Monarch

MONARCH CORPORATION

SITE SERVICING REPORT
STORMWATER SITE MANAGEMENT PLAN
AND EROSION AND SEDIMENT CONTROL PLAN
STONEBRIDGE DEVELOPMENTS - PHASE 10N - STAGE 3
BLOCK 57 - CALDERMILL PRIVATE
CITY OF OTTAWA

JUNE 2010

IBI GROUP

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1. INTRODUCTION

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

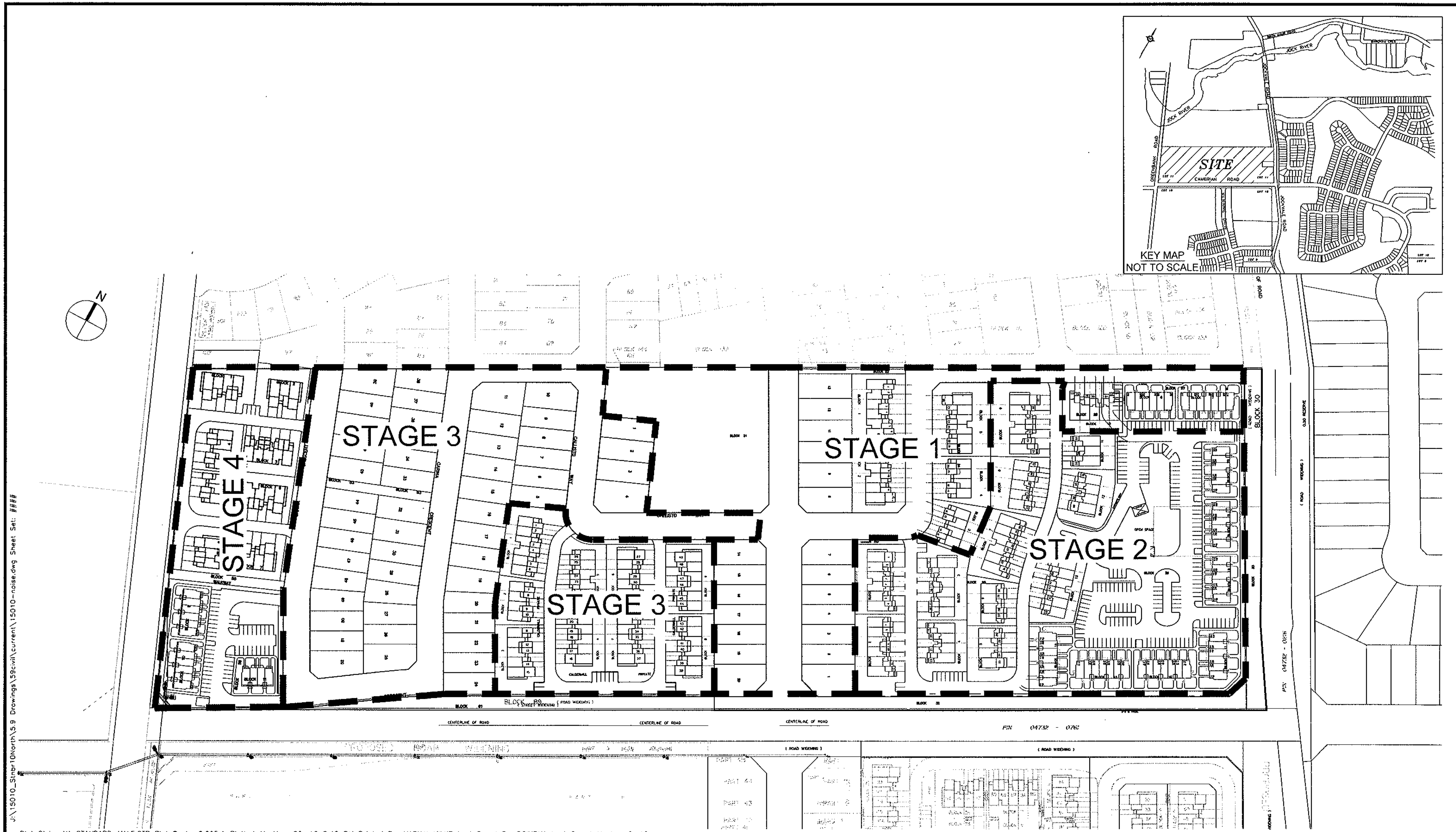
- Barrhaven South Master Servicing Study prepared by Stantec Consulting, June 2007.
- Jockvale Servicing Study South Nepean Urban Area (Official Plan Area 12A) prepared by Cumming Cockburn, March 1999.
- Corrigan Stormwater Management Facility Stormwater Management Report and Design Brief prepared by IBI Group, July 2008.
- Half Moon Bay Phase 1 Design Brief prepared by IBI Group, August 2008.
- Site Servicing Report Stormwater Management Plan and Erosion and Sediment Control Plan Phase 10N-Stage 1 prepared by IBI Group, October 2008.

Stonebridge Phase 10N is located north of Cambrian Road and is bounded on the east by Jockvale Road, to the west by Greenbank Road and to the north by the Half Moon Bay Subdivision. Staging of the site is shown on Figure 1. Stage 3 consists of the construction of Carina Crescent and Callisto Way from the adjacent Half Moon Bay Subdivision and the private townhouse site on Caldermill Private. Caldermill Private is bounded on the east by Tucana Way, the north by Callisto Way, to the west by Carino Crescent and to the south by Cambrian Road.

2. WATER DISTRIBUTION

The Stonebridge Development is fed from the existing 406 mm Manotick feedermain running along the west shoulder of Jockvale Road. A second parallel watermain feed was constructed form the existing 762 mm watermain on Greenbank Road to Phase 1 of the development at Riverstone Drive. Existing connections to the Manotick Feedermain are made at Riverstone Drive, the north and south intersections of Golflinks Drive, including Cambrian Road and Blackleaf Drive for the previous Phases 1 to 6. Stage 3 of Phase 10N is supplied by watermains on Tucana Way, Callisto Way and Corina Crescent which are interconnected to watermains on Cambrian Road and Jockvale Road.

Watermain analysis has been conducted by extending the Stonebridge Phase 10N-Stage 2 water analysis to include Stage 3 and is included in Appendix A; the Half Moon Bay Subdivision is also included in the analysis. Boundary conditions at the intersections of Jockvale Road and Riverstone Drive have been provided by the City for current and future (2011) conditions. Analysis has been carried out using the lower future hydraulic grade line boundary conditions with a check using current conditions to determine high pressure values. Other criteria used in the analysis are as follows:



J:\15010_Stnbr10North\5.9 Drawings\59civil\current\15010-noise.dwg Sheet Set: ####

Plot Style: AIA STANDARD-HALF.CTB Plot Scale: 0.995:1 Plotted At: May. 26, 10 2:42 PM Printed By: MARIAN MILNE Last Saved By: DSIURNA Last Saved At: Apr. 6, 10

IBI GROUP	Scale: N.T.S. Date: APRIL 2010 Drawn: DPS	Project Title: STONEBRIDGE PHASE 10N	Drawing Title: STAGING PLAN	Project No. 15010 DWG No. FIG 1 Sheet No. 1

- Average daily demand — 450 l/cap/day
- Peak daily demand — 1,125 l/cap/day
- Peak hour demand — 2,475 l/cap/day
- Fire Flow Rate — 6,000 l/min (single family units)
  8,000 l/min (semi-detached & townhouse units)
- Minimum hydraulic grade line during max hour = 275 kPa
- Minimum hydraulic grade line during max day and fire flows = 140 kPa

Results of the analysis using the H2O MAP Water Program were 6.0 produced by MNH soft are included in Appendix A. The requirements for peak hour pressure and fire flow are met for both phases; the minimum hour pressure under future conditions are all below 550 kPa; however, under current conditions, the pressure exceeds 550 kPa at all locations which requires that pressure reducing valves be installed for all residential units.

3. WASTEWATER SYSTEM (SANITARY SEWERS)

The sanitary outlet for the eastern portion of Phase 10N is through the existing sanitary sewer on Callisto Way and the east and west legs of Corina Crescent in the adjacent Half Moon Bay Subdivision. Allowance for flows from Stage 4 are made in the sanitary sewer on the west leg of Carina Crescent. All sanitary flows from Stages 3 and 4 are identified on the Half Moon Bay Sanitary Drainage Area Plan Phase 2 drawing no 501A.

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
- Residential Peaking Factor — Harmon Formula
- Infiltration Allowance — 0.28 l/s/ha
- Average Non-Residential Rate* (Commercial, Industrial, School) — 0.57 l/s/ha (50,000 l/day/ha)
- Non-Residential Peaking Factor — 1.55
- Minimum Velocity — 0.60 m/s

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

Appendix B contains the Stage 3 sanitary drainage area plan and the sanitary sewer design sheet.

4. STORMWATER SYSTEM

Storm sewers for this development outlet to existing storm sewers on Tucana Way, Callisto Way and the east and west legs of Corina Crescent. All the existing storm sewers outlet through the Half Moon Bay Subdivision and drain to the Corrigan Stormwater Management Facility located north of the development. All storm flows from Stages 3 and 4 are identified in the Half Moon Bay Storm Drainage Area Plan Phase 2 drawing No. 500B and the Stonebridge Phase 10 North Storm Drainage Area Plan Stages 1 and 2 drawing no. 500-B. Appendix C contains the Stage 3 Drainage Area Plan and Storm Sewer Design Sheet.

On Figure 2 of the Corrigan SWM Report, the east portion of Stage 3 (Caldermill Private and to the west leg of Callisto Way) are part of Area A10, while the remainder of Stage 3 is included in Area A11. As per Table 2 of the Corrigan SWM report, A10 is to be restricted to 85 l/s/ha, while A11 is restricted to the 5 year flow. To ensure that design flows are not exceeded, inlet control devices (ICD's) are added to carry inlet to the storm sewer. 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 primarily in rear yard catchbasins. Flows from the ICD's are calculated for each run of sewer on the sewer design sheet, an allowance Stage 4 ICD's are also included. The location of the ICD's and interconnected catchbasins are shown on the project drawings.

Major storm routing and street surface ponding is shown on drawing no. 400D in Appendix C. As shown on the plan, all major storm flows are directed north through the Half Moon Bay Subdivision in accordance with the Corrigan SWM Facility. All ponding depths do not exceed the maximum allowable depth of 0.3 m. For both Areas A10 and A11, the required storage rate is 56 m3/ha as shown on Table 2 of the Corrigan SWM Report. The total amount of street storage for Stage 3 as shown on the ponding plan is approximately 259 m3 and the total area of Stage 3, including rear yards, is approximately 4.7 ha, giving a storage rate of 55 m3/ha which is within 2% of the required rate.

In Appendix C, Figure 3 from the Corrigan Stormwater Management Report is included with the three major system outlets for this development which are marked on. The major system flows from the report have been conservatively prorated to produce a flow of 0.3 cms for Callisto Way and Carina Crescent West and 0.2 cms for Carina Crescent East. Also included in the appendix are calculations for the roads to determine the depth and velocity of major system flows. In all cases, the depth is less than 0.15 m (curb height) and the product of velocity and depth is 0.07 or lower which is much less than the 0.6 permitted in the sewer design guidelines.

At all the existing storm outlets for Stage 3, the 100 year hydraulic grade line is at or below the obvert of the pipe. All foundations are set at a minimum of 0.3 m above the obvert of the connecting storm sewer. Minimum underside of footing are shown on the grading plan.

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 D.

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.

J:\15010_Stnbr10North\5.2 Reports\5.2.2 Civil\2010-06-07\CTR_SiteServicingReport_2010-06-07.docx

APPENDIX A
WATER DISTRIBUTION PLAN

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : STONEBRIDGE PHASE 10N
LOCATION : CITY OF OTTAWA
DEVELOPER : MONARCH CORPORATION

FILE: 15010.5.7
DATE PRINTED: 6-Apr-10
DESIGN: LE

NODE	RESIDENTIAL UNITS				NON-RESIDENTIAL			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND
	SF	SD & TH	ST	POP'N	INDTRL (ha.)	COMM. (ha.)	INST. (ha.)	Res.	Non-res.	Total	Res.	Non-res.	Total	Res.	Non-res.	Total	(l/min)
Stage 3 & 4																	
520	5			17				0.09	0.00	0.09	0.22	0.00	0.22	0.49	0.00	0.49	6,000
530		12		32				0.17	0.00	0.17	0.42	0.00	0.42	0.93	0.00	0.93	8,000
540	5	12		49				0.26	0.00	0.26	0.64	0.00	0.64	1.42	0.00	1.42	8,000
550	17			58				0.30	0.00	0.30	0.75	0.00	0.75	1.66	0.00	1.66	6,000
560	11			37				0.19	0.00	0.19	0.49	0.00	0.49	1.07	0.00	1.07	6,000
570	5			17				0.09	0.00	0.09	0.22	0.00	0.22	0.49	0.00	0.49	6,000
580	4			14				0.07	0.00	0.07	0.18	0.00	0.18	0.39	0.00	0.39	6,000
590	5			17				0.09	0.00	0.09	0.22	0.00	0.22	0.49	0.00	0.49	6,000
600		11		30				0.15	0.00	0.15	0.39	0.00	0.39	0.85	0.00	0.85	8,000
610		14		38				0.20	0.00	0.20	0.49	0.00	0.49	1.08	0.00	1.08	8,000
620			32	74				0.38	0.00	0.38	0.96	0.00	0.96	2.11	0.00	2.11	8,000
630		14		38				0.20	0.00	0.20	0.49	0.00	0.49	1.08	0.00	1.08	8,000
640		16		43				0.23	0.00	0.23	0.56	0.00	0.56	1.24	0.00	1.24	8,000
Ex. Stage 1 & 2																	
230	20			68				0.35	0.00	0.35	0.89	0.00	0.89	1.95	0.00	1.95	6,000
240		26		70				0.37	0.00	0.37	0.91	0.00	0.91	2.01	0.00	2.01	8,000
250		22		59				0.31	0.00	0.31	0.77	0.00	0.77	1.70	0.00	1.70	8,000
260		14	14	70				0.36	0.00	0.36	0.91	0.00	0.91	2.01	0.00	2.01	8,000
270		24		65				0.34	0.00	0.34	0.84	0.00	0.84	1.86	0.00	1.86	8,000
280			14	32				0.17	0.00	0.17	0.42	0.00	0.42	0.92	0.00	0.92	8,000
310			12	28				0.14	0.00	0.14	0.36	0.00	0.36	0.79	0.00	0.79	8,000
330			12	28				0.14	0.00	0.14	0.36	0.00	0.36	0.79	0.00	0.79	
340			14	32				0.17	0.00	0.17	0.42	0.00	0.42	0.92	0.00	0.92	8,000
350			12	28				0.14	0.00	0.14	0.36	0.00	0.36	0.79	0.00	0.79	
360			12	28				0.14	0.00	0.14	0.36	0.00	0.36	0.79	0.00	0.79	
TOTALS	**72**	**165**	**122**	**971**	**0.00**	**0.00**	**0.00**	**5.05**	**0.00**	**5.05**	**12.63**	**0.00**	**12.63**	**27.83**	**0.00**	**27.83**	

ASSUMPTIONS

RESIDENTIAL DENSITIES

- Single Family (SF) 3.4 p / p / u
- Semi Detached (SD) & Townhouse (TH) 2.7 p / p / u
- Stacked Townhouse (ST) 2.3 p / p / u

AVG. DAILY DEMAND

- Residential 450 l / cap / day
- Non-Residential 20,000 l / ha / day

MAX. DAILY DEMAND

- Residential 1,125 l / cap / day
- Non-Residential 30,000 l / ha / day

MAX. HOURLY DEMAND

- Residential 2,475 l / cap / day
- Non-Residential 54,000 l / ha / day

FIRE FLOW

- SF 6,000 l / min
- SD, TH & ST 8,000 l / min

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Half Moon Bay																	
10	4	16		57				0.30	0.00	0.30	0.74	0.00	0.74	1.63	0.00	1.63	6,000
20		24		65				0.34	0.00	0.34	0.84	0.00	0.84	1.86	0.00	1.86	8,000
30		14		38				0.20	0.00	0.20	0.49	0.00	0.49	1.08	0.00	1.08	8,000
40		6		16				0.08	0.00	0.08	0.21	0.00	0.21	0.46	0.00	0.46	8,000
50		4		11				0.06	0.00	0.06	0.14	0.00	0.14	0.31	0.00	0.31	8,000
60		4		11				0.06	0.00	0.06	0.14	0.00	0.14	0.31	0.00	0.31	8,000
70		20		54				0.28	0.00	0.28	0.70	0.00	0.70	1.55	0.00	1.55	8,000
80	13			44				0.23	0.00	0.23	0.58	0.00	0.58	1.27	0.00	1.27	6,000
90	11			37				0.19	0.00	0.19	0.49	0.00	0.49	1.07	0.00	1.07	8,000
100	11			37				0.19	0.00	0.19	0.49	0.00	0.49	1.07	0.00	1.07	6,000
110	4			14				0.07	0.00	0.07	0.18	0.00	0.18	0.39	0.00	0.39	6,000
120	5			17				0.09	0.00	0.09	0.22	0.00	0.22	0.49	0.00	0.49	6,000
380	12			41				0.21	0.00	0.21	0.53	0.00	0.53	1.17	0.00	1.17	6,000
420	15			51				0.27	0.00	0.27	0.66	0.00	0.66	1.46	0.00	1.46	6,000
400	3			10				0.05	0.00	0.05	0.13	0.00	0.13	0.29	0.00	0.29	6,000
510	7			24				0.12	0.00	0.12	0.31	0.00	0.31	0.68	0.00	0.68	6,000
430	4			14				0.07	0.00	0.07	0.18	0.00	0.18	0.39	0.00	0.39	6,000
490	11			37				0.19	0.00	0.19	0.49	0.00	0.49	1.07	0.00	1.07	6,000
470	4			14				0.07	0.00	0.07	0.18	0.00	0.18	0.39	0.00	0.39	6,000
450	4			14				0.07	0.00	0.07	0.18	0.00	0.18	0.39	0.00	0.39	6,000
TOTALS	**108**	**88**	**0**	**605**	**0.00**	**0.00**	**0.00**	**3.14**	**0.00**	**3.14**	**7.88**	**0.00**	**7.88**	**17.33**	**0.00**	**17.33**	

ASSUMPTIONS

RESIDENTIAL DENSITIES

- Single Family (SF) 3.4 p / p / u
- Semi Detached (SD) & Townhouse (TH) 2.7 p / p / u
- Stacked Townhouse (ST) 2.3 p / p / u

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MAX. DAILY DEMAND

- Residential 1,125 l / cap / day
- Non-Residential 30,000 l / ha / day

MAX. HOURLY DEMAND

- Residential 2,475 l / cap / day
- Non-Residential 54,000 l / ha / day

FIRE FLOW

- SF 6,000 l / min
- SD, TH & ST 8,000 l / min

Terry Brule

From: Burda, Dave [Dave.Burda@ottawa.ca]
Sent: Tuesday, October 30, 2007 9:19 AM
To: Terry Brule (E-mail)
Subject: FW: Half Moon Bay
Importance: High

FYI
-----Original Message-----
From: Diduch, Roman
Sent: October 30,2007 8:16 AM
To: Burda, Dave
Subject: RE: Half Moon Bay

Hi

As requested

Current HGL (Meters)

	Max Day	Max Day Fire	Peak Hr.	Min Hr
Jockvale at Greenbank	153.	152	152.8	155
Jockvale at Riverstone	**153.8**	**150.**	**152.4**	**155**

Design HGL (Meters)

Jockvale at Greenbank	141	140	138	144
Jockvale at Riverstone	**140**	**138**	**136**	**144**

Roman

-----Original Message-----
From: Burda, Dave
Sent: October 29,2007 5:33 PM
To: Diduch, Roman
Subject: FW: Half Moon Bay
Importance: High

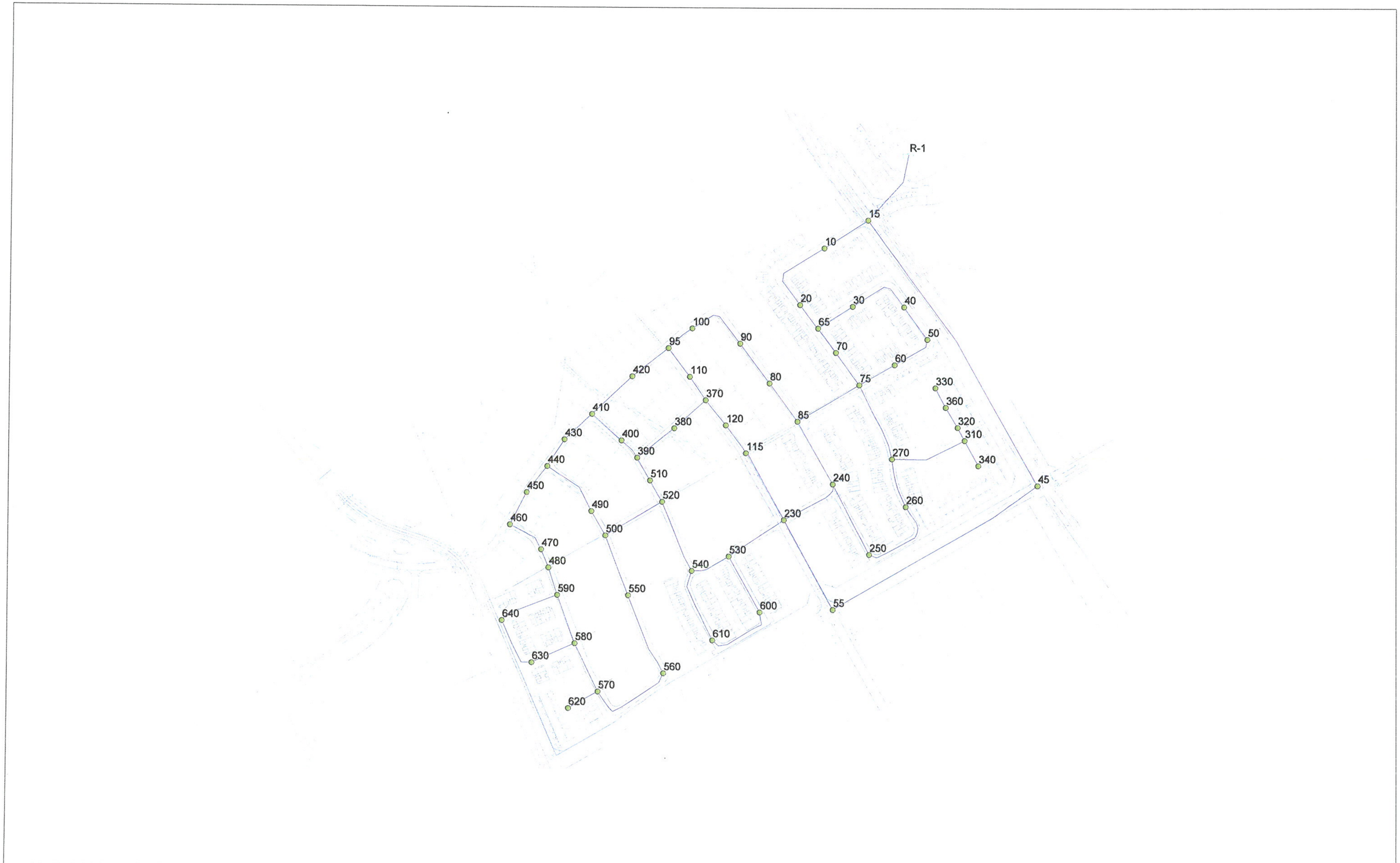
Hi Roman

They need the numbers for Jockvale and Riverstone.
Can you provide them?
Thanks
Dave
-----Original Message-----
From: Terry Brule [mailto:tbrule@ibigroup.com]
Sent: October 29,2007 5:30 PM
To: Burda, Dave
Subject: RE: Half Moon Bay

PHASE 10 NORTH STAGE 3 - PIPE SIZES

Date: Thursday, April 08, 2010

PHASE 10 NORTH STAGE 3 - NODE ID'S



Date: Thursday, April 08, 2010

PHASE 10 NORTH STAGE 3 - PIPE ID'S

Date: Thursday, April 08, 2010

Phase 10N Stage 3 155 HGL - Basic Day - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		10	0.30	95.70	154.99	581.00
2		100	0.19	93.30	154.97	604.29
3		110	0.07	93.10	154.97	606.25
4		115	0.00	93.80	154.97	599.40
5		120	0.09	93.50	154.97	602.33
6		15	0.00	96.00	155.00	578.15
7		20	0.34	94.80	154.98	589.69
8		230	0.35	93.95	154.97	597.95
9		240	0.37	95.10	154.97	586.67
10		250	0.31	96.80	154.97	570.01
11		260	0.36	97.10	154.97	567.07
12		270	0.34	97.30	154.97	565.11
13		30	0.20	95.60	154.97	581.80
14		310	0.14	98.00	154.97	558.25
15		320	0.00	98.20	154.97	556.29
16		330	0.14	97.70	154.96	561.11
17		340	0.17	97.50	154.97	563.15
18		360	0.00	98.10	154.97	557.27
19		370	0.00	93.00	154.97	607.23
20		380	0.21	93.20	154.97	605.26
21		390	0.00	93.40	154.97	603.29
22		40	0.08	97.50	154.97	563.17
23		400	0.05	93.20	154.97	605.25
24		410	0.00	93.35	154.97	603.78
25		420	0.27	93.10	154.97	606.24
26		430	0.07	93.05	154.96	606.72
27		440	0.00	93.45	154.96	602.79
28		45	0.00	96.40	155.00	574.21
29		450	0.07	93.15	154.96	605.73
30		460	0.00	93.55	154.96	601.81
31		470	0.07	93.55	154.96	601.80
32		480	0.00	93.45	154.96	602.78
33		490	0.19	93.50	154.96	602.30
34		50	0.22	98.20	154.97	556.31
35		500	0.00	93.30	154.96	604.26
36		510	0.12	93.50	154.97	602.31
37		520	0.09	93.80	154.97	599.37
38		530	0.17	93.90	154.97	598.41
39		540	0.26	93.95	154.97	597.91
40		55	0.00	94.50	154.99	592.77

Phase 10N Stage 3 155 HGL - Basic Day - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
41		550	0.30	93.40	154.96	603.28
42		560	0.19	93.90	154.96	598.37
43		570	0.09	94.20	154.96	595.43
44		580	0.07	93.75	154.96	599.84
45		590	0.09	93.80	154.96	599.35
46		60	0.29	96.90	154.97	569.04
47		600	0.15	94.80	154.97	589.59
48		610	0.20	94.70	154.97	590.56
49		620	0.38	94.65	154.96	591.02
50		630	0.20	94.20	154.96	595.43
51		640	0.23	94.10	154.96	596.41
52		65	0.00	94.60	154.97	591.61
53		70	0.28	94.90	154.97	588.66
54		75	0.00	95.40	154.97	583.74
55		80	0.23	93.90	154.97	598.42
56		85	0.00	94.40	154.97	593.53
57		90	0.19	93.90	154.97	598.41
58		95	0.00	92.90	154.97	608.20

Phase 10 North Stage 3 144 HGL - Basic Day - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		10	0.30	95.70	143.99	473.21
2		100	0.19	93.30	143.97	496.50
3		110	0.07	93.10	143.97	498.45
4		115	0.00	93.80	143.97	491.61
5		120	0.09	93.50	143.97	494.54
6		15	0.00	96.00	144.00	470.36
7		20	0.34	94.80	143.98	481.90
8		230	0.35	93.95	143.97	490.15
9		240	0.37	95.10	143.97	478.88
10		250	0.31	96.80	143.97	462.22
11		260	0.36	97.10	143.97	459.28
12		270	0.34	97.30	143.97	457.32
13		30	0.20	95.60	143.97	474.01
14		310	0.14	98.00	143.97	450.46
15		320	0.00	98.20	143.97	448.50
16		330	0.14	97.70	143.96	453.31
17		340	0.17	97.50	143.97	455.36
18		360	0.00	98.10	143.97	449.48
19		370	0.00	93.00	143.97	499.44
20		380	0.21	93.20	143.97	497.47
21		390	0.00	93.40	143.97	495.50
22		40	0.08	97.50	143.97	455.38
23		400	0.05	93.20	143.97	497.46
24		410	0.00	93.35	143.97	495.99
25		420	0.27	93.10	143.97	498.45
26		430	0.07	93.05	143.96	498.92
27		440	0.00	93.45	143.96	495.00
28		45	0.00	96.40	144.00	466.42
29		450	0.07	93.15	143.96	497.94
30		460	0.00	93.55	143.96	494.02
31		470	0.07	93.55	143.96	494.01
32		480	0.00	93.45	143.96	494.99
33		490	0.19	93.50	143.96	494.51
34		50	0.22	98.20	143.97	448.52
35		500	0.00	93.30	143.96	496.47
36		510	0.12	93.50	143.97	494.52
37		520	0.09	93.80	143.97	491.58
38		530	0.17	93.90	143.97	490.62
39		540	0.26	93.95	143.97	490.12
40		55	0.00	94.50	143.99	484.97

Phase 10 North Stage 3 144 HGL - Basic Day - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
41		550	0.30	93.40	143.96	495.48
42		560	0.19	93.90	143.96	490.58
43		570	0.09	94.20	143.96	487.64
44		580	0.07	93.75	143.96	492.05
45		590	0.09	93.80	143.96	491.56
46		60	0.29	96.90	143.97	461.25
47		600	0.15	94.80	143.97	481.79
48		610	0.20	94.70	143.97	482.77
49		620	0.38	94.65	143.96	483.23
50		630	0.20	94.20	143.96	487.64
51		640	0.23	94.10	143.96	488.62
52		65	0.00	94.60	143.97	483.82
53		70	0.28	94.90	143.97	480.87
54		75	0.00	95.40	143.97	475.95
55		80	0.23	93.90	143.97	490.63
56		85	0.00	94.40	143.97	485.74
57		90	0.19	93.90	143.97	490.62
58		95	0.00	92.90	143.97	500.41

Phase 10 North Stage 3 138 HGL - Max Day + Fire - Fireflow Report

	ID	Total Demand (L/s)	Critical Node 1 ID	Critical Node 1 Pressure (kPa)	Critical Node 1 Head (m)	Adjusted Fire-Flow (L/s)	Available Flow @Hydrant (L/s)	Critical Node 2 ID	Critical Node 2 Pressure (kPa)	Critcal Node 2 Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
1	10	134.07	50	356.44	132.07	455.18	385.85	10	139.96	109.98	385.85	385.85
2	100	100.49	320	344.37	128.44	281.79	224.14	100	139.96	107.58	224.14	224.14
3	110	100.18	320	344.81	128.29	283.84	227.84	110	139.96	107.38	227.84	227.84
4	115	100.00	320	345.41	129.05	286.64	230.38	115	139.96	108.08	230.38	230.38
5	120	100.22	320	345.09	128.72	285.25	229.58	120	139.96	107.78	229.58	229.58
6	20	134.17	50	322.74	127.74	291.78	285.06	20	139.96	109.08	285.06	285.06
7	230	100.89	320	346.68	129.33	293.14	282.79	600	132.82	107.50	278.79	278.79
8	240	134.24	320	311.22	126.86	266.11	255.97	240	139.96	109.38	255.97	255.97
9	250	134.10	250	278.83	125.25	206.29	206.29	250	139.96	111.08	206.29	206.29
10	260	134.24	260	268.91	124.54	198.69	198.69	260	139.96	111.38	198.69	198.69
11	270	134.17	320	265.79	124.42	200.94	204.96	320	131.13	110.68	200.94	200.94
12	30	133.82	50	299.08	126.12	241.36	232.17	30	139.96	109.88	232.17	232.17
13	310	133.69	320	170.20	115.37	143.81	144.45	320	138.00	112.08	143.82	143.81
14	320	133.33	320	152.08	113.72	137.14	137.14	320	139.96	112.48	137.14	137.14
15	340	133.75	340	141.52	111.94	134.21	134.21	340	139.96	111.78	134.21	134.21
16	370	100.00	320	345.01	128.21	284.65	232.06	370	139.96	107.28	232.06	232.06
17	380	100.53	380	326.66	126.53	176.51	176.51	380	139.96	107.48	176.51	176.51
18	390	100.00	320	345.12	128.62	285.12	211.97	390	139.96	107.68	211.97	211.97
19	40	133.54	40	277.73	125.84	207.64	207.64	40	139.96	111.78	207.64	207.64
20	400	100.13	320	345.10	128.42	285.16	209.81	400	139.96	107.48	209.81	209.81
21	410	100.00	320	345.03	128.56	284.66	214.25	410	139.96	107.63	214.25	214.25
22	420	100.66	320	344.80	128.29	284.19	217.37	420	139.96	107.38	217.37	217.37
23	430	100.18	620	337.63	127.50	202.21	200.70	430	139.96	107.33	200.70	200.70
24	440	100.00	620	331.65	127.29	193.77	193.77	620	139.95	107.73	193.77	193.77
25	450	100.18	620	322.86	126.10	183.53	179.55	450	139.96	107.43	179.55	179.55
26	460	100.00	460	314.39	125.63	168.04	168.04	460	139.96	107.83	168.04	168.04
27	470	100.18	630	304.92	124.67	163.93	161.00	470	139.96	107.83	161.00	161.00
28	480	100.00	630	300.42	124.11	160.25	158.78	480	139.96	107.73	158.78	158.78
29	490	100.49	620	332.34	127.41	194.94	188.95	490	139.96	107.78	188.95	188.95
30	50	133.89	50	272.70	126.03	206.79	206.79	50	139.96	112.48	206.79	206.79
31	500	100.00	620	331.87	127.17	194.05	194.77	620	138.13	107.40	194.05	194.05
32	510	100.31	320	345.17	128.72	285.67	210.92	510	139.96	107.78	210.92	210.92
33	520	100.22	320	345.25	129.03	285.96	214.17	520	139.96	108.08	214.17	214.17
34	530	133.75	600	304.80	125.00	222.17	224.87	600	133.91	107.57	222.17	222.17
35	540	133.97	610	302.88	124.86	219.67	218.79	540	139.96	108.23	218.79	218.79
36	550	100.75	620	316.34	125.68	177.25	170.56	550	139.96	107.68	170.56	170.56
37	560	100.49	560	295.97	124.10	156.20	156.20	560	139.96	108.18	156.20	156.20
38	570	133.55	620	192.52	113.85	150.12	151.45	620	135.55	108.03	150.12	150.12
39	580	133.51	630	203.09	114.47	153.78	154.03	630	139.13	107.95	153.78	153.78
40	590	133.55	640	206.82	114.91	155.21	155.34	640	139.55	108.04	155.22	155.21
41	60	134.07	50	289.82	126.48	227.60	225.15	60	139.96	111.18	225.15	225.15
42	600	133.72	600	273.70	122.73	193.07	193.07	600	139.96	109.08	193.07	193.07
43	610	133.82	610	271.88	122.44	191.46	191.46	610	139.96	108.98	191.46	191.46
44	620	134.29	620	150.80	110.04	137.27	137.27	620	139.96	108.93	137.27	137.27
45	630	133.82	630	181.46	112.72	146.18	146.18	630	139.96	108.48	146.18	146.18
46	640	133.89	640	180.30	112.50	145.81	145.81	640	139.96	108.38	145.81	145.81

Phase 10 North Stage 3 138 HGL - Max Day + Fire - Fireflow Report

		ID	Total Demand (L/s)	Critical Node 1 ID	Critical Node 1 Pressure (kPa)	Critical Node 1 Head (m)	Adjusted Fire-Flow (L/s)	Available Flow @Hydrant (L/s)	Critical Node 2 ID	Critical Node 2 Pressure (kPa)	Critcal Node 2 Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
47		65	133.33	50	311.68	126.41	264.35	273.87	50	124.06	107.26	264.35	264.35
48		70	134.03	50	310.53	126.59	262.40	258.01	70	139.96	109.18	258.01	258.01
49		75	133.33	320	306.36	126.66	254.91	264.16	320	124.02	108.06	254.91	254.91
50		80	100.58	320	342.60	128.86	274.50	231.39	80	139.96	108.18	231.39	231.39
51		85	133.33	320	312.16	126.26	266.79	257.14	85	139.96	108.68	257.14	257.14
52		90	100.49	320	343.66	128.97	278.81	220.24	90	139.96	108.18	220.24	220.24
53		95	100.00	320	344.59	128.07	282.53	232.93	95	139.96	107.18	232.93	232.93

Phase 10 North Stage 3 136 HGL - Peak Hour - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		10	1.63	95.70	135.76	392.58
2		100	1.07	93.30	135.15	410.11
3		110	0.39	93.10	135.15	412.07
4		115	0.00	93.80	135.18	405.49
5		120	0.49	93.50	135.16	408.23
6		15	0.00	96.00	136.00	391.97
7		20	1.86	94.80	135.42	398.08
8		230	1.95	93.95	135.23	404.47
9		240	2.01	95.10	135.21	393.03
10		250	1.70	96.80	135.20	376.31
11		260	2.01	97.10	135.20	373.37
12		270	1.86	97.30	135.20	371.42
13		30	1.08	95.60	135.30	389.01
14		310	0.79	98.00	135.19	364.46
15		320	0.00	98.20	135.19	362.50
16		330	0.79	97.70	134.98	365.35
17		340	0.92	97.50	135.19	369.36
18		360	0.79	98.10	135.19	363.44
19		370	0.00	93.00	135.16	413.09
20		380	1.17	93.20	135.13	410.84
21		390	0.00	93.40	135.11	408.73
22		40	0.46	97.50	135.27	370.11
23		400	0.29	93.20	135.11	410.69
24		410	0.00	93.35	135.11	409.21
25		420	1.46	93.10	135.13	411.82
26		430	0.39	93.05	135.10	412.01
27		440	0.00	93.45	135.08	407.99
28		45	0.00	96.40	135.95	387.57
29		450	0.39	93.15	135.08	410.85
30		460	0.00	93.55	135.07	406.86
31		470	0.39	93.55	135.06	406.78
32		480	0.00	93.45	135.06	407.73
33		490	1.00	93.50	135.08	407.49
34		50	1.23	98.20	135.25	363.11
35		500	1.07	93.30	135.08	409.45
36		510	0.68	93.50	135.11	407.75
37		520	0.49	93.80	135.11	404.80
38		530	0.93	93.90	135.16	404.27
39		540	1.42	93.95	135.14	403.62
40		55	0.00	94.50	135.77	404.45

Phase 10 North Stage 3 136 HGL - Peak Hour - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
41		550	1.66	93.40	135.07	408.31
42		560	1.07	93.90	135.06	403.30
43		570	0.49	94.20	135.05	400.32
44		580	0.39	93.75	135.05	404.73
45		590	0.49	93.80	135.05	404.26
46		60	1.62	96.90	135.24	375.75
47		600	0.85	94.80	135.15	395.36
48		610	1.08	94.70	135.14	396.29
49		620	2.11	94.65	135.05	395.89
50		630	1.08	94.20	135.05	400.31
51		640	1.24	94.10	135.05	401.29
52		65	0.00	94.60	135.32	399.04
53		70	1.55	94.90	135.28	395.70
54		75	0.00	95.40	135.24	390.40
55		80	1.27	93.90	135.18	404.55
56		85	0.00	94.40	135.21	399.88
57		90	1.07	93.90	135.17	404.38
58		95	0.00	92.90	135.15	413.99

Phase 10 North Stage 3 136 HGL - Peak Hour - Pipe Report

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)
1		10	65	30	51.63	203.00	110.00	7.28	0.22	0.02	0.46
2		11	30	40	83.41	203.00	110.00	6.20	0.19	0.03	0.34
3		13	60	75	51.01	203.00	110.00	2.89	0.09	0.00	0.08
4		14	75	70	50.06	203.00	110.00	-9.96	0.31	0.04	0.82
5		15	70	65	37.53	203.00	110.00	-11.51	0.36	0.04	1.07
6		16	75	85	90.12	203.00	110.00	6.38	0.20	0.03	0.36
7		17	85	80	59.04	203.00	110.00	6.83	0.21	0.02	0.41
8		18	80	90	61.69	203.00	110.00	5.56	0.17	0.02	0.28
9		19	90	100	81.28	203.00	110.00	4.49	0.14	0.02	0.19
10		20	100	95	38.57	203.00	110.00	3.42	0.11	0.00	0.11
11		23	95	110	44.51	203.00	110.00	-3.08	0.10	0.00	0.09
12		24	110	370	35.14	203.00	110.00	-3.47	0.11	0.00	0.12
13		25	120	370	40.18	203.00	110.00	3.46	0.11	0.00	0.12
14		26	120	115	42.74	203.00	110.00	-7.40	0.23	0.02	0.47
15		3	15	45	392.35	406.00	120.00	24.40	0.19	0.05	0.13
16		4	45	55	298.93	305.00	110.00	24.40	0.33	0.18	0.59
17		42	40	50	49.74	203.00	110.00	5.74	0.18	0.01	0.29
18		43	50	60	54.50	203.00	110.00	4.51	0.14	0.01	0.19
19		44	55	230	127.35	203.00	110.00	24.40	0.75	0.55	4.30
20		46	15	R-1	0.10	900.00	130.00	-46.68	0.07	0.00	0.00
21		48	230	115	96.28	203.00	110.00	7.40	0.23	0.05	0.47
22		49	230	240	80.71	203.00	110.00	4.85	0.15	0.02	0.22
23		50	240	85	89.77	203.00	110.00	0.45	0.01	0.000	0.00
24		51	240	250	98.71	203.00	110.00	2.39	0.07	0.01	0.06
25		52	250	260	108.23	203.00	110.00	0.69	0.02	0.000	0.01
26		53	260	270	62.22	203.00	110.00	-1.32	0.04	0.00	0.02
27		54	270	75	101.04	203.00	110.00	-6.47	0.20	0.04	0.37
28		59	310	270	96.05	203.00	110.00	-3.29	0.10	0.01	0.11
29		60	310	320	18.40	203.00	110.00	1.58	0.05	0.000	0.03
30		61	320	360	28.97	152.00	100.00	1.58	0.09	0.00	0.13
31		62	340	310	36.06	203.00	110.00	-0.92	0.03	0.000	0.01
32		64	360	330	27.38	51.00	100.00	0.79	0.39	0.20	7.48
33		65	370	120	40.18	203.00	110.00	-3.46	0.11	0.00	0.12
34		66	370	380	52.59	152.00	100.00	3.44	0.19	0.03	0.56
35		67	380	390	58.91	152.00	100.00	2.27	0.13	0.02	0.26
36		68	390	400	29.27	203.00	110.00	1.09	0.03	0.000	0.01
37		69	400	410	49.62	203.00	110.00	0.80	0.02	0.000	0.01
38		7	15	10	65.23	203.00	110.00	22.28	0.69	0.24	3.64
39		70	410	420	68.84	203.00	110.00	-5.04	0.16	0.02	0.23
40		71	420	95	57.14	203.00	110.00	-6.50	0.20	0.02	0.37
41		72	410	430	46.50	203.00	110.00	5.84	0.18	0.01	0.30
42		73	430	440	39.54	203.00	110.00	5.45	0.17	0.01	0.27
43		74	440	450	41.32	203.00	110.00	4.50	0.14	0.01	0.19
44		75	450	460	45.04	203.00	110.00	4.11	0.13	0.01	0.16
45		76	460	470	51.92	203.00	110.00	4.11	0.13	0.01	0.16
46		77	470	480	24.09	203.00	110.00	3.72	0.11	0.00	0.13
47		78	440	490	81.18	203.00	110.00	0.95	0.03	0.000	0.01

Phase 10 North Stage 3 136 HGL - Peak Hour - Pipe Report

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)
48		79	490	500	34.84	203.00	110.00	-0.05	0.00	0.00	0.00
49		8	10	20	107.25	203.00	110.00	20.65	0.64	0.34	3.16
50		80	390	510	32.50	203.00	110.00	1.18	0.04	0.000	0.02
51		81	510	520	30.59	203.00	110.00	0.50	0.02	0.0000	0.00
52		82	520	500	82.26	203.00	110.00	5.93	0.18	0.03	0.31
53		83	230	530	82.47	203.00	110.00	10.20	0.32	0.07	0.86
54		84	530	540	50.75	203.00	110.00	5.94	0.18	0.02	0.31
55		85	540	520	93.34	203.00	110.00	5.92	0.18	0.03	0.31
56		86	500	550	79.72	203.00	110.00	4.81	0.15	0.02	0.21
57		87	550	560	106.55	203.00	110.00	3.15	0.10	0.01	0.10
58		88	560	570	112.22	203.00	110.00	2.08	0.06	0.01	0.05
59		89	570	580	66.42	203.00	110.00	-0.52	0.02	0.000	0.00
60		9	20	65	38.48	203.00	110.00	18.79	0.58	0.10	2.65
61		90	580	590	63.73	203.00	110.00	-1.64	0.05	0.00	0.03
62		91	590	480	35.90	203.00	110.00	-3.72	0.11	0.00	0.13
63		92	530	600	79.50	203.00	110.00	3.33	0.10	0.01	0.11
64		93	600	610	86.45	203.00	110.00	2.48	0.08	0.01	0.06
65		94	610	540	94.58	203.00	110.00	1.40	0.04	0.00	0.02
66		95	570	620	42.03	203.00	110.00	2.11	0.07	0.00	0.05
67		96	580	630	58.84	203.00	110.00	0.73	0.02	0.000	0.01
68		97	630	640	70.48	203.00	110.00	-0.35	0.01	0.000	0.00
69		98	640	590	77.01	203.00	110.00	-1.59	0.05	0.00	0.03

APPENDIX B
SANITARY SEWER DESIGN

IBI GROUP

IBI Group
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

SANITARY SEWER DESIGN SHEET

PROJECT: STONEBRIDGE PHASE 10N - STAGE 3
BLOCK 57 - CALDERMILL PRIVATE

DEVELOPER: MONARCH CORPORATION

JOB #: 15010-5.7
DATE PRINTED: 7-Jun-10
DESIGN: LE
FILE: 5.7 Calculations

LOCATION			INDIVIDUAL					CUM. RES. FLOW			INSTIT., INDUST., & COMM. FLOW				INFILTRATION			TOTAL	PROPOSED SEWER						
STREET	FROM MH	TO MH	RESID. UNITS Sngls	RESID. UNITS Towns Semis	RESID. UNITS Stacked Towns	RES. AREA (Ha)	POP.	POP.	PEAK FACT.	PEAK FLOW (l/s)	Instit. AREA (Ha)	Comm. AREA (Ha)	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. (%)
Outlet to Callisto Way																									
Caldermill Private	100 A	101 A		23		0.65	62.1	62	4.00	1.02					0.65	0.65	0.18	**1.20**	**44.62**	200	90.5	1.70	1.38	43.42	97%
Callisto Way	101 A	102 A				0.06		62	4.00	1.02					0.06	0.71	0.20	**1.22**	**24.19**	200	42.8	0.50	0.75	22.98	95%
Callisto Way	102 A	106 A				0.02		62	4.00	1.02					0.02	0.73	0.20	**1.22**	**24.19**	200	9.7	0.50	0.75	22.97	95%
Caldermill Private	103 A	104 A		16		0.46	43.2	43	4.00	0.71					0.46	0.46	0.13	**0.84**	**37.49**	200	54.0	1.20	1.16	36.65	98%
Caldermill Private	104 A	105 A		10		0.27	27.0	70	4.00	1.15					0.27	0.73	0.20	**1.36**	**34.21**	200	27.7	1.00	1.06	32.86	96%
Caldermill Private	105 A	106 A					0.0	70	4.00	1.15					0.00	0.73	0.20	**1.36**	**59.28**	200	21.1	3.00	1.83	57.93	98%
Callisto Way	106 A	*Ex 208 A*	10			0.59	34.0	166	4.00	2.73					0.59	2.05	0.57	**3.30**	**19.36**	200	86.7	0.32	0.60	16.06	83%
	Ex 208 A	*Ex 209 A*	*6*			*0.44*	*20.4*	*187*	*4.00*	*3.06*					*0.44*	*2.49*	*0.70*	***3.76***	***66.21***	*200*	*66.2*	*0.32*	*0.60*	*62.45*	*94%*
Outlet to Carina Crescent East																									
Carina Crescent	108 A	109 A	11			0.66	37.4	37	4.00	0.61					0.66	0.66	0.18	**0.80**	**34.21**	200	77.2	1.00	1.06	33.41	98%
Carina Crescent	109 A	*Ex 211 A*	17			0.95	57.8	95	4.00	1.56					0.95	1.61	0.45	**2.01**	**19.36**	200	117.0	0.32	0.60	17.35	90%
	Ex 211 A	*Ex 212 A*	*9*			*0.50*	*30.6*	*126*	*4.00*	*2.06*					*0.50*	*2.11*	*0.59*	***2.65***	***19.36***	*200*	*59.4*	*0.32*	*0.60*	*16.71*	*86%*
Outlet to Carina Crescent West																									
Carina Crescent	110 A	111 A	2			0.22	6.8	7	4.00	0.11					0.22	0.22	0.06	**0.17**	**48.38**	200	16.5	2.00	1.49	48.21	100%
Carina Crescent	111 A	112 A	4		32	0.87	87.2	94	4.00	1.54					0.87	1.09	0.31	**1.85**	**24.19**	200	64.7	0.50	0.75	22.35	92%
Carina Crescent	112 A	113 A	5	8		0.57	38.6	133	4.00	2.17					0.57	1.66	0.46	**2.64**	**21.63**	200	67.2	0.40	0.67	18.99	88%
Carina Crescent	113 A	*Ex 213 A*	3	22		0.96	69.6	202	4.00	3.32					0.96	2.62	0.73	**4.05**	**21.63**	200	35.5	0.40	0.67	17.58	81%
	Ex 213 A	*Ex 214 A*	*4*			*0.30*	*13.6*	*216*	*4.00*	*3.54*					*0.30*	*2.92*	*0.82*	***4.36***	***19.36***	*200*	*38.8*	*0.32*	*0.60*	*15.00*	*77%*

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

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
2010-06-07
PROVINCE OF ONTARIO

LEGEND:

0.88 / 56.8	AREA IN HECTARES; POPULATION: SINGLES – 3.4 p/p/u, TOWNS – 2.7 p/p/u

No.	REVISIONS	By	Date
14			
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5			
4			
3			
2	REVISED PER CITY COMMENTS	LME	10:05:28
1	ISSUED FOR APPROVAL	LME	10:04:08

Monarch

IBI GROUP
333 Preston Street
Tower 1, Suite 400
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Tel (613)225-1311
FAX (613)225-9868

Project Title

STONEBRIDGE PHASE 10 NORTH STAGE 3

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
PROVINCE OF ONTARIO

N

Drawing Title

SANITARY DRAINAGE AREA PLAN

Scale: 1:500

Design	Date
LME	MARCH 2010
Drawn	**Checked**
DPS	LME
Project No.	**Drawing No.**
15010	501D

APPENDIX C
STORM SEWER DESIGN

IBI GROUP

IBI Group
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

STORM SEWER DESIGN SHEET

PROJECT: STONEBRIDGE PHASE 10N - STAGE 3
BLOCK 57 - CALDERMILL PRIVATE
DEVELOPER: MONARCH CORPORATION

JOB #: 15010-5.7
DATE PRINTED: 7-Jun-10
DESIGN: LE
FILE: 5.7 Calculations

LOCATION / AREA (Ha.) / DESIGN FLOW

STREET	FROM MH	TO MH	C= 0.20	C= 0.45	C= 0.55	C= 0.60	C= 0.61	C= 0.67	C= 0.80	INDIV. 2.78AC	ACCUM. 2.78AC	INLET (min.)	TIME IN PIPE	TOTAL	I (mm/Hr)	PEAK FLOW (l/s)
AREA A10																
Outlet to Tucana Way																
Caldermill West leg	103	104						0.25		0.47	0.47	10.00	0.72	10.72	104.20	**48.97**
	104	105								0.00	0.47	15.00	0.39	15.39	83.60	**39.29**
	105	106						0.19		0.35	0.82	15.39	0.20	15.59	82.30	**67.49**
Callisto Way	106	101		0.24				0.19		0.65	1.47	15.59	1.18	16.76	81.70	**120.10**
Caldermill East leg	100	101						0.35		0.65	0.65	10.00	1.02	11.02	104.20	**67.73**
Callisto Way	101	*EX 118*		0.13						0.16	2.28	16.76	1.47	18.23	78.30	**178.52**
AREA A11																
Outlet to Callisto Way																
Callisto Way	107	*EX 208*		0.30			0.38			1.02	1.02	15.00	1.60	16.60	83.60	**85.27**
Outlet to Carina East Leg																
Carina East leg	108	109		0.25			0.33			0.87	0.87	15.00	1.21	16.21	83.60	**72.73**
	109	*EX 211*		0.77			0.87			2.44	3.31	16.21	2.37	18.59	79.80	**264.14**
Outlet to Carina West Leg																
Carina West leg	110	111								0.00	0.00	10.00	0.25	10.25	104.20	**0.00**
	111	112					0.22		0.56	1.62	1.62	15.00	1.04	16.04	83.60	**135.43**
	112	113					0.34	0.29		1.12	2.74	16.04	1.38	17.41	80.40	**220.30**
	113	*EX 213*						0.73		1.36	4.10	17.41	0.68	18.09	76.50	**313.65**

SEWER DATA

STREET	FROM MH	TO MH	CAP. (l/s)	LENGTH (M)	PIPE (mm)	SLOPE (%)	n	VEL. (M/s)	AVAIL. CAP. (l/s)	AVAIL. CAP. (%)
Caldermill West leg	103	104	**62.02**	53.0	250	1.00	0.013	1.22	13.05	21.0%
	104	105	**62.02**	28.3	250	1.00	0.013	1.22	22.73	36.6%
	105	106	**100.91**	16.6	300	1.00	0.013	1.38	33.43	33.1%
Callisto Way	106	101	**132.98**	57.1	450	0.20	0.013	0.81	12.88	9.7%
Caldermill East leg	100	101	**76.01**	92.0	250	1.50	0.013	1.50	8.28	10.9%
Callisto Way	101	*EX 118*	**367.11**	71.1	750	0.10	0.013	0.81	188.59	51.4%
Callisto Way	107	*EX 208*	**132.98**	77.5	450	0.20	0.013	0.81	47.71	35.9%
Carina East leg	108	109	**78.15**	78.0	300	0.60	0.013	1.07	5.41	6.9%
	109	*EX 211*	**303.64**	117.0	675	0.12	0.013	0.82	39.50	13.0%
Carina West leg	110	111	**62.02**	18.5	250	1.00	0.013	1.22	62.02	100.0%
	111	112	**162.86**	61.6	450	0.30	0.013	0.99	27.43	16.8%
	112	113	**248.08**	70.2	600	0.15	0.013	0.85	27.79	11.2%
	113	*EX 213*	**367.11**	32.9	750	0.10	0.013	0.81	53.46	14.6%

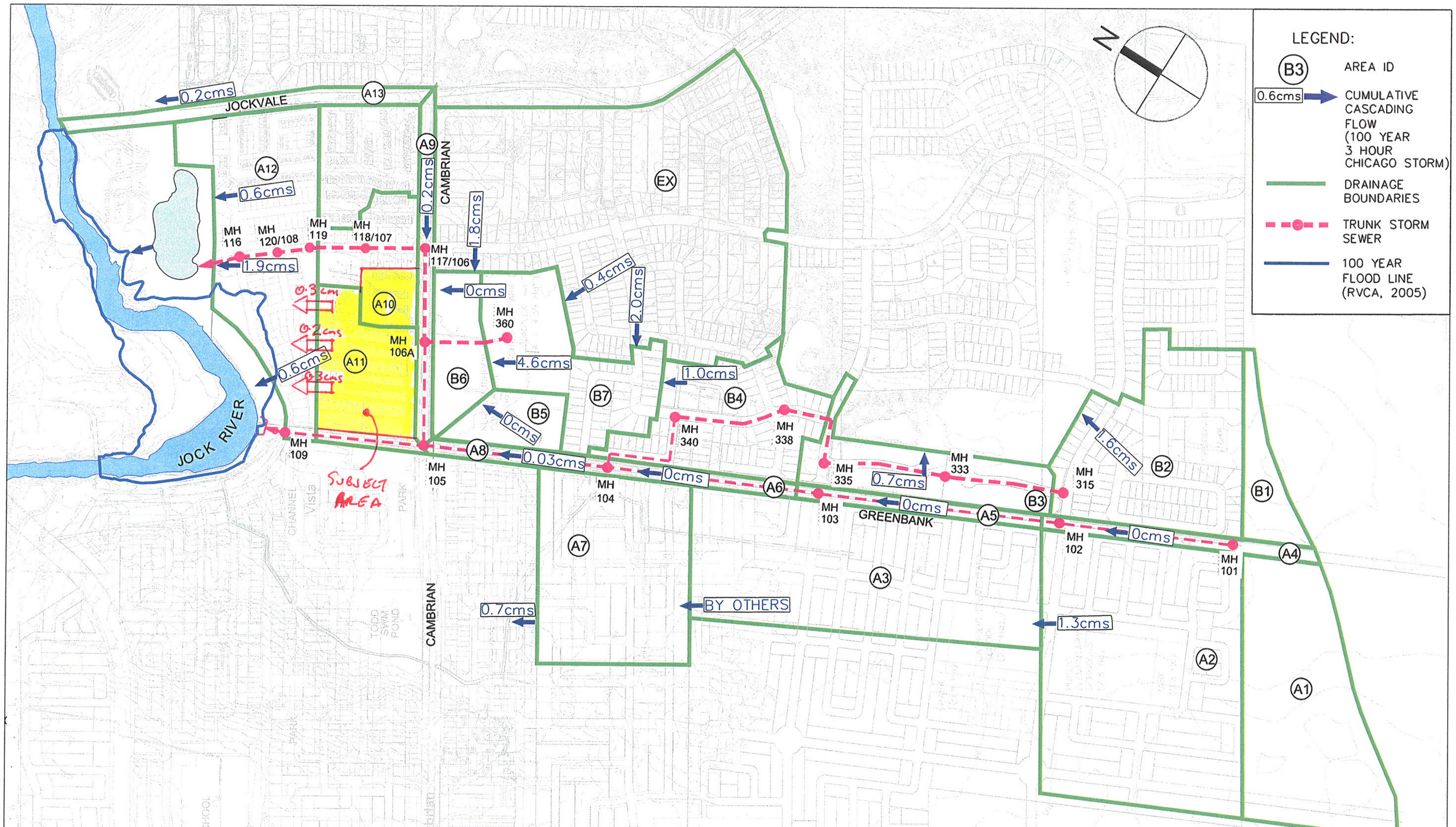
INLET RESTRICTED FLOW / AREA RESTRICTED FLOW *

STREET	FROM MH	TO MH	Type C l/s 37.0	Type A l/s 20.0	Type X l/s 13.4	INDIV. FLOW (l/s)	ACCUM. FLOW (l/s)	AREA (Ha)	INDIV. FLOW (l/s)	CUMM. FLOW (l/s)
AREA A10			Area Restricted to 85 l/s							
Caldermill West leg	103	104		1		20.00	20.00	0.25	21.25	21.25
	104	105				0.00	20.00	0.00	0.00	21.25
	105	106		1		20.00	40.00	0.19	16.15	37.40
Callisto Way	106	101		1	1	33.40	73.40	0.43	36.55	73.95
Caldermill East leg	100	101		1		20.00	20.00	0.35	29.75	29.75
Callisto Way	101	*EX 118*			1	13.40	106.80	0.13	11.05	114.75
AREA A11			Area Restricted to 5 year Flow							
Callisto Way	107	*EX 208*		4		80.00	80.00	0.68	57.80	57.80
Carina East leg	108	109	2	2		114.00	114.00	0.58	49.30	49.30
	109	*EX 211*	2	2		114.00	228.00	1.64	139.40	188.70
Carina West leg	110	111				0.00	0.00	0.00	0.00	0.00
	111	112		6		120.00	120.00	0.78	66.30	66.30
	112	113		3		60.00	180.00	0.63	53.55	119.85
	113	*EX 213*		6		120.00	300.00	0.73	62.05	181.90

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

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
2010-06-07
PROVINCE OF ONTARIO



J:\13931_CorriganSWM\5.9 Drawings\59civil\current\Servicing Figures\CIV-stmwaterbase-2007-07-25.dwg Layout Name: FIGURE 3

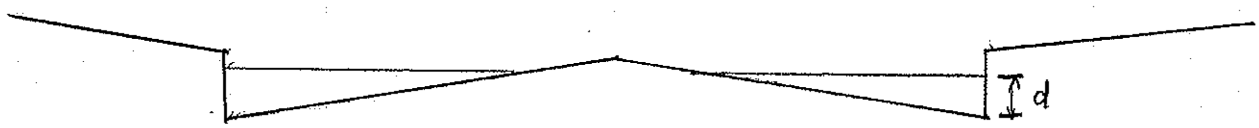
Plot Style: ---- Plot Scale: 1:1 Plotted At: Oct. 15, 08 11:10 AM Printed By: MICHEL BEAUCHEMIN Last Saved By: ---- Last Saved At: Sep. 19, 08

IBI GROUP	Scale: 1:7500	Project Title: CORRIGAN STORMWATER MANAGEMENT FACILITY	Drawing Title: DUAL DRAINAGE CASCADING FLOW	Sheet No.: FIGURE 3

IBI GROUP	PROJECT: STONEBRIDGE PHASE 10N	PROJECT NO.: 1510	SHEET: 1 OF: 1
	CLIENT: MONARCH	PREPARED BY: L.E.	DATE: 2010-05-26
	DESCRIPTION: FLOW CALCS	CHECKED BY:	OTHER:

MAJOR SYSTEM STREET FLOW

8.5m ASPHALT WIDTH, BARRIER CURB



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

CALLISTO WAY

REQUIRED FLOW = 0.30 m^3/s
LONGITUDINAL ROAD SLOPE S = 0.43 %
n = 0.016 (ROUGH ASPHALT)

FOR FLOW DEPTH d = 0.12 A = 0.48 m^2
P = 8.24 m R = 0.06

ACTUAL $Q = 1/0.016\,(0.48)(0.06)^{2/3}\sqrt{.0043} = 0.30\ m^3/s$
$V = Q/A = 0.30/0.48 = 0.62\ m/s$

$V \times d = 0.62 \times 0.12 =$ 0.07

CARINA CRESCENT EAST

REQUIRED FLOW = 0.20 m^3/s
LONGITUDINAL ROAD SLOPE S = 0.33 %

FOR FLOW DEPTH d = 0.11 Q = 0.21 m^3/s V = 0.51 m/s
$V \times d = 0.51 \times 0.11 =$ 0.06

CARINA CRESCENT WEST

REQUIRED FLOW = 0.30 m^3/s, LONGITUDINAL ROAD SLOPE = 0.37 %
FOR FLOW DEPTH d = 0.125 m Q = 0.31 m^3/s V = 0.59 m/s
$V \times d = 0.59 \times 0.125 =$ 0.07

LEGEND:

PONDING AREA

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			
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7			
6			
5			
4			
3			
2	REVISED AS PER CITY COMMENTS	LME	10:05:28
1	ISSUED FOR APPROVAL	LME	10:04:08

Monarch

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Project Title

STONEBRIDGE
PHASE 10 NORTH
STAGE 3

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
PROVINCE OF ONTARIO

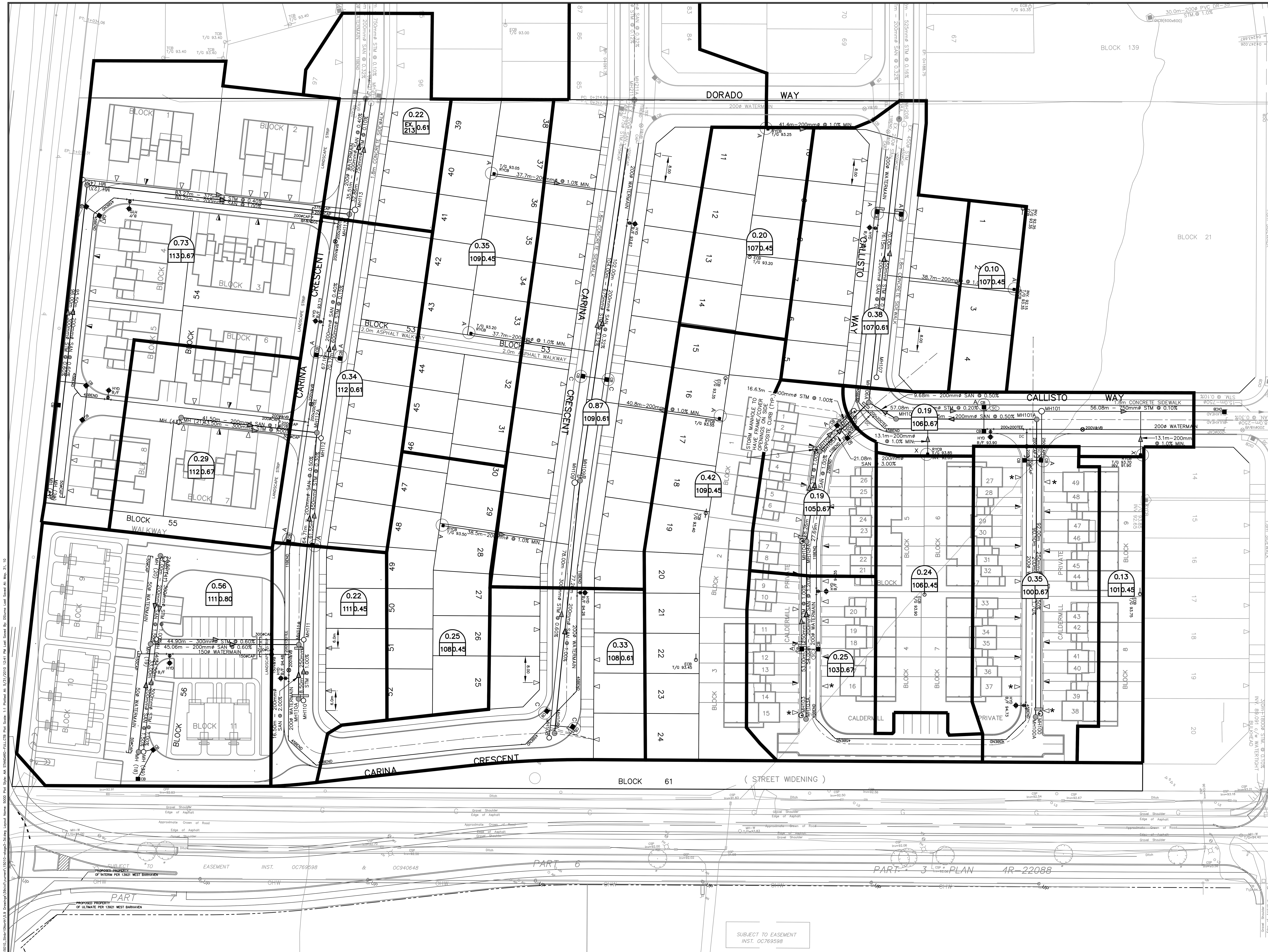
Drawing Title

PONDING PLAN

Scale

1:500

Design	Date
LME	MARCH 2010
Drawn	Checked
DPS	LME
Project No.	Drawing No.
15010	400-D



LEGEND :

- AREA IN HECTARES
- RUNOFF COEFFICIENT
- RECIEVING MH.
- MAJOR STORM DIRECTION

No.	REVISIONS	By	Date
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3			
2	REVISED PER CITY COMMENTS	LME	10:05:28
1	ISSUED FOR APPROVAL	LME	10:04:08

Monarch

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Project Title

STONEBRIDGE
PHASE 10 NORTH
STAGE 3

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
PROVINCE OF ONTARIO

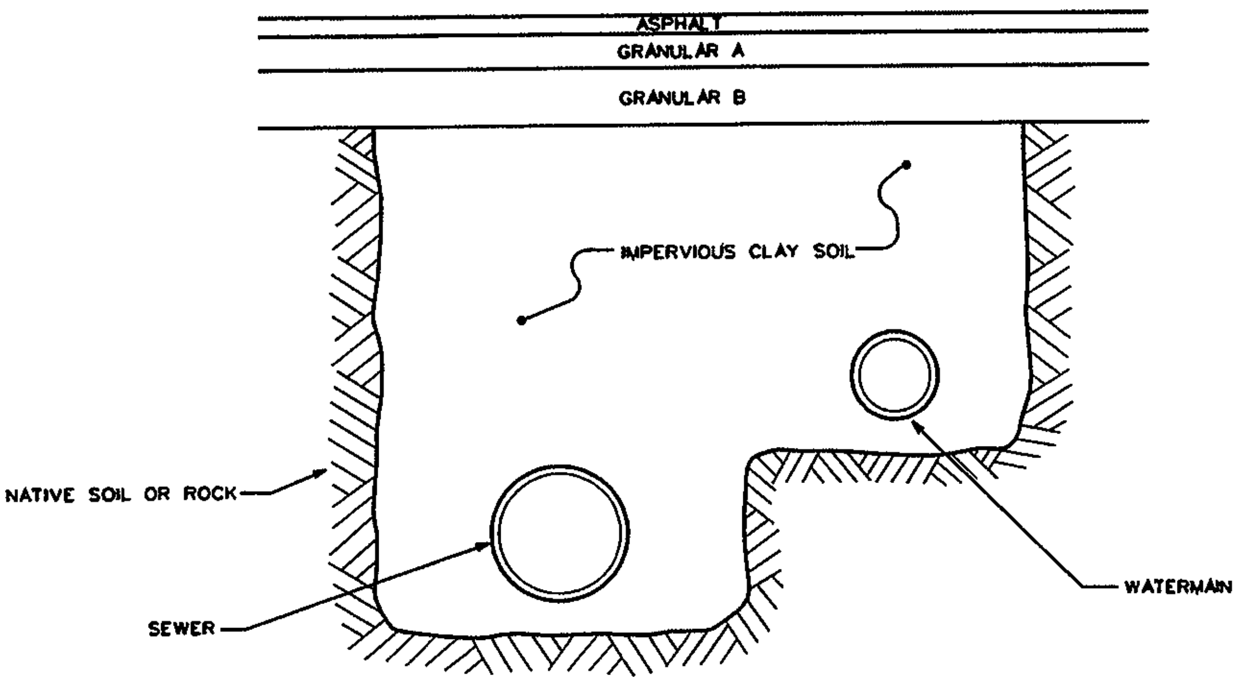
Drawing Title

STORM DRAINAGE
AREA PLAN

Scale 1:500

Design	LME	Date	MARCH 2010
Drawn	DPS	Checked	LME
Project No.	15010	Drawing No.	500-D

APPENDIX D
EROSION AND SEDIMENTATION CONTROL PLAN



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

LEGEND:

- SINGLE SERVICE LOCATION
- DOUBLE SERVICE LOCATION
- DRIVEWAY LOCATION
- STANDARD STREET CATCHBASIN
- RYCB REARYARD CB C/W TOP OF GRATE
- SC SINGLE CONNECTION BETWEEN PAIRS OF STREET CATCHBASINS
- CB WITH INLET CONTROL DEVICE
- ICD
  - TYPE A IPEX/PEDRO
  - TYPE B IPEX/PEDRO
  - TYPE C IPEX/PEDRO
  - TYPE X PEDRO
- BARRIER CURB
- MOUNTABLE CURB
- SILT FENCE AS PER OPSD-219.110
- STRAW BALE FLOW CHECK AS PER OPSD-219.180
- ROCK FLOW CHECK DAM AS PER OPSD-219.211

No.	REVISIONS	By	Date
14			
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6			
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4			
3	REVISED AS PER CITY COMMENTS	LME	10:05:28
2	ISSUED FOR APPROVAL	LME	10:04:08
1	ISSUED FOR TENDER	LME	10:03:25

Monarch

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Project Title

STONEBRIDGE
PHASE 10 NORTH
STAGE 3

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
PROVINCE OF ONTARIO

N

Drawing Title

SEDIMENT AND EROSION CONTROL PLAN

Scale: 1:500

Design	Date
LME	MARCH 2010
Drawn	Checked
DPS	LME
Project No.	Drawing No.
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