

SIDERIUS DEVELOPMENTS LTD

Union Park, Kingston, Ontario

STORMWATER MANAGEMENT REPORT

JOSELYN ENGINEERING INCORPORATED

1225 Gardiners Road Suite #105
Kingston, Ontario, K7P 0G3
(613) 634-9278

January 28, 2025.

JEI Project 792

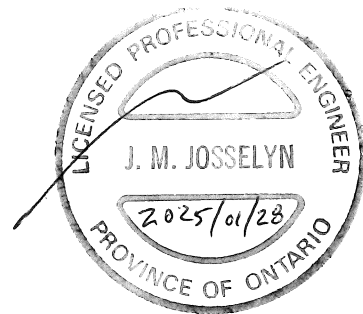


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1. Introduction

The purpose of this analysis is to review the grading and drainage requirements for the development of this site identified as Union Park, formerly the Kingston Prison for Women (P4W), and to make recommendations for the design of on-site stormwater management works to meet the requirements of the City of Kingston.

The site has been the subject of several development concepts since 2005. The P4W was constructed in circa 1934 and closed in 2000. The only remaining structures of the original facility are the former cell block and administration building noted in Appendix A as Block 2. The former prison walls have been removed, apart from the wall on the west limit of the site. The photo below shows an aerial view of the existing site.



2. Proposed Development

The proposed development will be developed as a plan of subdivision and consist of a mix of office, retail, residential, retirement home, hotel building and a park block, on five blocks created by plan of subdivision, and therefore subject to individual ownership. The blocks will be further developed through site plan approval. The blocks are identified as Blocks 1 through 8 on the Preliminary Plan of Subdivision in Appendix A. Maximum densities in accordance with zoning are as follows.

Block 1: Block 1 could consist of a residential building of up to 405 residential units with 2580 m² of retail space.

Block 2: The existing cell block, annex and administration building on Block 2 will be retained and converted to a residential condominium and be comprised of up to 50 units. Surface parking spaces on the site for Block 2 will be provided for approximately 12 vehicles and underground parking for 37 vehicles.

Block 3: Block 3 is new construction of up to 235 units.

Block 4: Block 4 will consist of up to 169 residential units, 150 hotel units and 534 m² of commercial floor area.

Block 5: Block 5 consists of a shared roadway and will be a dedicated park block comprised of approximately 4,829 square metres. Block 5 will be held and maintained by all Block owners of the subdivision.

Block 6 and 8 are municipal are road widenings, and Block 7 is a memorial garden.

3. Existing Site Conditions and Drainage

The site is located on the southwest corner of Sir John A. MacDonald Boulevard and Union Street, within the serviced area of the City of Kingston, and full municipal services are located within the general vicinity of the site. Adjacent streets are constructed to a full urban standard, with curb and gutter, concrete walks with storm sewers, sanitary sewers and municipal watermains.

The surface drainage from this 3.28ha parcel is generally from east to southwest, to the existing 375mm storm sewer on King Street. There is no external drainage tributary to this site. The existing 375mm sewer discharges to an existing 1050mm storm sewer approximately 89m downstream. Currently there is an onsite storm sewer within the parking area of the former prison building which discharges to Union Street. The existing King Street sewer and the Union Street sewer ultimately discharge to the St Lawrence River.

4. Proposed Site Drainage

The developed portion of the site shall occupy approximately 2.82ha, while the remainder of the site, 0.48 ha shall be landscaped space. At this time only the common road within Block 5 will be constructed. Drainage from the developed Blocks will be captured by the building's plumbing system and/or onsite storm sewer system and discharge to the storm sewer within Block 5 at a controlled rate. The development of these Blocks will be subject to Site Plan Approval and a separate Stormwater Management Report shall be provided prior to development. Quantity control for the common roadway in Block 5 will be compensated for as part of the onsite stormwater works provided.

The site storm sewer within Block 5 and will discharge to the existing storm sewer on King Street. The storm sewer shall be sized to convey up to 5-year event to the King Street sewer. A storm catchment area map depicting the areas tributary to each section of sewer and the corresponding storm sewer design charts are provided as Appendix C.

5. Proposed Stormwater Management Requirements

In accordance with the City of Kingston stormwater requirements, post-development runoff is to be controlled to pre-development condition.

5.1. Quantity control

In order to control post-development runoff to the required levels, controlled release and on-site storage are required. Storage volumes and release rates are calculated using the *Modified Rational Method (MRM)*. The MRM is also published in the *Regional SMP Guidelines, Water Quality partners of Ottawa-Carleton, March 2000*. The MRM is a relatively simple method of calculating storage for small sites, based on small time periods, with rainfall calculated using the rational method. For any time period within the required range, the resultant storage is calculated. The time period, which produces the highest calculation, is selected as the required storage volume.

To determine the allowable release rates the pre-development release rates during the 2, 5 and 100-year event must first be calculated using the rational method as follows.

$$Q = 0.00278CIA$$

where Q = release rate (m³/s)
C = runoff coefficient
I = Rainfall Intensity (mm/hr)
A = Drainage Area (m²)

The Rainfall Intensity Duration Frequency Values for the Kingston area have been provided by the City of Kingston as follows.

$$Intensity = a / (t + B)^C$$

2 year where $a=389.27$ 5 year where $a=551.13$ 100 year where $a=864.55$
 $B=2.798$ $B=4.592$ $B=5.077$
 $C=0.707$ $C=0.713$ $C=0.694$

It is noted that the use of the Environment Canada IDF Curves is preferred, however, the values provided in the City of Kingston Guidelines produces a more conservative intensity as demonstrated below.

15 minute Rainfall Intensities (mm/hr)		
Return Period	Environment Canada	City of Kingston
2-year	49.09	50.84
5-year	63.65	66.07
100-year	103.83	107.82

The pre-development release rates are calculated in Appendix D. As noted, the site is currently developed and has been historically developed with existing buildings and parking areas. The pre-development release rates are calculated Appendix D, and are summarized in Table 1. The pre-development drainage area is delineated on Figure 1.

Table 1 –Pre-Development Release Rates		
2 year (m³/s)	5 year (m³/s)	100 year (m³/s)
0.136	0.176	0.288

It is noted that the park area identified as part of Block 5 (0.48ha) has not been included in the pre or post development release rate calculations as this area will remain in a landscaped condition and does not require quantity or quality control. Therefore, the pre-development area has been set equal to the post-development area.

Allowable release rates

Post development flows from the individually developed Blocks within the subdivision will be required to provide on site stormwater controls in order to meet the pre development levels. The onsite controls will also provide quantity control for the common roadway so that roadway within Block 5 may drain uncontrolled.

The required controlled release rates from each of the Blocks have been calculated in Appendix D and are summarized as follows. A detailed stormwater management report and design will be required for these Blocks. The lot owner is responsible for designing and constructing stormwater management facilities in accordance with the requirements of the City of Kingston. The calculated required release rates have been calculated proportionally for each Block based on an average runoff coefficient of 0.28. As noted, the common roadway will drain uncontrolled with an assigned runoff coefficient of 0.9.

Table 2 –Required Controlled Release Rates						
Description	Area (ha)	% Site	Coefficient	2 year Controlled Rate (m³)	5 year Controlled Rate (m³)	100 year Controlled Rate (m³)
BLOCK 1	0.647	23%	0.28	0.026	0.033	0.054
BLOCK 2	0.690	25%	0.28	0.027	0.035	0.058
BLOCK 3	0.848	30%	0.28	0.034	0.044	0.071
BLOCK 4	0.361	13%	0.28	0.014	0.019	0.030
BLOCK 5	0.269	10%	0.90	0.034	0.044	0.073
Total				0.135	0.175	0.286

Flows from the controlled portion of the site shall be controlled through an appropriately sized orifice to meet pre-development release rates during the 2, 5 and the 100-year event.

As noted in Section 3, a portion of the site was tributary to the Union Street sewer by way of an onsite storm sewer within the parking area of the former prison building. In the post development condition, the controlled release from the entirety of the site will be directed to the existing Kingston Street sewer. The existing King Street sewer currently conveys drainage from the Sir John A. Boulevard right of way, an approximate area of 1.1ha. The capacity of the existing 375mm sewer is estimated as 0.37m³/s from the Discharge and Velocity Table, included as Appendix D. The flow in the existing sewer during a 5-year storm is calculated using the Rational Method as 0.120m³/s, therefore the additional flow from the site (0.175m³/s) will not exceed the capacity of the existing sewer.

5.2. Quality control

Due to the proximity of the development to the Lake Ontario an “enhanced level” of quality control is to be implemented for this site. This level of protection corresponds to the long-term average removal of 80% of suspended solids.

An oil/grit separator is proposed downstream of the developed area within Block 5. The separator shall provide 80% removal rate for the development. Typical details are provided in Appendix E.

6. Erosion and Sediment Control During Construction

In order to control the quality of storm runoff from the site during construction, the following recommendations are presented and are detailed on the Erosion and Sediment Control Plan prepared for this development.

- Silt fences (OPSD 219.110) are to be installed wherever there is a possibility of runoff from the construction site onto adjacent streets or properties. These silt fences are to be maintained during construction, and until a good growth of vegetation is obtained on all grassed areas, and until the new hard surfaced areas are constructed.
- All areas disturbed by construction are to be reinstated as soon as possible. Damage to existing vegetated areas is to be minimized by fencing the work area, to maintain construction activities to the pre-defined areas.
- Stockpiles of excavated material, or stockpiled granulars, are to be located to minimize the possibility of runoff beyond the construction zone. Silt fences may be required to contain runoff from stockpiles.

Erosion and sediment controls shall be installed prior to construction, monitored and maintained by the contractor until completion of the site works. These control measures are noted and detailed on the Erosion and Sediment Control Plan.

7. Maintenance

Maintenance can be broken down into two components – during construction and long term.

Maintenance during construction

Erosion and sediment controls shall be monitored and maintained by the contractor until completion of the site works. These control measures are shown on plans by Josselyn Engineering Inc.

Long-term maintenance

It is recommended that the oil/grit separator inspected weekly and cleaned out as required for the first year of operation or until the site is fully developed and vegetation has been established. Following the completion of construction be cleaned out at least

one time per year or when the sump is 85% full or at the end of a rainfall season in accordance with the manufacturer's recommendations.

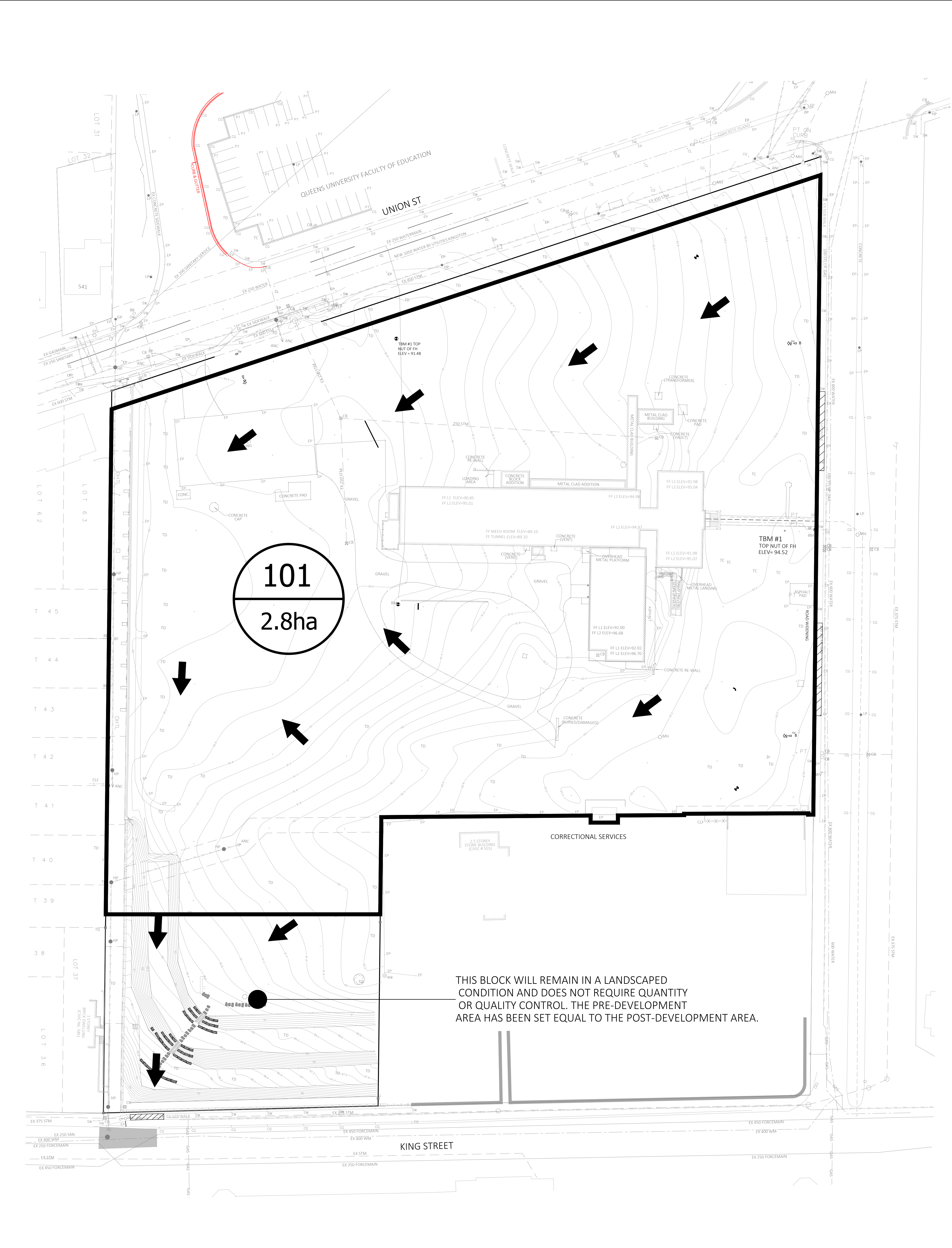
The clean out of the onsite storm sewer can be accomplished with a vactor truck, typical of normal maintenance of a storm sewer system. Regular cleaning of catchbasins and sumps is recommended, to avoid flushing sediment into the drainage course. Yearly inspections are recommended, to carry out the maintenance procedures.

8. Conclusions

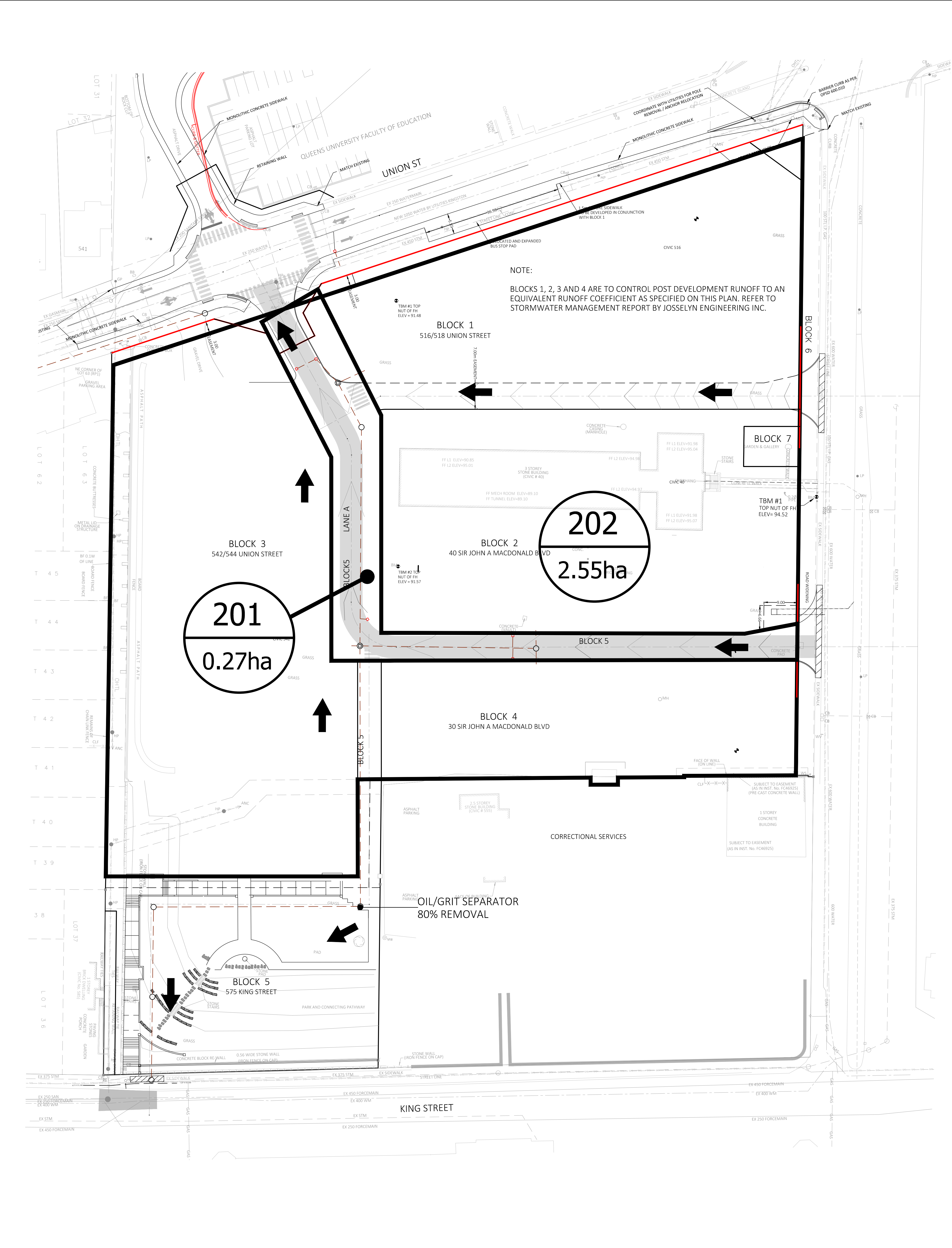
This report is to demonstrate that adequate drainage measures have been incorporated into the design of the site, to meet the requirements of the City of Kingston to control post-development runoff to pre-development levels, during the 2, 5 and 100-year events. Controlled release and on-site storage are to be provided on the individual Blocks. The development of these Blocks will be subject to Site Plan Approval and a separate Stormwater Management Report shall be provided prior to development.

A enhanced level of protection, 80% total suspended solids removal, is achieved by means of an oil/grit separator. Adequate quality control during construction can be achieved by implementing best management practices during construction, erosion and sediment controls.

Based on the above analysis, it is concluded that the servicing and grading design prepared for this development meets the criteria for Stormwater Management.



Owner: SIDERIUS DEVELOPMENTS LTD. UNION PARK		JE Josselyn Engineering Inc. 1225 GARDINERS ROAD, #105 KINGSTON, ONTARIO K7P 0G3 TEL : 613-634-9278 E-MAIL : mjosselyn@josselyn.ca		
Drawing Title: Pre Development Drainage Areas		Scale: N.T.S.		Drawing No: FIG 1
		Drawing File: 792BASE.DWG		
		Drawn By: N.B.	Checked By: M.J.	



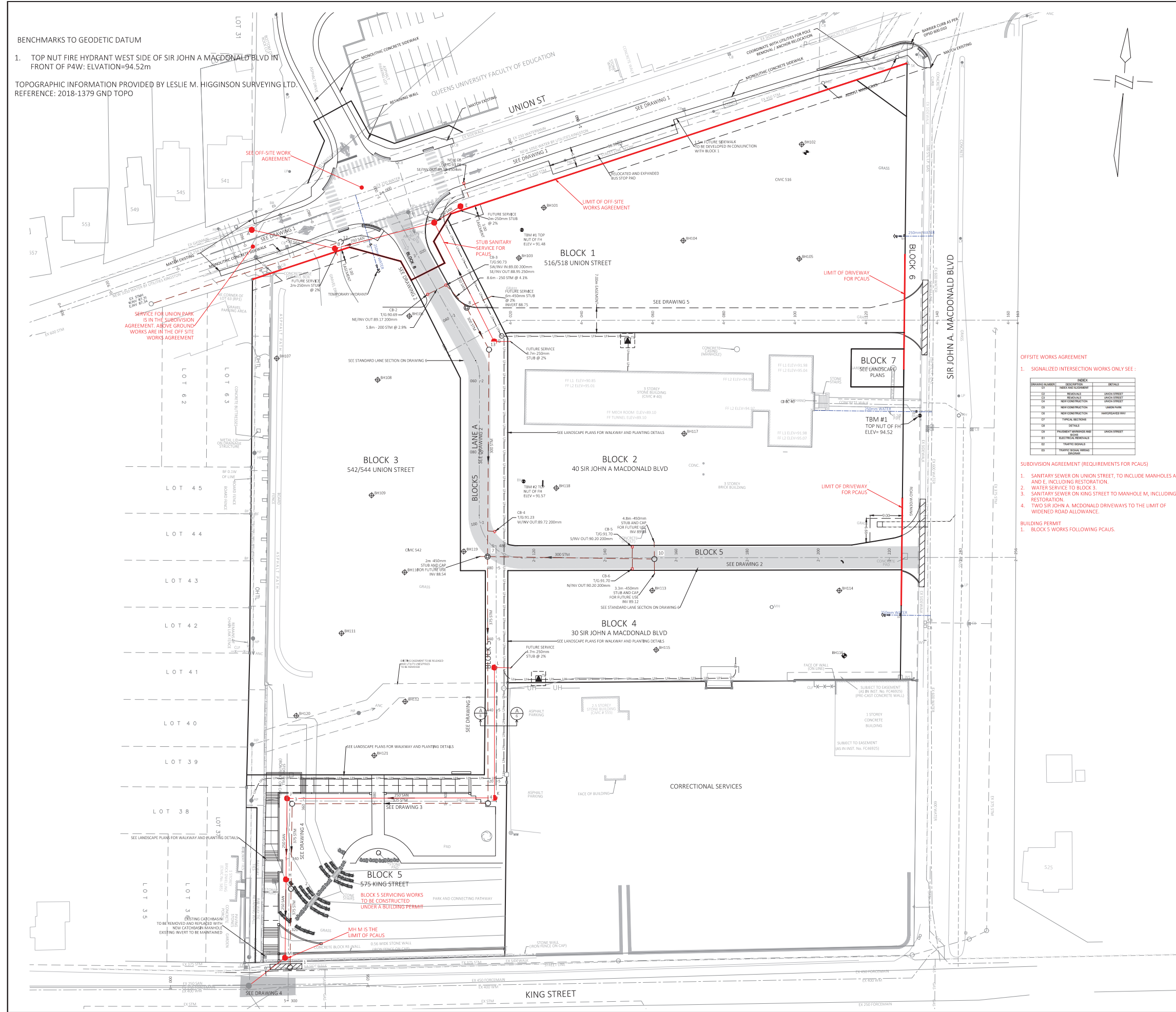
Owner: SIDERIUS DEVELOPMENTS LTD. UNION PARK		JE Josselyn Engineering Inc. 1225 GARDINERS ROAD, #105 KINGSTON, ONTARIO K7P 0G3 TEL : 613-634-9278 E-MAIL : mjosselyn@josselyn.ca		
Drawing Title: Post Development Drainage Areas		Scale: N.T.S.		Drawing No: FIG 2
		Drawing File: 792BASE.DWG		
		Drawn By: N.B.	Checked By: M.J.	

APPENDIX A

Preliminary Plan of Subdivision
General Plan

BENCHMARKS TO GEODETIC DATUM

1. TOP NUT FIRE HYDRANT WEST SIDE OF SIR JOHN A MACDONALD BLVD IN FRONT OF P4W: ELVATION=94.52m
- TOPOGRAPHIC INFORMATION PROVIDED BY LESLIE M. HIGGINSON SURVEYING LTD.
REFERENCE: 2018-1379 GND TOPO



KEY PLAN

LEGEND	EXISTING	PROPOSED
PAVEMENT		
CONCRETE CURB TYPE		
DITCH		
STORM SEWER & MANHOLE WITH DIRECTION OF FLOW		
SAN. SEWER & MANHOLE WITH DIRECTION OF FLOW		
WATERMAIN AND VALVE		
GAS METER LOCATION		
GAS MAIN		
HYDRO (UNDERGROUND)		
HYDRO (OVER HEAD)		
SINGLE CATCH BASIN		
DITCH INLET CATCH BASIN		
TWIN INLET CATCH BASIN		
CATCH BASIN MANHOLE		
HYDRANT & VALVE BOX		
BELL UTILITY POLE & ANCHOR		
HYDRO UTILITY POLE & ANCHOR		
STREET LIGHT		
TREES		
PROPERTY BOUNDARY		
EASEMENT		
FENCE		
SALT FENCE		
BENCH MARK LOCATION		
EXISTING GRADE		
PROPOSED GRADE		
DOOR		
HEAVY DUTY ASPHALT		
LIGHT DUTY ASPHALT		
CONCRETE		
TEST PIT LOCATION		
CHANNEL GRADE LEVEL BOX (BELL CANADA) 30w x 48 x 24 ft		

OFFSITE WORKS AGREEMENT

1. SIGNALIZED INTERSECTION WORKS ONLY SEE :

DRAWING NUMBER	DESCRIPTION	INDEX	DETAILS
01	TRUCK AND EQUIPMENT	UNION STREET	
02	REPAIRS	UNION STREET	
03	NEW CONSTRUCTION	UNION STREET	
04	NEW CONSTRUCTION	UNION STREET	
05	NEW CONSTRUCTION	UNION STREET	
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100	NEW CONSTRUCTION	UNION STREET	

SUBDIVISION AGREEMENT (REQUIREMENTS FOR PCAUS)

1. SANITARY SEWER ON UNION STREET, TO INCLUDE MANHOLES A,B,C AND E, INCLUDING RESTORATION.
2. WATER SERVICE TO BLOCK 5
3. SANITARY SEWER ON KING STREET TO MANHOLE M, INCLUDING RESTORATION.
4. TWO SIR JOHN A. MACDONALD DRIVEWAYS TO THE LIMIT OF WIDENED ROAD ALLOWANCE.

BUILDING PERMIT

1. BLOCK 5 WORKS FOLLOWING PCAUS.

Josselyn Engineering Inc.

1225 GARDINERS ROAD, #105
KINGSTON, ONTARIO K7P 0G3
TEL : 613-634-9278
E-MAIL : mjosselyn@josselyn.ca

OWNER:		SIDERIUS DEVELOPMENTS LTD.	
PROJECT:		UNION PARK	
DRAWING TITLE:		GENERAL PLAN OF SERVICES	
Designed By: M.J.	Date: MARCH 10, 2023.	Project No. 792	Drawing No. G1
Drawn By: N.B.	Scale: 1:500		
Checked By: M.J.			



1224 GARDINERS ROAD, SUITE 102
KINGSTON, ONTARIO K7P 0G2

APPENDIX B

Topographic Survey

LESLIE M. HIGGINSON SURVEYING Ltd.

2018

THIS REPORT WAS PREPARED FOR
DOORNEKAMP CONSTRUCTION Ltd. & THE
UNDERSIGNED ACCEPTS NO RESPONSIBILITY
FOR USE BY OTHER PARTIES

[illegible]

BEARINGS SHOWN HEREON ARE GRID BEARINGS REFERRED TO THE CENTRAL MERIDIAN, 75° WEST, ZONE 18, OF NAD 83 (1989 ADJUSTMENT), 6° UTM COORDINATE SYSTEM (GRS80 ELLIPSOID) AND ARE DERIVED FROM HORIZONTAL CONTROL MONUMENTS 0101990201, 00819680616 & 01019840003. COMPARISONS SHOWN IN BRACKETS ARE TO ASTRONOMIC BEARINGS.

NAD 83 UTM COORDINATES (ZONE 18)		
POINT No.	NORTHING (M)	EASTING (M)
01019900201	4897364.995	375546.430
00819680616	4908651.683	393861.806
01019840003	4904874.771	394057.750

ALL DISTANCES SHOWN HEREON ARE HORIZONTAL GROUND DISTANCES.

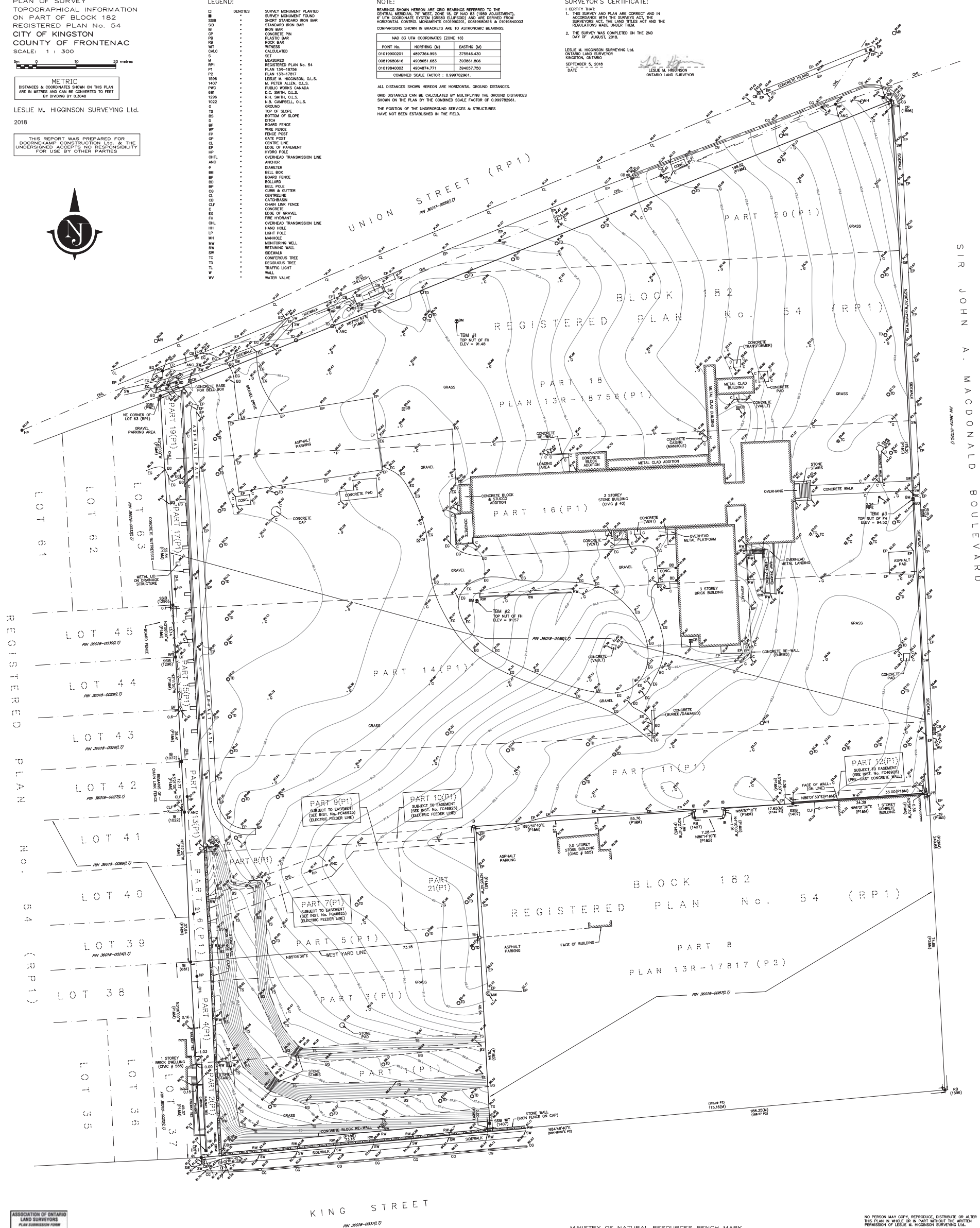
GRID DISTANCES CAN BE CALCULATED BY MULTIPLYING THE GROUND DISTANCE SHOWN ON THE PLAN BY THE COMBINED SCALE FACTOR OF 0.999782961.

THE POSITION OF THE UNDERGROUND SERVICES & STRUCTURES HAVE NOT BEEN ESTABLISHED IN THE FIELD.

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 2ND DAY OF AUGUST, 2018.

LESLIE M. HIGGINSON SURVEYING Ltd.
ONTARIO LAND SURVEYOR
KINGSTON, ONTARIO
SEPTEMBER 5, 2018
DATE



ASSOCIATION OF ONTARIO
LAND SURVEYORS
PLAN SUBMISSION FORM
2056924



THIS PLAN IS NOT VALID
UNLESS IT IS AN EMBOSSED
ORIGINAL COPY
ISSUED BY THE SURVEYOR
in accordance with
Regulation 1026, Section 29(3)

MINISTRY OF NATURAL RESOURCES BENCH MARK

B.M. No. 0011975U501
TABLET IN TOP OF CONCRETE WALL, ALONG WEST SIDE OF MARINA
AT NORTH SIDE OF OLYMPIC COMPLEX, SOUTH SIDE OF KING STREET,
JUST EAST OF YONGE STREET, 1.98M SOUTH OF NORTH END,
30CM FROM EAST & WEST EDGES, SLIGHTLY ABOVE PAVED PARKING LOT LEVEL.
ELEVATION = 75.99

NO PERSON MAY COPY, REPRODUCE, DISTRIBUTE OR ALTER
THIS PLAN IN WHOLE OR IN PART WITHOUT THE WRITTEN
PERMISSION OF LESLIE M. HIGGINSON SURVEYING Ltd.,

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LESLIE M. HIGGINSON O.J.S. 2018

DATED SEPTEMBER 5, 2018

LESLIE M. HIGGINSON SURVEYING Ltd. 1064 GARDINERS ROAD KINGSTON, ONTARIO K7P 1R7 (613) 389-7986 (FAX) 389-5578 or leslie@mhhigginson.com	
FILE: CITY R.P. 54, BLOCK 182	LMH1379GN

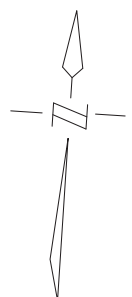
THIS IS NOT AN ORIGINAL COPY UNLESS EMBOSSED WITH A SEAL.

APPENDIX C

Storm Sewer Design Chart

1. TOP NUT FIRE HYDRANT WEST SIDE OF SIR JOHN A MACDONALD BLVD IN
FRONT OF P4W: ELVATION=94.52m

TOPOGRAPHIC INFORMATION PROVIDED BY LESLIE M. HIGGINSON SURVEYING LTD.
REFERENCE: 2018-1379 GND TOPO



BLOCKS 1, 2, 3 AND 4 ARE TO CONTROL POST DEVELOPMENT RUNOFF TO AN EQUIVALENT RUNOFF COEFFICIENT AS SPECIFIED ON THIS PLAN. REFER TO STORMWATER MANAGEMENT REPORT BY JOSSELYN ENGINEERING INC.

X DENOTES DRAINAGE AREA IDENTIFIER NUMBER
Y DENOTES RUNOFF COEFFICIENT
*Y DENOTES REQUIRED CONTROLLED RUNOFF COEFFICIENT
Z DENOTES DRAINAGE AREA (HECTARES)

 O^{KF}

300mm — STORM SEWER SHOWING
DIRECTION OF FLOW
AND DIAMETER

EX

DENOTES EXISTING

DRAINAGE AREA BOUNDARY

3	C8	MAY 9, 2024	REVISED FOR SUBDIVISION AGREEMENT AND OFF-SITE WORK AGREEMENT	M1
7	N6	AUGUST 16, 2023	ISSUED FOR FINAL PLAN APPROVAL	M1
8	N6	JUNE 29, 2023	REVISED ALPINE CITY COMMENTS	M1
No.	Ry	Date	Revision:	Checked



.\stamp.tif

**1225 GARDINERS ROAD, #105
KINGSTON, ONTARIO K7P 0G3
TEL : 613-634-9278
E-MAIL : mjosselyn@josselyn.ca**

OWNER: SIDERIUS DEVELOPMENTS LTD.

PROJECT:	UNION PARK
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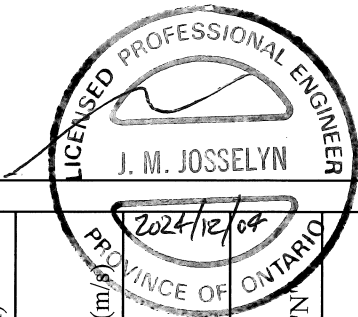
DRAWING TITLE:

STORM DRAINAGE AREA MAP

Designed By: M.J.	Date: MARCH 10, 2023.	Project No. 792	Drawing No. ST
Drawn By: N.B.			
Checked By: M.J.	Scale: 1:500		

Union Park
Storm Sewer Design Calculations
Date : December 3, 2024

intensity from City of Kingston 5-year IDF curve $I = 1778/(t+13)$



Description				Quantity								Sewer Design									
FROM M.H.	INVERT (m)	TO M.H.	INVERT (m)	AREA (ha.)	C	C*A	ACCUM. C*A	TIME (min)	INTENSITY mm/hr	Sub-basin ID	FLOW (m3/s)	GRADE (%)	PIPE Diameter (mm)	CAPACITY (m3/S)	LENGTH (M)	VELOCITY (m/s)	TIME (MIN)	MANNING "N"	Percent full	Time at end of pipe	
STMH-8	88.560	STMH-13	88.42	0.14	0.90	0.126	0.302	15.00	63.50	7	0.053	1.04	300	0.099	13.4	1.40	0.16	0.013	54.0%	15.16	
				0.63	0.28	0.176				1											
STMH-13	88.370	STMH-7	87.78	0.05	0.90	0.045	0.347	15.00	63.50	6	0.061	1.01	300	0.097	58.2	1.38	0.70	0.013	62.6%	15.86	
				0.66	0.28	0.185		15.16	63.14	2											
STMH-10	88.250	STMH-7	87.78	0.06	0.90	0.054	0.337	15.00	63.50	5	0.058	1.00	300	0.097	46.9	1.37	0.57	0.013	59.6%	16.43	
				0.35	0.28	0.098		15.86	61.60	4											
STMH-7	87.700	STMH-4	86.32	0.81	0.38	0.000	0.684	15.00	63.50	3	0.121	1.99	375	0.247	69.4	2.24	0.52	0.013	48.8%	15.52	
						0.000		15.00	63.50	4											
STMH-4	86.270	STMH-3	85.70	0.00	0.000	0.000	0.684	15.00	63.50		0.121	1.04	375	0.179	55.0	1.62	0.57	0.013	67.6%	15.57	
				0.38				15.00	63.50												
STMH-3	85.650	STMH-2	83.74	0.00	0.000	0.000	0.684	15.00	63.50		0.115	7.99	375	0.496	23.9	4.49	0.09	0.013	23.2%	16.52	
				0.00				16.43	60.41												
STMH-2	82.740	STMH-1	81.00	0.00	0.000	0.000	0.684	15.00	63.50		0.115	7.98	375	0.496	21.8	4.49	0.08	0.013	23.1%	16.60	
				0.00				16.52	60.22												

Note: Residential Blocks require on-site controls to achieve the prescribed runoff coefficient used in these calculations. Refer to Stormwater Management Report by Josselyn Engineering Inc.

APPENDIX D

Stormwater Calculations

Release Rates

Pre Development Release Rates										
Description	area (A) m ²	area (A) ha	% of Site	coefficient (C)	C x A(m ²)	tc (min)	2 year		5 year	
							intensity (mm/hr)	Release Rate (m ³ /s)	intensity (mm/hr)	Release Rate (m ³ /s)
Undeveloped property	28150	2.82	100%	0.25	7037.53	15	50.84	0.099	66.07	0.129
Total	28150	2.82		0.25	7037.53			0.099		0.129

Pre Development Release Rates										
Description	area (A) m ²	area (A) ha	% of Site	coefficient (C)	C x A(m ²)	tc (min)	2 year		5 year	
							intensity (mm/hr)	Release Rate (m ³ /s)	intensity (mm/hr)	Release Rate (m ³ /s)
Building	2164	0.22	8%	0.90	1947.51	15	50.84	0.028	66.07	0.036
Gravel	1210	0.12	4%	0.70	847.00	15	50.84	0.012	66.07	0.016
Asphalt	932.8	0.09	3%	0.90	839.52	15	50.84	0.012	66.07	0.015
Landscape	23843	2.38	85%	0.25	5960.83	15	50.84	0.084	66.07	0.109
Total	28150	2.82	100%	0.34	9594.86			0.136		0.176

Required Controlled Release Rates										
Description	area (A) m ²	area (A) ha	% of Site	coefficient (C)	C x A(m ²)	tc (min)	2 year		5 year	
							intensity (mm/hr)	Release Rate (m ³ /s)	intensity (mm/hr)	Release Rate (m ³ /s)
BLOCK 1	6467.2	0.65	23%	0.28	1810.82	15	50.84	0.026	66.07	0.033
BLOCK 2	6902.1	0.69	25%	0.28	1932.59	15	50.84	0.027	66.07	0.035
BLOCK 3	8481.2	0.85	30%	0.28	2374.74	15	50.84	0.034	66.07	0.044
BLOCK 4	3608.7	0.36	13%	0.28	1010.44	15	50.84	0.014	66.07	0.019
BLOCK 5	2690.9	0.27	10%	0.90	2421.81	15	50.84	0.034	66.07	0.044
Total	28150	2.82		0.34	9550.39			0.135		0.175

King Street Sewer

Post Development Release Rates											
Description	area (A) m ²	area (A) ha	coefficient (C)	C x A(m ²)	tc (min)	2 year		5 year		100 year	
						intensity (mm/hr)	Rate (m ³ /s)	intensity (mm/hr)	Rate (m ³ /s)	intensity (mm/hr)	Rate (m ³ /s)*
375mm Storm Sewer	11000.00	1.10	0.70	7700.00	20	42.68	0.091	56.18	0.120	92.40	0.249
Total	11000	1.10	0.70	7700.00			0.091		0.120		0.249

* Note: Runoff coefficients have been increased by 25% to a maximum of 0.95

Discharge & Velocity Table

Q in litres per second
V in metres per second

n= 0.013																		
% GRADE	150		200		250		300		375		450		525		600		% GRADE	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V		
8.00	43.1	2.44	92.8	2.95	168.3	3.43	273.6	3.87	496.1	4.49	806.8	5.07	1217.0	5.62	1737.5	6.14	8.00	
7.50	41.7	2.36	89.9	2.86	162.9	3.32	264.9	3.75	480.4	4.35	781.2	4.91	1178.3	5.44	1682.3	5.95	7.50	
7.00	40.3	2.28	86.8	2.76	157.4	3.21	256.0	3.62	464.1	4.20	754.7	4.74	1138.4	5.26	1625.3	5.75	7.00	
6.50	38.8	2.20	83.7	2.66	151.7	3.09	246.7	3.49	447.2	4.05	727.2	4.57	1097.0	5.07	1566.2	5.54	6.50	
6.00	37.3	2.11	80.4	2.56	145.7	2.97	237.0	3.35	429.7	3.89	698.7	4.39	1053.9	4.87	1504.7	5.32	6.00	
5.50	35.7	2.02	77.0	2.45	139.5	2.84	226.9	3.21	411.4	3.72	668.9	4.20	1009.1	4.66	1440.7	5.09	5.50	
5.00	34.1	1.93	73.4	2.33	133.0	2.71	216.3	3.06	392.2	3.55	637.8	4.01	962.1	4.44	1373.6	4.86	5.00	
4.50	32.3	1.83	69.6	2.21	126.2	2.57	205.2	2.90	372.1	3.37	605.1	3.80	912.7	4.21	1303.1	4.61	4.50	
4.00	30.5	1.72	65.6	2.09	119.0	2.42	193.5	2.74	350.8	3.18	570.5	3.59	860.5	3.97	1228.6	4.34	4.00	
3.50	28.5	1.61	61.4	1.95	111.3	2.27	181.0	2.56	328.2	2.97	533.6	3.35	804.9	3.72	1149.2	4.06	3.50	
3.00	26.4	1.49	56.8	1.81	103.0	2.10	167.6	2.37	303.8	2.75	494.0	3.11	745.2	3.44	1064.0	3.76	3.00	
2.50	24.1	1.36	51.9	1.65	94.1	1.92	153.0	2.16	277.4	2.51	451.0	2.83	680.3	3.14	971.3	3.43	2.50	
2.00	21.5	1.22	46.4	1.48	84.1	1.71	136.8	1.93	248.1	2.25	403.4	2.54	608.5	2.81	868.7	3.07	2.00	
1.80	20.4	1.16	44.0	1.40	79.8	1.63	129.8	1.84	235.3	2.13	382.7	2.41	577.3	2.67	824.2	2.91	1.80	
1.60	19.3	1.09	41.5	1.32	75.3	1.53	122.4	1.73	221.9	2.01	360.8	2.27	544.2	2.51	777.0	2.75	1.60	
1.50	18.7	1.06	40.2	1.28	72.9	1.48	118.5	1.68	214.8	1.94	349.3	2.20	527.0	2.43	752.4	2.66	1.50	
1.40	18.0	1.02	38.8	1.24	70.4	1.43	114.5	1.62	207.5	1.88	337.5	2.12	509.1	2.35	726.8	2.57	1.40	
1.30	17.4	0.98	37.4	1.19	67.8	1.38	110.3	1.56	200.0	1.81	325.2	2.04	490.6	2.27	700.4	2.48	1.30	
1.20	16.7	0.94	35.9	1.14	65.2	1.33	106.0	1.50	192.2	1.74	312.5	1.96	471.3	2.18	672.9	2.38	1.20	
1.10	16.0	0.90	34.4	1.10	62.4	1.27	101.5	1.43	184.0	1.67	299.2	1.88	451.3	2.08	644.3	2.28	1.10	
1.00	15.2	0.86	32.8	1.04	59.5	1.21	96.7	1.37	175.4	1.59	285.2	1.79	430.3	1.99	614.3	2.17	1.00	
0.95	14.9	0.84	32.0	1.02	58.0	1.18	94.3	1.33	171.0	1.55	278.0	1.75	419.4	1.94	598.7	2.12	0.95	
0.90	14.5	0.82	31.1	0.99	56.4	1.15	91.8	1.30	166.4	1.51	270.6	1.70	408.2	1.88	582.8	2.06	0.90	
0.85	14.0	0.79	30.3	0.96	54.9	1.12	89.2	1.26	161.7	1.46	263.0	1.65	396.7	1.83	566.4	2.00	0.85	
0.80	13.6	0.77	29.3	0.93	53.2	1.08	86.5	1.22	156.9	1.42	255.1	1.60	384.8	1.78	549.4	1.94	0.80	
0.75	13.2	0.75	28.4	0.90	51.5	1.05	83.8	1.18	151.9	1.37	247.0	1.55	372.6	1.72	532.0	1.88	0.75	
0.70	12.7	0.72	27.5	0.87	49.8	1.01	80.9	1.14	146.8	1.33	238.6	1.50	360.0	1.66	514.0	1.82	0.70	
0.68	12.6	0.71	27.1	0.86	49.1	1.00	79.8	1.13	144.6	1.31	235.2	1.48	354.8	1.64	506.6	1.79	0.68	
0.66	12.4	0.70	26.7	0.85	48.3	0.98	78.6	1.11	142.5	1.29	231.7	1.46	349.5	1.61	499.1	1.76	0.66	
0.64	12.2	0.69	26.3	0.84	47.6	0.97	77.4	1.09	140.3	1.27	228.2	1.43	344.2	1.59	491.4	1.74	0.64	
0.62	12.0	0.68	25.8	0.82	46.8	0.95	76.2	1.08	138.1	1.25	224.6	1.41	338.8	1.56	483.7	1.71	0.62	
0.60	11.8	0.67	25.4	0.81	46.1	0.94	74.9	1.06	135.9	1.23	220.9	1.39	333.3	1.54	475.8	1.68	0.60	
0.58	11.6	0.66	25.0	0.80	45.3	0.92	73.7	1.04	133.6	1.21	217.2	1.37	327.7	1.51	467.8	1.65	0.58	
0.56	11.4	0.64	24.6	0.78	44.5	0.91	72.4	1.02	131.3	1.19	213.5	1.34	322.0	1.49	459.7	1.63	0.56	
0.54	11.2	0.63	24.1	0.77	43.7	0.89	71.1	1.01	128.9	1.17	209.6	1.32	316.2	1.46	451.4	1.60	0.54	
0.52	11.0	0.62	23.7	0.75	42.9	0.87	69.8	0.99	126.5	1.14	205.7	1.29	310.3	1.43	443.0	1.57	0.52	
0.50	10.8	0.61	23.2	0.74	42.1	0.86	68.4	0.97	124.0	1.12	201.7	1.27	304.2	1.40	434.4	1.54	0.50	
0.48	10.6	0.60	22.7	0.72	41.2	0.84	67.0	0.95	121.5	1.10	197.6	1.24	298.1	1.38	425.6	1.50	0.48	
0.46	10.3	0.58	22.3	0.71	40.4	0.82	65.6	0.93	119.0	1.08	193.5	1.22	291.8	1.35	416.6	1.47	0.46	
0.44	10.1	0.57	21.8	0.69	39.5	0.80	64.2	0.91	116.4	1.05	189.2	1.19	285.4	1.32	407.5	1.44	0.44	
0.42	9.9	0.56	21.3	0.68	38.6	0.79	62.7	0.89	113.7	1.03	184.9	1.16	278.8	1.29	398.1	1.41	0.42	
0.40	9.6	0.55	20.8	0.66	37.6	0.77	61.2	0.87	110.9	1.00	180.4	1.13	272.1	1.26	388.5	1.37	0.40	
0.35	9.0	0.51	19.4	0.62	35.2	0.72	57.2	0.81	103.8	0.94	168.7	1.06	254.5	1.18	363.4	1.28	0.35	
0.30	8.3	0.47	18.0	0.57	32.6	0.66	53.0	0.75	96.1	0.87	156.2	0.98	235.7	1.09	336.5	1.19	0.30	
0.25	7.6	0.43	16.4	0.52	29.7	0.61	48.4	0.68	87.7	0.79	142.6	0.90	215.1	0.99	307.1	1.09	0.25	
0.22	7.1	0.40	15.4	0.49	27.9	0.57	45.4	0.64	82.3	0.74	133.8	0.84	201.8	0.93	288.1	1.02	0.22	
0.20	6.8	0.39	14.7	0.47	26.6	0.54	43.3	0.61	78.4	0.71	127.6	0.80	192.4	0.89	274.7	0.97	0.20	
0.18	6.5	0.37	13.9	0.44	25.2	0.51	41.0	0.58	74.4	0.67	121.0	0.76	182.5	0.84	260.6	0.92	0.18	
0.15	5.9	0.33	12.7	0.40	23.0	0.47	37.5	0.53	67.9	0.61	110.5	0.69	166.6	0.77	237.9	0.84	0.15	
0.12	5.3	0.30	11.4	0.36	20.6	0.42	33.5	0.47	60.8	0.55	98.8	0.62	149.0	0.69	212.8	0.75	0.12	
0.10	4.8	0.27	10.4	0.33	18.8	0.38	30.6	0.43	55.5	0.50	90.2	0.57	136.1	0.63	194.3	0.69	0.10	
0.08	4.3	0.24	9.3	0.30	16.8	0.34	27.4	0.39	49.6	0.45	80.7	0.51	121.7	0.56	173.7	0.61	0.08	

APPENDIX E

Oil Grit Separator Typical Details



**CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION**



Project Name: 40 Sir John A Macdonald Blvd
Location: Kingston, ON
OGS #: 1

Engineer: Josselyn Engineering
Contact: Nadine Berry
Report Date: 9-Mar-23

Area 2.800 ha
Weighted C 0.70
CDS Model 3025

Rainfall Station # 214
Particle Size Distribution FINE
CDS Treatment Capacity 68 l/s

<u>Rainfall Intensity¹</u> <u>(mm/hr)</u>	<u>Percent Rainfall Volume¹</u>	<u>Cumulative Rainfall Volume</u>	<u>Total Flowrate (l/s)</u>	<u>Treated Flowrate (l/s)</u>	<u>Operating Rate (%)</u>	<u>Removal Efficiency (%)</u>	<u>Incremental Removal (%)</u>
1.0	10.8%	20.7%	5.4	5.4	8.0	96.6	10.4
1.5	10.1%	30.8%	8.2	8.2	12.0	95.4	9.7
2.0	9.1%	39.9%	10.9	10.9	16.0	94.3	8.6
2.5	7.0%	46.9%	13.6	13.6	20.0	93.1	6.6
3.0	6.9%	53.9%	16.3	16.3	24.1	92.0	6.4
3.5	4.5%	58.4%	19.1	19.1	28.1	90.8	4.1
4.0	4.5%	62.9%	21.8	21.8	32.1	89.7	4.0
4.5	4.1%	67.0%	24.5	24.5	36.1	88.5	3.6
5.0	3.8%	70.8%	27.2	27.2	40.1	87.4	3.4
6.0	5.7%	76.5%	32.7	32.7	48.1	85.1	4.8
7.0	4.5%	81.0%	38.1	38.1	56.1	82.8	3.7
8.0	3.6%	84.5%	43.6	43.6	64.1	80.5	2.9
9.0	2.3%	86.8%	49.0	49.0	72.2	78.2	1.8
10.0	1.9%	88.7%	54.5	54.5	80.2	75.9	1.4
15.0	6.1%	94.8%	81.7	68.0	100.0	58.4	3.6
20.0	2.6%	97.5%	109.0	68.0	100.0	43.8	1.1
25.0	2.0%	99.4%	136.2	68.0	100.0	35.0	0.7
30.0	0.4%	99.9%	163.5	68.0	100.0	29.2	0.1
35.0	0.1%	100.0%	190.7	68.0	100.0	25.0	0.0
40.0	0.0%	100.0%	218.0	68.0	100.0	21.9	0.0
45.0	0.0%	100.0%	245.2	68.0	100.0	19.5	0.0
50.0	0.0%	100.0%	272.4	68.0	100.0	17.5	0.0

86.6

Removal Efficiency Adjustment² = 6.5%

Predicted Net Annual Load Removal Efficiency = 80.1%

Predicted Annual Rainfall Treated = 96.6%

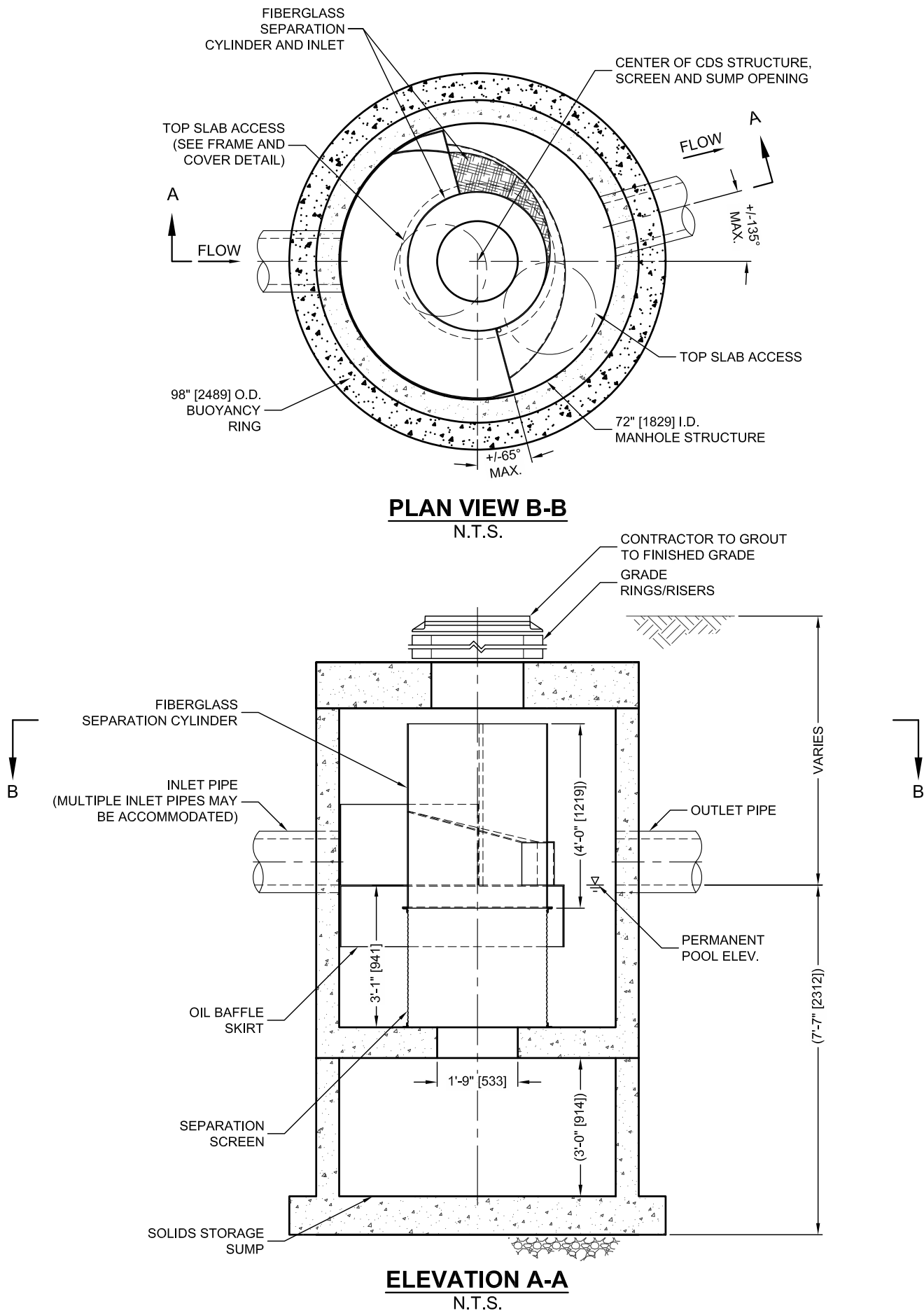
1 - Based on 44 years of hourly rainfall data from Canadian Station 6104175, Kingston ON

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

3 - CDS Efficiency based on testing conducted at the University of Central Florida

4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

Z:\4.0 MANUFACTURERS\CONTECH PRODUCT INFO\TREATMENT\CDSDRAWINGS ECHELOMIN LINE-PDF\2022 - PMSU UPDATED CONTECH DRAWINGS - HUD\6\CD3025-6-C-DTL.DWG 6/3/2022 10:07 AM

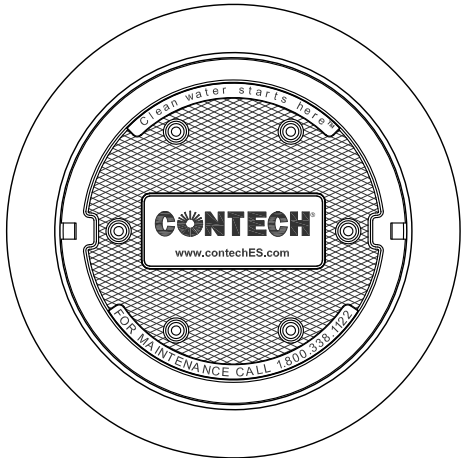


CDS PMSU3025-6-C DESIGN NOTES

THE STANDARD CDS PMSU3025-6-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION

- GRATED INLET ONLY (NO INLET PIPE)
- GRATED INLET WITH INLET PIPE OR PIPES
- CURB INLET ONLY (NO INLET PIPE)
- CURB INLET WITH INLET PIPE OR PIPES
- CUSTOMIZABLE SUMP DEPTH AVAILABLE
- ANTI-FLOTATION DESIGN AVAILABLE UPON REQUEST



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)			*
PEAK FLOW RATE (CFS OR L/s)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
SCREEN APERTURE (2400 OR 4700)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*
NOTES/SPECIAL REQUIREMENTS:			
* PER ENGINEER OF RECORD			

GENERAL NOTES

- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- DIMENSIONS MARKED WITH () ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
- FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
- CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
- STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
- PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES

- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
- CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
- CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

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