IDF Parameters
*#
*#  Soil type based on Geotechnical Investigation (Dec 2021);
*#     hydrologic soil type CD (Assumed).
*#
*# Apr 25 - Each site provides separate storage
*#        - 25 mm event infiltrated from all rooftops
*#        - all Reid's rooftops directed to parking area and northward
*#        - 100 year event infiltrated for Catchments 310 and 340
*#  - site & comm storage increased to match Total combined north and east flow
*#     - 95% to 5% split on increase in volume requirements
*#*************************************************************************
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[001]
*#                    ["GU-25mm.stm"] <--storm filename, one per line for NSTORM
*%------------------|-------------------------------------------------------|
READ STORM          STORM_FILENAME=["STORM.001"]

*#*************************************************************************
*#
*#****************    DRAINAGE within site boundary   ******************
*#
*#*************************************************************************
*#-------------------
*#    Catchment 305 - Paved driveway, drains to swale, east of site
*#-------------------
DESIGN STANDHYD     ID=[1],NHYD=["305"], DT=[1]min, AREA=[0.09](ha),
                    XIMP=[0.1], TIMP=[0.9], DWF=[0](cms), LOSS=[2], CN=[77],
                    SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
*#-------------------
*#    Catchment 340 - Landscaped area, drains east - 100 yr infiltrates
*#-------------------
DESIGN NASHYD       ID=[2, NHYD=["340"], DT=[1]min, AREA=[0.08](ha),
                    DWF=[0](cms), CN/C=[77], TP=[0.04]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
COMPUTE DUALHYD     IDin=[2], CINLET=[.024](cms), NINLET=[1],
                    MAJID=[4], MajNHYD=["340of"],
                    MINID=[9], MinNHYD=["340in"],
                    TMJSTO=[   ](cu-m)
ADD HYD             IDsum=[5], NHYD=["R-East"], IDs to add=[1,4]
*#-------------------
*#    Catchment 310 - Landscaped area, drains west - 100 yr infiltrates
*#-------------------
DESIGN NASHYD       ID=[1], NHYD=["310"], DT=[1]min, AREA=[0.11](ha),
                    DWF=[0](cms), CN/C=[77], TP=[0.04]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
COMPUTE DUALHYD     IDin=[1], CINLET=[.033](cms), NINLET=[1],
                    MAJID=[3], MajNHYD=["310of"],
                    MINID=[8], MinNHYD=["310in"],
                    TMJSTO=[   ](cu-m)
*#-------------------
*#    Rooftops - 360+370+380+390+395 - 25 mm infiltrated
*#-------------------
DESIGN STANDHYD     ID=[1],NHYD=["393"], DT=[1]min, AREA=[0.27](ha),
                    XIMP=[0.01], TIMP=[0.99], DWF=[0](cms), LOSS=[2], CN=[90],
                    SLOPE=[30](%), RAINFALL=[ , , , , ](mm/hr), END=-1
COMPUTE DUALHYD     IDin=[1], CINLET=[.056](cms), NINLET=[1],
                    MAJID=[4], MajNHYD=["393of"],
                    MINID=[7], MinNHYD=["393in"],
                    TMJSTO=[   ](cu-m)
*#-------------------
*#    Catchment 350 - Parking lot and Landscaped amenity area
*#-------------------
DESIGN STANDHYD     ID=[1],NHYD=["350"], DT=[1]min, AREA=[0.59](ha),
                    XIMP=[0.65], TIMP=[0.70], DWF=[0](cms), LOSS=[2], CN=[77],
                    SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
ADD HYD             IDsum=[6], NHYD=["SUB"], IDs to add=[1,4]
*#-------------------
*#  *******
*#  Storage for parking lot and excess rooftop runoff
*#  *******
ROUTE RESERVOIR     IDout=[4],   NHYD=["R-Sto" ],  IDin=[6],
                    RDT=[1 ](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [   0.015, 0.0125 ]
                                [   0.035, 0.02325 ]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*#-------------------
*#    Catchment 320 - Landscaped area, drains north
*#-------------------
DESIGN NASHYD       ID=[1], NHYD=["320"], DT=[1]min, AREA=[0.09](ha),
                    DWF=[0](cms), CN/C=[77], TP=[0.04]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
ADD HYD             IDsum=[2], NHYD=["RNorth"], IDs to add=[1,4  ]
ADD HYD             IDsum=[10], NHYD=["Rcombo"], IDs to add=[2,5  ]
*#-------------------
*#    Catchment 300 - Future site access, paved, drains to hwy 6
*#-------------------
DESIGN STANDHYD     ID=[1],NHYD=["300"], DT=[1]min, AREA=[0.07](ha),
                    XIMP=[0.1], TIMP=[0.90], DWF=[0](cms), LOSS=[2], CN=[77],
                    SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
*#*************************************************************************
*#
*#****************    DRAINAGE from Commercial Site   **********************
*#
*#*************************************************************************
*#-------------------
*#    Catchment 420 - Landscaped area, drains to Hwy 6
*#-------------------
DESIGN NASHYD       ID=[4], NHYD=["420"], DT=[1]min, AREA=[0.13](ha),
                    DWF=[0](cms), CN/C=[77], TP=[0.06]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*#************************
*#  Total Flow to Hwy 6
*#************************
ADD HYD             IDsum=[7], NHYD=["Hwy6"], IDs to add=[1,4 ]
*#-------------------
*#    Catchment 400 - Landscaped area, drains East
*#-------------------
DESIGN NASHYD       ID=[1], NHYD=["400"], DT=[1]min, AREA=[0.05](ha),
                    DWF=[0](cms), CN/C=[77], TP=[0.05]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*#-------------------
*#    Catchment 410 - Commercial Parking Lot, drains East
*#-------------------
DESIGN STANDHYD     ID=[4],NHYD=["410"], DT=[1]min, AREA=[0.31](ha),
                    XIMP=[0.8], TIMP=[0.9], DWF=[0](cms), LOSS=[2], CN=[77],
                    SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
ADD HYD             IDsum=[6], NHYD=["C-East"], IDs to add=[1,4  ]
ROUTE RESERVOIR     IDout=[1 ],   NHYD=["C-Sto"],  IDin=[6 ],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [   0.03, 0.006 ]
                                [   0.055, 0.00875 ]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*#************************
*#  Total Flow to Swale at East
*#************************
ADD HYD             IDsum=[4 ], NHYD=["TotalE"], IDs to add=[5,1  ]
*#************************
*#  Total Flow North
*#************************
ADD HYD             IDsum=[5], NHYD=["ComboT"], IDs to add=[2,4  ]
*#-------------------
*#    Catchment 430 - Commercial Rooftop - 25 mm infiltrates
*#-------------------
DESIGN STANDHYD     ID=[2],NHYD=["430"], DT=[1]min, AREA=[0.14](ha),
                    XIMP=[0.01], TIMP=[0.99], DWF=[0](cms), LOSS=[2], CN=[90],
                    SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
COMPUTE DUALHYD     IDin=[2], CINLET=[.026](cms), NINLET=[1],
                    MAJID=[4 ], MajNHYD=["430of"],
                    MINID=[6], MinNHYD=["430in"],
                    TMJSTO=[   ](cu-m)
*#-------------------
*#    Catchment 440 - Landscaped area, drains west
*#-------------------
DESIGN NASHYD       ID=[1], NHYD=["440"], DT=[1]min, AREA=[0.04](ha),
                    DWF=[0](cms), CN/C=[77], TP=[0.03]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
ADD HYD             IDsum=[2], NHYD=["C-West"], IDs to add=[4,1  ]
*#************************
*#  Total Flow West
*#************************
ADD HYD             IDsum=[1], NHYD=["TotalW"], IDs to add=[3,2]

*%------------------------------------------------------------------------
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*#                    ["Fer5yr.stm"] <--storm filename, one per line for NSTORM
*%------------------------------------------------------------------------
START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*#                    ["Fer100y.stm"] <--storm filename, one per line for NSTORM
*%------------------------------------------------------------------------
*%------------------------------------------------------------------------
START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*#                    ["hurhaz48.stm"] <--storm filename, one per line for NSTORM
*%------------------------------------------------------------------------


FINISH
```

```
 ======================================================================

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
       S  W W W  M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO            9      9   =========
                                                          9   9  9   9   # 4730904
        StormWater Management HYdrologic Model            999    999    =========

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

 ************************************************************************
 ********* Licensed user: Stantec Consulting Ltd. (Kitchener)          *********
 *********                Kitchener            SERIAL#:4730904        *********
 ************************************************************************

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


 *********************   D E T A I L E D   O U T P U T   *********************
 ************************************************************************
 *         DATE: 2022-05-04     TIME: 11:28:01     RUN COUNTER: 000521      *
 ************************************************************************
 * Input   filename: C:\PROGRA~2\SWMHYMO\Projects\Fergus\PD2511.dat         *
 * Output  filename: C:\PROGRA~2\SWMHYMO\Projects\Fergus\PD2511.out         *
 * Summary filename: C:\PROGRA~2\SWMHYMO\Projects\Fergus\PD2511.sum         *
 * User comments:                                                          *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 ************************************************************************


------------------------------------------------------------------------------
001:0001------------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: [Fergus]  Project Number: [161414172]
*#  Date        : April. 21, 2022
*#  Modeller    : [K. Macnaughton]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   :  4730904
*#**************************************************************************
*#  Proposed conditions model 25 mm, 5-year, 100-year, and Regional Storm Events
*#
*#  Per Centre Wellington Design Standards(<-CONFIRM?)
*#           Fergus Shand Dam IDF Parameters
*#
*#  Soil type based on Geotechnical Investigation (Dec 2021);
*#     hydrologic soil type CD (Assumed).
*#
*# Apr 25 - Each site provides separate storage
*#        - 25 mm event infiltrated from all rooftops
*#        - all Reid's rooftops directed to parking area and northward
*#        - 100 year event infiltrated for Catchments 310 and 340
*#  - site & comm storage increased to match Total combined north and east flow
*#     - 95% to 5% split on increase in volume requirements
*#**************************************************************************
--------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
--------------------  Rainfall dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
          #  1=GU-25mm.stm
------------------------------------------------------------------------------
001:0002------------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 25-mm, 4-hr, Chicago Storm, Guelph (a=50
| Ptotal=  25.02 mm|    Comments: 25-mm, 4-hr, Chicago Storm, Guelph (a=50
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   1.466 |   1.08   4.028 |   2.08   5.770 |   3.08   2.077
               .17   1.542 |   1.17   4.819 |   2.17   4.974 |   3.17   1.979
               .25   1.626 |   1.25   6.031 |   2.25   4.379 |   3.25   1.891
               .33   1.722 |   1.33   8.122 |   2.33   3.917 |   3.33   1.811
               .42   1.831 |   1.42  12.538 |   2.42   3.549 |   3.42   1.739
               .50   1.957 |   1.50  27.224 |   2.50   3.248 |   3.50   1.672
               .58   2.103 |   1.58  74.928 |   2.58   2.997 |   3.58   1.611
               .67   2.276 |   1.67  31.441 |   2.67   2.785 |   3.67   1.555
               .75   2.484 |   1.75  16.835 |   2.75   2.603 |   3.75   1.503
               .83   2.739 |   1.83  11.368 |   2.83   2.446 |   3.83   1.454
               .92   3.058 |   1.92   8.571 |   2.92   2.307 |   3.92   1.409
              1.00   3.471 |   2.00   6.888 |   3.00   2.185 |   4.00   1.367

------------------------------------------------------------------------------
001:0003------------------------------------------------------------------------
*#**************************************************************************
*#
*#****************    DRAINAGE within site boundary   ******************
*#
*#**************************************************************************
*#------------------
*#    Catchment 305 - Paved driveway, drains to swale, east of site
*#------------------
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .09
| 01:305    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   10.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .08          .01
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      24.49        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      74.93       535.00
               over (min)        1.00         5.00
     Storage Coeff.  (min)=      1.00 (ii)    4.61 (ii)
     Unit Hyd. Tpeak (min)=      1.00         5.00
     Unit Hyd. peak  (cms)=      1.07          .24
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .00          .01          .010 (iii)
     TIME TO PEAK    (hrs)=      1.58         1.63         1.633
     RUNOFF VOLUME    (mm)=     24.22        18.56        19.129
     TOTAL RAINFALL   (mm)=     25.02        25.02        25.025
     RUNOFF COEFFICIENT   =       .97          .74          .764

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0004------------------------------------------------------------------------
*#------------------
*#    Catchment 340 - Landscaped area, drains east - 100 yr infiltrates
*#------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=     .08   Curve Number    (CN)=77.00
| 02:340    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .040

     Unit Hyd Qpeak  (cms)=     .076

     PEAK FLOW       (cms)=     .003 (i)
     TIME TO PEAK    (hrs)=    1.600
     RUNOFF VOLUME    (mm)=    5.567
     TOTAL RAINFALL   (mm)=   25.025
     RUNOFF COEFFICIENT   =     .222

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

------------------------------------------------------------------------------
001:0005------------------------------------------------------------------------
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .024  (cms)
| TotalHyd 02:340    |   Number of inlets in system [NINLET] =      1
----------------------   Total minor system capacity          =    .024  (cms)
                         Total major system storage [TMJSTO] =      0.(cu.m.)

                   ID: NHYD        AREA     QPEAK     TPEAK     R.V.       DWF
                                    (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.   02:340           .08      .003     1.600    5.567     .000
     ==========================================================================
     MAJOR SYST   04:340of         .00      .000      .000     .000     .000
     MINOR SYST   09:340in         .08      .003     1.600    5.567     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0006------------------------------------------------------------------------
----------------------
| ADD HYD (R-East    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:305           .09     .010    1.63  19.13    .000
                     +ID2 04:340of         .00     .000     .00    .00    .000
                      ========================================================
                      SUM 05:R-East        .09     .010    1.63  19.13    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0007------------------------------------------------------------------------
*#------------------
*#    Catchment 310 - Landscaped area, drains west - 100 yr infiltrates
*#------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=     .11   Curve Number    (CN)=77.00
| 01:310    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .040

     Unit Hyd Qpeak  (cms)=     .105

     PEAK FLOW       (cms)=     .004 (i)
     TIME TO PEAK    (hrs)=    1.600
     RUNOFF VOLUME    (mm)=    5.567
     TOTAL RAINFALL   (mm)=   25.025
     RUNOFF COEFFICIENT   =     .222

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

------------------------------------------------------------------------------
001:0008------------------------------------------------------------------------
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .033  (cms)
| TotalHyd 01:310    |   Number of inlets in system [NINLET] =      1
----------------------   Total minor system capacity          =    .033  (cms)
                         Total major system storage [TMJSTO] =      0.(cu.m.)

                   ID: NHYD        AREA     QPEAK     TPEAK     R.V.       DWF
                                    (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.   01:310           .11      .004     1.600    5.567     .000
     ==========================================================================
     MAJOR SYST   03:310of         .00      .000      .000     .000     .000
     MINOR SYST   08:310in         .11      .004     1.600    5.567     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0009------------------------------------------------------------------------
*#------------------
*#    Rooftops - 360+370+380+390+395 - 25 mm infiltrated
*#------------------
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .27
| 01:393    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=    1.00
```

```
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .27          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=      30.00        30.00
     Length            (m)=      42.43        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      74.93      7414.48
               over (min)        1.00         1.00
     Storage Coeff.  (min)=        .62 (ii)    1.18 (ii)
     Unit Hyd. Tpeak (min)=       1.00         1.00
     Unit Hyd. peak  (cms)=       1.36          .97
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .00          .06          .056 (iii)
     TIME TO PEAK    (hrs)=       1.58         1.58         1.583
     RUNOFF VOLUME    (mm)=      24.22        24.73        24.723
     TOTAL RAINFALL   (mm)=      25.02        25.02        25.025
     RUNOFF COEFFICIENT   =        .97          .99          .988

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  90.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0010----------------------------------------------------------------------
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .056  (cms)
| TotalHyd 01:393    |   Number of inlets in system [NINLET] =       1
----------------------   Total minor system capacity          =    .056  (cms)
                         Total major system storage [TMJSTO] =      0.(cu.m.)

                ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                 (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.   01:393          .27      .056     1.583   24.723     .000
     ================================================================
     MAJOR SYST   04:393of        .00      .000      .000     .000     .000
     MINOR SYST   07:393in        .27      .056     1.583   24.723     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0011----------------------------------------------------------------------
*#------------------
*#    Catchment 350 - Parking lot and Landscaped amenity area
*#------------------
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .59
| 01:350    DT= 1.00 |   Total Imp(%)=   70.00   Dir. Conn.(%)=   65.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .41          .18
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      62.72        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      74.93        11.26
               over (min)        2.00        19.00
     Storage Coeff.  (min)=       1.76 (ii)   18.67 (ii)
     Unit Hyd. Tpeak (min)=       2.00        19.00
     Unit Hyd. peak  (cms)=        .61          .06
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .08          .00          .076 (iii)
     TIME TO PEAK    (hrs)=       1.58         1.92         1.583
     RUNOFF VOLUME    (mm)=      24.22         6.35        17.968
     TOTAL RAINFALL   (mm)=      25.02        25.02        25.025
     RUNOFF COEFFICIENT   =        .97          .25          .718

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0012----------------------------------------------------------------------
------------------------
| ADD HYD (SUB       ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                         ID1 01:350          .59     .076    1.58  17.97    .000
                        +ID2 04:393of        .00     .000     .00    .00    .000
                         ========================================================
                         SUM 06:SUB          .59     .076    1.58  17.97    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0013----------------------------------------------------------------------
*#------------------
*#  *******
*#  Storage for parking lot and excess rooftop runoff
*#  *******
--------------------
| ROUTE RESERVOIR  |    Requested routing time step =  1.0 min.
|  IN>06:(SUB   )  |
| OUT<04:(R-Sto )  |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .035  .2325E-01
                           .015  .1250E-01   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------        (ha)     (cms)     (hrs)       (mm)
     INFLOW >06: (SUB   )        .59      .076     1.583     17.968
     OUTFLOW<04: (R-Sto )        .59      .008     2.200     17.968

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   10.053
                  TIME SHIFT OF PEAK FLOW         (min)=    37.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.6371E-02

--------------------------------------------------------------------------------
001:0014----------------------------------------------------------------------
*#------------------
*#    Catchment 320 - Landscaped area, drains north
*#------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .09   Curve Number   (CN)=77.00
| 01:320    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .040

     Unit Hyd Qpeak  (cms)=     .086

     PEAK FLOW       (cms)=     .003 (i)
     TIME TO PEAK    (hrs)=    1.600
     RUNOFF VOLUME    (mm)=    5.567
     TOTAL RAINFALL   (mm)=   25.025
     RUNOFF COEFFICIENT   =     .222

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

--------------------------------------------------------------------------------
001:0015----------------------------------------------------------------------
------------------------
| ADD HYD (RNorth    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                         ID1 01:320          .09     .003    1.60   5.57    .000
                        +ID2 04:R-Sto        .59     .008    2.20  17.97    .000
                         ========================================================
                         SUM 02:RNorth       .68     .008    1.67  16.33    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0016----------------------------------------------------------------------
------------------------
| ADD HYD (Rcombo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                         ID1 02:RNorth       .68     .008    1.67  16.33    .000
                        +ID2 05:R-East       .09     .010    1.63  19.13    .000
                         ========================================================
                         SUM 10:Rcombo       .77     .018    1.63  16.65    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0017----------------------------------------------------------------------
*#------------------
*#    Catchment 300 - Future site access, paved, drains to hwy 6
*#------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .07
| 01:300    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   10.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .06          .01
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      21.60        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      74.93       535.00
               over (min)        1.00         5.00
     Storage Coeff.  (min)=        .93 (ii)    4.54 (ii)
     Unit Hyd. Tpeak (min)=       1.00         5.00
     Unit Hyd. peak  (cms)=       1.12          .24
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .00          .01          .008 (iii)
     TIME TO PEAK    (hrs)=       1.58         1.63         1.633
     RUNOFF VOLUME    (mm)=      24.22        18.56        19.129
     TOTAL RAINFALL   (mm)=      25.02        25.02        25.025
     RUNOFF COEFFICIENT   =        .97          .74          .764

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0018----------------------------------------------------------------------
*#*****************************************************************************
*#
*#***************    DRAINAGE from Commercial Site   ************************
*#
*#*****************************************************************************
*#------------------
*#    Catchment 420 - Landscaped area, drains to Hwy 6
*#------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .13   Curve Number   (CN)=77.00
| 04:420    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .060

     Unit Hyd Qpeak  (cms)=     .083

     PEAK FLOW       (cms)=     .004 (i)
     TIME TO PEAK    (hrs)=    1.617
     RUNOFF VOLUME    (mm)=    5.567
     TOTAL RAINFALL   (mm)=   25.025
     RUNOFF COEFFICIENT   =     .222

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

--------------------------------------------------------------------------------
001:0019----------------------------------------------------------------------
*#************************
*#  Total Flow to Hwy 6
*#************************
------------------------
| ADD HYD (Hwy6      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                         ID1 01:300          .07     .008    1.63  19.13    .000
                        +ID2 04:420          .13     .004    1.62   5.57    .000
                         ========================================================
                         SUM 07:Hwy6         .20     .012    1.63  10.31    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0020----------------------------------------------------------------------
*#------------------
```

```
*#    Catchment 400 - Landscaped area, drains East
*#-------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=     .05   Curve Number    (CN)=77.00
| 01:400    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .050

     Unit Hyd Qpeak  (cms)=     .038

     PEAK FLOW       (cms)=     .002 (i)
     TIME TO PEAK    (hrs)=    1.600
     RUNOFF VOLUME    (mm)=    5.565
     TOTAL RAINFALL   (mm)=   25.025
     RUNOFF COEFFICIENT   =     .222

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

-------------------------------------------------------------------------------
001:0021-----------------------------------------------------------------------
*#-------------------
*#    Catchment 410 - Commercial Parking Lot, drains East
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .31
| 04:410    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .28          .03
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     45.46        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     74.93        37.97
               over (min)        1.00        12.00
     Storage Coeff.  (min)=      1.45 (ii)   11.85 (ii)
     Unit Hyd. Tpeak (min)=      1.00        12.00
     Unit Hyd. peak  (cms)=       .85          .10
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .05          .00          .051 (iii)
     TIME TO PEAK    (hrs)=      1.58         1.77         1.583
     RUNOFF VOLUME    (mm)=     24.22         9.47        21.274
     TOTAL RAINFALL   (mm)=     25.02        25.02        25.025
     RUNOFF COEFFICIENT   =       .97          .38          .850

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0022-----------------------------------------------------------------------
----------------------
| ADD HYD (C-East    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:400           .05     .002    1.60   5.56    .000
                       +ID2 04:410           .31     .051    1.58  21.27    .000
                        ========================================================
                        SUM 06:C-East         .36     .053    1.58  19.09    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0023-----------------------------------------------------------------------
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>06:(C-East)    |
| OUT<01:(C-Sto )    |    =========  OUTLFOW STORAGE TABLE  =========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .055  .8750E-02
                            .030  .6000E-02   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------        (ha)     (cms)     (hrs)       (mm)
     INFLOW >06: (C-East)        .36      .053     1.583     19.092
     OUTFLOW<01: (C-Sto )        .36      .014     1.750     19.092

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   26.571
                  TIME SHIFT OF PEAK FLOW         (min)=    10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.2809E-02

-------------------------------------------------------------------------------
001:0024-----------------------------------------------------------------------
*#************************
*#  Total Flow to Swale at East
*#************************
----------------------
| ADD HYD (TotalE    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 05:R-East         .09     .010    1.63  19.13    .000
                       +ID2 01:C-Sto          .36     .014    1.75  19.09    .000
                        ========================================================
                        SUM 04:TotalE         .45     .023    1.65  19.10    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0025-----------------------------------------------------------------------
*#************************
*#  Total Flow North
*#************************
----------------------
| ADD HYD (ComboT    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 02:RNorth         .68     .008    1.67  16.33    .000
                       +ID2 04:TotalE         .45     .023    1.65  19.10    .000
                        ========================================================
                        SUM 05:ComboT        1.13     .031    1.65  17.43    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0026-----------------------------------------------------------------------
*#-------------------
*#    Catchment 430 - Commercial Rooftop - 25 mm infiltrates
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .14
| 02:430    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=    1.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .14          .00
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     30.55        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     74.93      7414.11
               over (min)        1.00         2.00
     Storage Coeff.  (min)=      1.14 (ii)    2.40 (ii)
     Unit Hyd. Tpeak (min)=      1.00         2.00
     Unit Hyd. peak  (cms)=       .99          .50
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .00          .03          .026 (iii)
     TIME TO PEAK    (hrs)=      1.58         1.58         1.583
     RUNOFF VOLUME    (mm)=     24.22        24.73        24.723
     TOTAL RAINFALL   (mm)=     25.02        25.02        25.025
     RUNOFF COEFFICIENT   =       .97          .99          .988

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  90.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0027-----------------------------------------------------------------------
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .026  (cms)
| TotalHyd 02:430    |   Number of inlets in system [NINLET] =       1
----------------------   Total minor system capacity          =    .026  (cms)
                         Total major system storage [TMJSTO] =      0.(cu.m.)

                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.       DWF
                                  (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.   02:430           .14      .026     1.583   24.723     .000
     ==========================================================================
     MAJOR SYST   04:430of         .00      .000     1.583   24.723     .000
     MINOR SYST   06:430in         .14      .026     1.583   24.723     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0028-----------------------------------------------------------------------
*#-------------------
*#    Catchment 440 - Landscaped area, drains west
*#-------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=     .04   Curve Number    (CN)=77.00
| 01:440    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .030

     Unit Hyd Qpeak  (cms)=     .051

     PEAK FLOW       (cms)=     .002 (i)
     TIME TO PEAK    (hrs)=    1.583
     RUNOFF VOLUME    (mm)=    5.566
     TOTAL RAINFALL   (mm)=   25.025
     RUNOFF COEFFICIENT   =     .222

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

      *** WARNING: Time step is too large for value of TP.
                   R.V. may be ok.  Peak flow could be off.
-------------------------------------------------------------------------------
001:0029-----------------------------------------------------------------------
----------------------
| ADD HYD (C-West    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 04:430of          .00      .000    1.58  24.72    .000
                       +ID2 01:440            .04      .002    1.58   5.57    .000
                        ========================================================
                        SUM 02:C-West         .04      .002    1.58   5.58    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0030-----------------------------------------------------------------------
*#************************
*#  Total Flow West
*#************************
----------------------
| ADD HYD (TotalW    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 03:310of          .00      .000     .00    .00    .000
                       +ID2 02:C-West         .04      .002    1.58   5.58    .000
                        ========================================================
                        SUM 01:TotalW         .04      .002    1.58   5.58    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0031-----------------------------------------------------------------------
  ** END OF RUN :   1

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




----------------------
| START              |  Project  dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
----------------------  Rainfall dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 002
    NSTORM=   1
           #  1=Fer5yr.stm
-------------------------------------------------------------------------------
002:0002-----------------------------------------------------------------------
*#*******************************************************************************
```

```
*#  Project Name: [Fergus]  Project Number: [161414172]
*#  Date        : April. 21, 2022
*#  Modeller    : [K. Macnaughton]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   :  4730904
*#*************************************************************************
*#  Proposed conditions model 25 mm, 5-year, 100-year, and Regional Storm Events
*#
*#  Per Centre Wellington Design Standards(<-CONFIRM?)
*#           Fergus Shand Dam IDF Parameters
*#
*#  Soil type based on Geotechnical Investigation (Dec 2021);
*#     hydrologic soil type CD (Assumed).
*#
*# Apr 25 - Each site provides separate storage
*#        - 25 mm event infiltrated from all rooftops
*#        - all Reid's rooftops directed to parking area and northward
*#        - 100 year event infiltrated for Catchments 310 and 340
*#  - site & comm storage increased to match Total combined north and east flow
*#     - 95% to 5% split on increase in volume requirements
*#*************************************************************************
-------------------------------------------------------------------------------
002:0002---------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 5-yr, 3hr Chicago Storm â€" Shand Dam ID
| Ptotal=  42.75 mm|    Comments: 5-yr, 3hr Chicago Storm â€" Shand Dam ID
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   4.561 |    .83  16.206 |   1.58   9.956 |   2.33   5.609
               .17   4.883 |    .92  30.537 |   1.67   9.078 |   2.42   5.377
               .25   5.266 |   1.00 174.456 |   1.75   8.367 |   2.50   5.167
               .33   5.732 |   1.08  37.648 |   1.83   7.777 |   2.58   4.975
               .42   6.312 |   1.17  23.457 |   1.92   7.279 |   2.67   4.800
               .50   7.059 |   1.25  17.808 |   2.00   6.852 |   2.75   4.640
               .58   8.064 |   1.33  14.631 |   2.08   6.481 |   2.83   4.491
               .67   9.508 |   1.42  12.554 |   2.17   6.156 |   2.92   4.354
               .75  11.803 |   1.50  11.074 |   2.25   5.867 |   3.00   4.227

-------------------------------------------------------------------------------
002:0003---------------------------------------------------------------------
*#*************************************************************************
*#
*#****************    DRAINAGE within site boundary   ******************
*#
*#*************************************************************************
*#-------------------
*#    Catchment 305 - Paved driveway, drains to swale, east of site
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .09
| 01:305    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   10.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .08          .01
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      24.49        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=     174.46      1419.89
               over (min)        1.00         3.00
     Storage Coeff.  (min)=        .71 (ii)    3.16 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.28          .36
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .00          .03          .030 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.02         1.000
     RUNOFF VOLUME    (mm)=      41.95        35.55        36.188
     TOTAL RAINFALL   (mm)=      42.75        42.75        42.751
     RUNOFF COEFFICIENT   =        .98          .83          .846

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0004---------------------------------------------------------------------
*#-------------------
*#    Catchment 340 - Landscaped area, drains east - 100 yr infiltrates
*#-------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .08   Curve Number   (CN)=77.00
| 02:340    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .040

     Unit Hyd Qpeak  (cms)=     .076

     PEAK FLOW       (cms)=     .010 (i)
     TIME TO PEAK    (hrs)=    1.017
     RUNOFF VOLUME    (mm)=   14.528
     TOTAL RAINFALL   (mm)=   42.751
     RUNOFF COEFFICIENT   =     .340

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

-------------------------------------------------------------------------------
002:0005---------------------------------------------------------------------
--------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .024  (cms)
| TotalHyd 02:340    |   Number of inlets in system [NINLET] =       1
--------------------   Total minor system capacity         =    .024  (cms)
                       Total major system storage [TMJSTO] =       0.(cu.m.)

                 ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                  (ha)     (cms)     (hrs)     (mm)    (cms)
     TOTAL HYD.   02:340           .08      .010     1.017   14.528     .000
     ================================================================
     MAJOR SYST   04:340of         .00      .000      .000     .000     .000
     MINOR SYST   09:340in         .08      .010     1.017   14.528     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0006---------------------------------------------------------------------
----------------------
| ADD HYD (R-East    ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:305            .09      .030    1.00  36.19    .000
                     +ID2 04:340of          .00      .000     .00    .00    .000
                      ==========================================================
                      SUM 05:R-East         .09      .030    1.00  36.19    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0007---------------------------------------------------------------------
*#-------------------
*#    Catchment 310 - Landscaped area, drains west - 100 yr infiltrates
*#-------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .11   Curve Number   (CN)=77.00
| 01:310    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .040

     Unit Hyd Qpeak  (cms)=     .105

     PEAK FLOW       (cms)=     .014 (i)
     TIME TO PEAK    (hrs)=    1.017
     RUNOFF VOLUME    (mm)=   14.528
     TOTAL RAINFALL   (mm)=   42.751
     RUNOFF COEFFICIENT   =     .340

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

-------------------------------------------------------------------------------
002:0008---------------------------------------------------------------------
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .033  (cms)
| TotalHyd 01:310    |   Number of inlets in system [NINLET] =       1
----------------------   Total minor system capacity         =    .033  (cms)
                         Total major system storage [TMJSTO] =       0.(cu.m.)

                 ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                  (ha)     (cms)     (hrs)     (mm)    (cms)
     TOTAL HYD.   01:310           .11      .014     1.017   14.528     .000
     ================================================================
     MAJOR SYST   03:310of         .00      .000      .000     .000     .000
     MINOR SYST   08:310in         .11      .014     1.017   14.528     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0009---------------------------------------------------------------------
*#-------------------
*#    Rooftops - 360+370+380+390+395 - 25 mm infiltrated
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .27
| 01:393    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=    1.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .27          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=      30.00        30.00
     Length            (m)=      42.43        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=     174.46     17268.43
               over (min)        1.00         1.00
     Storage Coeff.  (min)=        .44 (ii)     .84 (ii)
     Unit Hyd. Tpeak (min)=       1.00         1.00
     Unit Hyd. peak  (cms)=       1.52         1.18
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .00          .13          .131 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00         1.000
     RUNOFF VOLUME    (mm)=      41.95        42.45        42.445
     TOTAL RAINFALL   (mm)=      42.75        42.75        42.751
     RUNOFF COEFFICIENT   =        .98          .99          .993

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  90.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0010---------------------------------------------------------------------
--------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .056  (cms)
| TotalHyd 01:393    |   Number of inlets in system [NINLET] =       1
--------------------   Total minor system capacity         =    .056  (cms)
                       Total major system storage [TMJSTO] =       0.(cu.m.)

                 ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                  (ha)     (cms)     (hrs)     (mm)    (cms)
     TOTAL HYD.   01:393           .27      .131     1.000   42.445     .000
     ================================================================
     MAJOR SYST   04:393of         .05      .075     1.000   42.445     .000
     MINOR SYST   07:393in         .22      .056      .933   42.445     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0011---------------------------------------------------------------------
*#-------------------
*#    Catchment 350 - Parking lot and Landscaped amenity area
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .59
| 01:350    DT= 1.00 |   Total Imp(%)=   70.00   Dir. Conn.(%)=   65.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .41          .18
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      62.72        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=     174.46        41.66
               over (min)        1.00        11.00
     Storage Coeff.  (min)=       1.26 (ii)   11.27 (ii)
```

```
     Unit Hyd. Tpeak (min)=       1.00        11.00
     Unit Hyd. peak  (cms)=        .93          .10
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .18          .01          .187 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17         1.000
     RUNOFF VOLUME    (mm)=      41.95        16.14        32.919
     TOTAL RAINFALL   (mm)=      42.75        42.75        42.751
     RUNOFF COEFFICIENT   =        .98          .38          .770

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0012---------------------------------------------------------------------
----------------------
| ADD HYD (SUB       ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:350             .59      .187    1.00  32.92    .000
                    +ID2 04:393of           .05      .075    1.00  42.44    .000
                     ==========================================================
                     SUM 06:SUB             .64      .261    1.00  33.62    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0013---------------------------------------------------------------------
*#-------------------
*#  *******
*#  Storage for parking lot and excess rooftop runoff
*#  *******
----------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>06:(SUB   )   |
| OUT<04:(R-Sto )   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .035  .2325E-01
                            .015  .1250E-01    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >06: (SUB   )        .64      .261     1.000     33.618
     OUTFLOW<04: (R-Sto )        .64      .016     1.567     33.618

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.102
                  TIME SHIFT OF PEAK FLOW         (min)=    34.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1300E-01

-------------------------------------------------------------------------------
002:0014---------------------------------------------------------------------
*#-------------------
*#    Catchment 320 - Landscaped area, drains north
*#-------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .09   Curve Number   (CN)=77.00
| 01:320    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .040

     Unit Hyd Qpeak  (cms)=     .086

     PEAK FLOW       (cms)=     .012 (i)
     TIME TO PEAK    (hrs)=    1.017
     RUNOFF VOLUME    (mm)=   14.528
     TOTAL RAINFALL   (mm)=   42.751
     RUNOFF COEFFICIENT   =     .340

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

-------------------------------------------------------------------------------
002:0015---------------------------------------------------------------------
----------------------
| ADD HYD (RNorth    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:320             .09      .012    1.02  14.53    .000
                    +ID2 04:R-Sto           .64      .016    1.57  33.62    .000
                     ==========================================================
                     SUM 02:RNorth          .73      .023    1.02  31.25    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0016---------------------------------------------------------------------
----------------------
| ADD HYD (Rcombo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 02:RNorth          .73      .023    1.02  31.25    .000
                    +ID2 05:R-East          .09      .030    1.00  36.19    .000
                     ==========================================================
                     SUM 10:Rcombo          .82      .051    1.00  31.80    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0017---------------------------------------------------------------------
*#-------------------
*#    Catchment 300 - Future site access, paved, drains to hwy 6
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .07
| 01:300    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   10.00
----------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .06          .01
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     21.60        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    174.46      1419.89
               over (min)        1.00         3.00
     Storage Coeff.  (min)=       .66 (ii)    3.10 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.32          .37
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .00          .02          .023 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.02         1.000
     RUNOFF VOLUME    (mm)=      41.95        35.55        36.188
     TOTAL RAINFALL   (mm)=      42.75        42.75        42.751
     RUNOFF COEFFICIENT   =        .98          .83          .846

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0018---------------------------------------------------------------------
*#*************************************************************************
*#
*#****************    DRAINAGE from Commercial Site   *************************
*#
*#*************************************************************************
*#-------------------
*#    Catchment 420 - Landscaped area, drains to Hwy 6
*#-------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .13   Curve Number   (CN)=77.00
| 04:420    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .060

     Unit Hyd Qpeak  (cms)=     .083

     PEAK FLOW       (cms)=     .013 (i)
     TIME TO PEAK    (hrs)=    1.033
     RUNOFF VOLUME    (mm)=   14.528
     TOTAL RAINFALL   (mm)=   42.751
     RUNOFF COEFFICIENT   =     .340

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

-------------------------------------------------------------------------------
002:0019---------------------------------------------------------------------
*#************************
*#  Total Flow to Hwy 6
*#************************
----------------------
| ADD HYD (Hwy6      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:300             .07      .023    1.00  36.19    .000
                    +ID2 04:420             .13      .013    1.03  14.53    .000
                     ==========================================================
                     SUM 07:Hwy6            .20      .035    1.02  22.11    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0020---------------------------------------------------------------------
*#-------------------
*#    Catchment 400 - Landscaped area, drains East
*#-------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .05   Curve Number   (CN)=77.00
| 01:400    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .050

     Unit Hyd Qpeak  (cms)=     .038

     PEAK FLOW       (cms)=     .006 (i)
     TIME TO PEAK    (hrs)=    1.017
     RUNOFF VOLUME    (mm)=   14.526
     TOTAL RAINFALL   (mm)=   42.751
     RUNOFF COEFFICIENT   =     .340

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

-------------------------------------------------------------------------------
002:0021---------------------------------------------------------------------
*#-------------------
*#    Catchment 410 - Commercial Parking Lot, drains East
*#-------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .31
| 04:410    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
----------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .28          .03
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     45.46        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    174.46       135.45
               over (min)        1.00         7.00
     Storage Coeff.  (min)=       1.03 (ii)    7.29 (ii)
     Unit Hyd. Tpeak (min)=       1.00         7.00
     Unit Hyd. peak  (cms)=       1.05          .16
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .12          .01          .123 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08         1.000
     RUNOFF VOLUME    (mm)=      41.95        22.07        37.975
     TOTAL RAINFALL   (mm)=      42.75        42.75        42.751
     RUNOFF COEFFICIENT   =        .98          .52          .888

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0022---------------------------------------------------------------------
----------------------
| ADD HYD (C-East    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:400             .05      .006    1.02  14.53    .000
                    +ID2 04:410             .31      .123    1.00  37.97    .000
                     ==========================================================
                     SUM 06:C-East          .36      .128    1.00  34.72    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
--------------------------------------------------------------------------------
002:0023----------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>06:(C-East)   |
| OUT<01:(C-Sto )   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)     (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00    |     .055  .8750E-02
                           .030  .6000E-02    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------         (ha)     (cms)     (hrs)       (mm)
     INFLOW >06: (C-East)         .36      .128     1.000     34.718
     OUTFLOW<01: (C-Sto )         .36      .026     1.133     34.718

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   19.999
                   TIME SHIFT OF PEAK FLOW         (min)=     8.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.5123E-02

--------------------------------------------------------------------------------
002:0024----------------------------------------------------------------------
*#************************
*#  Total Flow to Swale at East
*#************************
----------------------
| ADD HYD (TotalE    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 05:R-East          .09      .030    1.00  36.19    .000
                    +ID2 01:C-Sto           .36      .026    1.13  34.72    .000
                     ========================================================
                     SUM 04:TotalE          .45      .050    1.02  35.01    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0025----------------------------------------------------------------------
*#************************
*#  Total Flow North
*#************************
----------------------
| ADD HYD (ComboT    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 02:RNorth          .73      .023    1.02  31.25    .000
                    +ID2 04:TotalE          .45      .050    1.02  35.01    .000
                     ========================================================
                     SUM 05:ComboT         1.18      .074    1.02  32.69    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0026----------------------------------------------------------------------
*#--------------------
*#    Catchment 430 - Commercial Rooftop - 25 mm infiltrates
*#--------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .14
| 02:430    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=    1.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      30.55        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     174.46     17267.99
               over (min)        1.00         2.00
     Storage Coeff.  (min)=       .82 (ii)    1.71 (ii)
     Unit Hyd. Tpeak (min)=      1.00         2.00
     Unit Hyd. peak  (cms)=      1.20          .62
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .00          .06          .063 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.00         1.000
     RUNOFF VOLUME    (mm)=     41.95        42.45        42.448
     TOTAL RAINFALL   (mm)=     42.75        42.75        42.751
     RUNOFF COEFFICIENT   =       .98          .99          .993

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  90.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
002:0027----------------------------------------------------------------------
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .026  (cms)
| TotalHyd 02:430    |   Number of inlets in system [NINLET] =       1
----------------------   Total minor system capacity          =    .026  (cms)
                         Total major system storage [TMJSTO] =       0.(cu.m.)

                   ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                    (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.   02:430            .14      .063     1.000   42.448     .000
     ==========================================================================
     MAJOR SYST   04:430of          .02      .037     1.000   42.448     .000
     MINOR SYST   06:430in          .12      .026      .950   42.448     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0028----------------------------------------------------------------------
*#--------------------
*#    Catchment 440 - Landscaped area, drains west
*#--------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .04   Curve Number   (CN)=77.00
| 01:440    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .030

     Unit Hyd Qpeak  (cms)=     .051

     PEAK FLOW       (cms)=     .006 (i)
     TIME TO PEAK    (hrs)=    1.000
     RUNOFF VOLUME    (mm)=   14.527
     TOTAL RAINFALL   (mm)=   42.751
     RUNOFF COEFFICIENT   =     .340

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

      *** WARNING: Time step is too large for value of TP.
                   R.V. may be ok.  Peak flow could be off.
--------------------------------------------------------------------------------
002:0029----------------------------------------------------------------------
----------------------
| ADD HYD (C-West    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 04:430of           .02      .037    1.00  42.45    .000
                    +ID2 01:440             .04      .006    1.00  14.53    .000
                     ========================================================
                     SUM 02:C-West          .06      .043    1.00  24.51    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0030----------------------------------------------------------------------
*#************************
*#  Total Flow West
*#************************
----------------------
| ADD HYD (TotalW    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 03:310of           .00      .000     .00    .00    .000
                    +ID2 02:C-West          .06      .043    1.00  24.51    .000
                     ========================================================
                     SUM 01:TotalW          .06      .043    1.00  24.51    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0031----------------------------------------------------------------------
--------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
  ** END OF RUN :   2

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




--------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
--------------------  Rainfall dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 003
    NSTORM=   1
            #  1=Fer100y.stm
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [Fergus]  Project Number: [161414172]
*#  Date        : April. 21, 2022
*#  Modeller    : [K. Macnaughton]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   :  4730904
*#*****************************************************************************
*#  Proposed conditions model 25 mm, 5-year, 100-year, and Regional Storm Events
*#
*#  Per Centre Wellington Design Standards(<-CONFIRM?)
*#           Fergus Shand Dam IDF Parameters
*#
*#  Soil type based on Geotechnical Investigation (Dec 2021);
*#     hydrologic soil type CD (Assumed).
*#
*# Apr 25 - Each site provides separate storage
*#        - 25 mm event infiltrated from all rooftops
*#        - all Reid's rooftops directed to parking area and northward
*#        - 100 year event infiltrated for Catchments 310 and 340
*#  - site & comm storage increased to match Total combined north and east flow
*#     - 95% to 5% split on increase in volume requirements
*#*****************************************************************************
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 100-yr, 3hr Chicago Storm â€" Shand Dam
| Ptotal=  70.85 mm|    Comments: 100-yr, 3hr Chicago Storm â€" Shand Dam
--------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .08   7.562 |    .83  26.913 |   1.58  16.519 |   2.33   9.301
             .17   8.096 |    .92  50.868 |   1.67  15.060 |   2.42   8.916
             .25   8.733 |   1.00 287.930 |   1.75  13.879 |   2.50   8.567
             .33   9.505 |   1.08  62.785 |   1.83  12.900 |   2.58   8.250
             .42  10.468 |   1.17  39.004 |   1.92  12.073 |   2.67   7.960
             .50  11.707 |   1.25  29.581 |   2.00  11.364 |   2.75   7.693
             .58  13.376 |   1.33  24.292 |   2.08  10.749 |   2.83   7.447
             .67  15.774 |   1.42  20.837 |   2.17  10.208 |   2.92   7.219
             .75  19.588 |   1.50  18.376 |   2.25   9.729 |   3.00   7.008

--------------------------------------------------------------------------------
003:0003----------------------------------------------------------------------
*#*****************************************************************************
*#
*#****************    DRAINAGE within site boundary   ******************
*#
*#*****************************************************************************
*#--------------------
*#    Catchment 305 - Paved driveway, drains to swale, east of site
*#--------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .09
| 01:305    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   10.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .08          .01
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      24.49        40.00
     Mannings n           =       .013         .250
```

```
     Max.eff.Inten.(mm/hr)=     287.93      2474.09
               over (min)        1.00         3.00
     Storage Coeff.  (min)=       .58 (ii)    2.54 (ii)
     Unit Hyd. Tpeak (min)=      1.00         3.00
     Unit Hyd. peak  (cms)=      1.39          .42
                                                  *TOTALS*
     PEAK FLOW       (cms)=       .01          .05          .056 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.02         1.000
     RUNOFF VOLUME    (mm)=     70.05        63.15        63.844
     TOTAL RAINFALL   (mm)=     70.85        70.85        70.853
     RUNOFF COEFFICIENT   =       .99          .89          .901

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
003:0004--------------------------------------------------------------------------
*#------------------
*#    Catchment 340 - Landscaped area, drains east - 100 yr infiltrates
*#------------------
---------------------
| DESIGN NASHYD      |   Area    (ha)=     .08   Curve Number   (CN)=77.00
| 02:340    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .040

     Unit Hyd Qpeak  (cms)=     .076

     PEAK FLOW       (cms)=     .024 (i)
     TIME TO PEAK    (hrs)=    1.017
     RUNOFF VOLUME    (mm)=   33.119
     TOTAL RAINFALL   (mm)=   70.853
     RUNOFF COEFFICIENT   =     .467

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

--------------------------------------------------------------------------------
003:0005--------------------------------------------------------------------------
---------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .024  (cms)
| TotalHyd 02:340    |   Number of inlets in system [NINLET] =      1
---------------------   Total minor system capacity         =    .024  (cms)
                        Total major system storage [TMJSTO] =      0.(cu.m.)

                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                  (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.   02:340           .08      .024     1.017   33.119     .000
     ==========================================================================
     MAJOR SYST   04:340of         .00      .000     1.017   33.119     .000
     MINOR SYST   09:340in         .08      .024     1.000   33.119     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0006--------------------------------------------------------------------------
---------------------
| ADD HYD (R-East    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
---------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:305           .09     .056    1.00  63.84    .000
                     +ID2 04:340of         .00     .000    1.02  33.12    .000
                      ========================================================
                      SUM 05:R-East        .09     .056    1.00  63.82    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0007--------------------------------------------------------------------------
*#------------------
*#    Catchment 310 - Landscaped area, drains west - 100 yr infiltrates
*#------------------
---------------------
| DESIGN NASHYD      |   Area    (ha)=     .11   Curve Number   (CN)=77.00
| 01:310    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .040

     Unit Hyd Qpeak  (cms)=     .105

     PEAK FLOW       (cms)=     .033 (i)
     TIME TO PEAK    (hrs)=    1.017
     RUNOFF VOLUME    (mm)=   33.120
     TOTAL RAINFALL   (mm)=   70.853
     RUNOFF COEFFICIENT   =     .467

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

--------------------------------------------------------------------------------
003:0008--------------------------------------------------------------------------
---------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .033  (cms)
| TotalHyd 01:310    |   Number of inlets in system [NINLET] =      1
---------------------   Total minor system capacity         =    .033  (cms)
                        Total major system storage [TMJSTO] =      0.(cu.m.)

                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                  (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.   01:310           .11      .033     1.017   33.120     .000
     ==========================================================================
     MAJOR SYST   03:310of         .00      .000     1.017   33.120     .000
     MINOR SYST   08:310in         .11      .033     1.000   33.120     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0009--------------------------------------------------------------------------
*#------------------
*#    Rooftops - 360+370+380+390+395 - 25 mm infiltrated
*#------------------
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .27
| 01:393    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=    1.00
---------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .27          .00
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=     30.00        30.00
     Length            (m)=     42.43        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     287.93     28503.40
               over (min)        1.00         1.00
     Storage Coeff.  (min)=       .36 (ii)     .69 (ii)
     Unit Hyd. Tpeak (min)=      1.00         1.00
     Unit Hyd. peak  (cms)=      1.59         1.30
                                                  *TOTALS*
     PEAK FLOW       (cms)=       .00          .21          .216 (iii)
     TIME TO PEAK    (hrs)=       .98         1.00         1.000
     RUNOFF VOLUME    (mm)=     70.05        70.55        70.546
     TOTAL RAINFALL   (mm)=     70.85        70.85        70.853
     RUNOFF COEFFICIENT   =       .99         1.00          .996

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  90.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
003:0010--------------------------------------------------------------------------
---------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .056  (cms)
| TotalHyd 01:393    |   Number of inlets in system [NINLET] =      1
---------------------   Total minor system capacity         =    .056  (cms)
                        Total major system storage [TMJSTO] =      0.(cu.m.)

                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                  (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.   01:393           .27      .216     1.000   70.546     .000
     ==========================================================================
     MAJOR SYST   04:393of         .07      .160     1.000   70.546     .000
     MINOR SYST   07:393in         .20      .056      .933   70.546     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0011--------------------------------------------------------------------------
*#------------------
*#    Catchment 350 - Parking lot and Landscaped amenity area
*#------------------
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .59
| 01:350    DT= 1.00 |   Total Imp(%)=   70.00   Dir. Conn.(%)=   65.00
---------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .41          .18
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=     2.00         2.00
     Length            (m)=    62.72        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     287.93       117.56
               over (min)        1.00         8.00
     Storage Coeff.  (min)=       1.03 (ii)    7.64 (ii)
     Unit Hyd. Tpeak (min)=      1.00         8.00
     Unit Hyd. peak  (cms)=      1.06          .15
                                                  *TOTALS*
     PEAK FLOW       (cms)=       .30          .04          .321 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.10         1.000
     RUNOFF VOLUME    (mm)=     70.05        35.96        58.119
     TOTAL RAINFALL   (mm)=     70.85        70.85        70.853
     RUNOFF COEFFICIENT   =       .99          .51          .820

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
003:0012--------------------------------------------------------------------------
---------------------
| ADD HYD (SUB       ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
---------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:350           .59     .321    1.00  58.12    .000
                     +ID2 04:393of         .07     .160    1.00  70.55    .000
                      ========================================================
                      SUM 06:SUB           .66     .481    1.00  59.37    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0013--------------------------------------------------------------------------
*#------------------
*#  *******
*#  Storage for parking lot and excess rooftop runoff
*#  *******
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>06:(SUB    )   |
| OUT<04:(R-Sto )    |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)     (ha.m.)
                           .000  .0000E+00     |     .035  .2325E-01
                           .015  .1250E-01     |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------        (ha)     (cms)     (hrs)       (mm)
     INFLOW >06: (SUB   )        .66      .481     1.000     59.370
     OUTFLOW<04: (R-Sto )        .66      .035     1.417     59.369

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.258
                  TIME SHIFT OF PEAK FLOW         (min)=    25.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.2319E-01

--------------------------------------------------------------------------------
003:0014--------------------------------------------------------------------------
*#------------------
*#    Catchment 320 - Landscaped area, drains north
*#------------------
---------------------
| DESIGN NASHYD      |   Area    (ha)=     .09   Curve Number   (CN)=77.00
| 01:320    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .040
```

```
     Unit Hyd Qpeak  (cms)=     .086

     PEAK FLOW       (cms)=     .027 (i)
     TIME TO PEAK    (hrs)=    1.017
     RUNOFF VOLUME    (mm)=   33.119
     TOTAL RAINFALL   (mm)=   70.853
     RUNOFF COEFFICIENT   =     .467

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

-------------------------------------------------------------------------------
003:0015---------------------------------------------------------------------
-----------------------
| ADD HYD (RNorth    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:320             .09     .027    1.02  33.12    .000
                    +ID2 04:R-Sto           .66     .035    1.42  59.37    .000
                     ==========================================================
                     SUM 02:RNorth          .75     .053    1.02  56.20    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
003:0016---------------------------------------------------------------------
-----------------------
| ADD HYD (Rcombo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 02:RNorth          .75     .053    1.02  56.20    .000
                    +ID2 05:R-East          .09     .056    1.00  63.82    .000
                     ==========================================================
                     SUM 10:Rcombo          .84     .105    1.00  57.02    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
003:0017---------------------------------------------------------------------
*#------------------
*#    Catchment 300 - Future site access, paved, drains to hwy 6
*#------------------
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .07
| 01:300    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   10.00
---------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .06          .01
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     21.60        40.00
     Mannings n            =      .013         .250

     Max.eff.Inten.(mm/hr)=    287.93      2488.95
               over (min)        1.00         2.00
     Storage Coeff.  (min)=       .54 (ii)    2.49 (ii)
     Unit Hyd. Tpeak (min)=      1.00         2.00
     Unit Hyd. peak  (cms)=      1.43          .48
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .01          .04          .046 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.00         1.000
     RUNOFF VOLUME    (mm)=     70.05        63.15        63.844
     TOTAL RAINFALL   (mm)=     70.85        70.85        70.853
     RUNOFF COEFFICIENT   =       .99          .89          .901

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0018---------------------------------------------------------------------
*#**************************************************************************
*#
*#****************    DRAINAGE from Commercial Site   **************************
*#
*#**************************************************************************
*#------------------
*#    Catchment 420 - Landscaped area, drains to Hwy 6
*#------------------
---------------------
| DESIGN NASHYD      |   Area    (ha)=     .13   Curve Number    (CN)=77.00
| 04:420    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=    .060

     Unit Hyd Qpeak  (cms)=     .083

     PEAK FLOW       (cms)=     .032 (i)
     TIME TO PEAK    (hrs)=    1.033
     RUNOFF VOLUME    (mm)=   33.119
     TOTAL RAINFALL   (mm)=   70.853
     RUNOFF COEFFICIENT   =     .467

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

-------------------------------------------------------------------------------
003:0019---------------------------------------------------------------------
*#************************
*#  Total Flow to Hwy 6
*#************************
-----------------------
| ADD HYD (Hwy6      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:300             .07     .046    1.00  63.84    .000
                    +ID2 04:420             .13     .032    1.03  33.12    .000
                     ==========================================================
                     SUM 07:Hwy6            .20     .073    1.00  43.87    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
003:0020---------------------------------------------------------------------
*#------------------
*#    Catchment 400 - Landscaped area, drains East
*#------------------
---------------------
| DESIGN NASHYD      |   Area    (ha)=     .05   Curve Number    (CN)=77.00
| 01:400    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=    .050

     Unit Hyd Qpeak  (cms)=     .038

     PEAK FLOW       (cms)=     .014 (i)
     TIME TO PEAK    (hrs)=    1.017
     RUNOFF VOLUME    (mm)=   33.118
     TOTAL RAINFALL   (mm)=   70.853
     RUNOFF COEFFICIENT   =     .467

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

-------------------------------------------------------------------------------
003:0021---------------------------------------------------------------------
*#------------------
*#    Catchment 410 - Commercial Parking Lot, drains East
*#------------------
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .31
| 04:410    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
---------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .28          .03
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     45.46        40.00
     Mannings n            =      .013         .250

     Max.eff.Inten.(mm/hr)=    287.93       368.85
               over (min)        1.00         5.00
     Storage Coeff.  (min)=       .85 (ii)    5.03 (ii)
     Unit Hyd. Tpeak (min)=      1.00         5.00
     Unit Hyd. peak  (cms)=      1.18          .23
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .20          .02          .212 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.05         1.000
     RUNOFF VOLUME    (mm)=     70.05        45.49        65.140
     TOTAL RAINFALL   (mm)=     70.85        70.85        70.853
     RUNOFF COEFFICIENT   =       .99          .64          .919

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0022---------------------------------------------------------------------
-----------------------
| ADD HYD (C-East    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:400             .05     .014    1.02  33.12    .000
                    +ID2 04:410             .31     .212    1.00  65.14    .000
                     ==========================================================
                     SUM 06:C-East          .36     .224    1.00  60.69    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
003:0023---------------------------------------------------------------------
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>06:(C-East)   |
| OUT<01:(C-Sto )   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00    |     .055  .8750E-02
                           .030  .6000E-02    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------        (ha)     (cms)     (hrs)       (mm)
     INFLOW >06: (C-East)        .36      .224     1.000     60.692
     OUTFLOW<01: (C-Sto )        .36      .054     1.100     60.692

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   24.310
                    TIME SHIFT OF PEAK FLOW         (min)=     6.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.8696E-02

-------------------------------------------------------------------------------
003:0024---------------------------------------------------------------------
*#************************
*#  Total Flow to Swale at East
*#************************
-----------------------
| ADD HYD (TotalE    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 05:R-East          .09     .056    1.00  63.82    .000
                    +ID2 01:C-Sto           .36     .054    1.10  60.69    .000
                     ==========================================================
                     SUM 04:TotalE          .45     .099    1.02  61.32    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
003:0025---------------------------------------------------------------------
*#************************
*#  Total Flow North
*#************************
-----------------------
| ADD HYD (ComboT    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 02:RNorth          .75     .053    1.02  56.20    .000
                    +ID2 04:TotalE          .45     .099    1.02  61.32    .000
                     ==========================================================
                     SUM 05:ComboT         1.20     .152    1.02  58.13    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
003:0026---------------------------------------------------------------------
*#------------------
*#    Catchment 430 - Commercial Rooftop - 25 mm infiltrates
*#------------------
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .14
| 02:430    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=    1.00
---------------------
```

```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14           .00
     Dep. Storage     (mm)=        .80          1.50
     Average Slope     (%)=       2.00          2.00
     Length            (m)=      30.55         40.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=     287.93      28503.40
               over (min)         1.00          1.00
     Storage Coeff.  (min)=        .67 (ii)     1.40 (ii)
     Unit Hyd. Tpeak (min)=        1.00          1.00
     Unit Hyd. peak  (cms)=        1.32           .87
                                                *TOTALS*
     PEAK FLOW       (cms)=         .00           .11          .109 (iii)
     TIME TO PEAK    (hrs)=        1.00          1.00         1.000
     RUNOFF VOLUME    (mm)=       70.04         70.55        70.549
     TOTAL RAINFALL   (mm)=       70.85         70.85        70.853
     RUNOFF COEFFICIENT   =         .99          1.00          .996

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  90.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
003:0027---------------------------------------------------------------------
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .026  (cms)
| TotalHyd 02:430    |   Number of inlets in system [NINLET] =      1
----------------------   Total minor system capacity         =    .026  (cms)
                         Total major system storage [TMJSTO] =       0.(cu.m.)

                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                   (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.   02:430           .14      .109     1.000   70.549     .000
     ==========================================================================
     MAJOR SYST   04:430of         .04      .083     1.000   70.549     .000
     MINOR SYST   06:430in         .10      .026      .933   70.549     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0028---------------------------------------------------------------------
*#------------------
*#    Catchment 440 - Landscaped area, drains west
*#------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .04   Curve Number   (CN)=77.00
| 01:440    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .030

     Unit Hyd Qpeak  (cms)=     .051

     PEAK FLOW       (cms)=     .014 (i)
     TIME TO PEAK    (hrs)=    1.000
     RUNOFF VOLUME    (mm)=   33.119
     TOTAL RAINFALL   (mm)=   70.853
     RUNOFF COEFFICIENT   =     .467

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

      *** WARNING: Time step is too large for value of TP.
                   R.V. may be ok.  Peak flow could be off.
--------------------------------------------------------------------------------
003:0029---------------------------------------------------------------------
----------------------
| ADD HYD (C-West    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                        ID1 04:430of         .04     .083    1.00  70.55    .000
                       +ID2 01:440           .04     .014    1.00  33.12    .000
                        ========================================================
                        SUM 02:C-West         .08     .097    1.00  50.67    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0030---------------------------------------------------------------------
*#************************
*#  Total Flow West
*#************************
------------------------
| ADD HYD (TotalW    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                        ID1 03:310of         .00     .000    1.02  33.12    .000
                       +ID2 02:C-West        .08     .097    1.00  50.67    .000
                        ========================================================
                        SUM 01:TotalW         .08     .098    1.00  50.64    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0031---------------------------------------------------------------------
--------------------------------------------------------------------------------
003:0002---------------------------------------------------------------------
--------------------------------------------------------------------------------
003:0002---------------------------------------------------------------------
  ** END OF RUN :   3

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




--------------------
| START            |  Project  dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
--------------------  Rainfall dir.: C:\PROGRA~2\SWMHYMO\Projects\Fergus\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 004
    NSTORM=   1
          #  1=hurhaz48.stm
--------------------------------------------------------------------------------
004:0002---------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: [Fergus]  Project Number: [161414172]
*#  Date        : April. 21, 2022
*#  Modeller    : [K. Macnaughton]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   :  4730904
*#****************************************************************************
*#  Proposed conditions model 25 mm, 5-year, 100-year, and Regional Storm Events
*#
*#  Per Centre Wellington Design Standards(<-CONFIRM?)
*#           Fergus Shand Dam IDF Parameters
*#
*#  Soil type based on Geotechnical Investigation (Dec 2021);
*#     hydrologic soil type CD (Assumed).
*#
*# Apr 25 - Each site provides separate storage
*#        - 25 mm event infiltrated from all rooftops
*#        - all Reid's rooftops directed to parking area and northward
*#        - 100 year event infiltrated for Catchments 310 and 340
*#  - site & comm storage increased to match Total combined north and east flow
*#     - 95% to 5% split on increase in volume requirements
*#****************************************************************************
--------------------------------------------------------------------------------
004:0002---------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: REGIONAL STORM
| Ptotal= 285.00 mm|    Comments: REGIONAL STORM
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	2.000	12.25	2.000	24.25	2.000	36.25	6.000
.50	2.000	12.50	2.000	24.50	2.000	36.50	6.000
.75	2.000	12.75	2.000	24.75	2.000	36.75	6.000
1.00	2.000	13.00	2.000	25.00	2.000	37.00	6.000
1.25	2.000	13.25	2.000	25.25	2.000	37.25	4.000
1.50	2.000	13.50	2.000	25.50	2.000	37.50	4.000
1.75	2.000	13.75	2.000	25.75	2.000	37.75	4.000
2.00	2.000	14.00	2.000	26.00	2.000	38.00	4.000
2.25	2.000	14.25	2.000	26.25	2.000	38.25	6.000
2.50	2.000	14.50	2.000	26.50	2.000	38.50	6.000
2.75	2.000	14.75	2.000	26.75	2.000	38.75	6.000
3.00	2.000	15.00	2.000	27.00	2.000	39.00	6.000
3.25	2.000	15.25	2.000	27.25	2.000	39.25	13.000
3.50	2.000	15.50	2.000	27.50	2.000	39.50	13.000
3.75	2.000	15.75	2.000	27.75	2.000	39.75	13.000
4.00	2.000	16.00	2.000	28.00	2.000	40.00	13.000
4.25	2.000	16.25	2.000	28.25	2.000	40.25	17.000
4.50	2.000	16.50	2.000	28.50	2.000	40.50	17.000
4.75	2.000	16.75	2.000	28.75	2.000	40.75	17.000
5.00	2.000	17.00	2.000	29.00	2.000	41.00	17.000
5.25	2.000	17.25	2.000	29.25	2.000	41.25	13.000
5.50	2.000	17.50	2.000	29.50	2.000	41.50	13.000
5.75	2.000	17.75	2.000	29.75	2.000	41.75	13.000
6.00	2.000	18.00	2.000	30.00	2.000	42.00	13.000
6.25	2.000	18.25	2.000	30.25	2.000	42.25	23.000
6.50	2.000	18.50	2.000	30.50	2.000	42.50	23.000
6.75	2.000	18.75	2.000	30.75	2.000	42.75	23.000
7.00	2.000	19.00	2.000	31.00	2.000	43.00	23.000
7.25	2.000	19.25	2.000	31.25	2.000	43.25	13.000
7.50	2.000	19.50	2.000	31.50	2.000	43.50	13.000
7.75	2.000	19.75	2.000	31.75	2.000	43.75	13.000
8.00	2.000	20.00	2.000	32.00	2.000	44.00	13.000
8.25	2.000	20.25	2.000	32.25	2.000	44.25	13.000
8.50	2.000	20.50	2.000	32.50	2.000	44.50	13.000
8.75	2.000	20.75	2.000	32.75	2.000	44.75	13.000
9.00	2.000	21.00	2.000	33.00	2.000	45.00	13.000
9.25	2.000	21.25	2.000	33.25	2.000	45.25	53.000
9.50	2.000	21.50	2.000	33.50	2.000	45.50	53.000
9.75	2.000	21.75	2.000	33.75	2.000	45.75	53.000
10.00	2.000	22.00	2.000	34.00	2.000	46.00	53.000
10.25	2.000	22.25	2.000	34.25	2.000	46.25	38.000
10.50	2.000	22.50	2.000	34.50	2.000	46.50	38.000
10.75	2.000	22.75	2.000	34.75	2.000	46.75	38.000
11.00	2.000	23.00	2.000	35.00	2.000	47.00	38.000
11.25	2.000	23.25	2.000	35.25	3.000	47.25	13.000
11.50	2.000	23.50	2.000	35.50	3.000	47.50	13.000
11.75	2.000	23.75	2.000	35.75	3.000	47.75	13.000
12.00	2.000	24.00	2.000	36.00	3.000	48.00	13.000

```
--------------------------------------------------------------------------------
004:0003---------------------------------------------------------------------
*#****************************************************************************
*#
*#****************    DRAINAGE within site boundary   ******************
*#
*#****************************************************************************
*#------------------
*#    Catchment 305 - Paved driveway, drains to swale, east of site
*#------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .09
| 01:305    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   10.00
----------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .08           .01
     Dep. Storage     (mm)=        .80          1.50
     Average Slope     (%)=       2.00          2.00
     Length            (m)=      24.49         40.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      53.00        476.41
               over (min)         1.00          5.00
     Storage Coeff.  (min)=        1.15 (ii)     4.93 (ii)
     Unit Hyd. Tpeak (min)=        1.00          5.00
     Unit Hyd. peak  (cms)=         .99           .23
                                                *TOTALS*
     PEAK FLOW       (cms)=         .00           .01          .013 (iii)
     TIME TO PEAK    (hrs)=       45.22         46.00         46.000
     RUNOFF VOLUME    (mm)=      284.19        276.64        277.400
     TOTAL RAINFALL   (mm)=      285.00        285.00        285.000
     RUNOFF COEFFICIENT   =        1.00           .97           .973

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
```

```
004:0004-------------------------------------------------------------------------
*#------------------
*#    Catchment 340 - Landscaped area, drains east - 100 yr infiltrates
*#------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .08   Curve Number   (CN)=77.00
| 02:340    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .040

     Unit Hyd Qpeak  (cms)=     .076

     PEAK FLOW       (cms)=     .011 (i)
     TIME TO PEAK    (hrs)=   46.000
     RUNOFF VOLUME    (mm)=  223.647
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .785

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

-------------------------------------------------------------------------------
004:0005-------------------------------------------------------------------------
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .024  (cms)
| TotalHyd 02:340    |   Number of inlets in system [NINLET] =       1
----------------------   Total minor system capacity         =    .024  (cms)
                         Total major system storage [TMJSTO] =       0.(cu.m.)

                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                   (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.   02:340           .08      .011    46.000  223.647     .000
     ==========================================================================
     MAJOR SYST   04:340of         .00      .000      .000     .000     .000
     MINOR SYST   09:340in         .08      .011    46.000  223.647     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
004:0006-------------------------------------------------------------------------
------------------------
| ADD HYD (R-East    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:305           .09     .013   46.00 277.40    .000
                      +ID2 04:340of         .00     .000     .00    .00    .000
                       ========================================================
                       SUM 05:R-East        .09     .013   46.00 277.40    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
004:0007-------------------------------------------------------------------------
*#------------------
*#    Catchment 310 - Landscaped area, drains west - 100 yr infiltrates
*#------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .11   Curve Number   (CN)=77.00
| 01:310    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .040

     Unit Hyd Qpeak  (cms)=     .105

     PEAK FLOW       (cms)=     .015 (i)
     TIME TO PEAK    (hrs)=   46.000
     RUNOFF VOLUME    (mm)=  223.647
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .785

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

-------------------------------------------------------------------------------
004:0008-------------------------------------------------------------------------
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .033  (cms)
| TotalHyd 01:310    |   Number of inlets in system [NINLET] =       1
----------------------   Total minor system capacity         =    .033  (cms)
                         Total major system storage [TMJSTO] =       0.(cu.m.)

                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                   (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.   01:310           .11      .015    46.000  223.647     .000
     ==========================================================================
     MAJOR SYST   03:310of         .00      .000      .000     .000     .000
     MINOR SYST   08:310in         .11      .015    46.000  223.647     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
004:0009-------------------------------------------------------------------------
*#------------------
*#    Rooftops - 360+370+380+390+395 - 25 mm infiltrated
*#------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .27
| 01:393    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=    1.00
----------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .27          .00
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=      30.00        30.00
     Length            (m)=      42.43        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00      5247.03
               over (min)        1.00         1.00
     Storage Coeff.  (min)=        .71 (ii)    1.35 (ii)
     Unit Hyd. Tpeak (min)=       1.00         1.00
     Unit Hyd. peak  (cms)=       1.28          .89
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .00          .04          .040 (iii)
     TIME TO PEAK    (hrs)=      45.13        45.35        45.333
     RUNOFF VOLUME    (mm)=     284.20       284.69       284.681
     TOTAL RAINFALL   (mm)=     285.00       285.00       285.000
     RUNOFF COEFFICIENT   =       1.00         1.00          .999

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  90.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
004:0010-------------------------------------------------------------------------
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .056  (cms)
| TotalHyd 01:393    |   Number of inlets in system [NINLET] =       1
----------------------   Total minor system capacity         =    .056  (cms)
                         Total major system storage [TMJSTO] =       0.(cu.m.)

                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                   (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.   01:393           .27      .040    45.333  284.681     .000
     ==========================================================================
     MAJOR SYST   04:393of         .00      .000      .000     .000     .000
     MINOR SYST   07:393in         .27      .040    45.333  284.677     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
004:0011-------------------------------------------------------------------------
*#------------------
*#    Catchment 350 - Parking lot and Landscaped amenity area
*#------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .59
| 01:350    DT= 1.00 |   Total Imp(%)=   70.00   Dir. Conn.(%)=   65.00
----------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .41          .18
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     62.72        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        58.78
               over (min)        2.00        11.00
     Storage Coeff.  (min)=       2.02 (ii)   10.75 (ii)
     Unit Hyd. Tpeak (min)=       2.00        11.00
     Unit Hyd. peak  (cms)=        .55          .10
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .06          .03          .085 (iii)
     TIME TO PEAK    (hrs)=      45.48        46.00        46.000
     RUNOFF VOLUME    (mm)=     284.20       230.78       265.513
     TOTAL RAINFALL   (mm)=     285.00       285.00       285.000
     RUNOFF COEFFICIENT   =       1.00          .81          .932

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
004:0012-------------------------------------------------------------------------
------------------------
| ADD HYD (SUB       ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:350           .59     .085   46.00 265.51    .000
                      +ID2 04:393of         .00     .000     .00    .00    .000
                       ========================================================
                       SUM 06:SUB           .59     .085   46.00 265.51    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
004:0013-------------------------------------------------------------------------
*#------------------
*#  *******
*#  Storage for parking lot and excess rooftop runoff
*#  *******
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>06:(SUB    )   |
| OUT<04:(R-Sto )    |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .035  .2325E-01
                            .015  .1250E-01   |     .000  .0000E+00
      *** WARNING: STORAGE-Q values were extrapolated.
                   Increase curve or use overflow option.

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >06: (SUB   )        .59      .085    46.000    265.513
     OUTFLOW<04: (R-Sto )        .59      .057    47.017    265.513

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   66.643
                    TIME SHIFT OF PEAK FLOW         (min)=    61.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3493E-01

-------------------------------------------------------------------------------
004:0014-------------------------------------------------------------------------
*#------------------
*#    Catchment 320 - Landscaped area, drains north
*#------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .09   Curve Number   (CN)=77.00
| 01:320    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .040

     Unit Hyd Qpeak  (cms)=     .086

     PEAK FLOW       (cms)=     .012 (i)
     TIME TO PEAK    (hrs)=   46.000
     RUNOFF VOLUME    (mm)=  223.647
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .785

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

-------------------------------------------------------------------------------
004:0015-------------------------------------------------------------------------
------------------------
| ADD HYD (RNorth    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:320           .09     .012   46.00 223.65    .000
```

```
                  +ID2 04:R-Sto           .59     .057   47.02 265.51    .000
                   ========================================================
                   SUM 02:RNorth          .68     .066   47.00 259.97    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0016----------------------------------------------------------------------
----------------------
| ADD HYD (Rcombo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 02:RNorth          .68     .066   47.00 259.97    .000
                  +ID2 05:R-East          .09     .013   46.00 277.40    .000
                   ========================================================
                   SUM 10:Rcombo          .77     .076   46.00 262.01    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0017----------------------------------------------------------------------
*#------------------
*#    Catchment 300 - Future site access, paved, drains to hwy 6
*#------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .07
| 01:300    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   10.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .06          .01
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     21.60        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     53.00       476.41
               over (min)        1.00         5.00
     Storage Coeff.  (min)=     1.07 (ii)    4.85 (ii)
     Unit Hyd. Tpeak (min)=     1.00         5.00
     Unit Hyd. peak  (cms)=     1.03          .23
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .00          .01          .010 (iii)
     TIME TO PEAK    (hrs)=    45.20        46.00         46.000
     RUNOFF VOLUME    (mm)=   284.19       276.64        277.400
     TOTAL RAINFALL   (mm)=   285.00       285.00        285.000
     RUNOFF COEFFICIENT   =     1.00          .97           .973

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
004:0018----------------------------------------------------------------------
*#**************************************************************************
*#
*#****************    DRAINAGE from Commercial Site   **************************
*#
*#**************************************************************************
*#------------------
*#    Catchment 420 - Landscaped area, drains to Hwy 6
*#------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .13   Curve Number    (CN)=77.00
| 04:420    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .060

     Unit Hyd Qpeak  (cms)=     .083

     PEAK FLOW       (cms)=     .018 (i)
     TIME TO PEAK    (hrs)=   46.000
     RUNOFF VOLUME    (mm)=  223.648
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .785

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

--------------------------------------------------------------------------------
004:0019----------------------------------------------------------------------
*#************************
*#  Total Flow to Hwy 6
*#************************
----------------------
| ADD HYD (Hwy6      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 01:300             .07     .010   46.00 277.40    .000
                  +ID2 04:420             .13     .018   46.00 223.65    .000
                   ========================================================
                   SUM 07:Hwy6            .20     .028   46.00 242.46    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0020----------------------------------------------------------------------
*#------------------
*#    Catchment 400 - Landscaped area, drains East
*#------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .05   Curve Number    (CN)=77.00
| 01:400    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .050

     Unit Hyd Qpeak  (cms)=     .038

     PEAK FLOW       (cms)=     .007 (i)
     TIME TO PEAK    (hrs)=   46.000
     RUNOFF VOLUME    (mm)=  223.646
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .785

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

--------------------------------------------------------------------------------
004:0021----------------------------------------------------------------------
*#------------------
*#    Catchment 410 - Commercial Parking Lot, drains East
*#------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .31
| 04:410    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .28          .03
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     45.46        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     53.00       103.86
               over (min)        2.00         9.00
     Storage Coeff.  (min)=     1.67 (ii)    8.62 (ii)
     Unit Hyd. Tpeak (min)=     2.00         9.00
     Unit Hyd. peak  (cms)=      .63          .13
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .04          .01          .045 (iii)
     TIME TO PEAK    (hrs)=    45.40        46.00         46.000
     RUNOFF VOLUME    (mm)=   284.18       250.76        277.516
     TOTAL RAINFALL   (mm)=   285.00       285.00        285.000
     RUNOFF COEFFICIENT   =     1.00          .88           .974

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
004:0022----------------------------------------------------------------------
----------------------
| ADD HYD (C-East    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 01:400             .05     .007   46.00 223.65    .000
                  +ID2 04:410             .31     .045   46.00 277.52    .000
                   ========================================================
                   SUM 06:C-East          .36     .052   46.00 270.03    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0023----------------------------------------------------------------------
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>06:(C-East)    |
| OUT<01:(C-Sto )    |    =========  OUTLFOW STORAGE TABLE  =========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00     |     .055  .8750E-02
                            .030  .6000E-02     |     .000  .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >06: (C-East)         .36      .052    46.000    270.035
     OUTFLOW<01: (C-Sto )         .36      .049    46.017    270.034

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   94.127
                   TIME SHIFT OF PEAK FLOW          (min)=     1.00
                   MAXIMUM  STORAGE   USED        (ha.m.)=.8122E-02

--------------------------------------------------------------------------------
004:0024----------------------------------------------------------------------
*#************************
*#  Total Flow to Swale at East
*#************************
----------------------
| ADD HYD (TotalE    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 05:R-East           .09     .013   46.00 277.40    .000
                  +ID2 01:C-Sto            .36     .049   46.02 270.03    .000
                   ========================================================
                   SUM 04:TotalE           .45     .062   46.00 271.51    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0025----------------------------------------------------------------------
*#************************
*#  Total Flow North
*#************************
----------------------
| ADD HYD (ComboT    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 02:RNorth          .68     .066   47.00 259.97    .000
                  +ID2 04:TotalE          .45     .062   46.00 271.51    .000
                   ========================================================
                   SUM 05:ComboT         1.13     .125   46.00 264.57    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0026----------------------------------------------------------------------
*#------------------
*#    Catchment 430 - Commercial Rooftop - 25 mm infiltrates
*#------------------
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .14
| 02:430    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=    1.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .14          .00
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     30.55        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     53.00      5247.03
               over (min)        1.00         3.00
     Storage Coeff.  (min)=     1.31 (ii)    2.76 (ii)
     Unit Hyd. Tpeak (min)=     1.00         3.00
     Unit Hyd. peak  (cms)=      .91          .40
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .00          .02          .021 (iii)
     TIME TO PEAK    (hrs)=    45.20        45.67         45.667
     RUNOFF VOLUME    (mm)=   284.17       284.71        284.696
     TOTAL RAINFALL   (mm)=   285.00       285.00        285.000
```

```
     RUNOFF COEFFICIENT   =       1.00         1.00           .999

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  90.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
004:0027----------------------------------------------------------------------
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .026  (cms)
| TotalHyd 02:430    |   Number of inlets in system [NINLET] =       1
----------------------   Total minor system capacity           =    .026  (cms)
                         Total major system storage [TMJSTO] =       0.(cu.m.)

                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                   (ha)     (cms)     (hrs)     (mm)    (cms)
     TOTAL HYD.   02:430           .14      .021    45.667  284.696     .000
     ==========================================================================
     MAJOR SYST   04:430of         .00      .000      .000     .000     .000
     MINOR SYST   06:430in         .14      .021    45.667  284.695     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0028----------------------------------------------------------------------
*#-------------------
*#    Catchment 440 - Landscaped area, drains west
*#-------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .04   Curve Number   (CN)=77.00
| 01:440    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .030

     Unit Hyd Qpeak  (cms)=     .051

     PEAK FLOW       (cms)=     .006 (i)
     TIME TO PEAK    (hrs)=   46.000
     RUNOFF VOLUME    (mm)=  223.647
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .785

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

      *** WARNING: Time step is too large for value of TP.
                   R.V. may be ok.  Peak flow could be off.
--------------------------------------------------------------------------------
004:0029----------------------------------------------------------------------
------------------------
| ADD HYD (C-West    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                        ID1 04:430of         .00     .000     .00    .00    .000
                       +ID2 01:440           .04     .006   46.00 223.65    .000
                        ========================================================
                        SUM 02:C-West        .04     .006   46.00 223.65    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0030----------------------------------------------------------------------
*#************************
*#  Total Flow West
*#************************
------------------------
| ADD HYD (TotalW    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                        ID1 03:310of         .00     .000     .00    .00    .000
                       +ID2 02:C-West        .04     .006   46.00 223.65    .000
                        ========================================================
                        SUM 01:TotalW        .04     .006   46.00 223.65    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0031----------------------------------------------------------------------
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 001:0028 DESIGN NASHYD
      *** WARNING: Time step is too large for value of TP.
                   R.V. may be ok.  Peak flow could be off.
      *** WARNING: Time step is too large for value of TP.
                   R.V. may be ok.  Peak flow could be off.
      *** WARNING: Time step is too large for value of TP.
                   R.V. may be ok.  Peak flow could be off.
 004:0013 ROUTE RESERVOIR
      *** WARNING: STORAGE-Q values were extrapolated.
                   Increase curve or use overflow option.
 004:0028 DESIGN NASHYD
      *** WARNING: Time step is too large for value of TP.
                   R.V. may be ok.  Peak flow could be off.
   Simulation ended on 2022-05-04     at 11:28:04
================================================================================
```

Subject: **Infiltration Facility Drawdown Calculations**
Project: **Fergus SWM Design**
Project No.: **1614-14172**
Client: **Reid's Heritage Homes**
Date: **05/05/22**

West)			East)			(Commercial)		
Max Volume	77	m^3	Max Volume	54	m^3	Max Volume	35	m^3
Footprint	121.3	m^2	Footprint	92.4	m^2	Footprint	98	m^2
Infiltration Rate	15	mm/hr	Infiltration Rate	15	mm/hr	Infiltration Rate	15	mm/hr
Outflow	0.00051	cms	Outflow	0.00039	cms	Outflow	0.00041	cms
Drawdown Time	**42.0**	**hrs**	**Drawdown Time**	**39.0**	**hrs**	**Drawdown Time**	**23.8**	**hrs**

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
VISIT OUR APP

950-960 ST. DAVID ST (REID'S)

FERGUS, CANADA

SC-740 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

1. STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 20-50 mm (3/4-2").
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

©2022 ADS, INC.

PROPOSED LAYOUT: WEST INFILTRATION

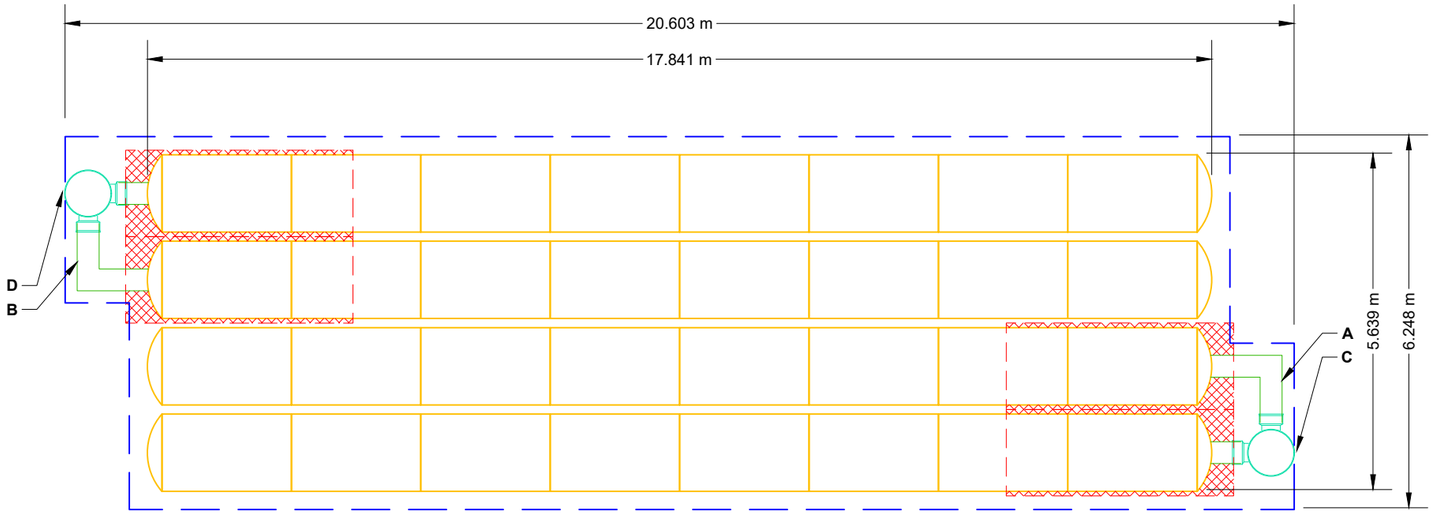
32	STORMTECH SC-740 CHAMBERS
8	STORMTECH SC-740 END CAPS
152	STONE ABOVE (mm)
152	STONE BELOW (mm)
40	STONE VOID
76.7	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
121.3	SYSTEM AREA (m^2)
53.7	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS: WEST INFILTRATION

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	424.753
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	422.924
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	422.772
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	422.772
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	422.772
TOP OF STONE:	422.467
TOP OF SC-740 CHAMBER:	422.314
300 mm x 300 mm BOTTOM MANIFOLD INVERT:	421.583
300 mm x 300 mm BOTTOM MANIFOLD INVERT:	421.583
300 mm BOTTOM CONNECTION INVERT:	421.583
300 mm BOTTOM CONNECTION INVERT:	421.583
BOTTOM OF SC-740 CHAMBER:	421.552
BOTTOM OF STONE:	421.400

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
MANIFOLD	A	300 mm x 300 mm BOTTOM MANIFOLD, ADS N-12	30 mm	
MANIFOLD	B	300 mm x 300 mm BOTTOM MANIFOLD, ADS N-12	30 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	C	750 mm DIAMETER (610 mm SUMP MIN)		65 L/s IN
NYLOPLAST (INLET W/ ISO PLUS ROW)	D	750 mm DIAMETER (610 mm SUMP MIN)		65 L/s IN



NO ISOLATOR ROW PLUS

PLACE MINIMUM 3.810 m OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

950-960 ST. DAVID ST (REID'S)
FERGUS, CANADA

DRAWN: CN | CHECKED: N/A
DATE: | PROJECT #:

DESCRIPTION	CHK	DRW	DATE

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 100

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

PROPOSED LAYOUT: EAST INFILTRATION

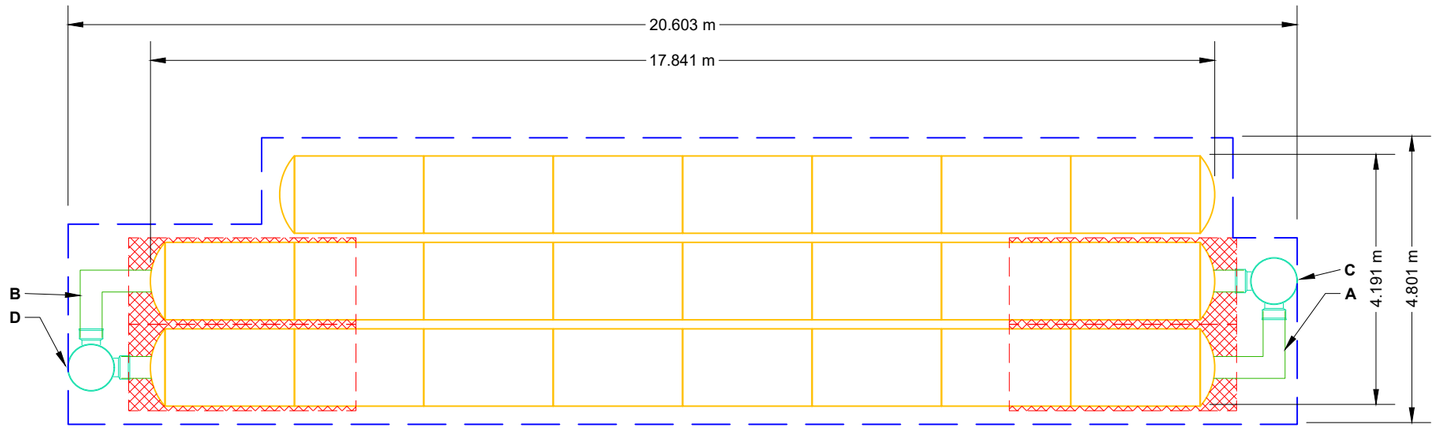
23	STORMTECH SC-740 CHAMBERS
6	STORMTECH SC-740 END CAPS
152	STONE ABOVE (mm)
152	STONE BELOW (mm)
40	STONE VOID
57.4	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
92.4	SYSTEM AREA (m^2)
50.8	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS: EAST INFILTRATION

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	424.553
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	422.724
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	422.572
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	422.572
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	422.572
TOP OF STONE:	422.267
TOP OF SC-740 CHAMBER:	422.114
300 mm x 300 mm BOTTOM MANIFOLD INVERT:	421.383
300 mm x 300 mm BOTTOM MANIFOLD INVERT:	421.383
300 mm BOTTOM CONNECTION INVERT:	421.383
300 mm BOTTOM CONNECTION INVERT:	421.383
BOTTOM OF SC-740 CHAMBER:	421.352
BOTTOM OF STONE:	421.200

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
MANIFOLD	A	300 mm x 300 mm BOTTOM MANIFOLD, ADS N-12	30 mm	
MANIFOLD	B	300 mm x 300 mm BOTTOM MANIFOLD, ADS N-12	30 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	C	750 mm DIAMETER (610 mm SUMP MIN)		65 L/s IN
NYLOPLAST (INLET W/ ISO PLUS ROW)	D	750 mm DIAMETER (610 mm SUMP MIN)		65 L/s IN



NO ISOLATOR ROW PLUS

PLACE MINIMUM 3.810 m OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

950-960 ST. DAVID ST (REID'S)
FERGUS, CANADA
DATE: DRAWN: CN CHECKED: N/A
PROJECT #:

DESCRIPTION	CHK	DRW	DATE

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 100

SHEET
3 OF 7

PROPOSED LAYOUT: STORAGE SYSTEM

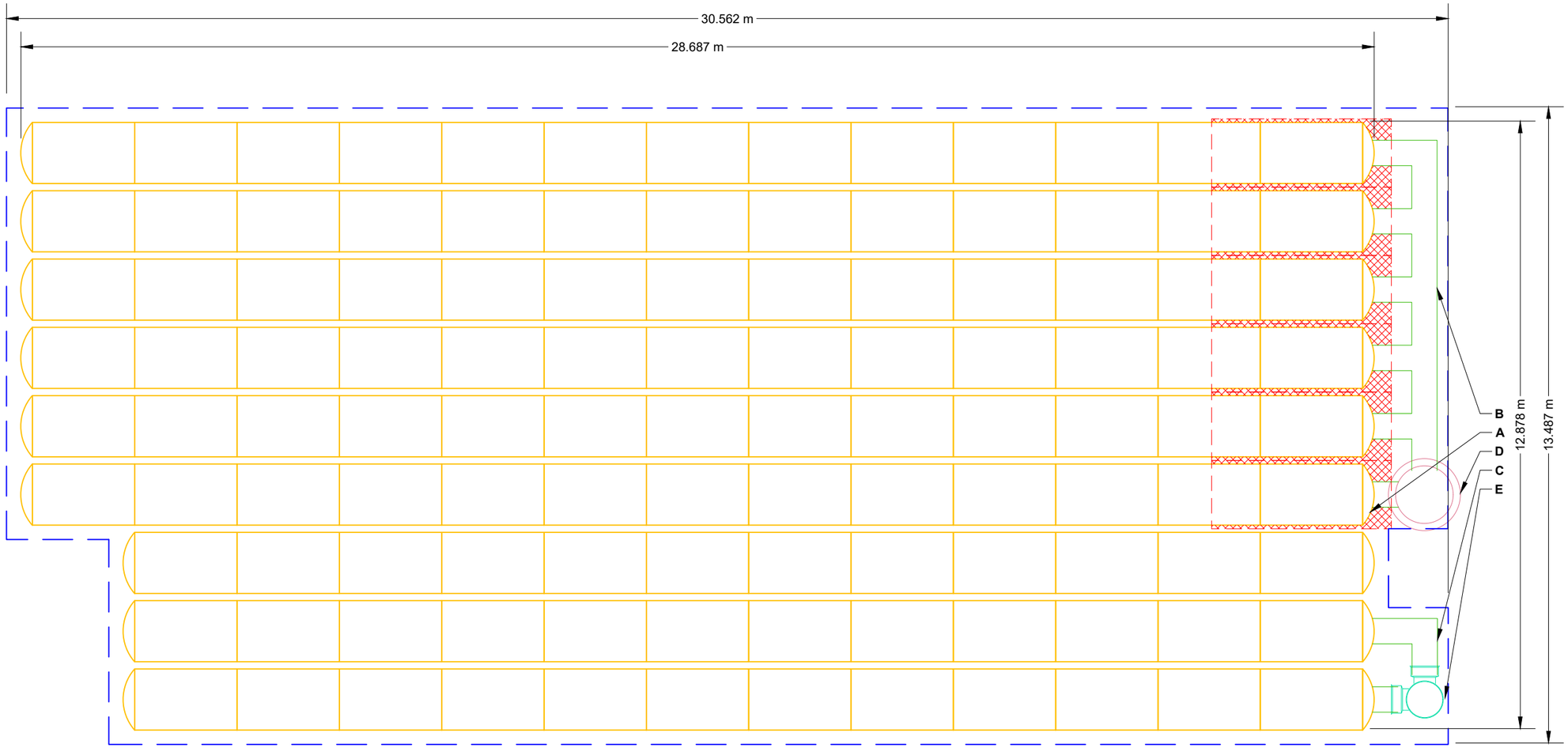
114	STORMTECH SC-740 CHAMBERS
18	STORMTECH SC-740 END CAPS
152	STONE ABOVE (mm)
152	STONE BELOW (mm)
40	STONE VOID
259.9	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
400.6	SYSTEM AREA (m^2)
90.6	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS: STORAGE SYSTEM

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	424.353
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	422.524
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	422.372
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	422.372
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	422.372
TOP OF STONE:	422.067
TOP OF SC-740 CHAMBER:	421.915
450 mm x 450 mm BOTTOM MANIFOLD INVERT:	421.193
450 mm x 450 mm BOTTOM MANIFOLD INVERT:	421.193
450 mm BOTTOM CONNECTION INVERT:	421.193
450 mm BOTTOM CONNECTION INVERT:	421.193
BOTTOM OF SC-740 CHAMBER:	421.153
BOTTOM OF STONE:	421.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	450 mm BOTTOM PREFABRICATED END CAP, PART#: SC740EPE18B / TYP OF ALL 450 mm BOTTOM CONNECTIONS	41 mm	
MANIFOLD	B	450 mm x 450 mm BOTTOM MANIFOLD, ADS N-12	41 mm	
MANIFOLD	C	450 mm x 450 mm BOTTOM MANIFOLD, ADS N-12	41 mm	
CONCRETE STRUCTURE	D	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		396 L/s IN
NYLOPLAST (OUTLET)	E	750 mm DIAMETER (DESIGN BY ENGINEER)		227 L/s OUT



NO ISOLATOR ROW PLUS

PLACE MINIMUM 3.810 m OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

950-960 ST. DAVID ST (REID'S)
FERGUS, CANADA
DRAWN: CN
CHECKED: N/A
DATE:
PROJECT #:

DESCRIPTION	CHK	DRW	DATE

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

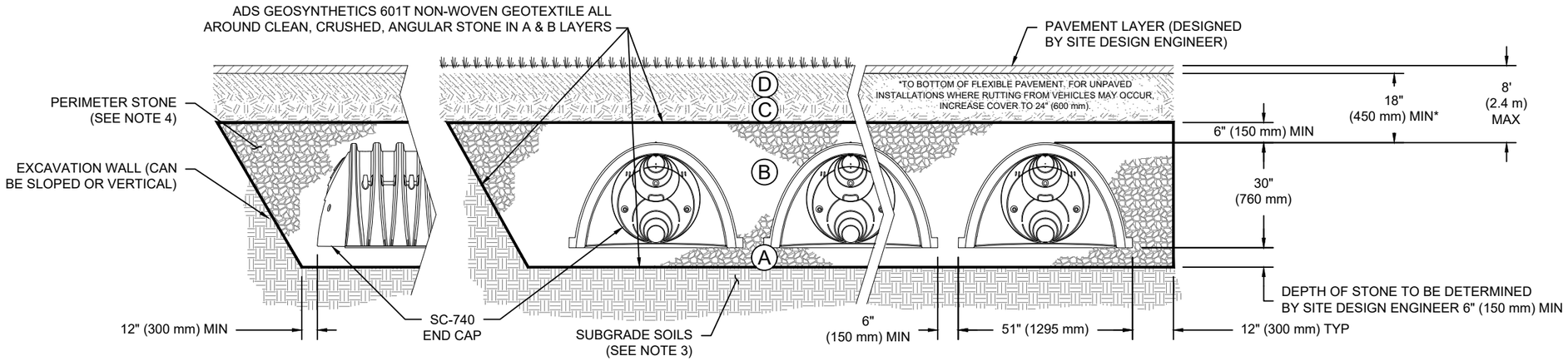
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 100

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

950-960 ST. DAVID ST (REID'S)
FERGUS, CANADA
DRAWN: CN
CHECKED: N/A
DATE:
PROJECT #:

DATE	DRW	CHK	DESCRIPTION

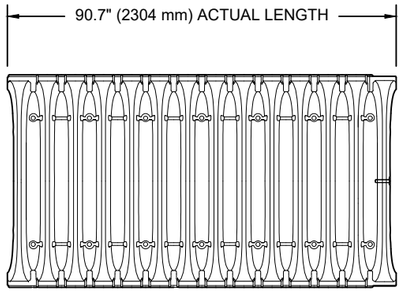
StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

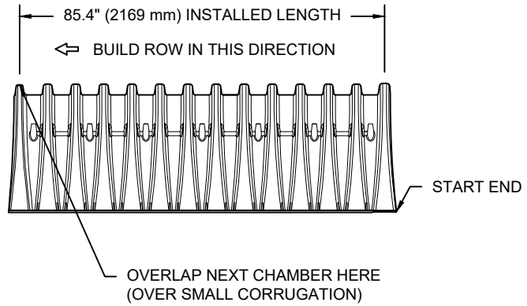
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

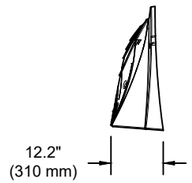
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

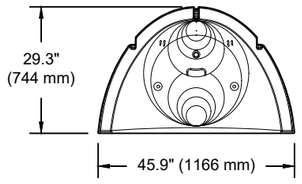
SC-740 TECHNICAL SPECIFICATION

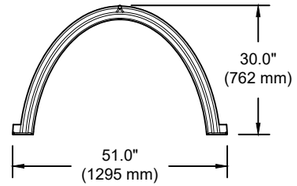
NTS







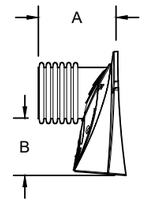


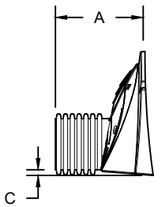


NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS





PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

950-960 ST. DAVID ST (REID'S)
FERGUS, CANADA
DATE:
DRAWN: CN
PROJECT #:
CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

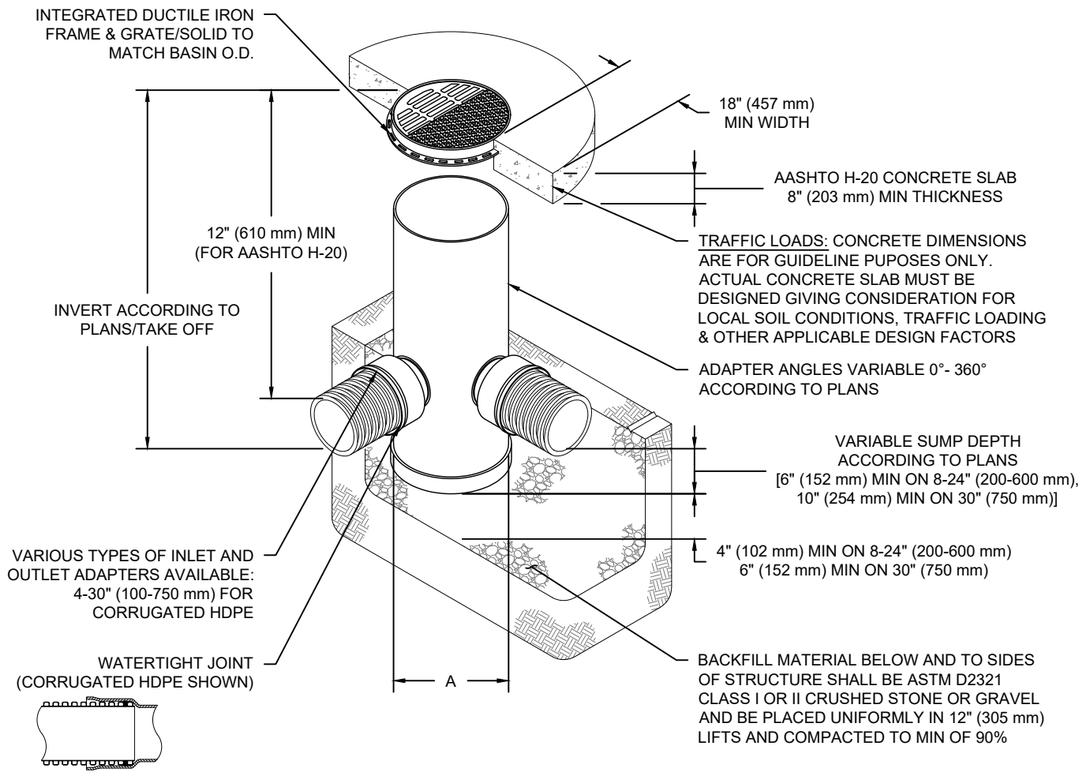
StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

NYLOPLAST DRAIN BASIN

NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

950-960 ST. DAVID ST (REID'S)
FERGUS, CANADA

DATE: | DRAWN: CN
PROJECT #: | CHECKED: N/A

DESCRIPTION	CHK	DRW	DATE

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

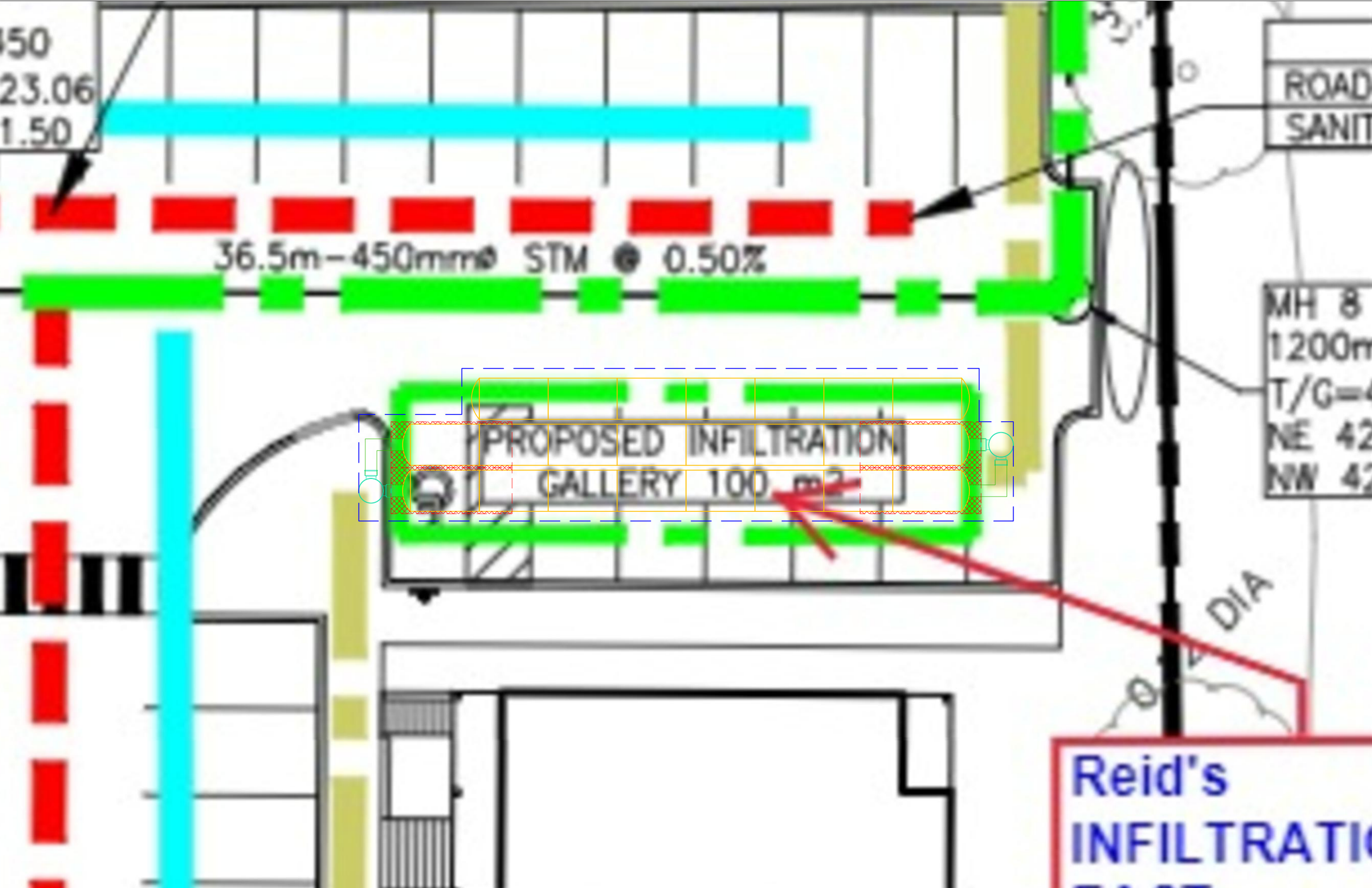
Nyloplast®
770-932-2443 | WWW.NYLOPLAST-US.COM
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

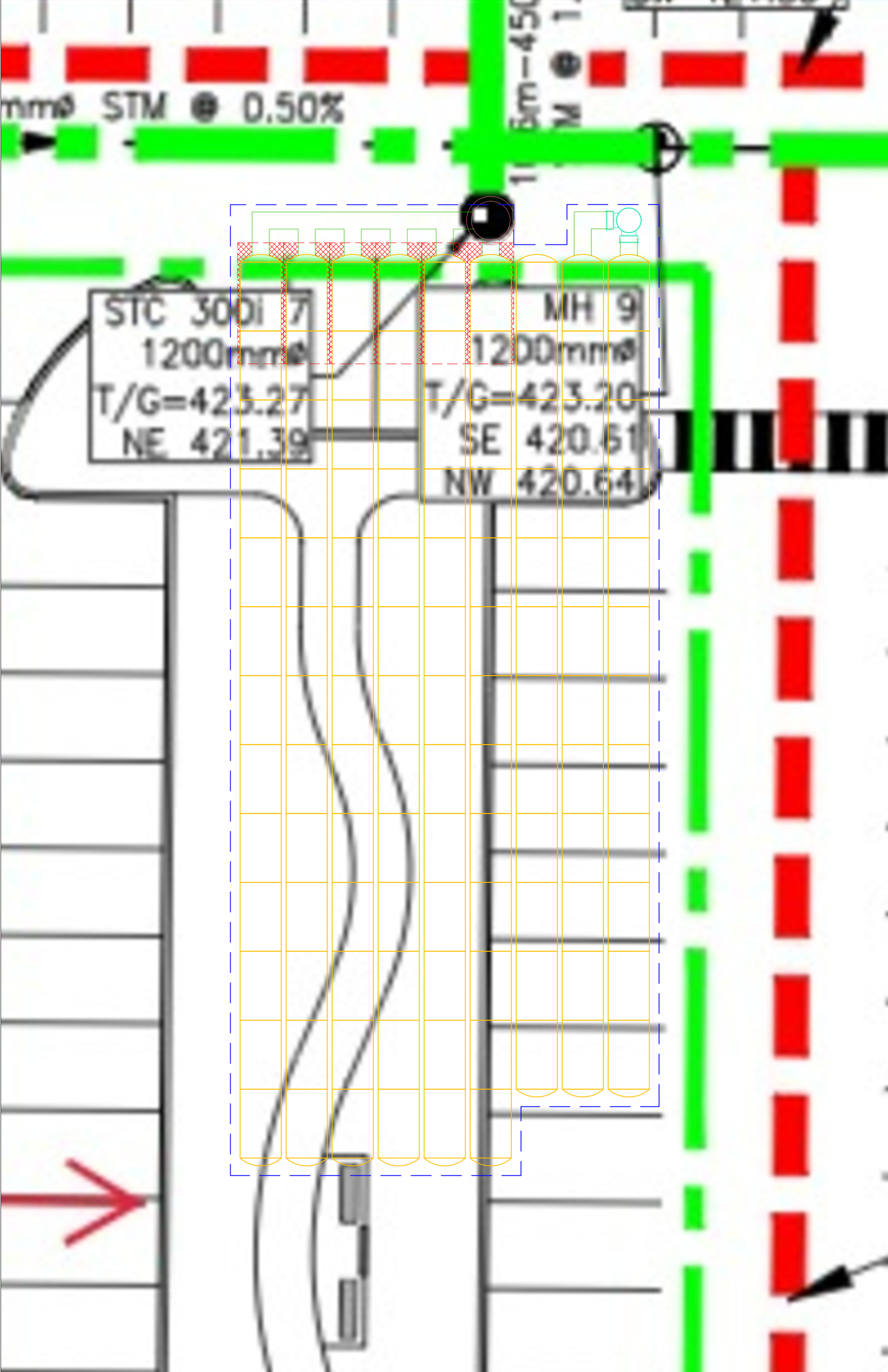
ATION

PROPOSED INFILTRATION
GALLERY 100 m2

MH 10
1200mmø
T/C=423.39
SE 420.83

37.1m


36.5m–450mmø STM @ 0.50%
PROPOSED INFILTRATION
GALLERY 100 m2
ROAD
SANIT
MH 8
1200m
T/G=
NE 42
NW 42
DIA
Reid's
INFILTRATIO


mmø STM @ 0.50%
STC 300i 7
1200mmø
T/G=423.27
NE 421.39
MH 9
1200mmø
T/G=423.20
SE 420.61
NW 420.64

	ELEV.	COVER
ROAD	423.28	
SANITARY	420.25	3.03

DCB 2
600x1450
T/G=423.06
SW 421.50

37.1m–450mmø STM @ 0.50%

36.5m–450mmø STM @ 0.50%

34.3m–450mmø

PROPOSED INFILTRATION GALLERY 100 m2

PROPOSED INFILTRATION GALLERY 100 m2

MH 10
1200mmø
T/G=423.39
SE 420.83

STC 300i 7
1200mmø
T/G=423.27
NE 421.39

MH 9
1200mmø
T/G=423.20
SE 420.61
NW 420.64

	ELEV.	COVER
ROAD	423.91	
SANITARY	420.01	3.90

	ELEV.	COVER
ROAD	423.81	
SANITARY	419.61	4.20

0.6 DIA

Reid
INFI
EAS

ADS OGS Sizing Summary

Project Name: 950-960 St. David St - Reid's OGS

Consulting Engineer: Stantec

Location: Fergus, ON

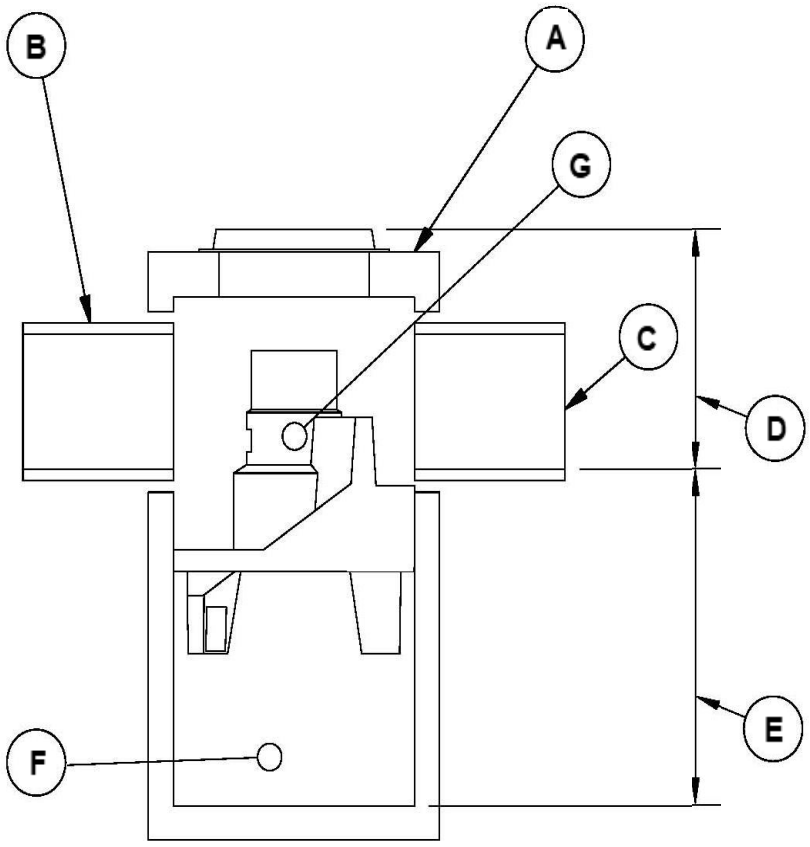
Sizing Completed By: C. Neath **Email:** cody.neath@ads-pipe.com

Treatment Requirements		
Treatment Goal:	Enhanced (MOE)	
Selected Parameters:	80% TSS	90% Volume
Selected Unit:	**FD-4HC**	

Site Details	
Site Area:	0.59 ha
% Impervious:	80%
Rational C:	0.78
Rainfall Station:	Waterloo_Wellington
Particle Size Distribution:	Fine
Peak Flowrate:	481 L/s

Summary of Results		
Model	**TSS Removal**	**Volume Treated**
FD-4HC	91.0%	>90%
FD-5HC	94.0%	>90%
FD-6HC	95.0%	>90%
FD-8HC	97.0%	>90%
FD-10HC	98.0%	>90%

FD-4HC Specification	
Unit Diameter (A):	1,200 mm
Inlet Pipe Diameter (B):	450 mm
Outlet Pipe Diameter (C):	450 mm
Height, T/G to Outlet Invert (D):	1880 mm
Height, Outlet Invert to Sump (E):	1515 mm
Sediment Storage Capacity (F):	0.78 m³
Oil Storage Capacity (G):	723 L
Recommended Sediment Depth for Maintenance:	440 mm
Max. Pipe Diameter:	600 mm
Peak Flow Capacity:	510 L/s



Site Elevations:	
Rim Elevation:	423.27
Inlet Pipe Elevation:	421.39
Outlet Pipe Elevation:	421.39

Notes:

Removal efficiencies are based on NJDEP Test Protocols and independently verified.

All units supplied by ADS have numerous local, provincial, and international certifications (copies of which can be provided upon request). The design engineer is responsible for ensuring compliance with applicable regulations.

Project Name: 950-960 St. David St - Reid's OGS
Consulting Engineer: Stantec
Location: Fergus, ON

Net Annual Removal Efficiency Summary: FD-4HC

Rainfall Intensity[1]	Fraction of Rainfall[1]	FD-4HC Removal Efficiency[2]	Weighted Net-Annual Removal Efficiency
mm/hr	%	%	%
0.50	0.3%	100.0%	0.3%
1.00	27.0%	100.0%	27.0%
1.50	3.2%	97.9%	3.2%
2.00	13.6%	95.3%	13.0%
2.50	7.2%	93.3%	6.7%
3.00	1.8%	91.8%	1.7%
3.50	6.7%	90.5%	6.1%
4.00	3.7%	89.3%	3.3%
4.50	1.5%	88.4%	1.3%
5.00	4.8%	87.5%	4.2%
6.00	3.3%	86.0%	2.9%
7.00	4.7%	84.8%	4.0%
8.00	2.8%	83.8%	2.3%
9.00	2.0%	82.9%	1.6%
10.00	2.5%	82.0%	2.1%
20.00	9.0%	76.9%	6.9%
30.00	3.1%	74.1%	2.3%
40.00	1.0%	72.1%	0.7%
50.00	0.8%	70.6%	0.5%
100.00	0.9%	66.2%	0.6%
150.00	0.1%	63.8%	0.1%
200.00	0.0%	62.1%	0.0%
		Total Net Annual Removal Efficiency:	91.0%
		Total Runoff Volume Treated:	99.9%

Notes:

(1) Rainfall Data: 1981:2007,HLY03 6149387, Waterloo/Wellingotn Airport, ON

(2) Based on third party verified data and appoximating the removal of a PSD similar to the STC Fine distribution

(3) Rainfall adjusted to 5 min peak intensity based on hourly average.

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
VISIT OUR APP

950-960 ST. DAVID ST (COMMERCIAL)

FERGUS, CANADA

SC-310 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-310.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE OR POLYETHYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2922 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310 SYSTEM

1. STORMTECH SC-310 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 20-50 mm (3/4-2").
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

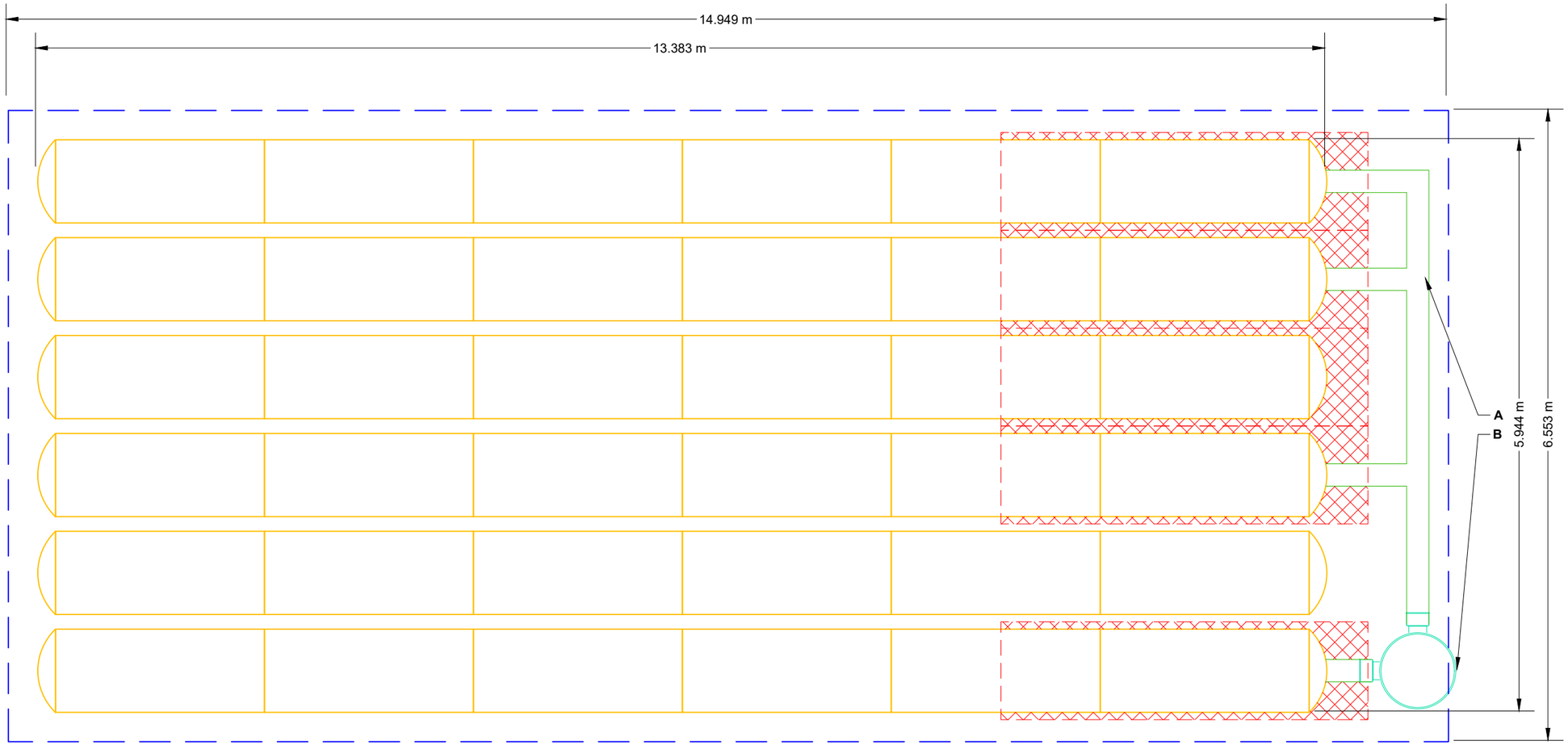
©2022 ADS, INC.

PROPOSED LAYOUT: EAST INFILTRATION	
36	STORMTECH SC-310 CHAMBERS
12	STORMTECH SC-310 END CAPS
152	STONE ABOVE (mm)
152	STONE BELOW (mm)
40	STONE VOID
36.9	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
98.0	SYSTEM AREA (m^2)
43.0	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS: EAST INFILTRATION	
MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	424.847
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	423.018
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	422.866
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	422.866
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	422.866
TOP OF STONE:	422.561
TOP OF SC-310 CHAMBER:	422.409
200 mm x 200 mm BOTTOM MANIFOLD INVERT:	422.018
200 mm BOTTOM CONNECTION INVERT:	422.018
BOTTOM OF SC-310 CHAMBER:	422.002
BOTTOM OF STONE:	421.850

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
MANIFOLD	A	200 mm x 200 mm BOTTOM MANIFOLD, MOLDED FITTINGS	15 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	B	750 mm DIAMETER (610 mm SUMP MIN)		71 L/s IN



NO ISOLATOR ROW PLUS

PLACE MINIMUM 3.810 m OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

950-960 ST. DAVID ST
(COMMERCIAL)
FERGUS, CANADA

DATE: | DRAWN: CN | CHECKED: N/A
PROJECT #:

DESCRIPTION	CHK	DRW	DATE

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 50

PROPOSED LAYOUT: STORAGE SYSTEM

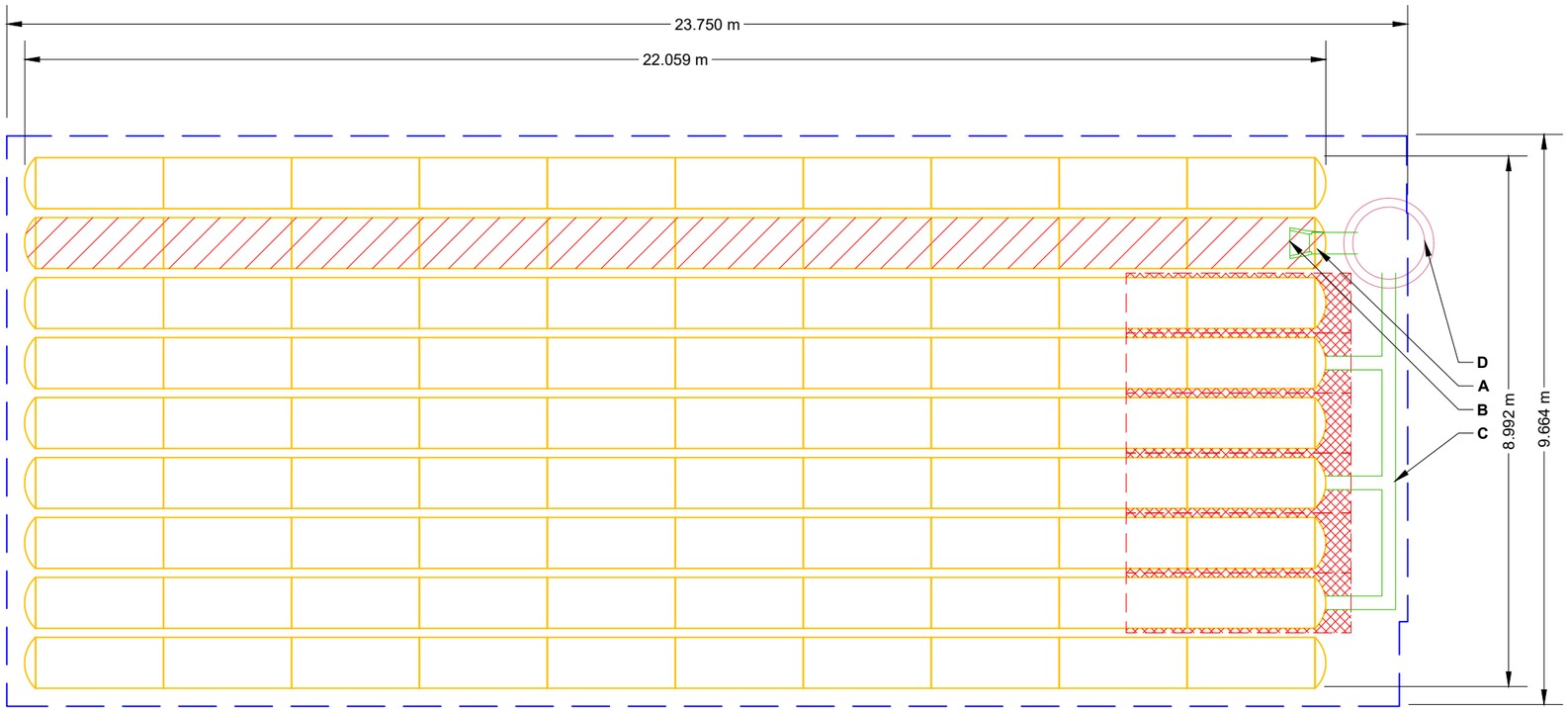
90	STORMTECH SC-310 CHAMBERS
18	STORMTECH SC-310 END CAPS
152	STONE ABOVE (mm)
152	STONE BELOW (mm)
40	STONE VOID
87.8	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
229.3	SYSTEM AREA (m^2)
66.8	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS: STORAGE SYSTEM

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	424.847
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	423.018
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	422.866
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	422.866
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	422.866
TOP OF STONE:	422.561
TOP OF SC-310 CHAMBER:	422.409
200 mm x 200 mm TOP MANIFOLD INVERT:	422.091
300 mm ISOLATOR ROW PLUS INVERT:	422.025
BOTTOM OF SC-310 CHAMBER:	422.002
BOTTOM OF STONE:	421.850

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	300 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 300 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	23 mm	
FLAMP	B	INSTALL FLAMP ON 300 mm ACCESS PIPE / PART#: SC31012RAMP		
MANIFOLD	C	200 mm x 200 mm TOP MANIFOLD, MOLDED FITTINGS	89 mm	
CONCRETE STRUCTURE	D	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		65 L/s IN



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

950-960 ST. DAVID ST
(COMMERCIAL)
FERGUS, CANADA

DRAWN: CN
CHECKED: N/A
DATE:
PROJECT #:

DATE	DRW	CHK	DESCRIPTION

4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 50

StormTech®
Chamber System

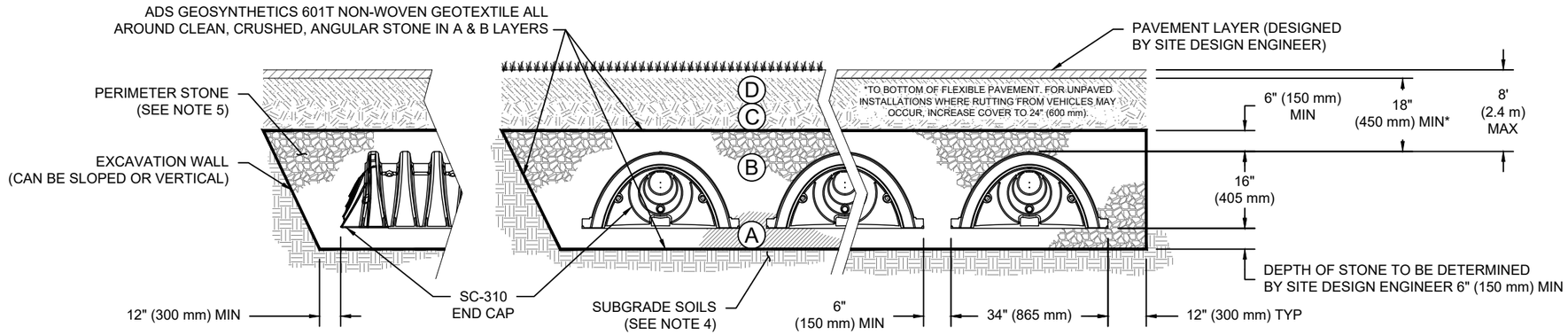
888-892-2694 | WWW.STORMTECH.COM

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

950-960 ST. DAVID ST
(COMMERCIAL)
FERGUS, CANADA

DATE: | DRAWN: CN | CHECKED: N/A
PROJECT #:

DATE	DRW	CHK	DESCRIPTION

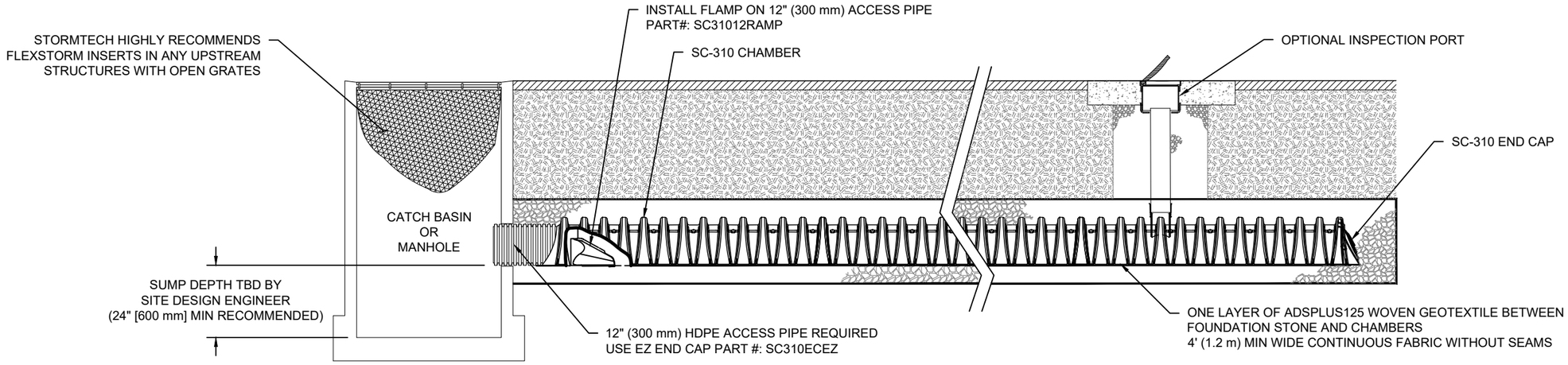
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

StormTech®
Chamber System

888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SHEET
4 OF 7



SC-310 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

950-960 ST. DAVID ST
(COMMERCIAL)
FERGUS, CANADA

DATE:
DRAWN: CN
PROJECT #:
CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

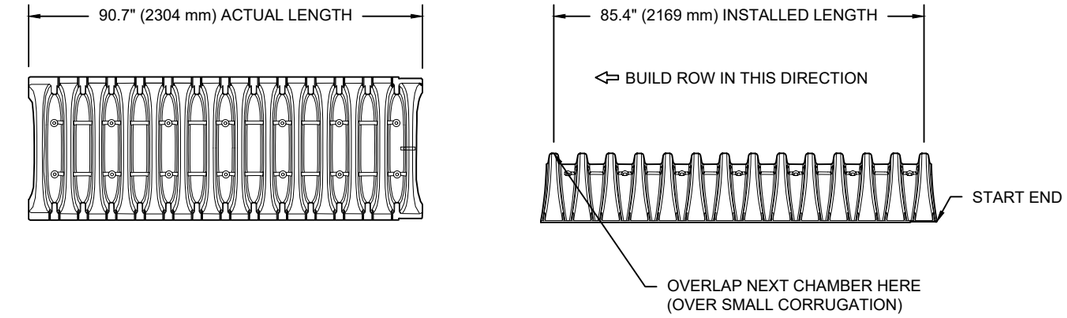
StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

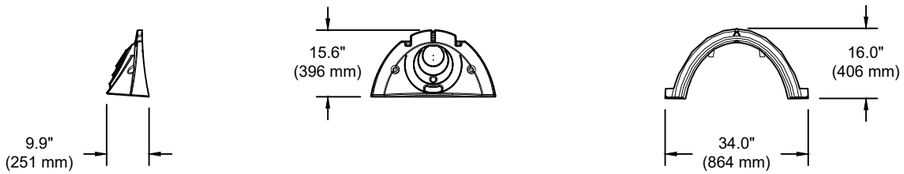
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

SC-310 TECHNICAL SPECIFICATION

NTS

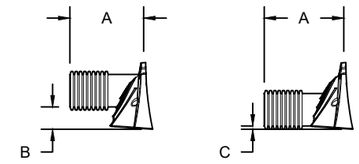




NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC310EPE06T / SC310EPE06TPC	6" (150 mm)	9.6" (244 mm)	5.8" (147 mm)	---
SC310EPE06B / SC310EPE06BPC			---	0.5" (13 mm)
SC310EPE08T / SC310EPE08TPC	8" (200 mm)	11.9" (302 mm)	3.5" (89 mm)	---
SC310EPE08B / SC310EPE08BPC			---	0.6" (15 mm)
SC310EPE10T / SC310EPE10TPC	10" (250 mm)	12.7" (323 mm)	1.4" (36 mm)	---
SC310EPE10B / SC310EPE10BPC			---	0.7" (18 mm)
SC310ECEZ*	12" (300 mm)	13.5" (343 mm)	---	0.9" (23 mm)

ALL STUBS, EXCEPT FOR THE SC310ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310ECEZ THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

950-960 ST. DAVID ST
(COMMERCIAL)
FERGUS, CANADA

DATE: | DRAWN: CN
PROJECT #: | CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

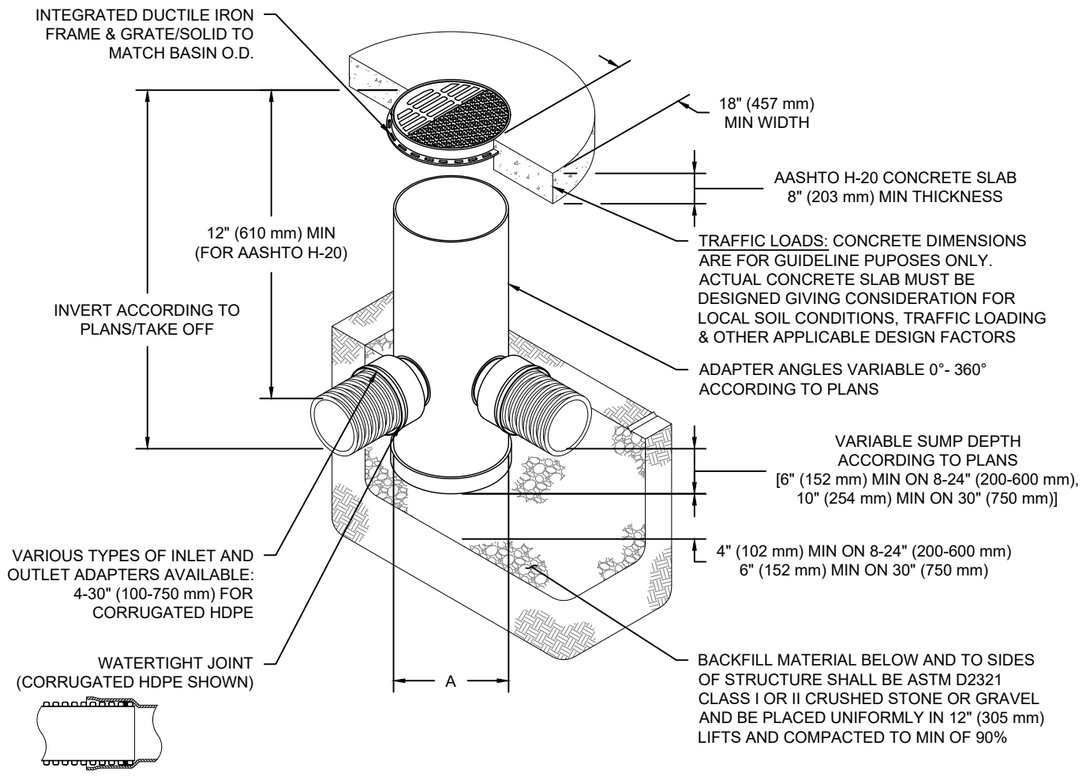
StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

NYLOPLAST DRAIN BASIN

NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

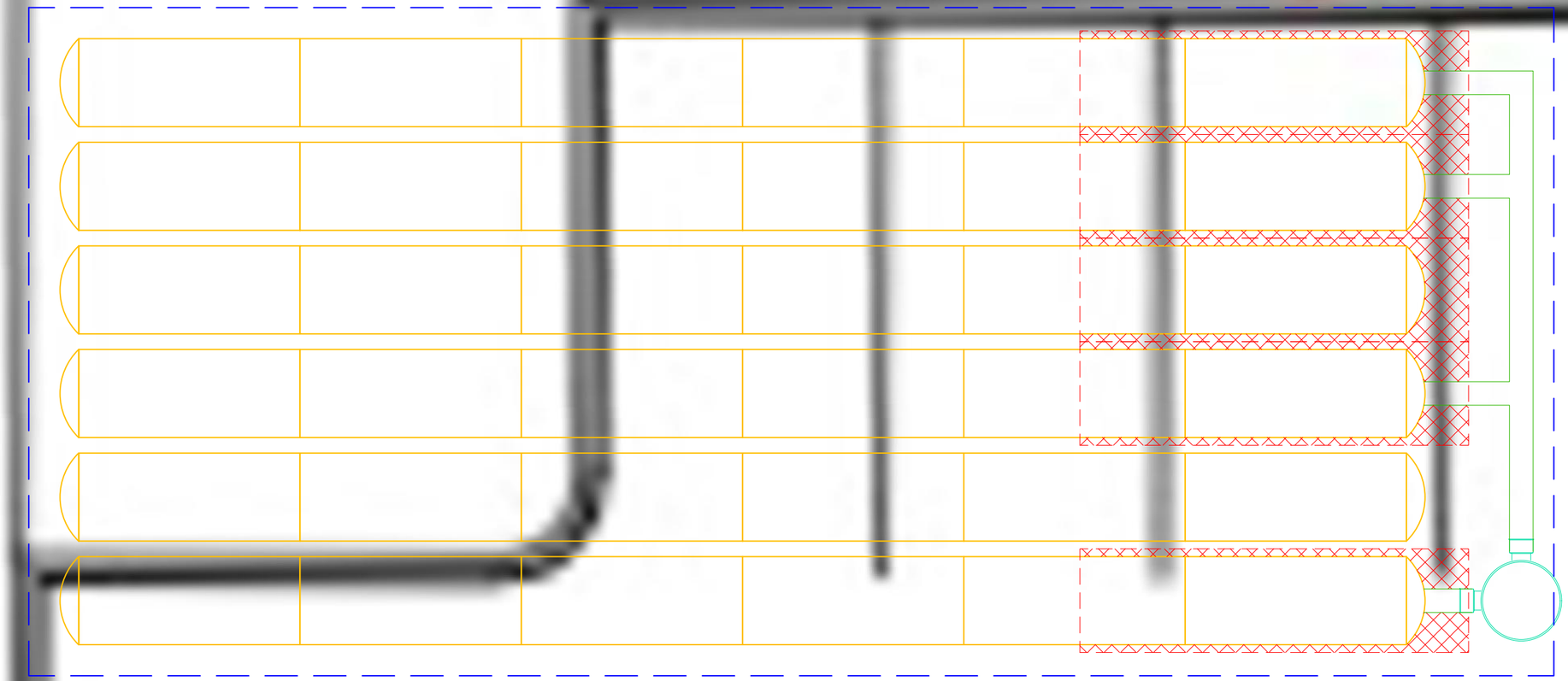
950-960 ST. DAVID ST
(COMMERCIAL)
FERGUS, CANADA

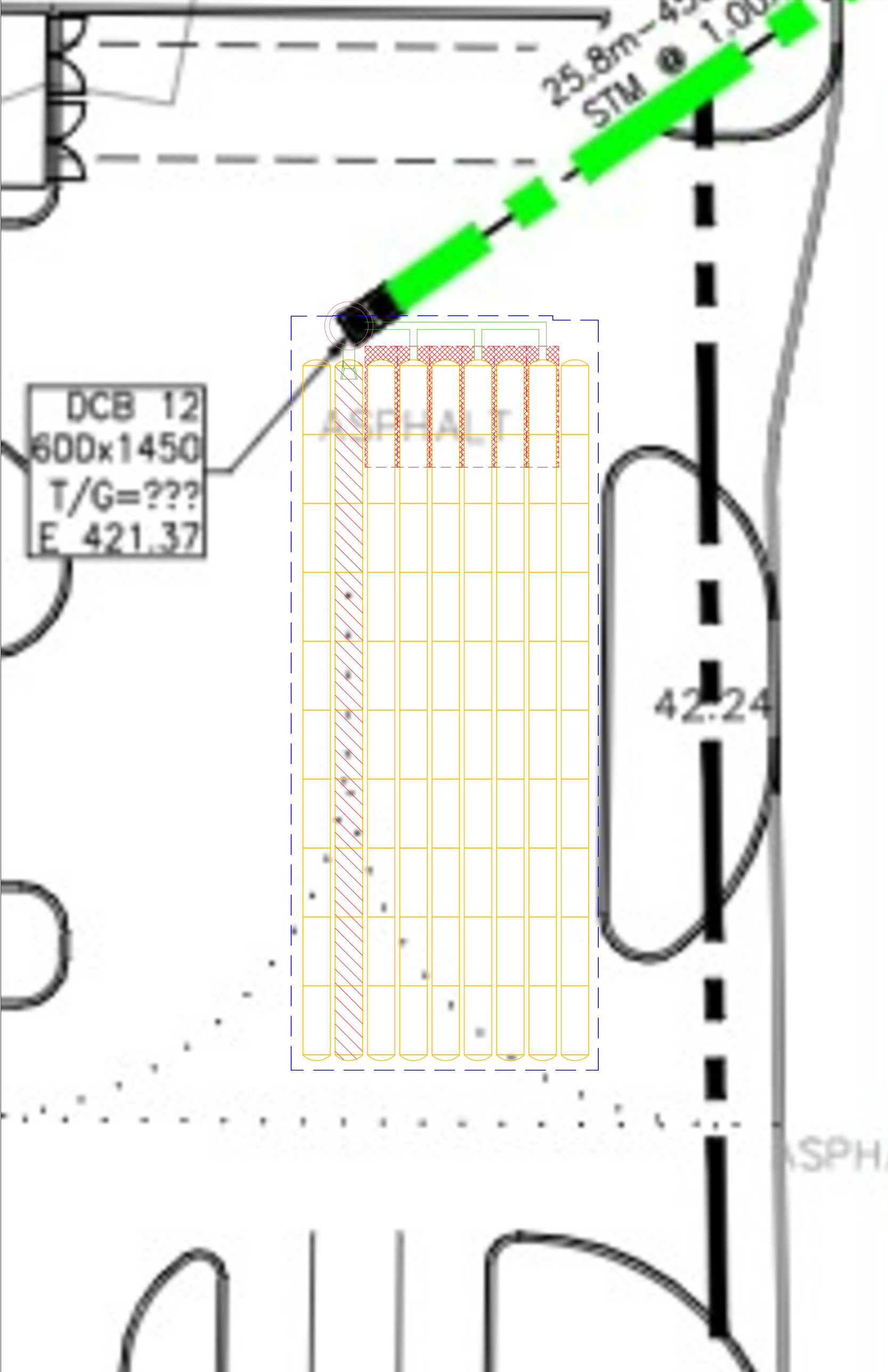
DATE:
DRAWN: CN
PROJECT #:
CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OF RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

Nyloplast®
770-932-2443 | WWW.NYLOPLAST-US.COM
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473




25.8m
STM
DCB 12
600x1450
T/G=???
E 421.37
42.24

DCB 12
600x1450
T/G=???
E 421.37

ASPHALT EDGE

25.8m
STM

ASPHALT

BRICK & METAL
CLAD BUILDING
No. 950

2 STOREY

HC

ASPHALT EDGE
40.13

42

ADS OGS Sizing Summary

Project Name: 950-960 St. David St - Commercial OGS

Consulting Engineer: Stantec

Location: Fergus, ON

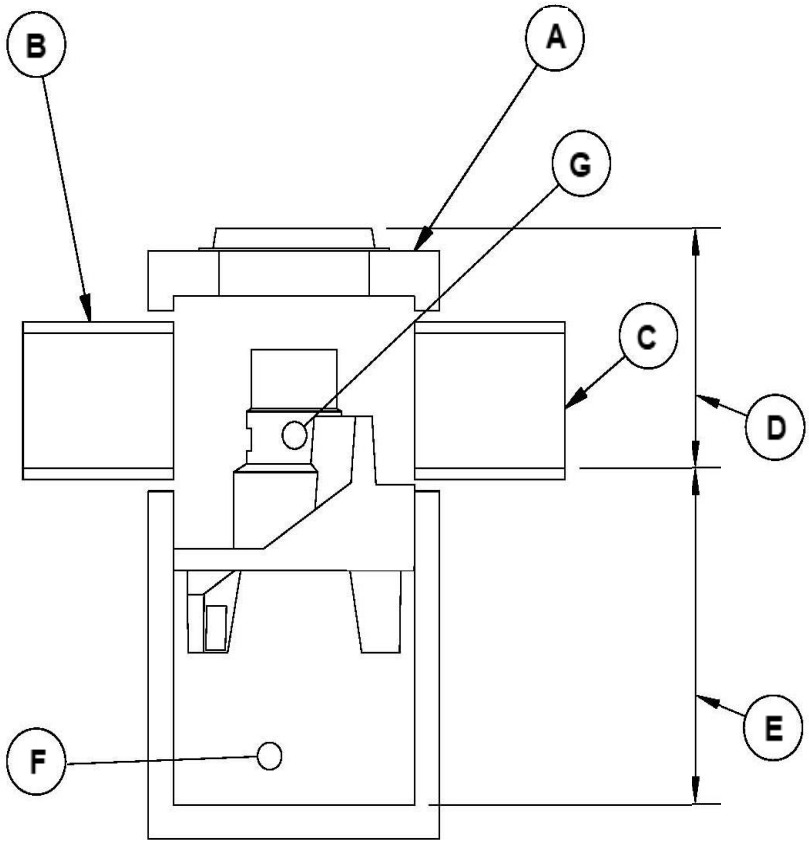
Sizing Completed By: C. Neath **Email:** cody.neath@ads-pipe.com

Treatment Requirements		
Treatment Goal:	Enhanced (MOE)	
Selected Parameters:	80% TSS	90% Volume
Selected Unit:	**FD-4HC**	

Site Details	
Site Area:	0.4 ha
% Impervious:	95%
Rational C:	0.87
Rainfall Station:	Waterloo_Wellington
Particle Size Distribution:	Fine
Peak Flowrate:	377 L/s

Summary of Results		
Model	**TSS Removal**	**Volume Treated**
FD-4HC	92.0%	>90%
FD-5HC	95.0%	>90%
FD-6HC	96.0%	>90%
FD-8HC	98.0%	>90%
FD-10HC	99.0%	>90%

FD-4HC Specification	
Unit Diameter (A):	1,200 mm
Inlet Pipe Diameter (B):	450 mm
Outlet Pipe Diameter (C):	450 mm
Height, T/G to Outlet Invert (D):	2650 mm
Height, Outlet Invert to Sump (E):	1515 mm
Sediment Storage Capacity (F):	0.78 m³
Oil Storage Capacity (G):	723 L
Recommended Sediment Depth for Maintenance:	440 mm
Max. Pipe Diameter:	600 mm
Peak Flow Capacity:	510 L/s



Site Elevations:	
Rim Elevation:	423.02
Inlet Pipe Elevation:	420.43
Outlet Pipe Elevation:	420.37

Notes:

Removal efficiencies are based on NJDEP Test Protocols and independently verified.

All units supplied by ADS have numerous local, provincial, and international certifications (copies of which can be provided upon request). The design engineer is responsible for ensuring compliance with applicable regulations.

Project Name:	950-960 St. David St - Commercial OGS
Consulting Engineer:	Stantec
Location:	Fergus, ON

Net Annual Removal Efficiency Summary: FD-4HC

Rainfall Intensity[1]	Fraction of Rainfall[1]	FD-4HC Removal Efficiency[2]	Weighted Net-Annual Removal Efficiency
mm/hr	%	%	%
0.50	0.3%	100.0%	0.3%
1.00	27.0%	100.0%	27.0%
1.50	3.2%	100.0%	3.2%
2.00	13.6%	97.8%	13.3%
2.50	7.2%	95.8%	6.9%
3.00	1.8%	94.2%	1.7%
3.50	6.7%	92.8%	6.2%
4.00	3.7%	91.7%	3.4%
4.50	1.5%	90.7%	1.3%
5.00	4.8%	89.8%	4.3%
6.00	3.3%	88.3%	2.9%
7.00	4.7%	87.0%	4.1%
8.00	2.8%	86.0%	2.4%
9.00	2.0%	85.0%	1.7%
10.00	2.5%	84.2%	2.1%
20.00	9.0%	79.0%	7.1%
30.00	3.1%	76.0%	2.4%
40.00	1.0%	74.0%	0.7%
50.00	0.8%	72.5%	0.6%
100.00	0.9%	68.0%	0.6%
150.00	0.1%	65.5%	0.1%
200.00	0.0%	63.7%	0.0%
		Total Net Annual Removal Efficiency:	92.0%
		Total Runoff Volume Treated:	99.9%

Notes:

(1) Rainfall Data: 1981:2007,HLY03 6149387, Waterloo/Wellingotn Airport, ON

(2) Based on third party verified data and appoximating the removal of a PSD similar to the STC Fine distribution

(3) Rainfall adjusted to 5 min peak intensity based on hourly average.

Appendix D
Utility Correspondence

From: Carm Stefanelli
To: Bellemare, Jackie
Subject: 950 St David
Date: Monday, May 02, 2022 9:42:38 AM
Attachments: image001.png
elec plan requirement2.pdf
Cust Request for Connection 3.pdf
contractor pre job 1.doc
electrical specifications cwh A1.doc

Good morning,
This project does fall into CWH service territory.
Please complete attached documents and return to me at your convenience
Thank you

Carm Stefanelli
Manager operations
Centre Wellington Hydro
519-8432900 ext 236 (office)
226-8200128 (cell)

From: Jenny Thompson
To: Bellemare, Jackie
Subject: RE: 950-960 St David Street Fergus - Enbridge Servicing
Date: Thursday, April 21, 2022 8:19:41 AM

Good morning Jackie,

Thank you for your patience.

Network Analysis has advised that there is sufficient capacity in the system at this time. Please note that capacity in the system is not reserved without an application for service. We would need to re-review the system to determine sufficient capacity at the time the project is to proceed.

Thank you.

Jenny Thompson
Advisor, Regional Expansion
Field Services & Growth

ENBRIDGE
TEL: 519-885-7400 ext. 5067488 | jenny.thompson@enbridge.com
603 Kumpf Drive, Waterloo, ON N2V 1K3

enbridge.com
Safety. Integrity. Respect. Inclusion.

From: Jenny Thompson
Sent: Friday, April 8, 2022 4:48 PM
To: Bellemare, Jackie <Jackie.Bellemare@stantec.com>
Subject: RE: 950-960 St David Street Fergus - Enbridge Servicing

Good afternoon Jackie,

Happy to help!

Please find the attached PDF file showing information for Enbridge Gas plant locations in respect to the above-mentioned project, for engineering purposes only. The location of Enbridge Gas facilities on this drawing is approximate and is to be used for information purposes. It is understood that locates must be obtained through Ontario One Call Limited at 1-800-400-2255 to confirm location of our gas line prior to excavation.

I will forward the drawing to our Network Analysis team to advise of system capacity. Network Analysis will only be able to advise regarding our current system, as we do not reserve capacity without an application for service. Capacity will need to be reviewed again once the project is to proceed.

Thank you.

Jenny Thompson

Sr Analyst New Business Projects
Construction and Growth

ENBRIDGE
TEL: 519-885-7400 ext. 5067488 | jenny.thompson@enbridge.com
603 Kumpf Drive, Waterloo, ON N2V 1K3

enbridge.com
Safety. Integrity. Respect. Inclusion.

From: Bellemare, Jackie <Jackie.Bellemare@stantec.com>
Sent: Friday, April 8, 2022 3:21 PM
To: Jenny Thompson <Jenny.Thompson@enbridge.com>
Subject: [External] 950-960 St David Street Fergus - Enbridge Servicing

CAUTION! EXTERNAL SENDER
Were you expecting this email? TAKE A CLOSER LOOK. Is the sender legitimate?
DO NOT click links or open attachments unless you are 100% sure that the email is safe.

Good Afternoon Jenny!

Thank you for your continued assistance with providing preliminary utility servicing information on our upcoming projects – we have another we would like some information on!

This one is located on St. David Street in Fergus, see attached Concept Plan. There will be 2 separate sites being developed – the townhouse development at the back with 144 units is being considered at this time.

Could you please provide some general information on existing infrastructure in the area and expected servicing capabilities for the site?

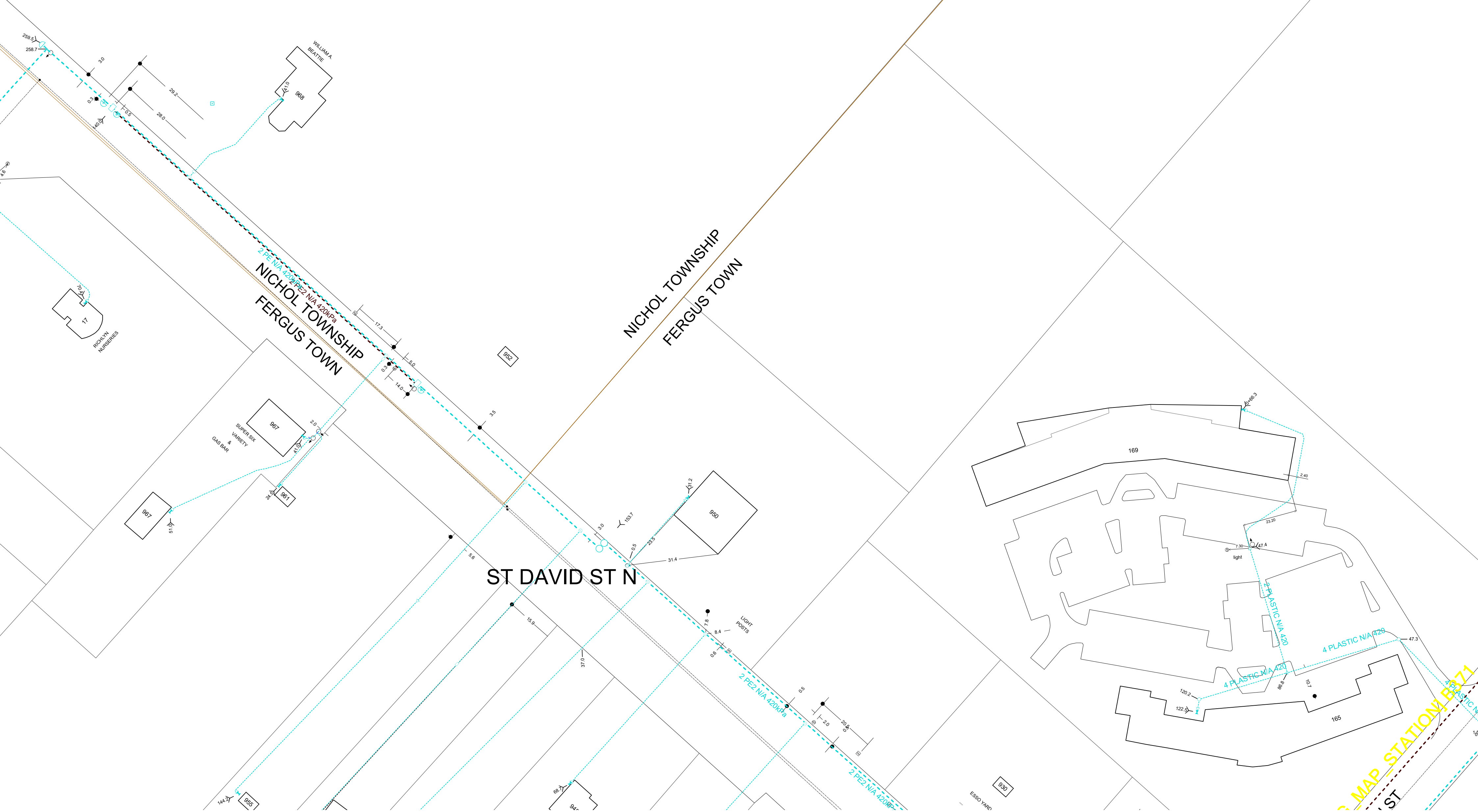
Thank you!

Jackie Bellemare E.I.T.
Project Coordinator- Community Development

Mobile: 1(519) 546-5166
Jackie.Bellemare@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.


ST DAVID ST N
NICHOL TOWNSHIP
FERGUS TOWN
NICHOL TOWNSHIP
FERGUS TOWN
2 PE N/A 420kPa
PE2 N/A 420kPa
2 PE2 N/A 420kPa
2 PE2 N/A 420kPa
WILLIAM A BEATTIE
968
17
RICHLYN NURSERIES
952
SUPER SIX VARIETY & GAS BAR
967
967
961
950
LIGHT POSTS
169
165
light
2 PLASTIC N/A 420
4 PLASTIC N/A 420
4 PLASTIC N/A 420
930
ESSO YARD
955

From: Ackerman, R. Neil
To: Bellemare, Jackie; MOC (Bell)
Cc: O"Shea, Brendan; Ackerman, R. Neil
Subject: RE: 950-960 St David Street Fergus - Bell Servicing
Date: Friday, April 08, 2022 3:50:00 PM
Attachments: image001.png
BLANK requestforwork_forbuilder 2022 (22).xls
161414172_R-CP2_20220203pdf.pdf

Hello MOC team

Please provide Jackie with a mark up of the Bell plant fronting 950 - 960 St David's St north.

Jackie we have two separate non encased duct banks fronting the property and multiple copper cables. Also there is a long haul fiber cable out front.

We have a cable feed with a lightning arrestor in the existing building. We will need to it remove prior to any building demo work.

We will also need a site CAD & PDF drawing along with the attached RFI excel sheet completed and returned once your site plan is approved.

Once we have all the info we with apply to our funding team for capital to service the site with fiber.

Neil Ackerman
Implementation Manager, Network Provisioning

Flr 3,20 Cork St East
Guelph, N1H-2W7
P 519.568.5797
C 226.750.5389
neil.ackerman1@bell.ca

From: Bellemare, Jackie <Jackie.Bellemare@stantec.com>
Sent: April-08-22 3:24 PM
To: Ackerman, R. Neil <neil.ackerman1@bell.ca>
Subject: [EXT]FW: 950-960 St David Street Fergus - Bell Servicing

My mistake – I'm guessing you won't be able to advise on Enbridge servicing. We appreciate the Bell servicing information!

Jackie Bellemare E.I.T.

Project Coordinator- Community Development

Mobile: 1(519) 546-5166
Jackie.Bellemare@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.

From: Bellemare, Jackie
Sent: Friday, April 8, 2022 3:22 PM
To: Ackerman, R. Neil <neil.ackerman1@bell.ca>
Subject: 950-960 St David Street Fergus - Enbridge Servicing

Good Afternoon Neil!

Thank you for your continued assistance with providing preliminary utility servicing information on our upcoming projects – we have another we would like some information on!

This one is located on St. David Street in Fergus, see attached Concept Plan. There will be 2 separate sites being developed – the townhouse development at the back with 144 units is being considered at this time.

Could you please provide some general information on existing infrastructure in the area and expected servicing capabilities for the site?

Thank you!

Jackie Bellemare E.I.T.
Project Coordinator- Community Development

Mobile: 1(519) 546-5166
Jackie.Bellemare@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.

External Email: *Please use caution when opening links and attachments /* ***Courriel externe:*** *Soyez prudent avec les liens et documents joints*

From: Devon McDermott
To: Bellemare, Jackie; Cheryl Jacob
Subject: RE: 950-960 St David Street Fergus - Rogers Servicing
Date: Monday, April 25, 2022 2:41:41 PM
Attachments: image001.jpg

Hello Jackie,
My understanding is Rogers is not servicing Fergus at this time. I would need to have the project assessed to determine if Rogers will service. Do you have a timeline for occupancy?

Devon McDermott
Rogers Communications Canada Inc.
85 Grand Crest Place
Kitchener ON N2C 2L6

DEVON.MCDERMOTT@RCI.ROGERS.COM
o 519.894.8121 **m** 519.572.3875
f 519.893.7857

From: Devon McDermott <Dmcdermo@rci.rogers.com>
Sent: April 14, 2022 2:05 PM
To: Bellemare, Jackie <Jackie.Bellemare@stantec.com>; Cheryl Jacob <Cheryl.Jacob@rci.rogers.com>
Cc: Devon McDermott <Dmcdermo@rci.rogers.com>
Subject: RE: 950-960 St David Street Fergus - Rogers Servicing

Hello Jackie,
Are you able to complete/return the new construction checklist when the information becomes available?

Hi Cheryl,
Can you comment?

Devon McDermott
Rogers Communications Canada Inc.
85 Grand Crest Place
Kitchener ON N2C 2L6

DEVON.MCDERMOTT@RCI.ROGERS.COM
o 519.894.8121 **m** 519.572.3875

t f 519.893.7857

From: Bellemare, Jackie <Jackie.Bellemare@stantec.com>
Sent: April 8, 2022 3:25 PM
To: Devon McDermott <Dmcdermo@rci.rogers.com>; Cheryl Jacob <Cheryl.Jacob@rci.rogers.com>
Subject: 950-960 St David Street Fergus - Rogers Servicing

Good Afternoon Cheryl and Devon,

Thank you for your continued assistance with providing preliminary utility servicing information on our upcoming projects – we have another we would like some information on!

This one is located on St. David Street in Fergus, see attached Concept Plan. There will be 2 separate sites being developed – the townhouse development at the back with 144 units is being considered at this time. If this is located outside of your areas please advise who we may contact!

Could you please provide some general information on existing infrastructure in the area and expected servicing capabilities for the site?

Thank you!

Jackie Bellemare E.I.T.
Project Coordinator- Community Development

Mobile: 1(519) 546-5166
Jackie.Bellemare@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.

This communication is confidential. We only send and receive email on the basis of the terms set out at www.rogers.com/web/content/emailnotice

Ce message est confidentiel. Notre transmission et réception de courriels se fait strictement suivant les modalités énoncées dans l'avis publié à www.rogers.com/aviscourriel

From: Jenny Thompson
To: Bellemare, Jackie
Subject: RE: 950-960 St David Street Fergus - Enbridge Servicing
Date: Thursday, April 21, 2022 8:19:41 AM

Good morning Jackie,

Thank you for your patience.

Network Analysis has advised that there is sufficient capacity in the system at this time. Please note that capacity in the system is not reserved without an application for service. We would need to re-review the system to determine sufficient capacity at the time the project is to proceed.

Thank you.

Jenny Thompson
Advisor, Regional Expansion
Field Services & Growth

ENBRIDGE
TEL: 519-885-7400 ext. 5067488 | jenny.thompson@enbridge.com
603 Kumpf Drive, Waterloo, ON N2V 1K3

enbridge.com
Safety. Integrity. Respect. Inclusion.

From: Jenny Thompson
Sent: Friday, April 8, 2022 4:48 PM
To: Bellemare, Jackie <Jackie.Bellemare@stantec.com>
Subject: RE: 950-960 St David Street Fergus - Enbridge Servicing

Good afternoon Jackie,

Happy to help!

Please find the attached PDF file showing information for Enbridge Gas plant locations in respect to the above-mentioned project, for engineering purposes only. The location of Enbridge Gas facilities on this drawing is approximate and is to be used for information purposes. It is understood that locates must be obtained through Ontario One Call Limited at 1-800-400-2255 to confirm location of our gas line prior to excavation.

I will forward the drawing to our Network Analysis team to advise of system capacity. Network Analysis will only be able to advise regarding our current system, as we do not reserve capacity without an application for service. Capacity will need to be reviewed again once the project is to proceed.

Thank you.

Jenny Thompson

Sr Analyst New Business Projects
Construction and Growth

ENBRIDGE
TEL: 519-885-7400 ext. 5067488 | jenny.thompson@enbridge.com
603 Kumpf Drive, Waterloo, ON N2V 1K3

enbridge.com
Safety. Integrity. Respect. Inclusion.

From: Bellemare, Jackie <Jackie.Bellemare@stantec.com>
Sent: Friday, April 8, 2022 3:21 PM
To: Jenny Thompson <Jenny.Thompson@enbridge.com>
Subject: [External] 950-960 St David Street Fergus - Enbridge Servicing

CAUTION! EXTERNAL SENDER
Were you expecting this email? TAKE A CLOSER LOOK. Is the sender legitimate?
DO NOT click links or open attachments unless you are 100% sure that the email is safe.

Good Afternoon Jenny!

Thank you for your continued assistance with providing preliminary utility servicing information on our upcoming projects – we have another we would like some information on!

This one is located on St. David Street in Fergus, see attached Concept Plan. There will be 2 separate sites being developed – the townhouse development at the back with 144 units is being considered at this time.

Could you please provide some general information on existing infrastructure in the area and expected servicing capabilities for the site?

Thank you!

Jackie Bellemare E.I.T.
Project Coordinator- Community Development

Mobile: 1(519) 546-5166
Jackie.Bellemare@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.

Appendix E
Correspondence

From: Ben Kissner
To: Bellemare, Jackie
Cc: Fraser, Trevor
Subject: RE: 950-960 St. David Street North Fergus - GRCA Correspondence
Date: Thursday, April 21, 2022 11:37:07 AM

Good morning,

I have reviewed the proposed plans, and will note that GRCA does not have any regulations that extend onto the subject lands.

Please that legal and adequate outlet for storm water will ne necessary; the plans that I was circulated do not show any SWM infrastructure and outlet onto neighbouring property. The municipality may require a drainage agreement for an outlet of this nature.

As the project evolves, I would appreciate being recirculated.

Regards,
Ben

Ben Kissner, M.Sc., MCIP, RPP
Resource Planner
Grand River Conservation Authority

400 Clyde Road, PO Box 729
Cambridge, ON N1R 5W6
Office: 519-621-2763 ext. 2237
Toll-free: 1-866-900-4722
Fax: 519-621-4844
www.grandriver.ca | Connect with us on social

From: Bellemare, Jackie <Jackie.Bellemare@stantec.com>
Sent: April 19, 2022 2:22 PM
To: Ben Kissner <bkissner@grandriver.ca>
Cc: Fraser, Trevor <Trevor.Fraser@stantec.com>
Subject: 950-960 St. David Street North Fergus - GRCA Correspondence

Good Afternoon Ben,

Trevor and I are working on a development located at 950 and 960 St. David Street North in Fergus per the attached concept plan (the plan is still being finalized so may change for the ZBA application). We are preparing a submission for ZBA at this time and will be focusing on the residential townhouse development at the back of the property. The current commercial property will be redeveloped per the attached at some undetermined point in the future. The site is outside of the GRCA regulated area which is why we have not reached out to you or needed to contact you to this point.

The site is generally flat sloping gently northward towards the unnamed stream shown on the attached outlet mark-up. Flows currently drain over the designated “EP” Environmental Protection area to the stream, including the swale located on the neighbouring property sideyard.

We are undergoing preliminary design in support of ZBA and would like to continue outletting clean flows to this stream under proposed conditions such to mimic the current regime and would appreciate any additional info or comment the GRCA can provide accordingly. Barring any issues on your end, we will submit our ZBA application to the Township and circulate to the GRCA for comment as well to ensure we meet any water quality or quantity control design criteria.

If you require any further information or have any questions please let us know!

Thank you,

Jackie Bellemare E.I.T.
Project Coordinator- Community Development

Mobile: 1(519) 546-5166
Jackie.Bellemare@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.