MONARCH CORPORATION

SITE SERVICING REPORT
STORMWATER SITE MANAGEMENT PLAN AND EROSION AND SEDIMENT CONTROL PLAN
STONEBRIDGE DEVELOPMENTS
PHASE 11 - BLOCKS 331, 332 & 333

Project 25099-5.2.2

AUGUST 2010

IBI GROUP

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1. INTRODUCTION

Design of the site has been undertaken in accordance with the following reports:

- Barrhaven South Master Servicing Study prepared by Stantec Consulting, June 2007.
- Jockvale Servicing Study South Nepean Urban Area (Official Plan Area 12A) prepared by Cumming Cockburn, March 1999.
- Corrigan Stormwater Management Facility Stormwater Management Report and Design Brief prepared by IBI Group, July 2008.
- Site Servicing Study Stonebridge Development, Phase 10S Recreation Center/School/Park/Fire Station Complex prepared by IBI Group, August 2009.
- Site Servicing Report, Stormwater Site Management Plan and Erosion and Sediment Control Plan, Stonebridge Developments, Phase 11 & 12.

Phase 11 and 12 of the Stonebridge subdivision is located south of Cambrian Road and east of Greenbank Road as shown on the Key Plan. The site consists primarily of single family lots with street and private townhouse units which are the last remaining phases of the Stonebridge development south of Cambrian Road. Phase 11 covers approximately 17.2 hectares including the private sites while Phase 12 covers approximately 14.5 hectares. Block 331 is a 11 unit freehold townhouse site fronting onto Dundonald Drive. Block 332 and 333 is a 109 unit private townhouse site backed on the east and west sides of Blackleaf Drive. Sanitary, storm and water for the two phases will be connected to existing infrastructure constructed in previous phases.

This report deals with the townhouse blocks 331, 332 and 333 which are located in Phase 11. Design of these blocks have been incorporated into the design of Phase 11 and 12.

2. WATER DISTRIBUTION

The site is provided by existing watermains located on Blackleaf Drive, Cheyenne Way, Dundonald Drive, Kilbirnie Drive and Kilmarnock Way. Watermain pipe sizes have been determined through hydraulic analysis to ensure peak demand pressures and fire flow requirements are met. Results of the analysis are included in the Water Distribution Plan for Phases 11 and 12 which is a separate report.

Water service for Block 331 is provided by the proposed watermain on Dundonald Drive while water service for Blocks 332 and 333 is provided by the proposed watermain on Blackleaf Drive.

3. WASTEWATER SYSTEM (SANITARY SEWERS)

The sanitary sewer outlet for Phase 11 is through the existing 300 mm sanitary sewer located at Blackleaf Drive and Cheyenne Way while Phase 12 drains to the existing 300 mm sanitary sewer at Kilbirnie Drive and Kilmarnock Way. Phase 11 also includes the extension of Cheyenne Way and the extension of the existing sanitary sewer stub at Cheyenne Way adjacent to Decona Terrace. Block 331 is serviced from the proposed sanitary sewer on Dundonald Drive while Blocks 332 and 333 drain to the proposed sanitary sewer on Blackleaf Drive.

All sanitary sewers within the Stonebridge development are designed in accordance with current City of Ottawa criteria, including the following:

- Average Residential Rate — 350 L/capita/day
- Population Density — Single Family – 3.4 ppu
Townhouse – 2.7 ppu
Stacked Townhouse – 2.3 ppu
- Residential Peaking Factor — Harmon Formula
- Infiltration Allowance — 0.28 l/s/ha
- Average Non-Residential Rate* (Commercial, Industrial, School) — 0.578 l/s/ha (50,000 l/day/ha)
- Non-Residential Peaking Factor — 1.5
- Minimum Velocity — 0.60 m/s

* As noted in Appendix E of the Barrhaven South Master Servicing Study.

Sanitary drainage from Phases 11 and 12 have been incorporated in previous phases of the Stonebridge Subdivision which outlets directly into the South Nepean collector sewer on the east side of Jockvale Road and west of the Jock River Crossing. There are no external sanitary drainage areas draining through Phases 11 and 12 as these phases represent the limit of the Stonebridge development south of Cambrian Road.

Appendix A contains the sanitary drainage area plans and sanitary sewer design sheets. On the Sanitary Sewer Design Sheet, the actual depth of flow is indicated for all pipes larger than 200 mm to demonstrate that the flow depth is greater than 30% of the diameter.

4. STORMWATER SYSTEM

Storm drainage from Phase 12 is tributary to Phase 11 which outlets to the future trunk storm sewer on Greenbank Road as outlined in the Corrigan Stormwater Management Report. A temporary outlet is available through the adjacent Phase 10S lands to the north that will service Phase 11 and 12 on an interim basis should the construction of the Greenbank trunk sewer be delayed. The temporary storm sewer will eventually become the permanent storm sewer for the proposed recreation center/school/park/fire station complex planned for the Phase 10S lands, as described in the Site Servicing Study. The temporary sewer is sized to service all the tributary Phase 11 lands, including Blocks 331, 332 and 333, except for the south leg of Sunita Crescent, which is

downstream of the temporary connection, and all of the Phase 12 lands. A section of the storm sewer linking Sunita Crescent and the park complex will be removed once the connection to the Greenbank trunk sewer is completed.

A section of Cheyenne Way from Decona Terrace to the bend drains back to Decona and is tributary to the Jockvale Stormwater Management Facility in accordance with the Phase 6 design. The areas tributary to the Jockvale Stormwater Management Facility are identified on the drainage area plan and design sheets.

There are no external storm drainage areas tributary to Phase 11 and 12. Drainage from an existing residence fronting onto Greenbank Road picked up on Blackleaf Drive south of Sunita in Phase 11. South of Phase 12 there is an area of existing drainage (Area B1 in the Corrigan Stormwater Management Report) that is tributary to Greenbank Road. In advance of the storm sewer construction on Greenbank Road, it is proposed to temporary intercept the flow in a temporary ditch inlet catchbasin in the Greenbank Road ditch south of Kilbirnie Drive. A total temporary external drainage area of 3.69 hectares is shown on the storm drainage area plan and the rational method flow has been added to the storm sewer design sheet.

At the outlet to the Greenbank trunk storm sewer, a hydraulic grade line elevation of 92.2 m is provided in the Corrigan Stormwater Management Report. The HGL has been extended back into the Phase 11 storm sewers until it meets to sewer obvert. Calculations are included in Appendix B and the HGL elevations are shown on the drawings where it is higher than the sewer obvert. In Block 333, the HGL of the storm sewers on Blackleaf Drive has been extended into the block. In Blocks 331 and 332, the HGL does not extend above pipe obvert. All underside of footing elevations have been set a minimum of 0.3 m above the higher of the HGL or sewer obvert. The minimum underside of footing elevations are shown on the Grading Plan. A check of the HGL for the temporary storm sewer was undertaken using the HGL elevation of 91.30 at Cambrian Road from the Corrigan Stormwater Management Report, as the temporary HGL at Sunita is lower than the permanent HGL from Greenbank, the permanent will be used.

Storm sewers are sized to convey a 5 year storm using City of Ottawa IDF curves and to convey the capture rate of 85 l/s/ha except for the portion of Cheyenne Way which is tributary to the Jockvale Stormwater Management Facility and has a capture rate of 70/l/s/ha. Due to the shape of the development, the capture rate produces a higher flow than the rationale method at the downstream end of the system and is used to size the pipe. To ensure that the design flows are not exceeded, inlet control devices (ICD's) are used in every inlet to the storm sewers and some pairs of street catchbasins are interconnected to reduce the total number of inlets. Standard IPEX/Pedro Plastic ICD's are used with the following release rates at the standard 1.22 m head.

Type A – 20.0 l/s
Type B – 28.4 l/s
Type C – 37.0 l/s
Type X – 13.4 l/s

The Type X ICD's are used exclusively in rear yard catchbasins. The location of the ICD's and interconnected catchbasins are shown on the project drawings.

Major system overland flow routes are provided with a maximum level of ponding of 0.3 m for rear yards and local streets and 0.25 m on collector roads. High points between road sags are set to provide a minimum 0.1% longitudinal slope. The major system route for Phase 12 outlets to the Stonebridge golf course through a dedicated block on Centerra Court. Kinloch Court and Dundonald Drive in Phase 11 also outlets to the golf course on Dundonald. The remainder of Phase

11 and portions of Phase 6 and 7B outlets through a dedicated block on Sunita Crescent to the Phase 10S park complex and into a future major system retention area as outlined in the Corrigan Stormwater Management Report.

Major system peak flows at the three major system outlets and for Block 321 have been determined by the SWMHYMO computer model. At these locations, the depth of flow and velocity has been calculated to ensure that the product of velocity and depth (VXD) do not exceed 0.6. Calculations and model output are included in Appendix B and summarized as follows:

Location	Major System Flow (m^2/s)	VXD
Block 335 Sunita	3.2	0.47
Block 329 Centerra	1.4	0.28
Dundonald at golf course	0.5	0.11
Block 321 Chenoa	0.2	0.07

As demonstrated, the product of velocity and depth is less than 0.6 at all locations.

In the Corrigan Stormwater Management Report, a storage rate of 42 m^3/ha is required for the lands which make up Phases 11 and 12. Storage is provided in the roadway sags which are indicated on the ponding plans. The total volume of street ponding available in the 26 ponding areas identified on the ponding plans, including 4 ponding areas on Block 332 and 333, are 1,282.4 m^3. The total storm drainage area for Phase 11 and 12 including Blocks 331, 332 and 333 is 27.11 hectares giving a storage rate of 47.3 m^3/ha which exceeds the required rate of 42 m^3/ha.

Storm drainage area plans, ponding plans, storm sewer design sheets and the hydraulic grade line calculations are included in Appendix B.

5. SOURCE CONTROLS

5.1 General

Since an end of pipe treatment facility is provided for this development, stormwater management will focus on site level or source control management of runoff. Such controls or mitigative measures are proposed for the development not only for final development but also during construction and build out. Some of these measures are:

- flat lot grading;
- split lot drainage;
- pre-installation of roof leader splash pads; and
- vegetation planting.
- groundwater recharge

5.2 Lot Grading

All lots and townhouse blocks within the development will make use of the split drainage runoff concept. In accordance with local municipal standards, all lot grading will be between two and seven percent. All front yard drainage will be directed over landscaped front yards to the roadway system and all rearyard drainage will be directed to a swale drainage system. Typically swales will have slopes of 1.5%. These measures all serve to encourage individual lot infiltration.

5.3 Roof Leaders

The development will consist of single family lots and townhouse units. It is proposed that roof leaders from these units be constructed such that runoff is directed to grassed areas adjacent to the units. This will promote water quality treatment through settling, absorption, filtration and infiltration and a slow release rate to the conveyance network.

5.4 Vegetation

As with most subdivision agreements, the developer will be required to complete a vegetation and planting program. Vegetation throughout the development, including roadside planting, provide opportunities to re-create lost natural habitat.

5.5 Groundwater Recharge

With regard to the existing hydrologic regime in the Stonebridge Development, seepage barriers made of impervious clay dykes will be constructed in the municipal service trenches at regular intervals to reduce ground water lowering at the site. Appropriately placed, these seepage barriers help to re-establish and maintain the historic ground water regime after construction of the development. Detail drawing S8 is attached for reference in Appendix C.

6. CONVEYANCE CONTROLS

6.1 General

Besides source controls, the development also proposes to use several conveyance control measures to improve runoff quality. These will include:

- flat vegetated swales
- pervious rearyard drainage
- catchbasin sumps

6.2 Flat Vegetated Swales

All rearyards within the Stonebridge Development make use of relatively flat vegetated swales. These swales generally employ saw-toothing at regular intervals. These swales encourage infiltration and runoff treatment.

6.3 Catchbasin and Maintenance Hole Sumps

All catchbasins within the development, either rear yard or street, will be constructed with minimum 600 mm deep sumps. These sumps trap pollutants, sand, grit and debris which can be mechanically removed prior to being flushed into the minor pipe system. Both rear yard and street catchbasins will be to OPSD 705.02. All storm sewer maintenance holes serving local sewers less than 900 mm shall be constructed with a 300 mm sump per City of Ottawa Stardards.

6.4 Pervious Rearyard Drainage

Some of the rearyard swales make use of a filter wrapper perforated drainage pipe constructed immediately below rearyard swales. This perforated pipe system is designed to provide some groundwater recharge and generally reduce both volumetric and pollutant loadings that enter the minor pipe system. Typically, a 250 mm Ø perforated pipe wrapped in a filter sock is constructed in a crushed stone surround at an invert elevation about 1.0 metre below grade. These pipes are in turn directly connected to rearyard catchbasins at regular intervals.

7. SEDIMENT AND EROSION CONTROL PLAN

7.1 General

During construction, existing stream and conveyance systems can be exposed to significant sediment loadings. Although construction is only a temporary situation, it is proposed to introduce a number of mitigative construction techniques to reduce unnecessary construction sediment loadings. These will include:

- groundwater in trench will be pumped into a filter mechanism prior to release to the environment;
- bulkhead barriers will be installed at the nearest downstream manhole in each sewer which connects to an existing downstream sewer;
- seepage barriers will be constructed in any temporary drainage ditches;
- filter cloths will remain on open surface structure such as manholes; catchbasins until these structures are commissioned and put into use; and
- silt fence on the site perimeter.

7.2 Trench Dewatering

Although little groundwater is expected during construction of municipal services, any trench dewatering using pumps will be discharged into a filter trap made up of geotextile filters and straw bales similar in design to the OPSD 219.240 Dewatering Trap. These will be constructed in a bowl shape with the fabric forming the bottom and the straw bales forming the sides. Any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filters as needed including sediment removal and disposal and material replacement as needed.

7.3 Bulkhead Barriers

Although the storm sewers eventually outlet into a sediment forebay, a ½ diameter bulkhead will be constructed over the lower half of the outletting sewer to reduce sediment loadings during construction. This bulkhead will trap any sediment carrying flows thus preventing any construction-related contamination of existing sewers. The bulkheads will be inspected and maintained including periodic sediment removal as needed.

7.4 Seepage Barriers

In order to further reduce sediment loading to the stormwater management facility, seepage barriers will be installed on any surface water courses at appropriate locations that may become evident during construction. These barriers will be similar to either the Light Duty Straw Bale Barrier as per OPSD 219.100 or the Light Duty Silt Fence Barrier as per OPSD 219.110. They are typically made of layers of straw bales or geotextile fabric staked in place. All seepage barriers will be inspected and maintained as needed.

7.5 Surface Structure Filters

All catchbasins, and to a lesser degree manholes, convey surface water to sewers. However, until the surrounding surface has been completed these structures should be covered in some fashion to prevent sediment from entering the minor storm sewer system. Until rearyards are sodded or until streets are asphalted and curbed, all catchbasins and manholes will be constructed with a geotextile filter fabric located between the structure frame and cover. These will stay in place and be maintained during construction and build until it is appropriate to remove same.

7.6 Stockpile Management

During construction of any development similar to the Stonebridge Development both imported and native soils are stockpiled. Mitigative measures and proper management to prevent these materials entering the sewer systems is needed.

During construction of the deeper municipal services, water, sewers and service connections, imported granular bedding materials are temporarily stockpiled on site. These materials are however quickly used up and generally before any catchbasins are installed. Street catchbasins are installed at the time of roadway construction and rearyard catchbasins are usually installed after base course asphalt is placed.

Contamination of the environment as a result of stockpiling of imported construction materials is generally not a concern. These materials are quickly used and the mitigative measures stated previously, especially the ½ diameter sewer bulkheads and filter fabric in catchbasins and manholes help to manage these concerns.

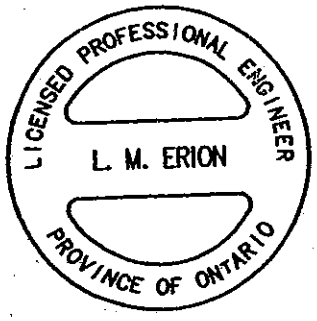
Roadway granular materials are not stockpiled on site. They are immediately placed in the roadway and have little opportunity of contamination. Lot grading sometimes generates stockpiles of native materials. However, this is only a temporary event since the materials are quickly moved off site.

8. CONCLUSIONS

As demonstrated in this report, the water, wastewater and stormwater systems are designed in conformance with the City of Ottawa standards.

The use of the lot level controls, conveyance controls and the end of pipe controls outlined in the report will result in effective treatment of surface stormwater runoff from the site. Adherence to the sediment and erosion control plan during construction will minimize harmful impacts on surface water.

Prepared by:



Lance Erion, P. Eng.
Associate

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APPENDIX A

IBI Group
333 Preston Street - Suite 400
Ottawa, Ontario
K1S 5N4

SANITARY SEWER DESIGN SHEET

PROJECT: STONEBRIDGE PHASE 11
DEVELOPER: MONARCH CORPORATION

JOB #: 25099-5.7
DATE PRINTED: 05-Aug-10
DESIGN: LE

LOCATION			INDIVIDUAL					CUM. RES. FLOW			INFILTRATION			TOTAL	PROPOSED SEWER							FLOW DEPTH	
STREET	FROM MH	TO MH	RESID. UNITS Sngls	Towns Semis	Stacked Towns	RES. AREA (Ha)	POP.	POP.	PEAK FACT.	PEAK FLOW (l/s)	INCR. AREA (Ha)	CUM. AREA (Ha)	FLOW (l/s)	DESIGN FLOW (l/s)	CAP. l/s	PIPE (mm)	LGTH. (m)	SLOPE %	VEL. (full) m/s	AVAIL. CAP. (l/s)	AVAIL. CAP. (%)	Flow qa/Qa (%)	Depth da/Df (%)
Phase 11																							
Kinlock Court	140 A	141 A	18			1.41	61.2	61	4.00	1.00	1.41	1.41	0.39	**1.40**	**26.49**	200	97.0	0.60	0.82	25.10	95%		
Kinlock Court	141 A	142 A	11			0.76	37.4	99	4.00	1.62	0.76	2.17	0.61	**2.22**	**26.49**	200	66.4	0.60	0.82	24.27	92%		
Kinlock Court	142 A	144 A	2			0.21	6.8	105	4.00	1.73	0.21	2.38	0.67	**2.39**	**26.49**	200	36.7	0.60	0.82	24.10	91%		
Dundonald Drive	143 A	144 A		6		0.27	16.2	16	4.00	0.27	0.27	0.27	0.08	**0.34**	**48.38**	200	35.5	2.00	1.49	48.04	99%		
														0.00									
Dundonald Drive	144 A	146 A		5		0.29	13.5	135	4.00	2.22	0.29	2.94	0.82	**3.04**	**19.36**	200	80.6	0.32	0.60	16.32	84%		
Blackleaf Drive	146 A	147 A	8			0.60	27.2	162	4.00	2.66	0.60	3.54	0.99	**3.65**	**19.36**	200	64.1	0.32	0.60	15.71	81%		
Blackleaf Drive	147 A	148 A	1			0.18	3.4	166	4.00	2.72	0.18	3.72	1.04	**3.76**	**19.36**	200	41.2	0.32	0.60	15.60	81%		
Blackleaf Drive	148 A	153 A						166	4.00	2.72	0.00	3.72	1.04	**3.76**	**19.36**	200	16.7	0.32	0.60	15.60	81%		
Cheyenne Way	149 A	150 A	3			0.33	10.2	10	4.00	0.17	0.33	0.33	0.09	**0.26**	**44.62**	200	25.5	1.70	1.38	44.36	99%		
Cheyenne Way	150 A	153 A	14			0.98	47.6	58	4.00	0.95	0.98	1.31	0.37	**1.31**	**39.76**	200	117.4	1.35	1.23	38.44	97%		
Block 332 Kennacraig Pr.	175 A	151 A		5		0.17	13.5	14	4.00	0.22	0.17	0.17	0.05	**0.27**	**27.60**	200	42.4	0.65	0.85	27.33	99%		
Block 332 Kennacraig Pr.	151 A	152 A		7		0.23	18.9	32	4.00	0.53	0.23	0.40	0.11	**0.64**	**24.19**	200	53.1	0.50	0.75	23.55	97%		
Block 332 Kennacraig Pr.	152 A	153 A		20		0.62	54.0	86	4.00	1.42	0.62	1.02	0.29	**1.70**	**44.62**	200	83.6	1.70	1.38	42.92	96%		
Blackleaf Drive	153 A	155 A	1			0.17	3.4	313	4.00	5.14	0.17	6.22	1.74	**6.88**	**31.01**	250	62.7	0.25	0.61	24.13	78%	22%	32%
Block 332 Kennacraig Pr.	154 A	155 A		24		0.75	64.8	65	4.00	1.06	0.75	0.75	0.21	**1.27**	**45.92**	200	92.5	1.80	1.42	44.65	97%		
Blackleaf Drive	155 A	161 A	6			0.42	20.4	399	4.00	6.54	0.42	7.39	2.07	**8.60**	**31.01**	250	75.0	0.25	0.61	22.41	72%	28%	36%
Block 333 Pamplona Pr.	156 A	157 A		4		0.19	10.8	11	4.00	0.18	0.19	0.19	0.05	**0.23**	**36.68**	200	21.0	1.15	1.13	36.45	99%		
Block 333 Pamplona Pr.	157 A	158 A		2		0.07	5.4	16	4.00	0.27	0.07	0.26	0.07	**0.34**	**36.68**	200	11.2	1.15	1.13	36.34	99%		
Block 333 Pamplona Pr.	158 A	160 A		3		0.08	8.1	24	4.00	0.40	0.08	0.34	0.10	**0.49**	**36.68**	200	20.5	1.15	1.13	36.18	99%		
Block 333 Pamplona Pr.	159 A	160 A		16		0.41	43.2	43	4.00	0.71	0.41	0.41	0.11	**0.82**	**30.61**	200	56.5	0.80	0.94	29.79	97%		
Block 333 Treadway Pr.	160 A	161 A		9		0.26	24.3	92	4.00	1.51	0.26	1.01	0.28	**1.79**	**24.19**	200	77.3	0.50	0.75	22.40	93%		
Blackleaf Drive	161 A	166 A	2			0.23	6.8	497	3.98	8.10	0.23	8.63	2.42	**10.52**	**45.09**	300	66.5	0.20	0.62	34.57	77%	23%	33%
Block 333 Rannoch Pr.	162 A	166 A		16		0.50	43.2	43	4.00	0.71	0.50	0.50	0.14	**0.85**	**24.19**	200	93.4	0.50	0.75	23.34	96%		
Sunita Crescent	163 A	164 A	6			0.52	20.4	20	4.00	0.33	0.52	0.52	0.15	**0.48**	**27.60**	200	117.5	0.65	0.85	27.12	98%		
Sunita Crescent	164 A	165 A	1			0.07	3.4	24	4.00	0.39	0.07	0.59	0.17	**0.56**	**27.60**	200	12.1	0.65	0.85	27.04	98%		
Sunita Crescent	165 A	166 A	11			0.68	37.4	61	4.00	1.00	0.68	1.27	0.36	**1.36**	**44.62**	200	83.9	1.70	1.38	43.26	97%		
Blackleaf Drive	166 A	167 A	2			0.26	6.8	608	3.93	9.80	0.26	10.66	2.98	**12.78**	**45.09**	300	70.7	0.20	0.62	32.31	72%	28%	38%
Blackleaf Drive	167 A	168 A	2			0.27	6.8	615	3.93	9.90	0.27	10.93	3.06	**12.96**	**45.09**	300	15.2	0.20	0.62	32.13	71%	29%	38%
Blackleaf Drive	168 A	170 A	6			0.50	20.4	636	3.92	10.21	0.50	11.43	3.20	**13.41**	**45.09**	300	53.1	0.20	0.62	31.68	70%	30%	38%
Sunita Crescent	173 A	172 A	10			0.68	34.0	34	4.00	0.56	0.68	0.68	0.19	**0.75**	**27.60**	200	65.0	0.65	0.85	26.85	97%		
Sunita Crescent	172 A	171 B	12			0.74	40.8	75	4.00	1.23	0.74	1.42	0.40	**1.62**	**24.19**	200	82.0	0.50	0.75	22.57	93%		
Sunita Crescent	171 B	171 A	2			0.25	6.8	82	4.00	1.34	0.25	1.67	0.47	**1.81**	**19.36**	200	12.0	0.32	0.60	17.55	91%		
Sunita Crescent	171 A	170 A	5			0.43	17.0	99	4.00	1.62	0.43	2.10	0.59	**2.21**	**19.36**	200	84.2	0.32	0.60	17.16	89%		
Blackleaf Drive	170 A	Ex. Stub	5			0.49	17.0	751	3.88	11.94	0.49	14.02	3.93	**15.86**	**55.24**	300	74.5	0.30	0.76	39.37	71%	29%	38%

Where Q = average daily per capita flow (350 l/cap.d.) or (0.0041l/sec./cap)
I = Unit of peak extraneous flow (0.28 l/sec/ha)
M = Residential Peaking factor = Harmon Peaking Factor , M = 1+(14/(4+P^0.5)) , where P = population in thousands
Population Density = 3.4 per single family, 2.7 per semi-detached and row townhouse units and 2.3 per stacked townhouse unit
Commercial, Office Space and School - Average flow 50,000 l/day/ha (0.578 l/s/ha) with Peaking Factor = 1.5
Undeveloped or Other Lands = 60 persons/gross hectare

L. M. ERION
2010-08-04
PROVINCE OF ONTARIO

LEGEND:

- SINGLE SERVICE LOCATION
- DRIVEWAY LOCATION
- STANDARD STREET CATCHBASIN
- REARYARD CB C/W TOP OF GRATE
- SINGLE CONNECTION BETWEEN PAIRS OF STREET CATCHBASINS
- CB WITH INLET CONTROL DEVICE

ICD TYPE	MAX. RELEASE RATE l/s
TYPE A IPEX/PEDRO	20.0
TYPE B IPEX/PEDRO	28.4
TYPE C IPEX/PEDRO	37.0
TYPE X PEDRO	13.4

- BARRIER CURB
- MOUNTABLE CURB
- DEPRESSED CURB
- PHASE LIMITS

LEGEND:

0.88 / 56.8 — AREA IN HECTARES / POPULATION

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7	REVISED AS PER NEW LEGAL BLOCKS 331, 332, AND 333	LME	10:08:04
6	LOWER TEMPORARY MAJOR STORM RETENTION AREA BY 0.30m	LME	10:07:12
5	REVISED AS PER CITY COMMENTS	LME	10:07:08
4	REVISED AS PER CITY COMMENTS	LME	10:06:18
3	REVISED AS PER CITY COMMENTS	LME	10:05:19
2	REVISED AS PER CITY COMMENTS	LME	10:03:01
1	ISSUED FOR APPROVAL	LME	10:01:25

Monarch

IBI GROUP
333 Preston Street
Tower 1, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
FAX (613)225-9868

Project Title

STONEBRIDGE
PHASE 11

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
PROVINCE OF ONTARIO

Drawing Title

SANITARY DRAINAGE AREA PLAN

Scale: 1:1250

Design	Date
LME	JANUARY 2010
Drawn	**Checked**
DPS	LME
Project No.	**Drawing No.**
25099	501

APPENDIX B

IBI GROUP
IBI Group
333 Preston Street - Suite 400
Ottawa, Ontario
K1S 5N4

STORM SEWER DESIGN SHEET

PROJECT: Stonebridge Phase 11
LOCATION: City of Ottawa
CLIENT: Monarch Corporation

LOCATION			AREA (Ha)								RATIONAL DESIGN FLOW					LEVEL OF SERVICE				ICD RESTRICTED FLOW						SEWER DATA					AVAIL. CAP. (%)	
STREET	FROM MH	TO MH	C= 0.20	C= 0.30	C= 0.45	C= 0.55	C= 0.60	C= 0.90	INDIV. 2.78AC	ACCUM. 2.78AC	INLET (min.)	TIME IN PIPE	TOTAL (min.)	I (mm/Hr)	PEAK FLOW (L/s)	AREA (ha) INDIV.	AREA (ha) ACCUM.	FLOW (L/s) INDIV.	FLOW (L/s) ACCUM.	INLET (L/s) 13.4	INLET (L/s) 20.0	INLET (L/s) 28.4	INLET (L/s) 37.0	INDIV. FLOW (L/s)	ACCUM. FLOW (L/s)	CAP. (L/s)	LENGTH (M)	PIPE (mm)	SLOPE (%)	VEL. (M/s)	RATIONAL 5 YEAR	ICD REST. FLOW
From Phase 12										21.62			26.51				13.99		1,189.15						1,182.80							
Phase 11																																
Kinloch Court	140	141			1.08				1.35	22.97	26.51	0.96	27.48	58.58	**1,345.65**	1.08	15.07	91.80	**1,280.95**	1	2			53.40	**1,236.20**	**1,560.63**	101.0	1050	0.30	1.746	13.78%	20.79%
Kinloch Court	141	142			0.22				0.28	23.25	27.48	0.82	28.30	57.21	**1,330.09**	0.22	15.29	18.70	**1,299.65**	1				13.40	**1,249.60**	**1,574.90**	66.5	1200	0.15	1.349	15.54%	20.66%
Kinloch Court	142	144			0.42				0.53	23.78	28.30	0.43	28.73	56.09	**1,333.85**	0.42	15.71	35.70	**1,335.35**		2			40.00	**1,289.60**	**1,574.90**	35.1	1200	0.15	1.349	15.31%	18.12%
Dundonald Way	143	144					0.56		0.93	0.93	15.00	0.62	15.62	83.56	**77.71**	0.56	0.56	47.60	**47.60**	2	1			46.80	**46.80**	**100.91**	51.0	300	1.00	1.383	22.99%	53.62%
Dundonald Way	144	146					0.25		0.42	25.13	28.73	0.99	29.72	55.52	**1,395.25**	0.25	16.52	21.25	**1,404.20**		1			20.00	**1,356.40**	**1,574.90**	80.0	1200	0.15	1.349	11.41%	13.87%
Dundonald Way	145	146					0.25		0.42	0.42	10.00	0.48	10.48	104.19	**43.76**	0.25	0.25	21.25	**21.25**		1			20.00	**20.00**	**87.71**	49.5	250	2.00	1.731	50.11%	77.20%
Blackleaf Drive	146	147					0.46		0.77	26.32	29.72	0.92	30.64	54.27	**1,428.38**	0.46	17.23	39.10	**1,464.55**		2			40.00	**1,416.40**	**1,761.25**	65.6	1350	0.10	1.192	18.90%	19.58%
Blackleaf Drive	147	148			0.15		0.12		0.39	26.71	30.64	0.57	31.20	53.16	**1,419.99**	0.27	17.50	22.95	**1,487.50**	2				26.80	**1,443.20**	**1,761.25**	40.4	1350	0.10	1.192	19.38%	18.06%
Blackleaf Drive	148	153							0.00	26.71	31.20	0.25	31.45	52.51	**1,402.43**	0.00	17.50	0.00	**1,487.50**					0.00	**1,443.20**	**1,761.25**	17.9	1350	0.10	1.192	20.37%	18.06%
Cheyenne Way	149	150			0.39		0.22		0.85	0.85	15.00	0.34	15.34	83.56	**71.02**	0.61	0.61	51.85	**51.85**	1	1			33.40	**33.40**	**87.34**	24.5	300	0.75	1.197	18.68%	61.76%
Cheyenne Way	150	153			0.71		0.07		1.00	1.85	15.34	2.01	17.35	82.47	**152.57**	0.78	1.39	66.30	**118.15**	1	1			33.40	**66.80**	**162.86**	119.4	450	0.30	0.992	6.32%	58.98%
Block 332 Kennacraig Private	175	151					0.55		0.92	0.92	15.00	0.79	15.79	83.56	**76.87**	0.55	0.55	46.75	**46.75**	1	1			33.40	**33.40**	**100.21**	41.4	375	0.30	0.879	23.29%	66.67%
Block 332 Kennacraig Private	151	152					0.07		0.12	1.04	15.79	0.97	16.76	81.10	**84.35**	0.07	0.62	5.95	**52.70**	1				13.40	**46.80**	**100.21**	51.3	375	0.30	0.879	15.83%	53.30%
Block 332 Kennacraig Private	152	153					0.31		0.52	1.56	16.76	1.26	18.02	78.28	**122.11**	0.31	0.93	26.35	**79.05**		1			20.00	**66.80**	**175.99**	80.9	450	0.35	1.072	30.62%	62.04%
Blackleaf Drive	153	155			0.26				0.33	30.45	31.45	0.83	32.29	52.22	**1,590.12**	0.26	20.08	22.10	**1,706.80**		1	2		53.40	**1,630.20**	**2,331.26**	63.8	1500	0.10	1.278	31.79%	30.07%
Block 332 Kennacraig Private	154	155					0.61		1.02	1.02	15.00	1.80	16.80	83.56	**85.23**	0.61	0.61	51.85	**51.85**		1	2		53.40	**53.40**	**100.21**	95.0	375	0.30	0.879	14.95%	46.71%
Blackleaf Drive	155	161			0.29		0.02		0.40	31.87	32.29	0.94	33.23	51.30	**1,634.82**	0.31	21.00	26.35	**1,785.00**		1	1		33.40	**1,717.00**	**2,331.26**	72.1	1500	0.10	1.278	29.87%	26.35%
Block 333 Pamplona Private	156	157					0.07		0.12	0.12	15.00	0.41	15.41	83.56	**10.03**	0.07	0.07	5.95	**5.95**		1			13.40	**13.40**	**43.88**	21.5	250	0.50	0.866	77.15%	69.46%
Block 333 Pamplona Private	157	158							0.00	0.12	15.41	0.23	15.65	82.24	**9.87**	0.00	0.07	0.00	**5.95**					0.00	**13.40**	**43.88**	12.0	250	0.50	0.866	77.51%	69.46%
Block 333 Pamplona Private	158	160							0.00	0.12	15.65	0.38	16.02	81.53	**9.78**	0.00	0.07	0.00	**5.95**					0.00	**13.40**	**43.88**	19.5	250	0.50	0.866	77.70%	69.46%
Block 333 Pamplona Private	159	160					0.22		0.37	0.37	10.00	1.08	11.08	104.19	**38.55**	0.22	0.22	18.70	**18.70**			1		20.00	**20.00**	**100.21**	57.0	375	0.30	0.879	61.53%	80.04%
Block 333 Treadway Private	160	161					0.30		0.50	0.99	15.00	1.54	16.54	83.56	**82.72**	0.30	0.59	25.50	**50.15**			2		40.00	**73.40**	**100.21**	81.0	375	0.30	0.879	17.46%	26.76%
Blackleaf Drive	161	166			0.61				0.76	33.62	33.23	0.87	34.09	50.29	**1,690.91**	0.61	22.20	51.85	**1,887.00**			1	2	94.00	**1,884.40**	**2,331.26**	66.5	1500	0.10	1.278	27.47%	19.17%
Block 333 Rannoch Private	162	166					0.51		0.85	0.85	10.00	1.82	11.82	104.19	**88.56**	0.51	0.51	43.35	**43.35**		1	3		73.40	**73.40**	**100.21**	96.0	375	0.30	0.879	11.63%	26.76%
Sunita Crescent	163	164			0.33				0.41	0.41	10.00	2.43	12.43	104.19	**42.72**	0.33	0.33	28.05	**28.05**			1		20.00	**20.00**	**91.44**	117.1	375	0.25	0.802	53.28%	78.13%
Sunita Crescent	164	165			0.06				0.08	0.49	15.00	0.28	15.28	83.56	**40.94**	0.06	0.39	5.10	**33.15**	1				13.40	**33.40**	**91.44**	13.4	375	0.25	0.802	55.22%	63.47%
Sunita Crescent	165	166			0.42				0.53	1.02	15.28	1.69	16.97	82.67	**84.32**	0.42	0.81	35.70	**68.85**			1		20.00	**53.40**	**132.98**	82.3	450	0.20	0.810	36.59%	59.84%
Blackleaf Drive	166	167			0.71		0.16		1.16	36.65	34.09	0.95	35.05	49.41	**1,810.84**	0.87	24.39	73.95	**2,073.15**		2	2		66.80	**2,078.00**	**2,331.26**	73.1	1500	0.10	1.278	22.32%	10.86%
Blackleaf Drive	167	168			0.25				0.31	36.96	35.05	0.22	35.27	48.47	**1,791.61**	0.25	24.64	21.25	**2,094.40**		1			13.40	**2,091.40**	**2,331.26**	17.1	1500	0.10	1.278	23.15%	10.29%
Blackleaf Drive	168	170							0.00	36.96	35.27	0.75	36.02	48.26	**1,783.74**	0.00	24.64	0.00	**2,094.40**					0.00	**2,091.40**	**2,331.26**	57.6	1500	0.10	1.278	23.49%	10.29%
Blackleaf Drive	169	170			0.29				0.36	0.36	10.00	1.25	11.25	104.19	**37.51**	0.29	0.29	24.65	**24.65**			1		20.00	**20.00**	**100.21**	66.0	375	0.30	0.879	62.57%	80.04%
Sunita Crescent	170	171			0.57				0.71	38.03	36.02	1.20	37.22	47.56	**1,808.66**	0.57	25.50	48.45	**2,167.50**		1	2		53.40	**2,164.80**	**2,331.26**	92.2	1500	0.10	1.278	22.42%	7.14%
Sunita Crescent	171	172			0.85				1.06	39.09	37.22	1.10	38.32	46.48	**1,816.93**	0.85	26.35	72.25	**2,239.75**		2		2	83.60	**2,248.40**	**3,006.23**	90.1	1650	0.10	1.362	39.56%	25.21%
Sunita Crescent	172	173			0.82				1.03	40.12	38.32	1.29	39.62	45.54	**1,826.99**	0.82	27.17	69.70	**2,309.45**		1	2		53.40	**2,301.80**	**3,006.23**	105.5	1650	0.10	1.362	39.23%	23.43%
					Refer to Phase 12 Storm Sewer Design Sheet																											

Designed: LME
Checked:
Revision | Date

Dwg. Reference: 25099-500
File Ref: 25099- 5.7
Date: 04/08/2010
Sheet No: 1 of 1

Q = 2.78AIC, where:
Q = Peak Flow in Litres per Second (l/s)
A = Area in Hectares (ha.)
I = Rainfall Intensity in Millimeters per Hour (mm/hr)
[I=998.071/((TC+6.053)^0.814]

Level of Service= 85.00 L/s/Ha

Assumed CB Head= 1.22 m [1:5 yr]

Mannings Coefficient (n) = 0.013

LICENSED PROFESSIONAL ENGINEER
L M. ERION
2010-08-04
PROVINCE OF ONTARIO

J:\25099-StnbrPh11\5.7 Calculations\5.7.1 Sewers & Grading\MOE\CCS_sewer_design_Ph11_Blk332&333_2010-07-26

IBI GROUP

IBI Group
333 Preston Street - Suite 400
Ottawa, Ontario
K1S 5N4

STORM SEWER DESIGN SHEET

PROJECT: Stonebridge Phase 11 & 12 Temporary Outlet
LOCATION: City of Ottawa
CLIENT: Monarch Corporation

LOCATION			AREA (Ha)								RATIONAL DESIGN FLOW							LEVEL OF SERVICE				SEWER DATA					AVAIL. CAP. (%)	
STREET	FROM MH	TO MH	C= 0.20	C= 0.30	C= 0.45	C= 0.70	C= 0.60	C= 0.80	INDIV. 2.78AC	ACCUM. 2.78AC	INLET (min.)	TIME IN PIPE	TOTAL (min.)	I (5 year) (mm/Hr)	I (10 year) (mm/Hr)	PEAK FLOW (L/s)	TOTAL PEAK FLOW (L/s)	AREA (ha) INDIV.	AREA (ha) ACCUM.	FLOW (L/s) INDIV.	FLOW (L/s) ACCUM.	CAP. (L/s)	LENGTH (M)	PIPE (mm)	SLOPE (%)	VEL. (M/s)	RATIONAL 5 YEAR	LEVEL OF SERVICE
TEMPORARY OUTLET THROUGH PARK LANDS																													
Sunita Crescent (see Storm Sewer Design Sheet																													
Stonebridge Phase 11 & 12)	170	171								38.03	37.22	1.20	38.42	46.48		**1,767.69**	**1,767.69**	0.00	25.50	0.00	**2,167.50**	**2,331.26**	92.2	1500	0.10	1.278	24.17%	7.02%
Temporary Outlet Block 335	171	300A							0.00	38.03	38.42	0.57	38.99	45.46		**1,728.71**	**1,728.71**	0.00	25.50	0.00	**2,167.50**	**2,226.68**	51.3	1350	0.16	1.507	22.36%	2.66%
Park	300A	300							0.00	38.03	38.99	0.24	39.23	44.99		**1,710.97**	**1,710.97**	0.00	25.50	0.00	**2,167.50**	**2,226.68**	21.7	1350	0.16	1.507	23.16%	2.66%
Park	300	301		2.18				0.76	3.51	41.54	38.99	1.01	40.00	44.99		**1,868.89**	**1,868.89**	2.94	28.44	249.90	**2,417.40**	**2,489.69**	102.5	1350	0.20	1.685	24.93%	2.90%
Park	301	301A							0.00	41.54	40.00	0.33	40.33	44.18		**1,985.32**	**1,985.32**	0.00	28.44	0.00	**2,567.40**	**2,783.72**	37.0	1350	0.25	1.884	28.68%	7.77%
Park	301A	302							0.00	41.54	40.33	0.58	40.91	43.93		**1,974.79**	**1,974.79**	0.00	28.44	0.00	**2,567.40**	**2,783.72**	65.0	1350	0.25	1.884	29.06%	7.77%
Park	302	303					2.43	2.74	10.15	51.69	40.33	0.67	41.00	43.93		**2,420.66**	**2,420.66**	5.17	33.61	439.45	**3,006.85**	**3,761.39**	82.9	1500	0.26	2.062	35.64%	20.06%
Cambrian Road	303	304				0.73			1.42	1.42	41.00	1.27	42.27		50.70	71.99		0.73	0.73	175.20								
				0.73						51.69	41.00			43.42		**2,394.31**	**2,466.30**	0.73	34.34	62.05	**3,244.10**	**3,793.06**	110.0	1800	0.10	1.444	34.98%	14.47%
Cambrian Road	304	Ex. 177								1.42	42.27	1.19	43.46		49.60	**70.43**		0.00	0.73	0.00								
										51.69	42.27			42.49		**2,346.17**	**2,416.61**	0.00	34.34	0.00	**3,244.10**	**3,793.06**	103.2	1800	0.10	1.444	36.29%	14.47%

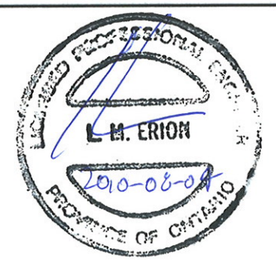
Designed: LME			
Checked:			
	Revision		**Date**
Dwg. Reference:	**File Ref:** 25099- 5.7	**Date:** 04/08/2010	**Sheet No:** 1 of 1

Q = 2.78AIC, where:
Q = Peak Flow in Litres per Second (l/s)
A = Area in Hectares (ha.)
I = Rainfall Intensity in Millimeters per Hour (mm/hr)
[I=998.071/((TC+6.053)^0.814]

Level of Service=
5 Year 85.00 L/s/Ha
10 Year 240.00 L/s/Ha

Mannings Coefficient (n) = 0.013

150 l/s added for major system retention area release flow



STONEBRIDGE PHASE 11

HGL CALCULATION - 100 YEAR

FRICTION LOSS SUNITA CRESCENT	FROM MH	TO MH	PIPE ID
	173	172	
INVERT ELEVATION (m)	90.261	90.366	
DIAMETER (mm)			1650
LENGHT (m)			105.5
OBVERT ELEVATION (m)	91.937	92.042	
FLOW (l/s)			2,309.5
HGL (m)	**92.200**	92.262	
MANHOLE LOSS (m)		0.010	
TOTAL HGL (m)		92.272	
MAX. SURCHARGE (mm)		229	

MANNING FORMULA - FLOWING FULL

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.676	2.21	5.26	0.42	1.36	2998.49

FRICTION LOSS SUNITA CRESCENT	FROM MH	TO MH	PIPE ID
	172	171	
INVERT ELEVATION (m)	90.366	90.456	
DIAMETER (mm)			1650
LENGHT (m)			90.1
OBVERT ELEVATION (m)	92.042	92.132	
FLOW (l/s)			2,239.8
HGL (m)	92.272	92.322	
MANHOLE LOSS (m)		0.009	
TOTAL HGL (m)		92.331	
MAX. SURCHARGE (mm)		199	

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.676	2.21	5.26	0.42	1.36	3004.50

FRICTION LOSS SUNITA CRESCENT	FROM MH	TO MH	PIPE ID
	171	170	
INVERT ELEVATION (m)	90.608	90.700	
DIAMETER (mm)			1500
LENGHT (m)			92.2
OBVERT ELEVATION (m)	92.132	92.224	
FLOW (l/s)			2,167.5
HGL (m)	92.331	92.411	
MANHOLE LOSS (m)		0.010	
TOTAL HGL (m)		92.421	
MAX. SURCHARGE (mm)		197	

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.524	1.82	4.79	0.38	1.28	2328.82

FRICTION LOSS BLACKLEAF DRIVE	FROM MH	TO MH	PIPE ID
	170	169	
INVERT ELEVATION (m)	91.903	92.100	
DIAMETER (mm)			375
LENGHT (m)			66.0
OBVERT ELEVATION (m)	92.284	92.481	
FLOW (l/s)			28.4
HGL (m)	92.421	92.437	
MANHOLE LOSS (m)			
TOTAL HGL (m)		92.437	
MAX. SURCHARGE (mm)		-44	

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
0.381	0.11	1.20	0.10	0.88	99.88

FRICTION LOSS BLACKLEAF DRIVE	FROM MH	TO MH	PIPE ID
	170	168	
INVERT ELEVATION (m)	90.760	90.818	
DIAMETER (mm)			1500
LENGHT (m)			56.6
OBVERT ELEVATION (m)	92.284	92.342	
FLOW (l/s)			2,094.4
HGL (m)	92.421	92.467	
MANHOLE LOSS (m)		0.010	
TOTAL HGL (m)		92.477	
MAX. SURCHARGE (mm)		135	

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.524	1.82	4.79	0.38	1.29	2360.12

FRICTION LOSS BLACKLEAF DRIVE	FROM MH	TO MH	PIPE ID
	168	167	
INVERT ELEVATION (m)	90.838	90.855	
DIAMETER (mm)			1500
LENGHT (m)			17.1
OBVERT ELEVATION (m)	92.362	92.379	
FLOW (l/s)			2,094.4
HGL (m)	92.477	92.491	
MANHOLE LOSS (m)		0.010	
TOTAL HGL (m)		92.501	
MAX. SURCHARGE (mm)		122	

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.524	1.82	4.79	0.38	1.28	2326.06

FRICTION LOSS BLACKLEAF DRIVE	FROM MH	TO MH	PIPE ID
	167	166	
INVERT ELEVATION (m)	90.885	90.958	
DIAMETER (mm)			1500
LENGHT (m)			73.1
OBVERT ELEVATION (m)	92.409	92.482	
FLOW (l/s)			2,073.2
HGL (m)	92.501	92.559	
MANHOLE LOSS (m)		0.009	
TOTAL HGL (m)		92.568	
MAX. SURCHARGE (mm)		86	

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.524	1.82	4.79	0.38	1.28	2328.61

FRICTION LOSS BLACKLEAF DRIVE	FROM MH	TO MH	PIPE ID
	166	161	
INVERT ELEVATION (m)	90.958	91.025	
DIAMETER (mm)			1500
LENGHT (m)			66.5
OBVERT ELEVATION (m)	92.482	92.549	
FLOW (l/s)			1,904.6
HGL (m)	92.568	92.612	
MANHOLE LOSS (m)		0.008	
TOTAL HGL (m)		92.620	
MAX. SURCHARGE (mm)		71	

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.524	1.82	4.79	0.38	1.28	2339.24

FRICTION LOSS BLACKLEAF DRIVE	FROM MH	TO MH	PIPE ID
INVERT ELEVATION (m)	161 91.025	155 91.097	
DIAMETER (mm)			1500
LENGHT (m)			72.1
OBVERT ELEVATION (m)	92.549	92.621	
FLOW (l/s)			1,785.9
HGL (m)	92.620	92.662	
MANHOLE LOSS (m)		0.007	
TOTAL HGL (m)		92.669	
MAX. SURCHARGE (mm)		48	

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.524	1.82	4.79	0.38	1.28	2328.90

FRICTION LOSS BLACKLEAF DRIVE	FROM MH	TO MH	PIPE ID
INVERT ELEVATION (m)	155 91.124	154 91.188	
DIAMETER (mm)			1500
LENGHT (m)			63.8
OBVERT ELEVATION (m)	92.648	92.712	
FLOW (l/s)			1,706.8
HGL (m)	92.669	92.704	
MANHOLE LOSS (m)		0.000	
TOTAL HGL (m)		92.704	
MAX. SURCHARGE (mm)		-8	

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.524	1.82	4.79	0.38	1.28	2334.49

STONEBRIDGE PHASE 11 - BLOCK 333

HGL CALCULATION - 100 YEAR

FRICTION LOSS RANNOCK PRIVATE	FROM MH	TO MH	PIPE ID
	166	162	
INVERT ELEVATION (m)	92.100	92.388	
DIAMETER (mm)			375
LENGHT (m)			96.0
OBVERT ELEVATION (m)	92.481	92.769	
FLOW (l/s)			72.9
HGL (m)	92.570	92.723	
MANHOLE LOSS (m)			
TOTAL HGL (m)		92.723	
MAX. SURCHARGE (mm)		-46	

MANNING FORMULA - FLOWING FULL

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
0.381	0.11	1.20	0.10	0.88	100.12

FRICTION LOSS PARK	FROM MH	TO MH	PIPE ID
	161	160	
INVERT ELEVATION (m)	92.168	92.411	
DIAMETER (mm)			375
LENGHT (m)			81.0
OBVERT ELEVATION (m)	92.549	92.792	
FLOW (l/s)			57.0
HGL (m)	92.620	92.699	
MANHOLE LOSS (m)			
TOTAL HGL (m)		92.699	
MAX. SURCHARGE (mm)		-93	

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
0.381	0.11	1.20	0.10	0.88	100.12

STONEBRIDGE PHASE 10S - TEMPORARY OUTLET

HGL CALCULATION - 100 YEAR

FRICTION LOSS PARK	FROM MH	TO MH	PIPE ID
INVERT ELEVATION (m)	303	302	
	89.605	89.824	
DIAMETER (mm)			1500
LENGHT (m)			82.9
OBVERT ELEVATION (m)	91.129	91.348	
FLOW (l/s)			3,006.0
HGL (m)	91.300	91.438	
MANHOLE LOSS (m)		0.022	
TOTAL HGL (m)		91.460	
MAX. SURCHARGE (mm)		112	

MANNING FORMULA - FLOWING FULL

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.524	1.82	4.79	0.38	2.08	3788.64

FRICTION LOSS PARK	FROM MH	TO MH	PIPE ID
INVERT ELEVATION (m)	302	301A	
	89.976	90.139	
DIAMETER (mm)			1350
LENGHT (m)			65.0
OBVERT ELEVATION (m)	91.348	91.511	
FLOW (l/s)			2,566.6
HGL (m)	91.460	91.598	
MANHOLE LOSS (m)		0.023	
TOTAL HGL (m)		91.621	
MAX. SURCHARGE (mm)		111	

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.372	1.48	4.31	0.34	1.89	2786.96

FRICTION LOSS PARK	FROM MH	TO MH	PIPE ID
INVERT ELEVATION (m)	301A	301	
	90.139	90.231	
DIAMETER (mm)			1350
LENGHT (m)			37.0
OBVERT ELEVATION (m)	91.511	91.603	
FLOW (l/s)			2,566.6
HGL (m)	91.621	91.700	
MANHOLE LOSS (m)		0.022	
TOTAL HGL (m)		91.722	
MAX. SURCHARGE (mm)		119	

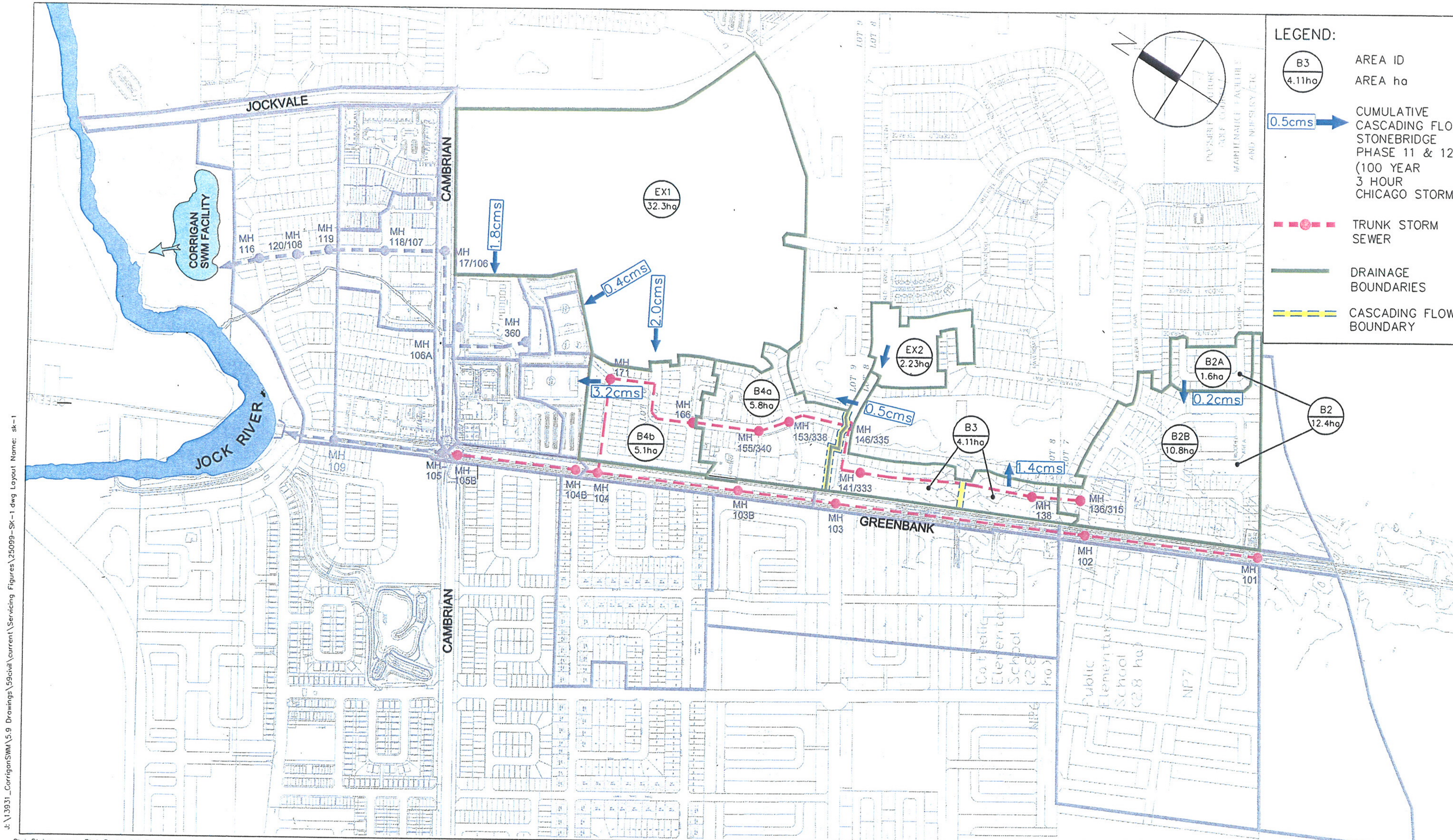
DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.372	1.48	4.31	0.34	1.88	2775.15

FRICTION LOSS PARK	FROM MH	TO MH	PIPE ID
INVERT ELEVATION (m)	301	300	
	90.231	90.436	
DIAMETER (mm)			1350
LENGHT (m)			102.5
OBVERT ELEVATION (m)	91.603	91.808	
FLOW (l/s)			2,416.6
HGL (m)	91.722	91.915	
MANHOLE LOSS (m)		0.018	
TOTAL HGL (m)		91.933	
MAX. SURCHARGE (mm)		126	

DIA (m)	AREA (M2)	PERIM. (m)	HYD.R. (m)	VEL. (m/s)	Q (l/s)
1.372	1.48	4.31	0.34	1.69	2488.90

FRICTION LOSS PARK	FROM MH	TO MH	PIPE ID
	300	171	
INVERT ELEVATION (m)	90.436	90.551	
DIAMETER (mm)			1350
LENGHT (m)			71.9
OBVERT ELEVATION (m)	91.808	91.923	
FLOW (l/s)			2,166.7
HGL (m)	91.933	92.042	
MANHOLE LOSS (m)		0.000	
TOTAL HGL (m)		92.042	
MAX. SURCHARGE (mm)		120	

DIA	AREA	PERIM.	HYD.R.	VEL.	Q
(m)	(M2)	(m)	(m)	(m/s)	(l/s)
1.372	1.48	4.31	0.34	1.51	2225.29



J:\13931_CorriganSWM\5.9 Drawings\59civil\current\Servicing Figures\25099-SK-1.dwg Layout Name: sk-1

Plot Style: ---- Plot Scale: 1:1 Plotted At: Jul. 8, 10 11:58 AM Printed By: SLAVICA VUKIC Last Saved By: SVUKIC Last Saved At: Jul. 8, 10

IBI GROUP

Scale: 1:7500

Project Title: STONEBRIDGE PHASE 11 AND 12

Drawing Title: DUAL DRAINAGE CASCADING FLOW

Sheet No.: SK-1

```
00001> ================================================================================
00002>
00003>  SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
00004>  S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
00005>  SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
00006>      S  W W   M   M  H   H    Y    M   M  O   O       9999   9999 July 1999
00007>  SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9 =========
00008>                                                      9   9  9   9 # 3699242
00009>       StormWater Management HYdrologic Model          999    999  =========
00010>
00011>  ********************************************************************************
00012>  ***************************** SWMHYMO-99 Ver/4.02 ******************************
00013>  *******  A single event and continuous hydrologic simulation model   *******
00014>  *******     based on the principles of HYMO and its successors       *******
00015>  *******                 OTTHYMO-83 and OTTHYMO-89.                   *******
00016>  ********************************************************************************
00017>  ******* Distributed by:  J.F. Sabourin and Associates Inc.            *******
00018>  *******                  Ottawa,  Ontario: (613) 727-5199            *******
00019>  *******                  Gatineau, Quebec: (819) 243-6858            *******
00020>  *******                  E-Mail: swmhymo@jfsa.Com                    *******
00021>  ********************************************************************************
00022>
00023>  +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024>  +++++++ Licensed user: Cumming Cockburn Limited                        +++++++
00025>  +++++++                Ottawa                SERIAL#:3699242         +++++++
00026>  +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028>  ********************************************************************************
00029>  *******          ++++++ PROGRAM ARRAY DIMENSIONS ++++++                 *******
00030>  *******          Maximum value for ID numbers  :     10                 *******
00031>  *******          Max. number of rainfall points:  15000                 *******
00032>  *******          Max. number of flow points    :  15000                 *******
00033>  ********************************************************************************
00034>
00035>
00036>  ********************   D E T A I L E D   O U T P U T   ********************
00037>  ********************************************************************************
00038>  *       DATE: 2010-06-15     TIME: 15:52:02     RUN COUNTER: 004270        *
00039>  ********************************************************************************
00040>  * Input   filename: D:\MYDOCU~1\13931C~1\SWMHYMO\JUNE20~1\MRCsub01.dat     *
00041>  * Output  filename: D:\MYDOCU~1\13931C~1\SWMHYMO\JUNE20~1\MRCsub01.out     *
00042>  * Summary filename: D:\MYDOCU~1\13931C~1\SWMHYMO\JUNE20~1\MRCsub01.sum     *
00043>  * User comments:                                                          *
00044>  * 1:_____________________________________________________________________*
00045>  * 2:_____________________________________________________________________*
00046>  * 3:_____________________________________________________________________*
00047>  ********************************************************************************
00048>
00049> --------------------------------------------------------------------------------
00050> 001:0001-------------------------------------------------------------------------
00051> *#*****************************************************************************
00052> *#  Project Name:   Corrigan SWM Facility
00053> *#  Project Number: 13931
00054> *#  Date         :
00055> *#  Modeller     :
00056> *#  Company      :   Cumming Cockburn Limited
00057> *#  License #    :   3699242
00058> *#*****************************************************************************
00059> *
00060> *
00061> ---------------------
00062> | START             |  Project  dir.: D:\MYDOCU~1\13931C~1\SWMHYMO\JUNE20~1\
00063> --------------------- Rainfall dir.: D:\MYDOCU~1\13931C~1\SWMHYMO\JUNE20~1\
00064>      TZERO =    .00 hrs on        0
00065>      METOUT=    2 (output = METRIC)
00066>      NRUN  = 001
```

```
00067>     NSTORM=    0
00068> ------------------------------------------------------------------------------
00069> 001:0002--------------------------------------------------------------------------
00070> *
00071> *# 2010-06 MAJOR FLOW - STONEBRIDGE PHASES 11 AND 12
00072> *# PARAMETERS REVISED TO REFLECT DETAILED DESIGN
00073> *
00074> *
00075> *#=============================================================
00076> *#=============================================================
00077> *# 100 YEAR 3 HOUR CHICAGO STORM - 10 MIN TIME STEP
00078> *#=============================================================
00079> *#=============================================================
00080> *
00081> ---------------------
00082> | READ STORM        |     Filename: D:\MYDOCU~1\13931C~1\SWMHYMO\JUNE20~1\CH
00083> | Ptotal=  71.68 mm|     Comments: CHICAGO 3 HOUR 10 MIN 100 YEAR STORM
00084> ---------------------
00085>               TIME     RAIN |    TIME     RAIN |    TIME     RAIN |    TIME     RAIN
00086>               hrs     mm/hr |     hrs    mm/hr |     hrs    mm/hr |     hrs    mm/hr
00087>               .17     6.050 |    1.00  178.560 |    1.83   11.050 |    2.67    5.760
00088>               .33     7.540 |    1.17   54.040 |    2.00    9.280 |    2.83    5.280
00089>               .50    10.170 |    1.33   27.310 |    2.17    8.020 |    3.00    4.880
00090>               .67    15.980 |    1.50   18.230 |    2.33    7.080 |
00091>               .83    40.760 |    1.67   13.730 |    2.50    6.340 |
00092>
00093> ------------------------------------------------------------------------------
00094> 001:0003--------------------------------------------------------------------------
00095> *
00096> *#=================================================
00097> *# AREA B2 (RESIDENTIAL)
00098> *# MH 136/315
00099> *# Note: Overflow to external drainage area
00100> *#=================================================
00101> *
00102> ----------------------
00103> | CALIB STANDHYD     |   Area     (ha)=   12.40
00104> | 01:000210 DT= 2.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   40.00
00105> ----------------------
00106>                                IMPERVIOUS    PERVIOUS (i)
00107>      Surface Area      (ha)=       4.96          7.44
00108>      Dep. Storage      (mm)=        .80          1.50
00109>      Average Slope      (%)=        .50          2.00
00110>      Length             (m)=     394.00         40.00
00111>      Mannings n            =       .013          .250
00112>
00113>      Max.eff.Inten.(mm/hr)=     178.56         65.59
00114>                   over (min)       6.00         14.00
00115>      Storage Coeff.   (min)=       5.68 (ii)    14.03 (ii)
00116>      Unit Hyd. Tpeak  (min)=       6.00         14.00
00117>      Unit Hyd. peak   (cms)=        .19           .08
00118>                                                          *TOTALS*
00119>      PEAK FLOW         (cms)=       1.96           .84          2.446 (iii)
00120>      TIME TO PEAK      (hrs)=       1.03          1.20          1.033
00121>      RUNOFF VOLUME      (mm)=      70.88         33.72         48.583
00122>      TOTAL RAINFALL     (mm)=      71.68         71.68         71.677
00123>      RUNOFF COEFFICIENT    =        .99           .47           .678
00124>
00125>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00126>            CN* =  77.0     Ia = Dep. Storage  (Above)
00127>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00128>            THAN THE STORAGE COEFFICIENT.
00129>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00130>
00131> ------------------------------------------------------------------------------
00132> 001:0004--------------------------------------------------------------------------
```

```
00133> *
00134> *
00135> ----------------------
00136> | ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
00137> |  IN>01:(000210)    |
00138> | OUT<07:(000110)    |     ==========  OUTLFOW STORAGE TABLE  ==========
00139> ----------------------     OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
00140>                              (cms)     (ha.m.)    |    (cms)     (ha.m.)
00141>                               .000  .0000E+00     |    1.064  .5400E-01
00142>                              1.054  .1000E-03     |     .000  .0000E+00
00143>
00144>      ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
00145>      ---------------------        (ha)      (cms)      (hrs)        (mm)
00146>      INFLOW >01: (000210)        12.40      2.446      1.033      48.583
00147>      OUTFLOW<07: (000110)        10.85      1.064      1.067      48.583
00148>     OVERFLOW<09: (000106)         1.55      1.358      1.067      48.583
00149>
00150>                      TOTAL NUMBER OF SIMULATED OVERFLOWS  =         2
00151>                      CUMULATIVE TIME OF OVERFLOWS  (hours)=       .32
00152>                      PERCENTAGE OF TIME OVERFLOWING     (%)=      5.49
00153>
00154>
00155>                      PEAK   FLOW   REDUCTION (Qout/Qin)(%)=    43.514
00156>                      TIME SHIFT OF PEAK FLOW          (min)=      2.00
00157>                      MAXIMUM  STORAGE   USED       (ha.m.)=.5377E-01
00158>
00159> ----------------------------------------------------------------------------------------
00160> 001:0005-------------------------------------------------------------------------------
00161> *
00162> ---------------------
00163> | DIVERT HYD        |
00164> | IN1D=09  (000106)|
00165> ---------------------
00166>       Outflow / Inflow  Relationships
00167>       Flow 01 +  Flow 04 =  Total
00168>        (cms)      (cms)      (cms)
00169>          .000       .000       .000
00170>          .197      1.161      1.358
00171>
00172>              NHYD        AREA     QPEAK  TpeakDate_hh:mm       R.V.  NFE WetHrs
00173>                          (ha)     (cms)                        (mm)       (hrs)
00174>    IDin = 09:000106      1.55     1.358  No_date    1:04      48.583    2      0.
00175>    ==========================================================================
00176>    IDout= 01:000101       .23      .197  No_date    1:04      48.583    2      0.
00177>    IDout= 04:000102      1.33     1.161  No_date    1:04      48.583    2      0.
00178> ----------------------------------------------------------------------------------------
00179> 001:0006-------------------------------------------------------------------------------
00180> *
00181> *
00182> *
00183> *#=================================================
00184> *# AREA B3 (RESIDENTIAL)
00185> *# MH 141/333
00186> *# Note: Overflow to external drainage area
00187> *#=================================================
00188> *
00189> ------------------------
00190> | CALIB STANDHYD      |   Area     (ha)=     4.11
00191> | 01:000210 DT= 2.00 |   Total Imp(%)=    40.00   Dir. Conn.(%)=    40.00
00192> ------------------------
00193>                                  IMPERVIOUS    PERVIOUS (i)
00194>      Surface Area      (ha)=         1.64          2.47
00195>      Dep. Storage      (mm)=          .80          1.50
00196>      Average Slope      (%)=          .50          2.00
00197>      Length             (m)=       350.00         40.00
00198>      Mannings n            =         .013          .250
```

```
00199>
00200>      Max.eff.Inten.(mm/hr)=     178.56        65.59
00201>                   over (min)      6.00        14.00
00202>      Storage Coeff.  (min)=      5.29 (ii)   13.64 (ii)
00203>      Unit Hyd. Tpeak (min)=      6.00        14.00
00204>      Unit Hyd. peak  (cms)=       .20          .08
00205>                                                      *TOTALS*
00206>      PEAK FLOW       (cms)=       .66          .28        .826 (iii)
00207>      TIME TO PEAK    (hrs)=      1.03         1.20       1.033
00208>      RUNOFF VOLUME    (mm)=     70.88        33.72      48.583
00209>      TOTAL RAINFALL   (mm)=     71.68        71.68      71.677
00210>      RUNOFF COEFFICIENT   =       .99          .47        .678
00211>
00212>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00213>            CN* =  77.0    Ia = Dep. Storage  (Above)
00214>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00215>            THAN THE STORAGE COEFFICIENT.
00216>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00217>
00218> ------------------------------------------------------------------------------
00219> 001:0007--------------------------------------------------------------------
00220> *
00221> *
00222> ----------------------
00223> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00224> |  IN>01:(000210)    |
00225> | OUT<04:(000110)    |    ==========  OUTLFOW STORAGE TABLE  ==========
00226> ----------------------    OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
00227>                             (cms)     (ha.m.)    |    (cms)     (ha.m.)
00228>                              .000   .0000E+00     |     .352   .2572E-01
00229>                              .349   .1000E-03     |     .000   .0000E+00
00230>
00231>      ROUTING RESULTS              AREA      QPEAK      TPEAK       R.V.
00232>      ---------------------        (ha)      (cms)      (hrs)       (mm)
00233>      INFLOW >01: (000210)         4.11       .826      1.033     48.583
00234>      OUTFLOW<04: (000110)         3.74       .352      1.117     48.583
00235>     OVERFLOW<08: (000106)          .37       .366      1.117     48.583
00236>
00237>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =         2
00238>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=       .27
00239>                     PERCENTAGE OF TIME OVERFLOWING     (%)=      4.91
00240>
00241>
00242>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=    42.630
00243>                     TIME SHIFT OF PEAK FLOW          (min)=     5.00
00244>                     MAXIMUM  STORAGE   USED       (ha.m.)=.2565E-01
00245>
00246> ------------------------------------------------------------------------------
00247> 001:0008--------------------------------------------------------------------
00248> *
00249> --------------------
00250> | DIVERT HYD       |
00251> | INTD=08  (000106)|
00252> --------------------
00253>       Outflow / Inflow  Relationships
00254>       Flow 01 +  Flow 10 =  Total
00255>         (cms)      (cms)      (cms)
00256>           .000       .000       .000
00257>           .142       .224       .366
00258>
00259>              NHYD        AREA     QPEAK  TpeakDate_hh:mm       R.V.  NFE WetHrs
00260>                          (ha)     (cms)                        (mm)       (hrs)
00261>    IDin = 08:000106       .37      .366  No_date    1:07     48.583    2      0.
00262>    ========================================================================
00263>    IDout= 01:000101       .14      .142  No_date    1:07     48.583    2      0.
00264>    IDout= 10:000102       .23      .224  No_date    1:07     48.583    2      0.
```

```
00265> ----------------------------------------------------------------------------------------
00266> 001:0009--------------------------------------------------------------------------------
00267> *
00268> *#================================
00269> *# ADDING OVERFLOW FROM B2
00270> *#================================
00271> *
00272> --------------------
00273> | ADD HYD (000107) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.      DWF
00274> --------------------                (ha)      (cms)    (hrs)    (mm)     (cms)
00275>                    ID1 01:000101      .14       .142     1.12   48.58     .000
00276>                   +ID2 09:000106     1.55     1.358     1.07   48.58     .000
00277>                    ==========================================================
00278>                    SUM 08:000107     1.70     1.358     1.07   48.58     .000
00279>
00280>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00281>
00282> ----------------------------------------------------------------------------------------
00283> 001:0010--------------------------------------------------------------------------------
00284> *
00285> *
00286> *
00287> *#================================
00288> *# EXTERNAL LANDS (STONEBRIDGE)
00289> *# Note: Minor and overflow to external area
00290> *#  (minor tributary to Jockvale SWM Facility)
00291> *#================================
00292> *
00293> ----------------------
00294> | CALIB STANDHYD      |   Area     (ha)=     2.23
00295> | 01:000210 DT= 2.00 |   Total Imp(%)=    54.00   Dir. Conn.(%)=    41.00
00296> ----------------------
00297>                                IMPERVIOUS     PERVIOUS (i)
00298>      Surface Area      (ha)=        1.20          1.03
00299>      Dep. Storage      (mm)=         .80          1.50
00300>      Average Slope      (%)=         .50          2.00
00301>      Length             (m)=      223.00         40.00
00302>      Mannings n            =        .013          .250
00303>
00304>      Max.eff.Inten.(mm/hr)=      178.56        118.07
00305>                   over (min)        4.00         10.00
00306>      Storage Coeff.   (min)=        4.04 (ii)    10.64 (ii)
00307>      Unit Hyd. Tpeak  (min)=        4.00         10.00
00308>      Unit Hyd. peak   (cms)=         .28           .11
00309>                                                          *TOTALS*
00310>      PEAK FLOW        (cms)=         .41           .20          .546 (iii)
00311>      TIME TO PEAK     (hrs)=        1.00          1.13         1.000
00312>      RUNOFF VOLUME     (mm)=       70.88         38.34        51.680
00313>      TOTAL RAINFALL    (mm)=       71.68         71.68        71.677
00314>      RUNOFF COEFFICIENT    =         .99           .53          .721
00315>
00316>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00317>            CN* =  77.0     Ia = Dep. Storage  (Above)
00318>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00319>            THAN THE STORAGE COEFFICIENT.
00320>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00321>
00322> ----------------------------------------------------------------------------------------
00323> 001:0011--------------------------------------------------------------------------------
00324> *
00325> *
00326> ----------------------
00327> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00328> |  IN>01:(000210)    |
00329> | OUT<02:(000110)    |    ==========  OUTLFOW STORAGE TABLE  ==========
00330> ----------------------    OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
```

```
00331>                              (cms)     (ha.m.)   |     (cms)     (ha.m.)
00332>                              .000   .0000E+00    |      .180   .2480E-02
00333>                              .178   .1000E-03    |      .000   .0000E+00
00334>
00335>      ROUTING RESULTS              AREA      QPEAK      TPEAK       R.V.
00336>      --------------------         (ha)      (cms)      (hrs)       (mm)
00337>      INFLOW >01: (000210)         2.23       .546      1.000     51.680
00338>      OUTFLOW<02: (000110)         1.64       .180       .933     51.680
00339>     OVERFLOW<09: (000106)          .59       .365      1.017     51.680
00340>
00341>                       TOTAL NUMBER OF SIMULATED OVERFLOWS  =         2
00342>                       CUMULATIVE TIME OF OVERFLOWS  (hours)=       .45
00343>                       PERCENTAGE OF TIME OVERFLOWING    (%)=      9.41
00344>
00345>
00346>                       PEAK   FLOW   REDUCTION [Qout/Qin](%)=    32.991
00347>                       TIME SHIFT OF PEAK FLOW          (min)=     -4.00
00348>                       MAXIMUM  STORAGE   USED       (ha.m.)=.2460E-02
00349>
00350> ------------------------------------------------------------------------------
00351> 001:0012-----------------------------------------------------------------------
00352> *
00353> *#=================================
00354> *# ADDING OVERFLOW FROM B3, EXTERNAL LANDS
00355> *#=================================
00356> *
00357> ---------------------
00358> | ADD HYD (000107) | ID: NHYD     AREA      QPEAK    TPEAK    R.V.      DWF
00359> ---------------------              (ha)      (cms)    (hrs)    (mm)    (cms)
00360>                    ID1 10:000102      .23       .224     1.12   48.58     .000
00361>                   +ID2 09:000106      .59       .365     1.02   51.68     .000
00362>                    ==========================================================
00363>                    SUM 01:000107      .82       .462     1.12   50.82     .000
00364>
00365>     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00366>
00367> ------------------------------------------------------------------------------
00368> 001:0013-----------------------------------------------------------------------
00369> *
00370> *#=================================
00371> *# ADDING MINOR FLOW FROM B2, B3
00372> *#=================================
00373> *
00374> ---------------------
00375> | ADD HYD (000107) | ID: NHYD     AREA      QPEAK    TPEAK    R.V.      DWF
00376> ---------------------              (ha)      (cms)    (hrs)    (mm)    (cms)
00377>                    ID1 04:000110     3.74       .352     1.12   48.58     .000
00378>                   +ID2 07:000110    10.85      1.064     1.07   48.58     .000
00379>                    ==========================================================
00380>                    SUM 10:000107    14.59      1.416     1.12   48.58     .000
00381>
00382>     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00383>
00384> ------------------------------------------------------------------------------
00385> 001:0014-----------------------------------------------------------------------
00386> *
00387> *#=================================================
00388> *# AREA B4A (RESIDENTIAL)
00389> *# MH 155/340
00390> *# Note: Overflow routed to B6B
00391> *#=================================================
00392> *
00393> ----------------------
00394> | CALIB STANDHYD     |   Area     (ha)=     5.80
00395> | 01:000210 DT= 2.00 |   Total Imp(%)=    49.00   Dir. Conn.(%)=    49.00
00396> ----------------------
```

```
00397>                                    IMPERVIOUS     PERVIOUS (i)
00398>      Surface Area      (ha)=          2.84           2.96
00399>      Dep. Storage      (mm)=           .80           1.50
00400>      Average Slope      (%)=           .50           2.00
00401>      Length             (m)=        263.00          40.00
00402>      Mannings n            =          .013           .250
00403>
00404>      Max.eff.Inten.(mm/hr)=        178.56          71.11
00405>                   over (min)          4.00          12.00
00406>      Storage Coeff.   (min)=          4.46 (ii)     12.54 (ii)
00407>      Unit Hyd. Tpeak  (min)=          4.00          12.00
00408>      Unit Hyd. peak   (cms)=           .26            .09
00409>                                                          *TOTALS*
00410>      PEAK FLOW         (cms)=          1.25            .36          1.441 (iii)
00411>      TIME TO PEAK      (hrs)=          1.00           1.17          1.000
00412>      RUNOFF VOLUME      (mm)=         70.88          33.72         51.927
00413>      TOTAL RAINFALL     (mm)=         71.68          71.68         71.677
00414>      RUNOFF COEFFICIENT    =           .99            .47           .724
00415>
00416>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00417>            CN* =  77.0     Ia = Dep. Storage  (Above)
00418>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00419>            THAN THE STORAGE COEFFICIENT.
00420>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00421>
00422> ------------------------------------------------------------------------------
00423> 001:0015--------------------------------------------------------------------
00424> *
00425> *
00426> ----------------------
00427> | ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
00428> |  IN>01:(000210)    |
00429> | OUT<04:(000110)    |     ==========  OUTLFOW STORAGE TABLE  ==========
00430> ----------------------     OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
00431>                              (cms)      (ha.m.)    |    (cms)     (ha.m.)
00432>                               .000   .0000E+00     |     .498   .1957E-01
00433>                               .494   .1000E-03     |     .000   .0000E+00
00434>
00435>      ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
00436>      ---------------              (ha)      (cms)      (hrs)         (mm)
00437>      INFLOW >01: (000210)         5.80      1.441      1.000       51.927
00438>      OUTFLOW<04: (000110)         4.66       .498       .983       51.927
00439>     OVERFLOW<08: (000106)         1.14       .934      1.017       51.927
00440>
00441>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =          2
00442>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=        .37
00443>                     PERCENTAGE OF TIME OVERFLOWING    (%)=       6.96
00444>
00445>
00446>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=     34.570
00447>                     TIME SHIFT OF PEAK FLOW           (min)=     -1.00
00448>                     MAXIMUM  STORAGE  USED        (ha.m.)=.1946E-01
00449>
00450> ------------------------------------------------------------------------------
00451> 001:0016--------------------------------------------------------------------
00452> *
00453> *
00454> *
00455> *#================================
00456> *# ADDING MINOR FLOW FROM B2, B3, B4A
00457> *#================================
00458> *
00459> ----------------------
00460> | ADD HYD (000107) | ID: NHYD     AREA      QPEAK    TPEAK    R.V.      DWF
00461> ----------------------              (ha)      (cms)    (hrs)    (mm)     (cms)
00462>                    ID1 10:000107    14.59     1.416     1.12   48.58     .000
```

```
00463>                  +ID2 04:000110     4.66      .498      .98  51.93     .000
00464>                   ================================================================
00465>                   SUM 01:000107    19.25     1.914     1.12  49.39     .000
00466>
00467>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00468>
00469> ---------------------------------------------------------------------------------
00470> 001:0017-----------------------------------------------------------------------
00471> *
00472> *#=============================================
00473> *# AREA B4B (RESIDENTIAL)
00474> *# MH 171
00475> *# Note: Overflow routed to B6B
00476> *#=============================================
00477> *
00478> ----------------------
00479> | CALIB STANDHYD     |   Area     (ha)=    5.08
00480> | 04:000210 DT= 2.00 |   Total Imp(%)=   39.00   Dir. Conn.(%)=   39.00
00481> ----------------------
00482>                                IMPERVIOUS    PERVIOUS (i)
00483>      Surface Area      (ha)=       1.98          3.10
00484>      Dep. Storage      (mm)=        .80          1.50
00485>      Average Slope      (%)=        .50          2.00
00486>      Length             (m)=     307.00         40.00
00487>      Mannings n             =       .013          .250
00488>
00489>      Max.eff.Inten.(mm/hr)=     178.56         65.59
00490>                  over (min)       4.00         14.00
00491>      Storage Coeff.   (min)=       4.89 (ii)    13.24 (ii)
00492>      Unit Hyd. Tpeak  (min)=       4.00         14.00
00493>      Unit Hyd. peak   (cms)=        .24           .08
00494>                                                          *TOTALS*
00495>      PEAK FLOW        (cms)=        .85           .36        1.014 (iii)
00496>      TIME TO PEAK     (hrs)=       1.00          1.20        1.000
00497>      RUNOFF VOLUME     (mm)=      70.88         33.72       48.211
00498>      TOTAL RAINFALL    (mm)=      71.68         71.68       71.677
00499>      RUNOFF COEFFICIENT    =        .99           .47         .673
00500>
00501>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00502>            CN* =  77.0     Ia = Dep. Storage   (Above)
00503>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00504>            THAN THE STORAGE COEFFICIENT.
00505>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00506>
00507> ---------------------------------------------------------------------------------
00508> 001:0018-----------------------------------------------------------------------
00509> *
00510> *
00511> ----------------------
00512> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00513> |  IN>04:(000210)    |
00514> | OUT<10:(000110)    |    ==========  OUTFLOW STORAGE TABLE  ==========
00515> ----------------------    OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
00516>                             (cms)      (ha.m.)   |    (cms)     (ha.m.)
00517>                              .000   .0000E+00     |     .436   .1848E-01
00518>                              .432   .1000E-03     |     .000   .0000E+00
00519>
00520>      ROUTING RESULTS              AREA     QPEAK     TPEAK       R.V.
00521>      -------------------          (ha)     (cms)     (hrs)       (mm)
00522>      INFLOW >04: (000210)         5.08     1.014     1.000     48.211
00523>      OUTFLOW<10: (000110)         4.39      .436     1.033     48.211
00524>     OVERFLOW<07: (000106)          .69      .574     1.033     48.211
00525>
00526>                      TOTAL NUMBER OF SIMULATED OVERFLOWS  =         1
00527>                      CUMULATIVE TIME OF OVERFLOWS  (hours)=       .33
00528>                      PERCENTAGE OF TIME OVERFLOWING    (%)=      6.15
```

```
00529>
00530>
00531>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   43.016
00532>                    TIME SHIFT OF PEAK FLOW          (min)=     2.00
00533>                    MAXIMUM  STORAGE   USED        (ha.m.)=.1842E-01
00534>
00535> ----------------------------------------------------------------------------------------
00536> 001:0019----------------------------------------------------------------------------------
00537> *
00538> *
00539> *
00540> *#=================================
00541> *# ADDING MINOR FLOW FROM B2, B3, B4A, B4B
00542> *#=================================
00543> *
00544> --------------------
00545> | ADD HYD (000107) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.      DWF
00546> --------------------                (ha)      (cms)    (hrs)    (mm)    (cms)
00547>                     ID1 10:000110     4.39      .436     1.03   48.21     .000
00548>                    +ID2 01:000107    19.25     1.914     1.12   49.39     .000
00549>                     ================================================================
00550>                     SUM 04:000107    23.63     2.351     1.12   49.17     .000
00551>
00552>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00553>
00554> ----------------------------------------------------------------------------------------
00555> 001:0020----------------------------------------------------------------------------------
00556> *
00557> *#=============================================================
00558> *# ADDING FLOW FROM B1, A1-A7 TO FLOW FROM B2-B4
00559> *#=============================================================
00560> *
00561> --------------------
00562> | ADD HYD (000107) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.      DWF
00563> --------------------                (ha)      (cms)    (hrs)    (mm)    (cms)
00564>                     ID1 04:000107    23.63     2.351     1.12   49.17     .000
00565>                    +ID2 02:000110     1.64      .180      .93   51.68     .000
00566>                     ================================================================
00567>                     SUM 01:000107    25.27     2.530     1.12   49.34     .000
00568>
00569>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00570>
00571> ----------------------------------------------------------------------------------------
00572> 001:0021----------------------------------------------------------------------------------
00573> *
00574> *#=================================
00575> *# ADDING MAJOR FLOW FROM B4A, B4B
00576> *#=================================
00577> *
00578> --------------------
00579> | ADD HYD (000107) | ID: NHYD      AREA      QPEAK    TPEAK    R.V.      DWF
00580> --------------------                (ha)      (cms)    (hrs)    (mm)    (cms)
00581>                     ID1 08:000106     1.14      .934     1.02   51.93     .000
00582>                    +ID2 07:000106      .69      .574     1.03   48.21     .000
00583>                     ================================================================
00584>                     SUM 05:000107     1.84     1.489     1.03   50.52     .000
00585>
00586>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00587>
00588> ----------------------------------------------------------------------------------------
00589> 001:0022----------------------------------------------------------------------------------
00590> *
00591> *#==============================
00592> *# EXTERNAL LANDS (STONEBRIDGE)
00593> *# Note: Overflow routed to B6B, minor flow to external
00594> *#  (tributary to Jockvale SWM Facility)
```

```
00595> *#============================
00596> *
00597> ----------------------
00598> | CALIB STANDHYD     |   Area     (ha)=   32.30
00599> | 10:000210 DT= 2.00 |   Total Imp(%)=   54.00   Dir. Conn.(%)=   41.00
00600> ----------------------
00601>                                IMPERVIOUS     PERVIOUS (i)
00602>      Surface Area      (ha)=      17.44          14.86
00603>      Dep. Storage      (mm)=        .80           1.50
00604>      Average Slope      (%)=        .50           2.00
00605>      Length             (m)=     607.00          40.00
00606>      Mannings n            =       .013           .250
00607>
00608>      Max.eff.Inten.(mm/hr)=     178.56          97.60
00609>                  over (min)       8.00          14.00
00610>      Storage Coeff.  (min)=       7.36 (ii)     14.49 (ii)
00611>      Unit Hyd. Tpeak (min)=       8.00          14.00
00612>      Unit Hyd. peak  (cms)=        .15            .08
00613>                                                          *TOTALS*
00614>      PEAK FLOW       (cms)=       4.64           2.45       6.444 (iii)
00615>      TIME TO PEAK    (hrs)=       1.07           1.20       1.100
00616>      RUNOFF VOLUME    (mm)=      70.88          38.34      51.680
00617>      TOTAL RAINFALL   (mm)=      71.68          71.68      71.677
00618>      RUNOFF COEFFICIENT   =        .99            .53        .721
00619>
00620>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00621>            CN* =  77.0    Ia = Dep. Storage  (Above)
00622>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00623>            THAN THE STORAGE COEFFICIENT.
00624>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00625>
00626> ------------------------------------------------------------------------------
00627> 001:0023--------------------------------------------------------------------------
00628> *
00629> *
00630> ----------------------
00631> | ROUTE RESERVOIR    |     Requested routing time step =  1.0 min.
00632> |  IN>10:(000210)    |
00633> | OUT<02:(000110)    |     ==========  OUTFLOW STORAGE TABLE  ==========
00634> ----------------------     OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
00635>                              (cms)      (ha.m.)   |    (cms)     (ha.m.)
00636>                               .000   .0000E+00    |    2.284   .1357E+00
00637>                              2.261   .1000E-03    |     .000   .0000E+00
00638>
00639>      ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
00640>      ---------------              (ha)      (cms)      (hrs)        (mm)
00641>      INFLOW >10: (000210)        32.30      6.444      1.100      51.680
00642>      OUTFLOW<02: (000110)        25.40      2.284      1.067      51.441
00643>     OVERFLOW<04: (000106)         6.90      4.160      1.100      51.680
00644>
00645>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =          2
00646>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=        .47
00647>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      13.66
00648>
00649>
00650>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=     35.444
00651>                     TIME SHIFT OF PEAK FLOW          (min)=     -2.00
00652>                     MAXIMUM  STORAGE   USED        (ha.m.)=.1354E+00
00653>
00654> ------------------------------------------------------------------------------
00655> 001:0024--------------------------------------------------------------------------
00656> *
00657> *#============================
00658> *# MAJOR FLOW TO BLACKLEAF DITCH
00659> *#============================
00660> *
```

```
00661> --------------------
00662> | DIVERT HYD       |
00663> | INID=04  (000106)|
00664> --------------------
00665>       Outflow / Inflow  Relationships
00666>       Flow 08 +  Flow 07 =  Total
00667>        (cms)      (cms)      (cms)
00668>          .000       .000       .000
00669>         2.000      2.200      4.200
00670>
00671>                NHYD        AREA    QPEAK  TpeakDate_hh:mm       R.V.  NFE WetHrs
00672>                            (ha)    (cms)                        (mm)       (hrs)
00673>    IDin = 04:000106        6.90    4.160  No_date    1:06      51.680    2     0.
00674>    ==========================================================================
00675>    IDout= 08:000101        3.28    1.981  No_date    1:06      51.680    2     0.
00676>    IDout= 07:000102        3.61    2.179  No_date    1:06      51.680    2     0.
00677> ------------------------------------------------------------------------------
00678> 001:0025-------------------------------------------------------------------------
00679> *
00680> *#=================================
00681> *# ADDING MAJOR FLOW ON BLACKLEAF TO B4A, B4B
00682> *#=================================
00683> *
00684> --------------------
00685> | ADD HYD (000107) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.      DWF
00686> --------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
00687>                    ID1 05:000107    1.84    1.489    1.03  50.52    .000
00688>                   +ID2 08:000101    3.28    1.981    1.10  51.68    .000
00689>                    ==========================================================
00690>                    SUM 04:000107    5.12    3.168    1.07  51.26    .000
00691>
00692>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00693>
00694> ------------------------------------------------------------------------------
00695> 001:0026-------------------------------------------------------------------------
00696> *
00697>       FINISH
00698> ------------------------------------------------------------------------------
00699> ******************************************************************************
00700>      WARNINGS / ERRORS / NOTES
00701>      -------------------------
00702>    Simulation ended on 2010-06-15     at 15:52:02
00703> ==============================================================================
00704>
00705>
```

IBI GROUP			
PROJECT: STONE BRIDGE PHASE II&12	PROJECT NO.: 25099	SHEET: 1 OF: 2
CLIENT: MONARCH	PREPARED BY: L.E	DATE: 2010-06-17
DESCRIPTION: FLOW CALCS	CHECKED BY:	OTHER:

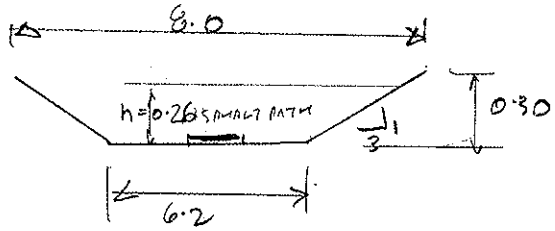
FLOW THROUGH MAJOR SYSTEM OUTLETS

$$Q = \frac{1}{n} A R^{2/3} S^{1/2}$$

BLOCK 335 SUNITA CRESCENT

REQUIRED FLOW $Q = 3.2\ m^3/s$

SECTION



longitudinal slope = 1.1%

FOR FLOW HEIGHT $h = 0.26$ AREA $= 1.81\ m^2$

$n = [2.0 \times 0.016 (\text{rough asphalt}) + 6.0 \times 0.024 (\text{grass})] / 8 = 0.022$

ACTUAL $Q = \frac{1}{0.022}(1.81)(0.23)^{2/3}\sqrt{.011} = 3.26\ m^3/s$

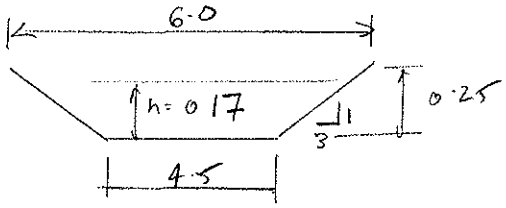
$V = Q/A = 3.26 / 1.81 = 1.80\ m/s$

DEPTH X VELOCITY $= 1.80 \times 0.26 = 0.47 < 0.60$

BLOCK 329 CONTESSA COURT

REQUIRED FLOW $Q = 1.4\ m^3/s$

SECTION



longitudinal slope = 2.0%

FOR FLOW HEIGHT $h = 0.17$ AREA $= 0.85\ m^2$

$n = 0.024$ (grass)

ACTUAL $Q = \frac{1}{0.024}(0.85)(0.15)^{2/3}\sqrt{.02} = 1.40\ m^3/s$

$V = Q/A = 1.4 / 0.85 = 1.65\ m/s$

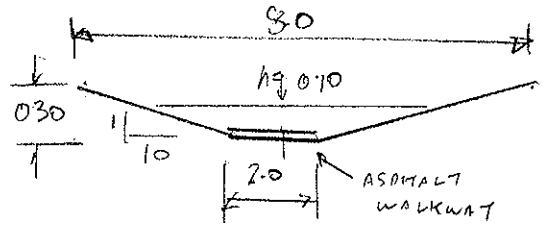
DEPTH X VELOCITY $= 1.65 \times 0.17 = 0.28 < 0.60$

IBI GROUP	PROJECT: STONEBRIDGE PHASE 11&12	PROJECT NO.: 25099	SHEET: 2 OF: 2
	CLIENT: MONARCH	PREPARED BY: L.E.	DATE: 2010-06-17
	DESCRIPTION: FLOW CALCS	CHECKED BY:	OTHER:

BLOCK 321 CHENOA WAY TO KIRKCONNEL WAY

REQUIRED FLOW $Q = 0.2\ m^3/s$

SECTION



longitudinal slope = 0.65%

FOR FLOW HEIGHT $h = 0.10$ AREA = $0.30\ m^2$

$n = 0.022$ (see Block 335)

ACTUAL $Q = 1/0.022\ (0.30)(0.07)^{2/3}\sqrt{.0065} = 0.20\ m^3/s$

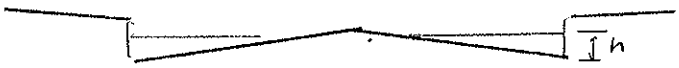
$V = Q/A = 0.20/0.30 = 0.65\ m/s$

DEPTH x VELOCITY $= 0.10 \times 0.65 = 0.07 < 0.60$

DONDONALD WAY

REQUIRED FLOW $Q = 0.5\ m^3/s$

SECTION
11m ASPHALT WIDTH



longitudinal slope = 0.60%

FOR FLOW HEIGHT $h = 0.14$ AREA = $0.65\ m^2$

$n = 0.016$

ACTUAL $Q = 1/0.016\ (0.65)(0.07)^{2/3}\sqrt{.006} = 0.53\ m^3/s$

$V = Q/A = 0.53/0.65 = 0.81\ m/s$

DEPTH x VELOCITY $= 0.14 \times 0.81 = 0.11 < 0.60$

LEGEND:

PONDING AREA
(PONDING VOLUMES DETERMINED BY CIVIL 3D SOFTWARE)

18	POND AREA NUMBER
98.00	MAX. POND ELEVATION (m)
0.24	MAX. POND DEPTH (m)
163.5	POND VOLUME (m³)

MAJOR STORM FLOW DIRECTION

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6	REVISED AS PER NEW LEGAL BLOCKS 331, 332, AND 333	LME	10:08:04
5	LOWER TEMPORARY MAJOR STORM RETENTION AREA BY 0.30m	LME	10:07:12
4	REVISED AS PER CITY COMMENTS	LME	10:06:18
3	REVISED AS PER CITY COMMENTS	LME	10:05:19
2	REVISED AS PER CITY COMMENTS	LME	10:03:01
1	ISSUED FOR APPROVAL	LME	10:01:25

Monarch

IBI GROUP
333 Preston Street
Tower 1, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
FAX (613)225-9868

Project Title

STONEBRIDGE
PHASE 11

L. M. ERION

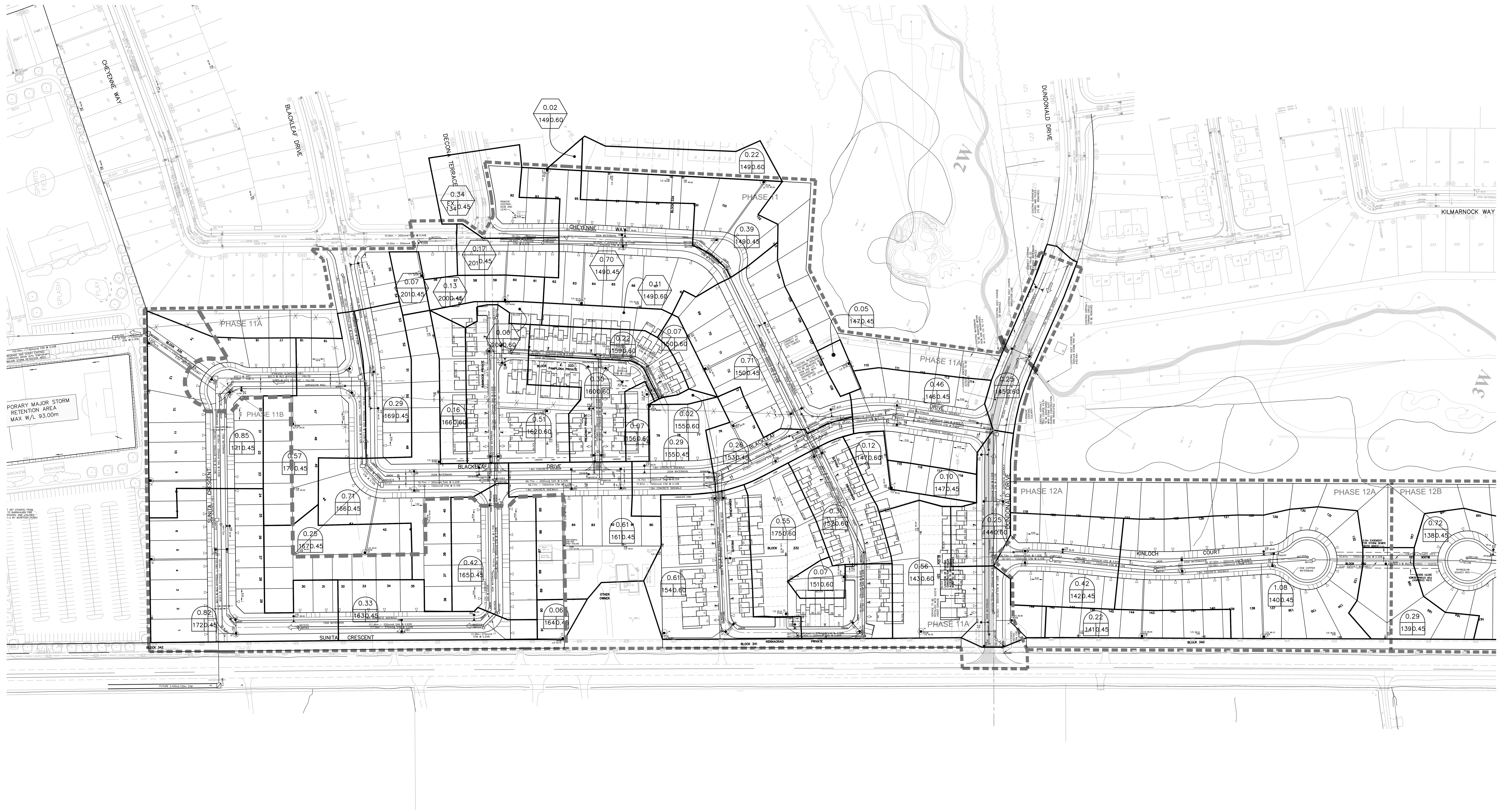
Drawing Title

PONDING PLAN

Scale

1:1250

Design: LME	Date: JANUARY 2010
Drawn: DPS	Checked: LME
Project No.: 25099	Drawing No.: 400



LEGEND:

- SINGLE SERVICE LOCATION
- DRIVEWAY LOCATION
- STANDARD STREET CATCHBASIN
- REARYARD CB C/W TOP OF GRATE
- SINGLE CONNECTION BETWEEN PAIRS OF STREET CATCHBASINS
- CB WITH INLET CONTROL DEVICE

ICD TYPE	MAX. RELEASE RATE l/s
TYPE A IPEX/PEDRO	20.0
TYPE B IPEX/PEDRO	28.4
TYPE C IPEX/PEDRO	37.0
TYPE X PEDRO	13.4

- BARRIER CURB
- MOUNTABLE CURB
- DEPRESSED CURB
- PHASE LIMITS

AREA CONNECTED TO JOCKVALE SWMF

0.25 — AREA IN HECTARES
0.45 — RUNOFF COEFFICIENT
9 — RECIEVING MH.

AREA CONNECTED TO CORRIGAN SWMF

0.25 — AREA IN HECTARES
0.45 — RUNOFF COEFFICIENT
9 — RECIEVING MH.

MAJOR STORM DIRECTION

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7	REVISED AS PER NEW LEGAL BLOCKS 331, 332, AND 333	LME	10:08:04
6	LOWER TEMPORARY MAJOR STORM RETENTION AREA BY 0.30m	LME	10:07:12
5	REVISED AS PER CITY COMMENTS	LME	10:07:08
4	REVISED AS PER CITY COMMENTS	LME	10:06:18
3	REVISED AS PER CITY COMMENTS	LME	10:05:19
2	REVISED AS PER CITY COMMENTS	LME	10:03:01
1	ISSUED FOR APPROVAL	LME	10:01:25

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333 Preston Street
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Project Title

STONEBRIDGE
PHASE 11

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
PROVINCE OF ONTARIO

Drawing Title

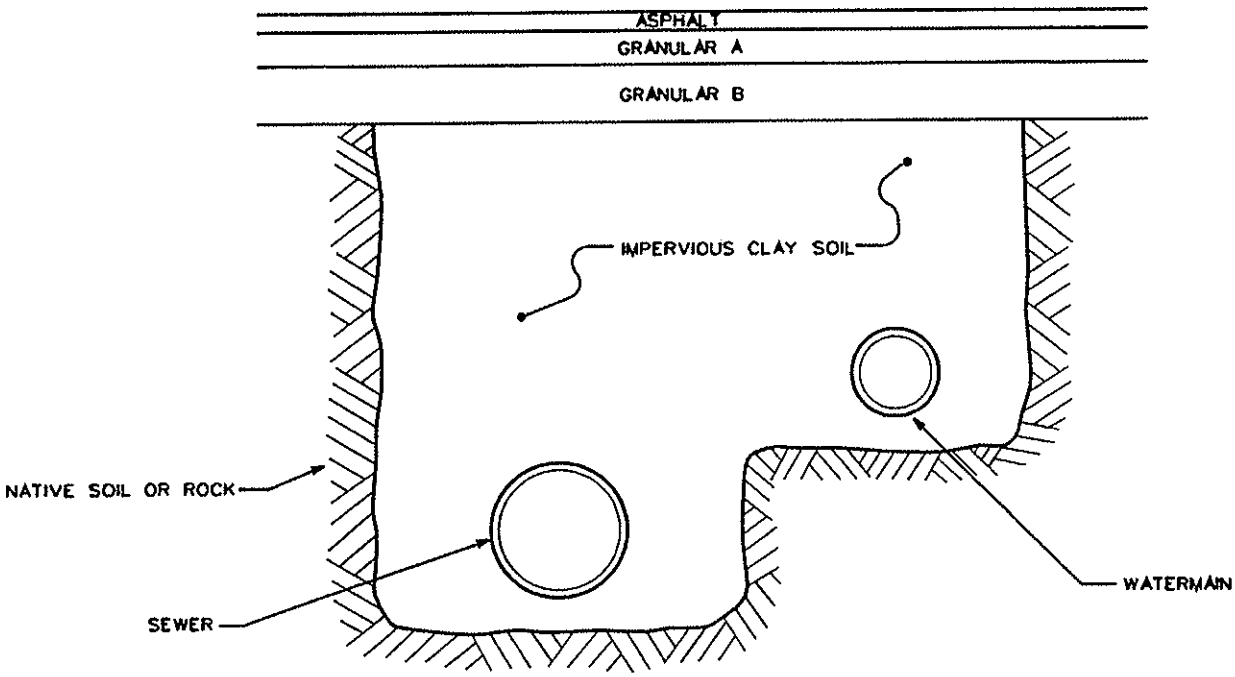
STORM DRAINAGE
AREA PLAN

Scale

1:1250

Design	Date
LME	JANUARY 2010
Drawn	**Checked**
DPS	LME
Project No.	**Drawing No.**
25099	500

APPENDIX C



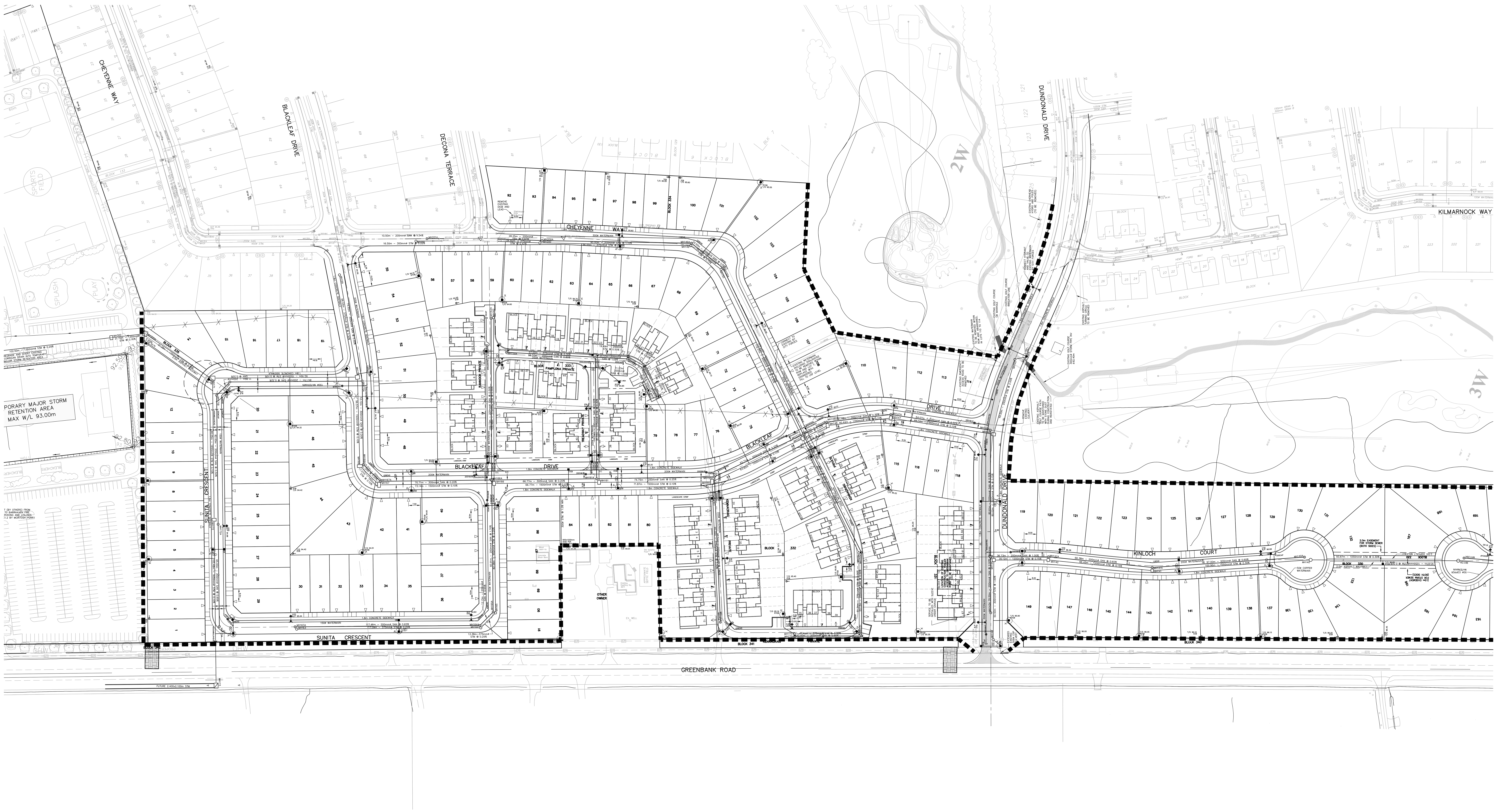
NOTES:

1. CLAY SEAL TO EXTEND FROM BOTTOM OF TRENCH EXCAVATION TO UNDERSIDE OF ROAD STRUCTURE.
2. CLAY SEAL TO EXTEND FULL TRENCH WIDTH TO EXISTING NATIVE SOILS WITH A MINIMUM THICKNESS OF 1.0m ALONG PIPES.
3. CLAY SEAL TO BE LOCATED SO THAT NO PIPE JOINTS ARE WITHIN THE CLAY SEAL MATERIAL.

Ottawa

CLAY SEAL FOR PIPE TRENCHES

DATE:	MAY 2001
REV. DATE:	MARCH 2006
DWG. No.:	S8



NOTE:
NO TRACKING OF MUD OR SEDIMENTS IS ALLOWED ONTO EXISTING ROADS. ANY MUD OR SEDIMENT OBSERVED ON EXISTING ROADS MUST BE REMOVED IMMEDIATLEY.

SILT FENCE AS PER OPSD-219.110

STRAW BALE FLOW CHECK AS PER OPSD-219.180

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8	REVISED AS PER NEW LEGAL BLOCKS 331, 332, AND 333	LME	10:08:04
7	LOWER TEMPORARY MAJOR STORM RETENTION AREA BY 0.30m	LME	10:07:12
6	REVISED AS PER CITY COMMENTS	LME	10:07:08
5	REVISED AS PER CITY COMMENTS	LME	10:06:18
4	REVISED AS PER CITY COMMENTS	LME	10:05:19
3	ISSUED FOR TENDER	LME	10:03:25
2	REVISED AS PER CITY COMMENTS	LME	10:03:01
1	ISSUED FOR APPROVAL	LME	10:01:25

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Project Title

STONEBRIDGE
PHASE 11

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
PROVINCE OF ONTARIO

N

Drawing Title

EROSION AND SEDIMENT CONTROL PLAN

Scale

1:1250

Design	Date
LME	JANUARY 2010
Drawn	Checked
DPS	LME
Project No.	Drawing No.
25099	900