NOVATECH

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- Municipal Infrastructure
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- Traffic/ Transportation
- Recreational

Planning

- Land/Site Development
- Planning Application Management
- Municipal Planning
- Urban Design
- Expert Witness (LPAT)
- Wireless Industry

Landscape Architecture

- Streetscapes & Public Amenities
- Open Space, Parks & Recreation
- Community & Residential
- Commercial & Institutional
- Environmental Restoration

West Capital Airpark Phase 1B-2 Residential (Novatech Phase 2B)

Stormwater Management Report

Prepared for: West Capital Developments

Engineering excellence. Planning progress. Liveable landscapes.

West Capital Airpark – Phase 1B-2 Residential
1500 Thomas Argue Road
Ottawa, Ontario

Stormwater Management Report

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

July 28, 2023
Revised: February 26, 2024
Revised: June 28, 2024

Novatech File: 102085
Ref: R-2023-010

NOVATECH
Engineers, Planners & Landscape Architects

June 28, 2024

BY EMAIL

City of Ottawa
Planning & Growth Management Department
110 Laurier Avenue West
4th Floor Infrastructure Approvals Division
Ottawa, ON K1P 1J1

Attention: Kevin Hall, C.E.T. Project Manager

Dear Sir:

Reference: West Capital Airpark – Phase 1B-2 Residential
Stormwater Management Report
1500 Thomas Argue Road, Ottawa
Our File No: 102085
City File No.: D07-16-22-0017

Please find enclosed the Stormwater Management Report, revised June 28, 2024, prepared for the Phase 1B-2 Residential area of the West Capital Airpark, to address stormwater management related conditions of Final Approval. This report is submitted in response to City of Ottawa comments received June 12 and June 13, 2024.

If you have any questions or require any additional information, please contact us.

Yours truly,

NOVATECH

Melanie Schroeder

Melanie Schroeder, P.Eng.
cc: West Capital Developments
MVCA, Matt Craig

Table of Contents

Figures

Tables

Appendices

Drawings

Existing Phase 1B-1 Drawings

PCSWMM Modelling Files

1.0 INTRODUCTION

1.1 Background

Novatech has been retained to provide design services for the proposed West Capital Airpark (residential development and business park) located at Carp Airport. The Carp Airport property is described as Part of Lots 12, 13, 14 and 15 Concession 3, Part of Lots 13 and 14 Concession 4 and part of the Road Allowance between Concession 3 & 4, in the former Township of West Carleton (Huntley Ward), now the City of Ottawa. Refer to **Figure 1** (Key Plan) for the site location.

1.2 Purpose

This Stormwater Management Report has been prepared to address conditions of Final Approval for the revised Draft Plan of Subdivision application for the proposed Phase 1B-2 Residential subdivision, which was originally part of the registered Phase 1 Residential subdivision. The conditions of Final Approval are included in **Appendix A**.

This report outlines the detailed stormwater management design for the proposed Phase 1B-2 Residential development. Detailed site servicing is addressed in the separate Site Servicing Report.

This report has been revised to address comments from the City of Ottawa as indicated in the cover letter. The City review comments and response to comments are included in **Appendix A** for reference.

The City of Ottawa Development Servicing Study Checklist has been included in **Appendix G.**

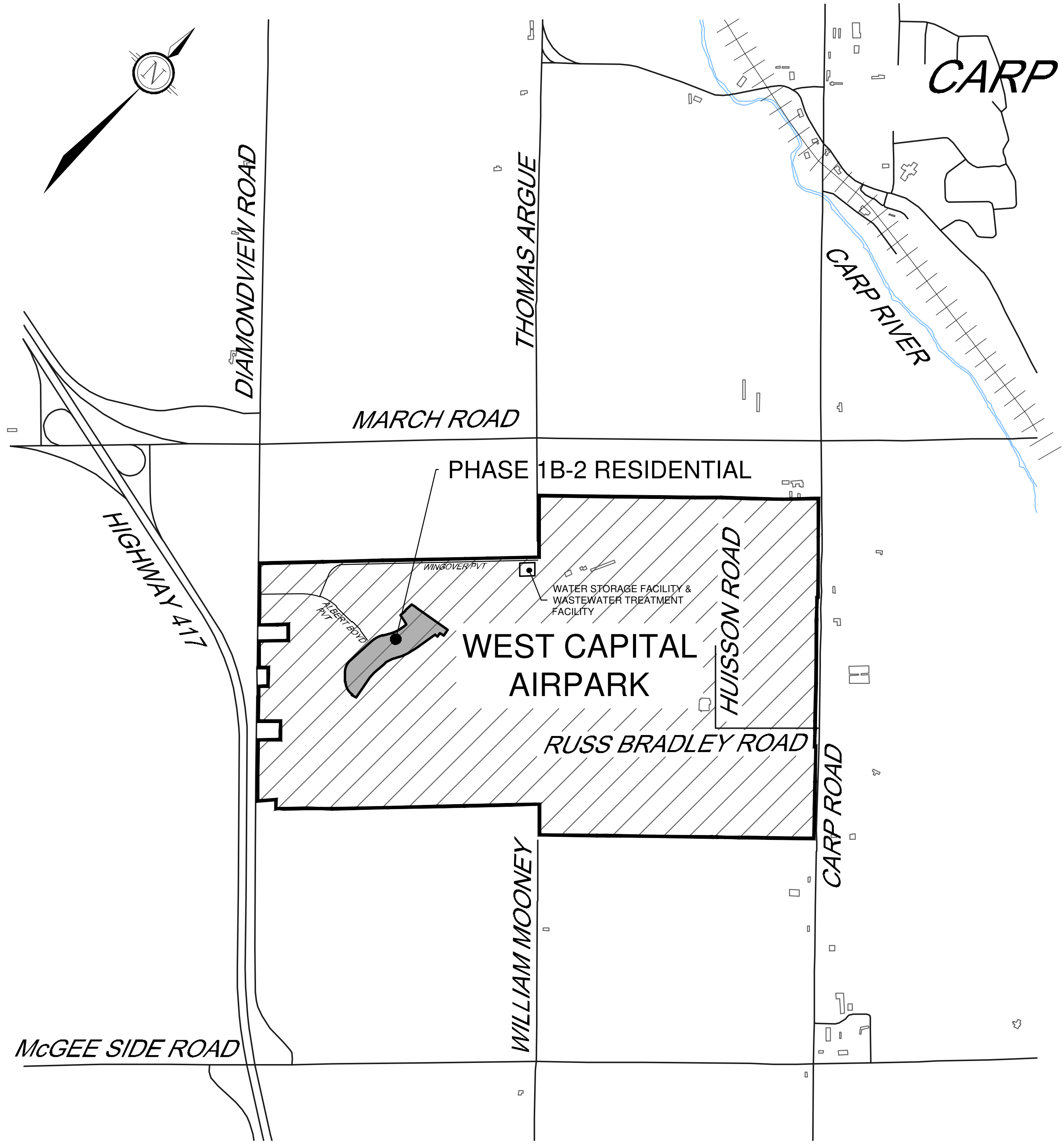
1.3 Proposed Development

In Phase 1B-2, it is proposed to construct a residential subdivision consisting of 77 single family homes and 30 townhouse units. The development will include one new private street with extensions to existing Chandelle Private and Albert Boyd Private.

A total of 329 residential units have been draft approved for Phase 1 and Phase 2. The Phase 1B-2 development will bring the total unit count to 342. The draft approved 329 residential units included 270 single family homes and 59 townhomes, with a corresponding population of 1,077. With the current unit breakdown of single-family homes and townhouses, the total development population will be 1,109. A summary of the residential unit counts and population is as follows:

Table 1: Residential Units and Population

Phase	Single Family Homes	Townhouses	Population	Status
1A	77	-	262	Registered
1B-1	28	-	96	Registered
2A	82	48	409	Registered
1B-2	77	30	340	Revised Draft Approval Pending
Subtotal	264	78	1,109	
1 & 2	270	59	1,077	Draft Approved



NOVATECH
Engineers, Planners & Landscape Architects

Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone	(613) 254-9643
Facsimile	(613) 254-5867
Website	www.novatech-eng.com

WEST CAPITAL AIRPARK

KEY PLAN

DATE	JOB	FIGURE
JUN 2024	102085	1

M:\2002\102085\CAD_PHASES2B&3\Civil\Figures\102085-KEY PLAN.dwg, FIG 1- KEY PLAN, Feb 10, 2023 - 9:10am, arongve

Refer to the **Draft 4M Plan** and **Figure 2** (Residential Phasing Plan) for the proposed development concept for Phase 1B-2 Residential. Design drawings are listed in the Table of Contents.

1.4 Reference Documents

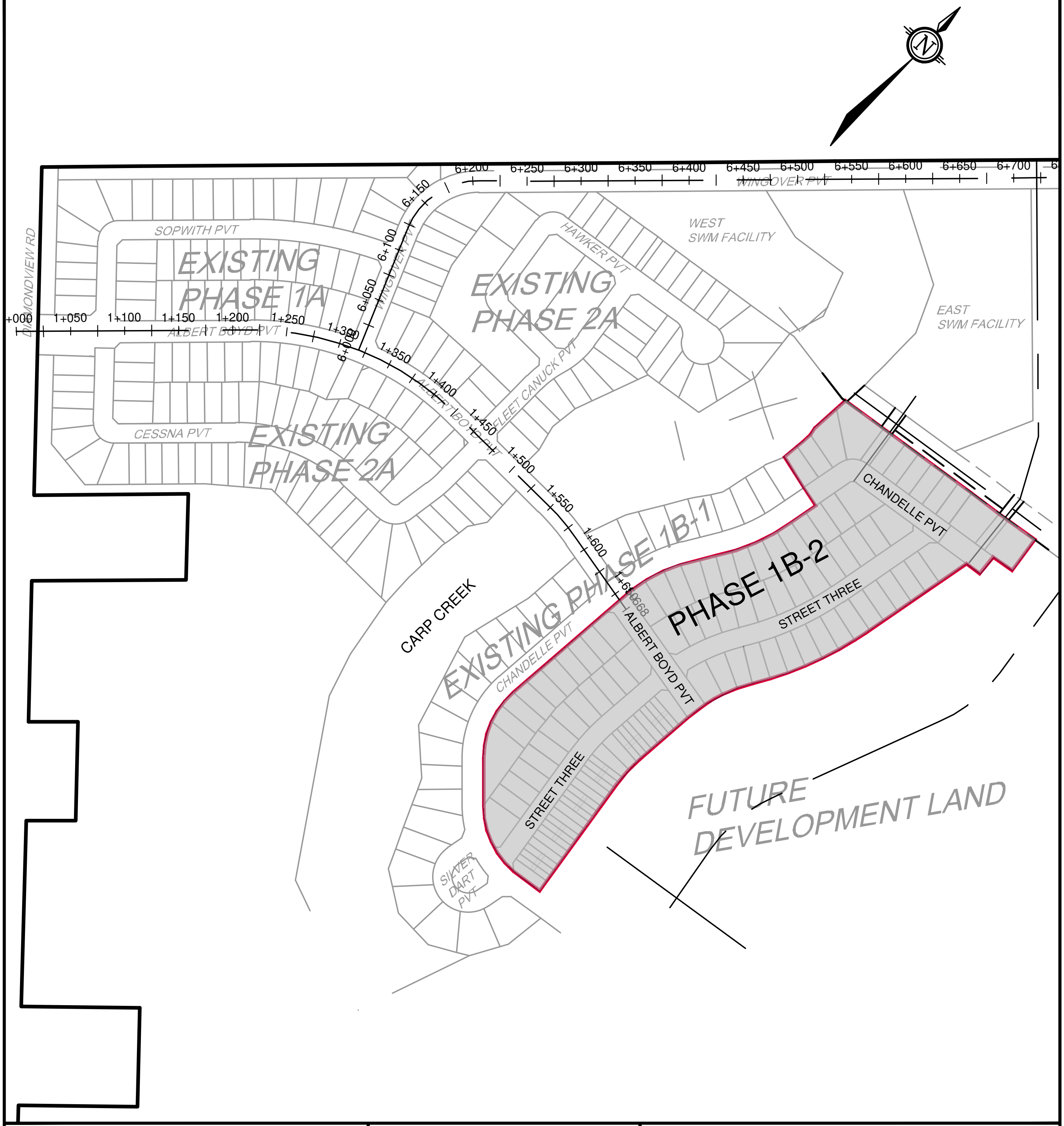
The following references documents are to be read in conjunction with this report.

- Stormwater Site Management Report – Residential Phase 1 (R-2015-060) dated April 2015, by Novatech.
- Phase 1B-2 Residential Serviceability and Conceptual Stormwater Management Report (R-2023-106) dated June 20, 2023, by Novatech.
- Geotechnical Investigation Carp Airport Servicing and Residential Development – Phase 1 (PG2450-2) Revision 1 dated January 16, 2023, by Paterson Group.
- Phase 1B-2 Residential Servicing Report (R-2024-075) dated June 28, 2024, by Novatech

1.5 Ownership, Operation and Maintenance of Proposed Servicing

The right of ways within the West Capital Airpark development will be owned by the condominium as common elements. However, in accordance with the Municipal Capital Facility Development Agreement (MCFDA) that is in place for the project, the City of Ottawa would be responsible for maintenance, repair and replacement of the storm drainage system, including the stormwater management facilities.

Details are included in Schedule I of the Subdivision Agreement for Phase 1 Residential (**Appendix A**). This is the same approach proposed for Phase 1B-2.



\\novatech2018\nova2\2002\102085\DATA\Phase 2B\Reports\Servicing_rev3 - for registration\Figures\102085-2B-KP.dwg, 8x11 Keyplan, Jun 26, 2024 - 3:33pm, mblanton

NOVATECH
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Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

WEST CAPITAL AIRPARK PHASE 1B-2 RESIDENTIAL

RESIDENTIAL PHASING PLAN

DATE	JOB	FIGURE
JUN 2024	102085	2

SHT8X11.DWG - 216mmx279mm

LOT/BLOCK	PART OF PIN(S)	PART OF LOT /BLOCK ON 4M1593	SUBJECT TO EASEMENT(s)	PART(s) on Plan 4R30566	PART(s) on Plan 4R35312
1	04538–0811	120	OC1983198, OC1983279, OC1983318	29	
2	04538–0811, 04538–0851	120, 160	OC1983198, OC1983279, OC1983318, OC1983234	29	
3,4	04538–0811, 04538–0851, 04538–0812	120, 160, 121	OC1983234		
5	04538–0812	121	NO EASEMENTS		
6,7	04538–0812, 04538–0820	121, 177			
8	04538–0820	177			
9,10	04538–0820, 04538–0814	177, 123			
11	04538–0820, 04538–0813, 04538–1093	121, 122	OC1983198, OC1983279, OC1983318	31, 32	
		176	OC1983223,OC1983279,OC1983333,OC2481626,OC2520813,OC2588447		2
12	04538–0813, 04538–1093	122	OC1983198, OC1983279, OC1983318	32	
		176	OC1983223,OC1983279,OC1983333,OC2481626,OC2520813,OC2588447		2
13	04538–0801, 04538–0813, 04538–0852, 04538–1093	110, 122, 161	OC1983198, OC1983279, OC1983318, OC1983223	32, 33, 34	
		176	OC1983223,OC1983279,OC1983333,OC2481626,OC2520813,OC2588447		2
14	04538–0801, 04538–0852, 04538–1093	110, 161	OC1983198, OC1983279, OC1983318, OC1983223	34	
		176	OC1983223,OC1983279,OC1983333,OC2481626,OC2520813,OC2588447		2
15	04538–0800, 04538–0801	109, 110	OC1983198 OC1983279 OC1983318	34, 35	
16	04538–0800	109		35	
17	04538–0799, 04538–0800	108, 109		35, 36	
18	04538–0799	108		36	
19	04538–0798, 04538–0799	107, 108		36,37	
20	04538–0798	107		37	
21	04538–0797, 04538–0798	106, 107		37, 38	
22	04538–0797	106		38	
23	04538–0796, 04538–0797	105, 106		38, 39	
24	04538–0796	105		39	
25	04538–0794, 04538–0795	103, 104		40, 41	
26	04538–0794	103		41	
27	04538–0793, 04538–0794	102, 103		41, 42	
28	04538–0793	102		42	
29	04538–0792, 04538–0793	101, 102		42, 43	
30	04538–0792, 04538–0793	101, 102		43	
31	04538–0792	101		43	
32	04538–0791, 04538–0792	100, 101		43, 44	
33	04538–0791	100		44	
34	04538–0789, 04538–0790, 04538–0791	98, 99, 100		44, 45, 46	
35	04538–0788, 04538–0789	97, 98		46, 47	
36,37	04538–0789, 04538–0790	98, 99	NO EASEMENTS		
38	04538–0789, 04538–0790, 04538–0868	98, 99, 177			
39	04538–0790, 04538–0791, 04538–0868	99, 100, 177			
40	04538–0791, 04538–0868	100, 177			
41	04538–0791, 04538–0792, 04538–0868	100, 101, 177			
42	04538–0792, 04538–0868	101, 177			
43	04538–0792, 04538–0793, 04538–0868	101, 102, 177			
44	04538–0793, 04538–0868	102, 177			
45	04538–0793, 04538–0794, 04538–0868	102, 103, 177			
46	04538–0794, 04538–0868	103, 177			
47	04538–0794, 04538–0795, 04538–0868	103, 104, 177			
48,49	04538–0796, 04538–0797, 04538–0868	105, 106, 177			
50	04538–0797, 04538, 0798, 04538–0868	106, 107,177			
51	04538, 0798, 04538–0868	107, 177			
52	04538–0798, 04538–0799, 04538–0868	107, 108, 177			
53	04538–0799, 04538–0868	108, 177			
54	04538–0799, 04538–0800, 04538–0868	108, 109, 177			
55	04538–0800, 04538–0868	109, 177			
56	04538–0800, 04538–0801, 04538–0868	109, 110, 177			
57	04538–0801, 04538–0852, 04538–0868	110, 161, 177	OC1983223		
58	04538–0801, 04538–0813, 04538–0852, 04538–0868	110,122,161,177	OC1983223		
59,60	04538–0813, 04538–0868	122, 177	NO EASEMENTS		
61	04538–0812, 04538–0813, 04538–0815, 04538–0868	121,122,124,177			
62	04538–0814, 04538–0815, 04538–0869	123, 124	OC1983198, OC1983279, OC1983318	63, 64	
		178	OC1983223, OC198327, OC1983333		
63	04538–0815, 04538–0816, 04538–0869	124, 125	OC1983198, OC1983279, OC1983318	63	
		178	OC1983223, OC198327, OC1983333		
64	04538–0815, 04538–0816	124, 125	NO EASEMENTS		
65	04538–0816	125			
66	04538–0816, 04538–0817, 04538–0853	125, 126, 162	OC1983223		
67	04538–0817	126	NO EASEMENTS		
68	04538–0817, 04538–0818	126, 127			
69	04538–0818	127			
70	04538–0818, 04538–0819	127, 128			
71	04538–0819	128			
72	04538–0819, 04538–0820	128, 129			
73,74	04538–0820, 04538–0821	129, 130			
75	04538–0821, 04538–0822	130, 131			
76	04538–0822	131			
77	04538–0822, 04538–0823	131, 132			
78	04538–0823, 04538–0824	132, 133			
79,80,81	04538–0824	133			
82,83	04538–0824, 04538–0825	133, 134			
84,85,86	04538–0825	134			
87	04538–0825, 04538–0826	134, 135			
88,89,90	04538–0826	135			
91	04538–0826, 04538–0827	135, 136			
92	04538–0827	136			
93,94,95,96	04538–0827, 04538–0868	136, 177			
97	04538–0788, 04538–0868	97, 177			
98,99	04538–0787, 04538–0788, 04538–0868	96, 97, 177			
100–106	04538–0787, 04538–0788	96, 97			
107	04538–0787, 04538–0788	96, 97	OC1983198, OC1983279, OC1983318	47, 48	
108	04538–0841	150	NO EASEMENT		
109	04538–0854	163	OC1983234		
110	04538–0814	123	NO EASEMENT		
111	04538–0814, 04538–0841, 04538–0854, 04538–0869	123, 150	OC1983198, OC1983279, OC1983318	66	13, 14
		163	OC1983198, OC1983279, OC1983234	65	
		178	OC1983223, OC1983279, OC1983333		15
112	04538–0811, 04538–0812, 04538–0813, 004538–814, 04538–0815, 04538–0851, 04538–1093, 04538–0868	120, 121	OC1983198, OC1983279, OC1983318		3, 4, 7, 8
		122,123,124,177			10, 11, 12, 13
		160	OC1983198 OC1983279 OC1983318		5
			OC2588448, OC1983234		5, 6
		176	OC2588448, OC1983223, OC1983279, OC1983333, OC2481626, OC2520813		1
			OC2588447		1
113	04538–0812	121	OC2588448		9
114	04538–0795, 04538–0796, 04538–0823, 04538–0868	104,105,132,177	OC1983198, OC1983279, OC1983318	39, 40	
115	04538–0814 TO 04538–0823, 04538–0853, 04538–0868	123 TO 132, 162, 177	OC1983223		
116	04538–0788,04538–0789, 04538–0823 TO 04538–0827, 04538–0868	97,98,132 TO 136, 177	OC1983198, OC1983279, OC1983318	47	

COORDINATES WERE DERIVED FROM REGISTERED PLAN 4M–1593 MTM ZONE 9, NAD83 ORIGINAL.

COORDINATES HAVE BEEN DETERMINED TO AN URBAN ACCURACY IN ACCORDANCE WITH SECTION 14(2) OF O.REG 216/10.

POINT ID	NORTHING	EASTING
*	*	*
*	*	*
*	*	*
*	*	*

COORDINATES CANNOT IN THEMSELVES BE USED TO RE–ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

APPROVED UNDER SECTION 51 OF
THE PLANNING ACT BY THE CITY OF OTTAWA
THIS _ _ _ _ DAY OF _ _ _ _

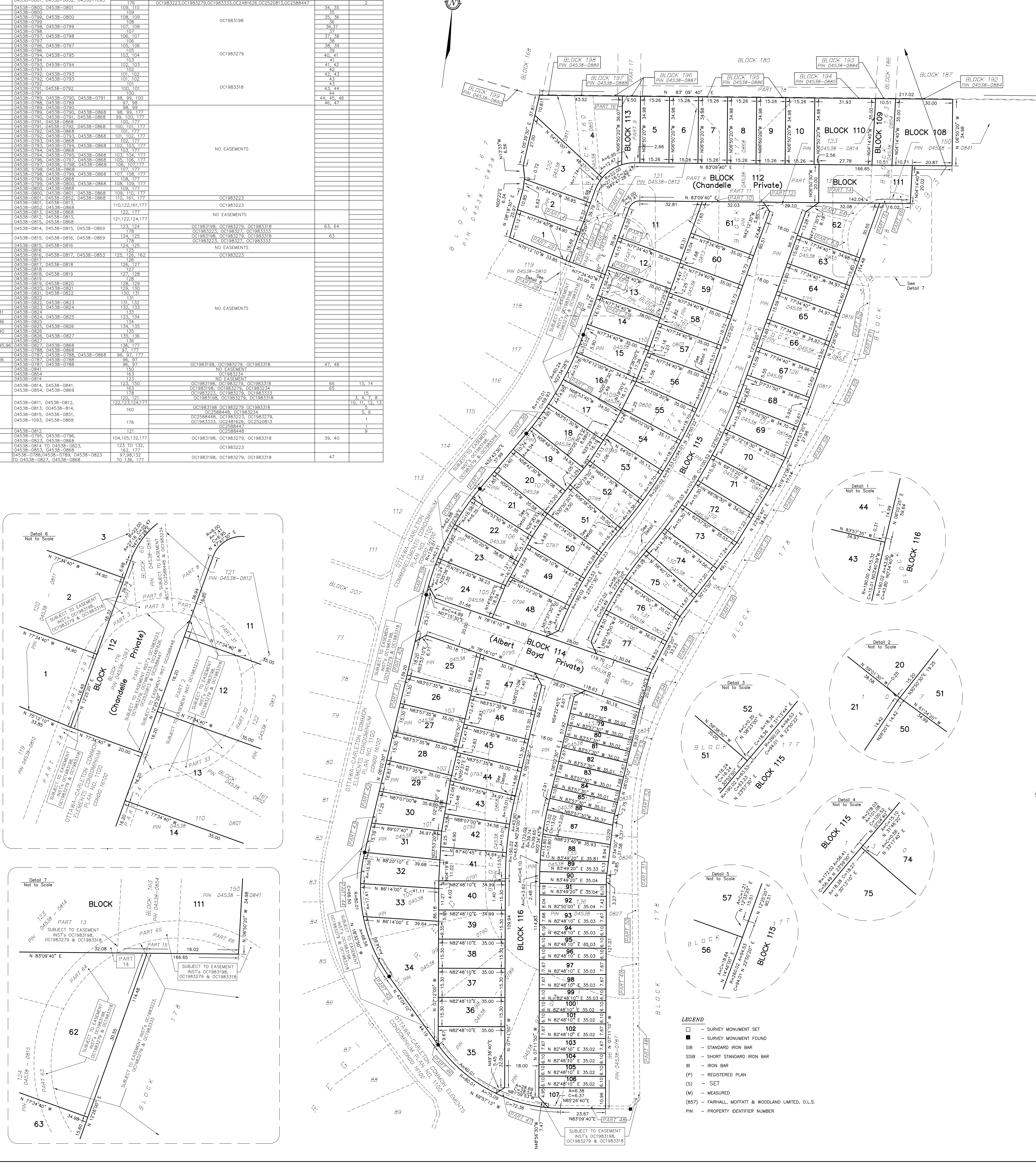
____
JOHN L. MOSER, GENERAL MANAGER
PLANNING AND GROWTH MANAGEMENT DEPARTMENT
PLANNING AND INFRASTRUCTURE PORTFOLIO
CITY OF OTTAWA

PLAN 4M–

I certify that this Plan is registered in the Land Registry Office for the Land Titles Division of Ottawa–Carleton N° 4 at _ _ _ o'clock on the _ _ _ _ day of _ _ _ _ and entered in the register for Property Identifier _ _ _ _ and required consents are registered as Plan Document N° _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _
Representative for Land Registrar

THE SUBDIVISION REPRESENTED BY THIS PLAN AFFECTS



PLAN OF SUBDIVISION OF
LOTS 97 TO 110 (INCLUSIVE), LOTS 120, 121,122 & 123 BLOCKS 160,161,163 PART OF LOTS 96,124 TO 136(INCLUSIVE) &150 PART OF BLOCKS 162,176,177 & 178 REGISTERED PLAN 4M–1593 CITY OF OTTAWA

SCALE 1 : 750
0 10 20 50 75 metres

FAIRHALL, MOFFATT & WOODLAND LIMITED
ONTARIO LAND SURVEYORS

CURVE TABLE

LOT/BLOCK	RADIUS	ARC	CHORD	BEARING
3	22.00	7.74	7.70	N 22°37'52" E
4	22.00	12.47	12.30	N 48°44'00" E
11	6.00	7.41	6.95	N 47°47'30" E
15	170.01	10.02	10.01	N 14°06'44" E
16	170.01	15.78	15.77	N 18°27'30" E
17	170.01	14.95	14.95	N 23°38'40 " E
18	170.01	14.95	14.95	N 28°40'50" E
19	170.01	4.54	4.54	N 31°58'00" E
21	135.01	6.35	6.35	N 31°22'40" E
22	135.01	16.58	16.57	N 26°31'30" E
23	135.01	19.82	19.81	N 18°47'00" E
24	135.01	15.24	15.23	N 11°20'55 " E
32	80.01	16.56	16.53	N 00°06'33" E
33	80.01	17.41	17.37	N 12°03'20" W
34	80.01	34.60	34.33	N 30°40'44" W
35	80.01	40.01	39.57	N 57°28'40" W
41	190.02	13.57	13.56	N 05°09'00" W
42	190.02	15.01	15.01	N 00°50'37" W
43	190.02	15.01	15.01	N 03°40'59" E
44	190.02	0.31	0.31	N 05°59'30" E
48	190.02	14.42	14.42	N 16°27'10" E
49	190.02	16.26	16.25	N 21°04'41" E
50	190.02	16.26	16.25	N 25°58'50" E
51	190.02	16.24	16.24	N 30°52'50" E
52	260.02	18.36	18.36	N 31°13'44" E
52	190.02	0.35	0.35	N 33°23'00" E
53	260.02	18.70	18.70	N 27°08'40" E
54	260.02	18.70	18.70	N 23°01'26" E
55	260.02	18.70	18.70	N 18°54'12" E
56	260.02	18.84	18.84	N 14°46'00" E
57	260.02	1.21	1.21	N 12°33'30" E
68	278.03	9.83	9.83	N 13°26'10 E
69	278.03	15.30	15.30	N 16°01'35" E
70	278.03	15.30	15.30	N 19°11'30" E
71	278.03	15.30	15.30	N 22°19'20" E
72	278.03	15.30	15.30	N 25°30'15" E
73	278.03	15.30	15.30	N 28°38'25" E
74	278.03	14.74	14.74	N 31°44'11" E
74	172.02	0.56	0.56	N 33°17'40" E
75	172.02	18.28	18.27	N 30°13'10" E
76	172.02	19.44	19.43	N 23°56'15" E
77	172.02	18.50	18.49	N 17°37'09" E
86	172.02	3.21	3.21	N 05°30'18" E
87	172.02	13.04	13.04	N 02°48'38" E
88	172.02	13.79	13.79	N 01°39'36" W
89	172.02	6.10	6.10	N 04°59'24" W
90	172.02	3.60	3.60	N 06°36'21" W

NOTES

1. BEARINGS ARE GRID, DERIVED FROM OBSERVED REFERENCE POINTS (*) AND (*) BY REAL TIME NETWORK OBSERVATIONS AND ARE REFERRED TO THE CENTRAL MERIDIAN, 76°30'W LONGITUDE MTM ZONE 9, (NAD83 ORIGINAL).
2. DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR 0.999905.
3. ALTERNATE AND REDUCED LENGTH MONUMENTS SET DUE TO UNDERGROUND UTILITY HAZARD.

OWNER'S CERTIFICATE

THIS IS TO CERTIFY THAT:

1. LOTS 1 TO 107, BOTH INCLUSIVE, AND BLOCKS 108 TO 116, BOTH INCLUSIVE HAVE BEEN LAID OUT IN ACCORDANCE WITH OUR INSTRUCTIONS.

1514947 ONTARIO INC.

I HAVE THE
AUTHORITY TO
BIND THE
CORPORATION

_ _ _ _ _ _ _ _ _
ANDREW WILDEBOER
PRESIDENT

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

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

_ _ _ _
DATE

ONTARIO LAND SURVEYOR

LEGEND

☐	– SURVEY MONUMENT SET
■	– SURVEY MONUMENT FOUND
SIB	– STANDARD IRON BAR
SSIB	– SHORT STANDARD IRON BAR
IB	– IRON BAR
(P)	– REGISTERED PLAN
(S)	– SET
(M)	– MEASURED
(857)	– FAIRHALL, MOFFATT & WOODLAND LIMITED, O.L.S.
PIN	– PROPERTY IDENTIFIER NUMBER

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER ......

Fairhall Moffatt & Woodland
LIMITED
ONTARIO LAND SURVEYORS
OTTAWA
Surveying and Land Information Services
100–600 TERRY FOX DRIVE, KANATA, ONTARIO K2L 4B6
TEL: (613) 591–2580 FAX: (613) 591–1495
www.fmw.on.ca

JOB No.
AB25901

E , N

REFERENCE No.
*

S:\JOBS\Z35100\DWG\
mplan–drafttonovatech

May 23, 2024

2.0 STORMWATER MANAGEMENT

The Stormwater Site Management Report (Novatech, April 2015) provides details of the stormwater management design for the draft approved residential lots (329 units) including Phase 1B-2. The details include calculations and analysis of the proposed stormwater quantity control, stormwater quality control, temperature mitigation and erosion and sediment control.

The East Community subdivision design has increased unit density in Phase 1B-2 since the Stormwater Site Management Report (Novatech, April 2015), with a change from a rural road cross-section and taxiways with ditches to an urban road cross-section with storm sewers. Updated stormwater management, specific to Phase 1B-2, is discussed below.

2.1 Stormwater Management Design Criteria

The following stormwater management criteria were established in consultation with the Mississippi Valley Conservation Authority (MVCA) and the City of Ottawa.

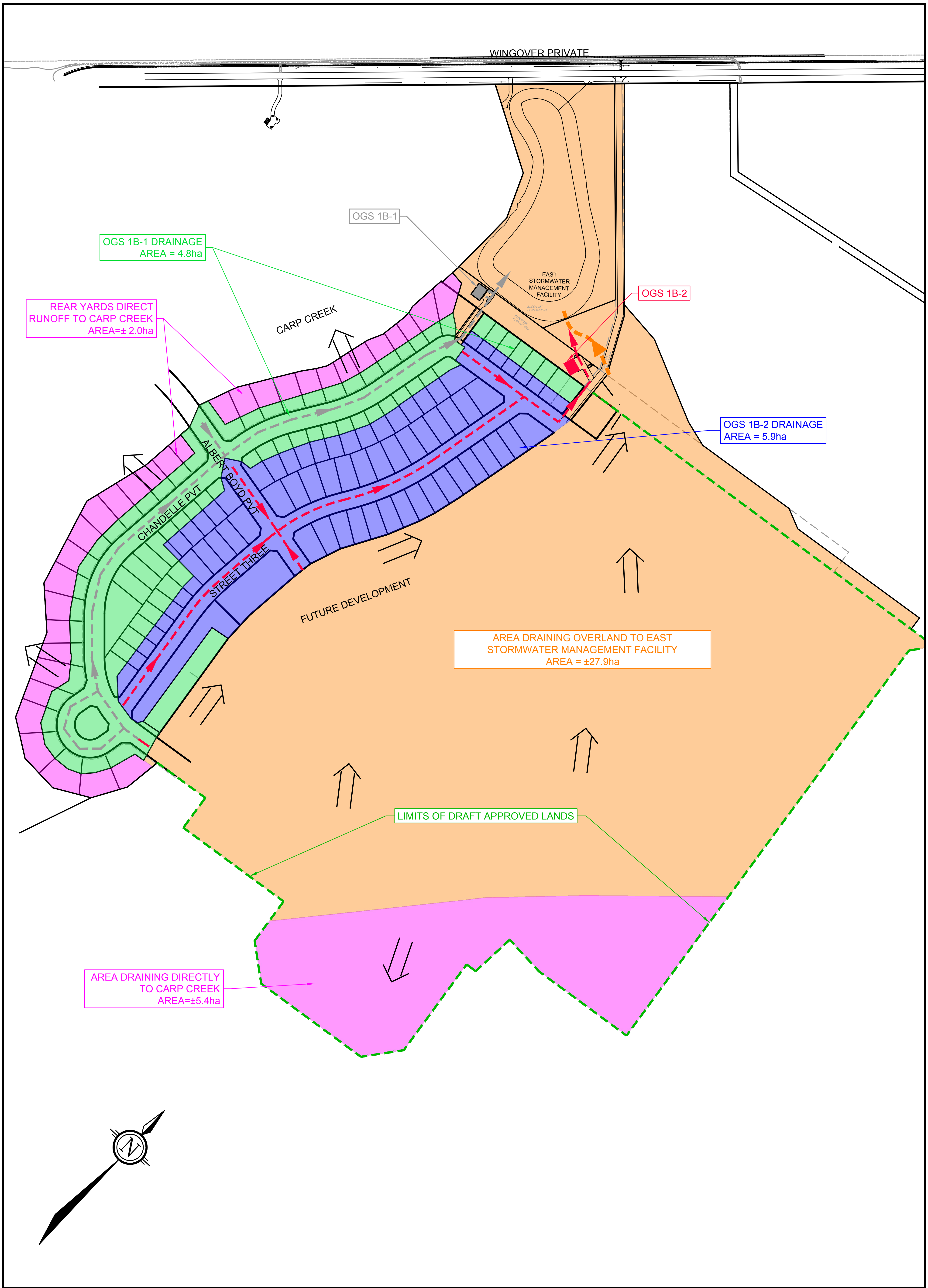
- Control post-development flows to pre-development levels for the 1:2 year to 1:100 year events.
- Provide an ’Enhanced’ level of water quality protection, corresponding to 80% long-term TSS removal.
- Provide measures to mitigate thermal impacts of SWM facilities.
- Design storm sewers to convey the 1:2 year post-development peak flow for the proposed development.
- Confine overland flows to within the right of ways and/or defined drainage easements for all storms up to and including the 1:100 year event.
- Ensure the underside of footing (USF) elevations for the proposed development is at least 0.3m above the 100-year hydraulic grade line (HGL) in the storm sewers.
- Ensure the underside of footing (USF) elevations for the proposed development is above the stress test hydraulic grade line (HGL) in the storm sewers.
- Provide infiltration measures to increase post-development infiltration in areas outside the rights-of-way.

2.2 Stormwater Quality Control

The East Stormwater Management (SWM) Facility was constructed as part of the Phase 1B-1 residential development, based on the above noted criteria, with Ministry of the Environment and Parks (MECP) approval. Refer to **Appendix H** for a copy of the MECP ECA for the East Stormwater Management Facility and existing water quality treatment unit. The proposed drainage areas to the various water quality treatment units are shown in **Figures 102085-OGS1** and **102085-OGS2**.

Existing Vortechs Unit (Phase 1B-1)

The existing inlet to the SWM facility for Phase 1B-1 includes a Vortechs Model 9000 Off-Line treatment unit to provide an ‘Enhanced’ level of quality control (80% long-term TSS removal for 90% of the annual runoff volume). The unit was sized for an overall area of 6.9 ha with a runoff coefficient of 0.65. The treatment flow rate is up to 400 L/s. Peak flows in excess of 400 L/s will bypass the unit and discharge directly into the pond.



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LEGEND

🟪 AREA DRAINING DIRECTLY TO CARP CREEK

🟩 AREA DRAINING TO EAST STORMWATER MANAGEMENT FACILITY INLET #1

🟦 AREA DRAINING TO EAST STORMWATER MANAGEMENT FACILITY INLET #2

🟧 AREA DRAINING OVERLAND TO EAST STORMWATER MANAGEMENT FACILITY

- - ► - - PROPOSED STORM SEWER AND DIRECTION OF FLOW

- - ► - - EXISTING STORM SEWER AND DIRECTION OF FLOW

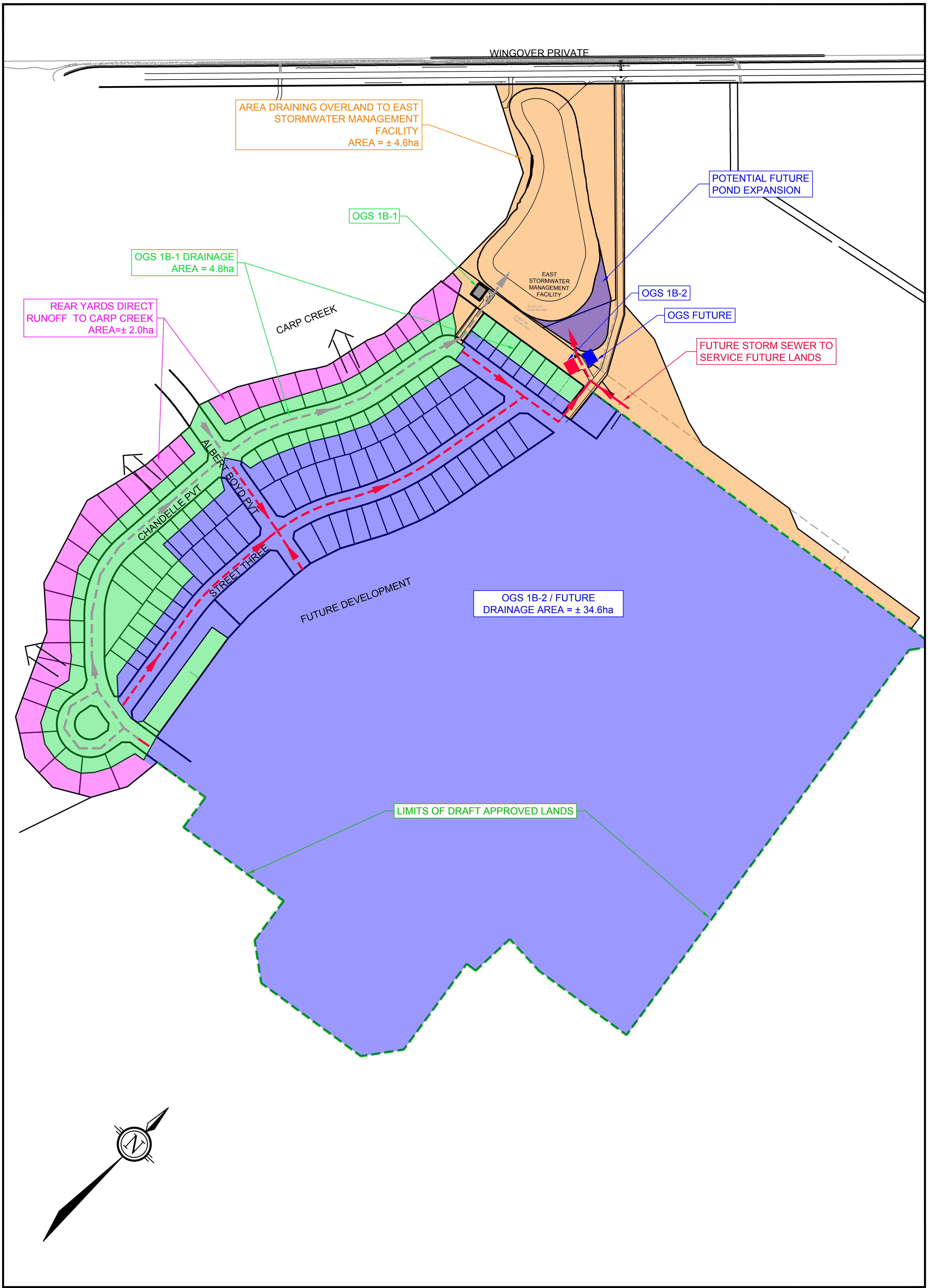
⇒ MAJOR OVERLAND FLOW ROUTE

CARP AIRPORT - PHASE 1B-2
RESIDENTIAL

EAST STORMWATER
MANAGEMENT FACILITY OGS
AREAS - INTERIM CONDITION

SCALE 1 : 3500		
DATE FEB 2024	JOB 102085	FIGURE 102085-OGS1

SHT11X17.DWG - 279mmX432mm



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LEGEND

🟪	AREA DRAINING DIRECTLY TO CARP CREEK	– – ➝	PROPOSED STORM SEWER AND DIRECTION OF FLOW
🟩	AREA DRAINING TO EAST STORMWATER MANAGEMENT FACILITY INLET #1	– – ➝	EXISTING STORM SEWER AND DIRECTION OF FLOW
🟦	AREA DRAINING TO EAST STORMWATER MANAGEMENT FACILITY INLET #2	⟹	MAJOR OVERLAND FLOW ROUTE
🟧	AREA DRAINING OVERLAND TO EAST STORMWATER MANAGEMENT FACILITY		

CARP AIRPORT - PHASE 1B-2 RESIDENTIAL

EAST STORMWATER MANAGEMENT FACILITY OGS AREAS - ULTIMATE CONDITION

SCALE 1 : 3500		
DATE FEB 2024	JOB 102085	FIGURE 102085-OGS2

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Based on changes to the subdivision layout, the contributing drainage area to the existing Vortechs unit will be significantly smaller than what was originally assumed. A portion of the Phase 1B-2 rear yards will outlet to this OGS unit, but the overall AxC value for the area to be treated by the unit is less than what was used in the sizing of the OGS unit. A comparison of the Phase 1B-1 contributing drainage area is summarized in **Table 2**. The original sizing calculations for the Vortechs Model 9000 is provided in **Appendix E**.

Table 2: Phase 1B-1 OGS Unit Drainage Area Comparison

Phase 1B-1 Drainage Area Parameters	Phase 1 Residential Registration	Proposed Phase 1B-2 Residential Design (includes existing Phase 1B-1)
Drainage Area (ha)	6.90	4.813
Runoff Coefficient	0.65	0.55
Total AxC	**4.49**	**2.65**

Although some of the Phase 1B-2 area is draining to the existing Phase 1B-1 OGS unit, the total AxC value serviced by the Phase 1B-1 OGS unit is within its proposed capacity.

Proposed Vortechs Units (Phase 1B-2 and Future)

Due to changes in the subdivision design, a new SWM pond inlet and water quality treatment unit is required for Phase 1B-2 and the future development areas tributary to the East SWM Facility. The proposed water quality treatment system will consist of two (2) Vortechs Model 1929CIP Off-Line hydrodynamic separators installed in parallel, which will provide an ‘Enhanced’ level of quality control (80% long-term TSS removal for 90% of the annual runoff volume) for Phase 1B-2 and the future development (35.56 ha total).

Each of the two proposed Vortechs units can treat the runoff from an area of 17.28 ha (runoff coefficient of 0.64) resulting in a total area of 35.56 treated by both units. For Phase 1B-2, only a single Vortechs Model 1929CIP will be required, but the configuration of the proposed storm outlet will allow for the second Vortechs unit to be installed in a parallel configuration as part of the future development once the developed area exceeds 17.28 ha, as shown in **Table 3**.

Table 3: Phase 1B-2 OGS (Vortechs Model 1929CIP) Drainage Area Comparison

Phase 1B-2 Drainage Area Parameters	Proposed Phase 1B-2 Only		Proposed Phase 1B-2 and Future Development	
	Capacity of Single Unit	Phase 1B-2 to Unit	Capacity of Twin Unit	Ultimate Drainage to Units
Drainage Area (ha)	17.91	5.913	35.56	34.563
Runoff Coefficient	0.62	0.58	0.64	0.64
Total AxC	**11.10**	**3.43**	**22.76**	**22.12**

A weir is proposed in MH 276 to direct the water quality event (25mm design storm) peak flow from Phase 1B-2 to the water quality treatment unit. The 25mm design storm accounts for 90% of the annual runoff volume which will be treated by the unit. Peak flows in excess of the 25mm event will begin to overtop the weir, bypassing the unit and discharging directly into the pond. In the future, this weir can be raised to accommodate the additional flows that will result from the future development. Refer to **Appendix E** for detailed OGS sizing information, which shows the unit will treat 90% of the annual runoff volume.

2.3 Hydrologic and Hydraulic Modeling

The City of Ottawa Sewer Design Guidelines (October 2012) require hydrologic modeling for all dual drainage systems:

- For the Stormwater Site Management Report (Novatech, 2015), the performance of the storm drainage system for the East Residential Community (Phase 1B-1, 1B-2, and future lands) was evaluated using the SWMHYMO hydrologic model.

- For the detailed design of Phase 1B-2, the performance of the existing storm drainage system for Phase 1B-1 and proposed storm drainage system for Phase 1B-2 has been re-evaluated using the PCSWMM hydrologic/hydraulic model.

The PCSWMM model provides a more detailed analysis of the HGL elevations and major system ponding depths during each of the storm events. The subdivision unit density and stormwater management system for the Phase 1B-2 has also changed, resulting in a higher imperviousness and with roadside ditches being replaced with storm sewers. These changes are reflected in the updated PCSWMM model and SWM design of Phase 1B-2.

The PCSWMM model schematics and model data are provided in **Appendix D**. Digital copies of the modeling files and model output for all storm events are provided with this report submission.

2.3.1 Design Storms

For Phase 1B-2, the hydrologic analysis was completed using the following synthetic design storm events, which were used in the Stormwater Site Management Report (Novatech, 2015 SWMHYMO model. The IDF parameters used to generate the design storms were taken from the *City of Ottawa Sewer Design Guidelines* (October 2012).

4 Hour Chicago Storms:
25mm 4hr Chicago storm
2-year 4hr Chicago storm
5-year 4hr Chicago storm
100-year 4hr Chicago storm

12-Hour SCS Type II Storms:
2-year 12hr SCS Type II storm
5-year 12hr SCS Type II storm
100-year 12hr SCS Type II storm

The critical design storm for the storm drainage system is the 4-hour Chicago storm distribution. It generates the highest HGL elevations and ponding depths for the minor and major systems, respectively. The proposed storm drainage system has also been stress tested using a 4-hour Chicago design storm that has a 20% higher intensity and total volume compared to the 100-year event.

The critical design storm for the SWM Facility is the 12-hour SCS storm distribution. This storm produces more runoff volume; therefore, higher water levels in the SWM Facility.

It is noted that the City of Ottawa prefers the use of the 3-hour Chicago storm distribution, but the SWMHYMO hydrologic model used in the design of the East SWM Facility used the 4-hour Chicago storm distribution. The 4-hour Chicago storm distribution is required to compare modelled post-development peak flows to pre-development flows that were evaluated in the 2015 SWMHYMO model.

2.3.2 Model Development

The PCSWMM model has been developed to account for both minor and major system flows from the development and ensure no adverse impacts on the downstream drainage system. The results of the analysis were used to:

- Determine the total major and minor system runoff from the site.
- Calculate the storm sewer hydraulic grade line for the 100-year storm event;
- Evaluate overland flow depths and ponding volumes during the 100-year event; and

Model Scenarios

Two post-development model scenarios were created to ensure that the proposed storm drainage infrastructure for Phase 1B-2 and the East SWM Facility can accommodate runoff from the upstream areas under interim and ultimate development conditions:

- Interim condition: Includes full development of Phase 1B-1 and 1B-2, with the future development lands modelled as undeveloped and maintaining current drainage patterns. The East SWM Facility is represented by the as-built pond curve.
- Ultimate condition: Includes full development of Phase 1B-1 and 1B-2, plus the future development lands assuming a runoff coefficient of 0.65. It is assumed that the entire future development area will inlet to the pond through the Phase 1B-2 pond inlet. The East SWM Facility is represented by a future pond stage-storage curve that assumes expanding the pond into the portion of the SWM block where the Phase 1B-2 pond inlet is located. The pond expansion required to accommodate the future development area runoff will be confirmed at detailed design of the future phase. The Phase 1B-2 pond inlet and major system swale for the have been sized to accommodate the ultimate condition flows (includes Phase 1B-2 and future development lands). The SWM Block has additional space for expansion and can accommodate a larger expansion volume if required.

The differences between the interim and ultimate development scenarios are shown in **Figures 102085-OGS1** and **102085-OGS2**.

Storm Drainage Areas

For modeling purposes, the site has been divided into subcatchments based on the drainage areas tributary to each inlet of the proposed storm sewer system. The catchment areas are shown on the Post-Development Storm Drainage Area Plan (**102085-SWM7**) and summarized in **Appendix D**.

East SWM Facility

The East SWM pond was designed previously (in 2015) and has been constructed as designed. The outlet structure for the SWM Facility consists of a cooling trench, a 300mm CSP culvert, and 1.2m wide rectangular flow control weir embedded into the side slopes of the SWM facility. The area above the rectangular weir serves as a trapezoidal emergency spillway to convey flows above the 100-year event. Each individual outlet structure was modelled as a link in PCSWMM.

In the PCSWMM model, the SWM pond is represented by an area vs. depth storage curve. Refer to **Appendix E** for additional details:

- The storage curve for the interim condition is based on the as-built pond contours.

  The storage curve for ultimate conditions is based on a conceptual future expansion of the SWM Facility to accommodate the future development area.

Infiltration

Infiltration losses for all sub-catchments were modelled using Horton's infiltration equation, which defines the infiltration capacity of soil over the duration of a precipitation event using a decay function that ranges from an initial maximum infiltration rate to a minimum rate as the storm progresses. The default values for the City of Ottawa were used for all catchments.

Horton's Equation:	Initial infiltration rate:	$f_o = 76.2$ mm/hr
$f(t) = f_c + (f_o - f_c)e^{-k(t)}$	Final infiltration rate:	$f_c = 13.2$ mm/hr
	Decay Coefficient:	$k = 4.14$/hr

Depression Storage

The default values for depression storage in the City of Ottawa were used for all catchments. Rooftops were assumed to provide no depression storage (zero-impervious parameter).

Depression Storage (pervious areas):	4.67 mm
Depression Storage (impervious areas):	1.57 mm

Equivalent Width

'Equivalent Width' refers to the width of the sub-catchment flow path. This parameter is calculated as described in Section 5.4.5.6 of the City of Ottawa Sewer Design Guidelines (October 2012).

Impervious Values

Runoff coefficients for each sub-catchment area were determined based on the proposed site plan. Refer to the Stormwater Management Plan – Coefficient Calculations (**102085-SWM-CC**) for details. Percent impervious values were calculated using:

$$\%imp = (C - 0.20) / 0.70$$

Minor System

The proposed storm sewers have been designed using the Rational Method to convey peak flows associated with a 2-year return period. The storm sewer design sheets are provided in **Appendix C.**

To establish the HGL elevations within the storm sewer system, inflows to the storm sewer were modelled based on the characteristics of each inlet;

- For areas where catchbasins are located at low points, inflows to the storm sewer are based on the ICD specified for the inlet and the maximum depth of ponding. Storage volumes within the right-of-way are based on the grading design.
- For areas where catchbasins are located on a continuous grade, the capture rate is based on the type of grate, the geometry of the road, and the approach flow.

Major System

The proposed road network was input into the PCSWMM model to calculate the total inflow into the storm sewers (minor system), and to calculate the overland flows and ponding depths within the rights-of-way (major system).

The roads are represented in the model as open channels. Model input includes:

- Right-of-way cross-sections;

- Length and slope of the road between each high and low point;
- The location of all storm inlets and whether the inlets are in a sag or on-grade.

The centerline of road elevations shown on the Grading Plans (**102085-GR13 and 102085-GR14)** are used to define the road network in the PCSWMM model.

Future Development Area

For the ultimate condition PCSWMM model, it was assumed that the minor system (storm sewers) for future development area will be designed with a 2-year level of service, with the larger storms being conveyed overland to the East SWM Facility through the major system. It was assumed that the future area will provide approximately 100m^3/ha of major system storage in the rights-of-way and that the major system will outlet to the East SWM Facility without flowing through Phase 1B-2.

2.3.3 Carp Creek

The outlet for the East SWM Facility servicing the Phase 1B-2 Residential Subdivision is Carp Creek. This watercourse was analyzed in the *Stormwater Site Management Report (Novatech, April 2015).* The hydrology of the watershed was analyzed using SWMHYMO; Hydraulic modeling was completed using HEC-RAS. Refer to excerpts provided in **Appendix B**.

Boundary Conditions – East SWM Facility Outlet

The 100-year water level at HEC-RAS STN: 0+354.65 (Carp Creek outlet) was estimated to be 111.44 m. This is the ‘Fixed’ outfall condition applied at the outlet of the East SWM facility for the 100-year storm event.

The normal water level of Carp Creek was estimated to be 110.40 m based on survey information at the outlet. This elevation is 0.45 m below the invert of the outlet ditch (110.85 m). As such, a ‘Normal’ outfall condition was applied for the 2-year & 5-year storm events.

2.3.4 PCSWMM Model Results

The model was used to evaluate the performance of the proposed storm drainage system for the Phase 1B-2 lands and specifically to determine the 100-year hydraulic grade line.

Peak Flows

The post-development peak flows to Carp Creek from Phase 1B-1, 1B-2, and the future development area include the controlled outflow from the existing dry pond and uncontrolled runoff. In the interim condition, the uncontrolled areas include the rear yards adjacent to Carp Creek, and the future development drainage areas that follow pre-development drainage patterns and drain to Carp Creek. During ultimate conditions, only rear yards adjacent to Carp Creek are uncontrolled.

In **Table 4** the total post-development peak flows to Carp Creek during interim and ultimate conditions are compared with the allowable pre-development release rates. Allowable pre-development release rates are from the *Stormwater Site Management Report (*Novatech, April 2015*)*. Refer to Excerpts provided in **Appendix B**.

Table 4: Comparison of Peak Flows

Peak Flow (L/s)	4-hour Chicago			12-hour SCS		
	2yr	5yr	100yr	2yr	5yr	100yr
Pre-Development (SWMHYMO)						
TOTAL (Pre)	263	500	1,379	333	590	1,537
Post-Development - Interim (PCSWMM)						
Total Controlled	40	69	197	42	78	200
Total Uncontrolled	150	304	869	70	199	531
TOTAL (Post)*	**159**	**314**	**965**	**87**	**234**	**670**
Difference (Post-Pre)	*-104*	*-186*	*-414*	*-246*	*-356*	*-867*
Post-Development - Ultimate (PCSWMM)						
Total Controlled	122	182	959	156	193	1053
Total Uncontrolled	70	186	624	31	136	361
TOTAL (Post)*	**124**	**256**	**978**	**158**	**294**	**1085**
Difference (Post-Pre)	*-139*	*-244*	*-401*	*-175*	*-296*	*-452*

**Value taken from system outflow; accounts for the timing of the hydrographs.*

The post-development model results provided above are based on the 'system outflows' as reported in the PCSWMM output files. The total (or system) peak flow accounts for differences in timing of the individual peak flows at the various outfall locations when adding up the total post-development flow. Based on the post-development model results, the total post-development flow to Carp Creek will be below the previously established pre-development flow rates.

Inlet Control Devices (Minor System)

The proposed inlet control devices (ICDs) have been sized to control inflows to the storm sewer to the approximate 2-year peak flow at each inlet, as well as to reduce the 100-year HGL elevation in the storm sewers. Since the ICDs are sized to capture the 2-year peak flow, there will be no ponding within the rights-of-way during the 2-year event. The selection of ICDs takes into account the overland flow that bypasses on-grade catchbasins by providing additional capacity at the downstream inlets. A detailed list of ICD sizes and flow is provided in **Appendix D** and summarized in **Table 5** below.

Table 5: Inlet Control Device Sizes and Design Flows

ICD Location	ICD Size & Inlet Rate					2-year Approach Flow	
	Diameter 1 (mm)	Diameter 2[1] (mm)	Max Head (m)	2-yr ICD Flow Rate		Rational Method (L/s)	PCSWMM[2] (L/s)
				Calculated (L/s)	PCSWMM[2] (L/s)		
Phase 1B-1 (Existing)							
Road CBs (in sag)							
CB118-119[3]	127	127	1.80	93.3	84.0	63.2	85.7
CB126-127[3]	127	-	1.94	48.4	33.6	35.1	35.0

ICD Location	ICD Size & Inlet Rate					2-year Approach Flow	
	Diameter 1 (mm)	Diameter 2[1] (mm)	Max Head (m)	2-yr ICD Flow Rate		Rational Method (L/s)	PCSWMM[2] (L/s)
				Calculated (L/s)	PCSWMM[2] (L/s)		
Road CBs (on-grade)							
CB120-121	94	-	2.09	27.6	24.8	33.6	51.1
CB122-123	94	-	2.04	27.2	24.8	37.1	43.7
CB124-125	94	-	2.00	27.0	22.0	25.6	29.4
CB128-129	94	-	1.95	26.6	24.8	27.8	41.6
CB130-131	94	-	1.95	26.6	24.6	30.4	39.7
CB132-133	94	-	1.95	26.6	24.2	29.0	34.4
CB134-135	94	-	1.95	26.6	20.8	26.1	27.6
CB136-137	94	-	1.85	25.9	15.2	18.7	19.8
CB138-139[4]	94	94	1.95	26.6	14.7	14.9	19.0
CB140-141	94	-	1.95	26.6	9.8	14.4	12.3
CB142-143	94	-	1.94	26.6	10.2	17.8	15.7
CB157-158	94	-	1.87	26.1	24.8	27.7	29.4
CB159-160	83	83	1.76	39.4	17.5	23.5	21.3
Phase 1B-2 (Proposed)							
Road CBs (in sag)							
CB-161A-B	152	127	1.02	85.6	77.9	66.3	78.5
CB-163A-B	108	108	1.05	51.5	43.6	24.9	44.6
CB-164A-B	127	127	1.04	70.8	69.1	67.5	69.8
CB-165A-B	152	127	1.02	85.6	76.0	74.0	76.6
CB-166A-B	94	83	1.05	34.8	34.1	33.7	34.9
CB-167A-B	94	94	1.05	39.1	37.3	38.1	37.9
Road CBs (on-grade)							
CB-162A-B	108	108	1.15	53.9	49.7	57.2	59.8
CB-168A-B	83	83	1.16	32.0	27.3	32.3	33.4
CB-169A-B	83	83	0.98	29.4	26.1	34.6	36.3
Rear Yard CBs							
CB170	200	-	1.57	108.1	58.0	49.9	58.0
CB176	200	-	1.21	94.9	40.3	34.9	40.3
CB177	178	-	1.76	90.7	55.6	55.8	55.6
CB184	152	-	0.64	40.0	31.3	31.9	31.3
CB187	94	-	1.15	20.5	19.0	21.2	19.0
CB188	250	-	0.75	116.4	55.4	53.7	55.4
CB194	178	-	1.70	89.1	36.7	35.4	36.7
CB195	152	-	0.72	42.4	29.2	29.0	29.2
CB200	152	-	1.77	66.4	37.4	38.1	37.4

[1] *Diameter 2 is specified where pairs of roadway catchbasins are not interconnected and have separate ICDs.*

[2] *From PCSWMM Model, 2-year 4-hour Chicago storm distribution.*

[3] *CB118-119 and CB126-127 required new ICDs due to impacts from Phase 1B-2.*

[4] *CBs 138 and 139 are interconnected but there will be an ICD installed on both CB leads. This is due to the Phase 1B-1 design drawings incorrectly indicated an ICD in the upstream CB. An ICD was installed in the downstream CB in order to control flows as intended. Only the downstream ICD was accounted for in the PCSMM model. The ICD in the upstream CB will not affect ponding as these CBs are on grade.*

Major System

The major system network was evaluated using the PCSWMM model to ensure that the ponding depths will conform to City standards. For the Ultimate Conditions scenario, it is assumed that the overland flow route from the future development area to the East SWM Facility will not be routed though the Phase 1B-2 development and therefore will have no impact on the major system design for Phase 1B-2. Therefore, the major system model results are only provided for the interim condition scenario:

- **Table 6** provides a summary of ponding depths for the full range of storm events (2yr to 100yr and stress test).
- **Table 7** provides a summary of the major system analysis for the 100yr and stress test events (static and dynamic ponding, depth x velocity).

An extended table with additional information on the major system is provided in **Appendix D**. The model results demonstrate that the major system design for Phase 1B-2 meets all applicable City guidelines and standards:

- There is no ponding in the rights-of-way during the 2-year event.
- The maximum ponding depths do not exceed 0.35m for all storms up to and including the 100-year event.
- The product of the 100-year flow depth (m) and flow velocity (m/s) within the rights-of-way does not exceed 0.60.
- The model results for the stress-test show that while ponding depths in some locations will exceed 0.35m but the water level will not touch any part of the building envelope and will remain below the lowest building opening.

Table 6: Ponding Depths and Volumes

Structure	Max. Static Ponding		Ponding Depth (m)			
	Depth (m)	Vol (m^3)	2-year	5-year	100-year	100-year + 20%
Phase 1B-1						
CB118-119	0.20	35.0	0.00	0.14	0.31	0.37
CB126-127	0.23	49.5	0.00	0.06	0.35	0.40
Phase 1B-2						
ROW						
CB-161A-B	0.25	57.9	0.00	0.10	0.28	0.32
CB-163A-B	0.08	1.7	0.00	0.12	0.22	0.26
CB-164A-B	0.23	38.3	0.00	0.10	0.23	0.27
CB-165A-B	0.06	3.2	0.00	0.08	0.16	0.18
CB-166A-B	0.12	4.3	0.00	0.03	0.23	0.27
CB-167A-B	0.10	5.6	0.00	0.10	0.20	0.22
Rear Yards						
RYCB171	-	-	0.00	0.11	0.28	0.31
RYCB178	-	-	0.00	0.10	0.25	0.30
RYCB183	-	-	0.00	0.10	0.29	0.35
RYCB186	-	-	0.00	0.06	0.11	0.13

Structure	Max. Static Ponding		Ponding Depth (m)			
	Depth (m)	Vol (m^3)	2-year	5-year	100-year	100-year + 20%
RYCB189	-	-	0.00	0.10	0.30	0.35
RYCB193	-	-	0.00	0.06	0.22	0.27
RYCB196	-	-	0.00	0.11	0.23	0.28
RYCB199	-	-	0.00	0.12	0.27	0.32
RYCB201	-	-	0.00	0.00	0.28	0.32

[1] Flow Depth from PCSWMM model 4-hour Chicago Storm Event.

Table 7: Major System Flow Depths and Velocities

Location	100-year					100-year +20%			
	Peak Flow (m^3/s)	Velocity (m/s)	Max. Static Depth (m)	Total Depth (static + dynamic) (m)	Velocity x Depth (m^2/s)	Peak Flow (m^3/s)	Velocity (m/s)	Total Depth (m)	Velocity x Depth (m^2/s)
Phase 1B-2									
Catchbasins at Low Points									
CB-161A-B	0.310	0.34	0.25	0.28	0.10	0.404	0.34	0.32	0.11
CB-163A-B	0.406	0.44	0.08	0.22	0.10	0.658	0.46	0.26	0.12
CB-164A-B	0.218	0.09	0.23	0.23	0.02	0.266	0.15	0.27	0.04
CB-165A-B	0.272	0.33	0.06	0.16	0.05	0.374	0.41	0.18	0.07
CB-166A-B	0.301	0.23	0.12	0.23	0.05	0.518	0.34	0.27	0.09
CB-167A-B	0.208	0.51	0.10	0.20	0.10	0.289	0.56	0.22	0.12
Catchbasins On-Grade									
CB-162A-B	0.258	0.41	-	0.11	0.05	0.415	0.42	0.14	0.06
CB-168A-B	0.106	0.00	-	0.08	0.00	0.130	0.00	0.10	0.00
CB-169A-B	0.149	0.33	-	0.07	0.02	0.195	0.36	0.08	0.03
High Points									
01+722	0.218	0.51	-	0.09	0.05	0.390	0.63	0.11	0.07
01+777	0.121	0.41	-	0.07	0.03	0.169	0.42	0.08	0.03
09+412	0.074	0.64	-	0.05	0.03	0.111	0.68	0.06	0.04
09+756	0.661	0.82	-	0.12	0.10	1.100	0.87	0.17	0.15
10+018	0.200	0.88	-	0.10	0.09	0.421	1.00	0.13	0.13
10+070	0.143	0.33	-	0.07	0.02	0.240	0.41	0.09	0.04
10+093	0.045	0.33	-	0.04	0.01	0.093	0.36	0.05	0.02
10+140	0.104	0.21	-	0.19	0.04	0.138	0.26	0.21	0.05
10+171	0.000	0.00	-	0.00	0.00	0.000	0.00	0.00	0.00
11+166	0.076	0.13	-	0.03	0.00	0.137	0.29	0.07	0.02
11+251	0.000	0.00	-	0.00	0.00	0.000	0.00	0.00	0.00
11+305	0.000	0.00	-	0.00	0.00	0.000	0.00	0.00	0.00
11+411	0.016	0.13	-	0.01	0.00	0.085	0.23	0.04	0.01

Hydraulic Grade Line (HGL)

The results of the HGL analysis were used to ensure that a minimum freeboard of 0.30m is provided between the 100-year HGL and the designed underside of footing elevations. The HGL elevations were evaluated for both the interim and ultimate conditions. The ultimate conditions model results show higher HGL elevations (compared to interim conditions) and demonstrate that Phase 1B-2 will not have any HGL concerns when the future development area is developed.

The 100-year HGL (ultimate condition) is indicated on the Plan and Profile Drawings. The 100-year HGL elevations for the Ultimate condition at each storm manhole with the respective underside of footing are provided in **Table 8.** This same table includes the results of the stress test showing that underside of footing elevations (USF) are above the stress test HGLs (100-year +20% event). More detailed tables for both the interim and ultimate condition HGLs are provided in **Appendix D**.

Table 8: Hydraulic Grade Line Elevations (Ultimate Condition)

Manhole ID	Pipe / MH Information		HGL Information[1]		Design USF	Clearance from USF	
	MH Invert Elev.	MH T/G Elev.	100-year	100-year (+20%)		100-year	100-year (+20%)
	(m)	(m)	(m)	(m)	(m)	(m)	(m)
Phase 1B-2							
MH266	115.02	117.89	115.35	115.54	115.96	0.61	0.42
MH267	114.34	117.29	114.86	114.94	115.36	0.50	0.42
MH268	114.14	117.39	114.78	114.86	115.36	0.58	0.50
MH269	113.20	116.97	114.63	114.70	115.01	0.38	0.31
MH270	113.02	117.07	114.45	114.51	115.01	0.56	0.50
MH271	112.81	116.49	114.13	114.18	114.56	0.43	0.38
MH272	112.65	116.57	113.98	114.02	114.61	0.63	0.59
MH273	112.36	116.04	113.51	113.53	113.90	0.39	0.37
MH274	112.25	116.02	113.33	113.34	113.86	0.53	0.52
MH275	111.61	115.11	113.15	113.22	-	-	-
MH276	111.52	115.31	113.12	113.19	-	-	-
MH277	111.46	115.29	113.09	113.17	-	-	-
MH278	111.42	115.23	113.06	113.15	-	-	-
MH279	113.89	116.22	114.86	114.93	-	-	-
MH280	112.92	115.71	113.56	113.58	113.90	0.34	0.32
MH281	114.97	117.33	115.46	115.48	-	-	-
MH-FUT	111.46	115.29	113.09	113.17	-	-	-
Vortech-1929CIP-A	111.48	115.39	113.10	113.18	-	-	-
Vortech-1929CIP-B	111.48	115.39	113.10	113.18	-	-	-

(1) *HGL information is for a 4-hour Chicago Storm Distribution*

2.3.5 East SWM Facility

The East SWM Facility, designed for the East Community (Phases 1B-1, 1B-2, and future lands), was approved by the MOECC to meet the quality and quantity criteria noted in **Section 2.1**, and was constructed as part of the Phase 1B-1 works. The facility consists of a Vortechs treatment unit (Model 9000) to provide quality control of the Phase 1B-1 stormwater runoff, a dry pond to provide quantity control, and a cooling trench to provide outlet temperature control. Refer to **Appendix H** for a copy of the Environmental Compliance Approval (ECA) for the East Stormwater Management Facility. It should be noted that the East SWM Facility is a dry pond and is not intended to be fish habitat.

Summary of Design Revisions

The East Community subdivision design has been revised with increased unit density since the Stormwater Site Management Report (Novatech, April 2015). As a result, modifications are required to the East SWM Facility to accommodate Phase 1B-2 and the future development lands:

- The storm drainage system for Phase 1B-2 has changed from rural ditching to storm sewers, with an increase in lot density and runoff coefficient.
- A new inlet to the East SWM Facility is proposed to connect the Phase 1B-2 storm sewers and major overland drainage, including a new hydrodynamic separator to provide stormwater quality control for Phase 1B-2.
- To provide water quality treatment for the future development lands, the new inlet to the East SWM Facility has been designed to accommodate a second hydrodynamic separator, operating in a parallel configuration.
- The cooling trench in the East SWM Pond will be expanded to provide additional capacity for Phase 1B-2 due to increased runoff volumes resulting from the change from ditches and culverts to storm sewers.

The outlet structure from the SWM Facility consists of the cooling trench, a 300mm CSP culvert, and a 1.2m wide rectangular flow control weir embedded into the side slopes of the SWM facility. The top of the rectangular weir has been designed as a trapezoidal emergency spillway to convey flows above the 100-year event. A rip-rap lined outlet swale directs flows from the SWM facility to the bank of the main channel of Carp Creek. To more accurately simulate outflows from the pond for different storm events and boundary conditions, each component of the outlet structure has been represented separately in the PCSWMM model (as opposed to using a combined outlet rating curve).

Pond Inlet and Inlet Swale

The new inlet to the East SWM Facility consists of a headwall to a swale that connects to the existing SWM facility. During full buildout of the future lands, the SWM Facility will be expanded to accommodate for the increased runoff due to changes in the lot density of Phase 1B-2 and the future development area. The proposed design of the new SWMF inlet places the headwall near the edge of the SWM block to account for this future expansion and eliminate the requirement to relocate the headwall. The inlet swale is proposed as an interim measure to connect the inlet headwall to the SWM Facility prior to the pond expansion. There is a separate major system inlet swale that conveys major system runoff to the SWM facility.

Erosion control measures for the pond inlet pipe are proposed at the headwall for the minor pond inlet flows. The SWMF inlet requires 150mm diameter riprap as shown on **Drawing 102085-SWMF5.** Riprap sizing calculations are provided in **Appendix E**.

The PCSWMM model reports that the 100-year flow in the swale from the headwall to the SWM Facility during the interim condition is 1,956 L/s at a depth of 0.77 to 0.96m, which is well within the capacity of the swale (the swale is at least 3m deep). The 100-year velocity in the swale is approximately 1m/s, which should not require any supplemental erosion control measures as grass is able to handle this velocity without any erosion concerns. The major system inlet swale has deemed to have similar erosion control requirements as the inlet swale from the headwall.

The major system inlet swale collects runoff from Phase 1B-2 and the interim infiltration swale that captures runoff from the undeveloped future development lands. The interim swale connects to the major SWM pond inlet through a 600mm diameter culvert that crosses under the gravel access road. This culvert was sized to convey the 5-year interim flows from the future development lands. Storm events above the 5-year would overtop the gravel access road and continue along the major system inlet swale to the SWM facility. The future flows during the ultimate conditions will depend on available roadway surface (ponding) storage, which is unknown at this time. Sizing of the culvert will be reviewed for the ultimate condition at the time of the detailed design of the future development lands. Interim culvert sizing was done in HY-8, refer to **Appendix E** for the sizing report.

Temperature Mitigation

Temperature mitigation is provided by a cooling trench within the East SWM Pond. The Cooling trench was originally sized to provide cooling for the first 5mm of runoff from the urban portion of the development as documented in the Stormwater Site Management Report (Novatech, April 2015).

In the 2015 design, the roadside ditches within Phase 1B-2 would provide sufficient capacity to infiltrate the first 5mm of runoff from this area, thus not requiring any additional temperature mitigation. With the change from ditches and culverts to storm sewers, there will be an increase in runoff from Phase1B-2 which will require the expansion of the existing cooling trench within the East SWM Facility.

The cooling trench sizing calculations from the 2015 SWM Report was updated to reflect the new 5mmm flows to the East SWM Facility based on the PCSWMM model results. A new section of cooling trench will be constructed in the East SWM Facility starting at the new storm inlet and connecting to the existing cooling trench as shown on **Drawing 102085-SWMF5**. The new section of cooling trench will have the following dimensions and materials:

Length:	105m
Depth:	0.3m
Width:	4.0m
Material:	50mm diameter limestone wrapped in non-woven geotextile

The geotextile wrap on the existing cooling trench will need to be opened up at the connection with the new section to create a continuous flow path through the stone and ensure that the geotextile does not impede flow through the trench.

Updated calculations for the cooling trench are provided in **Appendix E**. For more details on the cooling design, refer to excerpts of the Stormwater Site Management Report (Novatech, April 2015), provided in **Appendix B**. The Ultimate build-out condition may require further expansion of the cooling trench and would be addressed as part of any future development.

Model Results Comparison

The results of the PCSWMM analysis were used to confirm that the existing East SWM Facility has sufficient capacity to provide the required stormwater quantity and quality controls and does not need to be expanded as part of Phase 1B-2.

The full build out of the future lands (ultimate condition) will require the expansion of the East SWM pond to accommodate additional flows due to changes in the subdivision layout, lots sizes and road cross-section from a rural design to a more urbanized design. The stage-storage curve used in the ultimate condition model is based on a conceptual future expansion within the existing SWM block near the proposed Phase 1B-2 inlet. The SWMF block provides significant room for additional expansion, so there is no concern that additional land will be required in the future to maintain the design operating levels in the East SWM Pond.

Table 9 provides a comparison of the modeled water levels and release rates for the East SWM Facility for the following scenarios:

- Approved Phase 1 Design (2015)
- Interim Conditions - Phase 1B-2 (2024)
- Ultimate conditions – Phase 1B-2 and Future Lands (with conceptual SWMF expansion)

Table 9: East SWM Pond Stage-Storage-Discharge

Return Period	**Elevation (m)**	**Depth (m)**	**Volume (m^3)**	**Release Rate (L/s)**				
				Trench	**Culvert**	**Weir 1**	**Weir 2**	**Total**
Original Design - Phase 1 (2015) ***(1)***								
Cooling Trench	*110.05*	*0.30*	*82*	*25*	*0*	*0*	*0*	*25*
Bottom of Pond	111.05	0.00	82	25	0	0	0	25
1:2 Year	111.68	0.63	5,153	25	201	0	0	226
1:5 Year	112.07	1.02	8,447	25	261	0	0	286
1:100 Year	112.71	1.66	17,020	25	336	819	0	1,180
Interim Condition - Phase 1B-2 ***(2)***								
Cooling Trench	*109.24*	*0.30*	*127*	*0*	*0*	*0*	*0*	*0*
Bottom of Pond	110.75	0.00	127	0	0	0	0	0
1:2 Year	111.30	0.55	2,250	13	30	0	0	43
1:5 Year	111.44	0.69	3,353	14	64	0	0	78
1:100 Year(3)	112.16	1.41	11,293	15	186	0	0	201
Ultimate Condition – Phase 1B-2 and Future Lands with SWMF Expansion ***(2)***								
Cooling Trench	*109.24*	*0.3*	*127*	*0*	*0*	*0*	*0*	*0*
Bottom of Pond	110.75	0.00	127	0	0	0	0	0
1:2 Year	111.72	0.97	7,327	17	141	0	0	158
1:5 Year	111.97	1.22	10,644	19	174	0	0	193
1:100 Year(3)	112.71	1.96	22,199	19	225	808	0	1052

(1)SWMHYMO model resuts for a 12-hour SCS storm distribution (2015 critical design storm for pond).
(2)PCSWMM model results for a 12-hour SCS storm distribution (2024 critical design storm for pond).
(3)'Fixed' outfall conditions for 100-year storm event (111.44m – 100-year water level in Carp Creek).

Outlet Structure Component	*Invert/Crest Elevation*
200mm Perforated Pipe (Cooling Trench)	109.50m – 110.35m (perched pipe)
300mm CSP Culvert	111.10m – 111.00m (19m length)
1.20m Rectangular Weir	112.20m (0.51m height)
4.60m Trapazoidal Weir (3:1 Side Slopes)	112.71m (0.23 height)

There are minor changes to the SWMF operating levels between the 2015 design and this report. The changes are primarily due to the increased lot density and other changes to the subdivision layout, but also as a result of switching from SWMHYMO to PCSWMM. The PCSWMM model provides additional hydraulic analysis capabilities such as dynamic storage within the roadways and the ability to represent downstream boundary conditions.

- The total available storage in the East SWM Facility exceeds the 100-year storage requirements for Phase 1B-2. Refer to the Stage-Storage table provided in **Appendix E**.

3.0 WATER BALANCE (INFILTRATION)

The Stormwater Site Management Report (Novatech, 2015) included water balance calculations to estimate the impacts of development on the hydrologic cycle and estimate the performance of proposed infiltration Best Management Practices (BMPs). The water balance calculations were completed for both the East and West Residential Communities, based on pre- and post-development conditions (for full build-out of the Draft Approved residential lands). A BMP Land Use Parameters table is provided in **Appendix F** and is based on a combination of Table 3.1 in the MOE SWM Planning and Design Manual and the Carp River Subwatershed Study which were established as part of the approved Stormwater Site Management Report (Novatech, 2015).

The pre-development land use for the West and East Communities consisted of pasture / meadow and woodlands. Development increases impervious areas, thereby reducing infiltration rates and increasing runoff volumes. A summary of the pre and post-development infiltration rates, without implementing infiltration measures is shown below:

Average Annual Infiltration Rate	*Pre-Dev.*	*Post-Dev.*
West Community	232 mm	154 mm
East Community	250 mm	190 mm

Based on the subdivision layout from the 2015 design, it was recognized that the ditches and culverts proposed for the East Residential Community would provide better opportunities for infiltration compared to the urban (storm sewers) design of the West community. The East Community also covers a significantly larger area than the West Community. As such, it was proposed that infiltration measures would be implemented primarily within the East Community and that they would be designed to offset the reduction in infiltration in the West Community under post-development conditions.

Based on changes to the storm servicing design for the West Community from ditches and culverts to storm sewers, there are more constraints to incorporating infiltration measures, particularly within the rights-of-way. Subsurface infiltration systems are not well suited to this area due to relatively shallow groundwater depths. Furthermore, the site is subject to grade raise restrictions as described in the Geotechnical Investigation Report (Paterson, January 16, 2023), which limits the flexibility of filling the site to raise the finished grade which could allow for additional vertical separation from the existing groundwater elevation. Due to these restrictions and based on discussions with City staff, the approach moving forward is to promote as much infiltration as possible using the lot-level best management practices described in the following sections.

The Geotechnical Report provides groundwater elevations during summer/fall, which is appropriate for infiltration measures as infiltration in the water balance calculations is only accounted for from May to October. Higher groundwater levels in the spring should not adversely impact the anticipated infiltration during the intended operating period of the infiltration measures.

3.1 West Residential Community (Phase 1A & 2A)

West Residential Community will achieve 164mm of annual infiltration based on the site conditions and BMPs installed within the development. The installed BMPs consist of rear yard infiltration trenches (0.40m x 1.50m, 40% void ratio) which store and infiltrate runoff from 1.30 ha of rear yards.

3.2 East Residential Community (Phase 1B-1 & 1B-2)

Various infiltration measures are proposed to in Phase 1B-2 to enhance the annual infiltration for post-development conditions. These measures include rear yard infiltration trenches, and interim swales and rock check dams, which are all described in detail below. Infiltration sizing calculations are provided in **Appendix F**. The locations and details of the rear yard infiltration trenches, and interim swales and rock check dams are shown on the Infiltration Measures Plan (**102085-INF2**).

Temporary Infiltration Swale (Phase 1B-1)

To address the reduction in infiltration associated with the development of Phase 2A (West Residential Community), temporary infiltration swales with riprap check dams were constructed along the western limit of Phase 1B-1 (within the Phase 1B-2 lands). These infiltration swales served to meet pre-development infiltration measures throughout the development of the West Capital Airpark Residential Communities. With the construction of Phase 1B-2, these infiltration swales will be removed and are no longer accounted for the in the water balance.

Rear Yard – Infiltration Trenches (Phase 1B-2)

Rear yard infiltration trenches have been provided in Phase 1B-2. The proposed infiltration trenches (1.0m x 1.45m, 40% void ratio) will store and infiltrate runoff from a total contributing area of 4.15ha. A total of 872.3m of infiltration trenches will provide a 531.6m^3 of total storage for infiltration. Some sections may not be 1.0m above the seasonal high groundwater, however, they are designed at the standard depth for City of Ottawa rear yard subdrain system. This is consistent with the proposed best management practices approach.

Infiltration Swales and Check Dams (Phase 1B-2)

As part of the Phase 1B-2 works, swales are proposed within the adjacent undeveloped lands to capture runoff from these lands before it enters the East SWM pond. Earth check dams lined with rip-rap will be provided at specified intervals within the swales to attenuate and infiltrate runoff from an area of 23.26ha, providing 116.7 m^3 of total storage for infiltration.

When the lands to the east are developed, the infiltration swales would be removed and replaced with measures constructed with the future development.

Construction

In accordance with the MECP SWM Planning & Design Manual (2003) the following measures should be followed during construction to ensure proper operation of the infiltration measures:

- *Basins should be constructed at the end of the development construction;*
- *Smearing of the native material at the interface with the basin floor must be avoided and/or corrected by raking or roto-tilling; and*
- *Compaction of the basin during construction must be minimized.*

During construction erosion and sediment control measures are required to prevent sediment accumulation and clogging of the infiltration systems. This includes, but is not limited to, geotextile or filter bags placed under the lid of each rear yard catchbasin. They must be kept in place and regularly inspected until sod or vegetation has fully established. Routine maintenance during construction may also be required.

Post-Construction Maintenance

The infiltration trenches will collect and infiltrate only rear yard drainage which consists of rooftop areas and vegetated yards. These areas are considered ‘clean’ drainage. In addition, roof leaders are directed to grassed yards. As such, there is not anticipated to be any significant sediment contributions post-construction that could potentially clog the subdrains. Therefore, no regular maintenance is anticipated.

3.3 Water Balance Summary and Conclusion

The drainage areas used in the revised water balance calculations for the west and east residential developments are 23.22 ha and 58.19 ha, respectively. The overall water balance (weighted by area) for both the West and East Residential Communities is summarized in **Table 10**. The overall annual infiltration (weighted by area) for both the West and East Residential Communities is summarized in **Table 11.** Supporting calculations are provided in **Appendix F.**

Table 10: Pre vs. Post Development Water Balance (mm)

Location	Area	Total Precip.	Infiltration		Runoff [1]		Actual ET	
			PRE	POST	PRE	POST	PRE	POST
West Residential Community	23.32 ha	944	232	164	182	391	530	389
East Residential Community	58.19 ha		250	250	144	187	550	508
Total (Weighted by Area)	81.51 ha	944	245	225	155	245	544	474

[1] *The SWM facilities have been designed to provide quantity control to maintain pre-development flow rates.*

Table 11: Comparison of Average Annual Infiltration Rates (mm)

Location	Area	Pre-Development	Post-Development (no BMPs) [1]	Post-Development (with BMPs)
West Residential Community	23.32 ha	232	154	164
East Residential Community	58.19 ha	250	190	250
Total (Weighted by Area)	81.51 ha	245	180	225

[1] *From the Stormwater Site Management Report (Novatech, 2015).*

The conclusions based on the results of the water balance analysis are as follows:

- The existing infiltration measures constructed within the West Community and the proposed infiltration measures proposed for Phase 1B (infiltration trenches and infiltration swales / rock check dams will increase post-development infiltration rates for both the East and West Communities as much as possible.

- When the lands to the east are developed, the infiltration swales could be removed and replaced with measures constructed with the future development.

4.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures will be implemented during construction in accordance with the “Guidelines on Erosion and Sediment Control for Urban Construction Sites” (Government of Ontario, May 1987). Proposed erosion and sediment control measures are shown in the Erosion and Sediment Control Plan (**102085-ESC3**).

Inspections of erosion and sediment control measures will be required daily during active construction, and immediately after every rainfall event (a minimum of 25 mm of rain in any 24-hour period), significant snowmelt event (melting of snow at a rate which adversely affects the performance and function of the system), and any extreme weather event. It will be required to repair any damaged or nonfunctioning measures immediately. Inspections and maintenance of erosion and sediment control measures would continue until they are no longer required.

The contractor will be required to:

- Identify and rectify any deficiencies and undertake necessary maintenance measures as soon as possible.
- Ensure that records of inspection, including at a minimum, the inspector’s name, date of inspection, visual observations, and any necessary remedial measures to maintain the interim erosion and sediment control measures.

In order to preserve the proper operation of the infiltration trenches, appropriate measures should be followed during construction as described in **Section 3.2**. Compaction of the underlying native soils should be avoided. Inlets to the infiltration trenches should be protected from sediments using geotextile or filter bags placed under the lid of each rear yard or roadside catchbasin. They must be kept in place and regularly inspected until sod or vegetation has fully established. Routine maintenance during construction may also be required to protect the subdrains from clogging.

The contractor is advised that the existing Vortechs unit will remain in service during construction. The contractor is responsible to maintain free of debris, monitor on a regular basis, and clean as required.

5.0 CONCLUSIONS

This report has been prepared to address storm water management related conditions of Final Approval for the proposed West Capital Airpark Phase 1B-2 Residential Subdivision.

The conclusions are as follows:

- The proposed storm sewer system will direct stormwater to the existing East Stormwater Management Facility which has sufficient capacity to provide quantity control of stormwater from the proposed development.
- Quality control will be provided by an additional Vortechs Model 1929CIP hydro-dynamic separator for Phase 1B-2.
- Inlet control devices have been sized to control the inflows to the storm sewers for the 2-year storm event and to control the Hydraulic Grade Line (HGL) elevation.
- The USF elevations are at least 0.3m above the HGL elevation in the storm sewers during the 100-year storm event. The USF elevations are above the HGL elevation in the storm sewers during the stress test event.
- Runoff from upstream external drainage areas are directed around the perimeter of the site by existing and/or proposed swales and ditches.
- The infiltration trenches and infiltration swales / rock check dams will increase post-development infiltration rates as much as possible.
- When the lands to the east are developed, the infiltration swales would be removed and replaced with measures constructed with the future development.
- Erosion and sediment control measures would be implemented during construction.

NOVATECH

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APPENDIX A
Documentation and Conditions of Final Approval

1) Conditions of Final Approval
2) Phase 1 Subdivision Agreement – Schedule I
3) City Review Comments Email and Attachments (email received November 29, 2023)
4) Response to City Review Comments (dated February 23, 2024)
5) City Stormwater Review Comments (dated March 26, 2024)
6) City Stormwater Operations Comments (dated April 10, 2024)
7) Response to City Stormwater Review Comments (dated May 14, 2024)
8) Response to City Stormwater Operations Comments (dated May 14, 2024)
9) City Stormwater Review Comments (received June 12, 2024)
10) City Stormwater Operations Comments (received June 13, 2024)
11) Response to City Review Comments (dated June 28, 2024)

File: D07-16-22-0017

CONDITIONS FOR DRAFT APPROVAL
1514947 ONTARIO INC.
CARP AIRPORT COMMUNITY 1500 THOMAS ARGUE RD.
DRAFT APPROVED 00/00/2023.
REVISED DD/MM/YYYY
DRAFT APPROVAL EXTENDED FROM DD/MM/YYYY TO DD/MM/YYYY

INDEX

The City of Ottawa's conditions applying to the draft approval of 1514947 Ontario Inc. Carp Airport Community (1500 Thomas Argue Road) Subdivision are as follows:

		This approval applies to the draft plan certified by John Gutri, Ontario Land Surveyor, dated September, 16, 2022, showing 77 residential lots, 4 blocks and 1 future block for streets, 2 residential blocks for 30 townhomes, 1 future residential block, 2 servicing blocks, 1 open space block. This approval applies to the approved conceptual plans and reports in support of the draft plan as follows (list plans, reports and studies associated with the draft approval): • Draft Plan of Subdivision, by Novatech, dated September 2022 • Draft Plan of Condominium, by Novatech, dated October 2022 • Planning Rationale, by Novatech, dated September 1, 2022 • Phase One Environmental Site Assessment, by GEMTEC, dated August 12, 2022, Project No.: 101491.002 • Species at Risk Assessment, by Muncaster Environmental Planning Inc., dated February 17, 2023 and addendums • Geotechnical Investigation, by Paterson Group Inc., Revision 1, dated January 16, 2023, Report No. PG2450-2 West Capital Airpark, Phase 1B-2 Residential Serviceability and Conceptual Stormwater Management Report (R-2023-106), prepared by Novatech, revised June 20, 2023 • Transportation Impact Study REV 1 (R-2011-168) prepared by Novatech dated November 18, 2011 • Integrated Environmental Review prepared by Muncaster Environmental Planning Inc. dated March 2007 Subject to the conditions below, these plans and reports may require updating and/or additional details prior to final approval.	
		The Owner agrees, by entering into a Subdivision Agreement, to satisfy all terms, conditions and obligations, financial and otherwise, of the City of Ottawa, at the Owner's sole expense, all to the satisfaction of the City.	**Clearing Agency**[i]
		General	
1.		Prior to the issuance of a Commence Work Notification, the Owner shall obtain such permits as may be required from Municipal or Provincial authorities and shall file copies thereof with the General Manager, Planning, Real Estate and Economic Development Department.	**OTTAWA Planning**
2.		Prior to commencing construction, the Owner shall enter into a subdivision agreement with the City. The subdivision agreement shall, among other matters, require that the Owner post securities in a format approved by the	**OTTAWA Planning**

		City Solicitor, in an amount of 100% of the estimated cost of all works, save and except non-municipal buildings. The aforementioned security for site works shall be for works on both private and public property and shall include, but not be limited to, lot grading and drainage, landscaping and driveways, roads and road works, road drainage, underground infrastructure and services (storm, sanitary, watermains), streetlights, stormwater management works and park works. The amount secured by the City shall be determined by the General Manager, Planning, Real Estate and Economic Development Department, based on current City tender costs, which costs shall be reviewed and adjusted annually. Securities for on-site works may be at a reduced rate subject to the approval of the General Manager, Planning, Real Estate and Economic Development Department. Engineering, Inspection and Review fees will be collected based on the estimated cost of the works (+HST) and a park review and inspection fee will be based on 4% (+HST) of the total value of the park works as noted herein and in accordance with the City's Fees By-law for planning applications (By-law No. 2022-239 or as amended).	
3.		The Owner acknowledges and agrees that any residential blocks for street-oriented dwelling units on the final Plan shall be configured to ensure that there will be no more than 25 units per block.	**OTTAWA Planning**
4.		The Owner acknowledges and agrees that any person who, prior to the draft plan approval, entered into a purchase and sale agreement with respect to lots or blocks created by this Subdivision, shall be permitted to withdraw from such agreement without penalty and with full refund of any deposit paid, up until the acknowledgement noted above has been executed. The Owner agrees to provide to the General Manager, Planning, Real Estate and Economic Development Department an acknowledgement from those purchasers who signed a purchase and sale agreement before this Subdivision was draft approved, that the Subdivision had not received draft approval by the City. The Owner agrees that the purchase and sale agreements signed prior to draft approval shall be amended to contain a clause to notify purchasers of this fact, and to include any special warning clauses, such as but not limited to Noise Warnings and easements.	**OTTAWA Legal**
5.		A warning clause will be inserted into the subdivision agreement and in all offers of purchase and sale agreements, to read as follows:	**OTTAWA Legal**

		• The Purchasers of Lots 1 through 4 acknowledge the sensitive environmental nature of Carp Creek, and adjacent woodlands, the importance of good stewardship practices to ensure the health and sustainability of these natural features and that it is the City's intent to protect the Carp Creek corridor and woodlots and leave them in a natural state for the long term. • The Purchaser undertakes and agrees that composters, garden plots, yard waste pile or other disturbances will not occur on City owned land. • The Purchaser undertakes and agrees that all roof leaders will be directed to pervious areas such as lawns to enhance ground water recharge. • The Purchaser acknowledges that occupancy cannot be permitted until sanitary water and storm services are in operation to the satisfaction of the City. • The Purchasers acknowledge that the lots are located in an agricultural area and may therefore be subjected to noise, dust, odours and other activities associated with an agricultural area. • The Purchasers acknowledge that they are purchasing land that is part of an active airport and as owners of land in an active airport they are subject to Transport Canada rules and regulations established for the operation of the Airport and will develop, and operate and contribute to the life cycle and operational costs of the Airport as per the terms of the MCF Agreement. • The Purchasers acknowledge that they must enter into a Common Elements Agreement for all commonly owned components of the subdivision as described in the Common Elements Condominium Agreement. The City, through the Municipal Capital Facilities Agreement, will maintain portions of the common elements treated as public systems and facilities, save and except for private communal water and wastewater systems and communal hangars and taxiways.	
6.		The Owner acknowledges that prior to registration of the plan of subdivision, the City of Ottawa shall be satisfied that the Carp Airport Amended and Restated Municipal Capital Facilities and Development Agreement, dated June 9, 2021, (MCFA), for both the Residential and Business Park components of the development, has been signed and the development is proceeding in accordance with MCFA to the satisfaction of the director of CREO.	

7.		The Owner, or his agents, shall not commence or permit the commencement of any site related works until such time as a pre-construction meeting has been held with Planning, Real Estate and Economic Development Department staff and until the City issues a Commence Work Notification.	**OTTAWA Planning**
8.		The Owner must demonstrate through a detailed phasing plan that the ratio of fifteen (15) units per Communal Hangar will be met. The development of the communal hangars, should they be outside of the core airport area, are subject to Site Plan Approval. The detailed phasing plan shall set forth, in a summary manner, the anticipated timing of the provision of the communal hangars and shall contain a sketch indicating the anticipated locations for such communal hangars.	**OTTAWA Planning**
9.		The Owner agrees that the final design of the communal hangar blocks may, as a result of the Owner's determination, require more land outside of the core airport area in order to meet the 15:1 unit/hangar ratio. If the lands for the communal hangars need to be expanded outside of the core airport area, the Owner agrees that additional lands will be provided within the development area as identified in the plan of subdivision to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department.	**OTTAWA Planning**
10.		The Owner shall not demand of the City to issue, nor shall anyone claiming title from it or under its authority, demand of the City to issue, one or more building permits to construct any building or other structure on any lot or block on the Site until: • applicable roads in the Subdivision have been connected to a public street; • the Municipal Capital Facilities Agreement (MCFA) and a Responsibility Agreement for both the Residential and Business Park components of the Development has been signed and the Development is proceeding in accordance with the MCFA and Responsibility Agreement; • access for fire fighting equipment has been provided to each building by means of a street or private roadway, which shall be designated and posted to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department. and the Emergency and Protective Services Department; • the access route has been surfaced with concrete, asphalt, or Granular "A" base capable of permitting accessibility under all climatic conditions and is continuously maintained so as to be immediately ready for use by the Emergency and Protective Services Department vehicles or any other vehicles in the event of an emergency;	**OTTAWA Planning**

		• the City has approved, where applicable, a site plan, a grading plan and a design plan for the proposed building or structure and; • the water distribution system has received all applicable Certificates of Approval from MOE; • the Sanitary Waste Treatment Facility has received all applicable Certificates of Approval from MOE; • Storm Water Management Pond has received all applicable Certificates of Approval from MOE; • a development phasing plan and a construction phasing plan have been approved by the Director of Planning Real Estate and Development and securities consistent with the phasing plan have been posted with the City of Ottawa to the satisfaction of the Director of Planning Real Estate and Development	
		Zoning	
11.		The Owner agrees that prior to registration of the Plan of Subdivision, the Owner shall ensure that the proposed Plan of Subdivision shall conform with a Zoning By-law approved under the requirements of the *Planning Act*, with all possibility of appeal to the Ontario Land Tribunal exhausted.	**OTTAWA Planning**
12.		The Owner undertakes and agrees that prior to the registration of the Plan of Subdivision, the Owner shall deliver to the City a certificate executed by an Ontario Land Surveyor showing that the area and frontage of all lots and blocks within the Subdivision are in accordance with the applicable Zoning By-law.	**OTTAWA Planning**
		Roadway Modifications	
13.		Any dead ends and/or open spaces of road allowances created by this plan of subdivision may be terminated in 0.3 metre reserves. The Owner shall place 0.3 metre reserves on the following locations: • Block 84 Future Roadblock • Block 88 (Albert Boyd Private) at the end of	**OTTAWA Planning Legal**
14.		The Owner shall provide site triangles at the following locations on the final plan: • Local Road to Local Road: 3m x 3m	**OTTAWA Planning Legal**
15.		The Owner agrees to provide a construction traffic management plan for the subdivision prior to the earlier of registration of the Agreement or early servicing. Such plan shall be to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department.	**OTTAWA Planning**

16.		All streets shall be named to the satisfaction of the Director of Building Code Services and in accordance with the Municipal Addressing By-law or the Private Roadways By-law as applicable.	**OTTAWA Planning BCS**
17.		[Development on Private Streets] The Owner covenants and agrees to: a) obtain approval for a Common Elements Condominium, or other agreement as deemed appropriate, which condominium or other agreement once registered on title, will set out the obligations between the co-Owners of the common elements for the operation and maintenance of the private streets, private watermains, private hydrants and private water services, such agreement to be to the satisfaction of the City Solicitor. b) design all private watermains within the subdivision to the satisfaction of the City, and it will pay all related costs, including the cost of connection, inspection, and disinfection by City personnel. c) install the private infrastructure services in accordance with the staging schedule approved by the City.	**OTTAWA Planning Legal**
18.		The Owner acknowledges that the construction of buildings may be restricted on certain lots and/or blocks until such time as road connections are made so that snowplow turning and garbage collection can be implemented.	**OTTAWA Planning**
19.		The Owner agrees that it shall upgrade Diamondview Road at his sole cost, from the entrance to the subdivision north to March Road <u>when required</u> by and to the satisfaction of the City of Ottawa.	**OTTAWA Planning**
20.		The Owner agrees to provide access for emergency vehicles at all times by way of providing two (2) separate and distinct accesses to the Subdivision(s); one access may be temporary during construction.	
21.		The Owner acknowledges and agrees that all construction traffic shall enter the site primarily from Carp Road and where required Thomas Argue Road. Diamondview Road will not be used as a construction access. The Owner further agrees to post signs at appropriate locations on Diamondview Road to indicate that the road is not a construction access route and that all construction traffic should access the subdivision lands from Carp Road (or Thomas Argue as appropriate). The Owner further acknowledges and agrees that he will repair any damage caused to Thomas Argue Road as a result of construction traffic associated with this development.	
22.		The Owner shall be responsible for 100% of the cost and installation of all permanent and temporary street name signs, caution signs and traffic signs that may be required in accordance with City specifications. All signs shall be	

		installed and located to the satisfaction of the City and installed prior to the City’s acceptance of the roads within the subdivision.	
		Geotechnical	
23.		The Owner shall submit an updated geotechnical report prepared in accordance with the City’s Geotechnical Investigation and Reporting Guidelines and/or Slope Stability Guidelines for Development Applications by a geotechnical engineer or geoscientist, licensed in the Province of Ontario, containing detailed information on applicable geotechnical matters and recommendations to the satisfaction of the General Manager, Planning, Real Estate and Economic Development which include, but are not limited to: a) existing sub-surface soils, groundwater conditions; b) slope stability (including an assessment during seismic loading) and erosion protection, in addition to any building construction requirements adjacent to unstable slope; c) clearly indicate orientation of any cross-sections used in slope stability analysis and location of center of the slip circle; d) grade raise restrictions on the site and, if appropriate, the impacts this will have on the slope stability; e) design and construction of underground services to the building, including differential settlement near any buildings or structures; f) design and construction of roadway, fire routes and parking lots; g) design and construction of retaining walls and/or slope protection; h) design and construction of engineered fill; i) design and construction of building foundations; j) site dewatering; k) design and construction of swimming pools; l) design and construction of park blocks for its intended uses; and m) in areas of sensitive marine clay soils:	**OTTAWA Planning**
24.		[Sensitive marine clay soils] Subject to the specific recommendations of the geotechnical report, where applicable: a) The Owner agrees to any restrictions to landscaping, in particular the type and size of trees and the proximity of these to structures/buildings due to the presence of sensitive marine clay soils, as per the City’s Tree Planting in Sensitive Marine Clay Soils – 2017 Guidelines. b) The Owner agrees to provide the following tests, data, and information prior to zoning approval , in order to determine the sensitivity of the clay soils and how it will impact street tree planting and potentially front yard setbacks:	**OTTAWA Planning**

		i. Shear Vane analysis including remolded values per ASTM D2573. ii. Atterberg Limit testing per ASTM D4318; with the following data clearly identified, Natural water content (W), Plastic Limit (PL), Plasticity Index (PI), Liquidity Index (LI), and Activity (A). iii. Shrinkage Limit testing per ASTM D4943 with Shrinkage Limit (SL). iv. A separate section within the geotechnical report on sensitive marine clay soils, which will include a signed letter and corresponding map that confirms the locations of low, medium sensitivity (generally <40% plasticity) or high sensitivity clay soils (generally >40% plasticity), as determined by the above tests and data. v. The report identifies that foundation walls are to be reinforced at least nominally, with a minimum of two upper and two lower 15M (rebar size) bars in the foundation wall. c) In locations where all six conditions in the Tree Planting in Sensitive Marine Clay Soils – 2017 Guidelines cannot be met (e.g. if soils are generally >40% plasticity) the 2005 Clay Soils Policy will apply, meaning only small, low-water demand trees can be planted at a minimum separation distance of 7.5m from a building foundation. In these cases, the Zoning By-law will be used to ensure sufficient front yard setbacks to accommodate street trees in the right-of-way. For example, if street trees are planted in the right-of-way at a distance of 2m from the front lot line, then the minimum front yard setback would be 5.5m (7.5m – 2m).	
25.		In areas of sensitive marine clay soils, the Owner agrees that, prior to registration, to prepare an information package for homeowners regarding tree planting and watering, in accordance with the supporting geotechnical report. This information must be approved by Forestry Services prior to circulation to homeowners.	**OTTAWA Forestry**
		Pathways, Sidewalks, Walkways, Fencing, and Noise Barriers	
26.		The Owner acknowledges and agrees that all pathways, sidewalks, walkways, and fencing, are to be designed and constructed in accordance with City specifications, at no cost to the City, and to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department.	
27.		[Pathways and fencing on private lands] The Owner shall construct a 1.5 metre wide stone dust pathway(s) as well as fencing (1.5 metre black vinyl-coated chain link) connecting Chandelle	**OTTAWA Planning**

		Private to Wingover Private for the purposes of accessing the Park Block (Block 1 on Plan 4M-1512)	
28.		The Owner agrees to connect all new pathways, sidewalks, walkways to the existing pathways, sidewalks, walkways located at the following locations: • along the east and north sides of Chandrelle Private through Block 84, Block 81, on the draft plan, to Block 193, 184 and 186 on Plan 4M-1593 and, • along the north side of the extension of Albert Boyd Private (Block 87)	**OTTAWA Planning**
29.		[Chain link fence between public and private lands] The Owner agrees to design and construct 1.5 metre black vinyl-coated chain link fences in accordance with the Fence By-law at the following locations: • along the rear and side property lines of all lots adjacent to the conservation lands (Block 167 Plan 4M-1593) to clearly indicate property limits while minimizing vegetation damage and/or loss. All chain link fencing that separate public lands and residential lots and blocks shall have a maximum opening (the diamond shape area) of no greater than 37 mm in order to comply with the applicable part of the “Pool Enclosure By-Law”. The Owner agrees that any vinyl-coated chain link fence required to be installed with the exception of parks fencing shall be located a minimum of 0.15 metres inside the property line of the private property.	**OTTAWA Planning**
30.		Appropriate security fencing shall be installed by the Owner as per the MCFA Clause 7.4 j & k. (Carp Airport Amended and Restated Municipal Capital Facilities and Development Agreement, dated June 9, 2021).	**OTTAWA Planning Creo**
31.		The Owner shall insert a clause in each agreement of purchase and sale and shall be registered as a notice on title in respect of all lands which fences have been constructed stating that: “Purchasers are advised that they must maintain all fences in good repair, including those as constructed by *(developer name)* along the boundary of this land, to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department. The Purchaser agrees to include this clause in any future purchase and sale agreements”.	**OTTAWA Planning**

		Landscaping/Streetscaping	
32.		The Owner agrees, prior to registration or early servicing, whichever is earlier, to have a landscape plan(s) for the plan of subdivision prepared by a Landscape Architect, in accordance with the recommendations contained in the geotechnical report(s), the Tree Conservation Report, and/or the Environmental Impact Statement (if appropriate). The landscape plan(s) shall include detailed planting locations, plant lists which include species, plant form and sizes, details of planting methods, pathway widths and materials, access points, fencing requirements and fencing materials, other landscape features and gateway features where required. The Owner agrees to implement the approved landscape plan(s) and bear all costs and responsibility for the preparation and implementation of the plan(s). The Owner agrees that where sensitive marine clay soils are present, and the geotechnical report has satisfied the applicable conditions of the Tree Planting in Sensitive Marine Clay Soils - 2017 Guidelines, confirmation of adequate soil volumes in accordance with the subject guidelines shall be provided by a Landscape Architect prior to zoning approval. All streetscaping and landscaping plans will be subject to Transport Canada regulations. All of the aforementioned are to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department.	**OTTAWA Planning Forestry**
33.		The Owner agrees that for all single detached and semi-detached lots, a minimum of 1 tree per interior lot and 2 trees per exterior side yard lots (i.e. corner lots) shall be provided on the landscape plan(s). In areas of low/medium plasticity sensitive marine clay soils, the following exceptions in accordance with the Tree Planting in Sensitive Marine Clay Soils - 2017 Guidelines will apply in order to maximize the number of medium size trees: a) Where abutting properties form a continuous greenspace between driveways, one medium size tree will be planted instead of two small size trees, provided the minimum soil volume can be achieved. In these cases only, for the purposes of determining the minimum number of trees to be planted, one medium size tree that replaces two small trees will be counted as two trees.	**OTTAWA Planning Forestry**

		b) The medium size tree should be planted as close as possible to the middle of this continuous greenspace (in the right-of-way) to maximize available soil volume. c) On larger lots with sufficient soil volume for a medium size tree, one medium size tree will be planted on each lot (or each side of a corner lot), even if the abutting properties form a continuous greenspace between driveways. Along park frontages, the Landscape Plan shall locate trees at a 6-8 metre on-centre separation distance along the full extent of the road right-of-way abutting any park block(s). Should specific site constraints prevent the required allocation of trees, the remaining number of required trees shall be provided within any proposed park(s), open space or environmental blocks, non-residential road right-of-way frontages, stormwater management facility(s), or other suitable alternative locations, to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department.	
34.		In areas of sensitive marine clay soils where the six conditions of the Tree Planting in Sensitive Marine Clay Soils – 2017 Guidelines have been met; the following shall be provided: a) The landscape plan shall include a note indicating that is has been developed as per the geotechnical report(s) (date, author), the letter (date, author), and Map (date, title), to the satisfaction of the General Manager, Planning, Real Estate and Economic Development. b) At the time of tree planting, in addition to providing an F1 inspection form, the Landscape Architect will provide a signed letter indicating that trees have been planted with appropriate soil volume in accordance with the approved Landscape Plan, to the satisfaction of the General Manager, Planning, Real Estate and Economic Development.	**OTTAWA Planning**
		<u>Tree Conservation</u>	
35.		The Owner agrees to maintain the tree protection measures until construction is complete and/or the City has provided written permission to remove them.	**OTTAWA Planning**
		<u>Parks</u>	
36.		In accordance with the *Planning Act* and the City of Ottawa Parkland Dedication By-law, the parkland dedication requirement has been based on the proposed residential use and calculated at a rate of 5% of the gross land area (residential <18units/ha).	**OTTAWA Parks**

Based on the estimated gross land area of for this subdivision for a parkland dedication requirement of 0.369 hectares, as shown in the table below.

Parkland Dedication Required:	***1B-2 Residential 107 units (77 single dwelling units and 30 townhouse units)***	
Rate 5% the Gross land area (residential <18 units/ha)	*Land area*	*Parkland required*
	7.379 ha	*0.369 ha*
Parkland Required total (ha):		***0.369***
Parkland Dedication:		***0.000***
Parkland Over/Under Dedication (ha)		***-0.369***

It is acknowledged that a 5.130 ha park block, being Block 1 on Plan 4M-1512 has been dedicated to the City within the Carp Airport development. The total Parkland Required and Dedication is as follows:

Phase/Registration	**Parkland dedication rate**	**Gross Land Area (ha)**	**Parkland Dedication Required (ha)**
Residential 1A 4M-1593	5% - Residential 77 Units	8.330	0.417
Business Phase 1 4M-1512	2% Commercial/ Industrial	20.081	0.402
Residential 1B-1 4M-1593	5% - Residential 28 Units	4.239	0.212
Residential 2A 4M-1683	5% Residential 130 Units	9.815	0.491
Residential 1B-2 (current application)	5% Residential 107 Units	7.379	0.369
Business Phase 2 (Draft approved)	2% Commercial/ Industrial	49.149	0.983
Total parkland dedication required			2.874
Total parkland dedicated to date (Block 1 Plan 4M-1512)			5.130

		Parkland Over dedication (ha) **2.256** In the event that there is change in the proposed use, block area, residential product and/or number of dwelling units within the Final Plan, the required parkland dedication will also be subject to change. The Owner acknowledges and agrees that based on the final unit count and the area parkland calculations, should the parkland conveyed be in excess of the requirements under s.51 of the Planning Act, the City shall not compensate the Owner.	
37.		The Owner covenants and agrees to pay the city the Park Development Contribution (Rural) fee, as indexed annually, for each lot as per the Plan of Subdivision, at the time of registration of each phase of development, in order to satisfy the park development requirements for this subdivision. ($2,823.00/lot (as of July 1, 2023). It is acknowledged that a lump sum payment was provided by the Owner as a developer contribution for park development in the amount of $445,107.48, for the approval of 329 units. The Park Development Contribution (Rural) fee shall be required on all units above and beyond that figure, being 13 units.	**OTTAWA Parks**
		Environmental Constraints	
38.		The Owner shall acknowledge and adhere to the Integrated Environmental Review prepared by Muncaster Environmental Planning Inc. dated March 2007.	**OTTAWA Planning**
39.		The Owner acknowledges and agrees that the construction of the subdivision shall be in accordance with the recommendations of Species at Risk Assessment (17Feb 2023) and additionally: • include a statement in mitigation measure #9 (under Summary and Mitigation Measures, p9), to prohibit any gates in the permanent fencing along the Carp Creek Corridor to restrict intrusions and disturbances on the natural feature.	**OTTAWA Planning**
40.		The Owner agrees to abide by all appropriate regulations associated with Provincial and Federal statutes for the protection of wildlife, including migratory birds and species at risk.	**OTTAWA Planning**
41.		The Owner acknowledges that the Carp Creek Tributary is subject to the “Development, Interference with Wetlands **Mississippi Valley Conservation Authority’s** and Alterations to Shorelines and Watercourses” regulation, made under Section 28 of the Conservation Authorities Act, R.S.O. 1990, c. C.27, as amended. The regulation requires	**OTTAWA Planning CA**

		that the Owner of the property obtain a permit from the Conservation Authority prior to straightening, changing, diverting, or interfering in any way with any watercourse. Any application received in this regard will be assessed within the context of approved policies for the administration of the regulation.	
42.		The Owner shall erect protective fencing and sediment and erosion control measures along the setback perimeter of the Carp Creek Tributary prior to any site preparation works within the Subdivision to ensure no disturbance of the watercourse during construction. These measures shall be maintained in good working order until the site has stabilized, after which any such measures that are not permanent shall be removed in a manner that minimizes disturbance to the site.	**OTTAWA** **Planning**
43.		The Owner acknowledges that any proposed works on or adjacent to the Carp Creek Tributary corridor will need to comply with the requirements of the Federal Fisheries Act and avoid causing death of fish and the harmful alteration, disruption or destruction of fish habitat, and that the Department of Fisheries and Oceans (DFO) has provided authorization to complete works in the Carp River Tributary corridor.	**OTTAWA** **Planning** **CA**
44.		Where required, the Owner shall prepare, to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department, an Owner Awareness Package (OAP) highlighting the advantages and responsibilities of a homeowner living in or adjacent to a natural area. The OAP shall describe the natural attributes of the community and the importance of good stewardship practices to ensure the long-term health and sustainability of the Natural Heritage System. Topics to be discussed include, but are not limited to, reducing environmental impacts from common household activities (e.g., water conservation, yard waste disposal, chemical use and storage, etc.), avoiding human-wildlife conflicts, and recommendations of locally appropriate native species for landscaping. The OAP shall be distributed to all purchasers with the Agreement of Purchase and Sale.	**OTTAWA** **Planning** **CA**
		<u>Schools</u>	
45.		The Owner is required to inform prospective purchasers that school accommodation problems exist in the Ottawa-Carleton District School Board schools designated to serve this development and that at the present time this problem is being addressed by the utilization of portable classrooms and/or by directing students to schools outside their community.	**OCDSB**
		<u>Archaeology</u>	

46.		The Owner shall adhere to the procedures of the “Contingency Plan for the Protection of Archaeological Resources in Urgent Situations” as approved by the Ministry of Citizenship, Culture and Recreation in the Archaeological Resource Potential Mapping Study of the City of Ottawa.	**OTTAWA** **Planning** **MTCS**
		<u>Stormwater Management</u>	
47.		The Owner shall provide any and all stormwater reports (list of reports, for example, a Stormwater Site Management Plan in accordance with a Conceptual Stormwater Site Management Plan) that may be required by the City for approval prior to the commencement of any works in any phase of the Plan of Subdivision. Such reports shall be in accordance with any watershed or subwatershed studies, conceptual stormwater reports, City or Provincial standards, specifications, and guidelines. The reports shall include, but not be limited to, the provision of erosion and sedimentation control measures, implementation, or phasing requirements of interim or permanent measures, and all stormwater monitoring and testing requirements. All reports and plans shall be to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department.	**OTTAWA** **Planning** **CA**
48.		(a) Prior to the commencement of construction of any phase of this Subdivision (roads, utilities, any off site work, etc.) the Owner shall: i. have a Stormwater Management Plan and an Erosion and Sediment Control Plan prepared by a Professional Engineer in accordance with current best management practices; ii. (if appropriate) provide all digital models and modelling analysis in an acceptable format; iii. have said plans approved by the General Manager, Planning, Real Estate and Economic Development Department, and iv. provide certification through a Professional Engineer licensed in the province of Ontario that the plans have been implemented. (b) All submissions and any changes made to the Plan shall be submitted to the satisfaction to the City. (c) The Owner shall implement an inspection and monitoring plan to maintain erosion control measures.	**OTTAWA** **Planning**
49.		On completion of all stormwater works, the Owner agrees to provide certification to the General Manager, Planning, Real Estate and Economic Development Department through a Professional Engineer, licensed in the province of Ontario, that all measures have been implemented in conformity with the approved Stormwater Site Management Plan.	**OTTAWA** **Planning**

50.		The Owner agrees that the development of the Subdivision shall be undertaken in such a manner as to prevent any adverse effects, and to protect, enhance or restore any of the existing or natural environment, through the preparation of any storm water management reports, as required by the City.	**OTTAWA Planning**
51.		The Owner covenants and agrees that the following clause shall be incorporated into all agreements of purchase and sale for the whole, or any part, of a lot or block on the Plan of Subdivision, and registered separately against the title: “The Owner acknowledges that some of the rear yards within this subdivision are used for on-site storage of infrequent storm events. Pool installation and/or grading alterations and/or coach houses on some of the lots may not be permitted and/or revisions to the approved Subdivision Stormwater Management Plan Report may be required to study the possibility of modification on any individual lot. The Owner must obtain approval of the General Manager, Planning, Real Estate and Economic Development Department of the City of Ottawa prior to undertaking any grading alterations.”	**OTTAWA Legal**
52.		[To be used for lots that contain drainage swales, landscaping tees or any stormwater management conveyance infrastructure.] The Transferee, for themself, their heirs, executors, administrators, successors and assigns covenants and agrees to insert a clause in agreements of purchase and sale for the Lots/Blocks listed below that the Purchaser/Lessee is responsible to maintain conveyance of surface flow over the rear and/or side of their lot, and maintain sub-surface drainage infrastructure, all of which shall be to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department of the City of Ottawa.	**OTTAWA Planning**
		<u>Sanitary Services</u>	
53.		The Owner agrees to submit detailed municipal servicing plans, prepared by a Professional Civil Engineer licensed in the Province of Ontario, to the General Manager, Planning, Real Estate and Economic Development Department.	**OTTAWA Planning**
54.		Where the Owner is required under this Agreement to provide and install sanitary sewers of a diameter larger and/or at a greater depth than would be required to service the area to be developed, as detailed in the approved plans of this agreement, the Owner shall convey to the City such 0.3m reserves as may be necessary to prevent the Owners and	**OTTAWA Planning**

		developers of adjacent lands from making connections to the sanitary sewers installed by the Owner, the City will, insofar as it legally may, require other persons connecting to the sewer to pay an equitable share of the cost thereof to the Owner. The amount of payment shall be determined by the General Manager, Planning, Real Estate and Economic Development Department.	
55.		As the Owner proposes a road allowance(s) of less than 20 metres, and if the Owner also proposed boulevards between 4.0 and 5.0 metres wide, the Owner shall meet the following requirements: a) extend water, sanitary, and storm services a minimum of 2.0 metres onto private property during installation before being capped; b) install high voltage electrical cable through the transformer foundations to maintain adequate clearance from the gas main; c) provide and install conduits as required by each utility; d) provide and install transformer security walls when a 3.0 metres clearance, as required by the Electrical Code, cannot be maintained. The design and location of the security wall must be approved by the local hydro utility; and e) install all road-crossing ducts at a depth not to exceed 1.2 metres from top of duct to final grade.	**OTTAWA Planning**
		<u>Water Services</u>	
56.		The Owner agrees to design and construct all necessary watermains and the details of water servicing and metering for the lots abutting the watermains within the subject lands. The Owner shall pay all related costs, including the cost of connection, inspection and sterilization by City personnel, as well as the supply and installation of water meters by the City.	**OTTAWA Planning**
57.		The Owner shall prepare, at its cost, a hydraulic network analysis of the proposed water plant within the Plan of Subdivision and as it relates to the existing infrastructure. This analysis shall be submitted for review and approval as part of the water plant design submission.	**OTTAWA Planning**
58.		The Owner acknowledges and agrees not to permit any occupancy of buildings on the individual Lots described in Schedule "A" until the water plant has been installed, sterilized and placed in service to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department.	**OTTAWA Planning**

59.		The Owner further acknowledges and agrees that the service post, which is the fitting located near the property line that allows access to the shutoff valve, must be visible, raised to finished grade and in working condition.	**OTTAWA Planning**
60.		The Owner acknowledges and agrees not to apply for, nor shall the City issue, building permits for more than 50 dwelling units (or the equivalent) where the watermain for such units is not looped. Any unit serviced by a looped watermain that is not looped shall be required to have sufficient fire protection, to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department.	**OTTAWA Planning**
		<u>Serviced Lands</u>	
61.		The Owner shall be responsible for the provisions of the following works, including oversizing and over depth (where appropriate), at its cost, in accordance with plans approved by the General Manager, Planning, Real Estate and Economic Development Department, and/or the Province: a. Watermains; b. Sanitary Sewers; c. Storm Sewers; d. Roads and traffic plant(s); e. Street Lights; f. Sidewalks; g. Landscaping; h. Street name, municipal numbering, and traffic signs; i. Stormwater management facilities; and j. Grade Control and Drainage.	**OTTAWA Planning**
62.		The Owner shall not commence construction of any Works or cause or permit the commencement of any Works until the City issues a Commence Work Notification, and only then in accordance with the conditions contained therein.	**OTTAWA Planning**
63.		The Owner shall not be entitled to a building permit, early servicing, or commencement of work construction until they can demonstrate that there is adequate road, sanitary, storm, and watermain capacity and any Environmental Compliance Approvals (ECA) necessary are approved. All are to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department.	**OTTAWA Planning**
		<u>Utilities</u>	
64.		The Owner is hereby advised that prior to commencing any work within the subdivision, the Owner must confirm that sufficient wire-line communication /telecommunication infrastructure is currently available to the proposed development to provide communication/telecommunication service to the proposed development. In the event that such infrastructure	**OTTAWA Planning Bell Hydro One**

		is not available, the Owner is hereby advised that the Owner shall ensure, at no cost to the City, the connection to and/or extension of the existing communication / telecommunication infrastructure. The Owner shall be required to demonstrate to the municipality that sufficient communication /telecommunication infrastructure facilities are available within the proposed development to enable, at a minimum, the effective delivery of communication /telecommunication for emergency management services (i.e. 911 Emergency Services).	**Rogers** **Enbridge**
65.		The Owner agrees, prior to registration or early servicing, whichever is earlier, to provide a composite utility plan for the subdivision. Such plan shall be to the satisfaction of the General Manager, Planning, Real Estate and Economic Development Department.	**OTTAWA Planning** **Bell** **Hydro One** **Rogers** **Enbridge**
66.		The Owner acknowledges and agrees to convey any easement(s) as deemed necessary by Bell Canada to service this new development. The Owner further agrees and acknowledges to convey such easements at no cost to Bell Canada.	**Bell**
67.		The Owner agrees that should any conflict arise with existing Bell Canada facilities where a current and valid easement exists within the subject area, the Owner shall be responsible for the relocation of any such facilities or easements at their own cost.	**Bell**
68.		Upon receipt of this approval, the Owner is to provide Bell Canada with servicing plans/CUP at their earliest convenience to planninganddevelopment@bell.ca to confirm the provision of communication/telecommunication infrastructure needed to service the development.	**Bell**
69.		It shall be noted that it is the responsibility of the Owner to provide entrance/service duct(s) from Bell Canada's existing network infrastructure to service this development. In the event that no such network infrastructure exists, in accordance with the Bell Canada Act, the Owner may be required to pay for the extension of such network infrastructure.	**Bell**
70.		If the Owner elects not to pay for the above noted connection, Bell Canada may decide not to provide service to this development.	**Bell**
		Fire Services	
71.		Prior to registration the Owner acknowledges and agrees that Fire Protection has been addressed to the satisfaction of the General manager of Planning, Real Estate and Economic Development Department.	**OTTAWA Planning** **Fire**

		Land Transfers	
72.		The Owner shall convey, at no cost to the City, all lands required for public purposes, including but not limited to, reserves, road widenings, daylighting triangles, walkway blocks, open space blocks, and lands required for parks (or cash-in-lieu thereof) and for stormwater management. In particular, the Owner agrees to convey the following lands: i. 0.3 m Reserve Blocks –	**OTTAWA** **Planning** **Legal**
73.		The Owner agrees to convey, at no cost to the City, any easements that may be required for underground or overland stormwater drainage systems.	**OTTAWA** **Planning** **Legal**
		Blasting	
74.		The Owner agree that all blasting activities will conform to the City of Ottawa's standard S.P. No: F-1201 Use of Explosives. Prior to any blasting activities, a pre-blast survey shall be prepared as per F-1201, at the Owner expense for all buildings, utilities, structures, water wells, and facilities likely to be affected by the blast and those within 75 m of the location where explosives are to be used. The standard inspection procedure shall include the provision of an explanatory letter to the owner or occupant and owner with a formal request for permission to carry out an inspection. The Owner agree to provide a Notification Letter in compliance with City specification F-1201. Specification indicates that a minimum of 15 Business days prior to blasting the Contractor shall provide written notice to all owner(s) and tenants of buildings or facilities within a minimum of 150m of the blasting location. The Owner agrees to submit a copy of the Notification Letter to the City.	**OTTAWA** **Planning**
		Development Charges By-law	
75.		The Owner acknowledges that for building permits issued after January 15, 2010, payment of non-residential development charges, excluding development charges for institutional developments, may be calculated in two installments at the option of the Owner, such option to be exercised by the Owner at the time of the application for the building permit. The non-discounted portion of the development charge shall be paid at the time of issuance of the building permit and the discounted portion of the development charge shall be payable a maximum of two years from the date of issuance of the initial building permit subject to the following conditions:	**OTTAWA** **Planning** **Legal**

		a) a written acknowledgement from the Owner of the obligation to pay the discounted portion of the development charges; b) no reduction in the Letter of Credit below the amount of the outstanding discounted development charges; and c) indexing of the development charges in accordance with the provisions of the Development Charges By-law. The Owner further acknowledges that Council may terminate the eligibility for this two-stage payment at any time without notice, including for the lands subject to this agreement and including for a building permit for which an application has been filed but not yet issued. For the purposes of this provision, “discounted portion” means the costs of eligible services, except fire, police and engineered services that are subject to 90% cost recovery of growth-related net capital costs for purposes of funding from development charges. The 10% discounted portion, for applicable services, must be financed from non-development charge revenue sources. “Non-discounted portion” means the costs of eligible services, fire, police and engineered services, that are subject to 100% cost recovery of growth-related net capital costs for purposes of funding from development charges.	
		Survey Requirements	
76.		The Owner shall provide the final plan intended for registration in a digital format that is compatible with the City’s computerized system.	**OTTAWA Planning**
77.		The Plan of Subdivision shall be referenced to the Horizontal Control Network in accordance with the City requirements and guidelines for referencing legal surveys.	**OTTAWA Surveys**
78.		The distance from the travelled Centreline of all existing adjacent roads to the subdivision boundary should be set out in the Plan of Subdivision.	**OTTAWA Surveys**
		Closing Conditions	
79.		The City Subdivision Agreement shall state that the conditions run with the land and are binding on the Owner's, heirs, successors and assigns.	**OTTAWA Legal**
80.		[Bill 163 and 20] At any time prior to final approval of this plan for registration, the City may, in accordance with Section 51 (44) of the *Planning Act*, amend, delete or add to the conditions and this may include the need for amended or new studies.	**OTTAWA Legal**

81.		The owner shall pay any outstanding taxes owing to the City of Ottawa prior to registration.	**OTTAWA Planning Revenue**
82.		Prior to registration of the Plan of Subdivision, the City is to be satisfied that conditions 1 to 81 have been fulfilled.	**OTTAWA Planning**
83.		The Owner covenants and agrees that should damage be caused to any of the Works in this Subdivision by any action or lack of any action whatsoever on its part, the General Manager, Planning, Real Estate and Economic Development Department may serve notice to the Owner to have the damage repaired and if such notification is without effect for a period of two full days after such notice, the General Manager, Planning, Real Estate and Economic Development Department may cause the damage to be repaired and shall recover the costs of the repair plus the Management Fee under Section 427, of the *Municipal Act*, *2001*, like manner as municipal taxes.	**OTTAWA Planning**
84.		[Bill 163 and 20] If the Plan(s) of Subdivision, including all phases within the draft approved plan of subdivision, has not been registered by 00/00/00, the draft approval shall lapse pursuant to Section 51 (32) of the *Planning Act*. Extensions may only be granted under the provisions of Section 51 (33) of said *Planning Act* prior to the lapsing date.	**OTTAWA Planning**

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[i] For Clearing Agencies:
“Planning” refers to Planning Services.
“LG” refers to applicable landowners group, such as Kanata North (KNLG), Kanata West (KWLG), Fernbank (FLG), East Urban (EULG), Manotick SDA (MLG), and Barrhaven South (BSLG).
“CA” refers to applicable conservation authorities, including RVCA, MVCA, and SNCA.
“Legal” refers to Legal Services.
“Parks” refers to Parks and Facilities Planning Services.
“BCS” refers to Building Code Services.
“Transit” refers to Transit Planning.
“Transpo Plg” refers to Transportation Planning.
“Forestry” refers to Forest Management.
“MTCS” refers to the Ministry of Tourism, Culture and Sport.
“Revenue” refers to Revenue Services.

"Surveys" refers to Surveys & Mapping/City Surveyor.

SCHEDULE "I"

MAINTENANCE OF WORKS/FACILITIES

West Capital Airpark (Carp Airport)
Residential – Phase 1

In accordance with Section 7.6 of the Carp Airport Municipal Capital Facility and Development Agreement, the City is responsible for maintenance, repair and replacement of the works/facilities listed below:

1) **Roads including roadside ditches, grassed boulevards, sidewalks, curbs, culverts, streetlights, line painting, street name signs and traffic control signs:** Blocks 172 and 175 (Albert Boyd Private), Block 173 (Sopwith Private), Blocks 174, 180, 181 and 182 (Wingover Private), Blocks 159 and 176 (Chandelle Private) (from the cul-de-sac to Block 178 (Tailslide Private) and Block 178 (Tailslide Private).

2) **Storm Sewer Network including storm sewers, ICD's, road catchbasins, storm manholes):** Along Blocks 160, 169, 170, 171, 185, 197 and 201; Blocks 172 and 175 (Albert Boyd Private), Block 173 (Sopwith Private), Blocks 174, 180, 181 and 182 (Wingover Private), Blocks 159 and 176 (Chandelle Private) and Block 178 (Tailslide Private)

3) **Rearyard catachbasins and leads:**
    - Parts of Lots 1 and 2 being Parts 2, 3, 4 and 5 on an approved draft reference plan
    - Parts of Lots 5 and 6 being Parts 10, 11, 12 and 13 on an approved draft reference plan
    - Parts of Lots 45 and 46 being Parts 71, 72, 73 and 74 on an approved draft reference plan
    - Parts of Lots 33 and 34 being Parts 55, 56, 57 and 58 on an approved draft reference plan
    - Parts of Lots 25 and 26 being Parts 39, 40, 41 and 42 on an approved draft reference plan
    - Parts of Lots 22 and 23 being Parts 32, 33, 34 and 35 on an approved draft reference plan
    - Parts of Lots 69 and 70 being Parts 99, 100, 101 and 102 on an approved draft reference plan
    - Parts of Lots 74 and 75 being Parts 108, 109, 110 and 111 on an approved draft reference plan
    - Parts of Lots 31 and 32 being Parts 49, 50, 51 and 52 on an approved draft reference plan
    - Part of Lot 28 being Parts 114 and 115 on an approved draft reference plan

4) **Stormwater Management Pond:**
    - Block 157 - Stormwater Management Pond East
    - Block 156 - Stormwater Management Pond West

5) **Outlet Ditches:**
    - Blocks 163, 184, 186 and 193

6) **Stone Trench:** Beneath roadside ditches in Block 178 (Tailslide Private).

7) **Asphalt Walkways (including culverts, grassed areas and fence):**
    - Blocks 161, 162, 164, 165 and 170

8) **Stonedust Pathways including culverts:**
    - Along Blocks 174, 180, 181 and 182 (Wingover Private) from the west limit of the park to the bend in the road
    - Through Blocks 166, 167, 168 and 199

The City will be maintaining the roads in the Residential Phase 1 to the Class 5A standard as described in the City of Ottawa Maintenance Quality Standards for Roadway, Sidewalks and Pathways approved by Council and any future amendments.

Aden Rongve

From: Hall, Kevin <Kevin.Hall@ottawa.ca>
Sent: Wednesday, November 29, 2023 3:03 PM
To: Susan Gordon
Cc: Alex McAuley; Ostafichuk, Jeffrey
Subject: First Engineering Comments Carp Airport 1B-2
Attachments: Carp subd.revison 2.docx; Final stormwater comments Carp Airport Residential Phase 1-B2_Review Memo_2023-11-15.docx

Susan

Below and attached are the City's review comments on the First Engineering Submission reports and plans for the engineering design of Phase 1B-2 of the Carp Airport

General:

1. The City will not be accepting LIDs within the ROW. The City understands that due to the soils and high groundwater onsite, the development will not meet the requirements of LID design guidelines. Due to this the requirements of the Carp River Subwatershed Study will not be achieved. Best efforts to promote infiltration will be encouraged. Please continue with the rear yard and offsite infiltration trenches. Provide the amount of infiltration that will be achieved.
2. Storm sewers don't appear to be matching obvert to obvert along the streets. Please change that or provide a reason why they have to be designed that way.
3. Please add the manhole numbers to the SWM plan. Makes the review much easier.
4. GR-15. A culvert will be required at the intersection of the pathway and Wingover Private.
5. The outlet pipe from the OGS should continue to the pond.
6. No comments on the Hydraulic analysis of the watermains.
7. The draft plan conditions in Appendix A are not the correct conditions. The conditions shown are for the original draft approval. There are separate and new conditions for Phase 1B-2.
8. There is not much information provided to prove that the existing pond will work with the revised design of the drainage area to the pond. I generally agree that there will not be any issues with the change, but there still needs to be an analysis of the pond to confirm that the pond will perform as expected and no new HGL issues will arise.
9.

Stormwater Operations:

10. Please see attached document

Stormwater and Modelling Review:

11. Please see attached comments.

Kevin Hall, C.E.T.
Senior Project Manager
Development Review - Rural Services
Gestionnaire de projet, Approbation des demandes d'infrastructure

Examen des demandes d’aménagement (Services ruraux)
City of Ottawa | Ville d'Ottawa
ottawa.ca/planning / ottawa.ca/urbanisme

I am currently working from home. Email is the best way to contact me.

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'

City of Ottawa Stormwater Operations Comments
Received via email attachment November 29, 2023

West Capital Airpark

Carp Airport Phase 1B-2   General Plan of Services -Phase 1B-2

Design Drawings:

General Plan of Services -Phase 1B-2 10285-GP14

Grading Plan Phase 1B-2 10285-GR-13

The asphalt service road beside the Vortech Unit should be extended to the Unit to facilitate parking of a vacuum truck.

Arrows indicating the major flow pointing towards the CB 184; please provide a detail of the major flow channel entering the easement/block 81 towards the depression riprap.

The temporary ditch and major overland swale are discharging into a rip-rap depression where dimensions are not provided. The maintenance access for this feature is required.

DWG 102085 -P28   Plan and Profile Phase 1B-2   Block1 &Storm Sewer Outlet

Usually, upstream pipes are design to meet or exceed downstream pipe obverts and not as the profile indicated on the design drawing.

Can you please provide us with DWG. SWMF 6 detail since the profile is incomplete.

Date: 11/15/2023 File: D07-16-22-0017
To: Kevin Hall
From: Charles Warnock
Project: Carp Airport Residential Phase 1B-2
Subject: Stormwater Review – First Submission

TECHNICAL MEMO

The following is a summary of the review that was undertaken by GM BluePlan Engineering (GMBP) of the West Capital Airpark Phase 1B-2 Residential SWM Report (NOVATECH, dated July 28, 2023), the West Capital Airpark Phase 1B-2 Residential Servicing Report (NOVATECH, dated July 28, 2023), and supporting modelling files and engineering drawings titled "WEST CAPITAL AIRPARK PHASE 1B-2 – RESIDENTIAL," JULY 28, 2023.

Comments:

THe comments below assume that the proposed ROW infiltration cb's are removed.
It is our recommendation that the following comments be provided to the applicant:

West Capital Airpark Phase 1B-2 Residential Servicing Report (NOVATECH, dated July 28, 2023):

1. The 2-year storm also requires a 10 minute TC not 15 minutes as shown.

West Capital Airpark Phase 1B-2 Residential SWM Report (NOVATECH, dated July 28, 2023)

1. Is it possible to provide a more details for selection of the 4-hour Chicago design storm as a critical design storm. Does the Chicago 4-hour storm create maximum peak flow or create maximum volume related to the inside of the pond elevation? Is there some excerpt from a previously approved SWM report in which the 4-hour Chicago storm was determined to be the critical design storm? The East SWM facility was designed using the SWMHYMO model, which used 4-hour Chicago storm distribution. And a 3-hour Chicago storm distribution is required to ensure that the pond's boundary conditions match the design storm being run for the development. It is assumed that the 3-hour Chicago storm is used as a boundary condition in the PCSWMM model. Please clarify.
2. On page 5, it is mentioned that "Refer to Section 4.3.4 for …". We assumed that it is typo of Section 2.3.4. please revise as required.
3. In Table 2, it is not clear why there is no capture flow within the RYCB's.
   The capture flow rate (2-year) shown as 'zero' in Table 2 for the rear yard catch basins are assumed to be because those flow/volume are not accounted for storage?
   City is in the process of updating guidelines with respect to LID's. Currently we do not allow for the elimination or downsizing of end-of-pipe facilities due to proposed infiltration methods. The model can be run to verify that the infiltration works. However outside of this the model runs for the different return periods used to estimate flows, volumes, HGL, etc. should assume that the LID is not present (or is full at the commencement of the storm). Please provide additional details about the rear yard infiltration trenches, including the quantity/storage information..
4. The information in Table 2 is not clear. In cases where the approach flow is greater than the capture flow, will there be ponding? If so, please add a column to this table to indicate the depth of the ponding. It should be minimal. The City of Ottawa Storm Sewer Design-Technical Bulletin, the minimum sewer size for local streets is based on 2-year storm and there should not have any surface ponding during 2-year event.
5. Based on the Table 3 in the SWM report, the current drainage area is about 9 ha less than it was designed to be at the time of Phase 1 Residential Registration. Is that +/- 9ha area that now drains uncontrolled to Carp Creek? Are any additional lands being directed directly to Carp Creek as part of the current proposal and if so, how will that impact the creek?

6. Based on the Table 3 in the SWM report, the current runoff coefficient comparing Phase 1 Residential Registration is reduced to 0.29. Please provide rationale of the reduced runoff coefficient in the SWM report? It seems that the future lands should be accounted for as developed, not undeveloped, so that proposed infrastructure is sized with the capacity for future development. What significant changes in land use resulted in lower A x C values when calculating the capacity of the East SWM facility? What is the stormwater quantity control plan for future development of undeveloped land?
7. Please provide rip-rap size and calculation for the rip-rap sizing.
8. Please provide capacity of the SWM pond inlet swale and please provide measures to prevent erosion in the SWM pond inlet swale (out-side of the rip-rap limits).
9. The groundwater from BH43-13 was observed below 1.51m from the surface. Please confirm if the infiltration trench in the backyard of Block 79 and Block 78 secures a minimum depth of 1.0m from the groundwater table. Please provide elevations for various cross sections along the infiltration trench and swales. The profiles should show the observed groundwater elevations from the Geotech report in the vicinity of the chosen cross-sections. In some areas near BH 9-11, BH 10-11, and BH 43-13, the elevation from the ground surface to the observed groundwater appears to be in the range of 0.4 to 1.54 m. Please review all infiltration trench, exfiltration, and infiltration swale measures.
10. The percolation rate should reflect the soil condition of the project site. Could you add details about the percolation rate of 25mm/h that is mentioned in the report (page 6). The most recent geotechnical report does not include a section on the proposal for infiltration. Please provide a reference to a Geotechnical report or an earlier approved report. There needs to be a minimum discussion on the ground water level and infiltration. Infiltration should be based on field measurements not assumptions made on based on soil types.
    The geotechnical report provided shows in Table 3 shows ground water elevations at a time that is not typically the highest level. Please comment on how this may affect the proposed infiltration practices proposed.
11. It is not clear in the Contech Sizing Report found in Appendix C what the contributing area to the OGS is in the Contech sizing software, as well as the imperviousness of that area. Please update accordingly and provide a drainage area plan for existing and proposed water quality treatment units.
12. Please verify that the OGS unit will treat a minimum of 90% of the total annual stormwater volume from the contributing area. Ensure that the bypass structure with the splitter weir does not allow too much of the flow to bypass the treatment system.
13. It would be helpful if a figure was provided that shows what catchment area contributes to the existing OGS, what area contributes to the proposed OGS, and what area contributes to the future OGS.
14. It is unclear how the annual infiltration rates found in the table on page 94 of the SWM report PDF were generated. Please provide details of how the infiltration rate per year was established for each location. Include calculations of infiltration depths for each of the infiltration/exfiltration units shown on page. The annual infiltration rates provided for the East Residential Water balance are not clear. Provide infiltration (mm) calculations for land use areas draining to an infiltration or exfiltration trench. Please note that, according to the table, post-development infiltration in the East Residential areas increased by 10.7% not decreased by.
15. It is assumed that the infiltration/water balance calculations and design details are taken from the 2015 SWM report. If so, please refer that as well in Section 2 of this report and include in the appendix any relevant information.
16. Section 2.2 is unclear about the water quality treatment measures proposed for Phases 1B-2 and future development areas. The new proposed treatment unit would consider half of the modelled 25 mm storm event from Phase 1B-2 and the entire future development area. But subsequently it stated that a second treatment unit would be provided for additional treatment for future development areas. Please review and clarify as necessary.

17. To compare and understand the changes, a table showing the water quality treatment areas, flows, and volumes from the previous submission (SWMMHYMO model result) and the recent submission (PCSWMM model output) is useful. For the SWM pond please provide a table that compares the previously approved inflows and outflows, volumes, and water levels with the proposed for this phase. Provide confirmation that all criteria listed in section 2.1 are being met or exceeded.
18. Section 2.3.4 stated that "...*was approved by the MOECC to meet the above noted criteria*." What criteria is it referring to?
19. Is the infiltration/water balance calculations, the same as in the 2015 SWM draft plan that was approved? Please make sure that all details such as length, bottom width, side slope, infiltration volume, etc. be provided for each infiltration trench type for the west and east residential communities in a table and compare the total volume meets the infiltration volume requirement for the site. Are the infiltration measures proposed in Phase 1B-2 the same as those proposed in the 2015 SWM report? If so, were the existing infiltration trenches in Phase 1B-2 area (marked as 'will be removed' in plans) excluded and used the new proposed ones in calculating the infiltration volume?
20. Grading plans must show the depths (elevations), volumes, and extent of ponding of all surface storage including spill areas. This would include the rear yards and the interim check dams.
21. Please provide the sizing details and infiltration drawdown times for the proposed interim swales. The extent of the interim swale should be clearly shown including grades at the top and bottom of the channel. The assumption is that all the water trapped upstream of the rock check dams will infiltrate. However, these check dams are permeable and only "slow down" the water. Was this factored into the calculations?
22. The total drainage area used in designing the water quality treatment units differ from the areas used in calculating the infiltration requirements for the East residential community. Please explain and/or correct the difference if necessary.
23. Please provide sample calculations sowing the C value for all zoning types and road cross sections. Include the minimum setbacks and maximum driveway widths allowed by the zoning.
24. It is assumed that the bypass structure (weir splitter) shown on the SWMF drawing is to divert flow for water quality treatment (required flow/volume) and the rest to the Pond without treatment. However, the Typical Bypass layout diagram provided in the report depicts bypassing the flow to two water quality treatment (either side) and the rest going to the Pond. It is assumed that a second water quality treatment unit will be installed as part of future development (this information is inconsistent in the report and drawings). Please include details on how the proposed water quality treatment unit works for this proposed development (including the drainage area).
25. Please consider protecting proposed infiltration units by capping end until the site is stabilized,
26. As per condition 63 of the subdivision agreement. Is the infiltration, OGS, SWM pond, temperature mitigation operating as designed. Please provide the monitoring information to date as required through the ECA.
27. PCSWMM hydrologic modeling routine chosen should not assume zero percent imperviousness. It will underestimate runoff and peak flows. A minimum 7% (C=0,25) should be used in the model.
28. Please describe how parameters width and slopes are determined. Please make sure they follow City guidelines.
29. Where are the HGL comparisons to the usf? There appears to be one location where the clearance is only 0.3 m from the usf. This is the minimum and leaves no room for error. Please comment.
30. If you could provide the C value and area in the ICD table this would help in checking the capacities.
31. Do cb's on grade even require an icd?
32. The cb's ICD's need to be designed to the rational method flows. Some areas such as the rear yards are over controlled. Example A-3 the 2-year rational flow is 48.8 l/s while the restriction at cb 170 is 28.6 l /s.
33. Why is the HGL 0.35m at the outlet from the 1650 mm pipe? Please extend the HGL profile to the outlet of the dry pond. Include the downstream receiving water surface elevation.
34. Show ponding areas upstream of proposed check dams. Provide the calculations for the volume estimate.

35. In the proposed infiltration trenches. Should there not be some sort of impermeable cutoff wall to keep water from draining out along the sewer trenches?

Engineering drawings titled "WEST CAPITAL AIRPARK PHASE 1B-2 – RESIDENTIAL," JULY 28, 2023.

1. Please add ICD sizes to the General Plan of Services.
2. Are the spill areas shown on the grading plan at the intersection of Street Three and Albert Boyd Private occur during the 2-year storm (at elevation of 116.83 m)? Note that, according to the City of Ottawa Storm Sewer Design-Technical Bulletin, there should be no surface ponding during the 2-year event. Please check all spill areas.
3. The design details of the inlet spillway (V-ditch) to the SWM facility, including cross-section and water levels (for the designed return period including the 100-year storm), must be provided in section E-E.
4. Riprap swale design details should include length of riprap areas on either side.
5. Are clear stone fillings of rock check dams within infiltration swales provided to the top of the bank of the swale, without any freeboard?
6. CB 200 and 170 connects to the existing system. Does it have the capacity? Why are the cb's 118 and 119 being swapped. Where are the calculations to show this requirement?
7. Drawing shows cb 119 and 118 to be swapped while table 2 indicates that cb's to be swapped 126 and 127 (can't locate these 2 cb's) and icd's in each of cb 138 and 139. Can't find these two locations in the previous phase on the drawings provided?
8. What is the purpose of having interconnected icd's each with their own icd? One of the most common reasons for interconnecting cb's is to have only one icd.
9. Show rear yard ponding and in the interim swale on the plans.
10. The spill elevation 116.33 behind lot 63 appears to be higher than the overflow to the undeveloped land set at 116.29. It would be a better if all the overflows to the adjacent lands were at least 15 cm higher than the internal spill elevation along the swale.
11. Profile drawing P28 show 1650 mm outlet 112.36 m then a slope down to the pond. Please extend the profile through the pond and out.
12. GR14, top left-hand corner, is the spill point drawing for Block 83?
13. Drawings show interconnected cb's 162A/162B and168A/168B with ponding on one side of the street but not the other. There is a continuous grade running from the T/G on 162A and 168A . Is it possible to have 6 and 7 cm of ponding on one side of the street without the water flowing up through the other cb? Similar at cross connected cb's 165A and 165B.
14. How do you model a segment that has one side in a sump and the other is on a continuous grade? Would it not be better to have them both the same?
15. SWMF5, provide inverts on the proposed offline exfiltration, provide inverts on Vortechs, provide details of the flow splitter upstream and downstream of Vortechs, Provide confirmation from Vortechs that the downstream weir will not affect the function of the OGS.

PCSWMM Modelling:

1. There are minor discrepancies regarding the size of the pipes in the PCSWMM. Please revise the size of the pipe as required. (ex.: between MH269-MH270- drawing 675mm, PCSWMM 686mm).
2. It seems that the infiltration ratio is calculated per the location of the trenches. Please provide rationale and/or calculation results regarding infiltration ratio into subsoil for the rear yard infiltration trenches, roadside exfiltration trenches, and an offline exfiltration trench in PCSWMM.
3. The volume between the modeling and report shows discrepancy for the rear yard infiltration trenches. In PCSWMM, the infiltration trenches are modeled as a combination of a box culvert (0.56mx1m) and 250mm pipe. The trenches are filled with 25 mm gravel, so the infiltration trenches in the PCSWMM are assumed to provide more volume. Please provide a rationale for the volume of the infiltration trenches applied in the model. In addition, please confirm if the volume of the 250mm pipe is subtracted from the volume of the trenches according to the model configuration.

4. Please review the model not to have any double accounting for storage (for example Albert Boyd Private Street).
5. Please acknowledge that City of Ottawa does not like to have interconnected catch basins. In some cases we have to allow for larger diameter icd's. Please review the design to see if you can eliminate interconnected CBs.
6. Please verify that the sawtooth flow conveyance in rear yard was not modeled as such but rather on a continuous grade.
7. The PCSWMM model files for 100 years are shown as outdated in the result tab. Please check and provide the most recent model with results.
8. How are the contributing areas to Infiltration RYCB to CB represented in the model calculated? The PCSWMM model is assumed to include only infiltration measures connected to storm sewers. Please note we do not allow for infiltration storage to be part of quantity and HGL calculations as noted earlier.
9. The report states the proposed water quality treatment units are for Phase 1B-2 and future development. The model shows only one water quality treatment unit. Please clarify.
10. According to the model, half of the stormwater from the development area goes to the OGS unit and the rest goes to the pond without treatment. Similarly, approximately 380 L/s of runoff is directed to the Pond via a swale, which includes external flows as well as approximately 68 L/s flow from development areas. The flows from the external areas are assumed to be from the existing conditions and do not require treatment at this Phase of development. Please clarify.

City of Ottawa Comments (November 29, 2023)		Topic	Added	Hold/ Waiting for Info	Novatech Notes	Accepted
General						
1	The City will not be accepting LIDs within the ROW. The City understands that due to the soils and high groundwater onsite, the development will not meet the requirements of LID design guidelines. Due to this the requirements of the Carp River Subwatershed Study will not be achieved. Best efforts to promote infiltration will be encouraged. Please continue with the rear yard and offsite infiltration trenches. Provide the amount of infiltration that will be achieved.	LIDs			The infiltration trench LIDs within the ROW and the offline infiltration trench, located downstream of the OGS unit, have been removed per discussions with the City. The geotechnical grade raise restriction limits the ability to fill the site to raise the finished grade to allow for separation of the infiltration measures above the shallow groundwater. Explanation has been added to Section 3.0 (Water Balance) of the SWM report.	
2	Storm sewers don't appear to be matching obvert to obvert along the streets. Please change that or provide a reason why they have to be designed that way.	General			Storm sewers match obverts where possible. In some cases, sewer inverts were matched in order to increase the depth of the sewer and lower hydraulic grade line elevations so that geotechnical grade raise restrictions could be met.	
3	Please add the manhole numbers to the SWM plan. Makes the review much easier.	General			Manhole numbers have been added to the SWM plan (102085-SWM7).	
4	GR-15. A culvert will be required at the intersection of the pathway and Wingover Private.	General			The pathway occurs at the high point in the Wingover Private roadside ditches. Therefore, no culvert is required.	
5	The outlet pipe from the OGS should continue to the pond.	Pond Inlet and RipRap			The proposed outlet stops short of the pond to account for potential pond expansion as part of the future development lands.	
6	No comments on the Hydraulic analysis of the watermains.	General			Noted.	
7	The draft plan conditions in Appendix A are not the correct conditions. The conditions shown are for the original draft approval. There are separate and new conditions for Phase 1B-2.	General			The new correct draft plan conditions, received with the Notice of Approval of the revised Plan of Subdivision on September 20, 2023 have been added to Appendix A.	
8	There is not much information provided to prove that the existing pond will work with the revised design of the drainage area to the pond. I generally agree that there will not be any issues with the change, but there still needs to be an analysis of the pond to confirm that the pond will perform as expected and no new HGL issues will arise.	OGS, Pond Capacity, and Future Lands			The pond has been modelled with the current design and sufficient pond capacity has been confirmed. Refer to the results in Appendix D of the SWM report.	
Grading Plan (102085-GR13)						
1	The asphalt service road beside the Vortech Unit should be extended to the Unit to facilitate parking of a vacuum truck.	General			Refer to the Grading Plan (102085-GR14) for asphalt limits, which are shown around the Vortech unit to facilitate parking.	
2	Arrows indicating the major flow pointing towards the CB 184; please provide a detail of the major flow channel entering the easement/block 81 towards the depression riprap.	General			The access road to SWM Facility will act as a major flow channel through Block 81. Refer to details on drawings 102085-GR14 and 102085-SWMF5.	
3	The temporary ditch and major overland swale are discharging into a rip-rap depression where dimensions are not provided. The maintenance access for this feature is required.	General			Rip rap dimensions have been added to the 102085-SWMF5 drawing. Access to this feature is via the asphalt access area provided to the OGS unit.	
Plan and Profile Phase 1B-2 Block 81 & Storm Sewer Outlet (102085-P28)						
1	Usually, upstream pipes are design to meet or exceed downstream pipe obverts and not as the profile indicated on the design drawing.	General			See response to General comment 2.	
2	Can you please provide us with DWG. SWMF 6 detail since the profile is incomplete.	Pond Inlet & RipRap			Additional pond inlet details are provided on drawings 102085-SWMF5 and 102085-SWMF6.	

	City of Ottawa Comments (November 29, 2023)	Topic	Added	Hold/ Waiting for Info	Novatech Notes	Accepted
Servicing Report						
1	The 2-year storm also requires a 10 minute TC not 15 minutes as shown.	General			The storm sewer design sheet has been updated with a time of concentration of 10 minutes. Refer to Appendix D of the Servicing Report.	
SWM Report						
1	Is it possible to provide a more details for selection of the 4-hour Chicago design storm as a critical design storm. Does the Chicago 4-hour storm create maximum peak flow or create maximum volume related to the inside of the pond elevation? Is there some excerpt from a previously approved SWM report in which the 4-hour Chicago storm was determined to be the critical design storm? The East SWM facility was designed using the SWMHYMO model, which used 4-hour Chicago storm distribution. And a 3-hour Chicago storm distribution is required to ensure that the pond's boundary conditions match the design storm being run for the development. It is assumed that the 3-hour Chicago storm is used as a boundary condition in the PCSWMM model. Please clarify.	General			In order to be consistent with the original pond design in the Stormwater Site Management Report Residential, April 6, 2015, only the 4-hour Chicago storm was used in the analysis as the 2015 report indicates that this is the critical design storm. Additional text has been added to Section 2.3.1 of the SWM report to clarify.	
2	On page 5, it is mentioned that “Refer to Section 4.3.4 for …”. We assumed that it is typo of Section 2.3.4. please revise as required.	General			This was a typo. Due to changes to the report, this reference was removed.	
3	In Table 2, it is not clear why there is no capture flow within the RYCB’s. The capture flow rate (2-year) shown as 'zero' in Table 2 for the rear yard catch basins are assumed to be because those flow/volume are not accounted for storage? City is in the process of updating guidelines with respect to LID’s. Currently we do not allow for the elimination or downsizing of end-of-pipe facilities due to proposed infiltration methods. The model can be run to verify that the infiltration works. However outside of this the model runs for the different return periods used to estimate flows, volumes, HGL, etc. should assume that the LID is not present (or is full at the commencement of the storm). Please provide additional details about the rear yard infiltration trenches, including the quantity/storage information.	LIDs			Rear yard infiltration was removed from the modelling. This corrected any issues with the ICD table (Table 5 in Section 2.3.4) for the rear yards. Infiltration volume calculations are provided in Appendix F of the SWM report.	
4	The information in Table 2 is not clear. In cases where the approach flow is greater than the capture flow, will there be ponding? If so, please add a column to this table to indicate the depth of the ponding. It should be minimal. The City of Ottawa Storm Sewer Design-Technical Bulletin, the minimum sewer size for local streets is based on 2-year storm and there should not have any surface ponding during 2-year event.	Ponding			A ponding table (Table 6) has been provided in Section 2.3.4 to show that there is no ponding in sags during the 2-year event. Updated ICD sizes show that the inlet rate of the ICDs can handle the 2-year flows.	
5	Based on the Table 3 in the SWM report, the current drainage area is about 9 ha less than it was designed to be at the time of Phase 1 Residential Registration. Is that +/- 9ha area that now drains uncontrolled to Carp Creek? Are any additional lands being directed directly to Carp Creek as part of the current proposal and if so, how will that impact the creek?	OGS, Pond Capacity, and Future Lands			The difference in areas is due to the interim condition having undeveloped area being directed to the Creek as per existing drainage patterns. The ultimate design of the East Residential Community will have a similar drainage area being controlled by the pond and there are no significant changes to the post-development drainage patterns from the original design of the subdivision. Note that Table 3 is no longer included in the report as the SWMF has been included in the PCSWMM model. The PCSWMM model, which includes the pond and outlet structure, shows that there are no impacts to the creek based on the proposed interim and ultimate conditions of the East Residential Community. Refer to figures 102085-OGS1 and 102085-OGS2 which clarify the interim and ultimate drainage areas to the pond.	

	City of Ottawa Comments (November 29, 2023)	Topic	Added	Hold/ Waiting for Info	Novatech Notes	Accepted
6	Based on the Table 3 in the SWM report, the current runoff coefficient comparing Phase 1 Residential Registration is reduced to 0.29. Please provide rationale of the reduced runoff coefficient in the SWM report? It seems that the future lands should be accounted for as developed, not undeveloped, so that proposed infrastructure is sized with the capacity for future development. What significant changes in land use resulted in lower A x C values when calculating the capacity of the East SWM facility? What is the stormwater quantity control plan for future development of undeveloped land?	OGS, Pond Capacity, and Future Lands			Table 3, in Section 2.3.4, was for the capcity of the Existing SWM facility with the future lands being undeveloped. This table has been removed and replaced with further analysis and discussion on both the interim condtion (1B-2 with undeveloped future lands) and the ultimate condition (1B-2 with developed future lands) contributing to the SWM facility. The storm sewers near the pond outlet are sized to accommodate the future developed lands. A second OGS unit is proposed as part of the future development to meet the quality control requirements of the future development lands. Refer to figures 102085-OGS1 and 102085-OGS2 which clarify the interim and ultimate drainage areas to the pond.	
7	Please provide rip-rap size and calculation for the rip-rap sizing.	Pond Inlet & RipRap			Refer to Appendix E of the SWM Report for supporting calculations.	
8	Please provide capacity of the SWM pond inlet swale and please provide measures to prevent erosion in the SWM pond inlet swale (out-side of the rip-rap limits).	Pond Inlet & RipRap			The capacity of the SWM pond inlet swale was evaluated in PCSWMM. The velocities in the swale show that erosion control measures are not required. Additional discussion is provided in Section 2.3.5 of the SWM Report.	
9	The groundwater from BH43-13 was observed below 1.51m from the surface. Please confirm if the infiltration trench in the backyard of Block 79 and Block 78 secures a minimum depth of 1.0m from the groundwater table. Please provide elevations for various cross sections along the infiltration trench and swales. The profiles should show the observed groundwater elevations from the Geotech report in the vicinity of the chosen cross-sections. In some areas near BH 9-11, BH 10-11, and BH 43-13, the elevation from the ground surface to the observed groundwater appears to be in the range of 0.4 to 1.54 m. Please review all infiltration trench, exfiltration, and infiltration swale measures.	LIDs			As discussed with City staff, a best management practice approach is being proposed for infiltration. Some rearyard systems may not meet the depth above groundwater, which is consistent with standard City of Ottawa rearyard subdrain systems. Refer to section 3.0 of the Stormwater Management Report for further discussion.	
10	The percolation rate should reflect the soil condition of the project site. Could you add details about the percolation rate of 25mm/h that is mentioned in the report (page 6). The most recent geotechnical report does not include a section on the proposal for infiltration. Please provide a reference to a Geotechnical report or an earlier approved report. There needs to be a minimum discussion on the ground water level and infiltration. Infiltration should be based on field measurements not assumptions made on based on soil types. The geotechnical report provided shows in Table 3 shows ground water elevations at a time that is not typically the highest level. Please comment on how this may affect the proposed infiltration practices proposed.	LIDs			The infiltration rate used is per the approved 2015 Master SWM Report and is per Table 4.4 of the MOE SWM Planning & Design Manual, based on the on-site soils. Based geotechnical and gorundwater constraints that limit infiltration measures to best management practices, in-situ testing does not provide additional benefit. Additional discussion on groundwater elevations has been added to Section 3.0 of the SWM Report.	
11	It is not clear in the Contech Sizing Report found in Appendix C what the contributing area to the OGS is in the Contech sizing software, as well as the imperviousness of that area. Please update accordingly and provide a drainage area plan for existing and proposed water quality treatment units.	OGS, Pond Capacity, and Future Lands			Refer to figures 102085-OGS1 and 102085-OGS2 which clarify the interim and ultimate drainage areas to the pond and OGS units.	
12	Please verify that the OGS unit will treat a minimum of 90% of the total annual stormwater volume from the contributing area. Ensure that the bypass structure with the splitter weir does not allow too much of the flow to bypass the treatment system.	General			Per the Vortechs design sheets provided in Appendix C, 90% of the projected annual runoff volume would be treated. The bypass weir is designed to convey the 25mm 4-hour Chicago event to the OGS unit (for both the interim and ultimate condition).	
13	It would be helpful if a figure was provided that shows what catchment area contributes to the existing OGS, what area contributes to the proposed OGS, and what area contributes to the future OGS.	OGS, Pond Capacity, and Future Lands			Refer to figures 102085-OGS1 and 102085-OGS2 which clarify the interim and ultimate drainage areas to the pond.	

City of Ottawa Comments (November 29, 2023)		Topic	Added	Hold/ Waiting for Info	Novatech Notes	Accepted
14	It is unclear how the annual infiltration rates found in the table on page 94 of the SWM report PDF were generated. Please provide details of how the infiltration rate per year was established for each location. Include calculations of infiltration depths for each of the infiltration/exfiltration units shown on page. The annual infiltration rates provided for the East Residential Water balance are not clear. Provide infiltration (mm) calculations for land use areas draining to an infiltration or exfiltration trench. Please note that, according to the table, post-development infiltration in the East Residential areas increased by 10.7% not decreased by.	LIDs			The Infiltration rates on Page 94 were from the approved 2021 Servicing and Stormwater Report (Phase 2A, 2021). The calculations for this area were added to Appendix F of the SWM report. Additional notes to the Appendix F calculations are provided to clarify the calculations for the annual infiltration rates.	
15	It is assumed that the infiltration/water balance calculations and design details are taken from the 2015 SWM report. If so, please refer that as well in Section 2 of this report and include in the appendix any relevant information.	LIDs			The water balance calculations use the same methodology as the Stormwater Site Management Report Residential (April 6, 2015), but with updated design info for Phase 1B-2 and the West Residential Development (Phase 1A and 2A). Note that the water balance calculations that assumes no BMPs from the 2015 SWM report was added to Appendix F.	
16	Section 2.2 is unclear about the water quality treatment measures proposed for Phases 1B-2 and future development areas. The new proposed treatment unit would consider half of the modelled 25 mm storm event from Phase 1B-2 and the entire future development area. But subsequently it stated that a second treatment unit would be provided for additional treatment for future development areas. Please review and clarify as necessary.	OGS, Pond Capacity, and Future Lands			Additional clarification has been added to Section 2.2 of the SWM report to clarify existing, proposed, and future OGS units. Refer to figures 102085-OGS1 and 102085-OGS2 which clarify the interim and ultimate drainage areas to the pond and OGS units.	
17	To compare and understand the changes, a table showing the water quality treatment areas, flows, and volumes from the previous submission (SWMMHYMO model result) and the recent submission (PCSWMM model output) is useful. For the SWM pond please provide a table that compares the previously approved inflows and outflows, volumes, and water levels with the proposed for this phase. Provide confirmation that all criteria listed in section 2.1 are being met or exceeded.	OGS, Pond Capacity, and Future Lands			Figures 102085-OGS1 and 102085-OGS2 have been prepared and added to the SWM report to clarify drainage areas to the pond and OGS units in both the interim and ultimate conditions. The SWMF was included in the PCSWMM model. The report discusses that the volumes, HGLs and outflows are in accordance with the previous design and all design criteria.	
18	Section 2.3.4 stated that "...was approved by the MOECC to meet the above noted criteria." What criteria is it referring to?	General			The report text has been updated to reference the design criteria in Section 2.1	
19	Is the infiltration/water balance calculations, the same as in the 2015 SWM draft plan that was approved? Please make sure that all details such as length, bottom width, side slope, infiltration volume, etc. be provided for each infiltration trench type for the west and east residential communities in a table and compare the total volume meets the infiltration volume requirement for the site. Are the infiltration measures proposed in Phase 1B-2 the same as those proposed in the 2015 SWM report? If so, were the existing infiltration trenches in Phase 1B-2 area (marked as 'will be removed' in plans) excluded and used the new proposed ones in calculating the infiltration volume?	LIDs			The water balance calculations uses the same methodology as the approved Stormwater Site Management Report Residential (April 6, 2015), but with updated design info for Phase 1B-2 and the West Residential Development. Storage volume calculations for the East and West Residential Communities have been provided in Appendix F. Due to the site constraints, and discussions with the City, the infiltration volume requirement no longer applies. The infiltration measures in the 2015 SWM report were assumed to be roadside ditches and taxiways which are no longer proposed in Phase 1B-2. The infiltration swales in Phase 1B-2 marked as "to be removed" were part of the West Residential Phase 2A design, in order to meet the requirement of matching the pre-development infiltration throughout construction. These removed swale have been excluded from the updated water balance calculations. Infiltration measures have been revised based on the proposed Phase 1B-2 design.	

City of Ottawa Comments (November 29, 2023)		Topic	Added	Hold/ Waiting for Info	Novatech Notes	Accepted
20	Grading plans must show the depths (elevations), volumes, and extent of ponding of all surface storage including spill areas. This would include the rear yards and the interim check dams.	Ponding			Static ponding depths (elevations) and extents (contours) have been added to all surface storage areas in the right-of-way, rear yards, and interim infiltration swales. Ponding elevations have been shown for the 100-year and 100-yr + 20% storm events within the right-of-way. Refer to the Grading Plans. Ponding volumes are in provided in Table 6 of the SWM Report	
21	Please provide the sizing details and infiltration drawdown times for the proposed interim swales. The extent of the interim swale should be clearly shown including grades at the top and bottom of the channel. The assumption is that all the water trapped upstream of the rock check dams will infiltrate. However, these check dams are permeable and only “slow down” the water. Was this factored into the calculations?	LIDs			Additional sizing details and drawdown times for the interim infiltration swales are provided in Appendix F. Drawdown times provided in the infiltration summary in Appendix F. Check dams have been revised to have 0.20m earth berm to hold back and infiltrate the runoff. The volumes are based on a 0.20m depth. Refer to the Infiltration Measures Plan (102085-INF2) for check dam details.	
22	The total drainage area used in designing the water quality treatment units differ from the areas used in calculating the infiltration requirements for the East residential community. Please explain and/or correct the difference if necessary.	OGS, Pond Capacity, and Future Lands			Water balance includes direct runoff areas and external areas that are not captured by the OGS units. Figures 102085-OGS1 and 102085-OGS2 have been prepared and added to the SWM report to clarify existing, proposed, and future OGS units.	
23	Please provide sample calculations sowing the C value for all zoning types and road cross sections. Include the minimum setbacks and maximum driveway widths allowed by the zoning.	General			C value calculations have been revised to include minimum setbacks, maximum lot coverage and maximum driveway widths. Refer to Coefficient Calculations drawing 102085-SWM-CC.	
24	It is assumed that the bypass structure (weir splitter) shown on the SWMF drawing is to divert flow for water quality treatment (required flow/volume) and the rest to the Pond without treatment. However, the Typical Bypass layout diagram provided in the report depicts bypassing the flow to two water quality treatment (either side) and the rest going to the Pond. It is assumed that a second water quality treatment unit will be installed as part of future development (this information is inconsistent in the report and drawings). Please include details on how the proposed water quality treatment unit works for this proposed development (including the drainage area).	OGS, Pond Capacity, and Future Lands			Figures 102085-OGS1 and 102085-OGS2 have been prepared and added to the SWM report to clarify existing, proposed, and future OGS units. The SWM report and PCSWMM models include both an interim and ultimate condition. The ultimate condition model demonstrates the function of the OGS units and bypass weir for the future development areas. Note that the future OGS unit sizing and bypass weir elevation will be confirmed during the design of the future development.	
25	Please consider protecting proposed infiltration units by capping end until the site is stabilized.	LIDs			Filter bags are to be placed under all rear yard catch basin lids until the site is stabilized. Refer to drawing 102085-ESC3.	
26	As per condition 63 of the subdivision agreement. Is the infiltration, OGS, SWM pond, temperature mitigation operating as designed. Please provide the monitoring information to date as required through the ECA.	LIDs			Due to ongoing buildout of the homes in Phase 1B-1 residential, temperature monitoring has not begun. Temperature monitoring program will begin following additional buildout of Phase 1B-1.	
27	PCSWMM hydrologic modeling routine chosen should not assume zero percent imperviousness. It will underestimate runoff and peak flows. A minimum 7% (C=0,25) should be used in the model.	General			Noted, these areas have been updated to have a 7% imperviousness.	
28	Please describe how parameters width and slopes are determined. Please make sure they follow City guidelines.	General			It has been confirmed that the width and slopes for subcatchment parameters were determined per City guidelines. Additional text is provided in the SWM report (Section 2.3.2) to reflect this.	
29	Where are the HGL comparisons to the usf? There appears to be one location where the clearance is only 0.3 m from the usf. This is the minimum and leaves no room for error. Please comment.	General			Refer to the updated USF tables in Appendix D which outlines HGL clearances to USFs for both the interim and ultimate conditions. Table 8 in the SWM Report provides the HGLs for the ultimate condition.	

City of Ottawa Comments (November 29, 2023)		Topic	Added	Hold/ Waiting for Info	Novatech Notes	Accepted
30	If you could provide the C value and area in the ICD table this would help in checking the capacities.	ICDs			Table 5 in the report body provides the rational method flows, and an expanded ICD table Appendix D of the Stormwater Management Report has been updated to provide the area and C value.	
31	Do cb's on grade even require an icd?	ICDs			On-grade CBs require ICDs to control the 100-year runoff to the 2-year peak flows from the subcatchment.	
32	The cb's ICD's need to be designed to the rational method flows. Some areas such as the rear yards are over controlled. Example A-3 the 2-year rational flow is 48.8 l/s while the restriction at cb 170 is 28.6 l /s.	ICDs			Rational Method flows have been added to Table 5. Previously the rear yards were under-controlled due to storage within the infiltration system. The ICD sizes have been updated with the model now reflecting that the rear yard infiltration system is full.	
33	Why is the HGL 0.35m at the outlet from the 1650 mm pipe? Please extend the HGL profile to the outlet of the dry pond. Include the downstream receiving water surface elevation.	Pond Inlet & RipRap			The HGL of 112.71 at the pond inlet pipe represents the 100-year water level in the pond. The approved design drawing for the existing pond has been included and provides a profile through the pond. Refer to drawing 102085-SWMF2 included in the SWM Report.	
34	Show ponding areas upstream of proposed check dams. Provide the calculations for the volume estimate.	Ponding			Static ponding contours have been added to the interim infiltration swales. Volumes are not quantified as the infiltration approach is "Best-Management Practices."	
35	In the proposed infiltration trenches. Should there not be some sort of impermeable cutoff wall to keep water from draining out along the sewer trenches?	LIDs			Infiltration trenches have been removed from within the right of ways.	
Drawings						
1	Please add ICD sizes to the General Plan of Services.	ICDs			The catchbasin table showing the ICD sizes previously located on the Notes and Details Plan 102085-ND1B2 has been moved to the General Plans of Services 102085-GP13 and 102085-GP14.	
2	Are the spill areas shown on the grading plan at the intersection of Street Three and Albert Boyd Private occur during the 2-year storm (at elevation of 116.83 m)? Note that, according to the City of Ottawa Storm Sewer Design-Technical Bulletin, there should be no surface ponding during the 2-year event. Please check all spill areas.	Ponding			Ponding contours shown on the grading plans represent static ponding elevations. No ponding is proposed during the 2-year event.	
3	The design details of the inlet spillway (V-ditch) to the SWM facility, including cross-section and water levels (for the designed return period including the 100-year storm), must be provided in section E-E.	Pond Inlet & RipRap			Additional pond inlet details are provided on drawings 102085-SWMF5 and 102085-SWMF6.	
4	Riprap swale design details should include length of riprap areas on either side.	Pond Inlet & RipRap			This information has been added to the drawing 102085-SWMF5.	
5	Are clear stone fillings of rock check dams within infiltration swales provided to the top of the bank of the swale, without any freeboard?	Ponding			Refer to drawing 102085-INF2 for updated details of the rock check dams. As the runoff originates from the undeveloped lands, freeboard is not provided on the undeveloped side of the swale.	

City of Ottawa Comments (November 29, 2023)		Topic	Added	Hold/ Waiting for Info	Novatech Notes	Accepted
6	CB 200 and 170 connects to the existing system. Does it have the capacity? Why are the cb's 118 and 119 being swapped. Where are the calculations to show this requirement?	ICDs			The modelling results indicate sufficient capacity to connect CB 200 and CB 170 to the existing Phase 1B-1 system. Some existing ICDs are being swapped due to changes in system HGL with the development of Phase 1B-2. Refer to model results in Appendix D.	
7	Drawing shows cb 119 and 118 to be swapped while table 2 indicates that cb's to be swapped 126 and 127 (can't locate these 2 cb's) and icd's in each of cb 138 and 139. Can't find these two locations in the previous phase on the drawings provided?	ICDs			Drawing 102085-GP13 has been revised to indicate the location of CB 126 and CB 127. CB 138 and CB 139 are shown on drawing 102085-GP13 at approximately station 9+490.	
8	What is the purpose of having interconnected icd's each with their own icd? One of the most common reasons for interconnecting cb's is to have only one icd.	ICDs			Design has been revised such that there are no more interconnected catch basins. Each catch basin will have its own ICD, if required.	
9	Show rear yard ponding and in the interim swale on the plans.	Ponding			Static ponding contours have been added to the Grading Plans.	
10	The spill elevation 116.33 behind lot 63 appears to be higher than the overflow to the undeveloped land set at 116.29. It would be a better if all the overflows to the adjacent lands were at least 15 cm higher than the internal spill elevation along the swale.	General			The Lot 63 corner elevation has been revised. Refer to Grading Plan 102085-GR14.	
11	Profile drawing P28 show 1650 mm outlet 112.36 m then a slope down to the pond. Please extend the profile through the pond and out.	Pond Inlet & RipRap			Additional pond details are provided on drawings 102085-SWMF5 and 102085-SWMF6. The approved design drawing for the existing pond has been included and provides a profile through the pond. Refer to drawing 102085-SWMF2.	
12	GR14, top left-hand corner, is the spill point drawing for Block 83?	General			Yes. Name of detail has been updated to refer to Block 83.	
13	Drawings show interconnected cb's 162A/162B and168A/168B with ponding on one side of the street but not the other. There is a continuous grade running from the T/G on 162A and 168A . Is it possible to have 6 and 7 cm of ponding on one side of the street without the water flowing up through the other cb? Similar at cross connected cb's 165A and 165B.	Ponding			The ponding contours shown are static ponding elevations which would represent maximum ponding in emergency situations (i.e. blockage in CB162A or CB 168A).	
14	How do you model a segment that has one side in a sump and the other is on a continuous grade? Would it not be better to have them both the same?	General			In the PCSWMM model, both were modelled as on-grade. In the drawings, the ponding limits shown reflect the maximum static ponding for the CB in a sag.	
15	SWMF5, provide inverts on the proposed offline exfiltration, provide inverts on Vortechs, provide details of the flow splitter upstream and downstream of Vortechs, Provide confirmation from Vortechs that the downstream weir will not affect the function of the OGS.	General			The offline exfiltration trench and the weir in MH 277 have been removed. Refer to the Vortech 1929CIP Layout Detail on drawing 102085-SWMF5 for details.	
PCSWMM Modelling						
1	There are minor discrepancies regarding the size of the pipes in the PCSWMM. Please revise the size of the pipe as required. (ex.: between MH269-MH270- drawing 675mm, PCSWMM 686mm).	General			Actual pipe sizes were used in the model instead of nominal pipe sizes.	
2	It seems that the infiltration ratio is calculated per the location of the trenches. Please provide rationale and/or calculation results regarding infiltration ratio into subsoil for the rear yard infiltration trenches, roadside exfiltration trenches, and an offline exfiltration trench in PCSWMM.	LIDs			All infiltration measures have been removed from the PCSWMM model. Rear yard pipes are assumed to be full for modelling purposes.	
3	The volume between the modeling and report shows discrepancy for the rear yard infiltration trenches. In PCSWMM, the infiltration trenches are modeled as a combination of a box culvert (0.56mx1m) and 250mm pipe. The trenches are filled with 25 mm gravel, so the infiltration trenches in the PCSWMM are assumed to provide more volume. Please provide a rationale for the volume of the infiltration trenches applied in the model. In addition, please confirm if the volume of the 250mm pipe is subtracted from the volume of the trenches according to the model configuration.	LIDs			The rear yard infiltration was excluded from the PCSWMM model as they are assumed to be full for modelling purposes. Only the downstream rear yard pipe was modelled. Due to the perched outlet pipe for the rear yard systems (to promote infiltration) all rear yard pipes were modelled as full using an initial depth.	
4	Please review the model not to have any double accounting for storage (for example Albert Boyd Private Street).	General			Updated the major system conduits at intersections to ensure no double counting of storage. Set lengths shorter so as to not double count the road sections.	
5	Please acknowledge that City of Ottawa does not like to have interconnected catch basins. In some cases we have to allow for larger diameter icd's. Please review the design to see if you can eliminate interconnected CBs.	ICDs			The storm sewer design has been revised such that there are no more interconnected catch basins.	
6	Please verify that the sawtooth flow conveyance in rear yard was not modeled as such but rather on a continuous grade.	General			All major systems in the rear yards show a continuous grade to the road. No saw toothing was modelled.	

City of Ottawa Comments (November 29, 2023)		Topic	Added	Hold/ Waiting for Info	Novatech Notes	Accepted
7	The PCSWMM model files for 100 years are shown as outdated in the result tab. Please check and provide the most recent model with results.	General			Updated PCSWMM model packages have been provided with updated results.	
8	How are the contributing areas to Infiltration RYCB to CB represented in the model calculated? The PCSWMM model is assumed to include only infiltration measures connected to storm sewers. Please note we do not allow for infiltration storage to be part of quantity and HGL calculations as noted earlier.	LIDs			All infiltration measures have been removed from the PCSWMM model. Rear yard pipes are assumed to be full for modelling purposes.	
9	The report states the proposed water quality treatment units are for Phase 1B-2 and future development. The model shows only one water quality treatment unit. Please clarify.	OGS, Pond Capacity, and Future Lands			An ultimate conditions model was added to the SWM analysis which includes the additional water quality treatment unit.	
10	According to the model, half of the stormwater from the development area goes to the OGS unit and the rest goes to the pond without treatment. Similarly, approximately 380 L/s of runoff is directed to the Pond via a swale, which includes external flows as well as approximately 68 L/s flow from development areas. The flows from the external areas are assumed to be from the existing conditions and do not require treatment at this Phase of development. Please clarify.	OGS, Pond Capacity, and Future Lands			Only minor system flows are directed through the OGS unit, and the OGS unit is only designed to treat the water quality event (25mm storm event). In the interim condition PCSWMM model, the future development area is undeveloped and does not require treatment. An ultimate condition PCSWMM model was included in the SWM report that shows the additional unit and the treatment of the future development area with a C = 0.65. Figures 102085-OGS1 and 102085-OGS2 clarify the interim and ultimate drainage areas to the pond and OGS units.	

Date:	3/26/2024	File:	D07-16-22-0017
To:	Kevin Hall		
From:	Charles Warnock, Sobha Kunjikutty		
Project:	Carp Airport Residential Phase 1B-2		
Subject:	Stormwater Review – Second Submission		

TECHNICAL MEMO

The following is a summary of the review that was undertaken by the City of Ottawa SWM review unit of the West Capital Airpark Phase 1B-2 Residential SWM Report (NOVATECH, Revised dated February 26, 2024), the West Capital Airpark Phase 1B-2 Residential Servicing Report (NOVATECH, Revised dated February 26,2024), and supporting modelling files and engineering drawings titled “WEST CAPITAL AIRPARK PHASE 1B-2 – RESIDENTIAL,“ February 2024.

Comments:

It is our recommendation that the following comments be provided to the applicant:

	Comments	Response	Outstanding/Additional info to discuss
West Capital Airpark Phase 1B-2 Residential Servicing Report			
1.	The 2-year storm also requires a 10 minute TC not 15 minutes as shown.	The storm sewer design sheet has been updated with a time of concentration of 10 minutes. Refer to Appendix D of the Servicing Report.	No further comment
West Capital Airpark Phase 1B-2 Residential SWM Report			
1.	Is it possible to provide a more details for selection of the 4-hour Chicago design storm as a critical design storm. Does the Chicago 4-hour storm create maximum peak flow or create maximum volume related to the inside of the pond elevation? Is there some excerpt from a previously approved SWM report in which the 4-hour Chicago storm was determined to be the critical design storm? The East SWM facility was designed using the SWMHYMO model, which used 4-hour Chicago storm distribution. And a 3-hour Chicago storm distribution is required to ensure that the pond's boundary conditions match the design storm being run for the development. It is assumed that the 3-hour Chicago storm is used as a	In order to be consistent with the original pond design in the Stormwater Site Management Report Residential, April 6, 2015, only the 4-hour Chicago storm was used in the analysis as the 2015 report indicates that this is the critical design storm. Additional text has been added to Section 2.3.1 of the SWM report to clarify.	Section 2.3.1 now states that the 4-hour Chicago design storm produces the maximum HGL levels and ponding depths for both the minor and major systems. The same design storm was utilized for the stress test, a 4-hour Chicago design storm with 20% more intensity and total volume than

	boundary condition in the PCSWMM model. Please clarify.		the 100-year event. In response to the previous comment, an excerpt of the prior report or table comparing the assessed design storms should have been provided when identifying critical design storms. No further comment
2.	On page 5, it is mentioned that "Refer to Section 4.3.4 for …". We assumed that it is typo of Section 2.3.4. please revise as required.	This was a typo. Due to changes to the report, this reference was removed.	No further comment
3.	In Table 2, it is not clear why there is no capture flow within the RYCB's. The capture flow rate (2-year) shown as 'zero' in Table 2 for the rear yard catch basins are assumed to be because those flow/volume are not accounted for storage? City is in the process of updating guidelines with respect to LID's. Currently we do not allow for the elimination or downsizing of end-of-pipe facilities due to proposed infiltration methods. The model can be run to verify that the infiltration works. However outside of this the model runs for the different return periods used to estimate flows, volumes, HGL, etc. should assume that the LID is not present (or is full at the commencement of the storm). Please provide additional details about the rear yard infiltration trenches, including the quantity/storage information.	Rear yard infiltration was removed from the modelling. This corrected any issues with the ICD table (Table 5 in Section 2.3.4) for the rear yards. Infiltration volume calculations are provided in Appendix F of the SWM report.	No further comment
4.	The information in Table 2 is not clear. In cases where the approach flow is greater than the capture flow, will there be ponding? If so, please add a column to	A ponding table (Table 6) has been provided in Section 2.3.4 to show that there is no ponding in sags	No further comment

	this table to indicate the depth of the ponding. It should be minimal. The City of Ottawa Storm Sewer Design-Technical Bulletin, the minimum sewer size for local streets is based on 2-year storm and there should not have any surface ponding during 2-year event.	during the 2-year event. Updated ICD sizes show that the inlet rate of the ICDs can handle the 2-year flows.	
5.	Based on the Table 3 in the SWM report, the current drainage area is about 9 ha less than it was designed to be at the time of Phase 1 Residential Registration. Is that +/- 9ha area that now drains uncontrolled to Carp Creek? Are any additional lands being directed directly to Carp Creek as part of the current proposal and if so, how will that impact the creek?	The difference in areas is due to the interim condition having undeveloped area being directed to the Creek as per existing drainage patterns. The ultimate design of the East Residential Community will have a similar drainage area being controlled by the pond and there are no significant changes to the post-development drainage patterns from the original design of the subdivision. Note that Table 3 is no longer included in the report as the SWMF has been included in the PCSWMM model. The PCSWMM model, which includes the pond and outlet structure, shows that there are no impacts to the creek based on the proposed interim and ultimate conditions of the East Residential Community. Refer to figures 102085-OGS1 and 102085-OGS2 which clarify the interim and ultimate drainage areas to the pond.	No further comment
6.	Based on the Table 3 in the SWM report, the current runoff coefficient comparing Phase 1 Residential Registration is reduced to 0.29. Please provide rationale of the reduced runoff coefficient in the	Table 3, in Section 2.3.4, was for the capacity of the Existing SWM facility with the future lands being undeveloped. This table	No further comment

	SWM report? It seems that the future lands should be accounted for as developed, not undeveloped, so that proposed infrastructure is sized with the capacity for future development. What significant changes in land use resulted in lower A x C values when calculating the capacity of the East SWM facility? What is the stormwater quantity control plan for future development of undeveloped land?	has been removed and replaced with further analysis and discussion on both the interim condition (1B-2 with undeveloped future lands) and the ultimate condition (1B-2 with developed future lands) contributing to the SWM facility. The storm sewers near the pond outlet are sized to accommodate the future developed lands. A second OGS unit is proposed as part of the future development to meet the quality control requirements of the future development lands. Refer to figures 102085-OGS1 and 102085-OGS2 which clarify the interim and ultimate drainage areas to the pond.	
7.	Please provide rip-rap size and calculation for the rip-rap sizing.	Refer to Appendix E of the SWM Report for supporting calculations.	No further comment.
8.	Please provide capacity of the SWM pond inlet swale and please provide measures to prevent erosion in the SWM pond inlet swale (out-side of the rip-rap limits).	The capacity of the SWM pond inlet swale was evaluated in PCSWMM. The velocities in the swale show that erosion control measures are not required. Additional discussion is provided in Section 2.3.5 of the SWM Report.	No further comment
9.	The groundwater from BH43-13 was observed below 1.51m from the surface. Please confirm if the infiltration trench in the backyard of Block 79 and Block 78 secures a minimum depth of 1.0m from the groundwater table. Please provide elevations for various cross sections along the infiltration trench and swales. The profiles should show the observed groundwater elevations from the Geotech report in the vicinity of the chosen cross-sections. In some areas near BH 9-11, BH 10-11, and BH 43-13, the elevation from	As discussed with City staff, a best management practice approach is being proposed for infiltration. Some rearyard systems may not meet the depth above groundwater, which is consistent with standard City of Ottawa rearyard subdrain systems. Refer to section 3.0 of the Stormwater Management Report for further discussion.	No further comment

	the ground surface to the observed groundwater appears to be in the range of 0.4 to 1.54 m. Please review all infiltration trench, exfiltration, and infiltration swale measures.		
10.	The percolation rate should reflect the soil condition of the project site. Could you add details about the percolation rate of 25mm/h that is mentioned in the report (page 6). The most recent geotechnical report does not include a section on the proposal for infiltration. Please provide a reference to a Geotechnical report or an earlier approved report. There needs to be a minimum discussion on the ground water level and infiltration. Infiltration should be based on field measurements not assumptions made on based on soil types. The geotechnical report provided shows in Table 3 shows ground water elevations at a time that is not typically the highest level. Please comment on how this may affect the proposed infiltration practices proposed.	The infiltration rate used is per the approved 2015 Master SWM Report and is per Table 4.4 of the MOE SWM Planning & Design Manual, based on the on-site soils. Based geotechnical and groundwater constraints that limit infiltration measures to best management practices, in-situ testing does not provide additional benefit. Additional discussion on groundwater elevations has been added to Section 3.0 of the SWM Report.	We do not agree with the statement "*in-situ testing does not provide additional benefit.*" However considering that best management practice approach is being proposed for infiltration the estimate of the infiltration rate is not as critical. No further comment.
11.	It is not clear in the Contech Sizing Report found in Appendix C what the contributing area to the OGS is in the Contech sizing software, as well as the imperviousness of that area. Please update accordingly and provide a drainage area plan for existing and proposed water quality treatment units.	Refer to figures 102085-OGS1 and 102085-OGS2 which clarify the interim and ultimate drainage areas to the pond and OGS units.	No further comment.
12.	Please verify that the OGS unit will treat a minimum of 90% of the total annual stormwater volume from the contributing area. Ensure that the bypass structure with the splitter weir does not allow too much of the flow to bypass the treatment system.	Per the Vortechs design sheets provided in Appendix C, 90% of the projected annual runoff volume would be treated. The bypass weir is designed to convey the 25mm 4-hour Chicago event to the OGS unit (for both the interim and ultimate condition).	It is noted that the OGS device will treat runoff from 25 mm design storm (from the storm sewer). Is this accounted to 90 percent of the annual runoff volume?

13.	It would be helpful if a figure was provided that shows what catchment area contributes to the existing OGS, what area contributes to the proposed OGS, and what area contributes to the future OGS.	Refer to figures 102085-OGS1 and 102085-OGS2 which clarify the interim and ultimate drainage areas to the pond.	No further comment.
14.	It is unclear how the annual infiltration rates found in the table on page 94 of the SWM report PDF were generated. Please provide details of how the infiltration rate per year was established for each location. Include calculations of infiltration depths for each of the infiltration/exfiltration units shown on page. The annual infiltration rates provided for the East Residential Water balance are not clear. Provide infiltration (mm) calculations for land use areas draining to an infiltration or exfiltration trench. Please note that, according to the table, post-development infiltration in the East Residential areas increased by 10.7% not decreased by.	The Infiltration rates on Page 94 were from the approved 2021 Servicing and Stormwater Report (Phase 2A, 2021). The calculations for this area were added to Appendix F of the SWM report. Additional notes to the Appendix F calculations are provided to clarify the calculations for the annual infiltration rates.	No further comment.
15	It is assumed that the infiltration/water balance calculations and design details are taken from the 2015 SWM report. If so, please refer that as well in Section 2 of this report and include in the appendix any relevant information.	The water balance calculations use the same methodology as the Stormwater Site Management Report Residential (April 6, 2015), but with updated design info for Phase 1B-2 and the West Residential Development (Phase 1A and 2A). Note that the water balance calculations that assumes no BMPs from the 2015 SWM report was added to Appendix F.	No further comment.
16.	Section 2.2 is unclear about the water quality treatment measures proposed for Phases 1B-2 and future development areas. The new proposed treatment unit would consider half of the modelled 25 mm storm event from Phase 1B-2 and the entire future development area. But subsequently it stated that a second treatment unit would be provided for additional treatment for future	Additional clarification has been added to Section 2.2 of the SWM report to clarify existing, proposed, and future OGS units. Refer to figures 102085OGS1 and 102085-OGS2 which clarify the interim and ultimate drainage areas to the pond and OGS units.	No further comment.

	development areas. Please review and clarify as necessary.		
17	To compare and understand the changes, a table showing the water quality treatment areas, flows, and volumes from the previous submission (SWMMHYMO model result) and the recent submission (PCSWMM model output) is useful. For the SWM pond please provide a table that compares the previously approved inflows and outflows, volumes, and water levels with the proposed for this phase. Provide confirmation that all criteria listed in section 2.1 are being met or exceeded.	Figures 102085-OGS1 and 102085-OGS2 have been prepared and added to the SWM report to clarify drainage areas to the pond and OGS units in both the interim and ultimate conditions. The SWMF was included in the PCSWMM model. The report discusses that the volumes, HGLs and outflows are in accordance with the previous design and all design criteria.	No further comment.
18.	Section 2.3.4 stated that "...*was approved by the MOECC to meet the above noted criteria*." What criteria is it referring to?	The report text has been updated to reference the design criteria in Section 2.1	No further comment.
19	Is the infiltration/water balance calculations, the same as in the 2015 SWM draft plan that was approved? Please make sure that all details such as length, bottom width, side slope, infiltration volume, etc. be provided for each infiltration trench type for the west and east residential communities in a table and compare the total volume meets the infiltration volume requirement for the site. Are the infiltration measures proposed in Phase 1B-2 the same as those proposed in the 2015 SWM report? If so, were the existing infiltration trenches in Phase 1B-2 area (marked as 'will be removed' in plans) excluded and used the new proposed ones in calculating the infiltration volume?	The water balance calculations uses the same methodology as the approved Stormwater Site Management Report Residential (April 6, 2015), but with updated design info for Phase 1B-2 and the West Residential Development. Storage volume calculations for the East and West Residential Communities have been provided in Appendix F. Due to the site constraints, and discussions with the City, the infiltration volume requirement no longer applies. The infiltration measures in the 2015 SWM report were assumed to be roadside ditches and taxiways which are no longer proposed in	No further comment.

		Phase 1B-2. The infiltration swales in Phase 1B-2 marked as "to be removed" were part of the West Residential Phase 2A design, in order to meet the requirement of matching the pre-development infiltration throughout construction. These removed swales have been excluded from the updated water balance calculations. Infiltration measures have been revised based on the proposed Phase 1B-2 design	
20	Grading plans must show the depths (elevations), volumes, and extent of ponding of all surface storage including spill areas. This would include the rear yards and the interim check dams.	Static ponding depths (elevations) and extents (contours) have been added to all surface storage areas in the right-of-way, rear yards, and interim infiltration swales. Ponding elevations have been shown for the 100-year and 100-yr + 20% storm events within the right-of-way. Refer to the Grading Plans. Ponding volumes are in provided in Table 6 of the SWM Report	No further comment.
21	Please provide the sizing details and infiltration drawdown times for the proposed interim swales. The extent of the interim swale should be clearly shown including grades at the top and bottom of the channel. The assumption is that all the water trapped upstream of the rock check dams will infiltrate. However, these check dams are permeable and only “slow down” the water. Was this factored into the calculations?	Additional sizing details and drawdown times for the interim infiltration swales are provided in Appendix F. Drawdown times provided in the infiltration summary in Appendix F. Check dams have been revised to have 0.20m earth berm to hold back and infiltrate the runoff. The volumes are based on a 0.20m depth. Refer to the Infiltration Measures Plan (102085INF2) for check dam details	No further comment.
22	The total drainage area used in designing the water quality treatment units differ from	Water balance includes direct runoff areas and	No further comment.

	the areas used in calculating the infiltration requirements for the East residential community. Please explain and/or correct the difference if necessary.	external areas that are not captured by the OGS units. Figures 102085-OGS1 and 102085-OGS2 have been prepared and added to the SWM report to clarify existing, proposed, and future OGS units.	
23	Please provide sample calculations sowing the C value for all zoning types and road cross sections. Include the minimum setbacks and maximum driveway widths allowed by the zoning.	C value calculations have been revised to include minimum setbacks, maximum lot coverage and maximum driveway widths. Refer to Coefficient Calculations drawing 102085-SWM-CC.	No further comment.
24	It is assumed that the bypass structure (weir splitter) shown on the SWMF drawing is to divert flow for water quality treatment (required flow/volume) and the rest to the Pond without treatment. However, the Typical Bypass layout diagram provided in the report depicts bypassing the flow to two water quality treatment (either side) and the rest going to the Pond. It is assumed that a second water quality treatment unit will be installed as part of future development (this information is inconsistent in the report and drawings). Please include details on how the proposed water quality treatment unit works for this proposed development (including the drainage area).	Figures 102085-OGS1 and 102085-OGS2 have been prepared and added to the SWM report to clarify existing, proposed, and future OGS units. The SWM report and PCSWMM models include both an interim and ultimate condition. The ultimate condition model demonstrates the function of the OGS units and bypass weir for the future development areas. Note that the future OGS unit sizing and bypass weir elevation will be confirmed during the design of the future development.	No further comment.
25	Please consider protecting proposed infiltration units by capping end until the site is stabilized,	Filter bags are to be placed under all rear yard catch basin lids until the site is stabilized. Refer to drawing 102085-ESC3.	No further comment.
26	As per condition 63 of the subdivision agreement. Is the infiltration, OGS, SWM pond, temperature mitigation operating as designed. Please provide the monitoring information to date as required through the ECA.	Due to ongoing buildout of the homes in Phase 1B-1 residential, temperature monitoring has not begun. Temperature monitoring program will begin following additional buildout of Phase 1B-1.	Noted

27	PCSWMM hydrologic modeling routine chosen should not assume zero percent imperviousness. It will underestimate runoff and peak flows. A minimum 7% (C=0,25) should be used in the model.	Noted, these areas have been updated to have a 7% imperviousness.	No further comment.
28	Please describe how parameters width and slopes are determined. Please make sure they follow City guidelines.	It has been confirmed that the width and slopes for subcatchment parameters were determined per City guidelines. Additional text is provided in the SWM report (Section 2.3.2) to reflect this.	No further comment.
29	Where are the HGL comparisons to the usf? There appears to be one location where the clearance is only 0.3 m from the usf. This is the minimum and leaves no room for error. Please comment	Refer to the updated USF tables in Appendix D which outlines HGL clearances to USFs for both the interim and ultimate conditions. Table 8 in the SWM Report provides the HGLs for the ultimate condition.	The OSDG states a minimum clearance 0.3 m from HGL or the pipe obvert whichever is greater. However we note in this case at the locations where it should be compared with the obvert the clearance is sufficient. No further comment.
30	If you could provide the C value and area in the ICD table this would help in checking the capacities.	Table 5 in the report body provides the rational method flows, and an expanded ICD table Appendix D of the Stormwater Management Report has been updated to provide the area and C value.	No further comment.
31	Do cb's on grade even require an icd?	On-grade CBs require ICDs to control the 100-year runoff to the 2-year peak flows from the subcatchment.	No further comment.
32	The cb's ICD's need to be designed to the rational method flows. Some areas such as the rear yards are over controlled. Example A-3 the 2-year rational flow is	Rational Method flows have been added to Table 5. Previously the rear yards were under-controlled due to storage within the	No further comment.

	48.8 l/s while the restriction at cb 170 is 28.6 l /s.	infiltration system. The ICD sizes have been updated with the model now reflecting that the rear yard infiltration system is full.	
33	Why is the HGL 0.35m at the outlet from the 1650 mm pipe? Please extend the HGL profile to the outlet of the dry pond. Include the downstream receiving water surface elevation.	The HGL of 112.71 at the pond inlet pipe represents the 100-year water level in the pond. The approved design drawing for the existing pond has been included and provides a profile through the pond. Refer to drawing 102085-SWMF2 included in the SWM Report.	No further comment.
34	Show ponding areas upstream of proposed check dams. Provide the calculations for the volume estimate.	Static ponding contours have been added to the interim infiltration swales. Volumes are not quantified as the infiltration approach is "BestManagement Practices."	No further comment.
35	In the proposed infiltration trenches. Should there not be some sort of impermeable cutoff wall to keep water from draining out along the sewer trenches?	Infiltration trenches have been removed from within the right of ways.	No further comment.
Engineering drawings titled “WEST CAPITAL AIRPARK PHASE 1B-2 – RESIDENTIAL v .			
1.	Please add ICD sizes to the General Plan of Services	The catchbasin table showing the ICD sizes previously located on the Notes and Details Plan 102085-ND1B2 has been moved to the General Plans of Services 102085-GP13 and 102085-GP14.	No further comment.
2.	Are the spill areas shown on the grading plan at the intersection of Street Three and Albert Boyd Private occur during the 2-year storm (at elevation of 116.83 m)? Note that, according to the City of Ottawa Storm Sewer Design-Technical Bulletin, there should be no surface ponding during the 2-year event. Please check all spill areas.	Ponding contours shown on the grading plans represent static ponding elevations. No ponding is proposed during the 2-year event.	No further comment.
3.	The design details of the inlet spillway (V-ditch) to the SWM facility, including cross-	Additional pond inlet details are provided on drawings	No further comment.

	section and water levels (for the designed return period including the 100-year storm), must be provided in section E-E.	102085-SWMF5 and 102085-SWMF6.	
4.	Riprap swale design details should include length of riprap areas on either side. .	This information has been added to the drawing 102085-SWMF5.	The rip-rap swale details provided on the 102085-SWMF-5 drawing are assumed to be general one and shall refer to the location where external flow through the swale occurs. Is the channel section between E-E and the headwall the same as E-E with the exception that it contains rip-rap? Please clarify.
5.	Are clear stone fillings of rock check dams within infiltration swales provided to the top of the bank of the swale, without any freeboard?	Refer to drawing 102085-INF2 for updated details of the rock check dams. As the runoff originates from the undeveloped lands, freeboard is not provided on the undeveloped side of the swale.	No further comment.
6.	CB 200 and 170 connects to the existing system. Does it have the capacity? Why are the cb‘s 118 and 119 being swapped. Where are the calculations to show this requirement?	The modelling results indicate sufficient capacity to connect CB 200 and CB 170 to the existing Phase 1B-1 system. Some existing ICDs are being swapped due to changes in system HGL with the development of Phase 1B2. Refer to model results in Appendix D.	No further comment.
7.	Drawing shows cb 119 and 118 to be swapped while table 2 indicates that cb’s to be swapped 126 and 127 (can’t locate these 2 cb’s) and icd’s in each of cb 138 and 139. Can’t find these two locations in	Drawing 102085-GP13 has been revised to indicate the location of CB 126 and CB 127. CB 138 and CB 139 are shown on drawing 102085-GP13 at	No further comment.

	the previous phase on the drawings provided?	approximately station 9+490.	
8.	What is the purpose of having interconnected icd's each with their own icd? One of the most common reasons for interconnecting cb's is to have only one icd.	Design has been revised such that there are no more interconnected catch basins. Each catch basin will have its own ICD, if required.	It is noted the CB 138 and CB 139 with 1B-1 phase are interconnected with each its own ICDs (Table 5)? Please clarify.
9.	Show rear yard ponding and in the interim swale on the plans.	Static ponding contours have been added to the Grading Plans.	No further comment.
10.	The spill elevation 116.33 behind lot 63 appears to be higher than the overflow to the undeveloped land set at 116.29. It would be a better if all the overflows to the adjacent lands were at least 15 cm higher than the internal spill elevation along the swale.	The Lot 63 corner elevation has been revised. Refer to Grading Plan 102085GR14.	No further comment.
11.	Profile drawing P28 show 1650 mm outlet 112.36 m then a slope down to the pond. Please extend the profile through the pond and out.	Additional pond details are provided on drawings 102085-SWMF5 and 102085-SWMF6. The approved design drawing for the existing pond has been included and provides a profile through the pond. Refer to drawing 102085-SWMF2.	No further comment.
12.	GR14, top left-hand corner, is the spill point drawing for Block 83?	Yes. Name of detail has been updated to refer to Block 83.	No further comment.
13.	Drawings show interconnected cb's 162A/162B and168A/168B with ponding on one side of the street but not the other. There is a continuous grade running from the T/G on 162A and 168A . Is it possible to have 6 and 7 cm of ponding on one side of the street without the water flowing up through the other cb? Similar at cross connected cb's 165A and 165B.	The ponding contours shown are static ponding elevations which would represent maximum ponding in emergency situations (i.e. blockage in CB162A or CB 168A).	No further comment.
14.	How do you model a segment that has one side in a sump and the other is on a	In the PCSWMM model, both were modelled as on-grade. In the drawings, the	No further comment.

	continuous grade? Would it not be better to have them both the same?	ponding limits shown reflect the maximum static ponding for the CB in a sag.	
15.	SWMF5, provide inverts on the proposed offline exfiltration, provide inverts on Vortechs, provide details of the flow splitter upstream and downstream of Vortechs, Provide confirmation from Vortechs that the downstream weir will not affect the function of the OGS.	The offline exfiltration trench and the weir in MH 277 have been removed. Refer to the Vortech 1929CIP Layout Detail on drawing 102085-SWMF5 for details.	No further comment.
PCSWMM Modelling:			
1.	There are minor discrepancies regarding the size of the pipes in the PCSWMM. Please revise the size of the pipe as required. (ex.: between MH269-MH270-drawing 675mm, PCSWMM 686mm).	Actual pipe sizes were used in the model instead of nominal pipe sizes.	No further comment.
2.	It seems that the infiltration ratio is calculated per the location of the trenches. Please provide rationale and/or calculation results regarding infiltration ratio into subsoil for the rear yard infiltration trenches, roadside exfiltration trenches, and an offline exfiltration trench in PCSWMM.	All infiltration measures have been removed from the PCSWMM model. Rear yard pipes are assumed to be full for modelling purposes.	No further comment.
3.	The volume between the modeling and report shows discrepancy for the rear yard infiltration trenches. In PCSWMM, the infiltration trenches are modeled as a combination of a box culvert (0.56mx1m) and 250mm pipe. The trenches are filled with 25 mm gravel, so the infiltration trenches in the PCSWMM are assumed to provide more volume. Please provide a rationale for the volume of the infiltration trenches applied in the model. In addition, please confirm if the volume of the 250mm pipe is subtracted from the volume of the trenches according to the model configuration.	The rear yard infiltration was excluded from the PCSWMM model as they are assumed to be full for modelling purposes. Only the downstream rear yard pipe was modelled. Due to the perched outlet pipe for the rear yard systems (to promote infiltration) all rear yard pipes were modelled as full using an initial depth.	No further comment.
4.	Please review the model not to have any double accounting for storage (for example Albert Boyd Private Street).	Updated the major system conduits at intersections to ensure no double counting of storage. Set lengths shorter so as to not double count the road sections.	No further comment.

5.	Please acknowledge that City of Ottawa does not like to have interconnected catch basins. In some cases we have to allow for larger diameter icd's. Please review the design to see if you can eliminate interconnected CBs.	The storm sewer design has been revised such that there are no more interconnected catch basins	It is noted the CB 138 and CB 139 with 1B-1 phase are interconnected.
6.	Please verify that the sawtooth flow conveyance in rear yard was not modeled as such but rather on a continuous grade.	All major systems in the rear yards show a continuous grade to the road. No saw toothing was modelled.	No further comment.
7.	The PCSWMM model files for 100 years are shown as outdated in the result tab. Please check and provide the most recent model with results.	Updated PCSWMM model packages have been provided with updated results.	No further comment.
8.	How are the contributing areas to Infiltration RYCB to CB represented in the model calculated? The PCSWMM model is assumed to include only infiltration measures connected to storm sewers. Please note we do not allow for infiltration storage to be part of quantity and HGL calculations as noted earlier.	All infiltration measures have been removed from the PCSWMM model. Rear yard pipes are assumed to be full for modelling purposes.	No further comment.
9.	The report states the proposed water quality treatment units are for Phase 1B-2 and future development. The model shows only one water quality treatment unit. Please clarify.	An ultimate conditions model was added to the SWM analysis which includes the additional water quality treatment unit.	No further comment.
10.	According to the model, half of the stormwater from the development area goes to the OGS unit and the rest goes to the pond without treatment. Similarly, approximately 380 L/s of runoff is directed to the Pond via a swale, which includes external flows as well as approximately 68 L/s flow from development areas. The flows from the external areas are assumed to be from the existing conditions and do not require treatment at this Phase of development. Please clarify.	Only minor system flows are directed through the OGS unit, and the OGS unit is only designed to treat the water quality event (25mm storm event). In the interim condition PCSWMM model, the future development area is undeveloped and does not require treatment. An ultimate condition PCSWMM model was included in the SWM report that shows the additional unit and the treatment of the future development area with a C = 0.65. Figures 102085-OGS1 and 102085-	As per the response provided in comment #12 in SWM report section. It is noted that the OGS device will treat runoff from 25 mm design storm (from the storm sewer). Is this accounted to 90 percent of the annual runoff volume?

		OGS2 clarify the interim and ultimate drainage areas to the pond and OGS units	

Additional comments:

- Table 2 compares the OGS unit drainage area for Phase 1B-1. The 'Proposed Phase 1B-2 Residential Design' column is assumed to refer to the 1B-1 and rear yards 1B-2 drainage areas? A more appropriate column title would be preferable, as the current one is confusing concerning the proposed OGS unit for the 1B-2 development site is outlined in Table 3.
- It is noted that runoff from the entire future development areas will discharge to the East SWM Facility through the Phase 1B-2 pond inlet. Whether the proposed SWM plan can demonstrate that the proposed pond inlet can also regulate flows from future development regions, or whether it will be included in future development. Kindly clarify.
- The profile drawing for Block 81 (drawing 102085-P28) still includes offline exfiltration units. There are a few more references to exfiltration in legends and notes on various drawings. Please remove references to exfiltration units that are not part of the proposed SWM plan.
- It is noted that each of the two proposed OGS/Vortech units can treat runoff from 17.28 ha, for a total of 35.56 ha treated by both units. The proposed OGS unit for Phase 1B-2 is to treat runoff from 5.913 ha. This means that future development will direct flows to both the proposed interim and future OGS units. Please clarify.
- The west development resulted in an overall 34% decrease in infiltration, whereas the east development increased infiltration by 12%. However, the tables reveal that the total infiltration from the west and east development areas decreased by only 0.5%. Include calculation for the combined infiltration water balance for west and east developments, 245 mm/yr and 243 mm/yr, for pre and post-development circumstances, respectively.
- Where is the entrance to the construction or development site?

  Mud mat should be provided at the site's construction entrance(s) and egress(s).

  Erosion and Sediment Control (ESC) section include a heavy-duty silt fence if there any work in the area adjacent to water courses and include the type of erosion controls proposed for in stream works. Furthermore, the following should be added in ESC section:

  - Inspections of ESC measures at a frequency specified per the ESC plan, for dry weather periods (active and inactive construction phases), after Significant Storm Events (means a minimum of 25 mm of rain in any 24 hours period) and Significant Snowmelt Events **(means the melting of snow at a rate which adversely affects the performance and function of the system),** and after any extreme weather events.
  - Identify and rectify any deficiencies and undertake necessary maintenance measures as soon as possible.
  - Inspections and maintenance of temporary ESC measures shall continue until they are no longer required.
  - The contractor shall ensure that records of inspection, including at a minimum, the inspector's name, date of inspection, visual observations, and any necessary remedial measures to maintain the interim ESC measures.
- PCSWMM shows warning messages at several nodes, on Street 1-E, and in the cooling trenches. It is noted that the model automatically adds a small slope to any flat conduit that does not the above zero minimum slope requirements because the cooling trenches have a

flat or zero slope. However, why does the Street-1-E node have the same error?
The maximum depth increased at nodes CB-116A-B, CB-126-127, and CB-163A-B. When integrating with upstream nodes, the model automatically increased depth to match the top height of the highest connected links. Please check these nodes and adjust the offsets to eliminate number of warnings as feasible.

- Future development assumes 100m3/ha of storage for major flow to ROW. The 5.9 ha phase 1B is providing approximately 196 cu.m. surface storage.(Table 6). This translates to 33 cu.m./ha. This is closer to what we see in other subdivisions. Please look at what would happen if the assumed surface storage was reduced from the 100 cu.m./ha.

City of Ottawa Stormwater Operations Comments
Received via email attachment April 26, 2024

Carp Airport Development Phase 1B-2; East Pond Stormwater System,

April 10,2024

Although the city has not yet assumed responsibility for the pond, an inspection revealed the problem with the inlet and lower channel. The West Pond inlet is buried by sediments, potentially causing issues with the cooling trench inlet, which might be plugged. Sediment deposition from overland flow carrying sandy sediments might be the source of the problem.

It's necessary for a consultant to inspect both the inlet and the lower channel, as the cooling trench may also be compromised or plugged. This is particularly crucial as the new development in the East Pond inlet and cooling trench have the same design elements as the West Pond.

The proposed overland swale should be diverted to the pond instead of discharging into the riprapped cooling manhole 281 depression to prevent further potential inlet plugging issues. The cooling trench must be provided with a subdrain all the way up to the connection with the existing west cooling channel, to ensure functionality. Referring to the mark-up at DWG 102085 SWF-5 East Stormwater Management Facility Phase 1B-2 Inlet Details for specific details and guidance on addressing the issues.

The inspection and correction of the problem should be done expeditiously due to uncertainties about the system's short and long-term functionality.

In summary, it's imperative to address the sedimentation issue at the West Pond inlet promptly to prevent further complications with the cooling trench and ensure the functionality of the stormwater management facility as well.

Additionally, the consultant must update the 2023 geotechnical report to confirm the groundwater table elevations, as field measurements were taken in September 2011

Please provide response to our previous comment:
Who will be responsible for maintaining the rear yard infiltration trench while it's in the place. Please provide a service road parallel to the trench.

Lastly the off-line Oil Grid separators must be provided with the gate to provide efficient maintenance.

City of Ottawa Comments (November 29, 2023)		Novatech Notes (February 23, 2024)	City of Ottawa Comments (March 26, 2024)	Novatech Notes (May 14, 2024)	Accepted
General					
	Comments 1 to 8		No further comment		✓
Grading Plan (102085-GR13)					
	Comments 1 to 3		No further comment		✓
Plan and Profile Phase 1B-2 Block 81 & Storm Sewer Outlet (102085-P28)					
	Comments 1 to 2				
Servicing Report					
1	The 2-year storm also requires a 10 minute TC not 15 minutes as shown.	The storm sewer design sheet has been updated with a time of concentration of 10 minutes. Refer to Appendix D of the Servicing Report.	No further comment		✓
SWM Report					
	Comments 1 to 11		No further comment		✓
12	Please verify that the OGS unit will treat a minimum of 90% of the total annual stormwater volume from the contributing area. Ensure that the bypass structure with the splitter weir does not allow too much of the flow to bypass the treatment system.	Per the Vortechs design sheets provided in Appendix C, 90% of the projected annual runoff volume would be treated. The bypass weir is designed to convey the 25mm 4-hour Chicago event to the OGS unit (for both the interim and ultimate condition).	It is noted that the OGS device will treat runoff from 25 mm design storm (from the storm sewer). Is this accounted to 90 percent of the annual runoff volume?	Yes, the 25mm rainfall event is included in the 90% of the annual runoff volume treated. Please refer to Appendix E, page 226 for the estimated net annual solids load reductions table, prepared by Contech.	
	Comments 13 to 35		No further comment		✓
Drawings					
	Comments 1 to 3		No further comment		✓
4	Riprap swale design details should include length of riprap areas on either side.	This information has been added to the drawing 102085-SWMF5.	The rip-rap swale details provided on the 102085-SWMF-5 drawing are assumed to be general one and shall refer to the location where external flow through the swale occurs. Is the channel section between E-E and the headwall the same as E-E with the exception that it contains rip-rap? Please clarify.	An additional cross section through the rip-rap portion of the inlet swale has been added to drawing 102085-SWMF5.	
	Comments 5 to 7		No further comment		✓
8	What is the purpose of having interconnected icd's each with their own icd? One of the most common reasons for interconnecting cb's is to have only one icd.	Design has been revised such that there are no more interconnected catch basins. Each catch basin will have its own ICD, if required.	It is noted the CB 138 and CB 139 with 1B-1 phase are interconnected with each its own ICDs (Table 5)? Please clarify.	The Phase 1B-1 design drawings incorrectly indicated an ICD in the upstream CB. An ICD was installed in the downstream CB in order to control flows as intended. Only the downstream ICD was accounted for in the PCSMM model. The ICD in the upstream CB will not effect ponding as these CBs are on grade.	
	Comments 9 to 15		No further comment.		✓
PCSWMM Modelling					
	Comments 1 to 9		No further comment.		✓
10	According to the model, half of the stormwater from the development area goes to the OGS unit and the rest goes to the pond without treatment. Similarly, approximately 380 L/s of runoff is directed to the Pond via a swale, which includes external flows as well as approximately 68 L/s flow from development areas. The flows from the external areas are assumed to be from the existing conditions and do not require treatment at this Phase of development. Please clarify.	Only minor system flows are directed through the OGS unit, and the OGS unit is only designed to treat the water quality event (25mm storm event). In the interim condition PCSWMM model, the future development area is undeveloped and does not require treatment. An ultimate condition PCSWMM model was included in the SWM report that shows the additional unit and the treatment of the future development area with a C = 0.65. Figures 102085-OGS1 and 102085-OGS2 clarify the interim and ultimate drainage areas to the pond and OGS units.	As per the response provided in comment #12 in SWM report section. It is noted that the OGS device will treat runoff from 25 mm design storm (from the storm sewer). Is this accounted to 90 percent of the annual runoff volume?	Please see response to comment #12 of the SWM Report section above.	

City of Ottawa Comments (November 29, 2023)		**Novatech Notes (February 23, 2024)**	**City of Ottawa Comments (March 26, 2024)**	**Novatech Notes (May 14, 2024)**	**Accepted**
Additional Comments					
1			Table 2 compares the OGS unit drainage area for Phase 1B-1. The 'Proposed Phase 1B-2 Residential Design' column is assumed to refer to the 1B-1 and rear yards 1B-2 drainage areas? A more appropriate column title would be preferable, as the current one is confusing concerning the proposed OGS unit for the 1B-2 development site is outlined in Table 3.	Table 2 is intended to show the change in AC value (drainage area times runoff coefficient) for the drainage area of the existing Phase 1B-1 OGS unit, from the time of original design as part of the 2015 SWM Report, to the current design of Phase 1B-2. As some of the Phase 1B-2 area is draining to the existing Phase 1B-1 OGS unit we wanted to clarify the total AC value serviced by the Phase 1B-1 OGS unit is within the capacity of the OGS unit.	
2			It is noted that runoff from the entire future development areas will discharge to the East SWM Facility through the Phase 1B-2 pond inlet. Whether the proposed SWM plan can demonstrate that the proposed pond inlet can also regulate flows from future development regions, or whether it will be included in future development. Kindly clarify.	Please refer to page 6 of the SWM Report. In the ultimate condition (full development of future development lands) the PCSWMM model has accounted for the entire future development area to inlet to the pond through the Phase 1B-2 inlet. The model has assumed expansion of the pond (additional pond volume and additional OGS unit) to accommodate the future development. The pond inlet (pipes and major system swale) have been sized based on the ultimate condition flows. Please refer to figure 102085-OGS2 for the approximate size and location of pond expansion assumed in the PCSWMM model.	
3			The profile drawing for Block 81 (drawing 102085-P28) still includes offline exfiltration units. There are a few more references to exfiltration in legends and notes on various drawings. Please remove references to exfiltration units that are not part of the proposed SWM plan.	The exfiltration trench has been removed from profile drawing 102085-P28.	
4			It is noted that each of the two proposed OGS/Vortech units can treat runoff from 17.28 ha, for a total of 35.56 ha treated by both units. The proposed OGS unit for Phase 1B-2 is to treat runoff from 5.913 ha. This means that future development will direct flows to both the proposed interim and future OGS units. Please clarify.	Please refer to page 4 of the SWM Report. The proposed OGS unit to be installed with Phase 1B-2 will treat runoff from Phase 1B-2 only (5.913 ha) in the interim condition. In the future, once the contributing drainage area to this unit exceeds 17.28 ha, the second unit will be required. In the ultimate condition once future development is complete, the OGS unit installed with Phase 1B-2 and the future OGS unit will both treat the total area equally (17.28 ha each, 35.56ha total).	
5			The west development resulted in an overall 34% decrease in infiltration, whereas the east development increased infiltration by 12%. However, the tables reveal that the total infiltration from the west and east development areas decreased by only 0.5%. Include calculation for the combined infiltration water balance for west and east developments, 245 mm/yr and 243 mm/yr, for pre and post-development circumstances, respectively.	The values referred to in your comment were taken from a table that was part of the original 2015 SWM Report. This table is outdated and was included in Appendix F, page 234-235, of the SWM Report as a reference tool for the updated water balance calculations. Please refer to Appendix F, page 240 of the SWM Report for the updated Pre vs. Post-development water balance comparison for Phase 1B-2. The combined values for the east and west developments were area weighted in the new calculations, as shown in the overall summary table. Refer to attached markup of excerpt from the Stormwater Management Report for clarity.	

City of Ottawa Comments (November 29, 2023)		Novatech Notes (February 23, 2024)	City of Ottawa Comments (March 26, 2024)	Novatech Notes (May 14, 2024)	Accepted
6			Where is the entrance to the construction or development site? Mud mat should be provided at the site's construction entrance(s) and egress(s). Erosion and Sediment Control (ESC) section include a heavy-duty silt fence if there any work in the area adjacent to water courses and include the type of erosion controls proposed for in stream works. Furthermore, the following should be added in ESC section: o Inspections of ESC measures at a frequency specified per the ESC plan, for dry weather periods (active and inactive construction phases), after Significant Storm Events (means a minimum of 25 mm of rain in any 24 hours period) and Significant Snowmelt Events (means the melting of snow at a rate which adversely affects the performance and function of the system), and after any extreme weather events. o Identify and rectify any deficiencies and undertake necessary maintenance measures as soon as possible. o Inspections and maintenance of temporary ESC measures shall continue until they are no longer required. o The contractor shall ensure that records of inspection, including at a minimum, the inspector's name, date of inspection, visual observations, and any necessary remedial measures to maintain the interim ESC measures.	Construction access will be via the gravel access road which connects existing Wingover Private to Phase 1B-2. Refer to drawing 102085-GR15 for the location of the access road. Heavy-duty silt fence has been added along the rear of the lots backing onto the Carp Creek. A mud mat has been added to drawing 102085-ESC3. Proposed location of silt fence is shown on drawing 102085-ESC3. No in-stream works are proposed as part of Phase 1B-2 works. ESC notes have been added to drawing 102085-ESC3	
7			PCSWMM shows warning messages at several nodes, on Street 1-E, and in the cooling trenches. It is noted that the model automatically adds a small slope to any flat conduit that does not the above zero minimum slope requirements because the cooling trenches have a flat or zero slope. However, why does the Street-1-E node have the same error? The maximum depth increased at nodes CB-116A-B, CB-126-127, and CB-163A-B. When integrating with upstream nodes, the model automatically increased depth to match the top height of the highest connected links. Please check these nodes and adjust the offsets to eliminate number of warnings as feasible.	The PCSWMM model has been reviewed and the warning messages do not impact the results. The cooling trenches are designed with a zero slope, so the model will assign a minimum slope in order to calculate the flow through the cooling trench. The Street1-E conduit has the same error due to the lowest T/G between CB 162A and CB 162B is 116.72 (CB 162B) which was assigned for both CBs (as they are represented by a single node). The spill for CB 162A along Albert Boyd Private is also 116.72, which results in a flat conduit. When using irregular cross-sections, the maximum depth error sometimes occurs. These nodes were reviewed and the node depth was set to the anticipate top of the conduit. We checked the impact of raising the node depth by 0.01m to remove the error and the model results were unaffected.	
8			Future development assumes 100m3/ha of storage for major flow to ROW. The 5.9 ha phase 1B is providing approximately 196 cu.m. surface storage.(Table 6). This translates to 33 cu.m./ha. This is closer to what we see in other subdivisions. Please look at what would happen if the assumed surface storage was reduced from the 100 cu.m./ha.	We did a quick check in the model where we decreased the storage to 30m3/ha. This would result in an increase in major system flows to the pond from the future development areas, but would not impact the Phase 1B-2 system in any significant way. There is no impact on the total runoff volume or storage requirements in the pond. The surface storage available and the major system flows to the pond from the future development area will be determined at the detailed design of the future lands.	

WEST CAPITAL AIRPARK - PHASE 2A RESIDENTIAL
BMP CALCULATIONS

NOVATECH MARKUP - MAY 14, 2025
EXCERPT FROM APPENDIX E OF STORMWATER
MANAGEMENT REPORT (PAGE 239 OF REPORT)

NOVATECH
Engineers, Planners & Landscape Architects

WEST RESIDENTIAL WATER BALANCE (with Infiltration Trenches)

Existing Conditions

Area	Land Use	Soil Type	Area		Individual				Weighted (by Area)			
			ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
A-1	Pasture/Meadow	Sand/Sandy Silt	12.27	52.6%	944	527	229	188	497	277	121	99
A-2	Pasture/Meadow	Sand/Sandy Silt	6.25	26.8%	944	527	229	188	253	141	61	50
A-3	Pasture/Meadow	Sand/Sandy Silt	1.87	8.0%	944	527	229	188	76	42	18	15
A-4	Woodland	Sand/Sandy Silt	2.92	12.5%	944	550	250	144	118	69	31	18
	Totals		**23.31**	**100.0%**					**944**	**530**	**232**	**182**

Developed Conditions (with Infiltration BMPs)

Land Use	Soil Type	Area		Individual				Weighted (by Area)			
		ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
Woodland	Sand/Sandy Silt	2.03	8.7%	944	550	250	144	82.2	47.9	21.8	12.5
SMWF *(surface area @ maximum storage)*	Topsoil over Sand/Sandy Silt	0.88	3.8%	944	660	50	234	35.6	24.9	1.9	8.8
SWMF Block *(grassed area, minus SWMF)*	Topsoil over Sand/Sandy Silt	0.55	2.4%	944	520	200	224	22.3	12.3	4.7	5.3
Rearyards and Frontyards *(grass)*	Topsoil over Sand/Sandy Silt	10.96	47.0%	944	520	200	224	443.7	244.4	94.0	105.3
Rearyards (directed to infiltration trenches)*	Topsoil over Sand/Sandy Silt	1.30	5.6%	944	520	388	36	52.6	29.0	21.6	2.0
Rear Rooftops *(directed to grassed rearyards)*	Topsoil over Sand/Sandy Silt	2.34	10.0%	944	95	200	649	94.7	9.5	20.1	65.1
Front Rooftops *(directed to impervious areas)*	Topsoil over Sand/Sandy Silt	2.34	10.0%	944	95	0	849	94.7	9.5	0.0	85.2
Impervious Areas *(roads, driveways)*	Topsoil over Sand/Sandy Silt	2.92	12.5%	944	95	0	849	118.2	11.9	0.0	106.3
Totals		**23.32**	**100%**					**944.0**	**389.4**	**164.1**	**390.6**

**Storage provided in infiltration trenches will infiltrate 388 mm/year; refer to Infiltration Calculations.*

Pre vs. Post-Development (West)

Component	Pre (mm/yr)	Post (mm/yr)	% Change
Precipitation	944	944	0.0%
Evapotranspiration	530	389	26.5% Decrease
Infiltration	232	164	29.2% Decrease
Runoff	182	391	114.0% Increase

Added to overall table
(next page)

NOVATECH MARKUP - MAY 14, 2025
EXCERPT FROM APPENDIX E OF STORMWATER MANAGEMENT REPORT (PAGE 240 OF REPORT)

EAST RESIDENTIAL WATER BALANCE

Existing Conditions *Taken from original Phase 1 SWM Report

Area	Land Use	Soil Type	Area		Individual				Weighted (by Area)			
			ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
A-1	Woodland	Sand/Sandy Silt	40.62	69.8%	944	550	250	144	659	384	175	101
A-2	Woodland	Sand/Sandy Silt	5.36	9.2%	944	550	250	144	87	51	23	13
E-1	Woodland	Sand/Sandy Silt	12.21	21.0%	944	550	250	144	198	115	52	30
	Totals		**58.19**	**100.0%**					**944**	**550**	**250**	**144**

Developed Conditions (with Infiltration BMPs)

Land Use	Soil Type	Area		Individual				Weighted (by Area)			
		ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
Woodland	Sand/Sandy Silt	12.24	21.0%	944	550	250	144	198.6	115.7	52.6	30.3
SWMF *(surface area @ maximum storage)*	Topsoil over Sand/Sandy Silt	1.68	2.9%	944	660	50	234	27.3	19.1	1.4	6.8
SWMF Block *(grassed area, minus SWMF)*	Topsoil over Sand/Sandy Silt	2.96	5.1%	944	520	200	224	48.0	26.5	10.2	11.4
PHASE 1B-1											
Rearyards and Frontyards (grass) (not draining to infiltration trench)	Topsoil over Sand/Sandy Silt	3.39	5.8%	944	520	200	224	55.0	30.3	11.7	13.1
Rear Rooftops (directed to grassed rearyards w/ no infiltration trench)	Topsoil over Sand/Sandy Silt	0.29	0.5%	944	95	200	649	4.7	0.5	1.0	3.2
Front Rooftops (directed to impervious areas)	Topsoil over Sand/Sandy Silt	0.56	1.0%	944	95	0	849	9.1	0.9	0.0	8.2
Impervious Areas *(roads, driveways) (directed to storm sewers)*	Topsoil over Sand/Sandy Silt	1.26	2.2%	944	95	0	849	20.4	2.1	0.0	18.4
PHASE 1B-2											
Frontyards (grass) (not draining to infiltration trench)	Topsoil over Sand/Sandy Silt	1.10	1.9%	944	520	200	224	17.9	9.8	3.8	4.2
*Rearyards (grass) (draining to infiltration trench)	Topsoil over Sand/Sandy Silt	3.01	5.2%	944	520	388	36	48.9	26.9	20.1	1.8
*Rear Rooftops (directed to grassed rearyards w/ infiltration trench)	Topsoil over Sand/Sandy Silt	1.14	2.0%	944	95	388	461	18.5	1.9	7.6	9.0
Front Rooftops (directed to impervious areas)	Topsoil over Sand/Sandy Silt	0.66	1.1%	944	95	0	849	10.7	1.1	0.0	9.6
Impervious Areas *(roads, driveways) (directed to storm sewers)*	Topsoil over Sand/Sandy Silt	1.24	2.1%	944	95	0	849	20.1	2.0	0.0	18.1
FUTURE PHASES											
*Future Lands w/ Rock Check dams (Woodland)	Topsoil over Sand/Sandy Silt	28.65	49.2%	944	550	287	107	464.8	270.8	141.3	52.7
Totals		**58.19**	**100%**					**944.0**	**507.5**	**249.7**	**186.8**

**Storage provided in rear yard infiltration trenches will infiltrate 388 mm/year; Interim Infiltration measures (rock check dams) will infiltrate an additional 37mm/year (from the baseline 250mm for woodland areas); Refer to Infiltration Calculations*

Pre vs. Post-Development East

Component	Pre (mm/yr)	Post (mm/yr)	% Change
Precipitation	944	944	0.0%
Evapotranspiration	550	508	7.7% Decrease
Infiltration	250	250	0.1% Decrease
Runoff	144	187	29.7% Increase

From West development table

Summary Pre vs Post-Development Water Balance (Overall)

Location	Area (ha)	Total Precipitation (mm/yr)	Infiltration (mm/yr)		Runoff (mm/yr)		Actual ET (mm/yr)	
			PRE	POST	PRE	POST	PRE	POST
West Residential Community	23.32	944	232	164	182	391	530	389
East Residential Community	58.19		250	250	144	187	550	508
Total (Weighted by Area)	**81.51**	**944**	**245**	**225**	**155**	**245**	**544**	**474**

overall values area weighted

	City of Ottawa Comments (April 26, 2024)	Novatech Notes (May 14, 2024)	Accepted
East Pond Stormwater System			
1	The West Pond inlet is buried by sediments, potentially causing issues with the cooling trench inlet, which might be plugged. Sediment deposition from overland flow carrying sandy sediments might be the source of the problem. It's necessary for a consultant to inspect both the inlet and the lower channel, as the cooling trench may also be compromised or plugged. This is particularly crucial as the new development in the East Pond inlet and cooling trench have the same design elements as the West Pond.	The existing west SWM pond is part of Phase 1A of the subdivision. Water levels in both the Carp creek and the SWM pond are high due to the time of year / heavy rainfall. The condition of the west SWM pond and cooling trench will be reviewed / inspected once the water levels have lowered.	
2	The proposed overland swale should be diverted to the pond instead of discharging into the riprapped cooling manhole 281 depression to prevent further potential inlet plugging issues.	The overland flow swale has been revised to have a separate inlet from the Phase 1B-2 storm sewer inlet.	
3	The cooling trench must be provided with a subdrain all the way up to the connection with the existing west cooling channel, to ensure functionality. Referring to the mark-up at DWG 102085 SWF-5 East Stormwater Management Facility Phase 1B-2 Inlet Details for specific details and guidance on addressing the issues.	A subdrain has been added for the full length of the cooling trench.	
4	Additionally, the consultant must update the 2023 geotechnical report to confirm the groundwater table elevations, as field measurements were taken in September 2011	October 2022 groundwater elevations were provided in the Paterson Geotechnical Investigation Report, dated January 16, 2023. Refer to pages 49 to 51 for the soil profile and test data sheets.	
5	Who will be responsible for maintaining the rear yard infiltration trench while it's in the place? Please provide a service road parallel to the trench.	Maintenance of the rear yard infiltration trench would be the responsibility of the homeowners. This is consistent with standard City of Ottawa projects with a rear yard subdrain / infiltration system. Outlet catchbasins have been proposed within the ROW as part of the rear yard infiltration system and would provide maintenance access to the infiltration trench.No service road will be provided through the residential rear yards.	
6	Lastly the off-line Oil Grid separators must be provided with the gate to provide efficient maintenance.	The Stormwater Management Facility is a dry pond system and will not require the installation of gates in order to access the oil-grit separator for maintenance.	

City Review Comments
Received via email attachment June 12, 2023

	City of Ottawa Comments (November 29, 2023)	Novatech Notes (February 23, 2024)	City of Ottawa Comments (March 26, 2024)	Novatech Notes (May 14, 2024)	Accepted
General					
	Comments 1 to 8		No further comment		✓
Grading Plan (102085-GR13)					
	Comments 1 to 3		No further comment		✓
Plan and Profile Phase 1B-2 Block 81 & Storm Sewer Outlet (102085-P28)					
Comments 1 to 2					
Servicing Report					
1	The 2-year storm also requires a 10 minute TC not 15 minutes as shown.	The storm sewer design sheet has been updated with a time of concentration of 10 minutes. Refer to Appendix D of the Servicing Report.	No further comment		✓
SWM Report					
	Comments 1 to 11		No further comment		✓
12	Please verify that the OGS unit will treat a minimum of 90% of the total annual stormwater volume from the contributing area. Ensure that the bypass structure with the splitter weir does not allow too much of the flow to bypass the treatment system.	Per the Vortechs design sheets provided in Appendix C, 90% of the projected annual runoff volume would be treated. The bypass weir is designed to convey the 25mm 4-hour Chicago event to the OGS unit (for both the interim and ultimate condition).	It is noted that the OGS device will treat runoff from 25 mm design storm (from the storm sewer). Is this accounted to 90 percent of the annual runoff volume?	Yes, the 25mm rainfall event is included in the 90% of the annual runoff volume treated. Please refer to Appendix E, page 226 for the estimated net annual solids load reductions table, prepared by Contech.	Please include this clarification in the report with a reference to the associated Appendix.
	Comments 13 to 35		No further comment		✓
Drawings					
	Comments 1 to 3		No further comment		✓
4	Riprap swale design details should include length of riprap areas on either side.	This information has been added to the drawing 102085-SWMF5.	The rip-rap swale details provided on the 102085-SWMF-5 drawing are assumed to be general one and shall refer to the location where external flow through the swale occurs. Is the channel section between E-E and the headwall the same as E-E with the exception that it contains rip-rap? Please clarify.	An additional cross section through the rip-rap portion of the inlet swale has been added to drawing 102085-SWMF5.	Thank you for adding cross-section F-F
4a					The conveyance and discharge of major overland flows to the pond through the swale have been changed in the resubmission. Though no chnages in volume or flows to the pond is anticipated, the change in the conveyance plan needs to be added to the report.
	Comments 5 to 7		No further comment		✓
8	What is the purpose of having interconnected icd's each with their own icd? One of the most common reasons for interconnecting cb's is to have only one icd.	Design has been revised such that there are no more interconnected catch basins. Each catch basin will have its own ICD, if required.	It is noted the CB 138 and CB 139 with 1B-1 phase are interconnected with each its own ICDs (Table 5)? Please clarify.	The Phase 1B-1 design drawings incorrectly indicated an ICD in the upstream CB. An ICD was installed in the downstream CB in order to control flows as intended. Only the downstream ICD was accounted for in the PCSMM model. The ICD in the upstream CB will not effect ponding as these CBs are on grade.	Noted. However, the response was not provided with respect to Table 5 of the report and should be updated in the report, as required.
	Comments 9 to 15		No further comment.		✓
PCSWMM Modelling					
	Comments 1 to 9		No further comment.		✓

10	According to the model, half of the stormwater from the development area goes to the OGS unit and the rest goes to the pond without treatment. Similarly, approximately 380 L/s of runoff is directed to the Pond via a swale, which includes external flows as well as approximately 68 L/s flow from development areas. The flows from the external areas are assumed to be from the existing conditions and do not require treatment at this Phase of development. Please clarify.	Only minor system flows are directed through the OGS unit, and the OGS unit is only designed to treat the water quality event (25mm storm event). In the interim condition PCSWMM model, the future development area is undeveloped and does not require treatment. An ultimate condition PCSWMM model was included in the SWM report that shows the additional unit and the treatment of the future development area with a C = 0.65. Figures 102085-OGS1 and 102085-OGS2 clarify the interim and ultimate drainage areas to the pond and OGS units.	As per the response provided in comment #12 in SWM report section. It is noted that the OGS device will treat runoff from 25 mm design storm (from the storm sewer). Is this accounted to 90 percent of the annual runoff volume?	Please see response to comment #12 of the SWM Report section above.	See comment # 12 above

City of Ottawa Comments (November 29, 2023)		Novatech Notes (February 23, 2024)	City of Ottawa Comments (March 26, 2024)	Novatech Notes (May 14, 2024)	Accepted
Additional Comments					
1			Table 2 compares the OGS unit drainage area for Phase 1B-1. The 'Proposed Phase 1B-2 Residential Design' column is assumed to refer to the 1B-1 and rear yards 1B-2 drainage areas? A more appropriate column title would be preferable, as the current one is confusing concerning the proposed OGS unit for the 1B-2 development site is outlined in Table 3.	Table 2 is intended to show the change in AC value (drainage area times runoff coefficient) for the drainage area of the existing Phase 1B1 OGS unit, from the time of original design as part of the 2015 SWM Report, to the current design of Phase 1B-2. As some of the Phase 1B-2 area is draining to the existing Phase 1B-1 OGS unit we wanted to clarify the total AC value serviced by the Phase 1B-1 OGS unit is within the capacity of the OGS unit.	Thank you for the clarification. Please include in the report that 'although some of the Phase 1B-2 area is draining to the existing Phase 1B-1 OGS unit, the total AC value serviced by the Phase 1B-1 OGS unit is within its proposed capacity'.
2			It is noted that runoff from the entire future development areas will discharge to the East SWM Facility through the Phase 1B-2 pond inlet. Whether the proposed SWM plan can demonstrate that the proposed pond inlet can also regulate flows from future development regions, or whether it will be included in future development. Kindly clarify.	Please refer to page 6 of the SWM Report. In the ultimate condition (full development of future development lands) the PCSWMM model has accounted for the entire future development area to inlet to the pond through the Phase 1B-2 inlet. The model has assumed expansion of the pond (additional pond volume and additional OGS unit) to accommodate the future development. The pond inlet (pipes and major system swale) have been sized based on the ultimate condition flows. Please refer to figure 102085-OGS2 for the approximate size and location of pond expansion assumed in the PCSWMM model.	Please note that the details provided under 'Ultimate Condition' were not clear enough. It was understood that a future pond stage-storage curve for the East SWMF was included in the ultimate model. However, the next statement reads, "The pond expansion required to accommodate the future development area runoff will be confirmed during the detailed design of the future phase." The previous comment was to confirm whether the inlet to the East SWMF is proposed to be sized to accommodate future flows as well. Please add to clarify that "the pond inlet and major system swale have been sized based on the ultimate condition flows" prior to the last sentence in that paragraph (The SWM Block has additional space for expansion and can accommodate a larger expansion volume if required).
3			The profile drawing for Block 81 (drawing 102085-P28) still includes offline exfiltration units. There are a few more references to exfiltration in legends and notes on various drawings. Please remove references to exfiltration units that are not part of the proposed SWM plan.	The exfiltration trench has been removed from profile drawing 102085P28.	OK

4			It is noted that each of the two proposed OGS/Vortech units can treat runoff from 17.28 ha, for a total of 35.56 ha treated by both units. The proposed OGS unit for Phase 1B-2 is to treat runoff from 5.913 ha. This means that future development will direct flows to both the proposed interim and future OGS units. Please clarify.	Please refer to page 4 of the SWM Report. The proposed OGS unit to be installed with Phase 1B-2 will treat runoff from Phase 1B-2 only (5.913 ha) in the interim condition. In the future, once the contributing drainage area to this unit exceeds 17.28 ha, the second unit will be required. In the ultimate condition once future development is complete, the OGS unit installed with Phase 1B-2 and the future OGS unit will both treat the total area equally (17.28 ha each, 35.56ha total).	OK
5			The west development resulted in an overall 34% decrease in infiltration, whereas the east development increased infiltration by 12%. However, the tables reveal that the total infiltration from the west and east development areas decreased by only 0.5%. Include calculation for the combined infiltration water balance for west and east developments, 245 mm/yr and 243 mm/yr, for pre and postdevelopment circumstances, respectively.	The values referred to in your comment were taken from a table that was part of the original 2015 SWM Report. This table is outdated and was included in Appendix F, page 234-235, of the SWM Report as a reference tool for the updated water balance calculations. Please refer to Appendix F, page 240 of the SWM Report for the updated Pre vs. Post-development water balance comparison for Phase 1B-2. The combined values for the east and west developments were area weighted in the new calculations, as shown in the overall summary table. Refer to attached markup of excerpt from the Stormwater Management Report for clarity.	OK

City of Ottawa Comments (November 29, 2023)		Novatech Notes (February 23, 2024)	City of Ottawa Comments (March 26, 2024)	Novatech Notes (May 14, 2024)	Accepted
6			Where is the entrance to the construction or development site? Mud mat should be provided at the site's construction entrance(s) and egress(s).	Construction access will be via the gravel access road which connects existing Wingover Private to Phase 1B-2. Refer to drawing 102085GR15 for the location of the access road. Heavy-duty silt fence has been added along the rear of the lots backing onto the Carp Creek. A mud mat has been added to drawing 102085-ESC3. Proposed location of silt fence is shown on drawing 102085-ESC3. No in-stream works are proposed as part of Phase 1B-2 works.	OK
			Erosion and Sediment Control (ESC) section include a heavy-duty silt fence if there any work in the area adjacent to water courses and include the type of erosion controls proposed for in stream works.	ESC notes have been added to drawing 102085-ESC3	
			Furthermore, the following should be added in ESC section:		This should be added to the ESC section of the report
			o Inspections of ESC measures at a frequency specified per the ESC plan, for dry weather periods (active and inactive construction phases), after Significant Storm Events (means a minimum of 25 mm of rain in any 24 hours period) and Significant Snowmelt Events (means the melting of snow at a rate which adversely affects the performance and function of the system), and after any extreme weather events. o Identify and rectify any deficiencies and undertake necessary maintenance measures as soon as possible.		
			o Inspections and maintenance of temporary ESC measures shall continue until they are no longer required.		
			o The contractor shall ensure that records of inspection, including at a minimum, the inspector's name, date of inspection, visual observations, and any necessary remedial measures to maintain the interim ESC measures.		
7			PCSWMM shows warning messages at several nodes, on Street 1-E, and in the cooling trenches. It is noted that the model automatically adds a small slope to any flat conduit that does not the above zero minimum slope requirements because the cooling trenches have a flat or zero slope. However, why does the Street-1-E node have the same error?	The PCSWMM model has been reviewed and the warning messages do not impact the results. The cooling trenches are designed with a zero slope, so the model will assign a minimum slope in order to calculate the flow through the cooling trench. The Street1-E conduit has the same error due to the lowest T/G between CB 162A and CB 162B is 116.72 (CB 162B) which was assigned for both CBs (as they are represented by a single node). The spill for CB 162A along Albert Boyd Private is also 116.72, which results in a flat conduit.	OK

			The maximum depth increased at nodes CB-116A-B, CB-126-127, and CB-163A-B. When integrating with upstream nodes, the model automatically increased depth to match the top height of the highest connected links. Please check these nodes and adjust the offsets to eliminate number of warnings as feasible.	When using irregular cross-sections, the maximum depth error sometimes occurs. These nodes were reviewed and the node depth was set to the anticipate top of the conduit. We checked the impact of raising the node depth by 0.01m to remove the error and the model results were unaffected.	
8			Future development assumes 100m3/ha of storage for major flow to ROW. The 5.9 ha phase 1B is providing approximately 196 cu.m. surface storage.(Table 6). This translates to 33 cu.m./ha. This is closer to what we see in other subdivisions. Please look at what would happen if the assumed surface storage was reduced from the 100 cu.m./ha.	We did a quick check in the model where we decreased the storage to 30m3/ha. This would result in an increase in major system flows to the pond from the future development areas, but would not impact the Phase 1B-2 system in any significant way. There is no impact on the total runoff volume or storage requirements in the pond. The surface storage available and the major system flows to the pond from the future development area will be determined at the detailed design of the future lands.	OK
9					A 600 mm CSP culvert is proposed to cross the gravel road (entrance to the site), but this was not included in the report, even though it might be under interim conditions.

City of Ottawa Stormwater Operations Comments
Received via email attachment June 13, 2024

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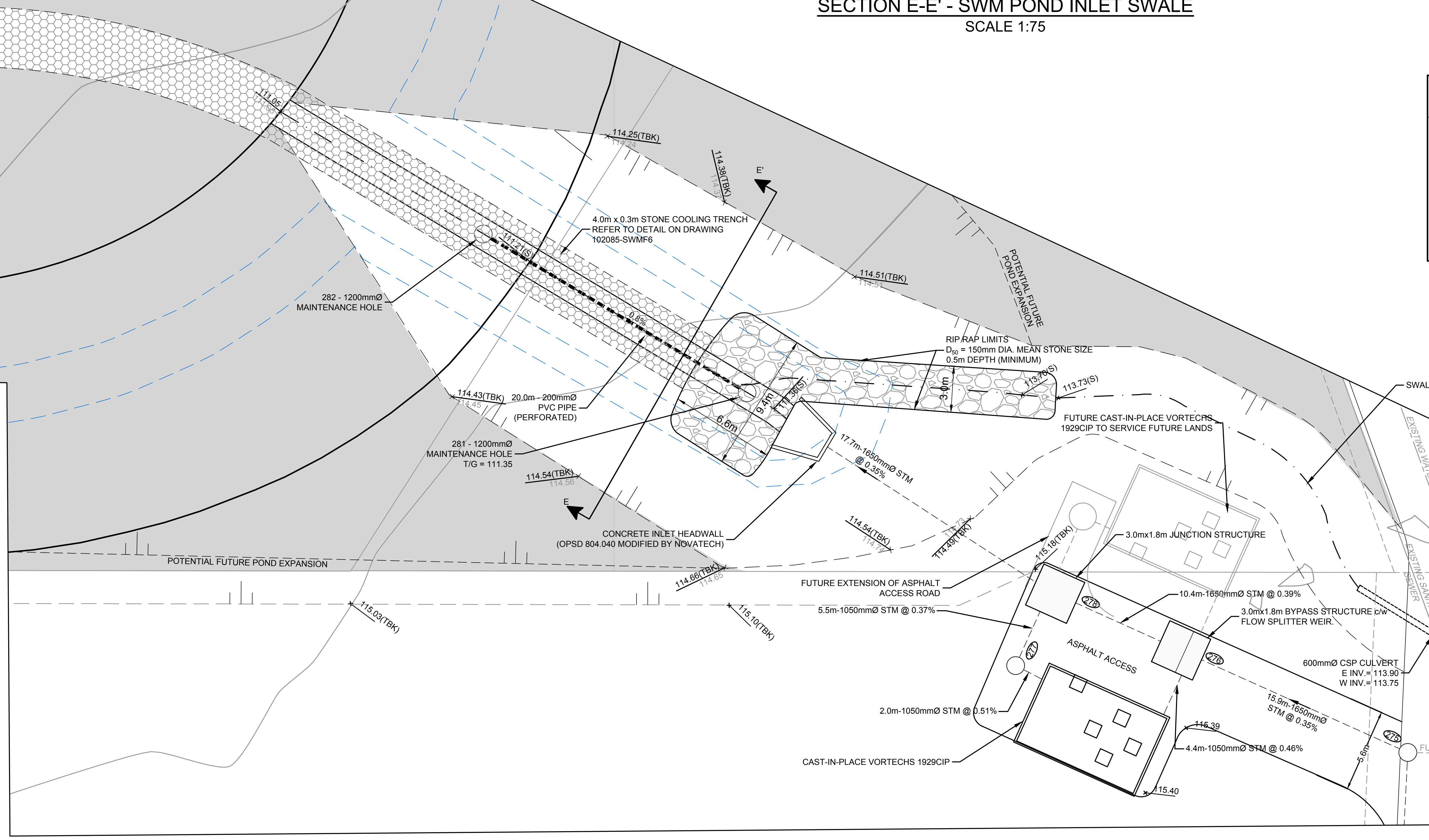
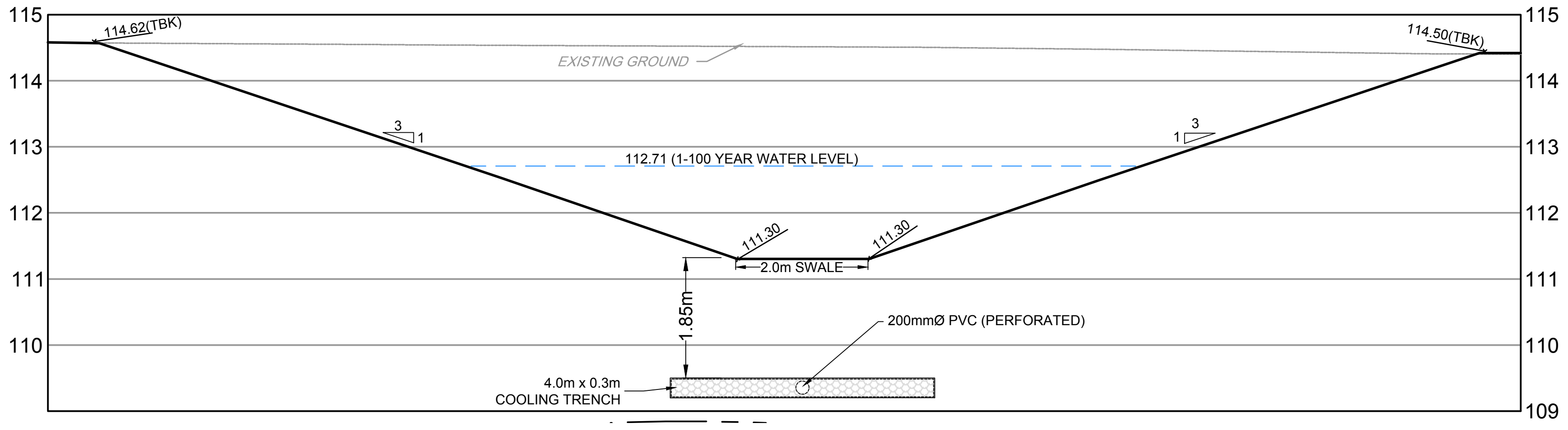
2	The proposed overland swale should be diverted to the pond instead of discharging into the riprapped cooling manhole 281 depression to prevent further potential inlet plugging issues.	The overland flow swale has been revised to have a separate inlet from the Phase 1B-2 storm sewer inlet.	OK
3	The cooling trench must be provided with a subdrain all the way up to the connection with the existing west cooling channel, to ensure functionality. Referring to the mark-up at DWG 102085 SWF-5 East Stormwater Management Facility Phase 1B-2 Inlet Details for specific details and guidance on addressing the issues.	A subdrain has been added for the full length of the cooling trench.	OK
4	Additionally, the consultant must update the 2023 geotechnical report to confirm the groundwater table elevations, as field measurements were taken in September 2011	October 2022 groundwater elevations were provided in the Paterson Geotechnical Investigation Report, dated January 16, 2023. Refer to pages 49 to 51 for the soil profile and test data sheets.	OK
5	Who will be responsible for maintaining the rear yard infiltration trench while it's in the place? Please provide a service road parallel to the trench.	Maintenance of the rear yard infiltration trench would be the responsibility of the homeowners. This is consistent with standard City of Ottawa projects with a rear yard subdrain / infiltration system. Outlet catchbasins have been proposed within the ROW as part of the rear yard infiltration system and would provide maintenance access to the infiltration trench.No service road will be provided through the residential rear yards.	OK
6	Lastly the off-line Oil Grid separators must be provided with the gate to provide efficient maintenance.	The Stormwater Management Facility is a dry pond system and will not require the installation of gates in order to access the oil-grit separator for maintenance.	

The sluice gates or stoplogs are required to isolate the OGS unit during the cleanup process

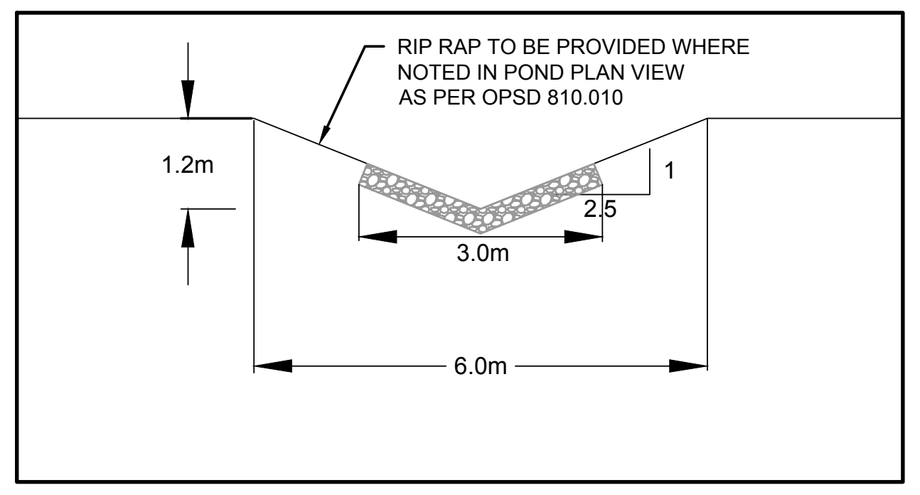
City of Ottawa Stormwater Operations Comments
Received via email attachment June 13, 2024



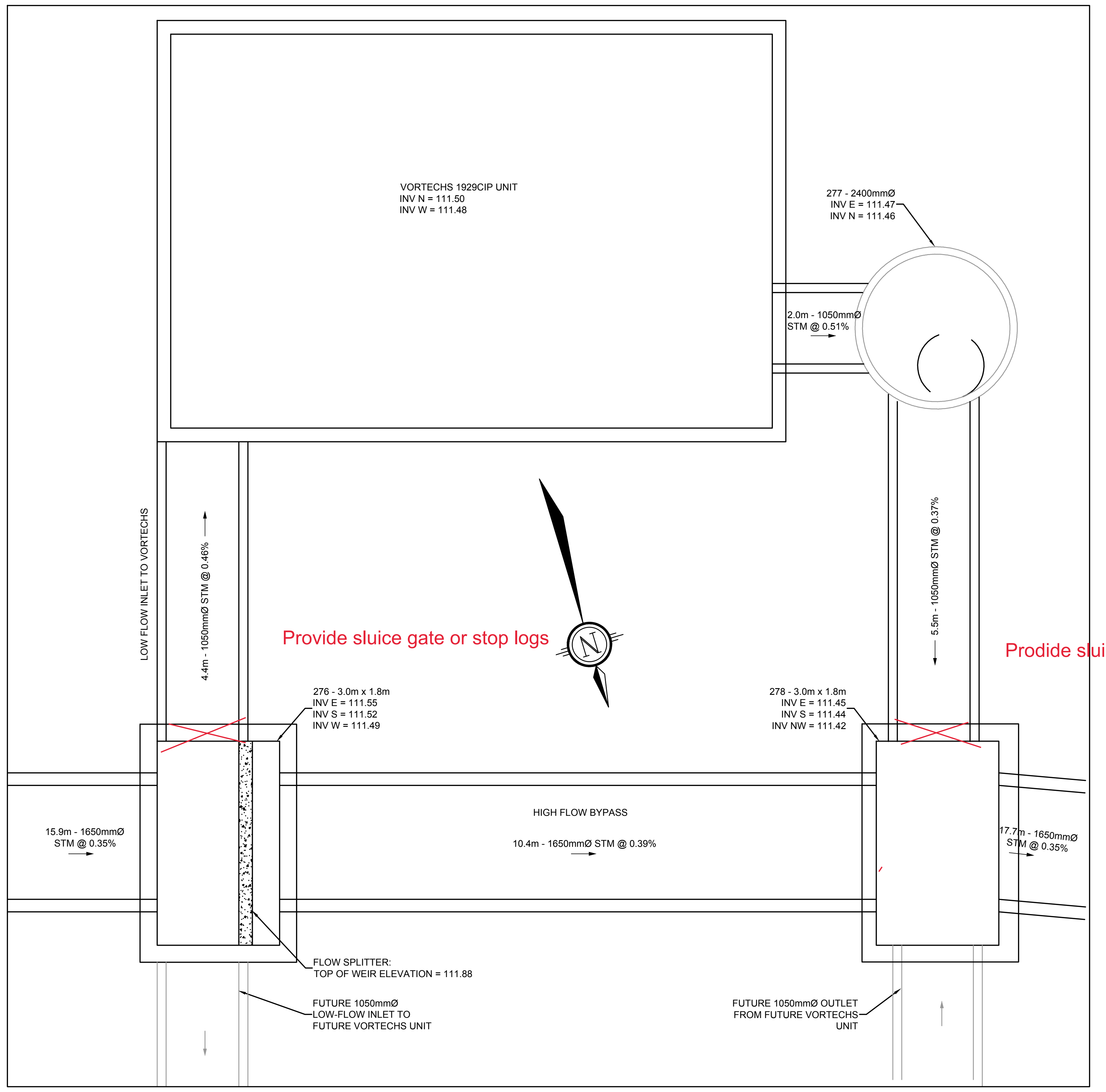
SWM POND INLET SWALE
SCALE 1:200



SECTION E-E' - SWM POND INLET SWALE
SCALE 1:75



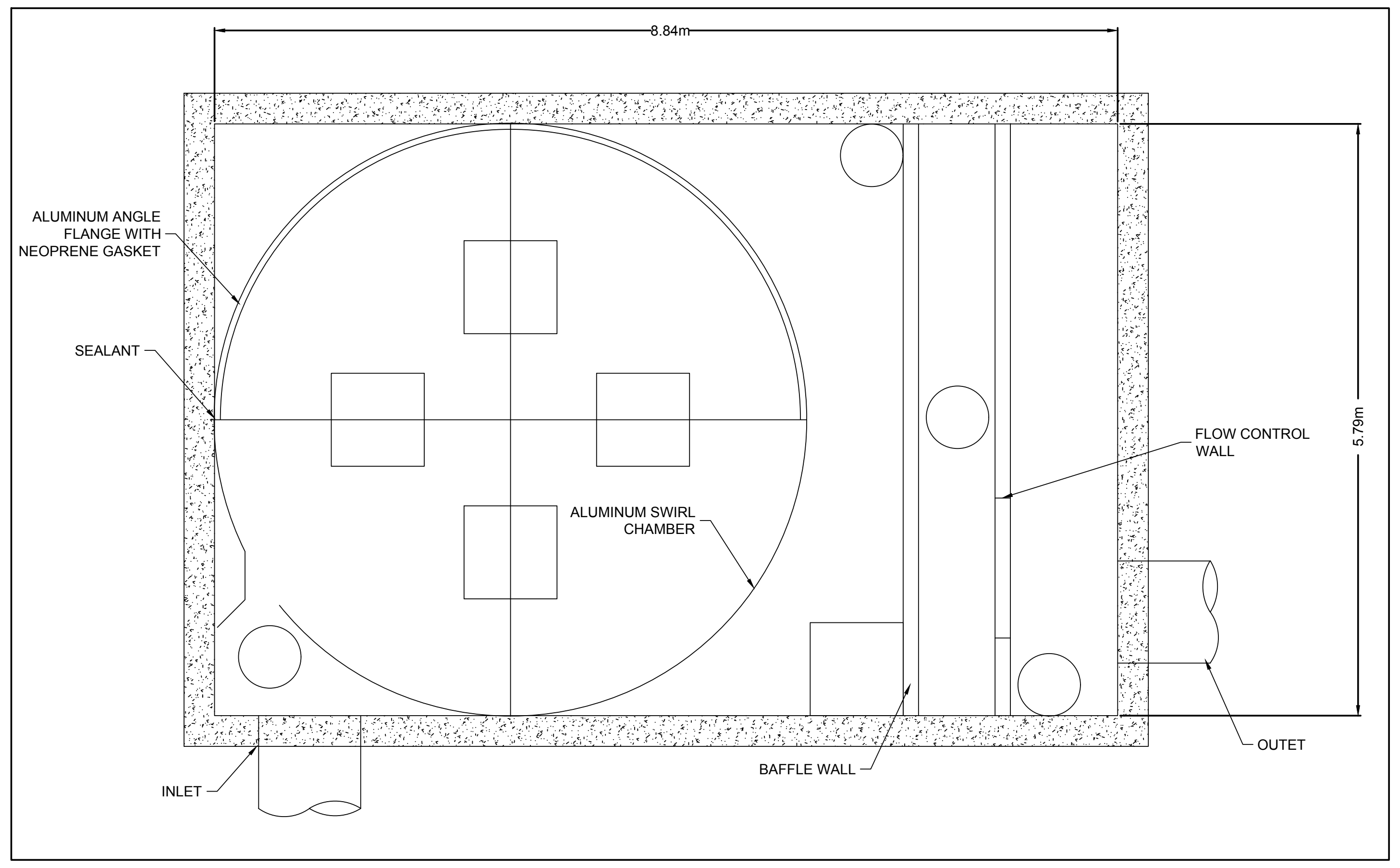
RIP-RAP SWALE DETAIL
SCALE: 1:100



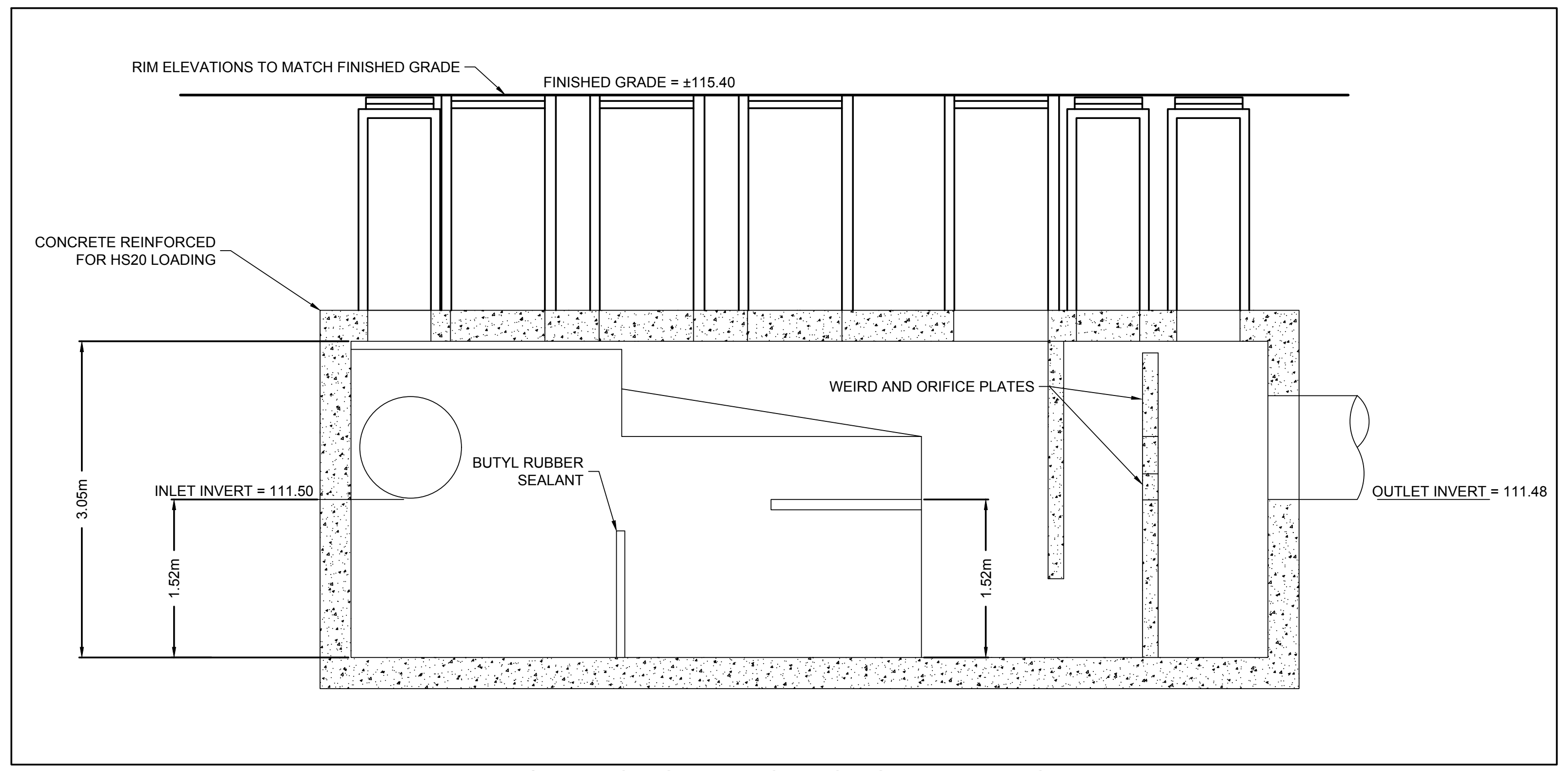
Provide sluice gate or stop logs

Prodide sluice gate or stop logs

VORTECHS 1929CIP LAYOUT DETAIL
SCALE 1:50



VORTECHS 1929CIP CAST-IN-PLACE
LAYOUT DETAIL
SCALE 1:50



VORTECHS 1929CIP CAST-IN-PLACE
LAYOUT DETAIL
SCALE 1:50

M:\2002\102085\CAD_PHASES2B&3\Civil\102085-2B3-SWMF.dwg, SWMF5, Feb 13, 2024 - 10:34am, lcorry

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
6.	REVISED PER CITY COMMENTS	FEB 20/24	ARM
5.	ISSUED WITH ADDENDUM #4	JAN 12/24	ARM
4.	ISSUED WITH ADDENDUM #2	JAN 5/24	ARM
3.	ISSUED FOR TENDER	DEC 7/23	ARM
2.	ISSUED FOR REVIEW	JUL 28/23	ARM
1.	ISSUED FOR COORDINATION	JAN 18/23	ARM

SCALE

DESIGN	MNP
CHECKED	ARM
DRAWN	MNP
CHECKED	ARM
APPROVED	XXX

FOR REVIEW ONLY

A.R. MCAULEY
100141256
Feb 20, 2024

S.M. GORDON
Feb 20, 2024

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Ottawa, Ontario, Canada K2M 1P6
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Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
EAST STORMWATER
MANAGEMENT FACILITY -
PHASE 1B-2 INLET DETAILS

PROJECT No. 102085
REV REV # 6
DRAWING No. 102085-SWMF5

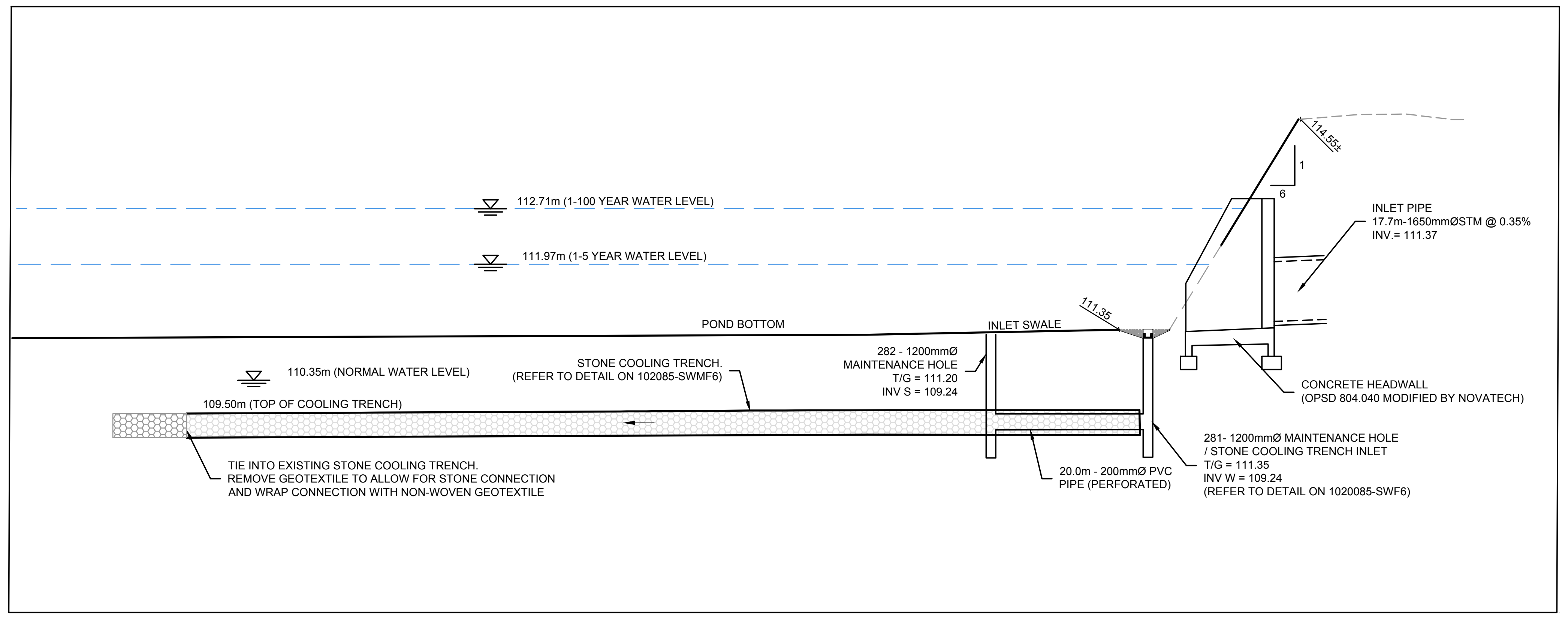
PLANB1.DWG - 1000mmx707mm

COOLING TRENCH NOTES:

1. ALL DISTURBED AREAS TO BE REINSTATED WITH TOPSOIL, HYDROSEED AND MULCH - UNLESS OTHERWISE NOTED.

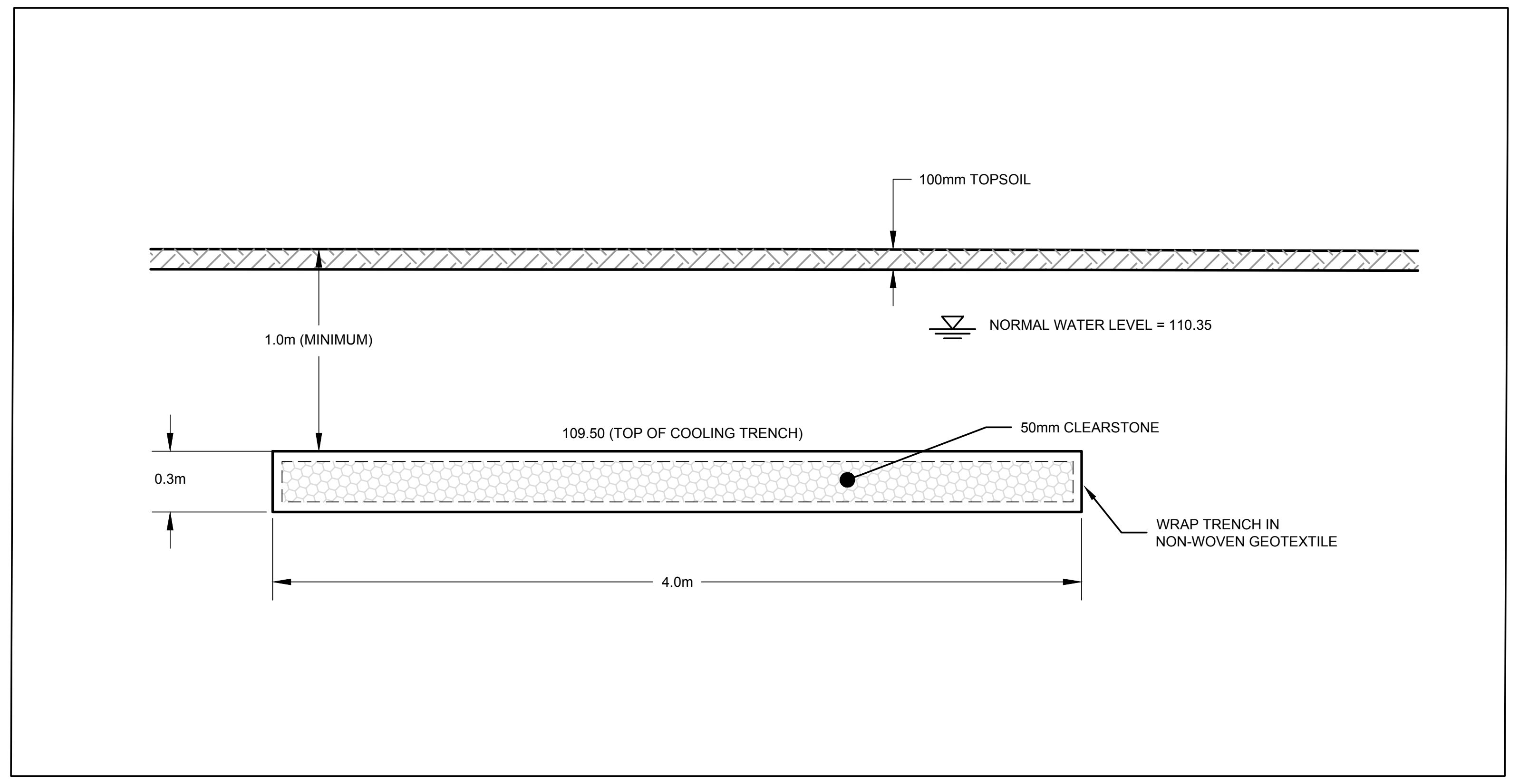
2. MAINTENANCE HOLE STRUCTURES WITHIN COOLING TRENCH SWM FACILITY TO BE AS PER OPSD 701.010. MAINTENANCE HOLE COVERS TO BE SOLID AS PER OPSD 401.060.

3. CUSTOM GRATES AT INLET AND OUTLET MAINTENANCE HOLES OF COOLING TRENCH TO BE DETAILED WITH SHOP DRAWINGS PRIOR TO ENGINEER REVIEW.



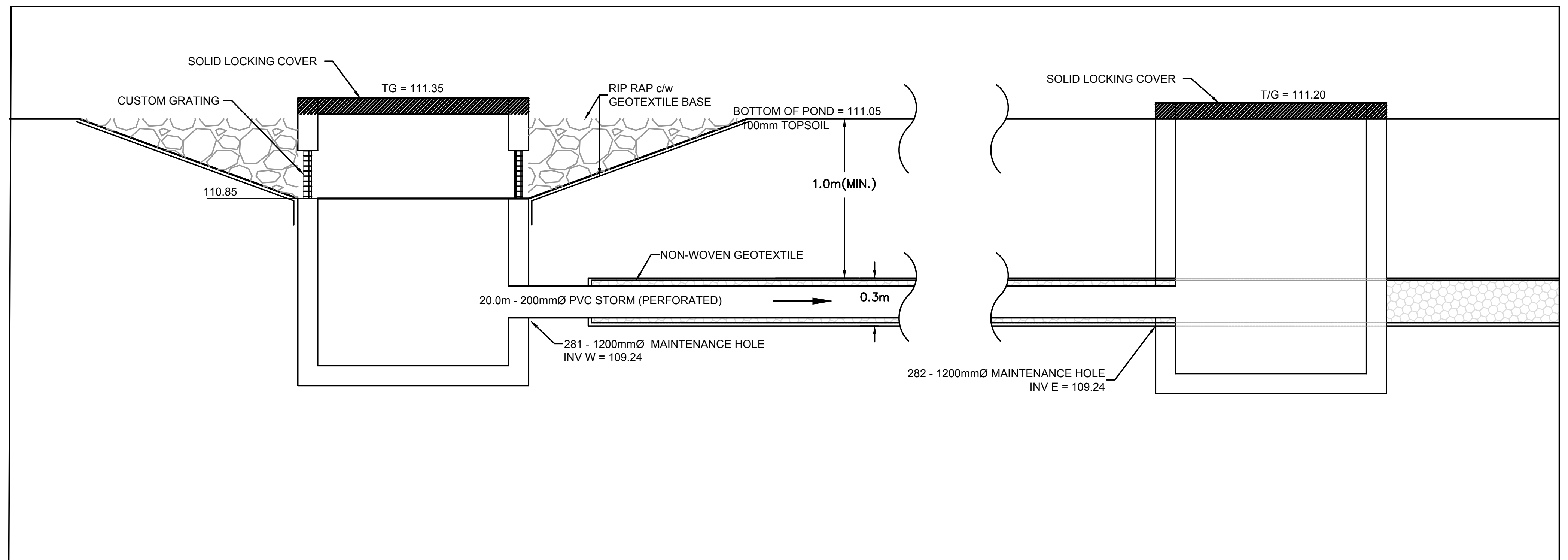
STONE COOLING TRENCH CROSS-SECTION

SCALE: N.T.S.



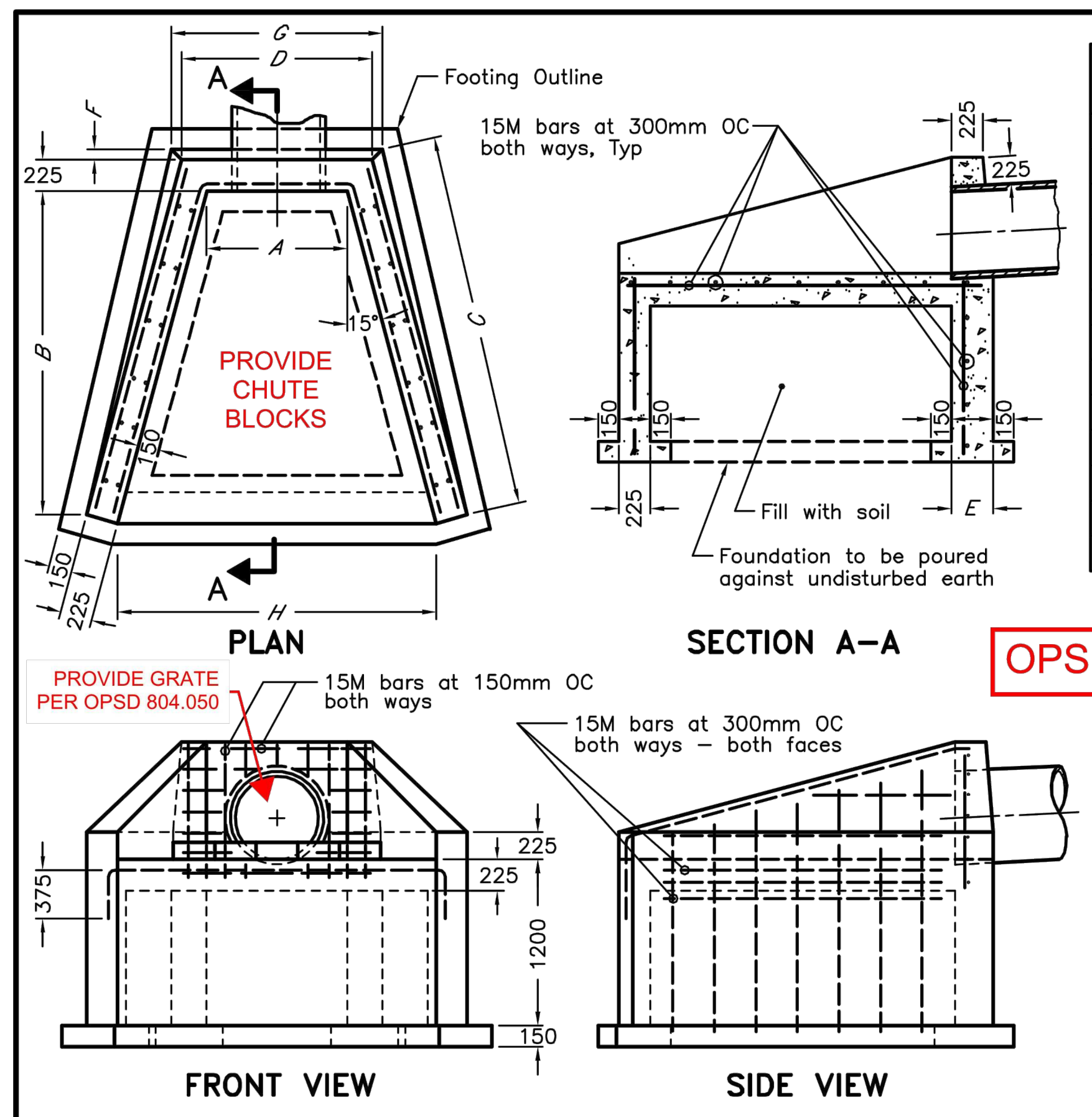
STONE COOLING TRENCH DETAIL

SCALE 1:50



MAINTENANCE HOLE AND STONE COOLING TRENCH INLET DETAIL

SCALE 1:50



PIPE DIA	ENDWALL DIMENSIONS							
	A	B	C	D	E	F	G	H
600	1050	2400	2725	1400	300	75	1525	2350
675	1125	2400	2725	1475	300	75	1600	2425
750	1200	2400	2725	1550	300	75	1675	2500
825	1275	2400	2725	1625	300	75	1755	2575
900	1350	2400	2725	1700	300	75	1825	2650
975	1425	2400	2725	1775	375	150	1975	2725
1050	1500	3000	3400	1850	375	150	2050	3100
1200	1650	3000	3400	2000	375	150	2200	3250
1350	1800	3000	3400	2150	375	150	2350	3400
1500	1950	3000	3400	2300	375	150	2500	3550
1650	2100	3000	3400	2450	375	150	2650	3700
1800	2250	3000	3400	2600	375	150	2800	3850
2400	3000	3000	3400	3350	375	150	3550	4600

OPSD MODIFIED BY NOVATECH JAN. 12/24

NOTES:

A This OPSD to be read in conjunction with OPSD 3940.150.

B Class of concrete: 30MPa.

C Cover to reinforcing bars: 75mm ±20mm.

D Granular backfill to be placed to 300mm min thickness on all sides.

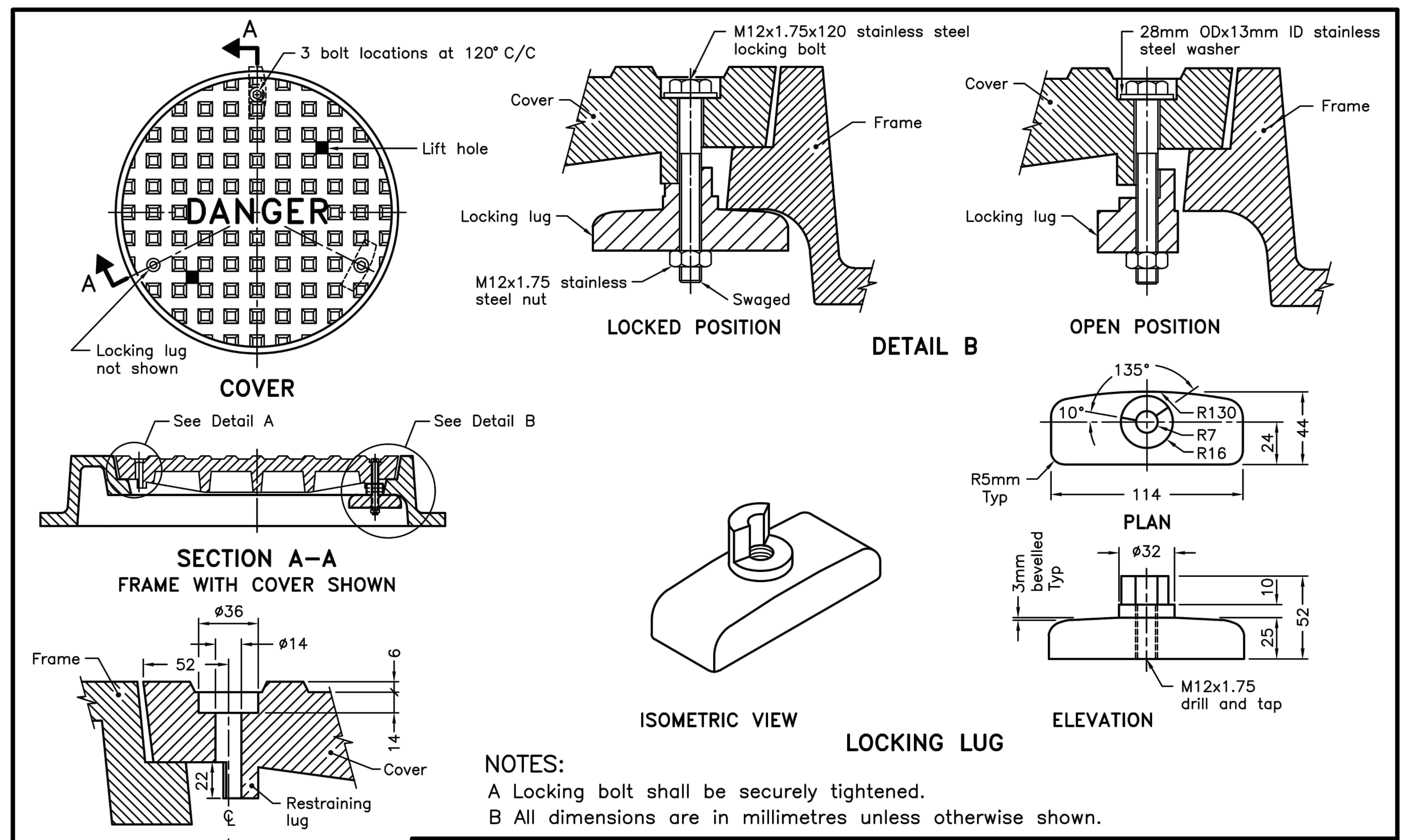
E All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2017 | Rev 1

CONCRETE HEADWALL

FOR SEWER OR CULVERT PIPE OUTLET

OPSD 804.040



NOTES:

A Locking bolt shall be securely tightened.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2018 | Rev 4

CAST IRON

CIRCULAR LOCKING COVER

FOR MAINTENANCE HOLES

OPSD 401.060

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No.	REVISION	DATE	BY
2.	REVISED PER CITY COMMENTS (NO CHANGES)	FEB 20/24	ARM
1.	ISSUED WITH ADDENDUM #4	JAN 12/24	ARM

SCALE

DESIGN MNP
CHECKED ARM
DRAWN MNP
CHECKED ARM
APPROVED XXX

FOR REVIEW ONLY

A.R. MCAULEY
100141256
Feb 20, 2024

S.M. GORDON
Feb 20, 2024

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
EAST STORMWATER
MANAGEMENT FACILITY DETAILS

PROJECT No. 102085
REV REV # 2
DRAWING No. 102085-SWMF6

Carp Airport Phase 1B-2 Residential (102085-22)
Novatech Response to City Comments Matrix
June 28, 2024

City of Ottawa Comments (November 2023)		Novatech Notes (February 23, 2024)	City of Ottawa Comments (March/April 2024)	Novatech Notes (May 14, 2024)	City of Ottawa Comments (June 2024)	Novatech Notes (June 28, 2024)
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Comments 1 to 2						
Servicing Report						
1	The 2-year storm also requires a 10 minute TC not 15 minutes as shown.	The storm sewer design sheet has been updated with a time of concentration of 10 minutes. Refer to Appendix D of the Servicing Report.	No further comment		✓	
SWM Report						
	Comments 1 to 11		No further comment		✓	
12	Please verify that the OGS unit will treat a minimum of 90% of the total annual stormwater volume from the contributing area. Ensure that the bypass structure with the splitter weir does not allow too much of the flow to bypass the treatment system.	Per the Vortechs design sheets provided in Appendix C, 90% of the projected annual runoff volume would be treated. The bypass weir is designed to convey the 25mm 4-hour Chicago event to the OGS unit (for both the interim and ultimate condition).	It is noted that the OGS device will treat runoff from 25 mm design storm (from the storm sewer). Is this accounted to 90 percent of the annual runoff volume?	Yes, the 25mm rainfall event is included in the 90% of the annual runoff volume treated. Please refer to Appendix E, page 226 for the estimated net annual solids load reductions table, prepared by Contech.	Please include this clarification in the report with a reference to the associated Appendix.	This clarification was added to the SWM report (Section 2.2) with reference to the appendix.
	Comments 13 to 35		No further comment		✓	
Drawings						
	Comments 1 to 3		No further comment		✓	
4	Riprap swale design details should include length of riprap areas on either side.	This information has been added to the drawing 102085-SWMF5.	The rip-rap swale details provided on the 102085-SWMF-5 drawing are assumed to be general one and shall refer to the location where external flow through the swale occurs. Is the channel section between E-E and the headwall the same as E-E with the exception that it contains rip-rap? Please clarify.	An additional cross section through the rip-rap portion of the inlet swale has been added to drawing 102085-SWMF5.	Thank you for adding cross-section F-F	
4a					The conveyance and discharge of major overland flows to the pond through the swale have been changed in the resubmission. Though no changes in volume or flows to the pond is anticipated, the change in the conveyance plan needs to be added to the report.	Rewording and additional text was added for the "Pond Inlet and Inlet Swale" in Section 2.3.5 to reflect the changes to the pond inlet swale.
	Comments 5 to 7		No further comment		✓	
8	What is the purpose of having interconnected icd’s each with their own icd? One of the most common reasons for interconnecting cb’s is to have only one icd.	Design has been revised such that there are no more interconnected catch basins. Each catch basin will have its own ICD, if required.	It is noted the CB 138 and CB 139 with 1B-1 phase are interconnected with each its own ICDs (Table 5)?	The Phase 1B-1 design drawings incorrectly indicated an ICD in the upstream CB. An ICD was installed in the downstream CB in order to control flows as intended. Only the downstream ICD was accounted for in the PCSMM model. The ICD in the upstream CB will not effect ponding as these CBs are on grade.	Noted. However, the response was not provided with respect to Table 5 of the report and should be updated in the report, as required.	Additional information was added to Note 4 under Table 5 to explain the ICDs on CB138 and CB139.
			Please clarify.			
	Comments 9 to 15		No further comment.		✓	

Carp Airport Phase 1B-2 Residential (102085-22)
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PCSWMM Modelling						
	Comments 1 to 9		No further comment.		✓	
10	According to the model, half of the stormwater from the development area goes to the OGS unit and the rest goes to the pond without treatment. Similarly, approximately 380 L/s of runoff is directed to the Pond via a swale, which includes external flows as well as approximately 68 L/s flow from development areas. The flows from the external areas are assumed to be from the existing conditions and do not require treatment at this Phase of development. Please clarify.	Only minor system flows are directed through the OGS unit, and the OGS unit is only designed to treat the water quality event (25mm storm event). In the interim condition PCSWMM model, the future development area is undeveloped and does not require treatment. An ultimate condition PCSWMM model was included in the SWM report that shows the additional unit and the treatment of the future development area with a C = 0.65. Figures 102085-OGS1 and 102085-OGS2 clarify the interim and ultimate drainage areas to the pond and OGS units.	As per the response provided in comment #12 in SWM report section. It is noted that the OGS device will treat runoff from 25 mm design storm (from the storm sewer). Is this accounted to 90 percent of the annual runoff volume?	Please see response to comment #12 of the SWM Report section above.	See comment # 12 above	Please see response to comment #12 of the SWM Report section above.
Additional Comments						
1			Table 2 compares the OGS unit drainage area for Phase 1B-1. The 'Proposed Phase 1B-2 Residential Design' column is assumed to refer to the 1B-1 and rear yards 1B-2 drainage areas? A more appropriate column title would be preferable, as the current one is confusing concerning the proposed OGS unit for the 1B-2 development site is outlined in Table 3.	Table 2 is intended to show the change in AC value (drainage area times runoff coefficient) for the drainage area of the existing Phase 1B1 OGS unit, from the time of original design as part of the 2015 SWM Report, to the current design of Phase 1B-2. As some of the Phase 1B-2 area is draining to the existing Phase 1B-1 OGS unit we wanted to clarify the total AC value serviced by the Phase 1B-1 OGS unit is within the capacity of the OGS unit.	Thank you for the clarification. Please include in the report that 'although some of the Phase 1B-2 area is draining to the existing Phase 1B-1 OGS unit, the total AC value serviced by the Phase 1B-1 OGS unit is within its proposed capacity'.	The requested text was added to Section 2.2 (after Table 2).
2			It is noted that runoff from the entire future development areas will discharge to the East SWM Facility through the Phase 1B-2 pond inlet. Whether the proposed SWM plan can demonstrate that the proposed pond inlet can also regulate flows from future development regions, or whether it will be included in future development. Kindly clarify.	Please refer to page 6 of the SWM Report. In the ultimate condition (full development of future development lands) the PCSWMM model has accounted for the entire future development area to inlet to the pond through the Phase 1B-2 inlet. The model has assumed expansion of the pond (additional pond volume and additional OGS unit) to accommodate the future development. The pond inlet (pipes and major system swale) have been sized based on the ultimate condition flows. Please refer to figure 102085-OGS2 for the approximate size and location of pond expansion assumed in the PCSWMM model.	Please note that the details provided under 'Ultimate Condition' were not clear enough. It was understood that a future pond stage-storage curve for the East SWMF was included in the ultimate model. However, the next statement reads, "The pond expansion required to accommodate the future development area runoff will be confirmed during the detailed design of the future phase." The previous comment was to confirm whether the inlet to the East SWMF is proposed to be sized to accommodate future flows as well. Please add to clarify that "the pond inlet and major system swale have been sized based on the ultimate condition flows" prior to the last sentence in that paragraph (The SWM Block has additional space for expansion and can accommodate a larger expansion volume if required).	The requested text was added to the ultimate condition model scenario in Section 2.3.2.
3			The profile drawing for Block 81 (drawing 102085-P28) still includes offline exfiltration units. There are a few more references to exfiltration in legends and notes on various drawings. Please remove references to exfiltration units that are not part of the proposed SWM plan.	The exfiltration trench has been removed from profile drawing 102085P28.	✓	
4			It is noted that each of the two proposed OGS/Vortech units can treat runoff from 17.28 ha, for a total of 35.56 ha treated by both units. The proposed OGS unit for Phase 1B-2 is to treat runoff from 5.913 ha. This means that future development will direct flows to both the proposed interim and future OGS units. Please clarify.	Please refer to page 4 of the SWM Report. The proposed OGS unit to be installed with Phase 1B-2 will treat runoff from Phase 1B-2 only (5.913 ha) in the interim condition. In the future, once the contributing drainage area to this unit exceeds 17.28 ha, the second unit will be required. In the ultimate condition once future development is complete, the OGS unit installed with Phase 1B-2 and the future OGS unit will both treat the total area equally (17.28 ha each, 35.56ha total).	✓	

Carp Airport Phase 1B-2 Residential (102085-22)
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5			The west development resulted in an overall 34% decrease in infiltration, whereas the east development increased infiltration by 12%. However, the tables reveal that the total infiltration from the west and east development areas decreased by only 0.5%. Include calculation for the combined infiltration water balance for west and east developments, 245 mm/yr and 243 mm/yr, for pre and postdevelopment circumstances, respectively.	The values referred to in your comment were taken from a table that was part of the original 2015 SWM Report. This table is outdated and was included in Appendix F, page 234-235, of the SWM Report as a reference tool for the updated water balance calculations. Please refer to Appendix F, page 240 of the SWM Report for the updated Pre vs. Post-development water balance comparison for Phase 1B-2. The combined values for the east and west developments were area weighted in the new calculations, as shown in the overall summary table. Refer to attached markup of excerpt from the Stormwater Management Report for clarity.	✓	
6			Where is the entrance to the construction or development site? Mud mat should be provided at the site's construction entrance(s) and egress(s).	Construction access will be via the gravel access road which connects existing Wingover Private to Phase 1B-2. Refer to drawing 102085GR15 for the location of the access road. Heavy-duty silt fence has been added along the rear of the lots backing onto the Carp Creek. A mud mat has been added to drawing 102085-ESC3. Proposed location of silt fence is shown on drawing 102085-ESC3. No in-stream works are proposed as part of Phase 1B-2 works.	✓	
			Erosion and Sediment Control (ESC) section include a heavy-duty silt fence if there any work in the area adjacent to water courses and include the type of erosion controls proposed for in stream works.	ESC notes have been added to drawing 102085-ESC3		
			Furthermore, the following should be added in ESC section:		This should be added to the ESC section of the report	Items were added to the ESC section of the SWM report.
			o Inspections of ESC measures at a frequency specified per the ESC plan, for dry weather periods (active and inactive construction phases), after Significant Storm Events (means a minimum of 25 mm of rain in any 24 hours period) and Significant Snowmelt Events (means the melting of snow at a rate which adversely affects the performance and function of the system), and after any extreme weather events. o Identify and rectify any deficiencies and undertake necessary maintenance measures as soon as possible.			
			o Inspections and maintenance of temporary ESC measures shall continue until they are no longer required.			
			o The contractor shall ensure that records of inspection, including at a minimum, the inspector's name, date of inspection, visual observations, and any necessary remedial measures to maintain the interim ESC measures.			
7			PCSWMM shows warning messages at several nodes, on Street 1-E, and in the cooling trenches. It is noted that the model automatically adds a small slope to any flat conduit that does not the above zero minimum slope requirements because the cooling trenches have a flat or zero slope. However, why does the Street-1-E node have the same error?	The PCSWMM model has been reviewed and the warning messages do not impact the results. The cooling trenches are designed with a zero slope, so the model will assign a minimum slope in order to calculate the flow through the cooling trench. The Street1-E conduit has the same error due to the lowest T/G between CB 162A and CB 162B is 116.72 (CB 162B) which was assigned for both CBs (as they are represented by a single node). The spill for CB 162A along Albert Boyd Private is also 116.72, which	✓	
			The maximum depth increased at nodes CB-116A-B, CB-126-127, and CB-163A-B. When integrating with upstream nodes, the model automatically increased depth to match the top height of the highest connected links. Please check these nodes and adjust the offsets to eliminate number of warnings as feasible.	When using irregular cross-sections, the maximum depth error sometimes occurs. These nodes were reviewed and the node depth was set to the anticipate top of the conduit. We checked the impact of raising the node depth by 0.01m to remove the error and the model results were unaffected.	✓	
8			Future development assumes 100m3/ha of storage for major flow to ROW. The 5.9 ha phase 1B is providing approximately 196 cu.m. surface storage.(Table 6). This translates to 33 cu.m./ha. This is closer to what we see in other subdivisions. Please look at what would happen if the assumed surface storage was reduced from the 100 cu.m./ha.	We did a quick check in the model where we decreased the storage to 30m3/ha. This would result in an increase in major system flows to the pond from the future development areas, but would not impact the Phase 1B-2 system in any significant way. There is no impact on the total runoff volume or storage requirements in the pond. The surface storage available and the major system flows to the pond from the future development	✓	
9					A 600 mm CSP culvert is proposed to cross the gravel road (entrance to the site), but this was not included in the report, even though it might be under interim conditions.	Additional text was added to the "Pond Inlet and Inlet Swale" in Section 2.3.5to discuss the culvert under the access road. Sizing information for HY-8 was included in Appendix E.

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Stormwater Operations Comments						
			The West Pond inlet is buried by sediments, potentially causing issues with the cooling trench inlet, which might be plugged. Sediment deposition from overland flow carrying sandy sediments might be the source of the problem. It's necessary for a consultant to inspect both the inlet and the lower channel, as the cooling trench may also be compromised or plugged. This is particularly crucial as the new development in the East Pond inlet and cooling trench have the same design elements as the West Pond.	The west SWM pond is part of Phase 1A of the subdivision. The condition of the west SWM pond and cooling trench will be reviewed / inspected once the water levels have lowered. Water levels in both the Carp creek and the SWM pond are high due to the time of year / heavy rainfall.	Before we approve the cooling trench inlet design, a response to this comment is necessary.	A site inspection of the Phase 1A pond was conducted with the City to investigate the performance of the pond with respect to sediment buildup. A memo was submitted to the City outlining the site inspection on June 20, 2024. Additional measures and notes have been added to the Erosion and Sediment Control Plan to provide additional sediment protection of the cooling trench and clarify OGS cleaning frequency requirements for Phase 1B-2.
			The proposed overland swale should be diverted to the pond instead of discharging into the riprapped cooling manhole 281 depression to prevent further potential inlet plugging issues.	The overland flow route has been revised to have a separate inlet from the Phase 1B-2 storm sewer inlet.	✓	
			The cooling trench must be provided with a subdrain all the way up to the connection with the existing west cooling channel, to ensure functionality. Referring to the mark-up at DWG 102085 SWF-5 East Stormwater Management Facility Phase 1B-2 Inlet Details for specific details and guidance on addressing the issues.	A subdrain has been added to the entirety of the cooling trench.	✓	
			Additionally, the consultant must update the 2023 geotechnical report to confirm the groundwater table elevations, as field measurements were taken in September 2011	October 2022 groundwater elevations were provided in the Paterson Geotechnical Investigation Report, dated January 16, 2023. Refer to pages 49 to 51 for the soil profile and test data sheets.	✓	
			Who will be responsible for maintaining the rear yard infiltration trench while it's in the place. Please provide a service road parallel to the trench.	Maintenance of the rear yard infiltration trench would be the responsibility of the homeowner. This is consistent with standard City of Ottawa projects with a rear yard subdrain / infiltration system. Outlet catchbasins which have been proposed within the ROW as part of the rear yard infiltration trench will provide maintenance access to the infiltration trench. No service road will be provided through the rear yards.	✓	
			Lastly the off-line Oil Grid separators must be provided with the gate to provide efficient maintenance.	The Stormwater Management Facility is a dry pond system and will not require the installation of gates in order to access the vortechs unit for maintenance.	The sluice gates or stop logs are required to isolate the OGS unit during the cleanup process.	Adjustable stop log restrictors per City detail S13.4 have been added to Storm Manholes 276 and 278 to isolate the OGS during maintenance. Refer to the OGS Layout Detail on the 102085-SWMF5 drawing.

APPENDIX B

Excerpts from the Stormwater Site Management Report (Novatech, 2015)

1) Carp Creek Modelling (Novatech, 2015)
2) Pre-development Flows (Novatech, 2015)
3) Cooling Trench Sizing and Design (Novatech, 2015)
4) East Residential Community SWMHYMO Output Files (Novatech, 2015)

West Capital Airpark - Carp Creek
Model Parameters

Carp Creek - External Drainage Area (Upstream of Street 6)

SCS Curve Number

Land Use	Area	% of total	HSG	CN	CN x (%)
Forest	256	0.82	B	55	45.4
Hwy 417	4.2	0.01	B	98	1.3
Diamondview Road	0.8	0.00	B	98	0.3
Quarry	21.7	0.07	B	86	6.0
Grass / Meadow	27.7	0.09	B	58	5.2
Total	**310.4**	1.00			***58.1***

Time to Peak

Length	$L =$	3600	m
Runoff Coefficient	$C =$	0.20	
U/S Elevation	$h_1 =$	141	m
D/S Elevation	$h_2 =$	106	m
Slope	$S =$	$(h_1 - h_2) / L$	
	$=$	0.9722	
Time of Concentration	$T_c =$	$3.26(1.1-C)L^{0.5} / S^{0.33}$	
	$=$	178	min
Time to Peak	$T_p =$	$0.6T_c$	
	$=$	106.6	min
	$=$	1.78	hrs

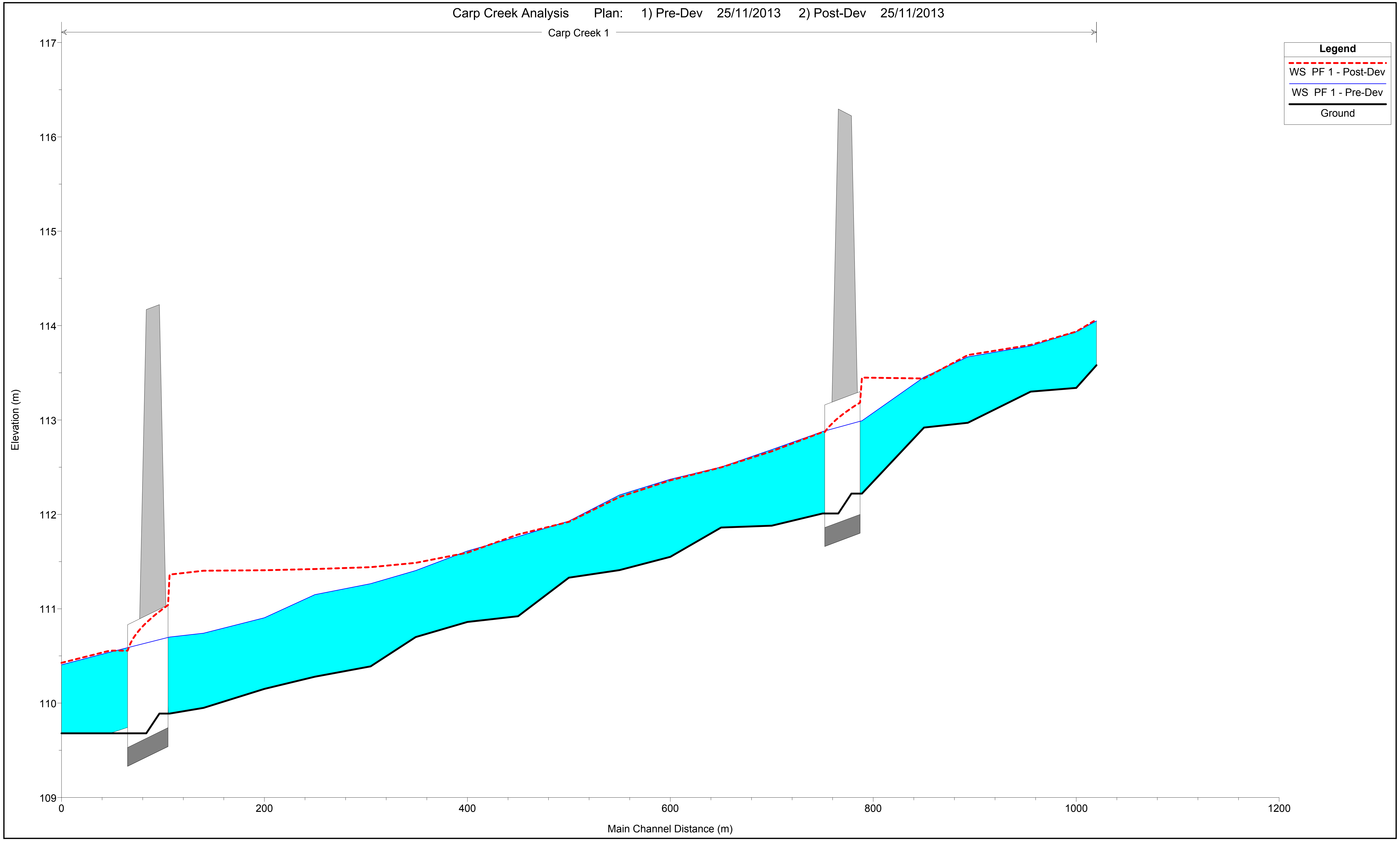
DATE: 24/05/2013
PREPARED BY: NOVATECH ENGINEERING CONSULTANTS LTD.
M:\2002\102085\DATA\Calculations\20111108 Carp Creek Crossings

HEC-RAS River: Carp Creek Reach: 1 Profile: PF 1

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Vel Chnl	Flow Area
				(m3/s)	(m)	(m)	(m/s)	(m2)
1	1070	PF 1	Pre-Dev	5.40	113.58	114.05	1.18	4.91
1	1070	PF 1	Post-Dev	5.37	113.58	114.06	1.45	5.26
1	1050	PF 1	Pre-Dev	5.40	113.34	113.94	0.81	6.84
1	1050	PF 1	Post-Dev	5.37	113.34	113.94	1.13	6.88
1	1005.20	PF 1	Pre-Dev	5.40	113.30	113.79	0.66	8.23
1	1005.20	PF 1	Post-Dev	5.37	113.30	113.80	0.75	8.58
1	0943.25	PF 1	Pre-Dev	5.40	112.97	113.67	0.53	10.34
1	0943.25	PF 1	Post-Dev	5.37	112.97	113.69	0.62	11.00
1	900	PF 1	Pre-Dev	5.40	112.92	113.45	1.26	4.58
1	900	PF 1	Post-Dev	5.37	112.92	113.44	1.62	4.24
1	838.85	PF 1	Pre-Dev	5.40	112.22	112.99	1.02	5.28
1	838.85	PF 1	Post-Dev	5.37	112.22	113.45	0.40	13.38
1	0800	PF 1	Pre-Dev	5.40	112.01	112.88	0.76	7.53
1	0800	PF 1	Post-Dev	5.37	112.01	112.87	1.04	7.44
1	0750	PF 1	Pre-Dev	5.40	111.88	112.69	1.00	5.51
1	0750	PF 1	Post-Dev	5.37	111.88	112.67	1.29	5.24
1	0700	PF 1	Pre-Dev	5.40	111.86	112.50	0.78	7.17
1	0700	PF 1	Post-Dev	5.37	111.86	112.50	1.09	7.09
1	0650	PF 1	Pre-Dev	5.40	111.55	112.37	0.65	8.36
1	0650	PF 1	Post-Dev	5.37	111.55	112.36	0.96	8.07
1	0600	PF 1	Pre-Dev	5.40	111.41	112.21	0.92	6.37
1	0600	PF 1	Post-Dev	5.37	111.41	112.18	1.16	5.90
1	0550	PF 1	Pre-Dev	5.40	111.33	111.93	1.01	5.55
1	0550	PF 1	Post-Dev	5.37	111.33	111.92	1.27	5.37
1	0500	PF 1	Pre-Dev	5.40	110.92	111.76	0.75	7.54
1	0500	PF 1	Post-Dev	5.37	110.92	111.79	0.83	8.05
1	0450	PF 1	Pre-Dev	5.40	110.86	111.61	0.67	8.31
1	0450	PF 1	Post-Dev	5.37	110.86	111.59	1.28	7.62
1	0399	PF 1	Pre-Dev	5.40	110.70	111.40	0.78	7.33
1	0399	PF 1	Post-Dev	5.37	110.70	111.49	0.74	9.64
1	0354.65	PF 1	Pre-Dev	5.40	110.39	111.27	0.80	7.10
1	0354.65	PF 1	Post-Dev	5.37	110.39	111.44	0.60	11.03
1	0299.65	PF 1	Pre-Dev	5.40	110.28	111.15	0.62	9.27
1	0299.65	PF 1	Post-Dev	5.37	110.28	111.42	0.45	18.00

HEC-RAS River: Carp Creek Reach: 1 Profile: PF 1 (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Vel Chnl	Flow Area
				(m3/s)	(m)	(m)	(m/s)	(m2)
1	0250	PF 1	Pre-Dev	5.40	110.15	110.90	1.13	4.92
1	0250	PF 1	Post-Dev	5.37	110.15	111.41	0.43	19.17
1	0190	PF 1	Pre-Dev	6.70	109.95	110.74	0.77	9.67
1	0190	PF 1	Post-Dev	6.71	109.95	111.40	0.29	31.10
1	0156.5	PF 1	Pre-Dev	6.70	109.89	110.70	0.57	12.02
1	0156.5	PF 1	Post-Dev	6.71	109.89	111.36	0.84	7.95
1	0097.70	PF 1	Pre-Dev	6.70	109.68	110.54	1.10	7.04
1	0097.70	PF 1	Post-Dev	6.71	109.68	110.56	1.06	7.38
1	0050	PF 1	Pre-Dev	6.70	109.68	110.41	0.88	8.31
1	0050	PF 1	Post-Dev	6.71	109.68	110.43	0.93	8.83


Carp Creek Analysis Plan: 1) Pre-Dev 25/11/2013 2) Post-Dev 25/11/2013
Carp Creek 1
Legend
WS PF 1 - Post-Dev
WS PF 1 - Pre-Dev
Ground
Elevation (m)
117
116
115
114
113
112
111
110
109
0
200
400
600
800
1000
1200
Main Channel Distance (m)

```
2     Metric units
*#*******************************************************************************
*#  Project Name: [Carp Airport]    Project Number: [102085]
*#  Date          : 05-01-2013
*#  Modeller      : [R. Langlois]
*#  Company       : NOVATECH ENGINEERING CONSULTANTS LTD
*#  License #     :  5320763
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DEFAULT VALUES      ICASEdef=[1],  read and print values
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*TOTAL FLOW INTO CULVERT 1 CROSSING STREET ONE
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                    DWF=[0](cms), CN/C=[58], TP=[1.78]hrs,
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                    HYD_FILENAME=["H-TCRK"]
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READ HYD            ID=[3],  NHYD=["B-2"],
                    HYD_FILENAME=["H-TOTCRK"]
*%------------------|------------------------------------------------------------
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*%------------------|------------------------------------------------------------
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  SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999   999  =========
  S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9 9   9
  SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9 9   9 Ver. 4.02
      S   W W   M   M  H   H    Y    M   M  O   O       9999  9999 July 1999
  SSSSS   W W   M   M  H   H    Y    M   M   OOO           9     9 =========
                                                       9   9 9   9 # 5320763
       StormWater Management HYdrologic Model           999   999  =========

  ************************************************************************
  *************************** SWMHYMO-99 Ver/4.02 ************************
  *******  A single event and continuous hydrologic simulation model  *******
  *******     based on the principles of HYMO and its successors      *******
  *******                 OTTHYMO-83 and OTTHYMO-89.                  *******
  ************************************************************************
  ******* Distributed by:  J.F. Sabourin and Associates Inc.            *******
  *******                  Ottawa,  Ontario: (613) 727-5199             *******
  *******                  Gatineau, Quebec: (819) 243-6858             *******
  *******                  E-Mail: swmhymo@jfsa.Com                     *******
  ************************************************************************

  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  +++++++ Licensed user: NOVATECH ENGINEERING CONSULTANTS LTD        +++++++
  +++++++                Neoean                   SERIAL#:5320763    +++++++
  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

  ************************************************************************
  *******            ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *******
  *******            Maximum value for ID numbers  :     10          *******
  *******            Max. number of rainfall points:  15000          *******
  *******            Max. number of flow points    :  15000          *******
  ************************************************************************

  *** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) ***
  ***-------------------------------------------------------------------***
  ***     ID:  Hydrograph IDentification numbers, (1-10).               ***
  ***   NHYD:  Hydrograph reference numbers, (6 digits or characters).  ***
  ***   AREA:  Drainage area associated with hydrograph, (ac.) or (ha.).***
  *** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).  ***
  *** TpeakDate_hh:mm is the date and time of the peak flow.           ***
  ***   R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).     ***
  ***   R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).     ***
  ***      *:  see WARNING or NOTE message printed at end of run.       ***
  ***     **:  see  ERROR  message printed at end of run.               ***
  ************************************************************************
  ************************************************************************

 ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

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

  *********************    S U M M A R Y   O U T P U T    *****************
  ************************************************************************
  *       DATE: 2013-05-23     TIME: 14:19:55     RUN COUNTER: 001792      *
  ************************************************************************
  * Input   filename: M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\CREEK.DAT  *
  * Output  filename: M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\CREEK.out  *
  * Summary filename: M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\CREEK.sum  *
  * User comments:                                                         *
  * 1:_____________________________________________________________________*
  * 2:_____________________________________________________________________*
  * 3:_____________________________________________________________________*
  ************************************************************************


 #***************************************************************************
 #  Project Name: [Carp Airport]    Project Number: [102085]
 #  Date        : 05-01-2013
 #  Modeller    : [R. Langlois]
 #  Company     : NOVATECH ENGINEERING CONSULTANTS LTD
 #  License #   :  5320763
 #***************************************************************************
  RUN:COMMAND#
  001:0001------------------------------------------------------------------
      START
        [TZERO =    .00 hrs on        0]
        [METOUT=   2    (1=imperial, 2=metric output)]
        [NSTORM=   1 ]
        [NRUN  =   1 ]
  001:0002------------------------------------------------------------------
      READ STORM
       Filename = STORM.001
       Comment  = City of Ottawa:  25mm-4hr Chicago (10 minute time step)
        [SDT=10.00:SDUR=   4.00:PTOT=  25.00]
  001:0003------------------------------------------------------------------
      DEFAULT VALUES
       Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\OTTAWA.DEF
       ICASEdv  = 1 (read and print data)
       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
       Horton's infiltration equation parameters:
       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
       Parameters for PERVIOUS surfaces in STANDHYD:
       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
       Parameters for IMPERVIOUS surfaces in STANDHYD:
       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
       Parameters used in NASHYD:
       [Ia=   4.67 mm] [N= 3.00]
  001:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      DESIGN NASHYD       01:E-1      310.40     .458 No_date    4:03    2.02 .081
        [CN= 58.0: N= 3.00]
        [Tp= 1.78:DT= 1.00]
  001:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      READ HYD            02:B-1       21.73     .628 No_date    1:40   39.79  n/a
       Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-TCRK.001
       Comment  = B-1
  001:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      READ HYD            03:B-2       45.87     .852 No_date    2:56   41.73  n/a
       Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-TOTCRK.001
       Comment  = B-2
  001:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD             01:E-1      310.40     .458 No_date    4:03    2.02  n/a
                        + 02:B-1       21.73     .628 No_date    1:40   39.79  n/a
                        + 03:B-2       45.87     .852 No_date    2:56   41.73  n/a
        [DT= 1.00]  SUM=  04:CULV6    377.99    1.551 No_date    3:00    9.01  n/a
   ** END OF RUN :   4

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





  RUN:COMMAND#
  005:0001------------------------------------------------------------------
      START
        [TZERO =    .00 hrs on        0]
        [METOUT=   2    (1=imperial, 2=metric output)]
        [NSTORM=   1 ]
        [NRUN  =   5 ]
 #***************************************************************************
 #  Project Name: [Carp Airport]    Project Number: [102085]
 #  Date        : 05-01-2013
 #  Modeller    : [R. Langlois]
 #  Company     : NOVATECH ENGINEERING CONSULTANTS LTD
 #  License #   :  5320763
 #***************************************************************************
  005:0002------------------------------------------------------------------
      READ STORM
       Filename = STORM.001
       Comment  = City of Ottawa:  100yr-4hr Chicago (10 minute time step)
        [SDT=10.00:SDUR=   4.00:PTOT=  76.02]
  005:0003------------------------------------------------------------------
      DEFAULT VALUES
       Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\OTTAWA.DEF
       ICASEdv  = 1 (read and print data)
       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
       Horton's infiltration equation parameters:
       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
       Parameters for PERVIOUS surfaces in STANDHYD:
       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
       Parameters for IMPERVIOUS surfaces in STANDHYD:
       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
       Parameters used in NASHYD:
       [Ia=   4.67 mm] [N= 3.00]
  005:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      DESIGN NASHYD       01:E-1      310.40    4.569 No_date    3:52   19.94 .262
        [CN= 58.0: N= 3.00]
        [Tp= 1.78:DT= 1.00]
  005:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      READ HYD            02:B-1       21.73     .628 No_date    1:40   39.79  n/a
       Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-TCRK.005
       Comment  = B-1
  005:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      READ HYD            03:B-2       45.75    1.187 No_date    2:52   48.55  n/a
       Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-TOTCRK.005
       Comment  = B-2
  005:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD             01:E-1      310.40    4.569 No_date    3:52   19.94  n/a
                        + 02:B-1       21.73     .628 No_date    1:40   39.79  n/a
                        + 03:B-2       45.75    1.187 No_date    2:52   48.55  n/a
        [DT= 1.00]  SUM=  04:CULV6    377.88    5.703 No_date    3:36   24.55  n/a
   ** END OF RUN :   5

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





  RUN:COMMAND#
  006:0001------------------------------------------------------------------
      START
        [TZERO =    .00 hrs on        0]
        [METOUT=   2    (1=imperial, 2=metric output)]
        [NSTORM=   1 ]
        [NRUN  =   6 ]
 #***************************************************************************
 #  Project Name: [Carp Airport]    Project Number: [102085]
 #  Date        : 05-01-2013
 #  Modeller    : [R. Langlois]
 #  Company     : NOVATECH ENGINEERING CONSULTANTS LTD
 #  License #   :  5320763
 #***************************************************************************
  006:0002------------------------------------------------------------------
      READ STORM
       Filename = STORM.001
       Comment  = City of Ottawa:  100yr-6hr Chicago (10 minute time step)
        [SDT=10.00:SDUR=   6.00:PTOT=  82.31]
  006:0003------------------------------------------------------------------
      DEFAULT VALUES
       Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\OTTAWA.DEF
       ICASEdv  = 1 (read and print data)
       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
       Horton's infiltration equation parameters:
       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
       Parameters for PERVIOUS surfaces in STANDHYD:
       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
       Parameters for IMPERVIOUS surfaces in STANDHYD:
       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
       Parameters used in NASHYD:
       [Ia=   4.67 mm] [N= 3.00]
  006:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      DESIGN NASHYD       01:E-1      310.40    4.817 No_date    4:31   23.04 .280
        [CN= 58.0: N= 3.00]
        [Tp= 1.78:DT= 1.00]
  006:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      READ HYD            02:B-1       21.73     .656 No_date    2:20   42.68  n/a
       Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-TCRK.006
       Comment  = B-1
  006:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      READ HYD            03:B-2       45.74    1.246 No_date    3:32   50.40  n/a
       Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-TOTCRK.006
       Comment  = B-2
  006:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
      ADD HYD             01:E-1      310.40    4.817 No_date    4:31   23.04  n/a
                        + 02:B-1       21.73     .656 No_date    2:20   42.68  n/a
                        + 03:B-2       45.74    1.246 No_date    3:32   50.40  n/a
        [DT= 1.00]  SUM=  04:CULV6    377.87    6.011 No_date    4:15   27.48  n/a
   ** END OF RUN :  12

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





  RUN:COMMAND#
  013:0001------------------------------------------------------------------
      START
        [TZERO =    .00 hrs on        0]
        [METOUT=   2    (1=imperial, 2=metric output)]
        [NSTORM=   1 ]
        [NRUN  =  13 ]
 #***************************************************************************
 #  Project Name: [Carp Airport]    Project Number: [102085]
 #  Date        : 05-01-2013
 #  Modeller    : [R. Langlois]
 #  Company     : NOVATECH ENGINEERING CONSULTANTS LTD
 #  License #   :  5320763
 #***************************************************************************
  013:0002------------------------------------------------------------------
      READ STORM
       Filename = STORM.001
       Comment  = City of Ottawa:  100yr-12hr SCS Type II (10 min time step)
        [SDT=10.00:SDUR=  12.00:PTOT=  93.91]
  013:0003------------------------------------------------------------------
      DEFAULT VALUES
       Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\OTTAWA.DEF
       ICASEdv  = 1 (read and print data)
       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
       Horton's infiltration equation parameters:
       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
       Parameters for PERVIOUS surfaces in STANDHYD:
       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
       Parameters for IMPERVIOUS surfaces in STANDHYD:
```

```
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 013:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN NASHYD      01:E-1      310.40    5.264 No_date     8:02   29.15 .310
      [CN= 58.0: N= 3.00]
      [Tp= 1.78:DT= 1.00]
 013:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     READ HYD           02:B-1       22.04     .521 No_date     6:00   46.75  n/a
      Filename = M:\2002\102085\DATA\CALCUL~1\SWMHYMO\2012\H-TCRK.013
      Comment  = B-1
 013:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     READ HYD           03:B-2       45.87    1.107 No_date     7:10   49.90  n/a
      Filename = M:\2002\102085\DATA\CALCUL~1\SWMHYMO\2012\H-TOTCRK.013
      Comment  = B-2
 013:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:E-1      310.40    5.264 No_date     8:02   29.15  n/a
                      + 02:B-1       22.04     .521 No_date     6:00   46.75  n/a
                      + 03:B-2       45.87    1.107 No_date     7:10   49.90  n/a
      [DT= 1.00]  SUM=  04:CULV6    378.31    6.452 No_date     7:47   32.69  n/a
  ** END OF RUN :  13

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





 RUN:COMMAND#
 014:0001-----------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =  14 ]
#*******************************************************************************
#  Project Name: [Carp Airport]    Project Number: [102085]
#  Date          : 05-01-2013
#  Modeller      : [R. Langlois]
#  Company       : NOVATECH ENGINEERING CONSULTANTS LTD
#  License #     :  5320763
#*******************************************************************************
 014:0002------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = City of Ottawa:  100yr-24hr SCS Type II (60 minute time step
      [SDT=60.00:SDUR=  24.00:PTOT= 105.74]
 014:0003------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2002\102085\DATA\CALCUL~1\SWMHYMO\2012\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 014:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN NASHYD      01:E-1      310.40    5.374 No_date    13:51   35.84 .339
      [CN= 58.0: N= 3.00]
      [Tp= 1.78:DT= 1.00]
 014:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     READ HYD           02:B-1       22.28     .388 No_date    12:41   49.36  n/a
      Filename = M:\2002\102085\DATA\CALCUL~1\SWMHYMO\2012\H-TCRK.014
      Comment  = B-1
 014:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     READ HYD           03:B-2       49.77    1.171 No_date    13:05   46.59  n/a
      Filename = M:\2002\102085\DATA\CALCUL~1\SWMHYMO\2012\H-TOTCRK.014
      Comment  = B-2
 014:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:E-1      310.40    5.374 No_date    13:51   35.84  n/a
                      + 02:B-1       22.28     .388 No_date    12:41   49.36  n/a
                      + 03:B-2       49.77    1.171 No_date    13:05   46.59  n/a
      [DT= 1.00]  SUM=  04:CULV6    382.45    6.707 No_date    13:39   38.03  n/a
 014:0002------------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2013-05-23     at 14:19:56
================================================================================


```

5.3.5 Modeling Files / Schematic

SWMHYMO modeling files are provided in **Appendix F**. The model schematic for the East Residential Community is provided on Drawing **102085-SWMHYMO3**. Digital copies of the modeling files are provided on the enclosed CD.

5.4 Results of Hydrologic Analysis

5.4.1 Pre-development Peak Flows / Allowable Release Rate

The results of the pre-development hydrologic analysis are summarized in **Table 5-3**. The total pre-development peak flow to Carp Creek represents the allowable post-development release rate from the East Residential Community.

Table 5-3: Pre-Development Peak Flows (m^3/s) – East Residential Community

Storm Distribution->	4hr Chicago			12hr SCS		
Return Period->	**2yr**	**5yr**	**100yr**	**2yr**	**5yr**	**100yr**
A-01	0.246	0.470	1.294	0.311	0.551	1.431
A-02	0.052	0.105	0.307	0.063	0.113	0.305
*Total Flow to Carp Creek**	*0.263*	*0.500*	*1.379*	*0.333*	*0.590*	*1.537*
External Drainage Areas						
E-1	0.045	0.086	0.242	0.057	0.102	0.275

** Note: The total flow is less than the sum of the individual peak flows due to differences in times to peak for each catchment area.*

5.4.2 Post-Development Peak Flows to Carp Creek – East Residential Community

The post-development peak flow to Carp Creek from the East Residential Community includes the controlled outflow from the proposed dry pond, as well as uncontrolled runoff (rearyards adjacent to Carp Creek, external drainage areas). The post-development peak flows to Carp Creek are compared with the allowable release rates in **Table 5-4**.

Table 5-4: Post-Development Peak Flows to Carp Creek – East Residential Community

Storm Distribution->	4hr Chicago			12hr SCS		
Return Period->	**2yr**	**5yr**	**100yr**	**2yr**	**5yr**	**100yr**
Allowable Flow to Carp Creek	0.263	0.500	1.379	0.333	0.590	1.537
Post Development Peak Flow	0.232	0.370	1.187	0.235	0.340	1.107

5.4.3 Major and Minor System Flows (Storm Sewers)

The SWMHYMO model was used to calculate the total inflow into the storm sewers on Chandelle Private (Streets 9) and the adjoining crescents (Streets 8 and 10), and to calculate the overland peak flows and flow depths within the right of ways.

The results of this analysis indicate that there will be no ponding within the right of ways during the 5-year event. During the 100-year event, all ponding areas within road sags will be fully utilized and storm runoff will be conveyed to the proposed dry pond by the road network. The maximum dynamic flow depth will be less than 0.30m and the product of depth x velocity will be less than 0.60. Major system flows will be confined within the right of ways.

Table 5-7: Grassed Channel Design Criteria (Based on MOE / FHWA Guidelines)

Street / Taxiway	Catchment ID	Area (ha)	Peak Flow (L/s)	Flow Depth (m)	Velocity (m/s)
Recommended Criteria (25mm-4hr Chicago Storm)		*< 2.0 ha (MOE)*		*± 0.10 m (FHWA)*	*< 0.5 m/s (MOE)*
Private Taxiway E1	B4-W	3.21	147	0.18	0.52
	B4-E	2.64	115	0.16	0.48
Tailslide Private (Street 11)	B5-W	1.28	59	0.11	0.39
	B5-E	3.76	153	0.19	0.53
Private Taxiway E2	B6-W	0.91	42	0.09	0.36
	B6-E	1.75	77	0.13	0.43
Street 12	B7-W	1.07	47	0.10	0.37
	B7-E	1.70	69	0.12	0.42
Private Taxiway E3	B8-W	1.91	85	0.14	0.44
	B8-E	1.81	82	0.13	0.44
Street 13 / 14	B9-W	1.17	40	0.09	0.35
	B9-E	2.57	82	0.13	0.44
Private Taxiway E4	B10-W	1.93	56	0.11	0.39
	B10-E	1.32	9	0.04	0.22

Area B5-E has the highest peak flow for the 25mm event, with a maximum velocity of 0.53 m/s at the downstream end of the catchment. Although this velocity exceeds the recommended velocity of < 0.5m/s by MOE, this flow rate will only occur at the downstream limit of the ditch. The results of the water quality analysis indicate that the proposed ditches will generally meet or exceed the recommended criteria for depth and velocity for the 25mm event.

The ditches on Private Taxiway E will act as collectors for the road and taxiway ditches in the East Residential Community. The ditches on both sides of Private Taxiway E will have subdrain trenches to further promote infiltration of accumulated runoff. Additional water quality treatment will be provided as runoff is routed through the dry pond.

In conclusion, the proposed treatment train, which consists of lot level, conveyance, and end-of-pipe controls, will meet the water quality target of 70% long-term TSS removal set in the Carp River Watershed / Subwatershed Study.

6.0 TEMPERATURE CONTROL

Urbanization commonly results in an increase in the temperature of storm runoff. Draft Condition #71 (**Appendix A**) indicates that post-development runoff must be controlled to a maximum outflow water temperature of 25°C before entering Carp Creek. The following mitigation measures have been incorporated into the design of the SWM facilities to reduce thermal impacts to Carp Creek associated with the proposed development:

- The dry ponds are not designed to provide extended detention storage which can lead to increased temperatures. Water quality treatment will be provided upstream of the SWM facilities using hydrodynamic separators (Vortechs®) for areas serviced by storm sewers, or using flat-bottomed grassed swales for areas without storm sewers.

- The dry ponds will incorporate berms and plantings designed to promote shading and inhibit temperature increases.
- Low flows (runoff generated by the first 5mm of rainfall) will be routed through a stone-filled subsurface cooling trenches designed to remove heat from storm runoff.
- Stone trenches underlying the roadside and taxiway ditches will infiltrate all runoff from a 5mm storm event; therefore no cooling is required for the taxiway lots.

6.1 Principles

"Treatment of water, by routing the discharge through a subsurface trench filled with clear stone, has been suggested to reduce temperature. As the water flows through the trench, heat is transferred to the stone."[2]

The efficiency of stone trenches for cooling depends on three main factors. First, the trench must provide enough thermal mass and contact time to transfer the heat from the water to the stone in the trench. Second, the trench must then be capable of transferring the stored heat into the surrounding soil. Third, the temperature of the surrounding soil must not become heat soaked to a point where the trench can no longer provide the requisite level of heat exchange.

6.1.1 Soil Temperature

Climate data from Environment Canada (**Table 6-1**) indicates that soil temperatures at 1.0m depth reach an average annual maximum temperature of 16.2°C during the month of August.

Table 6-1: Soil Temperature Data (Ottawa CDA)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5 cm depth (AM obs) (°C)	-0.2	-0.7	-0.2	3	11.1	16.6	19.1	18.2	14.2	8.3	3.5	0.5
5 cm depth (PM obs) (°C)	-0.2	-0.6	0	5.2	14.4	20.2	23	21.8	17	10.3	4.1	0.5
10 cm depth (AM obs) (°C)	0	-0.5	-0.1	3.2	11.2	16.7	19.2	18.4	14.6	8.8	3.8	0.8
10 cm depth (PM obs) (°C)	0	-0.4	0	4.7	13.6	19.4	22.1	21.1	16.6	10.2	4.2	0.8
20 cm depth (AM obs) (°C)	0.5	-0.1	0.3	3.4	11.5	17	19.6	19	15.3	9.7	4.6	1.4
20 cm depth (PM obs) (°C)	0.5	0	0.3	4.1	12.6	18.3	21	20.2	16.2	10.2	4.8	1.4
50 cm depth (AM obs) (°C)	1.1	0.3	0.3	2.5	9.8	15	17.8	17.8	15.2	10.4	5.6	2.2
100 cm depth (AM obs) (°C)	2.9	2	1.6	2.5	7.6	12.3	15.2	16.2	15	11.7	7.8	4.5
150 cm depth (AM obs) (°C)	5	3.9	3.3	3.5	6.8	10.7	13.6	15	14.8	12.7	9.7	6.7
300 cm depth (AM obs) (°C)	7	5.9	5.1	4.6	5.7	8.1	10.4	12.1	12.9	12.3	10.7	8.7

Canadian Climate Normals (1971-2000 Station Data)

6.1.2 Heat Transfer

The performance of stone cooling trenches is dependent on their capability to store energy (heat capacity) and the initial temperature. Heat transfer between the water and stone in the cooling trench is relatively efficient due to the large surface area to volume ratio achieved by using small diameter stone in the trench. Heat transfer to the surrounding soil is much less efficient, as heat exchange can only occur through the outer walls of the trench.

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[2] Stormwater Management Planning and Design Manual, Chapter 4.4 - Mitigation Measures for Increased Temperature (MOE, 2003)

Assuming an inter-event time of 3-5 days, cooling trenches should be capable of dispersing the majority of the stored heat over this time period. Initial calculations indicated that achieving a reasonable heat transfer rate to the surrounding soil solely through conductive cooling would require a significantly oversized trench. Furthermore, due to the relatively low thermal conductivity of the surrounding soil, there would be a high potential for the soil to become heatsoaked over the course of the summer, which would significantly degrade the performance of the cooling trench. Even with no thermal input from the cooling trench, the average soil temperature will effectively be at the upper limit of the acceptable temperature range for cooling throughout the months of July and August.

6.2 Cooling Trench Design

The cooling trenches have been designed to cool the runoff generated by a 5mm storm event to a maximum discharge temperature of 25°C, assuming that the inflow to the trench is at a constant temperature of 35°C and the initial temperature in the cooling trench is 15°C or less.

The soils surrounding the cooling trenches will be comprised of silty clay and are expected to be below the water table. As such, the stone trenches will provide no opportunity for infiltration and will operate solely as conveyance / cooling systems.

Inlet

Runoff will be directed into a subsurface stone cooling trench through custom inlets consisting of a modified 1200mm diameter maintenance hole. The maintenance hole will be located in a shallow depression exposing approximately 0.5m of the structure. A grated opening will be provided on the exposed sides of the structure to allow low flows to enter the cooling trench. The depression will be filled with riprap to prevent clogging of the inlet grates.

Runoff will then enter the stone trench through an 18 meter long, 200mm diameter perforated PVC pipe *(TYPE SP ADS/2)*. The perforations have been sized to capture the peak flow from the 5mm event, with a factor of safety to account for any debris or sediment entering the cooling trench. Cleanouts will be provided at the downstream end of each perforated pipe run to facilitate inspection and maintenance.

Materials

The cooling trenches will be wrapped with non-woven filter fabric to prevent the native material from blocking the pore space in the stone/rock and surrounding rip rap. The depressed area surrounding the inlets will be filled with standard 200mm rip rap. The stone in the cooling trench will be comprised of even graded limestone (average diameter of 50mm), since smaller stones will provide a greater total surface area for heat transfer. The stone trenches will be located at a minimum depth of 1.0 meter below the ground surface.

Outlet

The cooling trench outlets consist of 200mm PVC pipe discharging to the ground surface adjacent to Carp Creek. The outlet pipes are higher than the top of the stone trench, which will ensure that the trenches remain full of water following a storm event. The grate elevations of the cooling trench inlets are approximately 1m higher than the outlet pipes. Flow through the cooling trenches will be dependent on the head differential between the inlet and outlet pipes.

6.2.1 Dimensions / Flow Rates

The cooling trench designs are summarized below in **Table 6-2**. Additional details, supporting calculations and assumptions are provided in **Appendix G**.

All runoff entering the East Pond cooling trench during a 5mm event will be from the areas serviced by storm sewers. Stone trenches underlying the road and taxiway ditches within the East Residential Community will provide sufficient storage to store and infiltrate all runoff from a 5mm storm event.

Table 6-2: Cooling Trench Design Summary

Design Parameter	West Pond	East Pond
Runoff Data (5mm-4hr Event)*		
Total Runoff Volume	172 m^3	107 m^3
Peak Flow Rate	97 L/s	60 L/s
Average Flow Rate	12 L/s	7 L/s
Inlet Water Temperature	35 °C	35 °C
Trench Dimensions & Materials		
Length	186 m	250 m
Width	4.0 m	3.0 m
Depth	0.3 m	0.3 m
Stone Type	Limestone	Limestone
Stone Diameter (Average)	50 mm	50 mm
Volume of Void Space	81 m^3	82 m^3
Heat Transfer Summary		
Initial Temperature in Trench	15°C	15°C
Final Temperature in Trench	24.5°C	22.7°C
Total Heat Stored in Trench	6,084 MJ	4,950 MJ

** 5mm inflow flow taken from SWMHYMO model*

6.2.2 Temperature Monitoring

A temperature monitoring program will be implemented immediately following construction of both SWM facilities to ensure that the cooling trenches are functioning properly and verify that discharge temperatures meet the requirement of 25°C into Carp Creek. The monitoring program should run from approximately May – September until the one year mark following build out of 80% of Phase 1. Based on the initial findings after year one of monitoring, the monitoring program may be extended for an additional year.

Temperature flow monitors will be installed at the inlets and outlets of the cooling trenches, as well as Carp Creek upstream and downstream of the proposed SWM Facilities. The Carp Creek temperature monitors will be positioned at the upstream end of the proposed culvert crossings at Albert Boyd Private and Wingover Private. The temperature monitoring locations are identified in **Figure 5**.

The cooling trenches have been sized to treat runoff volumes associated with the ultimate development of the East and West Residential Communities. The discharge temperatures will be monitored following Phase 1 development, and runoff volumes will be considerably lower than the values used in the design calculations. The monitoring program should provide sufficient data to determine whether additional thermal treatment will be required.

In the event that the temperature monitoring program indicates that discharge temperatures are not meeting the requirement of 25°C into Carp Creek, options for improving the performance of the cooling trenches will be developed. There is sufficient space in the existing pond blocks to substantially increase the size of the cooling trenches. Another option would be to lower the temperature of the cooling trench using groundwater, either through the use of a heat exchanger or by mixing cool groundwater with the warm water stored in the trench.

7.0 WATER BALANCE

Water balance calculations have been completed to estimate the impacts of development on the hydrologic cycle and estimate the performance of the proposed infiltration BMPs. Water balance calculations were completed for both the East and West Residential Communities based on pre and post-development conditions (full build-out). Supporting calculations are provided in **Appendix H**.

7.1 West Residential Community

Under pre-development conditions, where the land use includes pasture/meadow and woodlands, the annual infiltration rate is estimated to be approximately 232mm. Under post-development conditions the annual infiltration rate will be reduced to approximately 154mm, while runoff volumes will increase substantially.

- Annual infiltration will decrease by approximately 34%.
- Runoff volumes will increase by approximately 120%.

There is limited opportunity to implement infiltration BMPs in the predominantly urban West Residential Development. To offset the reduction in annual infiltration, BMPs for the East Residential Community will be designed to provide a net increase in annual infiltration.

7.2 East Residential Community

Under pre-development conditions, where the land use includes woodlands, the annual infiltration rate is estimated to be approximately 250mm. Without the use of infiltration BMPs, the average annual infiltration rate would decrease to an estimated value of 190 mm.

7.2.1 Infiltration Trenches

To offset the potential reduction in annual infiltration for both the East and West Residential Communities, a series of “French drain” style infiltration trenches will be installed underneath the ditches of Taxiway E1, Street 11 (Tailslide Private), Taxiway E2, Street 12, Taxiway E3, Street 13, and Taxiway E. This represents a total length of 6,600m with a contributing drainage area of 31.1ha.

The proposed infiltration trenches (0.4m x 0.4m, 40% void ratio) will store and infiltrate the first 1.36mm of runoff of every storm event from a contributing area of 31.1ha within the East Residential Community. Using daily climate records obtained from the Ottawa CDA Environment Canada weather station for the past five years (2008 – 2012), it is estimated that the infiltration trenches will provide an infiltration capacity equivalent to 19% of the annual rainfall volume over the contributing drainage area.

Technical Notes

Technical Note 2.105

Re: Outflow from Perforated Pipe

Date: January 2004 (Published May, 2004)

Introduction

In order to provide guidance to the engineering community in designing drainage or recharge systems, ADS has conducted theoretical computations using an orifice equation. It should be emphasized that ADS conducted these calculations using ADS standard perforation patterns, and that the values are based on free outlet (no backfill) through the perforations. Infiltration is assumed to be equal to the calculated exfiltration rate.

When designing storm water drainage or recharge systems, the goal in mind is to calculate the amount of storm water which can escape the pipe and replenish the ground water. Although some may believe that the controlling parameter is the free outflow from the perforated pipe, this is not often the case. A perforated pipe can only discharge water at a rate at which the surrounding soil will accept it.

Procedure

The goal is to calculate the free outflow from the perforations in a pipe. Knowing the perforation hole diameter and hole pattern, a simple orifice equation can be used to calculate the flow rate in cubic feet per second.

Orifice equation

$$Q_P = C_d A\sqrt{2gH}$$

Where

Q_P = free out fall flow rate through one perforation (ft^3/sec)
C_d = Coefficient of discharge = 0.60
A = Cross sectional area of one perforation (ft^2)
g = Gravimetric constant = 32.2 ft/sec^2
H = Height of water above perforation, head (ft)

Having the orifice equation, the location of the perforations with respect to the invert of the pipe and the size of perforations, the free outflow at any elevation in the pipe can be calculated. To calculate the amount of flow per foot of pipe, or unit length, simply multiply the free outflow in one valley by the number of valleys per foot of pipe.

With the above procedure, we can calculate the free outflow at any given elevation provided the perforation orientation is known. Looking at a typical curve inside a pipe cross section, (Chart 1.) the curve is somewhat jumpy and not uniform throughout the pipe cross section. As the water head increases, however, the curve becomes more uniform and looks much more like a curve produced from using the orifice equation, Chart 2. The non-uniform part of the curve is due to the additional perforations holes at higher elevations inside the pipe cross-section, producing what can be characterized as hydraulic jumps.

When designing a pipe in typical storm sewer design, the pipe is assumed to be flowing full. For the purposes of this technical note, charts have been provided showing the relationship between free outflow and water head elevation when the pipe is full. Placed on these charts is a second order polynomial which best describes the data. This polynomial may be used to estimate the free outfall at various head elevations.

The designer should keep in mind that, for some applications and some pipe sizes, the free outfall from the pipe perforations may be larger than the flow rate of the pipe itself and thus the pipe may not flow full. This, however, will only exist in applications where the water is purely in a free outflow state and is not inhibited by the surrounding soil.

The determining factor for recharge systems is the surrounding soil's ability to accept water, not the pipe's ability to deliver water. Although the perforations in the pipe determine the allowable area at which water can be released, it is the soil's ability to accept the water that is the determining factor in designing recharge systems. This can best be described with the following example:

Example

A 12" diameter drainage pipe is used to recharge the ground water table through very permeable backfill envelope (coefficient of permeability, K = 1,000 m/d = 0.0375 ft/s). The ground water table is 3 feet below the pipe. The 12" diameter pipe has a total of 36 - 0.375" diameter holes per foot of pipe (area at which water enters the backfill envelop, A = 0.0276 ft^2/foot of pipe). Assume the pipe is full; determine the outfall rate of storm water through the pipe alone, (no backfill) and the acceptance rate of the soil envelope.

A) The outfall rate of the 12" pipe has been determined using the aforementioned procedure for determining the free outflow of a perforated pipe. $Q_{\text{pipe free}} = 0.086\ ft^3/s/ft = 38.7$ gpm./foot of pipe.

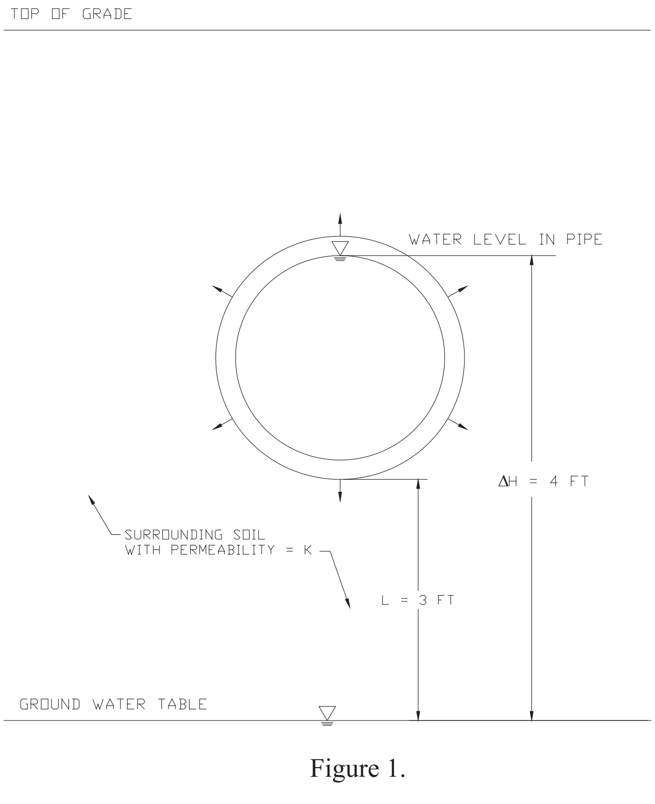


Figure 1.

B).Using Darcy’s Law one can solve for the flow through the soil.

$$Q_s = KiA$$

Where, Q = Flow rate through soil, ft^3/s

K = The permeability of the soil = 0.0375 ft/s

i = Hydraulic gradient ($\Delta H/L$), ft/ft

A = Area (sum of the areas from the perforations) = 0.0276 ft^2

$$Q_s = 0.0375 \frac{ft}{s} \text{ x } \frac{4 \text{ ft}}{3 \text{ ft}} \text{ x } 0.0276 \text{ ft}^2 = 0.0014 \frac{ft^3}{s} \text{ per foot of soil along the pipe}$$

Or

$$Q_s = 0.63 \ \frac{\text{gallons}}{\text{min.}} \text{ per foot of soil along the pipe}, \ Q_s << Q_P$$

As the example shows, the flow rate through the soil is much less than the flow rate through the pipe perforations. Although the area at which water can reach the soil is determined by the pipe perforations, the surrounding soil determines the flow rate through the soil. When designing drainage or recharge systems, one should reference the minimum inlet areas listed in ADS Product Note 3.106, AASHTO M294, or contact the pipe manufacturer for a detailed explanation of its pipe’s perforation pattern.

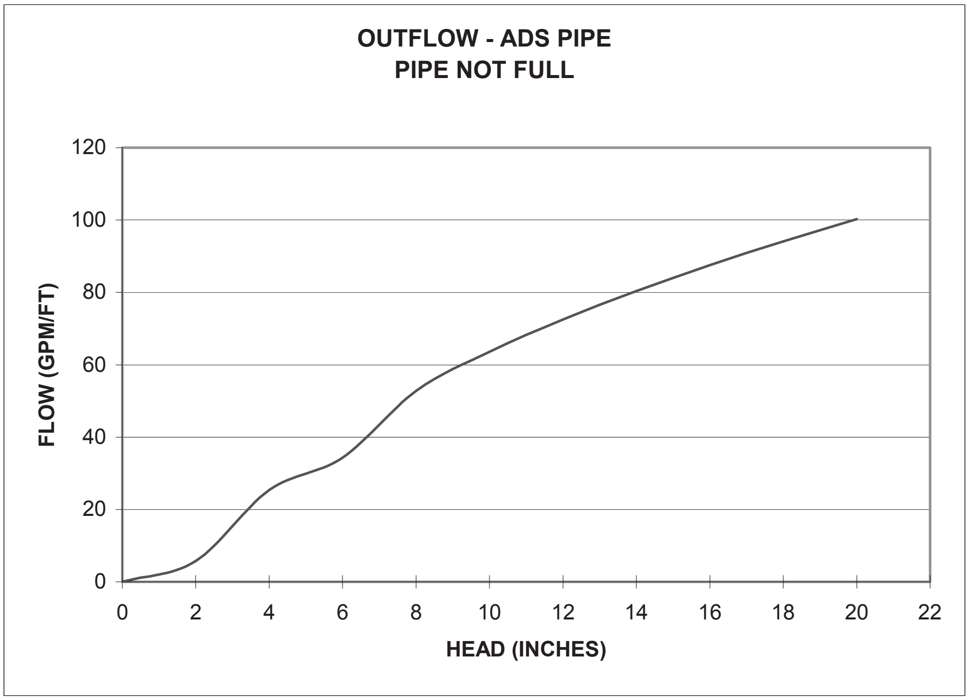


Chart 1.

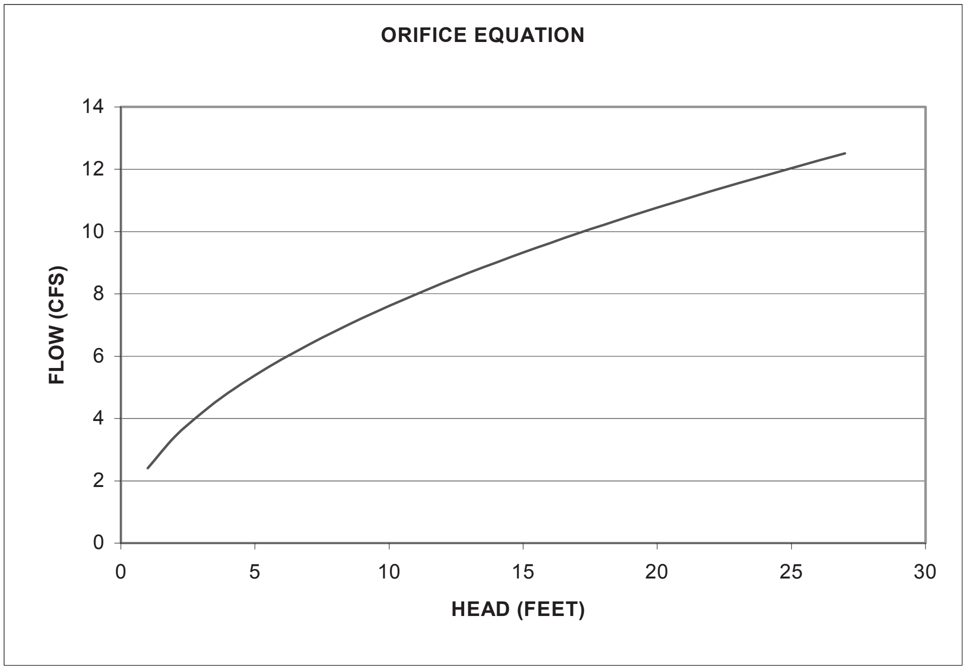
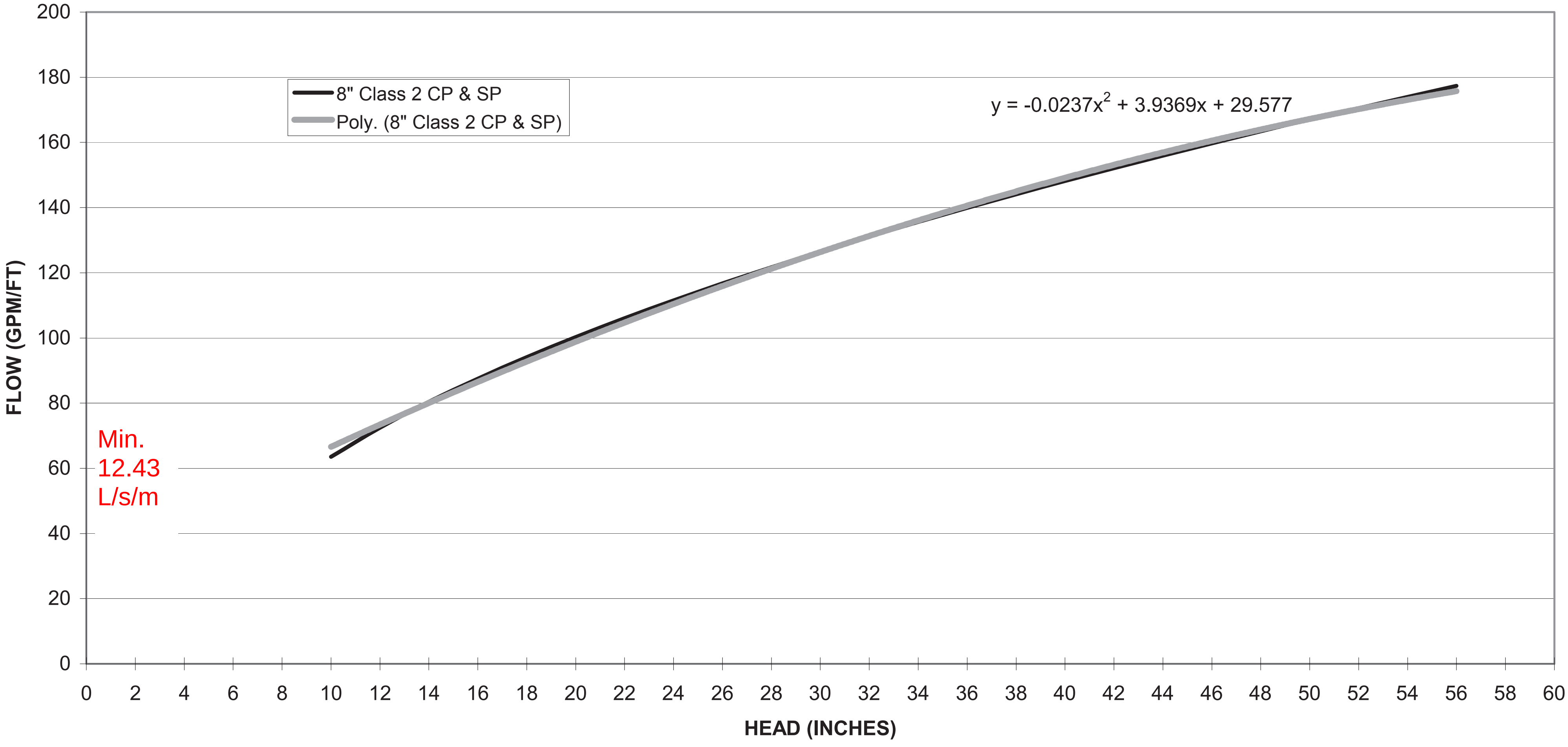

ORIFICE EQUATION
FLOW (CFS)
HEAD (FEET)
0
2
4
6
8
10
12
14
0
5
10
15
20
25
30

Chart 2.

Inlet Flow Rate = 150 L/s
Head = 0.3 m
Min. Length of Perforated Pipe (Multiplied by 1.5 to Account for Clogging)
= 150 L/s / 12.43 L/s/m x 1.5 = 18 m

OUTFLOW - ADS PIPE
8" CLASS II TYPE SP AND CP
FULL FLOW



West Capital Airpark
East Residential Community: Cooling Trench Design

ASSUMPTIONS

General:

1) Provide cooling of runoff from the first 5mm of rainfall for a given storm event
2) First 5mm of runoff at inlet to cooling trench has been heated to 35°C.
3) Runoff subsequent to first 5mm is below target temperature (25°C) and does not require temperature mitigation
4) Runoff volume to be treated calculated using SWMHYMO, based on 5mm storm event.
5) Cooling trench will always be filled with standing water (clay soil, below invert of Carp Creek / water table)
6) Heat transfer to stone occurs rapidly, approaching equilibrium (average) temperature at outlet
7) Groundwater (pumped) is used to reduce temperature in trench following precipitation event

Initial Conditions:

8) Max. initial temperature in cooling trench of 15°C.
9) Temperature of cooling trench regulated by introducing groundwater (5°C) if required.
10) The number of iterations used in the heat transfer calculations is based on the ratio of runoff volume / trench volume

Runoff Volume (5mm event) = *107* *m^3*
Cooling trench volume = *82* *m^3*
# of turnovers in trench = *1.3*
# of interations in heat transfer calculations = *2*

Heat Transfer Calculations:

11) Heat transfer between water and stone is based on total heat capacity (Joules) using volume of water and stone in the trench.
12) For each iteration (turnover volume), it is assumed that water flowing into the trench mixes fully with the water in the trench resulting in an average water temperature throughout the trench.
13) The water in the trench then transfers heat to the stone in the trench, reaching an equilibrium temperature prior to discharging to Carp Creek. The validity of this assumtion is checked by comparing the thermal time constant for heat transfer beetween the water and stone to the travel time from the inlet to the outlet.
14) The next iteration (turnover volume) uses the outlet temperature from the previous iteration as the starting temperature in the heat transfer calculation.
15) Assume negligible heat transfer to soil during storm event.

East SWMF

Cooling Trench Dimensions

Length	250	m
Width	3	m
Depth	0.3	m
Volume (Total)	225	m^3
Packing Space (p_s)	63.75%	
Volume of Stone	143	m^3
Void Space (Volume of Water)	82	m^3

Physical & Heat Transfer Properties	Stone	Water	Clay
Density (ρ) - kg/m^3	2,360	994	1,680
Heat Capacity (C_p) - $J\cdot kg^{-1}\cdot°C^{-1}$	908	4,178	920

Total Heat Capacity in Trench (Stone+Water)	Stone	Water	Total
Volume (m^3)	143	82	225
Mass (kg)	338,500	81,081	419,581
Heat Capacity (Q) - J·°C	307,358,000	338,757,600	-
kJ·°C	**307,000**	**339,000**	**646,000**

Ratio of heat capacity (Stone / Water) = 1.10

Assuming that there is sufficient time for the water and stone approach an equilibrium temperature, for every 1°C that the water is cooled, the temperature of the stone will increase by 1.1°C.

Check assumption (Travel time vs. thermal time constant)

Travel Time (Flow Length / Velocity)		
Cross-Sectional Flow Area	0.326	m
Average Flow Velocity	0.023	m/s
Peak Flow Velocity	0.184	m/s
Flow Length	250	m
Travel Time (Peak Flow)=	***0.38***	***hrs***
Travel Time (Average)=	***3.05***	***hrs***

Thermal Time Constant (Water-->Stone)	$\tau_{water\text{-}stone}$ =	ρ Cp V / (h As)
Stone Density (ρ)	2,360	kg/m3
Thermal Conductivity (k_{stone})	1.295	W/(m°C)
Surface Heat Transfer Coefficient (h)	40	$W/(m^2\,°C)$
Avg. Stone Diameter (D_{50})	0.050	m
Avg. Stone surface area (A_s)	0.008	m^2
Avg. Stone Volume (V)	0.00007	m^3
τ_{Stone} =	**446**	***sec***
τ_{Stone} =	**0.12**	**hrs**

The thermal time constant (0.12 hrs) represents the time to transfer approximately 63.2% of the heat from the water to the stone under transient conditions, following an exponential decay curve.

The travel time through the stone trench at peak flow (0.38 hrs) is approximately 3x the thermal time constant. The average travel time (3.05 hrs) is approximately 25x the thermal time constant. Based on the proposed trench dimensions and stone size, it is reasonable to assume that the water and stone will reach an equilibrium temperature at the outlet of the cooling trench.

HEAT TRANSFER CALCULATIONS (5mm EVENT)

Peak Flow =	60	L/s
Runoff Volume =	107	m^3
Event Duration =	4	hrs
Average Flowrate =	7	L/s
Storage Volume in Cooling Trench =	82	m^3
# of Volume Turnovers in Cooling Trench =	0.0	
Initial Temperature in Trench =	15.0	°C

First Turnover (82 m^3)

Inlet Water Temperature	35 °C	
Temperature of Water in Trench	15.0 °C	
Average Water Temperature (after mixing / before heat transfer to stone)	**25 °C**	
Heat Transfer (Water to Stone)	**Stone**	**Water**
Initial Temperature	15.0 °C	25 °C
Net Change	5.2 °C	-4.8 °C
Equilibrium Temperature at outlet (after 1 turnover)	**20.2 °C**	**20.2 °C**

Remainder (25 m^3)

Inlet Water Temperature	35 °C	*25 m^3*
Temperature of Water in Trench	20.2 °C	*56 m^3*
Average Water Temperature (after mixing / before heat transfer to stone)	**24.8 °C**	
Heat Transfer (Water to Stone)	**Stone**	**Water**
Initial Temperature	20.2 °C	24.8 °C
Net Change	2.4 °C	-2.2 °C
Equilibrium Temperature at outlet (after 5mm event)	**22.7 °C**	**22.7 °C**

The temperature in the cooling trench will increase from 15 °C at the start of the storm event to 22.7°C after cooling 5mm of runoff. (Assuming a constant inflow temperature of 35 °C). The net increase in heat energy in the trench can be calculated as follows:

Increase in Heat = [Heat Capacity (Stone) + Heat Capacity (Water)] x Increase in Temperature
= (307,000 kJ/°C + 339,000 kJ/ °C) x (22.7°C - 15°C)
= 4,949,710 kJ

The cooling trench will be monitored using temperature monitoring devices at the inlet, midpoint and outlet maintenance structures. Temperature monitoring will also take place both upstream and downstream of the SWM facility outlets within Carp Creek. If monitoring indicates that the performance of the cooling trench is not meeting the requirements set out by the Carp River Watershed / Subwatershed Study for Aquatic Habitat (Table 8.2.2) for areas identified as a cold water fish habitat, options for modification and/or expansion of the cooling trench design will be developed.

West Capital Airpark
West Residential Community: Cooling Trench Design

ASSUMPTIONS

General:

1) Provide cooling of runoff from the first 5mm of rainfall for a given storm event.
2) First 5mm of runoff at inlet to cooling trench has been heated to 35°C.
3) Runoff subsequent to first 5mm is below target temperature (25°C) and does not require temperature mitigation
4) Runoff volume to be treated calculated using SWMHYMO, based on 5mm storm event
5) Cooling trench will always be filled with standing water (clay soil, below invert of Carp Creek / water table)
6) Heat transfer to stone occurs rapidly, approaching equilibrium (average) temperature at outlet.
7) Groundwater (pumped) is used to reduce temperature in trench following precipitation event.

Initial Conditions:

8) Max. initial temperature in cooling trench of 15°C.
9) Temperature of cooling trench regulated by introducing groundwater (5°C) if required.
10) The number of iterations used in the heat transfer calculations is based on the ratio of runoff volume / trench volume

Runoff Volume (5mm event) =	*172*	*m^3*
Cooling trench volume =	*81*	*m^3*
# of turnovers in trench =	*2.1*	
# of interations in heat transfer calculations =	*3*	

Heat Transfer Calculations:

11) Heat transfer between water and stone is based on total heat capacity (Joules) using volume of water and stone in the trench
12) For each iteration (turnover volume), it is assumed that water flowing into the trench mixes fully with the water in the trench resulting in an average water temperature throughout the trench
13) The water in the trench then transfers heat to the stone in the trench, reaching an equilibrium temperature prior t discharging to Carp Creek. The validity of this assumtion is checked by comparing the thermal time constant for heat transfer between the water and stone to the travel time from the inlet to the outlet
14) The next iteration (turnover volume) uses the outlet temperature from the previous iteration as the starting temperature in the heat transfer calculation.
15) Assume negligible heat transfer to soil during storm event.

West SWMF

Cooling Trench Dimensions

Length	186	m
Width	4	m
Depth	0.3	m
Volume (Total)	223	m^3
Packing Space (p_s)	63.75%	
Volume of Stone	142	m^3
Void Space (Volume of Water)	81	m^3

Physical & Heat Transfer Properties	**Stone**	**Water**	**Clay**
Density (ρ) - kg/m^3	2,360	994	1,680
Heat Capacity (C_p) - J·kg^{-1}°C^{-1}	908	4,178	920

Total Heat Capacity in Trench (Stone+Water)	**Stone**	**Water**	**Total**
Volume (m^3)	142	81	223
Mass (kg)	335,800	80,433	416,233
Heat Capacity (Q) - J·°C	304,906,400	336,047,500	-
kJ·°C	**305,000**	**336,000**	**641,000**

Ratio of heat capacity (Stone / Water) = 1.10

Assuming that there is sufficient time for the water and stone approach an equilibrium temperature, for every 1°C that the water is cooled, the temperature of the stone will increase by 1.1°C.

Check assumption (Travel time vs. thermal time constant)

Travel Time (Flow Length / Velocity)		
Cross-Sectional Flow Area	0.435	m
Average Flow Velocity	0.027	m/s
Peak Flow Velocity	0.223	m/s
Flow Length	186	m
Travel Time (Peak Flow)=	***0.23***	***hrs***
Travel Time (Average)=	***1.88***	***hrs***

Thermal Time Constant (Water-->Stone)	$\tau_{water\text{-}stone} = \rho\ Cp\ V / (h\ As)$	
Stone Density (ρ)	2,360	kg/m3
Thermal Conductivity (k_{stone})	1.295	W/(m°C)
Surface Heat Transfer Coefficient (h)	40	W/(m^2 °C)
Avg. Stone Diameter (D_{50})	0.050	m
Avg. Stone surface area (A_s)	0.008	m^2
Avg. Stone Volume (V)	0.00007	m^3
τ_{Stone} =	**446**	***sec***
τ_{Stone} =	**0.12**	**hrs**

The thermal time constant (0.12 hrs) represents the time to transfer approximately 63.2% of the heat from the water to the stone under transient conditions, following an exponential decay curve.

The travel time through the stone trench at peak flow (0.23 hrs) is approximately 2x the thermal time constant. The average travel time (1.88 hrs) is approximately 15x the thermal time constant. Based on the proposed trench dimensions and stone size, it is reasonable to assume that the water and stone will reach an equilibrium temperature at the outlet of the cooling trench.

HEAT TRANSFER CALCULATIONS (5mm EVENT)

Peak Flow =	97	L/s
Runoff Volume =	172	m^3
Event Duration =	4	hrs
Average Flowrate =	12	L/s
Storage Volume in Cooling Trench =	81	m^3
# of Volume Turnovers in Cooling Trench =	2.1	
Initial Temperature in Trench =	15.0	°C

First Turnover (81 m^3)

Inlet Water Temperature	35 °C	
Temperature of Water in Trench	15.0 °C	
Average Water Temperature (after mixing / before heat transfer to stone)	**25 °C**	
Heat Transfer (Water to Stone)	**Stone**	**Water**
Initial Temperature	15.0 °C	25 °C
Net Change	5.2 °C	-4.8 °C
Equilibrium Temperature at outlet (after 81m^3 / 1 turnover)	**20.2 °C**	**20.2 °C**

Second Turnover (81 m^3)

Inlet Water Temperature	35 °C	
Temperature of Water in Trench	20.2 °C	
Average Water Temperature (after mixing / before heat transfer to stone)	**27.6 °C**	
Heat Transfer (Water to Stone)	**Stone**	**Water**
Initial Temperature	20.2 °C	27.6 °C
Net Change	3.9 °C	-3.5 °C
Equilibrium Temperature at outlet (after 162m^3 / 2 turnovers)	**24.1 °C**	**24.1 °C**

Remainder (10 m^3)

Inlet Water Temperature	30 °C	*10 m^3*
Temperature of Water in Trench	24.1 °C	*71 m^3*
Average Water Temperature (after mixing / before heat transfer to stone)	**24.8 °C**	
Heat Transfer (Water to Stone)	**Stone**	**Water**
Initial Temperature	24.1 °C	24.8 °C
Net Change	0.4 °C	-0.3 °C
Equilibrium Temperature at outlet (after 5mm Event)	**24.5 °C**	**24.5 °C**

The temperature in the cooling trench will increase from 15 °C at the start of the storm event to 24.5°C after cooling 5mm of runoff. (Assuming a constant inflow temperature of 35 °C). The net increase in heat energy in the trench can be calculated as follows:

Increase in Heat = [Heat Capacity (Stone) + Heat Capacity (Water)] x Increase in Temperature
= (305,000 kJ/°C + 336,000 kJ/ °C) x (24.5°C - 15°C)
= 6,083,711 kJ

The cooling trench will be monitored using temperature monitoring devices at the inlet, midpoint and outlet maintenance structures. Temperature monitoring will also take place both upstream and downstream of the SWM facility outlets within Carp Creek. If monitoring indicates that the performance of the cooling trench is not meeting the requirements set out by the Carp River Watershed / Subwatershed Study for Aquatic Habitat (Table 8.2.2) for areas identified as a cold water fish habitat, options for modification and/or expansion of the cooling trench design will be developed.

```
2     Metric units
*#****************************************************************************
*#  Project Name: [Carp Airport]     Project Number: [102085]
*#  Date          : 08-04-2011
*#  Modeller      : [R. Langlois]
*#  Company       : NOVATECH ENGINEERING CONSULTANTS LTD
*#  License #     :  5320763
*#****************************************************************************
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
                     C25mm-4.stm
*%------------------|-------------------------------------------------------|
READ STORM           STORM_FILENAME=["STORM.001"]
*%------------------|-------------------------------------------------------|
DEFAULT VALUES       ICASEdef=[1],  read and print values
                     DEFVAL_FILENAME=["OTTAWA.DEF"]
*%------------------|-------------------------------------------------------|
*PRE-DEVELOPMENT CONDITIONS FOR EAST RESIDENTIAL DEVELOPMENT
*%------------------|-------------------------------------------------------|
DESIGN NASHYD        ID=[1], NHYD=["A-1"], DT=[5]min, AREA=[40.6](ha),
                     DWF=[0](cms), CN/C=[63], TP=[.78]hrs,
                     END=-1
*%------------------|-------------------------------------------------------|
DESIGN NASHYD        ID=[2], NHYD=["A-2"], DT=[5]min, AREA=[5.4](ha),
                     DWF=[0](cms), CN/C=[55], TP=[.22]hrs,
                     END=-1
*TOTAL FLOW INTO CARP CREEK
*%------------------|-------------------------------------------------------|
ADD HYD              IDsum=[3], NHYD=["TOTCRK"], IDs to add=[1,2]
*%------------------|-------------------------------------------------------|
DESIGN NASHYD        ID=[2], NHYD=["E-1"], DT=[5]min, AREA=[12.24](ha),
                     DWF=[0](cms), CN/C=[55], TP=[1.02]hrs,
                     END=-1
*%------------------|-------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
                     C2-4.stm
*%------------------|-------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
                     C5-4.stm
*%------------------|-------------------------------------------------------|
*START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*                     C10-3.stm
*%------------------|-------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
                     C100-4.stm
*%------------------|-------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
                     S2-12.stm
*%------------------|-------------------------------------------------------|
*START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
*                     S2-24.stm
*%------------------|-------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[8]
                     S5-12.stm
*%------------------|-------------------------------------------------------|
*START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[9]
*                     S5-24.stm
*%------------------|-------------------------------------------------------|
*START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[10]
*                     S10-12.stm
*%------------------|-------------------------------------------------------|
*START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[11]
*                     S10-24.stm
*%------------------|-------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[12]
                     S100-12.stm
*%------------------|-------------------------------------------------------|
*START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[13]
*                     S100-24.stm
*%------------------|-------------------------------------------------------|
FINISH
```

```
2     Metric units
*#*************************************************************************
*#  Project Name: [Carp Airport]    Project Number: [102085]
*#  Date          : 05-03-2013
*#  Modeller      : [R. Langlois & K.Banks]
*#  Company       : NOVATECH ENGINEERING CONSULTANTS LTD
*#  License #     :  5320763
*#*************************************************************************
START                   TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
                        C25mm-4.stm
*%-----------------|-------------------------------------------------------|
READ STORM              STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------|
DEFAULT VALUES          ICASEdef=[1],  read and print values
                        DEFVAL_FILENAME=["OTTAWA.DEF"]
*%-----------------|-------------------------------------------------------|
*MODEL 1 OF 2: POST-DEVELOPMENT CONDITIONS FOR EAST RESIDENTIAL DEVELOPMENT
*HANGER LOTS AND POND DESIGN
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[1], NHYD=["B1"], DT=[1]min, AREA=[0.533](ha),
                        XIMP=[.01], TIMP=[0.30], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.46](%), END=-1
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["B2"], DT=[1]min, AREA=[1.19](ha),
                        XIMP=[.01], TIMP=[0.252], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.46](%), END=-1
*%-----------------|-------------------------------------------------------|
*FLOW OUTLETTING DIRECTLY INTO CARP CREEK ON THE WEST SIDE OF THE DEVELOPMENT
*%-----------------|-------------------------------------------------------|
ADD HYD                 IDsum=[10], NHYD=["FLW2CRK"], IDs to add=[1,2]
*%-----------------|-------------------------------------------------------|
*%-----------------|-------------------------------------------------------|
*FLOW OUTLETTING OVERLAND INTO CREEK SOUTH OF THE SITE
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[9], NHYD=["B11"], DT=[1]min, AREA=[0.770](ha),
                        XIMP=[.01], TIMP=[0.332], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.46](%), END=-1
*%-----------------|-------------------------------------------------------|
*TOTAL FLOW TO CREEK DIRECTLY FROM SITE
*%-----------------|-------------------------------------------------------|
ADD HYD                 IDsum=[1], NHYD=["TFLW2CRK"], IDs to add=[9,10]
*%-----------------|-------------------------------------------------------|
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["B10-W"], DT=[1]min, AREA=[1.93](ha),
                        XIMP=[.01], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.15](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[3],   NHYD=["STO.B10W"},  IDin=[2],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                               [  0.000, 0.0000]
                                      [  0.058, 0.0048]
                                      [  0.101, 0.0082]
                                      [  0.156, 0.0159]
                                      [  0.174, 0.0204]
                                      [  0.276, 0.0400]
                                      [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[10], NHYDovf=["OVFB10W"]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["B9-E"], DT=[1]min, AREA=[2.57](ha),
                        XIMP=[.01], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.20](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[4],   NHYD=["STO.B9E"],  IDin=[2],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                      [  0.000, 0.0000]
                                      [  0.100, 0.0040]
                                      [  0.161, 0.0080]
                                      [  0.256, 0.0162]
                                      [  0.293, 0.0211]
                                      [  0.406, 0.0460]
                                      [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[9], NHYDovf=["OVFB9E"]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["B9-W"], DT=[1]min, AREA=[1.17](ha),
                        XIMP=[.01], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.20](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[5],   NHYD=["STO.B9W"],  IDin=[2],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                      [  0.000, 0.0000]
                                      [  0.046, 0.0018]
                                      [  0.073, 0.0036]
                                      [  0.116, 0.0074]
                                      [  0.133, 0.0096]
                                      [  0.185, 0.0210]
                                      [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[8], NHYDovf=["OVFB9W"]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["COM1-E"], DT=[1]min, AREA=[0.80](ha),
                        XIMP=[.01], TIMP=[0.70], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.6](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[6],   NHYD=["STO.COM1E"],  IDin=[2],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                      [  0.000, 0.0000]
                                      [  0.024, 0.0020]
                                      [  0.042, 0.0034]
                                      [  0.065, 0.0066]
                                      [  0.072, 0.0084]
                                      [  0.114, 0.0195]
                                      [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[7], NHYDovf=["OVFCOM1E"]
*%-----------------|-------------------------------------------------------|
ADD HYD                 IDsum=[2], NHYD=["FLW"], IDs to add=[3,4,5,6,7,8,9,10]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[3], NHYD=["B8-E"], DT=[1]min, AREA=[1.81](ha),
                        XIMP=[.01], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.52](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[4],   NHYD=["STO.B8E"],  IDin=[3],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                      [  0.000, 0.0000]
                                      [  0.055, 0.0045]
                                      [  0.095, 0.0077]
                                      [  0.146, 0.0149]
                                      [  0.164, 0.0191]
                                      [  0.259, 0.0390]
                                      [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[10], NHYDovf=["OVFB8E"]
*%-----------------|-------------------------------------------------------|
*TOTAL FLOW GOING INTO CULVERT CROSSING AT TAXIWAY ECHO THREE
*%-----------------|-------------------------------------------------------|
ADD HYD                 IDsum=[3], NHYD=["CULV3"], IDs to add=[2,4,10]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["B8-W"], DT=[1]min, AREA=[1.91](ha),
                        XIMP=[.01], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.52](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[4],   NHYD=["STO.B8W"],  IDin=[2],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                      [  0.000, 0.0000]
                                      [  0.058, 0.0047]
                                      [  0.100, 0.0082]
                                      [  0.154, 0.0158]
                                      [  0.173, 0.0202]
                                      [  0.273, 0.0410]
                                      [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[10], NHYDovf=["OVFB8W"]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["B7E/12"], DT=[1]min, AREA=[5.00](ha),
                        XIMP=[.01], TIMP=[0.46], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.30](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[5],   NHYD=["STO.B7E,12"],  IDin=[2],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                      [  0.000, 0.0000]
                                      [  0.195, 0.0078]
                                      [  0.313, 0.0155]
                                      [  0.498, 0.0315]
                                      [  0.570, 0.0411]
                                      [  0.790, 0.0896]
                                      [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[9], NHYDovf=["OVFB7E"]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["B7-W"], DT=[1]min, AREA=[1.07](ha),
                        XIMP=[.01], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.42](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[6],   NHYD=["STO.B7W"],  IDin=[2],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                      [  0.000, 0.0000]
                                      [  0.042, 0.0017]
                                      [  0.067, 0.0033]
                                      [  0.106, 0.0067]
                                      [  0.122, 0.0088]
                                      [  0.169, 0.0192]
                                      [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[8], NHYDovf=["OVFB7W"]
*%-----------------|-------------------------------------------------------|
ADD HYD                 IDsum=[7], NHYD=["FLW2"], IDs to add=[4,5,6,8,9,10]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["B6-E"], DT=[1]min, AREA=[1.75](ha),
                        XIMP=[.01], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.47](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[4],   NHYD=["STO.B6E"],  IDin=[2],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                      [  0.000, 0.0000]
                                      [  0.053, 0.0043]
                                      [  0.092, 0.0075]
                                      [  0.141, 0.0144]
                                      [  0.158, 0.0185]
                                      [  0.250, 0.0365]
                                      [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[10], NHYDovf=["OVFB6E"]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["COM1W"], DT=[1]min, AREA=[1.92](ha),
                        XIMP=[.01], TIMP=[0.65], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.52](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[5],   NHYD=["STO.COM1W"],  IDin=[2],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                      [  0.000, 0.0000]
                                      [  0.058, 0.0047]
                                      [  0.101, 0.0082]
                                      [  0.155, 0.0158]
                                      [  0.174, 0.0203]
                                      [  0.275, 0.0435]
                                      [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[9], NHYDovf=["OVFCOM1W"]
*%-----------------|-------------------------------------------------------|
*TOTAL FLOW GOING INTO CULVERT CROSSING AT TAXIWAY ECHO TWO
*%-----------------|-------------------------------------------------------|
ADD HYD                 IDsum=[6], NHYD=["CULV2"], IDs to add=[4,5,7,9,10]
*%-----------------|-------------------------------------------------------|
*TOTAL FLOW THROUGH TAXIWAY ECHO ONE CULVERT SOUTH TO NORTH
*%-----------------|-------------------------------------------------------|
ADD HYD                 IDsum=[9], NHYD=["CULV+TX1"], IDs to add=[3,6]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["B6-W"], DT=[1]min, AREA=[0.91](ha),
                        XIMP=[.01], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.47](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[4],   NHYD=["STO.B6W"],  IDin=[2],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                      [  0.000, 0.0000]
                                      [  0.028, 0.0022]
                                      [  0.048, 0.0039]
                                      [  0.073, 0.0075]
                                      [  0.082, 0.0096]
                                      [  0.130, 0.0200]
                                      [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[10], NHYDovf=["OVFB6W"]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["B5-E"], DT=[1]min, AREA=[3.76](ha),
                        XIMP=[.01], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.46](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[5],   NHYD=["STO.B5E"],  IDin=[2],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                      [  0.000, 0.0000]
                                      [  0.147, 0.0059]
                                      [  0.236, 0.0117]
                                      [  0.374, 0.0237]
                                      [  0.429, 0.0309]
                                      [  0.594, 0.0674]
                                      [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[], NHYDovf=["OVFB5E"]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD         ID=[2], NHYD=["B5-W"], DT=[1]min, AREA=[1.28](ha),
                        XIMP=[.01], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[0.50](%), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR         IDout=[7],   NHYD=["STO.B5W"],  IDin=[2],
                        RDT=[1](min),
                               TABLE of ( OUTFLOW-STORAGE ) values
```

```
                                          (cms) - (ha-m)
                                        [  0.000, 0.0000]
                                        [  0.050, 0.0020]
                                        [  0.080, 0.0040]
                                        [  0.127, 0.0081]
                                        [  0.146, 0.0105]
                                        [  0.202, 0.0229]
                                        [   -1  ,  -1   ]  (max twenty pts)
                              IDovf=[8], NHYDovf=["OVFB5W"]
*%-----------------|-----------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["FLW3"], IDs to add=[4,5,7,8,10]
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD     ID=[4], NHYD=["B4-E"], DT=[1]min, AREA=[2.64](ha),
                    XIMP=[.01], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[0.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
ROUTE RESERVOIR     IDout=[5],   NHYD=["STO.B4E"],  IDin=[4],
                    RDT=[1](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                        [  0.000, 0.0000]
                                        [  0.080, 0.0065]
                                        [  0.139, 0.0113]
                                        [  0.213, 0.0218]
                                        [  0.239, 0.0279]
                                        [  0.378, 0.0547]
                                        [   -1  ,  -1   ]  (max twenty pts)
                              IDovf=[10], NHYDovf=["OVFB4E"]
*%-----------------|-----------------------------------------------------------|
*TOTAL FLOW THROUGH PRIVATE TAXIWAY ECHO ONE CULVERT CROSSING
*%-----------------|-----------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=["CULV1"], IDs to add=[2,5,10]
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD     ID=[2], NHYD=["B4-W"], DT=[1]min, AREA=[3.21](ha),
                    XIMP=[.01], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[0.63](%), END=-1
*%-----------------|-----------------------------------------------------------|
ROUTE RESERVOIR     IDout=[5],   NHYD=["STO.B4W"],  IDin=[2],
                    RDT=[1](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                        [  0.000, 0.0000]
                                        [  0.097, 0.0079]
                                        [  0.169, 0.0137]
                                        [  0.259, 0.0265]
                                        [  0.290, 0.0339]
                                        [  0.459, 0.0682]
                                        [   -1  ,  -1   ]  (max twenty pts)
                              IDovf=[10], NHYDovf=["OVFB4W"]
*%-----------------|-----------------------------------------------------------|
READ HYD            ID=[2],  NHYD=["Maj3"],
                    HYD_FILENAME=["H-B-03Maj"]
*%-----------------|-----------------------------------------------------------|
READ HYD            ID=[3],  NHYD=["min3"],
                    HYD_FILENAME=["H-B-03min"]
*%-----------------|-----------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=["B3MAJMIN"], IDs to add=[2,3]
*%-----------------|-----------------------------------------------------------|
DESIGN NASHYD       ID=[7], NHYD=["SWMF2"], DT=[1]min, AREA=[4.06](ha),
                    DWF=[0](cms), CN/C=[70], TP=[0.17]hrs,
                    END=-1
*%-----------------|-----------------------------------------------------------|
*TOTAL FLOW ENTERING DRY POND
*%-----------------|-----------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["TOTPND"], IDs to add=[8,4,5,7,9,10]
*%-----------------|-----------------------------------------------------------|
*COMPUTE VOLUME      ID=[2], STRATE=[-100](cms), RELRATE=[0.184](cms)
*%-----------------|-----------------------------------------------------------|
*COMPUTE VOLUME      ID=[2], STRATE=[-100](cms), RELRATE=[0.347](cms)
*%-----------------|-----------------------------------------------------------|
*COMPUTE VOLUME      ID=[2], STRATE=[-100](cms), RELRATE=[0.651](cms)
*%-----------------|-----------------------------------------------------------|
*COMPUTE VOLUME      ID=[2], STRATE=[-100](cms), RELRATE=[1.721](cms)
*%-----------------|-----------------------------------------------------------|
ROUTE RESERVOIR     IDout=[5],   NHYD=["SWMF2"],  IDin=[2],
                    RDT=[1](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                     [       0.000   ,        0.0000  ]
                     [       0.000   ,        0.0036  ]
                     [       0.025   ,        0.0073  ]
                     [       0.143   ,        0.2152  ]
                     [       0.202   ,        0.4131  ]
                     [       0.246   ,        0.6143  ]
                     [       0.283   ,        0.8170  ]
                     [       0.385   ,        1.1330  ]
                     [       0.803   ,        1.4694  ]
                     [       1.120   ,        1.6667  ]
                     [       1.401   ,        1.8262  ]
                     [ -1        ,    -1             ]  (max twenty pts)
                              IDovf=[6], NHYDovf=["OVF"]
*%-----------------------------------------------------------------------------
*TOTAL FLOW ENTERING CARP CREEK
*%-----------------|-----------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["TOTCRK"], IDs to add=[1,5,6]
*%-----------------|-----------------------------------------------------------|
SAVE HYD            ID=[2],   # OF PCYCLES=[1],  ICASEsh=[1]
                    HYD_COMMENT=["B-2"]
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD     ID=[1], NHYD=["B10-E"], DT=[1]min, AREA=[1.32](ha),
                    XIMP=[.01], TIMP=[.122], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[0.39](%), END=-1
*%-----------------|-----------------------------------------------------------|
ROUTE RESERVOIR     IDout=[3],   NHYD=["STO.B10E"],  IDin=[1],
                    RDT=[1](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                          (cms) - (ha-m)
                                        [  0.000, 0.0000]
                                        [  0.040, 0.0033]
                                        [  0.069, 0.0056]
                                        [  0.107, 0.0109]
                                        [  0.119, 0.0139]
                                        [  0.189, 0.0274]
                                        [   -1  ,  -1   ]  (max twenty pts)
                              IDovf=[10], NHYDovf=["OVFB10E"]
*%-----------------|-----------------------------------------------------------|
DESIGN NASHYD       ID=[1], NHYD=["B-EX01"], DT=[1]min, AREA=[11.0](ha),
                    DWF=[0](cms), CN/C=[70], TP=[1.02]hrs,
                    END=-1
*%-----------------|-----------------------------------------------------------|
*TOTAL FLOW INTO CULVERT CROSSING TO NORTH SIDE OF TAXIWAY ECHO
*%-----------------|-----------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=["CULV+"], IDs to add=[1,3,10]
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
                    C2-4.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
                    C5-4.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
                    C10-4.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
                    C100-4.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
                    C100-6.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
                    S2-12.stm
*%-----------------|-----------------------------------------------------------|
*START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[8]
*                    S2-24.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[9]
                    S5-12.stm
*%-----------------|-----------------------------------------------------------|
*START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[10]
*                    S5-24.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[11]
                    S10-12.stm
*%-----------------|-----------------------------------------------------------|
*START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[12]
*                    S10-24.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[13]
                    S100-12.stm
*%-----------------|-----------------------------------------------------------|
*START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[14]
*                    S100-24.stm
*%-----------------|-----------------------------------------------------------|
FINISH
```

```
2      Metric units
*#*************************************************************************
*#  Project Name:  [Carp Airport]     Project Number:  [102085]
*#  Date           05-03-2013
*#  Modeller       [R.S.ARCHER/R.LANGLOIS]
*#  Company        NOVATECH ENGINEERING CONSULTANTS LTD
*#  License #      5320763
*#*************************************************************************
START                   TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[1]
                        C25mm-4.stm
*%-----------------|---------------------------------------------------------|
READ STORM              STORM_FILENAME=["STORM.001"]
*%-----------------|---------------------------------------------------------|
DEFAULT VALUES          ICASEdef=[1],  read and print values
                        DEFVAL_FILENAME=["OTTAWA.DEF"]
*%-----------------|---------------------------------------------------------|
*MODEL 2 OF 2: POST-DEVELOPMENT CONDITIONS FOR EAST RESIDENTIAL DEVELOPMENT
*#STREETS NINE AND TEN
*%-----------------|---------------------------------------------------------|
DESIGN STANDHYD         ID=[1], NHYD=["B3-01"], DT=[1]min, AREA=[0.38](ha),
                        XIMP=[0.376], TIMP=[0.47], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[2.0](%), END=-1 AAA
*%-----------------|---------------------------------------------------------|
ROUTE RESERVOIR         IDout=[4],    NHYD=["R-01"],  IDin=[1],
                        RDT=[1](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms)        -        (ha-m)
                                    [  0.000    ,       0.0000  ]
                                    [  0.040    ,       0.0001  ]
                                    [  0.042    ,       0.0019  ]
                                    [  0.046    ,       0.0027  ]
                                    [  0.052    ,       0.0031  ]
                                    [  0.064    ,       0.0035  ]
                                    [  0.082    ,       0.0039  ]
                                    [  0.105    ,       0.0043  ]
                                    [  0.136    ,       0.0047  ]
                                    [  0.172    ,       0.0051  ]
                                    [  0.223    ,       0.0054  ]
                                    [  0.275    ,       0.0058  ]
                                    [   -1          ,     -1     ](max twenty pts)
                                       IDovf=[10], NHYDovf=["NO"]
*%-----------------|---------------------------------------------------------|
DIVERT HYD              IDin=[4], NIDout=[2]max five,
                        outflow hydrographs (ID, NHYD)=[2,"MAJ-01"/3,"min-01"]
                        flow distribution table: (modify as necessary)
                        Note: all flows are in (cms)
                                 QIDi   +      QIDii =       QTOTAL
                             [    0.000   +      0        =       0         ]
                             [    0.000   +      0.04     =       0.040     ]
                             [    0.000   +      0.042    =       0.042     ]
                             [    0.004   +      0.042    =       0.046     ]
                             [    0.010   +      0.042    =       0.052     ]
                             [    0.022   +      0.042    =       0.064     ]
                             [    0.039   +      0.043    =       0.082     ]
                             [    0.062   +      0.043    =       0.105     ]
                             [    0.093   +      0.043    =       0.136     ]
                             [    0.129   +      0.043    =       0.172     ]
                             [    0.180   +      0.043    =       0.223     ]
                             [    0.232   +      0.043    =       0.275     ]       end
*%-----------------|---------------------------------------------------------|
PRINT HYD               ID=[3],    # OF PCYCLES=[1]
*%-----------------|---------------------------------------------------------|
SHIFT HYD               IDout=[5], NHYD=["SHmn01"], IDin=[3], TLAG=[2](min)
*%-----------------|---------------------------------------------------------|
DESIGN STANDHYD         ID=[1], NHYD=["B3-04"], DT=[1]min, AREA=[0.740](ha),
                        XIMP=[0.475], TIMP=[0.593], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[2.0](%), END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD                 IDsum=[6], NHYD=["SUM-04"], IDs to add=[1,2]
*%-----------------|---------------------------------------------------------|
ROUTE RESERVOIR         IDout=[4],    NHYD=["R-04"],  IDin=[6],
                        RDT=[1](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms)        -        (ha-m)
                                    [  0.000    ,       0.0000  ]
                                    [  0.078    ,       0.0001  ]
                                    [  0.084    ,       0.0032  ]
                                    [  0.088    ,       0.0044  ]
                                    [  0.095    ,       0.0049  ]
                                    [  0.107    ,       0.0055  ]
                                    (  0.124    ,       0.0060  ]
                                    [  0.147    ,       0.0066  ]
                                    [  0.179    ,       0.0072  ]
                                    [  0.215    ,       0.0077  ]
                                    [  0.266    ,       0.0083  ]
                                    [  0.318    ,       0.0088  ]
                                    [  -1            , -1              ] (max twenty pts)
                                      IDovf=[10], NHYDovf=["NO"]
*%-----------------|---------------------------------------------------------|
DIVERT HYD              IDin=[4], NIDout=[2]max five,
                        outflow hydrographs (ID, NHYD)=[7,"MAJ-04"/8,"min-04"]
                        flow distribution table: (modify as necessary)
                        Note: all flows are in (cms)
                                 QIDi   +      QIDii =       QTOTAL
                             [    0.000   +      0        =       0         ]
                             [    0.000   +      0.078    =       0.078     ]
                             [    0.000   +      0.084    =       0.084     ]
                             [    0.004   +      0.084    =       0.088     ]
                             [    0.010   +      0.085    =       0.095     ]
                             [    0.022   +      0.085    =       0.107     ]
                             [    0.039   +      0.085    =       0.124     ]
                             [    0.062   +      0.085    =       0.147     ]
                             [    0.093   +      0.086    =       0.179     ]
                             [    0.129   +      0.086    =       0.215     ]
                             [    0.180   +      0.086    =       0.266     ]
                             [    0.232   +      0.086    =       0.318     ]       end
*%-----------------|---------------------------------------------------------|
PRINT HYD               ID=[8],    # OF PCYCLES=[1]
*%-----------------|---------------------------------------------------------|
DESIGN STANDHYD         ID=[1], NHYD=["B3-03"], DT=[1]min, AREA=[0.310](ha),
                        XIMP=[0.32], TIMP=[0.40], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[2.0](%), END=-1
*%-----------------|---------------------------------------------------------|
COMPUTE DUALHYD         IDin=[1], CINLET=[0.033](cms), NINLET=[1],
                        MAJID=[2], MajNHYD=["MAJ-03"],
                        MINID=[3], MinNHYD=["min-03"],
                        TMJSTO=[0](cu-m)
*%-----------------|---------------------------------------------------------|
ADD HYD                 IDsum=[4], NHYD=["sumn04"], IDs to add=[3,5,8]
*%-----------------|---------------------------------------------------------|
SHIFT HYD               IDout=[8], NHYD=["SHmn04"], IDin=[4], TLAG=[1](min)
*%-----------------|---------------------------------------------------------|
DESIGN STANDHYD         ID=[1], NHYD=["B3-02"], DT=[1]min, AREA=[0.390](ha),
                        XIMP=[0.576], TIMP=[0.72], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[2.0](%), END=-1
*%-----------------|---------------------------------------------------------|
ROUTE RESERVOIR         IDout=[5],    NHYD=["R-02"],  IDin=[1],
                        RDT=[1](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms)        -        (ha-m)
                                    [ 0.000              ,       0.0000  ]
                                    [ 0.078    ,       0.0001  ]
                                    [ 0.084    ,       0.0038  ]
                                    [ 0.089    ,       0.0051  ]
                                    [ 0.095    ,       0.0057  ]
```

```
                                    [     0.107    ,       0.0063  ]
                                    [     0.124    ,       0.0069  ]
                                    [     0.148    ,       0.0075  ]
                                    [     0.179    ,       0.0081  ]
                                    [     0.215    ,       0.0088  ]
                                    [     0.266    ,       0.0094  ]
                                    [     0.319    ,       0.0100  ]
                                    [     -1            ,    -1          ](max twenty pts)
                                       IDovf=[10], NHYDovf=["NO"]
*%-----------------|---------------------------------------------------------|
DIVERT HYD              IDin=[5], NIDout=[2]max five,
                        outflow hydrographs (ID, NHYD)=[3,"MAJ-02"/4,"min-02"]
                        flow distribution table: (modify as necessary)
                        Note: all flows are in (cms)
                                 QIDi   +      QIDii =       QTOTAL
                             [        0.000   +      0        =       0         ]
                             [        0.000   +      0.057    =       0.057     ]
                             [        0.000   +      0.062    =       0.062     ]
                             [        0.004   +      0.062    =       0.066     ]
                             [        0.010   +      0.062    =       0.072     ]
                             [        0.022   +      0.062    =       0.084     ]
                             [        0.039   +      0.063    =       0.102     ]
                             [        0.062   +      0.063    =       0.125     ]
                             [        0.093   +      0.063    =       0.156     ]
                             [        0.129   +      0.063    =       0.192     ]
                             [        0.180   +      0.063    =       0.243     ]
                             [        0.232   +      0.064    =       0.296     ]       end
*%-----------------|---------------------------------------------------------|
PRINT HYD               ID=[4],    # OF PCYCLES=[1]
*%-----------------|---------------------------------------------------------|
SHIFT HYD               IDout=[6], NHYD=["SHmn02"], IDin=[4], TLAG=[2](min)
*%-----------------|---------------------------------------------------------|
DESIGN STANDHYD         ID=[1], NHYD=["B3-05"], DT=[1]min, AREA=[0.300](ha),
                        XIMP=[0.40], TIMP=[0.50], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[2.0](%), END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD                 IDsum=[4], NHYD=["SUM-05"], IDs to add=[1,2,3]
*%-----------------|---------------------------------------------------------|
ROUTE RESERVOIR         IDout=[3],    NHYD=["RMaj05"],  IDin=[4],
                        RDT=[1](min),
                              TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms)        -        (ha-m)
                                    [     0.000    ,       0.0000  ]
                                    [     0.040    ,       0.0001  ]
                                    [     0.042    ,       0.0029  ]
                                    [     0.046    ,       0.0039  ]
                                    [     0.052    ,       0.0044  ]
                                    [     0.065    ,       0.0049  ]
                                    [     0.082    ,       0.0055  ]
                                    [     0.105    ,       0.0060  ]
                                    [     0.136    ,       0.0065  ]
                                    [     0.172    ,       0.0070  ]
                                    [     0.222    ,       0.0075  ]
                                    [     0.273    ,       0.0080  ]
                                    [   -1              ,             -1          ](max twenty pts)
                                      IDovf=[1], NHYDovf=["NO"]
*%-----------------|---------------------------------------------------------|
DIVERT HYD              IDin=[3], NIDout=[2]max five,
                        outflow hydrographs (ID, NHYD)=[1,"MAJ-05"/2,"min-05"]
                        flow distribution table: (modify as necessary)
                        Note: all flows are in (cms)
                                 QIDi   +      QIDii =       QTOTAL
                             [        0.000   +      0        =       0         ]
                             [        0.000   +      0.04     =       0.040     ]
                             [        0.000   +      0.042    =       0.042     ]
                             [        0.004   +      0.042    =       0.046     ]
                             [        0.010   +      0.042    =       0.052     ]
                             [        0.022   +      0.043    =       0.065     ]
                             [        0.039   +      0.043    =       0.082     ]
                             [        0.062   +      0.043    =       0.105     ]
                             [        0.093   +      0.043    =       0.136     ]
                             [        0.129   +      0.043    =       0.172     ]
                             [        0.179   +      0.043    =       0.222     ]
                             [        0.230   +      0.043    =       0.273     ]       end
*%-----------------|---------------------------------------------------------|
PRINT HYD               ID=[2],    # OF PCYCLES=[1]
*%-----------------|---------------------------------------------------------|
ADD HYD                 IDsum=[9], NHYD=["SMaj05"], IDs to add=[1,7]
*%-----------------|---------------------------------------------------------|
*ROUTE CHANNEL           IDout=[9], NHYD=["RSMj05"], IDin=[10],
*                        RDT=[1](min),
*                        CHLGTH=[98](m),         CHSLOPE=[0.50](%),
*                                                FPSLOPE=[0.50](%),
*                        SECNUM=[101],           NSEG=[3]
*                        ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSE
*                        ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
*                                                       [ 5.5 , 99.86]
*                                                       [ 5.6 , 99.81]
*                                                       [ 9.0 , 99.91]
*                                                       [12.5 , 99.81]
*                                                       [12.6 , 99.86]
*                                                       [20.0 , 100.0]
*%-----------------|---------------------------------------------------------|
ADD HYD                 IDsum=[7], NHYD=["Smin05"], IDs to add=[2,6]
*%-----------------|---------------------------------------------------------|
SHIFT HYD               IDout=[6], NHYD=["SHmi05"], IDin=[7], TLAG=[1](min)
*%-----------------|---------------------------------------------------------|
ADD HYD                 IDsum=[7], NHYD=["MH-209"], IDs to add=[6,8]
*%-----------------|---------------------------------------------------------|
SHIFT HYD               IDout=[10], NHYD=["SH-209"], IDin=[7], TLAG=[1](min)
*%-----------------|---------------------------------------------------------|
DESIGN STANDHYD         ID=[1], NHYD=["B3-06"], DT=[1]min, AREA=[0.210](ha),
                        XIMP=[0.368], TIMP=[0.46], DWF=[0](cms),  LOSS=[1],
                        SLOPE=[2.0](%), END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD                 IDsum=[2], NHYD=["SUM-06"], IDs to add=[1,9]
*%-----------------|---------------------------------------------------------|
DIVERT HYD              IDin=[2], NIDout=[2]max five,
                        outflow hydrographs (ID, NHYD)=[4,"min-06"/3,"Maj-06"]
                        flow distribution table: (modify as necessary)
                        Note: all flows are in (cms)
                        [ QIDi         +        QIDii    =        QTOTAL  ]
                        [ 0.00000      +        0.00000 =         0.00000 ]
                        [ 0.01400      +        0.01000 =         0.02400 ]
                        [ 0.02000      +        0.01100 =         0.03100 ]
                        [ 0.02600      +        0.01400 =         0.04000 ]
                        [ 0.03700      +        0.02400 =         0.06100 ]
                        [ 0.05500      +        0.04500 =         0.10000 ]
                        [ 0.07700      +        0.06300 =         0.14000 ]
                        [ 0.08400      +        0.08600 =         0.17000 ]
                        [ 0.09500      +        0.11500 =         0.21000 ]end
*%-----------------|---------------------------------------------------------|
COMPUTE DUALHYD         IDin=[4], CINLET=[0.0230](cms), NINLET=[1],
                        MAJID=[5], MajNHYD=["MAJ-06"],
                        MINID=[6], MinNHYD=["min-06"],
                        TMJSTO=[0](cu-m)
*%-----------------|---------------------------------------------------------|
ADD HYD                 IDsum=[7], NHYD=["SMaj06"], IDs to add=[3,5]
*%-----------------|---------------------------------------------------------|
ROUTE CHANNEL           IDout=[9], NHYD=["RSMj06"], IDin=[7],
                        RDT=[1](min),
                        CHLGTH=[110](m),        CHSLOPE=[0.50](%),
                                                FPSLOPE=[0.50](%),
                        SECNUM=[101],           NSEG=[3]
                        ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
```

```
00271>                     ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
00272>                                                    [ 5.5 , 99.86]
00273>                                                    [ 5.6 , 99.81]
00274>                                                    [ 9.0 , 99.91]
00275>                                                    [12.5 , 99.81]
00276>                                                    [12.6 , 99.86]
00277>                                                    [20.0 , 100.0]
00278> *%-----------------|----------------------------------------------------------|
00279> ADD HYD             IDsum=[7], NHYD=["smin-06"], IDs to add=[6,10]
00280> *%-----------------|----------------------------------------------------------|
00281> SHIFT HYD           IDout=[10], NHYD=["SHmn06"], IDin=[7], TLAG=[1](min)
00282> *%-----------------|----------------------------------------------------------|
00283> DESIGN STANDHYD     ID=[1], NHYD=["B3-07"], DT=[1]min, AREA=[1.080](ha),
00284>                     XIMP=[0.343], TIMP=[0.428], DWF=[0](cms),  LOSS=[1],
00285>                     SLOPE=[2.0](%), END=-1
00286> *%-----------------|----------------------------------------------------------|
00287> ADD HYD             IDsum=[2], NHYD=["SUM-07"], IDs to add=[1,9]
00288> *%-----------------|----------------------------------------------------------|
00289> ROUTE RESERVOIR     IDout=[1],   NHYD=["R-07"],  IDin=[2],
00290>                     RDT=[1](min),
00291>                           TABLE of ( OUTFLOW-STORAGE ) values
00292>                                    (cms)      -      (ha-m)
00293>                                  [ 0.000    ,      0.0000  ]
00294>                                  [ 0.078    ,      0.0001  ]
00295>                                  [ 0.085    ,      0.0072  ]
00296>                                  [ 0.089    ,      0.0091  ]
00297>                                  [ 0.096    ,      0.0101  ]
00298>                                  [ 0.108    ,      0.0110  ]
00299>                                  [ 0.125    ,      0.0120  ]
00300>                                  [ 0.148    ,      0.0130  ]
00301>                                  [ 0.180    ,      0.0139  ]
00302>                                  [ 0.216    ,      0.0149  ]
00303>                                  [ 0.267    ,      0.0159  ]
00304>                                  [ 0.320    ,      0.0168  ]
00305>                                  [   -1              ,          -1     ](max twenty pts
00306>                                   IDovf=[9], NHYDovf=["NO"]
00307> *%-----------------|----------------------------------------------------------|
00308> DIVERT HYD          IDin=[1], NIDout=[2]max five,
00309>                     outflow hydrographs (ID, NHYD)=[2,"MAJ-07"/3,"min-07"]
00310>                     flow distribution table: (modify as necessary)
00311>                     Note: all flows are in (cms)
00312>                              QIDi  +       QIDii =      QTOTAL
00313>                          [    0.000   +       0       =       0         ]
00314>                          [    0.000   +     0.078     =     0.078       ]
00315>                          [    0.000   +     0.085     =     0.085       ]
00316>                          [    0.004   +     0.085     =     0.089       ]
00317>                          [    0.010   +     0.086     =     0.096       ]
00318>                          [    0.022   +     0.086     =     0.108       ]
00319>                          [    0.039   +     0.086     =     0.125       ]
00320>                          [    0.062   +     0.086     =     0.148       ]
00321>                          [    0.093   +     0.087     =     0.180       ]
00322>                          [    0.129   +     0.087     =     0.216       ]
00323>                          [    0.180   +     0.087     =     0.267       ]
00324>                          [    0.232   +     0.088     =     0.320       ]      end
00325> *%-----------------|----------------------------------------------------------|
00326> PRINT HYD           ID=[3],   # OF PCYCLES=[1]
00327> *%-----------------|----------------------------------------------------------|
00328> ADD HYD             IDsum=[8], NHYD=["smin07"], IDs to add=[3,10]
00329> *%-----------------|----------------------------------------------------------|
00330> SHIFT HYD           IDout=[10], NHYD=["SHmn07"], IDin=[8], TLAG=[1](min)
00331> *%-----------------|----------------------------------------------------------|
00332> ROUTE CHANNEL       IDout=[9], NHYD=["R-Mj07"], IDin=[2],
00333>                     RDT=[1](min),
00334>                     CHLGTH=[49](m),      CHSLOPE=[0.50](%),
00335>                                           FPSLOPE=[0.50](%),
00336>                     SECNUM=[101],         NSEG=[3]
00337>                     ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
00338>                     ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
00339>                                                    [ 5.5 , 99.86]
00340>                                                    [ 5.6 , 99.81]
00341>                                                    [ 9.0 , 99.91]
00342>                                                    [12.5 , 99.81]
00343>                                                    [12.6 , 99.86]
00344>                                                    [20.0 , 100.0]
00345> *%-----------------|----------------------------------------------------------|
00346> DESIGN STANDHYD     ID=[1], NHYD=["B3-08"], DT=[1]min, AREA=[0.186](ha),
00347>                     XIMP=[0.464], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
00348>                     SLOPE=[2.0](%), END=-1
00349> *%-----------------|----------------------------------------------------------|
00350> ADD HYD             IDsum=[2], NHYD=["SUM-08"], IDs to add=[1,9]
00351> *%-----------------|----------------------------------------------------------|
00352> DIVERT HYD          IDin=[2], NIDout=[2]max five,
00353>                     outflow hydrographs (ID, NHYD)=[4,"min-08"/3,"Maj-08"]
00354>                     flow distribution table: (modify as necessary)
00355>                     Note: all flows are in (cms)
00356>                     [ QIDi           +         QIDii   =        QTOTAL  ]
00357>                     [ 0.00000        +         0.00000 =        0.00000 ]
00358>                     [ 0.01400        +         0.01000 =        0.02400 ]
00359>                     [ 0.02000        +         0.01100 =        0.03100 ]
00360>                     [ 0.02600        +         0.01400 =        0.04000 ]
00361>                     [ 0.03700        +         0.02400 =        0.06100 ]
00362>                     [ 0.05500        +         0.04500 =        0.10000 ]
00363>                     [ 0.07700        +         0.06300 =        0.14000 ]
00364>                     [ 0.08400        +         0.08600 =        0.17000 ]
00365>                     [ 0.09500        +         0.11500 =        0.21000 ]end
00366> *%-----------------|----------------------------------------------------------|
00367> COMPUTE DUALHYD     IDin=[4], CINLET=[0.022](cms), NINLET=[1],
00368>                     MAJID=[5], MajNHYD=["MAJ-08"],
00369>                     MINID=[6], MinNHYD=["min-08"],
00370>                     TMJSTO=[0](cu-m)
00371> *%-----------------|----------------------------------------------------------|
00372> ADD HYD             IDsum=[4], NHYD=["SMaj08"], IDs to add=[3,5]
00373> *%-----------------|----------------------------------------------------------|
00374> ROUTE CHANNEL       IDout=[9], NHYD=["RSMj08"], IDin=[4],
00375>                     RDT=[1](min),
00376>                     CHLGTH=[43](m),       CHSLOPE=[0.50](%),
00377>                                           FPSLOPE=[0.50](%),
00378>                     SECNUM=[101],         NSEG=[3]
00379>                     ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
00380>                     ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
00381>                                                    [ 5.5 , 99.86]
00382>                                                    [ 5.6 , 99.81]
00383>                                                    [ 9.0 , 99.91]
00384>                                                    [12.5 , 99.81]
00385>                                                    [12.6 , 99.86]
00386>                                                    [20.0 , 100.0]
00387> *%-----------------|----------------------------------------------------------|
00388> ADD HYD             IDsum=[8], NHYD=["Smin08"], IDs to add=[6,10]
00389> *%-----------------|----------------------------------------------------------|
00390> SHIFT HYD           IDout=[10], NHYD=["SHmn08"], IDin=[8], TLAG=[1](min)
00391> *%-----------------|----------------------------------------------------------|
00392> DESIGN STANDHYD     ID=[1], NHYD=["B3-09"], DT=[1]min, AREA=[0.246](ha),
00393>                     XIMP=[0.352], TIMP=[0.44], DWF=[0](cms),  LOSS=[1],
00394>                     SLOPE=[2.0](%), END=-1
00395> *%-----------------|----------------------------------------------------------|
00396> DIVERT HYD          IDin=[1], NIDout=[2]max five,
00397>                     outflow hydrographs (ID, NHYD)=[3,"min-09"/2,"Maj-09"]
00398>                     flow distribution table: (modify as necessary)
00399>                     Note: all flows are in (cms)
00400>                     [ QIDi           +         QIDii   =        QTOTAL  ]
00401>                     [ 0.00000        +         0.00000 =        0.00000 ]
00402>                     [ 0.01400        +         0.01000 =        0.02400 ]
00403>                     [ 0.02000        +         0.01100 =        0.03100 ]
00404>                     [ 0.02600        +         0.01400 =        0.04000 ]
00405>                     [ 0.03700        +         0.02400 =        0.06100 ]
```

```
00406>                     [ 0.05500    +       0.04500 =       0.10000 ]
00407>                     [ 0.07700    +       0.06300 =       0.14000 ]
00408>                     [ 0.08400    +       0.08600 =       0.17000 ]
00409>                     [ 0.09500    +       0.11500 =       0.21000 ]end
00410> *%-----------------|----------------------------------------------------------|
00411> COMPUTE DUALHYD     IDin=[3], CINLET=[0.022](cms), NINLET=[1],
00412>                     MAJID=[4], MajNHYD=["MAJ-09"],
00413>                     MINID=[5], MinNHYD=["min-09"],
00414>                     TMJSTO=[0](cu-m)
00415> *%-----------------|----------------------------------------------------------|
00416> ADD HYD             IDsum=[3], NHYD=["SUM-09"], IDs to add=[2,4]
00417> *%-----------------|----------------------------------------------------------|
00418> ROUTE CHANNEL       IDout=[7], NHYD=["RSMj09"], IDin=[3],
00419>                     RDT=[1](min),
00420>                     CHLGTH=[69](m),       CHSLOPE=[0.50](%),
00421>                                           FPSLOPE=[0.50](%),
00422>                     SECNUM=[101],         NSEG=[3]
00423>                     ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
00424>                     ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
00425>                                                    [ 5.5 , 99.86]
00426>                                                    [ 5.6 , 99.81]
00427>                                                    [ 9.0 , 99.91]
00428>                                                    [12.5 , 99.81]
00429>                                                    [12.6 , 99.86]
00430>                                                    [20.0 , 100.0]
00431> *%-----------------|----------------------------------------------------------|
00432> SHIFT HYD           IDout=[8], NHYD=["SHmn09"], IDin=[5], TLAG=[1](min)
00433> *%-----------------|----------------------------------------------------------|
00434> DESIGN STANDHYD     ID=[1], NHYD=["B3-11"], DT=[1]min, AREA=[0.273](ha),
00435>                     XIMP=[0.264], TIMP=[0.33], DWF=[0](cms),  LOSS=[1],
00436>                     SLOPE=[2.0](%), END=-1
00437> *%-----------------|----------------------------------------------------------|
00438> ADD HYD             IDsum=[2], NHYD=["SUM-11"], IDs to add=[1,7,9]
00439> *%-----------------|----------------------------------------------------------|
00440> DIVERT HYD          IDin=[2], NIDout=[2]max five,
00441>                     outflow hydrographs (ID, NHYD)=[4,"min-11"/3,"Maj-11"]
00442>                     flow distribution table: (modify as necessary)
00443>                     Note: all flows are in (cms)
00444>                     [ QIDi       +       QIDii   =       QTOTAL  ]
00445>                     [ 0.00000    +       0.00000 =       0.00000 ]
00446>                     [ 0.01400    +       0.01000 =       0.02400 ]
00447>                     [ 0.02000    +       0.01100 =       0.03100 ]
00448>                     [ 0.02600    +       0.01400 =       0.04000 ]
00449>                     [ 0.03700    +       0.02400 =       0.06100 ]
00450>                     [ 0.05500    +       0.04500 =       0.10000 ]
00451>                     [ 0.07700    +       0.06300 =       0.14000 ]
00452>                     [ 0.08400    +       0.08600 =       0.17000 ]
00453>                     [ 0.09500    +       0.11500 =       0.21000 ]end
00454> *%-----------------|----------------------------------------------------------|
00455> COMPUTE DUALHYD     IDin=[4], CINLET=[0.022](cms), NINLET=[1],
00456>                     MAJID=[5], MajNHYD=["MAJ-11"],
00457>                     MINID=[6], MinNHYD=["min-11"],
00458>                     TMJSTO=[0](cu-m)
00459> *%-----------------|----------------------------------------------------------|
00460> ADD HYD             IDsum=[4], NHYD=["SMaj11"], IDs to add=[3,5]
00461> *%-----------------|----------------------------------------------------------|
00462> ROUTE CHANNEL       IDout=[7], NHYD=["RSMj11"], IDin=[4],
00463>                     RDT=[1](min),
00464>                     CHLGTH=[44](m),       CHSLOPE=[0.50](%),
00465>                                           FPSLOPE=[0.50](%),
00466>                     SECNUM=[101],         NSEG=[3]
00467>                     ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
00468>                     ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
00469>                                                    [ 5.5 , 99.86]
00470>                                                    [ 5.6 , 99.81]
00471>                                                    [ 9.0 , 99.91]
00472>                                                    [12.5 , 99.81]
00473>                                                    [12.6 , 99.86]
00474>                                                    [20.0 , 100.0]
00475> *%-----------------|----------------------------------------------------------|
00476> ADD HYD             IDsum=[9], NHYD=["Smin11"], IDs to add=[6,8,10]
00477> *%-----------------|----------------------------------------------------------|
00478> SHIFT HYD           IDout=[8], NHYD=["SHmn11"], IDin=[9], TLAG=[1](min)
00479> *%-----------------|----------------------------------------------------------|
00480> DESIGN STANDHYD     ID=[1], NHYD=["B3-10"], DT=[1]min, AREA=[0.398](ha),
00481>                     XIMP=[0.374], TIMP=[0.467], DWF=[0](cms),  LOSS=[1],
00482>                     SLOPE=[2.0](%), END=-1
00483> *%-----------------|----------------------------------------------------------|
00484> ADD HYD             IDsum=[2], NHYD=["SUM-10"], IDs to add=[1,7]
00485> *%-----------------|----------------------------------------------------------|
00486> DIVERT HYD          IDin=[2], NIDout=[2]max five,
00487>                     outflow hydrographs (ID, NHYD)=[4,"min-10"/3,"Maj-10"]
00488>                     flow distribution table: (modify as necessary)
00489>                     Note: all flows are in (cms)
00490>                     [ QIDi       +       QIDii   =       QTOTAL  ]
00491>                     [ 0.00000    +       0.00000 =       0.00000 ]
00492>                     [ 0.01400    +       0.01000 =       0.02400 ]
00493>                     [ 0.02000    +       0.01100 =       0.03100 ]
00494>                     [ 0.02600    +       0.01400 =       0.04000 ]
00495>                     [ 0.03700    +       0.02400 =       0.06100 ]
00496>                     [ 0.05500    +       0.04500 =       0.10000 ]
00497>                     [ 0.07700    +       0.06300 =       0.14000 ]
00498>                     [ 0.08400    +       0.08600 =       0.17000 ]
00499>                     [ 0.09500    +       0.11500 =       0.21000 ]end
00500> *%-----------------|----------------------------------------------------------|
00501> COMPUTE DUALHYD     IDin=[4], CINLET=[0.022](cms), NINLET=[1],
00502>                     MAJID=[5], MajNHYD=["MAJ-10"],
00503>                     MINID=[6], MinNHYD=["min-10"],
00504>                     TMJSTO=[0](cu-m)
00505> *%-----------------|----------------------------------------------------------|
00506> ADD HYD             IDsum=[4], NHYD=["SMaj10"], IDs to add=[3,5]
00507> *%-----------------|----------------------------------------------------------|
00508> ROUTE CHANNEL       IDout=[9], NHYD=["RSMj10"], IDin=[4],
00509>                     RDT=[1](min),
00510>                     CHLGTH=[48](m),       CHSLOPE=[0.50](%),
00511>                                           FPSLOPE=[0.50](%),
00512>                     SECNUM=[101],         NSEG=[3]
00513>                     ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
00514>                     ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
00515>                                                    [ 5.5 , 99.86]
00516>                                                    [ 5.6 , 99.81]
00517>                                                    [ 9.0 , 99.91]
00518>                                                    [12.5 , 99.81]
00519>                                                    [12.6 , 99.86]
00520>                                                    [20.0 , 100.0]
00521> *%-----------------|----------------------------------------------------------|
00522> ADD HYD             IDsum=[10], NHYD=["Summ10"], IDs to add=[6,8]
00523> *%-----------------|----------------------------------------------------------|
00524> DESIGN STANDHYD     ID=[1], NHYD=["B3-12"], DT=[1]min, AREA=[0.267](ha),
00525>                     XIMP=[0.454], TIMP=[0.567], DWF=[0](cms),  LOSS=[1],
00526>                     SLOPE=[2.0](%), END=-1
00527> *%-----------------|----------------------------------------------------------|
00528> ADD HYD             IDsum=[2], NHYD=["SUM-12"], IDs to add=[1,9]
00529> *%-----------------|----------------------------------------------------------|
00530> DIVERT HYD          IDin=[2], NIDout=[2]max five,
00531>                     outflow hydrographs (ID, NHYD)=[4,"min-12"/3,"Maj-12"]
00532>                     flow distribution table: (modify as necessary)
00533>                     Note: all flows are in (cms)
00534>                     [ QIDi       +       QIDii   =       QTOTAL  ]
00535>                     [ 0.00000    +       0.00000 =       0.00000 ]
00536>                     [ 0.01400    +       0.01000 =       0.02400 ]
00537>                     [ 0.02000    +       0.01100 =       0.03100 ]
00538>                     [ 0.02600    +       0.01400 =       0.04000 ]
00539>                     [ 0.03700    +       0.02400 =       0.06100 ]
00540>                     [ 0.05500    +       0.04500 =       0.10000 ]
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                    [ 0.07700        +        0.06300 =        0.14000 ]
                    [ 0.08400        +        0.08600 =        0.17000 ]
                    [ 0.09500        +        0.11500 =        0.21000 ]end
*%-----------------|--------------------------------------------------------------|
COMPUTE DUALHYD     IDin=[4], CINLET=[0.022](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=["MAJ-12"],
                    MINID=[6], MinNHYD=["min-12"],
                    TMJSTO=[0](cu-m)
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=["SMaj12"], IDs to add=[3,5]
*%-----------------|--------------------------------------------------------------|
ROUTE CHANNEL       IDout=[9], NHYD=["RSMj12"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[51](m),        CHSLOPE=[0.50](%),
                                           FPSLOPE=[0.50](%),
                    SECNUM=[101],          NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
                    ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
                                                   [ 5.5 , 99.86]
                                                   [ 5.6 , 99.81]
                                                   [ 9.0 , 99.91]
                                                   [12.5 , 99.81]
                                                   [12.6 , 99.86]
                                                   [20.0 , 100.0]
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=["Smin12"], IDs to add=[6,10]
*%-----------------|--------------------------------------------------------------|
SHIFT HYD           IDout=[10], NHYD=["SHmn12"], IDin=[8], TLAG=[1](min)
*%-----------------|--------------------------------------------------------------|
DESIGN STANDHYD     ID=[1], NHYD=["B3-13"], DT=[1]min, AREA=[0.280](ha),
                    XIMP=[0.447], TIMP=[0.56], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[2.0](%), END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["SUM-13"], IDs to add=[1,9]
*%-----------------|--------------------------------------------------------------|
DIVERT HYD          IDin=[2], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[4,"min-13"/3,"Maj-13"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                    [ QIDi           +        QIDii   =        QTOTAL  ]
                    [ 0.00000        +        0.00000 =        0.00000 ]
                    [ 0.01400        +        0.01000 =        0.02400 ]
                    [ 0.02000        +        0.01100 =        0.03100 ]
                    [ 0.02600        +        0.01400 =        0.04000 ]
                    [ 0.03700        +        0.02400 =        0.06100 ]
                    [ 0.05500        +        0.04500 =        0.10000 ]
                    [ 0.07700        +        0.06300 =        0.14000 ]
                    [ 0.08400        +        0.08600 =        0.17000 ]
                    [ 0.09500        +        0.11500 =        0.21000 ]end
*%-----------------|--------------------------------------------------------------|
COMPUTE DUALHYD     IDin=[4], CINLET=[0.022](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=["MAJ-13"],
                    MINID=[6], MinNHYD=["min-13"],
                    TMJSTO=[0](cu-m)
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=["SMaj13"], IDs to add=[3,5]
*%-----------------|--------------------------------------------------------------|
ROUTE CHANNEL       IDout=[9], NHYD=["RSMj13"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[48](m),        CHSLOPE=[0.50](%),
                                           FPSLOPE=[0.50](%),
                    SECNUM=[101],          NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
                    ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
                                                   [ 5.5 , 99.86]
                                                   [ 5.6 , 99.81]
                                                   [ 9.0 , 99.91]
                                                   [12.5 , 99.81]
                                                   [12.6 , 99.86]
                                                   [20.0 , 100.0]
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=["Smin13"], IDs to add=[6,10]
*%-----------------|--------------------------------------------------------------|
SHIFT HYD           IDout=[10], NHYD=["SHmn13"], IDin=[8], TLAG=[1](min)
*%-----------------|--------------------------------------------------------------|
DESIGN STANDHYD     ID=[1], NHYD=["B3-14"], DT=[1]min, AREA=[0.270](ha),
                    XIMP=[0.375], TIMP=[0.468], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[2.0](%), END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["SUM-14"], IDs to add=[1,9]
*%-----------------|--------------------------------------------------------------|
DIVERT HYD          IDin=[2], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[4,"min-14"/3,"Maj-14"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                    [ QIDi           +        QIDii   =        QTOTAL  ]
                    [ 0.00000        +        0.00000 =        0.00000 ]
                    [ 0.01400        +        0.01000 =        0.02400 ]
                    [ 0.02000        +        0.01100 =        0.03100 ]
                    [ 0.02600        +        0.01400 =        0.04000 ]
                    [ 0.03700        +        0.02400 =        0.06100 ]
                    [ 0.05500        +        0.04500 =        0.10000 ]
                    [ 0.07700        +        0.06300 =        0.14000 ]
                    [ 0.08400        +        0.08600 =        0.17000 ]
                    [ 0.09500        +        0.11500 =        0.21000 ]end
*%-----------------|--------------------------------------------------------------|
COMPUTE DUALHYD     IDin=[4], CINLET=[0.022](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=["MAJ-14"],
                    MINID=[6], MinNHYD=["min-14"],
                    TMJSTO=[0](cu-m)
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=["SMaj14"], IDs to add=[3,5]
*%-----------------|--------------------------------------------------------------|
ROUTE CHANNEL       IDout=[9], NHYD=["RSMj14"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[48](m),        CHSLOPE=[0.50](%),
                                           FPSLOPE=[0.50](%),
                    SECNUM=[101],          NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
                    ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
                                                   [ 5.5 , 99.86]
                                                   [ 5.6 , 99.81]
                                                   [ 9.0 , 99.91]
                                                   [12.5 , 99.81]
                                                   [12.6 , 99.86]
                                                   [20.0 , 100.0]
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=["Smin14"], IDs to add=[6,10]
*%-----------------|--------------------------------------------------------------|
SHIFT HYD           IDout=[10], NHYD=["SHmn14"], IDin=[8], TLAG=[1](min)
*%-----------------|--------------------------------------------------------------|
DESIGN STANDHYD     ID=[1], NHYD=["B3-15"], DT=[1]min, AREA=[0.262](ha),
                    XIMP=[0.449], TIMP=[0.562], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[2.0](%), END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["SUM-15"], IDs to add=[1,9]
*%-----------------|--------------------------------------------------------------|
DIVERT HYD          IDin=[2], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[4,"min-15"/3,"Maj-15"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                    [ QIDi           +        QIDii   =        QTOTAL  ]
                    [ 0.00000        +        0.00000 =        0.00000 ]
                    [ 0.01400        +        0.01000 =        0.02400 ]
                    [ 0.02000        +        0.01100 =        0.03100 ]
                    [ 0.02600    +        0.01400 =        0.04000 ]
                    [ 0.03700    +        0.02400 =        0.06100 ]
                    [ 0.05500    +        0.04500 =        0.10000 ]
                    [ 0.07700    +        0.06300 =        0.14000 ]
                    [ 0.08400    +        0.08600 =        0.17000 ]
                    [ 0.09500    +        0.11500 =        0.21000 ]end
*%-----------------|--------------------------------------------------------------|
COMPUTE DUALHYD     IDin=[4], CINLET=[0.022](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=["MAJ-15"],
                    MINID=[6], MinNHYD=["min-15"],
                    TMJSTO=[0](cu-m)
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=["SMaj15"], IDs to add=[3,5]
*%-----------------|--------------------------------------------------------------|
ROUTE CHANNEL       IDout=[9], NHYD=["RSMj15"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[48](m),        CHSLOPE=[0.50](%),
                                           FPSLOPE=[0.50](%),
                    SECNUM=[101],          NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
                    ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
                                                   [ 5.5 , 99.86]
                                                   [ 5.6 , 99.81]
                                                   [ 9.0 , 99.91]
                                                   [12.5 , 99.81]
                                                   [12.6 , 99.86]
                                                   [20.0 , 100.0]
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=["Smin15"], IDs to add=[6,10]
*%-----------------|--------------------------------------------------------------|
SHIFT HYD           IDout=[10], NHYD=["SHmn15"], IDin=[8], TLAG=[1](min)
*%-----------------|--------------------------------------------------------------|
DESIGN STANDHYD     ID=[1], NHYD=["B3-16"], DT=[1]min, AREA=[0.250](ha),
                    XIMP=[0.445], TIMP=[0.56], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[2.0](%), END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["SUM-16"], IDs to add=[1,9]
*%-----------------|--------------------------------------------------------------|
DIVERT HYD          IDin=[2], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[4,"min-16"/3,"Maj-16"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                    [ QIDi       +        QIDii   =        QTOTAL  ]
                    [ 0.00000    +        0.00000 =        0.00000 ]
                    [ 0.01400    +        0.01000 =        0.02400 ]
                    [ 0.02000    +        0.01100 =        0.03100 ]
                    [ 0.02600    +        0.01400 =        0.04000 ]
                    [ 0.03700    +        0.02400 =        0.06100 ]
                    [ 0.05500    +        0.04500 =        0.10000 ]
                    [ 0.07700    +        0.06300 =        0.14000 ]
                    [ 0.08400    +        0.08600 =        0.17000 ]
                    [ 0.09500    +        0.11500 =        0.21000 ]end
*%-----------------|--------------------------------------------------------------|
COMPUTE DUALHYD     IDin=[4], CINLET=[0.022](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=["MAJ-16"],
                    MINID=[6], MinNHYD=["min-16"],
                    TMJSTO=[0](cu-m)
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=["SMaj16"], IDs to add=[3,5]
*%-----------------|--------------------------------------------------------------|
ROUTE CHANNEL       IDout=[9], NHYD=["RSMj16"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[63](m),        CHSLOPE=[0.50](%),
                                           FPSLOPE=[0.50](%),
                    SECNUM=[101],          NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
                    ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
                                                   [ 5.5 , 99.86]
                                                   [ 5.6 , 99.81]
                                                   [ 9.0 , 99.91]
                                                   [12.5 , 99.81]
                                                   [12.6 , 99.86]
                                                   [20.0 , 100.0]
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=["Smin16"], IDs to add=[6,10]
*%-----------------|--------------------------------------------------------------|
SHIFT HYD           IDout=[10], NHYD=["SHmn16"], IDin=[8], TLAG=[1](min)
*%-----------------|--------------------------------------------------------------|
DESIGN STANDHYD     ID=[1], NHYD=["B3-17"], DT=[1]min, AREA=[0.260](ha),
                    XIMP=[0.304], TIMP=[0.38], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[2.0](%), END=-1
*%-----------------|--------------------------------------------------------------|
DIVERT HYD          IDin=[1], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[3,"min-17"/2,"Maj-17"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                    [ QIDi       +        QIDii   =        QTOTAL  ]
                    [ 0.00000    +        0.00000 =        0.00000 ]
                    [ 0.01400    +        0.01000 =        0.02400 ]
                    [ 0.02000    +        0.01100 =        0.03100 ]
                    [ 0.02600    +        0.01400 =        0.04000 ]
                    [ 0.03700    +        0.02400 =        0.06100 ]
                    [ 0.05500    +        0.04500 =        0.10000 ]
                    [ 0.07700    +        0.06300 =        0.14000 ]
                    [ 0.08400    +        0.08600 =        0.17000 ]
                    [ 0.09500    +        0.11500 =        0.21000 ]end
*%-----------------|--------------------------------------------------------------|
COMPUTE DUALHYD     IDin=[3], CINLET=[0.022](cms), NINLET=[1],
                    MAJID=[4], MajNHYD=["MAJ-17"],
                    MINID=[5], MinNHYD=["min-17"],
                    TMJSTO=[0](cu-m)
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[3], NHYD=["SMaj17"], IDs to add=[2,4]
*%-----------------|--------------------------------------------------------------|
ROUTE CHANNEL       IDout=[7], NHYD=["RSMj17"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[89](m),        CHSLOPE=[0.50](%),
                                           FPSLOPE=[0.50](%),
                    SECNUM=[101],          NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
                    ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
                                                   [ 5.5 , 99.86]
                                                   [ 5.6 , 99.81]
                                                   [ 9.0 , 99.91]
                                                   [12.5 , 99.81]
                                                   [12.6 , 99.86]
                                                   [20.0 , 100.0]
*%-----------------|--------------------------------------------------------------|
SHIFT HYD           IDout=[8], NHYD=["SHmn17"], IDin=[5], TLAG=[1](min)
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[6], NHYD=["MH-245"], IDs to add=[8,10]
*%-----------------|--------------------------------------------------------------|
SHIFT HYD           IDout=[10], NHYD=["SH-245"], IDin=[6], TLAG=[1](min)
*%-----------------|--------------------------------------------------------------|
DESIGN STANDHYD     ID=[1], NHYD=["B3-18"], DT=[1]min, AREA=[0.290](ha),
                    XIMP=[0.451], TIMP=[0.563], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[2.0](%), END=-1
*%-----------------|--------------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["SUM-18"], IDs to add=[1,7,9]
*%-----------------|--------------------------------------------------------------|
DIVERT HYD          IDin=[2], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[4,"min-18"/3,"Maj-18"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                    [ QIDi       +        QIDii   =        QTOTAL  ]
```

```
                    [ 0.00000       +       0.00000 =       0.00000 ]
                    [ 0.01400       +       0.01000 =       0.02400 ]
                    [ 0.02000       +       0.01100 =       0.03100 ]
                    [ 0.02600       +       0.01400 =       0.04000 ]
                    [ 0.03700       +       0.02400 =       0.06100 ]
                    [ 0.05500       +       0.04500 =       0.10000 ]
                    [ 0.07700       +       0.06300 =       0.14000 ]
                    [ 0.08400       +       0.08600 =       0.17000 ]
                    [ 0.09500       +       0.11500 =       0.21000 ]end
*%------------------|------------------------------------------------------------|
COMPUTE DUALHYD     IDin=[4], CINLET=[0.022](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=["MAJ-18"],
                    MINID=[6], MinNHYD=["min-18"],
                    TMJSTO=[0](cu-m)
*%------------------|------------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=["SMaj18"], IDs to add=[3,5]
*%------------------|------------------------------------------------------------|
ROUTE CHANNEL       IDout=[9], NHYD=["RSMj18"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[59](m),        CHSLOPE=[0.50](%),
                                           FPSLOPE=[0.50](%),
                    SECNUM=[101],          NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
                    ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
                                                   [ 5.5 , 99.86]
                                                   [ 5.6 , 99.81]
                                                   [ 9.0 , 99.91]
                                                   [12.5 , 99.81]
                                                   [12.6 , 99.86]
                                                   [20.0 , 100.0]
*%------------------|------------------------------------------------------------|
ADD HYD             IDsum=[7], NHYD=["Smin18"], IDs to add=[6,10]
*%------------------|------------------------------------------------------------|
SHIFT HYD           IDout=[10], NHYD=["SHmn18"], IDin=[7], TLAG=[1](min)
*%------------------|------------------------------------------------------------|
DESIGN STANDHYD     ID=[1], NHYD=["B3-19"], DT=[1]min, AREA=[0.330](ha),
                    XIMP=[0.429], TIMP=[0.536], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[2.0](%), END=-1
*%------------------|------------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["SUM-19"], IDs to add=[1,9]
*%------------------|------------------------------------------------------------|
DIVERT HYD          IDin=[2], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[4,"min-19"/3,"Maj-19"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                      QIDi     +      QIDii    =      QTOTAL
                    [       0.00000 +       0.00000 =       0.00000 ]
                    [       0.01800 +       0.01000 =       0.02800 ]
                    [       0.02200 +       0.01300 =       0.03500 ]
                    [       0.03000 +       0.01500 =       0.04500 ]
                    [       0.03900 +       0.03300 =       0.07200 ]
                    [       0.05800 +       0.05200 =       0.11000 ]
                    [       0.08200 +       0.08700 =       0.16900 ]
                    [       0.08800 +       0.10200 =       0.19000 ]
                    [       0.09900 +       0.14100 =       0.24000 ]end
*%------------------|------------------------------------------------------------|
COMPUTE DUALHYD     IDin=[4], CINLET=[0.022](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=["MAJ-19"],
                    MINID=[6], MinNHYD=["min-19"],
                    TMJSTO=[0](cu-m)
*%------------------|------------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=["SMaj19"], IDs to add=[3,5]
*%------------------|------------------------------------------------------------|
ROUTE CHANNEL       IDout=[9], NHYD=["RSMj19"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[52](m),        CHSLOPE=[0.60](%),
                                           FPSLOPE=[0.60](%),
                    SECNUM=[101],          NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
                    ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
                                                   [ 5.5 , 99.86]
                                                   [ 5.6 , 99.81]
                                                   [ 9.0 , 99.91]
                                                   [12.5 , 99.81]
                                                   [12.6 , 99.86]
                                                   [20.0 , 100.0]
*%------------------|------------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=["Smin19"], IDs to add=[6,10]
*%------------------|------------------------------------------------------------|
SHIFT HYD           IDout=[10], NHYD=["SHmn19"], IDin=[8], TLAG=[1](min)
*%------------------|------------------------------------------------------------|
DESIGN STANDHYD     ID=[1], NHYD=["B3-20"], DT=[1]min, AREA=[0.290](ha),
                    XIMP=[0.425], TIMP=[0.53], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[2.0](%), END=-1
*%------------------|------------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["SUM-20"], IDs to add=[1,9]
*%------------------|------------------------------------------------------------|
DIVERT HYD          IDin=[2], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[4,"min-20"/3,"Maj-20"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                      QIDi     +      QIDii    =      QTOTAL
                    [       0.00000 +       0.00000 =       0.00000 ]
                    [       0.01800 +       0.01000 =       0.02800 ]
                    [       0.02200 +       0.01300 =       0.03500 ]
                    [       0.03000 +       0.01500 =       0.04500 ]
                    [       0.03900 +       0.03300 =       0.07200 ]
                    [       0.05800 +       0.05200 =       0.11000 ]
                    [       0.08200 +       0.08700 =       0.16900 ]
                    [       0.08800 +       0.10200 =       0.19000 ]
                    [       0.09900 +       0.14100 =       0.24000 ]end
*%------------------|------------------------------------------------------------|
COMPUTE DUALHYD     IDin=[4], CINLET=[0.022](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=["MAJ-20"],
                    MINID=[6], MinNHYD=["min-20"],
                    TMJSTO=[0](cu-m)
*%------------------|------------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=["SMaj20"], IDs to add=[3,5]
*%------------------|------------------------------------------------------------|
ROUTE CHANNEL       IDout=[9], NHYD=["RSMj20"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[56](m),        CHSLOPE=[0.60](%),
                                           FPSLOPE=[0.60](%),
                    SECNUM=[101],          NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
                    ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
                                                   [ 5.5 , 99.86]
                                                   [ 5.6 , 99.81]
                                                   [ 9.0 , 99.91]
                                                   [12.5 , 99.81]
                                                   [12.6 , 99.86]
                                                   [20.0 , 100.0]
*%------------------|------------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=["Smin20"], IDs to add=[6,10]
*%------------------|------------------------------------------------------------|
SHIFT HYD           IDout=[10], NHYD=["SHmn20"], IDin=[8], TLAG=[1](min)
*%------------------|------------------------------------------------------------|
DESIGN STANDHYD     ID=[1], NHYD=["B3-21"], DT=[1]min, AREA=[0.570](ha),
                    XIMP=[0.464], TIMP=[0.58], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[2.0](%), END=-1
*%------------------|------------------------------------------------------------|
ADD HYD             IDsum=[2], NHYD=["SUM-21"], IDs to add=[1,9]
*%------------------|------------------------------------------------------------|
DIVERT HYD          IDin=[2], NIDout=[2]max five,
                    outflow hydrographs (ID, NHYD)=[4,"min-21"/3,"Maj-21"]
                    flow distribution table: (modify as necessary)
                    Note: all flows are in (cms)
                      QIDi     +      QIDii    =      QTOTAL
                    [  0.00000 +      0.00000 =      0.00000 ]
                    [  0.01800 +      0.01000 =      0.02800 ]
                    [  0.02200 +      0.01300 =      0.03500 ]
                    [  0.03000 +      0.01500 =      0.04500 ]
                    [  0.03900 +      0.03300 =      0.07200 ]
                    [  0.05800 +      0.05200 =      0.11000 ]
                    [  0.08200 +      0.08700 =      0.16900 ]
                    [  0.08800 +      0.10200 =      0.19000 ]
                    [  0.09900 +      0.14100 =      0.24000 ]end
*%------------------|------------------------------------------------------------|
COMPUTE DUALHYD     IDin=[4], CINLET=[0.032](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=["MAJ-21"],
                    MINID=[6], MinNHYD=["min-21"],
                    TMJSTO=[0](cu-m)
*%------------------|------------------------------------------------------------|
ADD HYD             IDsum=[4], NHYD=["SMaj21"], IDs to add=[3,5]
*%------------------|------------------------------------------------------------|
ROUTE CHANNEL       IDout=[9], NHYD=["B-03Maj"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[92](m),        CHSLOPE=[0.60](%),
                                           FPSLOPE=[0.60](%),
                    SECNUM=[101],          NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.1,5.5 -0.013,12.6 0.1,20.0] NSEG
                    ( DISTANCE (m), ELEVATION (m))=[ 0.0 , 100.0]
                                                   [ 5.5 , 99.86]
                                                   [ 5.6 , 99.81]
                                                   [ 9.0 , 99.91]
                                                   [12.5 , 99.81]
                                                   [12.6 , 99.86]
                                                   [20.0 , 100.0]
*%------------------|------------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=["Smin21"], IDs to add=[6,10]
*%------------------|------------------------------------------------------------|
SHIFT HYD           IDout=[10], NHYD=["B-03min"], IDin=[8], TLAG=[2](min)
*%------------------|------------------------------------------------------------|
*THESE HYDROGRAPHS MUST BE CONVERTED TO A 5 MINUTE TIME STEP IF THEY ARE SAVED
SAVE HYD            ID=[10],    # OF PCYCLES=[5],   ICASEsh=[1]
                    HYD_COMMENT=["B-03min"]
*%------------------|------------------------------------------------------------|
SAVE HYD            ID=[9],     # OF PCYCLES=[5],   ICASEsh=[1]
                    HYD_COMMENT=["B-03maj"]
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[2]
                    C2-4.stm
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[3]
                    C5-4.stm
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[4]
                    C10-4.stm
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[5]
                    C100-4.stm
*%------------------|------------------------------------------------------------|
*START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[6]
*                    C100-6.stm
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[7]
                    S2-12.stm
*%------------------|------------------------------------------------------------|
*START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[8]
*                    S2-24.stm
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[9]
                    S5-12.stm
*%------------------|------------------------------------------------------------|
*START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[10]
*                    S5-24.stm
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[11]
                    S10-12.stm
*%------------------|------------------------------------------------------------|
*START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[12]
*                    S10-24.stm
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[13]
                    S100-12.stm
*%------------------|------------------------------------------------------------|
*START               TZERO=[0.0],   METOUT=[2],   NSTORM=[1],   NRUN=[14]
*                    S100-24.stm
*%------------------|------------------------------------------------------------|
FINISH
```

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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999   999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9 9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9 9   9  Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O       9999  9999  July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9     9  =========
                                                      9   9 9   9  # 5320763
      StormWater Management HYdrologic Model           999   999   =========

 **************************************************************************
 ************************** SWMHYMO-99 Ver/4.02 ***************************
 ******* A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors    *******
 *******                 OTTHYMO-83 and OTTHYMO-89.                *******
 **************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.         *******
 *******                  Ottawa,  Ontario: (613) 727-5199          *******
 *******                  Gatineau, Quebec: (819) 243-6858          *******
 *******                  E-Mail: swmhymo@jfsa.Com                  *******
 **************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: NOVATECH ENGINEERING CONSULTANTS LTD        +++++++
 +++++++                Neoean                 SERIAL#:5320763      +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 **************************************************************************
 *******             ++++++ PROGRAM ARRAY DIMENSIONS ++++++         *******
 *******             Maximum value for ID numbers  :    10          *******
 *******             Max. number of rainfall points:  15000         *******
 *******             Max. number of flow points    :  15000         *******
 **************************************************************************

 *** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) ***
 ***--------------------------------------------------------------------***
 ***     ID:  Hydrograph IDentification numbers, (1-10).                ***
 ***   NHYD:  Hydrograph reference numbers, (6 digits or characters).   ***
 ***   AREA:  Drainage area associated with hydrograph, (ac.) or (ha.)  ***
 *** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s)     ***
 *** TpeakDate_hh:mm is the date and time of the peak flow.             ***
 ***   R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm)       ***
 ***   R.C.:  Runoff Coefficient of simulated hydrograph, (ratio)       ***
 ***      *:  see WARNING or NOTE message printed at end of run.        ***
 ***     **:  see  ERROR  message printed at end of run.                ***
 **************************************************************************
 **************************************************************************

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

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

 *********************   S U M M A R Y   O U T P U T   *******************
 **************************************************************************
 *       DATE: 2013-05-23      TIME: 12:50:25      RUN COUNTER: 001789     *
 **************************************************************************
 * Input   filename: M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\PRE-EAST.dat*
 * Output  filename: M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\PRE-EAST.out*
 * Summary filename: M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\PRE-EAST.sum*
 * User comments:                                                         *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 **************************************************************************


#****************************************************************************
#  Project Name: [Carp Airport]    Project Number: [102085]
#  Date          : 08-04-2011
#  Modeller      : [R. Langlois]
#  Company       : NOVATECH ENGINEERING CONSULTANTS LTD
#  License #     :  5320763
#****************************************************************************
 RUN:COMMAND#
 001:0001-----------------------------------------------------------------------
     START
      [TZERO =     .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   1 ]
 001:0002-----------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = City of Ottawa:  100yr-4hr Chicago (10 minute time step)
      [SDT=10.00:SDUR=   4.00:PTOT=  76.02]
 001:0003-----------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 001:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN NASHYD      01:A-1       40.60    1.294 No_date    2:35   23.09 .304
      [CN= 63.0: N= 3.00]
      [Tp=  .78:DT= 5.00]
 001:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN NASHYD      02:A-2        5.40     .317 No_date    1:50   18.24 .240
      [CN= 55.0: N= 3.00]
      [Tp=  .22:DT= 5.00]
 001:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:A-1       40.60    1.294 No_date    2:35   23.09  n/a
                     +  02:A-2        5.40     .317 No_date    1:50   18.24  n/a
      [DT= 5.00]  SUM=  03:TOTCRK    46.00    1.382 No_date    2:30   22.52  n/a
 001:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN NASHYD      02:E-1       12.24     .250 No_date    2:55   18.24 .240
      [CN= 55.0: N= 3.00]
      [Tp= 1.02:DT= 5.00]
  ** END OF RUN :  11

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





 RUN:COMMAND#
 012:0001-----------------------------------------------------------------------
     START
      [TZERO =     .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =  12 ]
#****************************************************************************
#  Project Name: [Carp Airport]    Project Number: [102085]
#  Date          : 08-04-2011
#  Modeller      : [R. Langlois]
#  Company       : NOVATECH ENGINEERING CONSULTANTS LTD
#  License #     :  5320763
#****************************************************************************
 012:0002-----------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = City of Ottawa:  100yr-12hr SCS Type II (10 min time step)
      [SDT=10.00:SDUR=  12.00:PTOT=  93.91]
 012:0003-----------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 012:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN NASHYD      01:A-1       40.60    1.431 No_date  . 6:45   33.40 .356
      [CN= 63.0: N= 3.00]
      [Tp=  .78:DT= 5.00]
 012:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN NASHYD      02:A-2        5.40     .315 No_date    6:05   26.81 .285
      [CN= 55.0: N= 3.00]
      [Tp=  .22:DT= 5.00]
 012:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:A-1       40.60    1.431 No_date    6:45   33.40  n/a
                     +  02:A-2        5.40     .315 No_date    6:05   26.81  n/a
      [DT= 5.00]  SUM=  03:TOTCRK    46.00    1.541 No_date    6:40   32.63  n/a
 012:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN NASHYD      02:E-1       12.24     .284 No_date    7:05   26.81 .285
      [CN= 55.0: N= 3.00]
      [Tp= 1.02:DT= 5.00]
 012:0002-----------------------------------------------------------------------
      FINISH
-----------------------------------------------------------------------------
*****************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2013-05-23     at 12:50:25
=============================================================================


```

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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO       999   999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O     9   9 9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ## 9   9 9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O      9999  9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO          9     9 =========
                                                     9   9 9   9 # 5320763
      StormWater Management HYdrologic Model          999   999  =========

 ************************************************************************
 ************************* SWMHYMO-99 Ver/4.02 **************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors       *******
 *******                 OTTHYMO-83 and OTTHYMO-89.                   *******
 ************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.           *******
 *******                  Ottawa,  Ontario: (613) 727-5199            *******
 *******                  Gatineau, Quebec: (819) 243-6858            *******
 *******                  E-Mail: swmhymo@jfsa.Com                    *******
 ************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: NOVATECH ENGINEERING CONSULTANTS LTD          +++++++
 +++++++                Nepean               SERIAL#:5320763          +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ************************************************************************
 *******              ++++++ PROGRAM ARRAY DIMENSIONS ++++++          *******
 *******              Maximum value for ID numbers  :     10          *******
 *******              Max. number of rainfall points:  15000          *******
 *******              Max. number of flow points    :  15000          *******
 ************************************************************************

 *** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) ***
 ***--------------------------------------------------------------------***
 ***     ID:  Hydrograph IDentification numbers, (1-10).               ***
 ***   NHYD:  Hydrograph reference numbers, (6 digits or characters).  ***
 ***   AREA:  Drainage area associated with hydrograph, (ac.) or (ha.). ***
 ***  QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).  ***
 *** TpeakDate_hh:mm is the date and time of the peak flow.            ***
 ***   R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).     ***
 ***   R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).     ***
 ***      *:  see WARNING or NOTE message printed at end of run.       ***
 ***     **:  see  ERROR  message printed at end of run.               ***
 ************************************************************************
 ************************************************************************

:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

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

 *********************   S U M M A R Y   O U T P U T   *****************
 ************************************************************************
 *      DATE: 2013-05-23     TIME: 12:51:29     RUN COUNTER: 001790     *
 ************************************************************************
 * Input   filename: M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\POST-E1.DAT *
 * Output  filename: M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\POST-E1.out *
 * Summary filename: M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\POST-E1.sum *
 * User comments:                                                       *
 * 1:___________________________________________________________________*
 * 2:___________________________________________________________________*
 * 3:___________________________________________________________________*
 ************************************************************************


#**************************************************************************
#  Project Name: [Carp Airport]    Project Number: [102085]
#  Date        : 05-03-2013
#  Modeller    : [R. Langlois & K.Banks]
#  Company     : NOVATECH ENGINEERING CONSULTANTS LTD
#  License #   :  5320763
#**************************************************************************
 RUN:COMMAND#
 001:0001------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2     (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   1 ]
 001:0002------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = City of Ottawa:  100yr-4hr Chicago (10 minute time step)
      [SDT=10.00:SDUR=   4.00:PTOT=  76.02]
 001:0003------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=   .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 001:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    01:B1          .53     .139 No_date    1:46   41.28 .543
      [XIMP=.01:TIMP=.30]
      [SLP= .46:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B2         1.19     .287 No_date    1:47   39.63 .521
      [XIMP=.01:TIMP=.25]
      [SLP= .46:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:B1          .53     .139 No_date    1:46   41.28  n/a
                     +  02:B2         1.19     .287 No_date    1:47   39.63  n/a
      [DT= 1.00]   SUM= 10:FLW2CR     1.72     .424 No_date    1:47   40.14  n/a
 001:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    09:B11         .77     .203 No_date    1:46   42.38 .557
      [XIMP=.01:TIMP=.33]
      [SLP= .46:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0008---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            09:B11         .77     .203 No_date    1:46   42.38  n/a
                     +  10:FLW2CR     1.72     .424 No_date    1:47   40.14  n/a
      [DT= 1.00]   SUM= 01:TFLW2C     2.49     .627 No_date    1:46   40.83  n/a
 001:0009---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B10-W      1.93     .467 No_date    1:49   51.39 .676
      [XIMP=.01:TIMP=.58]
      [SLP= .15:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0010---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B10-W      1.93     .467 No_date    1:49   51.39  n/a
      [RDT= 1.00] out<- 03:STO.B1     1.93     .252 No_date    2:05   51.39  n/a
            overflow <= 10:OVFB10      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.3537E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0011---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B9-E       2.57     .651 No_date    1:48   51.39 .676
      [XIMP=.01:TIMP=.58]
      [SLP= .20:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0012---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B9-E       2.57     .651 No_date    1:48   51.39  n/a
      [RDT= 1.00] out<- 04:STO.B9     2.57     .376 No_date    2:02   51.39  n/a
            overflow <= 09:OVFB9E      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.3931E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0013---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B9-W       1.17     .311 No_date    1:47   51.39 .676
      [XIMP=.01:TIMP=.58]
      [SLP= .20:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0014---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B9-W       1.17     .311 No_date    1:47   51.39  n/a
      [RDT= 1.00] out<- 05:STO.B9     1.17     .174 No_date    2:01   51.39  n/a
            overflow <= 08:OVFB9W      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1864E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0015---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:COM1-E      .80     .280 No_date    1:43   56.95 .749
      [XIMP=.01:TIMP=.70]
      [SLP= .60:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0016---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:COM1-E      .80     .280 No_date    1:43   56.95  n/a
      [RDT= 1.00] out<- 06:STO.CO      .80     .113 No_date    1:57   56.95  n/a
            overflow <= 07:OVFCOM      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1931E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0017---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            03:STO.B1     1.93     .252 No_date    2:05   51.39  n/a
                     +  04:STO.B9     2.57     .376 No_date    2:02   51.39  n/a
                     +  05:STO.B9     1.17     .174 No_date    2:01   51.39  n/a
                     +  06:STO.CO      .80     .113 No_date    1:57   56.95  n/a
                     +  07:OVFCOM      .00     .000 No_date    0:00     .00  n/a
                     +  08:OVFB9W      .00     .000 No_date    0:00     .00  n/a
                     +  09:OVFB9E      .00     .000 No_date    0:00     .00  n/a
                     +  10:OVFB10      .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]   SUM= 02:FLW        6.47     .910 No_date    2:02   52.08  n/a
 001:0018---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    03:B8-E       1.81     .554 No_date    1:45   51.39 .676
      [XIMP=.01:TIMP=.58]
      [SLP= .52:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0019---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 03:B8-E       1.81     .554 No_date    1:45   51.39  n/a
      [RDT= 1.00] out<- 04:STO.B8     1.81     .256 No_date    1:59   51.39  n/a
            overflow <= 10:OVFB8E      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.3828E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0020---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            02:FLW        6.47     .910 No_date    2:02   52.08  n/a
                     +  04:STO.B8     1.81     .256 No_date    1:59   51.39  n/a
                     +  10:OVFB8E      .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]   SUM= 03:CULV3      8.28    1.164 No_date    2:02   51.93  n/a
 001:0021---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B8-W       1.91     .584 No_date    1:45   51.39 .676
      [XIMP=.01:TIMP=.58]
      [SLP= .52:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0022---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B8-W       1.91     .584 No_date    1:45   51.39  n/a
      [RDT= 1.00] out<- 04:STO.B8     1.91     .270 No_date    1:59   51.39  n/a
            overflow <= 10:OVFB8W      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.4034E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0023---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B7E/12     5.00    1.186 No_date    1:49   46.61 .613
      [XIMP=.01:TIMP=.46]
      [SLP= .30:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0024---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B7E/12     5.00    1.186 No_date    1:49   46.61  n/a
      [RDT= 1.00] out<- 05:STO.B7     5.00     .699 No_date    2:03   46.61  n/a
            overflow <= 09:OVFB7E      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.6949E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0025---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B7-W       1.07     .325 No_date    1:45   51.39 .676
      [XIMP=.01:TIMP=.58]
      [SLP= .42:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0026---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B7-W       1.07     .325 No_date    1:45   51.39  n/a
      [RDT= 1.00] out<- 06:STO.B7     1.07     .167 No_date    1:58   51.39  n/a
            overflow <= 08:OVFB7W      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1880E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0027---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:STO.B8     1.91     .270 No_date    1:59   51.39  n/a
                     +  05:STO.B7     5.00     .699 No_date    2:03   46.61  n/a
                     +  06:STO.B7     1.07     .167 No_date    1:58   51.39  n/a
                     +  08:OVFB7W      .00     .000 No_date    0:00     .00  n/a
                     +  09:OVFB7E      .00     .000 No_date    0:00     .00  n/a
                     +  10:OVFB8W      .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]   SUM= 07:FLW2       7.98    1.132 No_date    2:01   48.40  n/a
 001:0028---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B6-E       1.75     .530 No_date    1:45   51.39 .676
      [XIMP=.01:TIMP=.58]
      [SLP= .47:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0029---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B6-E       1.75     .530 No_date    1:45   51.39  n/a
      [RDT= 1.00] out<- 04:STO.B6     1.75     .250 No_date    1:59   51.39  n/a
            overflow <= 10:OVFB6E      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.3649E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0030---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:COM1W      1.92     .619 No_date    1:44   54.46 .716
      [XIMP=.01:TIMP=.65]
      [SLP= .52:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0031---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:COM1W      1.92     .619 No_date    1:44   54.46  n/a
      [RDT= 1.00] out<- 05:STO.CO     1.92     .273 No_date    1:58   54.46  n/a
            overflow <= 09:OVFCOM      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.4301E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0032---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:STO.B6     1.75     .250 No_date    1:59   51.39  n/a
                     +  05:STO.CO     1.92     .273 No_date    1:58   54.46  n/a
                     +  07:FLW2       7.98    1.132 No_date    2:01   48.40  n/a
                     +  09:OVFCOM      .00     .000 No_date    0:00     .00  n/a
                     +  10:OVFB6E      .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]   SUM= 06:CULV2     11.65    1.653 No_date    2:00   49.85  n/a
 001:0033---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            03:CULV3      8.28    1.164 No_date    2:02   51.93  n/a
                     +  06:CULV2     11.65    1.653 No_date    2:00   49.85  n/a
      [DT= 1.00]   SUM= 09:CULV+T    19.93    2.816 No_date    2:01   50.71  n/a
 001:0034---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B6-W        .91     .286 No_date    1:44   51.39 .676
      [XIMP=.01:TIMP=.58]
      [SLP= .47:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0035---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B6-W        .91     .286 No_date    1:44   51.39  n/a
      [RDT= 1.00] out<- 04:STO.B6      .91     .128 No_date    1:58   51.39  n/a
            overflow <= 10:OVFB6W      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1953E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0036---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B5-E       3.76    1.087 No_date    1:46   51.39 .676
      [XIMP=.01:TIMP=.58]
      [SLP= .46:DT= 1.00]
```

```
      [LOSS= 1 : HORTONS]
 001:0037---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 02:B5-E      3.76   1.087 No_date    1:46   51.39  n/a
      [RDT= 1.00] out<- 05:STO.B5    3.76    .578 No_date    1:59   51.39  n/a
    {MxStoUsed=.6385E-01}
 001:0038---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     02:B5-W      1.28    .401 No_date    1:44   51.39 .676
      [XIMP=.01:TIMP=.58]
      [SLP= .50:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0039---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 02:B5-W      1.28    .401 No_date    1:44   51.39  n/a
      [RDT= 1.00] out<- 07:STO.B5    1.28    .202 No_date    1:57   51.39  n/a
            overflow <= 08:OVFB5W     .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.2284E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0040---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             04:STO.B6     .91    .128 No_date    1:58   51.39  n/a
                      + 05:STO.B5    3.76    .578 No_date    1:59   51.39  n/a
                      + 07:STO.B5    1.28    .202 No_date    1:57   51.39  n/a
                      + 08:OVFB5W     .00    .000 No_date    0:00     .00  n/a
                      + 10:OVFB6W     .00    .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  02:FLW3      5.95    .907 No_date    1:58   51.39  n/a
 001:0041---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     04:B4-E      2.64    .794 No_date    1:45   51.39 .676
      [XIMP=.01:TIMP=.58]
      [SLP= .50:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0042---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 04:B4-E      2.64    .794 No_date    1:45   51.39  n/a
      [RDT= 1.00] out<- 05:STO.B4    2.64    .378 No_date    1:59   51.39  n/a
            overflow <= 10:OVFB4E     .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.5462E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0043---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             02:FLW3      5.95    .907 No_date    1:58   51.39  n/a
                      + 05:STO.B4    2.64    .378 No_date    1:59   51.39  n/a
                      + 10:OVFB4E     .00    .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  04:CULV1     8.59   1.284 No_date    1:59   51.39  n/a
 001:0044---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     02:B4-W      3.21    .984 No_date    1:45   51.39 .676
      [XIMP=.01:TIMP=.58]
      [SLP= .63:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0045---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 02:B4-W      3.21    .984 No_date    1:45   51.39  n/a
      [RDT= 1.00] out<- 05:STO.B4    3.21    .457 No_date    1:59   51.39  n/a
            overflow <= 10:OVFB4W     .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.6771E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0046---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    READ HYD            02:Maj3       .27    .020 No_date    1:41   12.29  n/a
     Filename = M:\2002\102085\DATA\CALCUL~1\SWMHYMO\2012\H-B-03Maj.001
     Comment  = B-03maj
 001:0047---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    READ HYD            03:min3      7.31    .362 No_date    1:52   11.03  n/a
     Filename = M:\2002\102085\DATA\CALCUL~1\SWMHYMO\2012\H-B-03min.001
     Comment  = B-03min
 001:0048---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             02:Maj3       .27    .020 No_date    1:41   12.29  n/a
                      + 03:min3      7.31    .362 No_date    1:52   11.03  n/a
      [DT= 1.00]  SUM=  08:B3MAJM    7.58    .371 No_date    1:52   11.08  n/a
 001:0049---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN NASHYD       07:SWMF2     4.06    .444 No_date    1:49   28.25 .372
      [CN= 70.0: N= 3.00]
      [Tp=  .17:DT= 1.00]
 001:0050---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             08:B3MAJM    7.58    .371 No_date    1:52   11.08  n/a
                      + 04:CULV1     8.59   1.284 No_date    1:59   51.39  n/a
                      + 05:STO.B4    3.21    .457 No_date    1:59   51.39  n/a
                      + 07:SWMF2     4.06    .444 No_date    1:49   28.25  n/a
                      + 09:CULV+T   19.93   2.816 No_date    2:01   50.71  n/a
                      + 10:OVFB4W     .00    .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  02:TOTPND   43.37   5.189 No_date    1:57   41.87  n/a
 001:0051---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 02:TOTPND   43.37   5.189 No_date    1:57   41.87  n/a
      [RDT= 1.00] out<- 05:SWMF2    43.37    .849 No_date    2:57   41.78  n/a
            overflow <= 06:OVF         .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.1498E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0052---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             01:TFLW2C    2.49    .627 No_date    1:46   40.83  n/a
                      + 05:SWMF2    43.37    .849 No_date    2:57   41.78  n/a
                      + 06:OVF         .00    .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  02:TOTCRK   45.87    .852 No_date    2:56   41.73  n/a
 001:0053---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SAVE HYD            02:TOTCRK   45.87    .852 No_date    2:56   41.73  n/a
     fname :M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-TOTCRK.001
     remark:B-2
 001:0054---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  * DESIGN STANDHYD     01:B10-E     1.32    .278 No_date    1:48   35.82 .471
      [XIMP=.01:TIMP=.12]
      [SLP= .39:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0055---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 01:B10-E     1.32    .278 No_date    1:48   35.82  n/a
      [RDT= 1.00] out<- 03:STO.B1    1.32    .143 No_date    2:03   35.82  n/a
            overflow <= 10:OVFB10     .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.1859E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0056---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN NASHYD       01:B-EX01   11.00    .354 No_date    2:53   28.25 .372
      [CN= 70.0: N= 3.00]
      [Tp= 1.02:DT= 1.00]
 001:0057---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             01:B-EX01   11.00    .354 No_date    2:53   28.25  n/a
                      + 03:STO.B1    1.32    .143 No_date    2:03   35.82  n/a
                      + 10:OVFB10     .00    .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  04:CULV+    12.32    .412 No_date    2:33   29.06  n/a
  ** END OF RUN :  12

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





 RUN:COMMAND#
 013:0001--------------------------------------------------------------------
    START
     [TZERO =    .00 hrs on        0]
     [METOUT=   2   (1=imperial, 2=metric output)]
     [NSTORM=   1 ]
     [NRUN  =  13 ]
#****************************************************************************
#  Project Name: [Carp Airport]    Project Number: [102085]
#  Date         : 05-03-2013
#  Modeller     : [R. Langlois & K.Banks]
#  Company      : NOVATECH ENGINEERING CONSULTANTS LTD
#  License #    :  5320763
#****************************************************************************
 013:0002---------------------------------------------------------------------
    READ STORM
     Filename = STORM.001
     Comment  = City of Ottawa:  100yr-12hr SCS Type II (10 min time step)
     [SDT=10.00:SDUR=  12.00:PTOT=  93.91]
 013:0003---------------------------------------------------------------------
    DEFAULT VALUES
     Filename = M:\2002\102085\DATA\CALCUL~1\SWMHYMO\2012\OTTAWA.DEF
     ICASEdv  = 1 (read and print data)
```

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       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
       Horton's infiltration equation parameters:
       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
       Parameters for PERVIOUS surfaces in STANDHYD:
       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
       Parameters for IMPERVIOUS surfaces in STANDHYD:
       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
       Parameters used in NASHYD:
       [Ia=   4.67 mm] [N= 3.00]
 013:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     01:B1         .53    .086 No_date    6:03   41.38 .441
      [XIMP=.01:TIMP=.30]
      [SLP= .46:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     02:B2        1.19    .183 No_date    6:04   40.20 .428
      [XIMP=.01:TIMP=.25]
      [SLP= .46:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             01:B1         .53    .086 No_date    6:03   41.38  n/a
                      + 02:B2        1.19    .183 No_date    6:04   40.20  n/a
      [DT= 1.00]  SUM=  10:FLW2CR    1.72    .269 No_date    6:04   40.56  n/a
 013:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     09:B11        .77    .126 No_date    6:03   41.97 .447
      [XIMP=.01:TIMP=.33]
      [SLP= .46:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0008---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             09:B11        .77    .126 No_date    6:03   41.97  n/a
                      + 10:FLW2CR    1.72    .269 No_date    6:04   40.56  n/a
      [DT= 1.00]  SUM=  01:TFLW2C    2.49    .395 No_date    6:03   41.00  n/a
 013:0009---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     02:B10-W     1.93    .299 No_date    6:06   49.73 .530
      [XIMP=.01:TIMP=.58]
      [SLP= .15:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0010---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 02:B10-W     1.93    .299 No_date    6:06   49.73  n/a
      [RDT= 1.00] out<- 03:STO.B1    1.93    .203 No_date    6:23   49.72  n/a
            overflow <= 10:OVFB10     .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.2606E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0011---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     02:B9-E      2.57    .410 No_date    6:05   49.72 .530
      [XIMP=.01:TIMP=.58]
      [SLP= .20:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0012---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 02:B9-E      2.57    .410 No_date    6:05   49.72  n/a
      [RDT= 1.00] out<- 04:STO.B9    2.57    .312 No_date    6:18   49.73  n/a
            overflow <= 09:OVFB9E     .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.2527E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0013---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     02:B9-W      1.17    .194 No_date    6:04   49.72 .530
      [XIMP=.01:TIMP=.58]
      [SLP= .20:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0014---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 02:B9-W      1.17    .194 No_date    6:04   49.72  n/a
      [RDT= 1.00] out<- 05:STO.B9    1.17    .144 No_date    6:16   49.72  n/a
            overflow <= 08:OVFB9W     .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.1207E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0015---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     02:COM1-E     .80    .158 No_date    6:01   55.93 .596
      [XIMP=.01:TIMP=.70]
      [SLP= .60:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0016---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 02:COM1-E     .80    .158 No_date    6:01   55.93  n/a
      [RDT= 1.00] out<- 06:STO.CO     .80    .094 No_date    6:13   55.93  n/a
            overflow <= 07:OVFCOM     .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.1416E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0017---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             03:STO.B1    1.93    .203 No_date    6:23   49.72  n/a
                      + 04:STO.B9    2.57    .312 No_date    6:18   49.73  n/a
                      + 05:STO.B9    1.17    .144 No_date    6:16   49.72  n/a
                      + 06:STO.CO     .80    .094 No_date    6:13   55.93  n/a
                      + 07:OVFCOM     .00    .000 No_date    0:00     .00  n/a
                      + 08:OVFB9W     .00    .000 No_date    0:00     .00  n/a
                      + 09:OVFB9E     .00    .000 No_date    0:00     .00  n/a
                      + 10:OVFB10     .00    .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  02:FLW       6.47    .749 No_date    6:19   50.49  n/a
 013:0018---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     03:B8-E      1.81    .329 No_date    6:02   49.72 .530
      [XIMP=.01:TIMP=.58]
      [SLP= .52:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0019---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 03:B8-E      1.81    .329 No_date    6:02   49.72  n/a
      [RDT= 1.00] out<- 04:STO.B8    1.81    .208 No_date    6:15   49.72  n/a
            overflow <= 10:OVFB8E     .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.2830E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0020---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             02:FLW       6.47    .749 No_date    6:19   50.49  n/a
                      + 04:STO.B8    1.81    .208 No_date    6:15   49.72  n/a
                      + 10:OVFB8E     .00    .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  03:CULV3     8.28    .956 No_date    6:18   50.32  n/a
 013:0021---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     02:B8-W      1.91    .347 No_date    6:02   49.72 .530
      [XIMP=.01:TIMP=.58]
      [SLP= .52:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0022---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 02:B8-W      1.91    .347 No_date    6:02   49.72  n/a
      [RDT= 1.00] out<- 04:STO.B8    1.91    .219 No_date    6:15   49.72  n/a
            overflow <= 10:OVFB8W     .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.2985E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0023---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     02:B7E/12    5.00    .770 No_date    6:06   45.80 .488
      [XIMP=.01:TIMP=.46]
      [SLP= .30:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0024---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 02:B7E/12    5.00    .770 No_date    6:06   45.80  n/a
      [RDT= 1.00] out<- 05:STO.B7    5.00    .593 No_date    6:18   45.80  n/a
            overflow <= 09:OVFB7E     .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.4611E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0025---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     02:B7-W      1.07    .193 No_date    6:02   49.72 .530
      [XIMP=.01:TIMP=.58]
      [SLP= .42:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0026---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 02:B7-W      1.07    .193 No_date    6:02   49.72  n/a
      [RDT= 1.00] out<- 06:STO.B7    1.07    .138 No_date    6:13   49.72  n/a
            overflow <= 08:OVFB7W     .00    .000 No_date    0:00     .00  n/a
    {MxStoUsed=.1237E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0027---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             04:STO.B8    1.91    .219 No_date    6:15   49.72  n/a
                      + 05:STO.B7    5.00    .593 No_date    6:18   45.80  n/a
                      + 06:STO.B7    1.07    .138 No_date    6:13   49.72  n/a
                      + 08:OVFB7W     .00    .000 No_date    0:00     .00  n/a
                      + 09:OVFB7E     .00    .000 No_date    0:00     .00  n/a
                      + 10:OVFB8W     .00    .000 No_date    0:00     .00  n/a
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      [DT= 1.00]  SUM=  07:FLW2       7.98     .948 No_date    6:16   47.26  n/a
 013:0028---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B6-E       1.75     .316 No_date    6:02   49.72 .530
      [XIMP=.01:TIMP=.58]
      [SLP= .47:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0029---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B6-E       1.75     .316 No_date    6:02   49.72  n/a
      [RDT= 1.00] out<- 04:STO.B6     1.75     .202 No_date    6:15   49.72  n/a
            overflow <= 10:OVFB6E      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.2706E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0030---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:COM1W      1.92     .360 No_date    6:01   52.95 .564
      [XIMP=.01:TIMP=.65]
      [SLP= .52:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0031---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:COM1W      1.92     .360 No_date    6:01   52.95  n/a
      [RDT= 1.00] out<- 05:STO.CO     1.92     .223 No_date    6:14   52.95  n/a
            overflow <= 09:OVFCOM      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.3151E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0032---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:STO.B6     1.75     .202 No_date    6:15   49.72  n/a
                      + 05:STO.CO     1.92     .223 No_date    6:14   52.95  n/a
                      + 07:FLW2       7.98     .948 No_date    6:16   47.26  n/a
                      + 09:OVFCOM      .00     .000 No_date    0:00     .00  n/a
                      + 10:OVFB6E      .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  06:CULV2     11.65    1.372 No_date    6:16   48.57  n/a
 013:0033---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            03:CULV3      8.28     .956 No_date    6:18   50.32  n/a
                      + 06:CULV2     11.65    1.372 No_date    6:16   48.57  n/a
      [DT= 1.00]  SUM=  09:CULV+T    19.93    2.327 No_date    6:17   49.30  n/a
 013:0034---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B6-W        .91     .167 No_date    6:02   49.72 .530
      [XIMP=.01:TIMP=.58]
      [SLP= .47:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0035---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B6-W        .91     .167 No_date    6:02   49.72  n/a
      [RDT= 1.00] out<- 04:STO.B6      .91     .104 No_date    6:15   49.72  n/a
            overflow <= 10:OVFB6W      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1440E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0036---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B5-E       3.76     .660 No_date    6:03   49.73 .530
      [XIMP=.01:TIMP=.58]
      [SLP= .46:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0037---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B5-E       3.76     .660 No_date    6:03   49.73  n/a
      [RDT= 1.00] out<- 05:STO.B5     3.76     .478 No_date    6:14   49.72  n/a
     {MxStoUsed=.4174E-01}
 013:0038---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B5-W       1.28     .234 No_date    6:02   49.72 .530
      [XIMP=.01:TIMP=.58]
      [SLP= .50:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0039---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B5-W       1.28     .234 No_date    6:02   49.72  n/a
      [RDT= 1.00] out<- 07:STO.B5     1.28     .166 No_date    6:13   49.72  n/a
            overflow <= 08:OVFB5W      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1503E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0040---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            04:STO.B6      .91     .104 No_date    6:15   49.72  n/a
                      + 05:STO.B5     3.76     .478 No_date    6:14   49.72  n/a
                      + 07:STO.B5     1.28     .166 No_date    6:13   49.72  n/a
                      + 08:OVFB5W      .00     .000 No_date    0:00     .00  n/a
                      + 10:OVFB6W      .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  02:FLW3       5.95     .748 No_date    6:14   49.72  n/a
 013:0041---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    04:B4-E       2.64     .471 No_date    6:02   49.72 .530
      [XIMP=.01:TIMP=.58]
      [SLP= .50:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0042---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 04:B4-E       2.64     .471 No_date    6:02   49.72  n/a
      [RDT= 1.00] out<- 05:STO.B4     2.64     .304 No_date    6:16   49.72  n/a
            overflow <= 10:OVFB4E      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.4037E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0043---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            02:FLW3       5.95     .748 No_date    6:14   49.72  n/a
                      + 05:STO.B4     2.64     .304 No_date    6:16   49.72  n/a
                      + 10:OVFB4E      .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  04:CULV1      8.59    1.051 No_date    6:15   49.72  n/a
 013:0044---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    02:B4-W       3.21     .584 No_date    6:02   49.72 .530
      [XIMP=.01:TIMP=.58]
      [SLP= .63:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0045---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:B4-W       3.21     .584 No_date    6:02   49.72  n/a
      [RDT= 1.00] out<- 05:STO.B4     3.21     .370 No_date    6:15   49.72  n/a
            overflow <= 10:OVFB4W      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.5019E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0046---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     READ HYD           02:Maj3       1.35     .432 No_date    6:01   62.05  n/a
      Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-B-03Maj.013
      Comment  = B-03maj
 013:0047---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     READ HYD           03:min3       6.23     .691 No_date    6:12   60.01  n/a
      Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-B-03min.013
      Comment  = B-03min
 013:0048---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            02:Maj3       1.35     .432 No_date    6:01   62.05  n/a
                      + 03:min3       6.23     .691 No_date    6:12   60.01  n/a
      [DT= 1.00]  SUM=  08:B3MAJM     7.58    1.112 No_date    6:01   60.38  n/a
 013:0049---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN NASHYD      07:SWMF2      4.06     .407 No_date    6:03   40.20 .428
      [CN= 70.0: N= 3.00]
      [Tp=  .17:DT= 1.00]
 013:0050---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            08:B3MAJM     7.58    1.112 No_date    6:01   60.38  n/a
                      + 04:CULV1      8.59    1.051 No_date    6:15   49.72  n/a
                      + 05:STO.B4     3.21     .370 No_date    6:15   49.72  n/a
                      + 07:SWMF2      4.06     .407 No_date    6:03   40.20  n/a
                      + 09:CULV+T    19.93    2.327 No_date    6:17   49.30  n/a
                      + 10:OVFB4W      .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  02:TOTPND    43.37    4.995 No_date    6:11   50.50  n/a
 013:0051---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:TOTPND    43.37    4.995 No_date    6:11   50.50  n/a
      [RDT= 1.00] out<- 05:SWMF2     43.37    1.095 No_date    7:11   50.42  n/a
            overflow <= 06:OVF         .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1651E+01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0052---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:TFLW2C     2.49     .395 No_date    6:03   41.00  n/a
                      + 05:SWMF2     43.37    1.095 No_date    7:11   50.42  n/a
                      + 06:OVF         .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  02:TOTCRK    45.87    1.107 No_date    7:10   49.90  n/a
 013:0053---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SAVE HYD           02:TOTCRK    45.87    1.107 No_date    7:10   49.90  n/a
      fname :M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-TOTCRK.013
      remark:B-2
 013:0054---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
   * DESIGN STANDHYD    01:B10-E      1.32     .184 No_date    6:05   37.62 .401
      [XIMP=.01:TIMP=.12]
      [SLP= .39:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0055---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 01:B10-E      1.32     .184 No_date    6:05   37.62  n/a
      [RDT= 1.00] out<- 03:STO.B1     1.32     .123 No_date    6:19   37.62  n/a
            overflow <= 10:OVFB10      .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1473E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0056---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN NASHYD      01:B-EX01    11.00     .394 No_date    7:04   40.20 .428
      [CN= 70.0: N= 3.00]
      [Tp= 1.02:DT= 1.00]
 013:0057---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:B-EX01    11.00     .394 No_date    7:04   40.20  n/a
                      + 03:STO.B1     1.32     .123 No_date    6:19   37.62  n/a
                      + 10:OVFB10      .00     .000 No_date    0:00     .00  n/a
      [DT= 1.00]  SUM=  04:CULV+     12.32     .464 No_date    6:48   39.92  n/a
 013:0002-----------------------------------------------------------------------
      FINISH
-------------------------------------------------------------------------------
*******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 001:0054 DESIGN STANDHYD
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
   Simulation ended on 2013-05-23     at 12:51:30
===============================================================================
```

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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999   999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O       9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9 =========
                                                    9   9  9   9 # 5320763
      StormWater Management HYdrologic Model         999   999  =========

 ************************************************************************
 ***************************** SWMHYMO-99 Ver/4.02 **********************
 *******  A single event and continuous hydrologic simulation model  *******
 *******      based on the principles of HYMO and its successors    *******
 *******                  OTTHYMO-83 and OTTHYMO-89.                *******
 ************************************************************************
 ******* Distributed by: J.F. Sabourin and Associates Inc.           *******
 *******                 Ottawa,  Ontario: (613) 727-5199           *******
 *******                 Gatineau, Quebec: (819) 243-6858           *******
 *******                 E-Mail: swmhymo@jfsa.Com                   *******
 ************************************************************************


 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: NOVATECH ENGINEERING CONSULTANTS LTD        +++++++
 +++++++                Nepean                 SERIAL#:5320763      +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ************************************************************************
 *******              ++++++ PROGRAM ARRAY DIMENSIONS ++++++        *******
 *******              Maximum value for ID numbers   :     10       *******
 *******              Max. number of rainfall points:  15000       *******
 *******              Max. number of flow points    :  15000       *******
 ************************************************************************

 *** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) ***
 ***-------------------------------------------------------------------***
 ***     ID:  Hydrograph IDentification numbers, (1-10).              ***
 ***   NHYD:  Hydrograph reference numbers, (6 digits or characters).  ***
 ***   AREA:  Drainage area associated with hydrograph, (ac.) or (ha.) ***
 *** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s)   ***
 *** TpeakDate_hh:mm is the date and time of the peak flow.           ***
 ***   R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).    ***
 ***   R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).    ***
 ***      *:  see WARNING or NOTE message printed at end of run.      ***
 ***     **:  see  ERROR  message printed at end of run.              ***
 ************************************************************************
 ************************************************************************

 ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

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

 *********************   S U M M A R Y   O U T P U T   *****************
 ************************************************************************
 *       DATE: 2013-05-23      TIME: 12:52:30      RUN COUNTER: 001791    *
 ************************************************************************
 * Input   filename: M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\POST-E2.DAT *
 * Output  filename: M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\POST-E2.out *
 * Summary filename: M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\POST-E2.sum *
 * User comments:                                                        *
 * 1:____________________________________________________________________*
 * 2:____________________________________________________________________*
 * 3:____________________________________________________________________*
 ************************************************************************


#*************************************************************************
#  Project Name: [Carp Airport]    Project Number: [102085]
#  Date        : 05-03-2013
#  Modeller    : [R.S.ARCHER/R.LANGLOIS]
#  Company     : NOVATECH ENGINEERING CONSULTANTS LTD
#  License #   : 5320763
#*************************************************************************
 RUN:COMMAND#
 001:0001-----------------------------------------------------------------
     START
      [TZERO =     .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   1 ]
 001:0002------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  = City of Ottawa:  100yr-4hr Chicago (10 minute time step)
      [SDT=10.00:SDUR=   4.00:PTOT=  76.02]
 001:0003------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
#STREETS NINE AND TEN
 001:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    01:B3-01       .38      .137 No_date    1:40   50.73 .667
      [XIMP=.38:TIMP=.47]
      [SLP=2.00:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 01:B3-01       .38      .137 No_date    1:40   50.73  n/a
      [RDT= 1.00] out<- 04:R-01        .38      .088 No_date    1:45   50.73  n/a
            overflow <= 10:NO          .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.4011E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DIVERT HYD      -> 04:R-01        .38      .088 No_date    1:45   50.73  n/a
            diverted <= 02:MAJ-01       .07      .045 No_date    1:45   50.73  n/a
            diverted <= 03:min-01       .31      .043 No_date    1:45   50.73  n/a
 001:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     PRINT HYD          03:min-01       .31      .043 No_date    1:45   50.73  n/a
 001:0008---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 03:min-01       .31      .043 No_date    1:45   50.73  n/a
      [LAG=  2.0 min]<- 05:SHmn01       .31      .043 No_date    1:47   50.73  n/a
 001:0009---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    01:B3-04       .74      .285 No_date    1:40   55.57 .731
      [XIMP=.47:TIMP=.59]
      [SLP=2.00:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0010---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:B3-04       .74      .285 No_date    1:40   55.57  n/a
                      + 02:MAJ-01       .07      .045 No_date    1:45   50.73  n/a
      [DT= 1.00]  SUM=  06:SUM-04       .81      .299 No_date    1:40   55.15  n/a
 001:0011---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 06:SUM-04       .81      .299 No_date    1:40   55.15  n/a
      [RDT= 1.00] out<- 04:R-04        .81      .225 No_date    1:43   55.15  n/a
            overflow <= 10:NO          .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.7821E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0012---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DIVERT HYD      -> 04:R-04        .81      .225 No_date    1:43   55.15  n/a
            diverted <= 07:MAJ-04       .21      .139 No_date    1:43   55.15  n/a
            diverted <= 08:min-04       .60      .086 No_date    1:43   55.15  n/a
 001:0013---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     PRINT HYD          08:min-04       .60      .086 No_date    1:43   55.15  n/a
 001:0014---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    01:B3-03       .31      .107 No_date    1:40   47.98 .631
      [XIMP=.32:TIMP=.40]
      [SLP=2.00:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0015---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     COMPUTE DUALHYD    01:B3-03       .31      .107 No_date    1:40   47.98  n/a
        Major System /  02:MAJ-03       .11      .074 No_date    1:40   47.98  n/a
        Minor System \  03:min-03       .20      .033 No_date    1:31   47.98  n/a
 001:0016---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            03:min-03       .20      .033 No_date    1:31   47.98  n/a
                      + 05:SHmn01       .31      .043 No_date    1:47   50.73  n/a
                      + 08:min-04       .60      .086 No_date    1:43   55.15  n/a
      [DT= 1.00]  SUM=  04:summ04      1.12      .162 No_date    1:45   52.61  n/a
 001:0017---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 04:summ04      1.12      .162 No_date    1:45   52.61  n/a
      [LAG=  1.0 min]<- 08:SHmn04      1.12      .162 No_date    1:46   52.61  n/a
 001:0018---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    01:B3-02       .39      .166 No_date    1:40   60.89 .801
      [XIMP=.58:TIMP=.72]
      [SLP=2.00:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0019---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 01:B3-02       .39      .166 No_date    1:40   60.89  n/a
      [RDT= 1.00] out<- 05:R-02        .39      .084 No_date    1:45   60.89  n/a
            overflow <= 10:NO          .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.3919E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0020---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DIVERT HYD      -> 05:R-02        .39      .084 No_date    1:45   60.89  n/a
            diverted <= 03:MAJ-02       .06      .022 No_date    1:45   60.89  n/a
            diverted <= 04:min-02       .33      .062 No_date    1:45   60.89  n/a
 001:0021---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     PRINT HYD          04:min-02       .33      .062 No_date    1:45   60.89  n/a
 001:0022---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 04:min-02       .33      .062 No_date    1:45   60.89  n/a
      [LAG=  2.0 min]<- 06:SHmn02       .33      .062 No_date    1:47   60.89  n/a
 001:0023---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    01:B3-05       .30      .113 No_date    1:40   51.91 .683
      [XIMP=.40:TIMP=.50]
      [SLP=2.00:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0024---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:B3-05       .30      .113 No_date    1:40   51.91  n/a
                      + 02:MAJ-03       .11      .074 No_date    1:40   47.98  n/a
                      + 03:MAJ-02       .06      .022 No_date    1:45   60.89  n/a
      [DT= 1.00]  SUM=  04:SUM-05       .47      .208 No_date    1:40   52.22  n/a
 001:0025---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 04:SUM-05       .47      .208 No_date    1:40   52.22  n/a
      [RDT= 1.00] out<- 03:RMaj05       .47      .136 No_date    1:45   52.22  n/a
            overflow <= 01:NO          .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.6509E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 001:0026---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DIVERT HYD      -> 03:RMaj05       .47      .136 No_date    1:45   52.22  n/a
            diverted <= 01:MAJ-05       .15      .093 No_date    1:45   52.22  n/a
            diverted <= 02:min-05       .32      .043 No_date    1:45   52.22  n/a
 001:0027---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     PRINT HYD          02:min-05       .32      .043 No_date    1:45   52.22  n/a
 001:0028---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:MAJ-05       .15      .093 No_date    1:45   52.22  n/a
                      + 07:MAJ-04       .21      .139 No_date    1:43   55.15  n/a
      [DT= 1.00]  SUM=  09:SMaj05       .35      .231 No_date    1:44   53.93  n/a
 001:0029---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            02:min-05       .32      .043 No_date    1:45   52.22  n/a
                      + 06:SHmn02       .33      .062 No_date    1:47   60.89  n/a
      [DT= 1.00]  SUM=  07:Smin05       .65      .105 No_date    1:47   56.60  n/a
 001:0030---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 07:Smin05       .65      .105 No_date    1:47   56.60  n/a
      [LAG=  1.0 min]<- 06:SHmi05       .65      .105 No_date    1:48   56.60  n/a
 001:0031---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            06:SHmi05       .65      .105 No_date    1:48   56.60  n/a
                      + 08:SHmn04      1.12      .162 No_date    1:46   52.61  n/a
      [DT= 1.00]  SUM=  07:MH-209      1.77      .267 No_date    1:48   54.08  n/a
 001:0032---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 07:MH-209      1.77      .267 No_date    1:48   54.08  n/a
      [LAG=  1.0 min]<- 10:SH-209      1.77      .267 No_date    1:49   54.08  n/a
 001:0033---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    01:B3-06       .21      .078 No_date    1:40   50.34 .662
      [XIMP=.37:TIMP=.46]
      [SLP=2.00:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0034---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:B3-06       .21      .078 No_date    1:40   50.34  n/a
                      + 09:SMaj05       .35      .231 No_date    1:44   53.93  n/a
      [DT= 1.00]  SUM=  02:SUM-06       .56      .283 No_date    1:44   52.59  n/a
 001:0035---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
   * DIVERT HYD      -> 02:SUM-06       .56      .283 No_date    1:44   52.59  n/a
            diverted <= 04:min-06       .28      .128 No_date    1:44   52.59  n/a
            diverted <= 03:Maj-06       .28      .155 No_date    1:44   52.59  n/a
 001:0036---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     COMPUTE DUALHYD    04:min-06       .28      .128 No_date    1:44   52.59  n/a
        Major System /  05:MAJ-06       .17      .105 No_date    1:44   52.59  n/a
        Minor System \  06:min-06       .12      .023 No_date    1:32   52.59  n/a
 001:0037---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            03:Maj-06       .28      .155 No_date    1:44   52.59  n/a
                      + 05:MAJ-06       .17      .105 No_date    1:44   52.59  n/a
      [DT= 1.00]  SUM=  07:SMaj06       .45      .260 No_date    1:44   52.59  n/a
 001:0038---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE CHANNEL   -> 07:SMaj06       .45      .260 No_date    1:44   52.59  n/a
      [RDT= 1.00] out<- 09:RSMj06       .45      .228 No_date    1:47   52.59  n/a
      [L/S/n=  110./ .500/.013]
      {Vmax=  .575:Dmax=  .098}
 001:0039---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            06:min-06       .12      .023 No_date    1:32   52.59  n/a
                      + 10:SH-209      1.77      .267 No_date    1:49   54.08  n/a
      [DT= 1.00]  SUM=  07:smin-0      1.88      .290 No_date    1:49   53.98  n/a
 001:0040---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 07:smin-0      1.88      .290 No_date    1:49   53.98  n/a
      [LAG=  1.0 min]<- 10:SHmn06      1.88      .290 No_date    1:50   53.98  n/a
 001:0041---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    01:B3-07      1.08      .372 No_date    1:40   49.08 .646
      [XIMP=.34:TIMP=.43]
      [SLP=2.00:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0042---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:B3-07      1.08      .372 No_date    1:40   49.08  n/a
                      + 09:RSMj06       .45      .228 No_date    1:47   52.59  n/a
      [DT= 1.00]  SUM=  02:SUM-07      1.53      .476 No_date    1:45   50.10  n/a
 001:0043---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 02:SUM-07      1.53      .476 No_date    1:45   50.10  n/a
      [RDT= 1.00] out<- 01:R-07       1.41      .320 No_date    1:44   50.14  n/a
            overflow <= 09:NO          .11      .154 No_date    1:45   50.10  n/a
     {MxStoUsed=.1677E-01, TotOvfVol=.5536E-02, N-Ovf=    2, TotDurOvf=    0.hrs
 001:0044---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DIVERT HYD      -> 01:R-07       1.41      .320 No_date    1:44   50.14  n/a
            diverted <= 02:MAJ-07       .54      .232 No_date    1:44   50.14  n/a
            diverted <= 03:min-07       .88      .088 No_date    1:44   50.14  n/a
 001:0045---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     PRINT HYD          03:min-07       .88      .088 No_date    1:44   50.14  n/a
 001:0046---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            03:min-07       .88      .088 No_date    1:44   50.14  n/a
                      + 10:SHmn06      1.88      .290 No_date    1:50   53.98  n/a
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00271>       [DT= 1.00]  SUM=  08:smin07     2.76    .378 No_date    1:49   52.76  n/a
00272>  001:0047---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00273>     SHIFT HYD        -> 08:smin07     2.76    .378 No_date    1:49   52.76  n/a
00274>       [LAG=  1.0 min]<- 10:SHmn07     2.76    .378 No_date    1:50   52.76  n/a
00275>  001:0048---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00276>     ROUTE CHANNEL    -> 02:MAJ-07      .54    .232 No_date    1:44   50.14  n/a
00277>       [RDT= 1.00] out<- 09:R-Mj07      .54    .231 No_date    1:52   50.14  n/a
00278>       [L/S/n=   49./ .500/.013]
00279>       {Vmax=  .569:Dmax=  .094}
00280>  001:0049---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00281>     DESIGN STANDHYD     01:B3-08       .19    .074 No_date    1:40   55.04 .724
00282>       [XIMP=.46:TIMP=.58]
00283>       [SLP=2.00:DT= 1.00]
00284>       [LOSS= 1 : HORTONS]
00285>  001:0050---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00286>     ADD HYD             01:B3-08       .19    .074 No_date    1:40   55.04  n/a
00287>                       + 09:R-Mj07      .54    .231 No_date    1:52   50.14  n/a
00288>       [DT= 1.00]  SUM=  02:SUM-08      .72    .263 No_date    1:49   51.40  n/a
00289>  001:0051---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00290>   * DIVERT HYD       -> 02:SUM-08      .72    .263 No_date    1:49   51.40  n/a
00291>            diverted <= 04:min-08      .36    .119 No_date    1:49   51.40  n/a
00292>            diverted <= 03:Maj-08      .36    .144 No_date    1:49   51.40  n/a
00293>  001:0052---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00294>     COMPUTE DUALHYD     04:min-08      .36    .119 No_date    1:49   51.40  n/a
00295>        Major System /   05:MAJ-08      .22    .097 No_date    1:49   51.40  n/a
00296>        Minor System \   06:min-08      .14    .022 No_date    1:31   51.40  n/a
00297>  001:0053---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00298>     ADD HYD             03:Maj-08      .36    .144 No_date    1:49   51.40  n/a
00299>                       + 05:MAJ-08      .22    .097 No_date    1:49   51.40  n/a
00300>       [DT= 1.00]  SUM=  04:SMaj08      .58    .241 No_date    1:49   51.40  n/a
00301>  001:0054---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00302>     ROUTE CHANNEL    -> 04:SMaj08      .58    .241 No_date    1:49   51.40  n/a
00303>       [RDT= 1.00] out<- 09:RSMj08      .58    .238 No_date    1:50   51.40  n/a
00304>       [L/S/n=   43./ .500/.013]
00305>       {Vmax=  .571:Dmax=  .095}
00306>  001:0055---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00307>     ADD HYD             06:min-08      .14    .022 No_date    1:31   51.40  n/a
00308>                       + 10:SHmn07     2.76    .378 No_date    1:50   52.76  n/a
00309>       [DT= 1.00]  SUM=  08:Smin08     2.90    .400 No_date    1:50   52.70  n/a
00310>  001:0056---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00311>     SHIFT HYD        -> 08:Smin08     2.90    .400 No_date    1:50   52.70  n/a
00312>       [LAG=  1.0 min]<- 10:SHmn08     2.90    .400 No_date    1:51   52.70  n/a
00313>  001:0057---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00314>     DESIGN STANDHYD     01:B3-09       .25    .087 No_date    1:40   49.56 .652
00315>       [XIMP=.35:TIMP=.44]
00316>       [SLP=2.00:DT= 1.00]
00317>       [LOSS= 1 : HORTONS]
00318>  001:0058---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00319>     DIVERT HYD       -> 01:B3-09       .25    .087 No_date    1:40   49.56  n/a
00320>            diverted <= 03:min-09      .15    .049 No_date    1:40   49.56  n/a
00321>            diverted <= 02:Maj-09      .10    .038 No_date    1:40   49.56  n/a
00322>  001:0059---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00323>     COMPUTE DUALHYD     03:min-09      .15    .049 No_date    1:40   49.56  n/a
00324>        Major System /   04:MAJ-09      .03    .027 No_date    1:40   49.56  n/a
00325>        Minor System \   05:min-09      .11    .022 No_date    1:31   49.56  n/a
00326>  001:0060---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00327>     ADD HYD             02:Maj-09      .10    .038 No_date    1:40   49.56  n/a
00328>                       + 04:MAJ-09      .03    .027 No_date    1:40   49.56  n/a
00329>       [DT= 1.00]  SUM=  03:SUM-09      .13    .065 No_date    1:40   49.56  n/a
00330>  001:0061---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00331>     ROUTE CHANNEL    -> 03:SUM-09      .13    .065 No_date    1:40   49.56  n/a
00332>       [RDT= 1.00] out<- 07:RSMj09      .13    .056 No_date    1:40   49.56  n/a
00333>       [L/S/n=   69./ .500/.013]
00334>       {Vmax=  .501:Dmax=  .059}
00335>  001:0062---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00336>     SHIFT HYD        -> 05:min-09      .11    .022 No_date    1:31   49.56  n/a
00337>       [LAG=  1.0 min]<- 08:SHmn09      .11    .022 No_date    1:32   49.56  n/a
00338>  001:0063---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00339>     DESIGN STANDHYD     01:B3-11       .27    .090 No_date    1:40   45.29 .596
00340>       [XIMP=.26:TIMP=.33]
00341>       [SLP=2.00:DT= 1.00]
00342>       [LOSS= 1 : HORTONS]
00343>  001:0064---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00344>     ADD HYD             01:B3-11       .27    .090 No_date    1:40   45.29  n/a
00345>                       + 07:RSMj09      .13    .056 No_date    1:40   49.56  n/a
00346>                       + 09:RSMj08      .58    .238 No_date    1:50   51.40  n/a
00347>       [DT= 1.00]  SUM=  02:SUM-11      .99    .320 No_date    1:48   49.47  n/a
00348>  001:0065---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00349>   * DIVERT HYD       -> 02:SUM-11      .99    .320 No_date    1:48   49.47  n/a
00350>            diverted <= 04:min-11      .49    .145 No_date    1:48   49.47  n/a
00351>            diverted <= 03:Maj-11      .50    .175 No_date    1:48   49.47  n/a
00352>  001:0066---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00353>     COMPUTE DUALHYD     04:min-11      .49    .145 No_date    1:48   49.47  n/a
00354>        Major System /   05:MAJ-11      .32    .123 No_date    1:48   49.47  n/a
00355>        Minor System \   06:min-11      .17    .022 No_date    1:31   49.47  n/a
00356>  001:0067---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00357>     ADD HYD             03:Maj-11      .50    .175 No_date    1:48   49.47  n/a
00358>                       + 05:MAJ-11      .32    .123 No_date    1:48   49.47  n/a
00359>       [DT= 1.00]  SUM=  04:SMaj11      .82    .298 No_date    1:48   49.47  n/a
00360>  001:0068---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00361>     ROUTE CHANNEL    -> 04:SMaj11      .82    .298 No_date    1:48   49.47  n/a
00362>       [RDT= 1.00] out<- 07:RSMj11      .82    .294 No_date    1:49   49.47  n/a
00363>       [L/S/n=   44./ .500/.013]
00364>       {Vmax=  .588:Dmax=  .102}
00365>  001:0069---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00366>     ADD HYD             06:min-11      .17    .022 No_date    1:31   49.47  n/a
00367>                       + 08:SHmn09      .11    .022 No_date    1:32   49.56  n/a
00368>                       + 10:SHmn08     2.90    .400 No_date    1:51   52.70  n/a
00369>       [DT= 1.00]  SUM=  09:Smin11     3.18    .444 No_date    1:51   52.42  n/a
00370>  001:0070---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00371>     SHIFT HYD        -> 09:Smin11     3.18    .444 No_date    1:51   52.42  n/a
00372>       [LAG=  1.0 min]<- 08:SHmn11     3.18    .444 No_date    1:52   52.42  n/a
00373>  001:0071---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00374>     DESIGN STANDHYD     01:B3-10       .40    .143 No_date    1:40   50.63 .666
00375>       [XIMP=.37:TIMP=.47]
00376>       [SLP=2.00:DT= 1.00]
00377>       [LOSS= 1 : HORTONS]
00378>  001:0072---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00379>     ADD HYD             01:B3-10       .40    .143 No_date    1:40   50.63  n/a
00380>                       + 07:RSMj11      .82    .294 No_date    1:49   49.47  n/a
00381>       [DT= 1.00]  SUM=  02:SUM-10     1.22    .367 No_date    1:49   49.84  n/a
00382>  001:0073---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00383>   * DIVERT HYD       -> 02:SUM-10     1.22    .367 No_date    1:49   49.84  n/a
00384>            diverted <= 04:min-10      .59    .166 No_date    1:49   49.84  n/a
00385>            diverted <= 03:Maj-10      .63    .201 No_date    1:49   49.84  n/a
00386>  001:0074---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00387>     COMPUTE DUALHYD     04:min-10      .59    .166 No_date    1:49   49.84  n/a
00388>        Major System /   05:MAJ-10      .40    .144 No_date    1:49   49.84  n/a
00389>        Minor System \   06:min-10      .19    .022 No_date    1:31   49.84  n/a
00390>  001:0075---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00391>     ADD HYD             03:Maj-10      .63    .201 No_date    1:49   49.84  n/a
00392>                       + 05:MAJ-10      .40    .144 No_date    1:49   49.84  n/a
00393>       [DT= 1.00]  SUM=  04:SMaj10     1.03    .345 No_date    1:49   49.84  n/a
00394>  001:0076---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00395>     ROUTE CHANNEL    -> 04:SMaj10     1.03    .345 No_date    1:49   49.84  n/a
00396>       [RDT= 1.00] out<- 09:RSMj10     1.03    .342 No_date    1:50   49.84  n/a
00397>       [L/S/n=   48./ .500/.013]
00398>       {Vmax=  .611:Dmax=  .107}
00399>  001:0077---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00400>     ADD HYD             06:min-10      .19    .022 No_date    1:31   49.84  n/a
00401>                       + 08:SHmn11     3.18    .444 No_date    1:52   52.42  n/a
00402>       [DT= 1.00]  SUM=  10:Summ10     3.37    .466 No_date    1:52   52.27  n/a
00403>  001:0078---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00404>     DESIGN STANDHYD     01:B3-12       .27    .105 No_date    1:40   54.51 .717
00405>       [XIMP=.45:TIMP=.57]
00406>       [SLP=2.00:DT= 1.00]
00407>       [LOSS= 1 : HORTONS]
00408>  001:0079---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00409>     ADD HYD             01:B3-12       .27    .105 No_date    1:40   54.51  n/a
00410>                       + 09:RSMj10     1.03    .342 No_date    1:50   49.84  n/a
00411>       [DT= 1.00]  SUM=  02:SUM-12     1.30    .388 No_date    1:49   50.80  n/a
00412>  001:0080---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00413>   * DIVERT HYD       -> 02:SUM-12     1.30    .388 No_date    1:49   50.80  n/a
00414>            diverted <= 04:min-12      .62    .176 No_date    1:49   50.80  n/a
00415>            diverted <= 03:Maj-12      .68    .213 No_date    1:49   50.80  n/a
00416>  001:0081---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00417>     COMPUTE DUALHYD     04:min-12      .62    .176 No_date    1:49   50.80  n/a
00418>        Major System /   05:MAJ-12      .44    .154 No_date    1:49   50.80  n/a
00419>        Minor System \   06:min-12      .18    .022 No_date    1:31   50.80  n/a
00420>  001:0082---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00421>     ADD HYD             03:Maj-12      .68    .213 No_date    1:49   50.80  n/a
00422>                       + 05:MAJ-12      .44    .154 No_date    1:49   50.80  n/a
00423>       [DT= 1.00]  SUM=  04:SMaj12     1.12    .366 No_date    1:49   50.80  n/a
00424>  001:0083---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00425>     ROUTE CHANNEL    -> 04:SMaj12     1.12    .366 No_date    1:49   50.80  n/a
00426>       [RDT= 1.00] out<- 09:RSMj12     1.12    .363 No_date    1:50   50.80  n/a
00427>       [L/S/n=   51./ .500/.013]
00428>       {Vmax=  .621:Dmax=  .109}
00429>  001:0084---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00430>     ADD HYD             06:min-12      .18    .022 No_date    1:31   50.80  n/a
00431>                       + 10:Summ10     3.37    .466 No_date    1:52   52.27  n/a
00432>       [DT= 1.00]  SUM=  08:Smin12     3.55    .488 No_date    1:52   52.20  n/a
00433>  001:0085---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00434>     SHIFT HYD        -> 08:Smin12     3.55    .488 No_date    1:52   52.20  n/a
00435>       [LAG=  1.0 min]<- 10:SHmn12     3.55    .488 No_date    1:53   52.20  n/a
00436>  001:0086---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00437>     DESIGN STANDHYD     01:B3-13       .28    .109 No_date    1:40   54.22 .713
00438>       [XIMP=.45:TIMP=.56]
00439>       [SLP=2.00:DT= 1.00]
00440>       [LOSS= 1 : HORTONS]
00441>  001:0087---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00442>     ADD HYD             01:B3-13       .28    .109 No_date    1:40   54.22  n/a
00443>                       + 09:RSMj12     1.12    .363 No_date    1:50   50.80  n/a
00444>       [DT= 1.00]  SUM=  02:SUM-13     1.40    .410 No_date    1:50   51.49  n/a
00445>  001:0088---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00446>   * DIVERT HYD       -> 02:SUM-13     1.40    .410 No_date    1:50   51.49  n/a
00447>            diverted <= 04:min-13      .66    .185 No_date    1:50   51.49  n/a
00448>            diverted <= 03:Maj-13      .73    .224 No_date    1:50   51.49  n/a
00449>  001:0089---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00450>     COMPUTE DUALHYD     04:min-13      .66    .185 No_date    1:50   51.49  n/a
00451>        Major System /   05:MAJ-13      .48    .163 No_date    1:50   51.49  n/a
00452>        Minor System \   06:min-13      .18    .022 No_date    1:31   51.49  n/a
00453>  001:0090---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00454>     ADD HYD             03:Maj-13      .73    .224 No_date    1:50   51.49  n/a
00455>                       + 05:MAJ-13      .48    .163 No_date    1:50   51.49  n/a
00456>       [DT= 1.00]  SUM=  04:SMaj13     1.22    .388 No_date    1:50   51.49  n/a
00457>  001:0091---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00458>     ROUTE CHANNEL    -> 04:SMaj13     1.22    .388 No_date    1:50   51.49  n/a
00459>       [RDT= 1.00] out<- 09:RSMj13     1.22    .383 No_date    1:50   51.49  n/a
00460>       [L/S/n=   48./ .500/.013]
00461>       {Vmax=  .629:Dmax=  .111}
00462>  001:0092---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00463>     ADD HYD             06:min-13      .18    .022 No_date    1:31   51.49  n/a
00464>                       + 10:SHmn12     3.55    .488 No_date    1:53   52.20  n/a
00465>       [DT= 1.00]  SUM=  08:Smin13     3.73    .510 No_date    1:53   52.16  n/a
00466>  001:0093---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00467>     SHIFT HYD        -> 08:Smin13     3.73    .510 No_date    1:53   52.16  n/a
00468>       [LAG=  1.0 min]<- 10:SHmn13     3.73    .510 No_date    1:54   52.16  n/a
00469>  001:0094---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00470>     DESIGN STANDHYD     01:B3-14       .27    .100 No_date    1:40   50.67 .667
00471>       [XIMP=.38:TIMP=.47]
00472>       [SLP=2.00:DT= 1.00]
00473>       [LOSS= 1   HORTONS]
00474>  001:0095---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00475>     ADD HYD             01:B3-14       .27    .100 No_date    1:40   50.67  n/a
00476>                       + 09:RSMj13     1.22    .383 No_date    1:50   51.49  n/a
00477>       [DT= 1.00]  SUM=  02:SUM-14     1.49    .439 No_date    1:41   51.34  n/a
00478>  001:0096---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00479>   * DIVERT HYD       -> 02:SUM-14     1.49    .439 No_date    1:41   51.34  n/a
00480>            diverted <= 04:min-14      .70    .199 No_date    1:41   51.34  n/a
00481>            diverted <= 03:Maj-14      .78    .241 No_date    1:41   51.34  n/a
00482>  001:0097---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00483>     COMPUTE DUALHYD     04:min-14      .70    .199 No_date    1:41   51.34  n/a
00484>        Major System /   05:MAJ-14      .53    .177 No_date    1:41   51.34  n/a
00485>        Minor System \   06:min-14      .18    .022 No_date    1:31   51.34  n/a
00486>  001:0098---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00487>     ADD HYD             03:Maj-14      .78    .241 No_date    1:41   51.34  n/a
00488>                       + 05:MAJ-14      .53    .177 No_date    1:41   51.34  n/a
00489>       [DT= 1.00]  SUM=  04:SMaj14     1.31    .417 No_date    1:41   51.34  n/a
00490>  001:0099---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00491>     ROUTE CHANNEL    -> 04:SMaj14     1.31    .417 No_date    1:41   51.34  n/a
00492>       [RDT= 1.00] out<- 09:RSMj14     1.31    .408 No_date    1:42   51.34  n/a
00493>       [L/S/n=   48./ .500/.013]
00494>       {Vmax=  .640:Dmax=  .114}
00495>  001:0100---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00496>     ADD HYD             06:min-14      .18    .022 No_date    1:31   51.34  n/a
00497>                       + 10:SHmn13     3.73    .510 No_date    1:54   52.16  n/a
00498>       [DT= 1.00]  SUM=  08:Smin14     3.91    .532 No_date    1:54   52.13  n/a
00499>  001:0101---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00500>     SHIFT HYD        -> 08:Smin14     3.91    .532 No_date    1:54   52.13  n/a
00501>       [LAG=  1.0 min]<- 10:SHmn14     3.91    .532 No_date    1:55   52.13  n/a
00502>  001:0102---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00503>     DESIGN STANDHYD     01:B3-15       .26    .102 No_date    1:40   54.30 .714
00504>       [XIMP=.45:TIMP=.56]
00505>       [SLP=2.00:DT= 1.00]
00506>       [LOSS= 1 : HORTONS]
00507>  001:0103---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00508>     ADD HYD             01:B3-15       .26    .102 No_date    1:40   54.30  n/a
00509>                       + 09:RSMj14     1.31    .408 No_date    1:42   51.34  n/a
00510>       [DT= 1.00]  SUM=  02:SUM-15     1.57    .478 No_date    1:41   51.83  n/a
00511>  001:0104---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00512>   * DIVERT HYD       -> 02:SUM-15     1.57    .478 No_date    1:41   51.83  n/a
00513>            diverted <= 04:min-15      .74    .216 No_date    1:41   51.83  n/a
00514>            diverted <= 03:Maj-15      .83    .262 No_date    1:41   51.83  n/a
00515>  001:0105---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00516>     COMPUTE DUALHYD     04:min-15      .74    .216 No_date    1:41   51.83  n/a
00517>        Major System /   05:MAJ-15      .56    .194 No_date    1:41   51.83  n/a
00518>        Minor System \   06:min-15      .18    .022 No_date    1:31   51.83  n/a
00519>  001:0106---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00520>     ADD HYD             03:Maj-15      .83    .262 No_date    1:41   51.83  n/a
00521>                       + 05:MAJ-15      .56    .194 No_date    1:41   51.83  n/a
00522>       [DT= 1.00]  SUM=  04:SMaj15     1.39    .456 No_date    1:41   51.83  n/a
00523>  001:0107---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00524>     ROUTE CHANNEL    -> 04:SMaj15     1.39    .456 No_date    1:41   51.83  n/a
00525>       [RDT= 1.00] out<- 09:RSMj15     1.39    .450 No_date    1:43   51.83  n/a
00526>       [L/S/n=   48./ .500/.013]
00527>       {Vmax=  .653:Dmax=  .118}
00528>  001:0108---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00529>     ADD HYD             06:min-15      .18    .022 No_date    1:31   51.83  n/a
00530>                       + 10:SHmn14     3.91    .532 No_date    1:55   52.13  n/a
00531>       [DT= 1.00]  SUM=  08:Smin15     4.09    .554 No_date    1:55   52.11  n/a
00532>  001:0109---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00533>     SHIFT HYD        -> 08:Smin15     4.09    .554 No_date    1:55   52.11  n/a
00534>       [LAG=  1.0 min]<- 10:SHmn15     4.09    .554 No_date    1:56   52.11  n/a
00535>  001:0110---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
00536>     DESIGN STANDHYD     01:B3-16       .25    .097 No_date    1:40   54.18 .713
00537>       [XIMP=.44:TIMP=.56]
00538>       [SLP=2.00:DT= 1.00]
00539>       [LOSS= 1 : HORTONS]
00540>  001:0111---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
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    ADD HYD            01:B3-16       .25      .097 No_date   1:40   54.18  n/a
                     + 09:RSMj15     1.39      .450 No_date   1:43   51.83  n/a
      [DT= 1.00]  SUM= 02:SUM-16     1.64      .514 No_date   1:42   52.19  n/a
001:0112---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
 *  DIVERT HYD      -> 02:SUM-16     1.64      .514 No_date   1:42   52.19  n/a
           diverted <= 04:min-16      .77      .232 No_date   1:42   52.19  n/a
           diverted <= 03:Maj-16      .87      .281 No_date   1:42   52.19  n/a
001:0113---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    COMPUTE DUALHYD    04:min-16      .77      .232 No_date   1:42   52.19  n/a
       Major System /  05:MAJ-16      .60      .210 No_date   1:42   52.19  n/a
       Minor System \  06:min-16      .18      .022 No_date   1:31   52.19  n/a
001:0114---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            03:Maj-16      .87      .281 No_date   1:42   52.19  n/a
                     + 05:MAJ-16      .60      .210 No_date   1:42   52.19  n/a
      [DT= 1.00]  SUM= 04:SMaj16     1.47      .492 No_date   1:42   52.19  n/a
001:0115---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE CHANNEL   -> 04:SMaj16     1.47      .492 No_date   1:42   52.19  n/a
     [RDT= 1.00] out<- 09:RSMj16     1.47      .483 No_date   1:44   52.19  n/a
     [L/S/n=   63./ .500/.013]
     {Vmax=  .666:Dmax=  .121}
001:0116---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            06:min-16      .18      .022 No_date   1:31   52.19  n/a
                     + 10:SHmn15     4.09      .554 No_date   1:56   52.11  n/a
      [DT= 1.00]  SUM= 08:Smin16     4.26      .576 No_date   1:56   52.12  n/a
001:0117---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 08:Smin16     4.26      .576 No_date   1:56   52.12  n/a
     [LAG=  1.0 min]<- 10:SHmn16     4.26      .576 No_date   1:57   52.12  n/a
001:0118---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-17       .26      .089 No_date   1:40   47.21 .621
     [XIMP=.30:TIMP=.38]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
001:0119---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DIVERT HYD      -> 01:B3-17       .26      .089 No_date   1:40   47.21  n/a
           diverted <= 03:min-17      .16      .050 No_date   1:40   47.21  n/a
           diverted <= 02:Maj-17      .10      .039 No_date   1:40   47.21  n/a
001:0120---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    COMPUTE DUALHYD    03:min-17      .16      .050 No_date   1:40   47.21  n/a
       Major System /  04:MAJ-17      .04      .028 No_date   1:40   47.21  n/a
       Minor System \  05:min-17      .12      .022 No_date   1:32   47.21  n/a
001:0121---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            02:Maj-17      .10      .039 No_date   1:40   47.21  n/a
                     + 04:MAJ-17      .04      .028 No_date   1:40   47.21  n/a
      [DT= 1.00]  SUM= 03:SMaj17      .14      .067 No_date   1:40   47.21  n/a
001:0122---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE CHANNEL   -> 03:SMaj17      .14      .067 No_date   1:40   47.21  n/a
     [RDT= 1.00] out<- 07:RSMj17      .14      .054 No_date   1:41   47.21  n/a
     [L/S/n=   89./ .500/.013]
     {Vmax=  .504:Dmax=  .059}
001:0123---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 05:min-17      .12      .022 No_date   1:32   47.21  n/a
     [LAG=  1.0 min]<- 08:SHmn17      .12      .022 No_date   1:33   47.21  n/a
001:0124---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            08:SHmn17      .12      .022 No_date   1:33   47.21  n/a
                     + 10:SHmn16     4.26      .576 No_date   1:57   52.12  n/a
      [DT= 1.00]  SUM= 06:MH-245     4.38      .597 No_date   1:52   51.98  n/a
001:0125---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 06:MH-245     4.38      .597 No_date   1:52   51.98  n/a
     [LAG=  1.0 min]<- 10:SH-245     4.38      .597 No_date   1:53   51.98  n/a
001:0126---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-18       .29      .113 No_date   1:40   54.36 .715
     [XIMP=.45:TIMP=.56]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
001:0127---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:B3-18       .29      .113 No_date   1:40   54.36  n/a
                     + 07:RSMj17      .14      .054 No_date   1:41   47.21  n/a
                     + 09:RSMj16     1.47      .483 No_date   1:44   52.19  n/a
      [DT= 1.00]  SUM= 02:SUM-18     1.90      .602 No_date   1:43   52.15  n/a
001:0128---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
 *  DIVERT HYD      -> 02:SUM-18     1.90      .602 No_date   1:43   52.15  n/a
           diverted <= 04:min-18      .89      .272 No_date   1:43   52.15  n/a
           diverted <= 03:Maj-18     1.01      .329 No_date   1:43   52.15  n/a
001:0129---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    COMPUTE DUALHYD    04:min-18      .89      .272 No_date   1:43   52.15  n/a
       Major System /  05:MAJ-18      .70      .250 No_date   1:43   52.15  n/a
       Minor System \  06:min-18      .20      .022 No_date   1:31   52.15  n/a
001:0130---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            03:Maj-18     1.01      .329 No_date   1:43   52.15  n/a
                     + 05:MAJ-18      .70      .250 No_date   1:43   52.15  n/a
      [DT= 1.00]  SUM= 04:SMaj18     1.70      .580 No_date   1:43   52.15  n/a
001:0131---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE CHANNEL   -> 04:SMaj18     1.70      .580 No_date   1:43   52.15  n/a
     [RDT= 1.00] out<- 09:RSMj18     1.70      .572 No_date   1:45   52.15  n/a
     [L/S/n=   59./ .500/.013]
     {Vmax=  .690:Dmax=  .128}
001:0132---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            06:min-18      .20      .022 No_date   1:31   52.15  n/a
                     + 10:SH-245     4.38      .597 No_date   1:53   51.98  n/a
      [DT= 1.00]  SUM= 07:Smin18     4.58      .619 No_date   1:53   51.99  n/a
001:0133---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 07:Smin18     4.58      .619 No_date   1:53   51.99  n/a
     [LAG=  1.0 min]<- 10:SHmn18     4.58      .619 No_date   1:54   51.99  n/a
001:0134---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-19       .33      .127 No_date   1:40   53.31 .701
     [XIMP=.43:TIMP=.54]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
001:0135---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:B3-19       .33      .127 No_date   1:40   53.31  n/a
                     + 09:RSMj18     1.70      .572 No_date   1:45   52.15  n/a
      [DT= 1.00]  SUM= 02:SUM-19     2.03      .650 No_date   1:44   52.34  n/a
001:0136---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
 *  DIVERT HYD      -> 02:SUM-19     2.03      .650 No_date   1:44   52.34  n/a
           diverted <= 04:min-19      .89      .268 No_date   1:44   52.34  n/a
           diverted <= 03:Maj-19     1.15      .382 No_date   1:44   52.34  n/a
001:0137---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    COMPUTE DUALHYD    04:min-19      .89      .268 No_date   1:44   52.34  n/a
       Major System /  05:MAJ-19      .68      .246 No_date   1:44   52.34  n/a
       Minor System \  06:min-19      .20      .022 No_date   1:31   52.34  n/a
001:0138---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            03:Maj-19     1.15      .382 No_date   1:44   52.34  n/a
                     + 05:MAJ-19      .68      .246 No_date   1:44   52.34  n/a
      [DT= 1.00]  SUM= 04:SMaj19     1.83      .628 No_date   1:44   52.34  n/a
001:0139---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE CHANNEL   -> 04:SMaj19     1.83      .628 No_date   1:44   52.34  n/a
     [RDT= 1.00] out<- 09:RSMj19     1.83      .624 No_date   1:45   52.34  n/a
     [L/S/n=   52./ .600/.013]
     {Vmax=  .754:Dmax=  .127}
001:0140---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            06:min-19      .20      .022 No_date   1:31   52.34  n/a
                     + 10:SHmn18     4.58      .619 No_date   1:54   51.99  n/a
      [DT= 1.00]  SUM= 08:Smin19     4.78      .641 No_date   1:54   52.01  n/a
001:0141---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 08:Smin19     4.78      .641 No_date   1:54   52.01  n/a
     [LAG=  1.0 min]<- 10:SHmn19     4.78      .641 No_date   1:55   52.01  n/a
001:0142---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-20       .29      .111 No_date   1:40   53.09 .698
     [XIMP=.43:TIMP=.53]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
001:0143---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:B3-20       .29      .111 No_date   1:40   53.09  n/a
                     + 09:RSMj19     1.83      .624 No_date   1:45   52.34  n/a
      [DT= 1.00]  SUM= 02:SUM-20     2.12      .689 No_date   1:45   52.44  n/a
```

```
 001:0144---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  DIVERT HYD      -> 02:SUM-20     2.12      .689 No_date   1:45   52.44  n/a
            diverted <= 04:min-20      .92      .284 No_date   1:45   52.44  n/a
            diverted <= 03:Maj-20     1.20      .405 No_date   1:45   52.44  n/a
 001:0145---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     COMPUTE DUALHYD    04:min-20      .92      .284 No_date   1:45   52.44  n/a
        Major System /  05:MAJ-20      .72      .262 No_date   1:45   52.44  n/a
        Minor System \  06:min-20      .19      .022 No_date   1:31   52.44  n/a
 001:0146---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            03:Maj-20     1.20      .405 No_date   1:45   52.44  n/a
                      + 05:MAJ-20      .72      .262 No_date   1:45   52.44  n/a
       [DT= 1.00]  SUM= 04:SMaj20     1.93      .667 No_date   1:45   52.44  n/a
 001:0147---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE CHANNEL   -> 04:SMaj20     1.93      .667 No_date   1:45   52.44  n/a
      [RDT= 1.00] out<- 09:RSMj20     1.93      .662 No_date   1:46   52.44  n/a
      [L/S/n=   56./ .600/.013]
      {Vmax=  .765:Dmax=  .130}
 001:0148---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            06:min-20      .19      .022 No_date   1:31   52.44  n/a
                      + 10:SHmn19     4.78      .641 No_date   1:55   52.01  n/a
       [DT= 1.00]  SUM= 08:Smin20     4.98      .663 No_date   1:55   52.02  n/a
 001:0149---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 08:Smin20     4.98      .663 No_date   1:55   52.02  n/a
      [LAG=  1.0 min]<- 10:SHmn20     4.98      .663 No_date   1:56   52.02  n/a
 001:0150---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    01:B3-21       .57      .218 No_date   1:40   55.04 .724
      [XIMP=.46:TIMP=.58]
      [SLP=2.00:DT= 1.00]
      [LOSS= 1 : HORTONS]
 001:0151---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:B3-21       .57      .218 No_date   1:40   55.04  n/a
                      + 09:RSMj20     1.93      .662 No_date   1:46   52.44  n/a
       [DT= 1.00]  SUM= 02:SUM-21     2.50      .792 No_date   1:45   53.03  n/a
 001:0152---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  *  DIVERT HYD      -> 02:SUM-21     2.50      .792 No_date   1:45   53.03  n/a
            diverted <= 04:min-21     1.09      .327 No_date   1:45   53.03  n/a
            diverted <= 03:Maj-21     1.41      .465 No_date   1:45   53.03  n/a
 001:0153---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     COMPUTE DUALHYD    04:min-21     1.09      .327 No_date   1:45   53.03  n/a
        Major System /  05:MAJ-21      .80      .295 No_date   1:45   53.03  n/a
        Minor System \  06:min-21      .29      .032 No_date   1:31   53.03  n/a
 001:0154---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            03:Maj-21     1.41      .465 No_date   1:45   53.03  n/a
                      + 05:MAJ-21      .80      .295 No_date   1:45   53.03  n/a
       [DT= 1.00]  SUM= 04:SMaj21     2.21      .760 No_date   1:45   53.03  n/a
 001:0155---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE CHANNEL   -> 04:SMaj21     2.21      .760 No_date   1:45   53.03  n/a
      [RDT= 1.00] out<- 09:B-03Ma     2.21      .744 No_date   1:46   53.03  n/a
      [L/S/n=   92./ .600/.013]
      {Vmax=  .785:Dmax=  .137}
 001:0156---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            06:min-21      .29      .032 No_date   1:31   53.03  n/a
                      + 10:SHmn20     4.98      .663 No_date   1:56   52.02  n/a
       [DT= 1.00]  SUM= 08:Smin21     5.27      .695 No_date   1:56   52.08  n/a
 001:0157---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 08:Smin21     5.27      .695 No_date   1:56   52.08  n/a
      [LAG=  2.0 min]<- 10:B-03mi     5.27      .695 No_date   1:58   52.08  n/a
 001:0158---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SAVE HYD           10:B-03mi     5.27      .695 No_date   1:58   52.08  n/a
       fname :M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-B-03mi.001
       remark:B-03min
 001:0159---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SAVE HYD           09:B-03Ma     2.21      .744 No_date   1:46   53.03  n/a
       fname :M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-B-03Ma.001
       remark:B-03maj
  ** END OF RUN : 12

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





 RUN:COMMAND#
 013:0001--------------------------------------------------------------------------
     START
      [TZERO =     .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =  13 ]
#******************************************************************************
#  Project Name: [Carp Airport]    Project Number: [102085]
#  Date          : 05-03-2013
#  Modeller      : [R.S.ARCHER/R.LANGLOIS]
#  Company       : NOVATECH ENGINEERING CONSULTANTS LTD
#  License #     : 5320763
#******************************************************************************
 013:0002--------------------------------------------------------------------------
     READ STORM
       Filename = STORM.001
       Comment  = City of Ottawa:  100yr-12hr SCS Type II (10 min time step)
       [SDT=10.00:SDUR=  12.00:PTOT=  93.91]
 013:0003--------------------------------------------------------------------------
     DEFAULT VALUES
       Filename = M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\OTTAWA.DEF
       ICASEdv  = 1 (read and print data)
       FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                  ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----□
       Horton's infiltration equation parameters:
       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
       Parameters for PERVIOUS surfaces in STANDHYD:
       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
       Parameters for IMPERVIOUS surfaces in STANDHYD:
       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
       Parameters used in NASHYD:
       [Ia=   4.67 mm] [N= 3.00]
#STREETS NINE AND TEN
 013:0004---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    01:B3-01       .38      .073 No_date   6:00   58.40 .622
      [XIMP=.38:TIMP=.47]
      [SLP=2.00:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0005---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ROUTE RESERVOIR -> 01:B3-01       .38      .073 No_date   6:00   58.40  n/a
      [RDT= 1.00] out<- 04:R-01        .38      .053 No_date   6:03   58.40  n/a
            overflow <= 10:NO          .00      .000 No_date   0:00     .00  n/a
     {MxStoUsed=.3128E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
 013:0006---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DIVERT HYD      -> 04:R-01        .38      .053 No_date   6:03   58.40  n/a
            diverted <= 02:MAJ-01      .01      .011 No_date   6:03   58.40  n/a
            diverted <= 03:min-01      .37      .042 No_date   6:03   58.40  n/a
 013:0007---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     PRINT HYD          03:min-01      .37      .042 No_date   6:03   58.40  n/a
 013:0008---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     SHIFT HYD       -> 03:min-01      .37      .042 No_date   6:03   58.40  n/a
      [LAG=  2.0 min]<- 05:SHmn01      .37      .042 No_date   6:05   58.40  n/a
 013:0009---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     DESIGN STANDHYD    01:B3-04       .74      .148 No_date   6:00   64.51 .687
      [XIMP=.47:TIMP=.59]
      [SLP=2.00:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0010---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
     ADD HYD            01:B3-04       .74      .148 No_date   6:00   64.51  n/a
                      + 02:MAJ-01      .01      .011 No_date   6:03   58.40  n/a
       [DT= 1.00]  SUM= 06:SUM-04      .75      .156 No_date   6:00   64.40  n/a
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013:0011---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 06:SUM-04       .75     .156 No_date    6:00   64.40  n/a
     [RDT= 1.00] out<- 04:R-04         .75     .134 No_date    6:02   64.40  n/a
            overflow <= 10:NO          .00     .000 No_date    0:00     .00  n/a
    {MxStoUsed=.6273E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
013:0012---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DIVERT HYD      -> 04:R-04         .75     .134 No_date    6:02   64.40  n/a
            diverted <= 07:MAJ-04      .05     .049 No_date    6:02   64.40  n/a
            diverted <= 08:min-04      .70     .085 No_date    6:02   64.40  n/a
013:0013---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    PRINT HYD          08:min-04       .70     .085 No_date    6:02   64.40  n/a
013:0014---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-03        .31     .059 No_date    6:00   54.83 .584
     [XIMP=.32:TIMP=.40]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
013:0015---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    COMPUTE DUALHYD    01:B3-03        .31     .059 No_date    6:00   54.83  n/a
       Major System /  02:MAJ-03       .05     .026 No_date    6:00   54.83  n/a
       Minor System \  03:min-03       .26     .033 No_date    5:39   54.83  n/a
013:0016---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            03:min-03       .26     .033 No_date    5:39   54.83  n/a
                     + 05:SHmn01       .37     .042 No_date    6:05   58.40  n/a
                     + 08:min-04       .70     .085 No_date    6:02   64.40  n/a
     [DT= 1.00]  SUM=  04:summ04      1.33     .160 No_date    5:56   60.87  n/a
013:0017---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 04:summ04      1.33     .160 No_date    5:56   60.87  n/a
     [LAG=  1.0 min]<- 08:SHmn04      1.33     .160 No_date    5:57   60.87  n/a
013:0018---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-02        .39     .082 No_date    6:00   70.92 .755
     [XIMP=.58:TIMP=.72]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
013:0019---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 01:B3-02        .39     .082 No_date    6:00   70.92  n/a
     [RDT= 1.00] out<- 05:R-02         .39     .078 No_date    6:00   70.92  n/a
            overflow <= 10:NO          .00     .000 No_date    0:00     .00  n/a
    {MxStoUsed=.2319E-03, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
013:0020---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DIVERT HYD      -> 05:R-02         .39     .078 No_date    6:00   70.92  n/a
            diverted <= 03:MAJ-02      .03     .016 No_date    6:00   70.92  n/a
            diverted <= 04:min-02      .36     .062 No_date    6:00   70.92  n/a
013:0021---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    PRINT HYD          04:min-02       .36     .062 No_date    6:00   70.92  n/a
013:0022---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 04:min-02       .36     .062 No_date    6:00   70.92  n/a
     [LAG=  2.0 min]<- 06:SHmn02       .36     .062 No_date    6:02   70.92  n/a
013:0023---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-05        .30     .059 No_date    6:00   59.91 .638
     [XIMP=.40:TIMP=.50]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
013:0024---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:B3-05        .30     .059 No_date    6:00   59.91  n/a
                     + 02:MAJ-03       .05     .026 No_date    6:00   54.83  n/a
                     + 03:MAJ-02       .03     .016 No_date    6:00   70.92  n/a
     [DT= 1.00]  SUM=  04:SUM-05       .38     .100 No_date    6:00   60.02  n/a
013:0025---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 04:SUM-05       .38     .100 No_date    6:00   60.02  n/a
     [RDT= 1.00] out<- 03:RMaj05       .38     .072 No_date    6:02   60.02  n/a
            overflow <= 01:NO          .00     .000 No_date    0:00     .00  n/a
    {MxStoUsed=.5142E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
013:0026---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DIVERT HYD      -> 03:RMaj05       .38     .072 No_date    6:02   60.02  n/a
            diverted <= 01:MAJ-05      .03     .029 No_date    6:02   60.02  n/a
            diverted <= 02:min-05      .35     .043 No_date    6:02   60.02  n/a
013:0027---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    PRINT HYD          02:min-05       .35     .043 No_date    6:02   60.02  n/a
013:0028---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:MAJ-05       .03     .029 No_date    6:02   60.02  n/a
                     + 07:MAJ-04       .05     .049 No_date    6:02   64.40  n/a
     [DT= 1.00]  SUM=  09:SMaj05       .08     .078 No_date    6:02   62.84  n/a
013:0029---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            02:min-05       .35     .043 No_date    6:02   60.02  n/a
                     + 06:SHmn02       .36     .062 No_date    6:02   70.92  n/a
     [DT= 1.00]  SUM=  07:Smin05       .71     .105 No_date    6:00   65.59  n/a
013:0030---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 07:Smin05       .71     .105 No_date    6:00   65.59  n/a
     [LAG=  1.0 min]<- 06:SHmi05       .71     .105 No_date    6:01   65.59  n/a
013:0031---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            06:SHmi05       .71     .105 No_date    6:01   65.59  n/a
                     + 08:SHmn04      1.33     .160 No_date    5:57   60.87  n/a
     [DT= 1.00]  SUM=  07:MH-209      2.04     .265 No_date    6:01   62.51  n/a
013:0032---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 07:MH-209      2.04     .265 No_date    6:01   62.51  n/a
     [LAG=  1.0 min]<- 10:SH-209      2.04     .265 No_date    6:02   62.51  n/a
013:0033---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-06        .21     .041 No_date    6:00   57.89 .616
     [XIMP=.37:TIMP=.46]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
013:0034---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:B3-06        .21     .041 No_date    6:00   57.89  n/a
                     + 09:SMaj05       .08     .078 No_date    6:02   62.84  n/a
     [DT= 1.00]  SUM=  02:SUM-06       .29     .109 No_date    6:01   59.25  n/a
013:0035---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DIVERT HYD      -> 02:SUM-06       .29     .109 No_date    6:01   59.25  n/a
            diverted <= 04:min-06      .17     .060 No_date    6:01   59.25  n/a
            diverted <= 03:Maj-06      .12     .049 No_date    6:01   59.25  n/a
013:0036---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    COMPUTE DUALHYD    04:min-06       .17     .060 No_date    6:01   59.25  n/a
       Major System /  05:MAJ-06       .04     .037 No_date    6:01   59.25  n/a
       Minor System \  06:min-06       .13     .023 No_date    5:48   59.25  n/a
013:0037---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            03:Maj-06       .12     .049 No_date    6:01   59.25  n/a
                     + 05:MAJ-06       .04     .037 No_date    6:01   59.25  n/a
     [DT= 1.00]  SUM=  07:SMaj06       .16     .086 No_date    6:01   59.25  n/a
013:0038---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE CHANNEL   -> 07:SMaj06       .16     .086 No_date    6:01   59.25  n/a
     [RDT= 1.00] out<- 09:RSMj06       .16     .072 No_date    6:04   59.25  n/a
     [L/S/n=  110./ .500/.013]
     {Vmax=  .520:Dmax=  .065}
013:0039---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            06:min-06       .13     .023 No_date    5:48   59.25  n/a
                     + 10:SH-209      2.04     .265 No_date    6:02   62.51  n/a
     [DT= 1.00]  SUM=  07:smin-0      2.17     .288 No_date    6:02   62.31  n/a
013:0040---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 07:smin-0      2.17     .288 No_date    6:02   62.31  n/a
     [LAG=  1.0 min]<- 10:SHmn06      2.17     .288 No_date    6:03   62.31  n/a
013:0041---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-07       1.08     .203 No_date    6:00   56.28 .599
     [XIMP=.34:TIMP=.43]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
013:0042---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:B3-07       1.08     .203 No_date    6:00   56.28  n/a
                     + 09:RSMj06       .16     .072 No_date    6:04   59.25  n/a
     [DT= 1.00]  SUM=  02:SUM-07      1.24     .257 No_date    6:00   56.65  n/a
013:0043---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE RESERVOIR -> 02:SUM-07      1.24     .257 No_date    6:00   56.65  n/a
     [RDT= 1.00] out<- 01:R-07        1.24     .208 No_date    6:05   56.69  n/a
            overflow <= 09:NO          .00     .000 No_date    0:00     .00  n/a
    {MxStoUsed=.1468E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs
013:0044---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DIVERT HYD      -> 01:R-07        1.24     .208 No_date    6:05   56.69  n/a
```

```
            diverted <= 02:MAJ-07      .21     .121 No_date    6:05   56.69  n/a
            diverted <= 03:min-07     1.02     .087 No_date    6:05   56.69  n/a
013:0045---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    PRINT HYD          03:min-07      1.02     .087 No_date    6:05   56.69  n/a
013:0046---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            03:min-07      1.02     .087 No_date    6:05   56.69  n/a
                     + 10:SHmn06      2.17     .288 No_date    6:03   62.31  n/a
     [DT= 1.00]  SUM=  08:smin07      3.20     .375 No_date    6:03   60.52  n/a
013:0047---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 08:smin07      3.20     .375 No_date    6:03   60.52  n/a
     [LAG=  1.0 min]<- 10:SHmn07      3.20     .375 No_date    6:04   60.52  n/a
013:0048---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE CHANNEL   -> 02:MAJ-07       .21     .121 No_date    6:05   56.69  n/a
 *   [RDT= 1.00] out<- 09:R-Mj07       .21     .118 No_date    6:07   56.69  n/a
     [L/S/n=   49./ .500/.013]
     {Vmax=  .538:Dmax=  .074}
013:0049---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-08        .19     .037 No_date    6:00   63.85 .680
     [XIMP=.46:TIMP=.58]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
013:0050---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:B3-08        .19     .037 No_date    6:00   63.85  n/a
                     + 09:R-Mj07       .21     .118 No_date    6:07   56.69  n/a
     [DT= 1.00]  SUM=  02:SUM-08       .40     .138 No_date    6:07   60.02  n/a
013:0051---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DIVERT HYD      -> 02:SUM-08       .40     .138 No_date    6:07   60.02  n/a
            diverted <= 04:min-08      .23     .076 No_date    6:07   60.02  n/a
            diverted <= 03:Maj-08      .17     .062 No_date    6:07   60.02  n/a
013:0052---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    COMPUTE DUALHYD    04:min-08       .23     .076 No_date    6:07   60.02  n/a
       Major System /  05:MAJ-08       .08     .054 No_date    6:07   60.02  n/a
       Minor System \  06:min-08       .15     .022 No_date    5:49   60.02  n/a
013:0053---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            03:Maj-08       .17     .062 No_date    6:07   60.02  n/a
                     + 05:MAJ-08       .08     .054 No_date    6:07   60.02  n/a
     [DT= 1.00]  SUM=  04:SMaj08       .25     .116 No_date    6:07   60.02  n/a
013:0054---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE CHANNEL   -> 04:SMaj08       .25     .116 No_date    6:07   60.02  n/a
     [RDT= 1.00] out<- 09:RSMj08       .25     .114 No_date    6:08   60.02  n/a
     [L/S/n=   43./ .500/.013]
     {Vmax=  .537:Dmax=  .072}
013:0055---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            06:min-08       .15     .022 No_date    5:49   60.02  n/a
                     + 10:SHmn07      3.20     .375 No_date    6:04   60.52  n/a
     [DT= 1.00]  SUM=  08:Smin08      3.35     .397 No_date    6:04   60.49  n/a
013:0056---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 08:Smin08      3.35     .397 No_date    6:04   60.49  n/a
     [LAG=  1.0 min]<- 10:SHmn08      3.35     .397 No_date    6:05   60.49  n/a
013:0057---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-09        .25     .047 No_date    6:00   56.88 .606
     [XIMP=.35:TIMP=.44]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
013:0058---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DIVERT HYD      -> 01:B3-09        .25     .047 No_date    6:00   56.88  n/a
            diverted <= 03:min-09      .15     .030 No_date    6:00   56.88  n/a
            diverted <= 02:Maj-09      .10     .017 No_date    6:00   56.88  n/a
013:0059---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    COMPUTE DUALHYD    03:min-09       .15     .030 No_date    6:00   56.88  n/a
       Major System /  04:MAJ-09       .01     .008 No_date    6:00   56.88  n/a
       Minor System \  05:min-09       .14     .022 No_date    5:42   56.88  n/a
013:0060---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            02:Maj-09       .10     .017 No_date    6:00   56.88  n/a
                     + 04:MAJ-09       .01     .008 No_date    6:00   56.88  n/a
     [DT= 1.00]  SUM=  03:SUM-09       .11     .025 No_date    6:00   56.88  n/a
013:0061---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE CHANNEL   -> 03:SUM-09       .11     .025 No_date    6:00   56.88  n/a
     [RDT= 1.00] out<- 07:RSMj09       .11     .024 No_date    6:00   56.88  n/a
     [L/S/n=   69./ .500/.013]
     {Vmax=  .405:Dmax=  .041}
013:0062---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 05:min-09       .14     .022 No_date    5:42   56.88  n/a
     [LAG=  1.0 min]<- 08:SHmn09       .14     .022 No_date    5:43   56.88  n/a
013:0063---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-11        .27     .050 No_date    6:00   50.99 .543
     [XIMP=.26:TIMP=.33]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
013:0064---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:B3-11        .27     .050 No_date    6:00   50.99  n/a
                     + 07:RSMj09       .11     .024 No_date    6:00   56.88  n/a
                     + 09:RSMj08       .25     .114 No_date    6:08   60.02  n/a
     [DT= 1.00]  SUM=  02:SUM-11       .63     .158 No_date    6:07   55.54  n/a
013:0065---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DIVERT HYD      -> 02:SUM-11       .63     .158 No_date    6:07   55.54  n/a
            diverted <= 04:min-11      .36     .081 No_date    6:07   55.54  n/a
            diverted <= 03:Maj-11      .27     .077 No_date    6:07   55.54  n/a
013:0066---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    COMPUTE DUALHYD    04:min-11       .36     .081 No_date    6:07   55.54  n/a
       Major System /  05:MAJ-11       .15     .059 No_date    6:07   55.54  n/a
       Minor System \  06:min-11       .21     .022 No_date    5:36   55.54  n/a
013:0067---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            03:Maj-11       .27     .077 No_date    6:07   55.54  n/a
                     + 05:MAJ-11       .15     .059 No_date    6:07   55.54  n/a
     [DT= 1.00]  SUM=  04:SMaj11       .42     .136 No_date    6:07   55.54  n/a
013:0068---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE CHANNEL   -> 04:SMaj11       .42     .136 No_date    6:07   55.54  n/a
     [RDT= 1.00] out<- 07:RSMj11       .42     .134 No_date    6:08   55.54  n/a
     [L/S/n=   44./ .500/.013]
     {Vmax=  .544:Dmax=  .077}
013:0069---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            06:min-11       .21     .022 No_date    5:36   55.54  n/a
                     + 08:SHmn09       .14     .022 No_date    5:43   56.88  n/a
                     + 10:SHmn08      3.35     .397 No_date    6:05   60.49  n/a
     [DT= 1.00]  SUM=  09:Smin11      3.70     .440 No_date    6:04   60.08  n/a
013:0070---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD       -> 09:Smin11      3.70     .440 No_date    6:04   60.08  n/a
     [LAG=  1.0 min]<- 08:SHmn11      3.70     .440 No_date    6:05   60.08  n/a
013:0071---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD    01:B3-10        .40     .077 No_date    6:00   58.26 .620
     [XIMP=.37:TIMP=.47]
     [SLP=2.00:DT= 1.00]
     [LOSS= 1 : HORTONS]
013:0072---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            01:B3-10        .40     .077 No_date    6:00   58.26  n/a
                     + 07:RSMj11       .42     .134 No_date    6:08   55.54  n/a
     [DT= 1.00]  SUM=  02:SUM-10       .82     .178 No_date    6:07   56.87  n/a
013:0073---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DIVERT HYD      -> 02:SUM-10       .82     .178 No_date    6:07   56.87  n/a
            diverted <= 04:min-10      .45     .086 No_date    6:07   56.87  n/a
            diverted <= 03:Maj-10      .37     .092 No_date    6:07   56.87  n/a
013:0074---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    COMPUTE DUALHYD    04:min-10       .45     .086 No_date    6:07   56.87  n/a
       Major System /  05:MAJ-10       .21     .064 No_date    6:07   56.87  n/a
       Minor System \  06:min-10       .24     .022 No_date    5:33   56.87  n/a
013:0075---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD            03:Maj-10       .37     .092 No_date    6:07   56.87  n/a
                     + 05:MAJ-10       .21     .064 No_date    6:07   56.87  n/a
     [DT= 1.00]  SUM=  04:SMaj10       .58     .156 No_date    6:07   56.87  n/a
013:0076---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE CHANNEL   -> 04:SMaj10       .58     .156 No_date    6:07   56.87  n/a
     [RDT= 1.00] out<- 09:RSMj10       .58     .154 No_date    6:08   56.87  n/a
     [L/S/n=   48./ .500/.013]
     {Vmax=  .551:Dmax=  .081}
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01081> 013:0077---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01082>     ADD HYD            06:min-10     .24     .022 No_date    5:33   56.87  n/a
01083>                      + 08:SHmn11    3.70     .440 No_date    6:05   60.08  n/a
01084>      [DT= 1.00]  SUM=  10:Sumn10    3.94     .462 No_date    6:05   59.89  n/a
01085> 013:0078---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01086>     DESIGN STANDHYD    01:B3-12      .27     .053 No_date    6:00   63.23 .673
01087>      [XIMP=.45:TIMP=.57]
01088>      [SLP=2.00:DT= 1.00]
01089>      [LOSS= 1 : HORTONS]
01090> 013:0079---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01091>     ADD HYD            01:B3-12      .27     .053 No_date    6:00   63.23  n/a
01092>                      + 09:RSMj10     .58     .154 No_date    6:08   56.87  n/a
01093>      [DT= 1.00]  SUM=  02:SUM-12     .84     .186 No_date    6:00   58.88  n/a
01094> 013:0080---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01095>     DIVERT HYD      -> 02:SUM-12     .84     .186 No_date    6:00   58.88  n/a
01096>            diverted <= 04:min-12     .45     .088 No_date    6:00   58.88  n/a
01097>            diverted <= 03:Maj-12     .39     .098 No_date    6:00   58.88  n/a
01098> 013:0081---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01099>     COMPUTE DUALHYD    04:min-12     .45     .088 No_date    6:00   58.88  n/a
01100>       Major System /   05:MAJ-12     .23     .066 No_date    6:00   58.88  n/a
01101>       Minor System \   06:min-12     .23     .022 No_date    5:34   58.88  n/a
01102> 013:0082---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01103>     ADD HYD            03:Maj-12     .39     .098 No_date    6:00   58.88  n/a
01104>                      + 05:MAJ-12     .23     .066 No_date    6:00   58.88  n/a
01105>      [DT= 1.00]  SUM=  04:SMaj12     .62     .164 No_date    6:00   58.88  n/a
01106> 013:0083---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01107>     ROUTE CHANNEL   -> 04:SMaj12     .62     .164 No_date    6:00   58.88  n/a
01108>      [RDT= 1.00] out<- 09:RSMj12     .62     .159 No_date    6:02   58.88  n/a
01109>      [L/S/n=   51./ .500/.013]
01110>      {Vmax=  .553:Dmax=  .082}
01111> 013:0084---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01112>     ADD HYD            06:min-12     .23     .022 No_date    5:34   58.88  n/a
01113>                      + 10:Sumn10    3.94     .462 No_date    6:05   59.89  n/a
01114>      [DT= 1.00]  SUM=  08:Smin12    4.16     .484 No_date    6:05   59.83  n/a
01115> 013:0085---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01116>     SHIFT HYD       -> 08:Smin12    4.16     .484 No_date    6:05   59.83  n/a
01117>      [LAG=  1.0 min]<- 10:SHmn12    4.16     .484 No_date    6:06   59.83  n/a
01118> 013:0086---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01119>     DESIGN STANDHYD    01:B3-13      .28     .056 No_date    6:00   62.84 .669
01120>      [XIMP=.45:TIMP=.56]
01121>      [SLP=2.00:DT= 1.00]
01122>      [LOSS= 1 : HORTONS]
01123> 013:0087---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01124>     ADD HYD            01:B3-13      .28     .056 No_date    6:00   62.84  n/a
01125>                      + 09:RSMj12     .62     .159 No_date    6:02   58.88  n/a
01126>      [DT= 1.00]  SUM=  02:SUM-13     .90     .211 No_date    6:00   60.11  n/a
01127> 013:0088---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01128>   * DIVERT HYD      -> 02:SUM-13     .90     .211 No_date    6:00   60.11  n/a
01129>            diverted <= 04:min-13     .47     .095 No_date    6:00   60.11  n/a
01130>            diverted <= 03:Maj-13     .43     .116 No_date    6:00   60.11  n/a
01131> 013:0089---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01132>     COMPUTE DUALHYD    04:min-13     .47     .095 No_date    6:00   60.11  n/a
01133>       Major System /   05:MAJ-13     .25     .073 No_date    6:00   60.11  n/a
01134>       Minor System \   06:min-13     .22     .022 No_date    5:33   60.11  n/a
01135> 013:0090---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01136>     ADD HYD            03:Maj-13     .43     .116 No_date    6:00   60.11  n/a
01137>                      + 05:MAJ-13     .25     .073 No_date    6:00   60.11  n/a
01138>      [DT= 1.00]  SUM=  04:SMaj13     .68     .189 No_date    6:00   60.11  n/a
01139> 013:0091---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01140>     ROUTE CHANNEL   -> 04:SMaj13     .68     .189 No_date    6:00   60.11  n/a
01141>      [RDT= 1.00] out<- 09:RSMj13     .68     .184 No_date    6:01   60.11  n/a
01142>      [L/S/n=   48./ .500/.013]
01143>      {Vmax=  .559:Dmax=  .087}
01144> 013:0092---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01145>     ADD HYD            06:min-13     .22     .022 No_date    5:33   60.11  n/a
01146>                      + 10:SHmn12    4.16     .484 No_date    6:06   59.83  n/a
01147>      [DT= 1.00]  SUM=  08:Smin13    4.38     .506 No_date    6:06   59.84  n/a
01148> 013:0093---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01149>     SHIFT HYD       -> 08:Smin13    4.38     .506 No_date    6:06   59.84  n/a
01150>      [LAG=  1.0 min]<- 10:SHmn13    4.38     .506 No_date    6:07   59.84  n/a
01151> 013:0094---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01152>     DESIGN STANDHYD    01:B3-14      .27     .052 No_date    6:00   58.33 .621
01153>      [XIMP=.38:TIMP=.47]
01154>      [SLP=2.00:DT= 1.00]
01155>      [LOSS= 1 : HORTONS]
01156> 013:0095---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01157>     ADD HYD            01:B3-14      .27     .052 No_date    6:00   58.33  n/a
01158>                      + 09:RSMj13     .68     .184 No_date    6:01   60.11  n/a
01159>      [DT= 1.00]  SUM=  02:SUM-14     .95     .235 No_date    6:00   59.60  n/a
01160> 013:0096---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01161>   * DIVERT HYD      -> 02:SUM-14     .95     .235 No_date    6:00   59.60  n/a
01162>            diverted <= 04:min-14     .48     .106 No_date    6:00   59.60  n/a
01163>            diverted <= 03:Maj-14     .46     .128 No_date    6:00   59.60  n/a
01164> 013:0097---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01165>     COMPUTE DUALHYD    04:min-14     .48     .106 No_date    6:00   59.60  n/a
01166>       Major System /   05:MAJ-14     .27     .084 No_date    6:00   59.60  n/a
01167>       Minor System \   06:min-14     .21     .022 No_date    5:34   59.60  n/a
01168> 013:0098---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01169>     ADD HYD            03:Maj-14     .46     .128 No_date    6:00   59.60  n/a
01170>                      + 05:MAJ-14     .27     .084 No_date    6:00   59.60  n/a
01171>      [DT= 1.00]  SUM=  04:SMaj14     .73     .213 No_date    6:00   59.60  n/a
01172> 013:0099---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01173>     ROUTE CHANNEL   -> 04:SMaj14     .73     .213 No_date    6:00   59.60  n/a
01174>      [RDT= 1.00] out<- 09:RSMj14     .73     .208 No_date    6:01   59.60  n/a
01175>      [L/S/n=   48./ .500/.013]
01176>      {Vmax=  .565:Dmax=  .091}
01177> 013:0100---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01178>     ADD HYD            06:min-14     .21     .022 No_date    5:34   59.60  n/a
01179>                      + 10:SHmn13    4.38     .506 No_date    6:07   59.84  n/a
01180>      [DT= 1.00]  SUM=  08:Smin14    4.60     .528 No_date    6:07   59.83  n/a
01181> 013:0101---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01182>     SHIFT HYD       -> 08:Smin14    4.60     .528 No_date    6:07   59.83  n/a
01183>      [LAG=  1.0 min]<- 10:SHmn14    4.60     .528 No_date    6:08   59.83  n/a
01184> 013:0102---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01185>     DESIGN STANDHYD    01:B3-15      .26     .052 No_date    6:00   62.95 .670
01186>      [XIMP=.45:TIMP=.56]
01187>      [SLP=2.00:DT= 1.00]
01188>      [LOSS= 1 : HORTONS]
01189> 013:0103---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01190>     ADD HYD            01:B3-15      .26     .052 No_date    6:00   62.95  n/a
01191>                      + 09:RSMj14     .73     .208 No_date    6:01   59.60  n/a
01192>      [DT= 1.00]  SUM=  02:SUM-15    1.00     .259 No_date    6:00   60.48  n/a
01193> 013:0104---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01194>   * DIVERT HYD      -> 02:SUM-15    1.00     .259 No_date    6:00   60.48  n/a
01195>            diverted <= 04:min-15     .50     .117 No_date    6:00   60.48  n/a
01196>            diverted <= 03:Maj-15     .49     .142 No_date    6:00   60.48  n/a
01197> 013:0105---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01198>     COMPUTE DUALHYD    04:min-15     .50     .117 No_date    6:00   60.48  n/a
01199>       Major System /   05:MAJ-15     .29     .095 No_date    6:00   60.48  n/a
01200>       Minor System \   06:min-15     .21     .022 No_date    5:34   60.48  n/a
01201> 013:0106---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01202>     ADD HYD            03:Maj-15     .49     .142 No_date    6:00   60.48  n/a
01203>                      + 05:MAJ-15     .29     .095 No_date    6:00   60.48  n/a
01204>      [DT= 1.00]  SUM=  04:SMaj15     .78     .237 No_date    6:00   60.48  n/a
01205> 013:0107---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01206>     ROUTE CHANNEL   -> 04:SMaj15     .78     .237 No_date    6:00   60.48  n/a
01207>      [RDT= 1.00] out<- 09:RSMj15     .78     .231 No_date    6:01   60.48  n/a
01208>      [L/S/n=   48./ .500/.013]
01209>      {Vmax=  .570:Dmax=  .094}
01210> 013:0108---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01211>     ADD HYD            06:min-15     .21     .022 No_date    5:34   60.48  n/a
01212>                      + 10:SHmn14    4.60     .528 No_date    6:08   59.83  n/a
01213>      [DT= 1.00]  SUM=  08:Smin15    4.81     .550 No_date    6:08   59.86  n/a
01214> 013:0109---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01215>     SHIFT HYD       -> 08:Smin15    4.81     .550 No_date    6:08   59.86  n/a
01216>      [LAG=  1.0 min]<- 10:SHmn15    4.81     .550 No_date    6:09   59.86  n/a
01217> 013:0110---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01218>     DESIGN STANDHYD    01:B3-16      .25     .050 No_date    6:00   62.75 .668
01219>      [XIMP=.44:TIMP=.56]
01220>      [SLP=2.00:DT= 1.00]
01221>      [LOSS= 1 : HORTONS]
01222> 013:0111---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01223>     ADD HYD            01:B3-16      .25     .050 No_date    6:00   62.75  n/a
01224>                      + 09:RSMj15     .78     .231 No_date    6:01   60.48  n/a
01225>      [DT= 1.00]  SUM=  02:SUM-16    1.03     .280 No_date    6:00   61.03  n/a
01226> 013:0112---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01227>   * DIVERT HYD      -> 02:SUM-16    1.03     .280 No_date    6:00   61.03  n/a
01228>            diverted <= 04:min-16     .52     .127 No_date    6:00   61.03  n/a
01229>            diverted <= 03:Maj-16     .52     .153 No_date    6:00   61.03  n/a
01230> 013:0113---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01231>     COMPUTE DUALHYD    04:min-16     .52     .127 No_date    6:00   61.03  n/a
01232>       Major System /   05:MAJ-16     .30     .105 No_date    6:00   61.03  n/a
01233>       Minor System \   06:min-16     .21     .022 No_date    5:34   61.03  n/a
01234> 013:0114---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01235>     ADD HYD            03:Maj-16     .52     .153 No_date    6:00   61.03  n/a
01236>                      + 05:MAJ-16     .30     .105 No_date    6:00   61.03  n/a
01237>      [DT= 1.00]  SUM=  04:SMaj16     .82     .258 No_date    6:00   61.03  n/a
01238> 013:0115---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01239>     ROUTE CHANNEL   -> 04:SMaj16     .82     .258 No_date    6:00   61.03  n/a
01240>      [RDT= 1.00] out<- 09:RSMj16     .82     .251 No_date    6:01   61.03  n/a
01241>      [L/S/n=   63./ .500/.013]
01242>      {Vmax=  .574:Dmax=  .098}
01243> 013:0116---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01244>     ADD HYD            06:min-16     .21     .022 No_date    5:34   61.03  n/a
01245>                      + 10:SHmn15    4.81     .550 No_date    6:09   59.86  n/a
01246>      [DT= 1.00]  SUM=  08:Smin16    5.02     .572 No_date    6:09   59.91  n/a
01247> 013:0117---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01248>     SHIFT HYD       -> 08:Smin16    5.02     .572 No_date    6:09   59.91  n/a
01249>      [LAG=  1.0 min]<- 10:SHmn16    5.02     .572 No_date    6:10   59.91  n/a
01250> 013:0118---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01251>     DESIGN STANDHYD    01:B3-17      .26     .049 No_date    6:00   53.80 .573
01252>      [XIMP=.30:TIMP=.38]
01253>      [SLP=2.00:DT= 1.00]
01254>      [LOSS= 1 : HORTONS]
01255> 013:0119---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01256>     DIVERT HYD      -> 01:B3-17      .26     .049 No_date    6:00   53.80  n/a
01257>            diverted <= 03:min-17     .16     .031 No_date    6:00   53.80  n/a
01258>            diverted <= 02:Maj-17     .10     .018 No_date    6:00   53.80  n/a
01259> 013:0120---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01260>     COMPUTE DUALHYD    03:min-17     .16     .031 No_date    6:00   53.80  n/a
01261>       Major System /   04:MAJ-17     .01     .009 No_date    6:00   53.80  n/a
01262>       Minor System \   05:min-17     .15     .022 No_date    5:42   53.80  n/a
01263> 013:0121---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01264>     ADD HYD            02:Maj-17     .10     .018 No_date    6:00   53.80  n/a
01265>                      + 04:MAJ-17     .01     .009 No_date    6:00   53.80  n/a
01266>      [DT= 1.00]  SUM=  03:SMaj17     .11     .027 No_date    6:00   53.80  n/a
01267> 013:0122---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01268>     ROUTE CHANNEL   -> 03:SMaj17     .11     .027 No_date    6:00   53.80  n/a
01269>      [RDT= 1.00] out<- 07:RSMj17     .11     .026 No_date    6:00   53.80  n/a
01270>      [L/S/n=   89./ .500/.013]
01271>      {Vmax=  .409:Dmax=  .042}
01272> 013:0123---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01273>     SHIFT HYD       -> 05:min-17     .15     .022 No_date    5:42   53.80  n/a
01274>      [LAG=  1.0 min]<- 08:SHmn17     .15     .022 No_date    5:43   53.80  n/a
01275> 013:0124---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01276>     ADD HYD            08:SHmn17     .15     .022 No_date    5:43   53.80  n/a
01277>                      + 10:SHmn16    5.02     .572 No_date    6:10   59.91  n/a
01278>      [DT= 1.00]  SUM=  06:MH-245    5.17     .593 No_date    6:06   59.74  n/a
01279> 013:0125---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01280>     SHIFT HYD       -> 06:MH-245    5.17     .593 No_date    6:06   59.74  n/a
01281>      [LAG=  1.0 min]<- 10:SH-245    5.17     .593 No_date    6:07   59.74  n/a
01282> 013:0126---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01283>     DESIGN STANDHYD    01:B3-18      .29     .058 No_date    6:00   63.05 .671
01284>      [XIMP=.45:TIMP=.56]
01285>      [SLP=2.00:DT= 1.00]
01286>      [LOSS= 1 : HORTONS]
01287> 013:0127---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01288>     ADD HYD            01:B3-18      .29     .058 No_date    6:00   63.05  n/a
01289>                      + 07:RSMj17     .11     .026 No_date    6:00   53.80  n/a
01290>                      + 09:RSMj16     .82     .251 No_date    6:01   61.03  n/a
01291>      [DT= 1.00]  SUM=  02:SUM-18    1.22     .333 No_date    6:00   60.84  n/a
01292> 013:0128---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01293>   * DIVERT HYD      -> 02:SUM-18    1.22     .333 No_date    6:00   60.84  n/a
01294>            diverted <= 04:min-18     .61     .151 No_date    6:00   60.84  n/a
01295>            diverted <= 03:Maj-18     .62     .182 No_date    6:00   60.84  n/a
01296> 013:0129---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01297>     COMPUTE DUALHYD    04:min-18     .61     .151 No_date    6:00   60.84  n/a
01298>       Major System /   05:MAJ-18     .37     .129 No_date    6:00   60.84  n/a
01299>       Minor System \   06:min-18     .24     .022 No_date    5:33   60.84  n/a
01300> 013:0130---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01301>     ADD HYD            03:Maj-18     .62     .182 No_date    6:00   60.84  n/a
01302>                      + 05:MAJ-18     .37     .129 No_date    6:00   60.84  n/a
01303>      [DT= 1.00]  SUM=  04:SMaj18     .99     .311 No_date    6:00   60.84  n/a
01304> 013:0131---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01305>     ROUTE CHANNEL   -> 04:SMaj18     .99     .311 No_date    6:00   60.84  n/a
01306>      [RDT= 1.00] out<- 09:RSMj18     .99     .304 No_date    6:01   60.84  n/a
01307>      [L/S/n=   59./ .500/.013]
01308>      {Vmax=  .594:Dmax=  .104}
01309> 013:0132---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01310>     ADD HYD            06:min-18     .24     .022 No_date    5:33   60.84  n/a
01311>                      + 10:SH-245    5.17     .593 No_date    6:07   59.74  n/a
01312>      [DT= 1.00]  SUM=  07:Smin18    5.41     .615 No_date    6:07   59.79  n/a
01313> 013:0133---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01314>     SHIFT HYD       -> 07:Smin18    5.41     .615 No_date    6:07   59.79  n/a
01315>      [LAG=  1.0 min]<- 10:SHmn18    5.41     .615 No_date    6:08   59.79  n/a
01316> 013:0134---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01317>     DESIGN STANDHYD    01:B3-19      .33     .065 No_date    6:00   61.70 .657
01318>      [XIMP=.43:TIMP=.54]
01319>      [SLP=2.00:DT= 1.00]
01320>      [LOSS= 1 : HORTONS]
01321> 013:0135---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01322>     ADD HYD            01:B3-19      .33     .065 No_date    6:00   61.70  n/a
01323>                      + 09:RSMj18     .99     .304 No_date    6:01   60.84  n/a
01324>      [DT= 1.00]  SUM=  02:SUM-19    1.32     .367 No_date    6:00   61.05  n/a
01325> 013:0136---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01326>   * DIVERT HYD      -> 02:SUM-19    1.32     .367 No_date    6:00   61.05  n/a
01327>            diverted <= 04:min-19     .62     .152 No_date    6:00   61.05  n/a
01328>            diverted <= 03:Maj-19     .70     .216 No_date    6:00   61.05  n/a
01329> 013:0137---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01330>     COMPUTE DUALHYD    04:min-19     .62     .152 No_date    6:00   61.05  n/a
01331>       Major System /   05:MAJ-19     .37     .130 No_date    6:00   61.05  n/a
01332>       Minor System \   06:min-19     .25     .022 No_date    5:33   61.05  n/a
01333> 013:0138---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01334>     ADD HYD            03:Maj-19     .70     .216 No_date    6:00   61.05  n/a
01335>                      + 05:MAJ-19     .37     .130 No_date    6:00   61.05  n/a
01336>      [DT= 1.00]  SUM=  04:SMaj19    1.07     .345 No_date    6:00   61.05  n/a
01337> 013:0139---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01338>     ROUTE CHANNEL   -> 04:SMaj19    1.07     .345 No_date    6:00   61.05  n/a
01339>      [RDT= 1.00] out<- 09:RSMj19    1.07     .339 No_date    6:01   61.05  n/a
01340>      [L/S/n=   52./ .600/.013]
01341>      {Vmax=  .653:Dmax=  .104}
01342> 013:0140---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01343>     ADD HYD            06:min-19     .25     .022 No_date    5:33   61.05  n/a
01344>                      + 10:SHmn18    5.41     .615 No_date    6:08   59.79  n/a
01345>      [DT= 1.00]  SUM=  08:Smin19    5.66     .637 No_date    6:08   59.84  n/a
01346> 013:0141---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01347>     SHIFT HYD       -> 08:Smin19    5.66     .637 No_date    6:08   59.84  n/a
01348>      [LAG=  1.0 min]<- 10:SHmn19    5.66     .637 No_date    6:09   59.84  n/a
01349> 013:0142---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
01350>     DESIGN STANDHYD    01:B3-20      .29     .057 No_date    6:00   61.43 .654
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      [XIMP=.43:TIMP=.53]
      [SLP=2.00:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0143---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             01:B3-20       .29     .057 No_date    6:00   61.43  n/a
                      + 09:RSMj19     1.07     .339 No_date    6:01   61.05  n/a
      [DT= 1.00]   SUM= 02:SUM-20     1.36     .395 No_date    6:00   61.13  n/a
 013:0144---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  * DIVERT HYD       -> 02:SUM-20     1.36     .395 No_date    6:00   61.13  n/a
            diverted <= 04:min-20      .63     .163 No_date    6:00   61.13  n/a
            diverted <= 03:Maj-20      .73     .232 No_date    6:00   61.13  n/a
 013:0145---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    COMPUTE DUALHYD     04:min-20      .63     .163 No_date    6:00   61.13  n/a
         Major System / 05:MAJ-20      .40     .141 No_date    6:00   61.13  n/a
         Minor System \ 06:min-20      .23     .022 No_date    5:33   61.13  n/a
 013:0146---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             03:Maj-20      .73     .232 No_date    6:00   61.13  n/a
                      + 05:MAJ-20      .40     .141 No_date    6:00   61.13  n/a
      [DT= 1.00]   SUM= 04:SMaj20     1.12     .373 No_date    6:00   61.13  n/a
 013:0147---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE CHANNEL    -> 04:SMaj20     1.12     .373 No_date    6:00   61.13  n/a
     [RDT= 1.00] out<- 09:RSMj20     1.12     .366 No_date    6:01   61.13  n/a
      [L/S/n=   56./ .600/.013]
      {Vmax=  .666:Dmax=  .107}
 013:0148---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             06:min-20      .23     .022 No_date    5:33   61.13  n/a
                      + 10:SHmn19     5.66     .637 No_date    6:09   59.84  n/a
      [DT= 1.00]   SUM= 08:Smin20     5.89     .659 No_date    6:09   59.89  n/a
 013:0149---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD        -> 08:Smin20     5.89     .659 No_date    6:09   59.89  n/a
      [LAG=  1.0 min]<- 10:SHmn20     5.89     .659 No_date    6:10   59.89  n/a
 013:0150---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    DESIGN STANDHYD     01:B3-21       .57     .114 No_date    6:00   63.85 .680
      [XIMP=.46:TIMP=.58]
      [SLP=2.00:DT= 1.00]
      [LOSS= 1 : HORTONS]
 013:0151---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             01:B3-21       .57     .114 No_date    6:00   63.85  n/a
                      + 09:RSMj20     1.12     .366 No_date    6:01   61.13  n/a
      [DT= 1.00]   SUM= 02:SUM-21     1.69     .477 No_date    6:00   62.05  n/a
 013:0152---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
  * DIVERT HYD       -> 02:SUM-21     1.69     .477 No_date    6:00   62.05  n/a
            diverted <= 04:min-21      .79     .197 No_date    6:00   62.05  n/a
            diverted <= 03:Maj-21      .91     .280 No_date    6:00   62.05  n/a
 013:0153---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    COMPUTE DUALHYD     04:min-21      .79     .197 No_date    6:00   62.05  n/a
         Major System / 05:MAJ-21      .44     .165 No_date    6:00   62.05  n/a
         Minor System \ 06:min-21      .35     .032 No_date    5:33   62.05  n/a
 013:0154---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             03:Maj-21      .91     .280 No_date    6:00   62.05  n/a
                      + 05:MAJ-21      .44     .165 No_date    6:00   62.05  n/a
      [DT= 1.00]   SUM= 04:SMaj21     1.35     .445 No_date    6:00   62.05  n/a
 013:0155---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ROUTE CHANNEL    -> 04:SMaj21     1.35     .445 No_date    6:00   62.05  n/a
     [RDT= 1.00] out<- 09:B-03Ma     1.35     .432 No_date    6:01   62.05  n/a
      [L/S/n=   92./ .600/.013]
      {Vmax=  .696:Dmax=  .113}
 013:0156---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    ADD HYD             06:min-21      .35     .032 No_date    5:33   62.05  n/a
                      + 10:SHmn20     5.89     .659 No_date    6:10   59.89  n/a
      [DT= 1.00]   SUM= 08:Smin21     6.23     .691 No_date    6:10   60.01  n/a
 013:0157---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SHIFT HYD        -> 08:Smin21     6.23     .691 No_date    6:10   60.01  n/a
      [LAG=  2.0 min]<- 10:B-03mi     6.23     .691 No_date    6:12   60.01  n/a
 013:0158---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SAVE HYD            10:B-03mi     6.23     .691 No_date    6:12   60.01  n/a
      fname :M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-B-03mi.013
      remark:B-03min
 013:0159---------------ID:NHYD-------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.
    SAVE HYD            09:B-03Ma     1.35     .432 No_date    6:01   62.05  n/a
      fname :M:\2002\102085\DATA\CALCUL-1\SWMHYMO\2012\H-B-03Ma.013
      remark:B-03maj
 013:0002-----------------------------------------------------------------------
      FINISH
-------------------------------------------------------------------------------
*******************************************************************************
    WARNINGS / ERRORS / NOTES
    -------------------------
 001:0035 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 001:0051 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 001:0065 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 001:0073 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 001:0080 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 001:0088 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 001:0096 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 001:0104 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 001:0112 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 001:0128 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 001:0136 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 001:0144 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 001:0152 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 013:0088 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 013:0096 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 013:0104 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 013:0112 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 013:0128 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 013:0136 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 013:0144 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
 013:0152 DIVERT HYD      ->
      *** WARNING: Outflow tables were exceeded.
  Simulation ended on 2013-05-23     at 12:52:32
===============================================================================
```

APPENDIX C
Storm Drainage

1) 2-Year Storm Sewer Design Sheet (February 2024)

PROJECT #: 102085
PROJECT NAME: CARP AIRPORT PHASE 1B-2 RESIDENTIAL
LOCATION: CARP, ON

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: JULY 2023
REVISED: FEBRUARY 2024

2 Year Storm Sewer Design Sheet - Phase 1B-2 and Future Development Lands

		AREA (ha)			FLOW					PROPOSED SEWER							
Upstream Manhole	Downstream Manhole	AREA ID	TOTAL AREA	R	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	*PEAK FLOW Q (l/s)	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	EXCESS CAPACITY (l/s)	Q/Qfull
266	267	A-2, A-4	0.69	0.68	1.31	1.31	10.00	76.81	100.87	375	0.57	114.0	132.50	1.20	1.59	31.63	0.76
267	268				0.00	1.31	11.59	71.21	93.53	450	0.41	40.8	182.74	1.15	0.59	89.21	0.51
268	269	A-6	0.38	0.71	0.74	2.06	12.18	69.35	142.69	525	0.33	78.2	247.30	1.14	1.14	104.61	0.58
279	269	A-5, A-8, A-10	1.00	0.49	1.37	1.37	10.00	76.81	105.10	450	0.22	74.2	133.86	0.84	1.47	28.76	0.79
281	269	A-7, A-12	1.05	0.50	1.47	1.47	10.00	76.81	112.80	375	0.70	45.5	146.84	1.33	0.57	34.04	0.77
269	270	A-9	0.23	0.67	0.42	5.32	13.32	66.04	351.04	675	0.26	50.8	429.05	1.20	0.71	78.01	0.82
270	271	A-11	0.47	0.47	0.61	5.92	14.03	64.16	380.05	675	0.24	66.4	412.22	1.15	0.96	32.16	0.92
271	272				0.00	5.92	14.99	61.80	366.02	750	0.18	59.5	472.80	1.07	0.93	106.78	0.77
272	273	A-14	0.51	0.68	0.96	6.89	15.92	59.69	411.11	750	0.18	104.9	472.80	1.07	1.64	61.69	0.87
280	273	A-16, A-13	0.89	0.53	1.31	1.31	10.00	76.81	100.42	525	0.25	73.6	215.25	0.99	1.23	114.82	0.47
273	274	A-17	0.29	0.62	0.50	8.69	17.55	56.34	489.65	900	0.25	43.4	906.07	1.42	0.51	416.42	0.54
274	275	A-15	0.41	0.45	0.52	9.21	18.06	55.38	509.90	900	0.25	53.0	906.07	1.42	0.62	396.17	0.56
FUTURE LANDS[1]	275	FUTURE	28.56	0.62	49.22	49.22	10.00	76.81	3780								
Combined Stormwater Management Pond Inlet																	
275	276					58.42	18.68	54.26	3169.95	1650	0.35	15.9	5397.62	2.52	0.11	2227.67	0.59
276	278					58.42	18.78	54.07	3159.14	1650	0.38	10.4	5624.19	2.63	0.07	2465.05	0.56
278	POND					58.42	18.85	53.96	3152.40	1650	0.35	17.7	5397.62	2.52	0.12	2245.22	0.58

[1] Future development lands assumed R value = 0.65. Refer to drawing 102085-SWM7. Sewers downstream of MH 275 are sized for Phase 1B-2 and future development lands combined.

Definitions
Q = 2.78 AIR
Q = Peak Flow, in Litres per second (L/s)
A = Area in hectares (ha)
I = 5 YEAR Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min Velocity = 0.8 m/sec.
3) 2 Year intensity = 732.951 / (time + 6.199)$^{0.810}$

APPENDIX D
Stormwater Modelling

West Capital Airpark - Phase 1B-2 Residential
Post-Development Model Parameters
Interim Conditions

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	No Depression (%)	Flow Path Length (m)	Equivalent Width (m)	Average Slope (%)
Phase 1B-1							
1B-01	0.17	0.49	41.4%	0%	15	113	2.0%
1B-02	0.24	0.54	48.6%	30%	18	132	4.5%
1B-03	0.15	0.45	35.7%	0%	43	35	1.5%
1B-04	0.22	0.50	42.9%	30%	18	124	5.0%
1B-05	0.14	0.50	42.9%	20%	15	91	3.0%
1B-06	0.19	0.46	37.1%	35%	20	94	5.0%
1B-07	0.24	0.51	44.3%	40%	25	97	4.0%
1B-08	0.23	0.59	55.7%	40%	25	94	4.5%
1B-09	0.23	0.62	60.0%	40%	24	95	4.5%
1B-10	0.21	0.62	60.0%	35%	23	93	4.5%
1B-11	0.35	0.47	38.6%	0%	13	267	3.0%
1B-12	0.20	0.60	57.1%	35%	22	93	5.0%
1B-13	0.28	0.62	60.0%	35%	24	117	4.5%
1B-14	0.25	0.63	61.4%	35%	24	105	4.0%
1B-15	0.47	0.63	61.4%	40%	23	200	4.5%
1B-16	4.61	0.25	7.1%	0%	213	217	2.0%
B1	0.70	0.32	17.1%	100%	27	257	4.0%
B2	1.26	0.30	14.3%	100%	27	471	3.5%
Phase 1B-2							
A-01	0.493	0.45	35.7%	100%	104	47	3.5%
A-02	0.242	0.67	67.1%	40%	22	109	4.0%
A-03	0.476	0.61	58.6%	100%	117	41	2.5%
A-04	0.450	0.69	70.0%	45%	24	186	4.5%
A-05	0.367	0.46	37.1%	100%	85	43	3.5%
A-06	0.377	0.71	72.9%	35%	27	140	4.0%
A-07	0.357	0.57	52.9%	100%	87	41	2.5%
A-08	0.205	0.57	52.9%	0%	14	151	2.0%
A-09	0.226	0.67	67.1%	30%	17	136	4.0%
A-10	0.430	0.48	40.0%	100%	101	43	4.0%
A-11	0.465	0.68	68.6%	35%	22	213	4.0%
A-12	0.692	0.47	38.6%	100%	184	38	3.0%
A-13	0.652	0.48	40.0%	100%	151	43	3.5%
A-14	0.510	0.68	68.6%	35%	21	242	4.0%
A-15	0.413	0.45	35.7%	100%	105	39	3.0%
A-16	0.239	0.66	65.7%	35%	14	174	4.0%
A-17	0.288	0.62	60.0%	15%	22	133	3.5%
A-18	0.274	0.45	35.7%	100%	128	21	3.5%
Future Development							
FUTURE3-A	23.26	0.25	7.1%	0%	579	402	1.0%
FUTURE3-B	5.39	0.25	7.1%	0%	437	123	0.5%
TOTAL DEVELOPMENT:	**45.95**						

West Capital Airpark - Phase 1B-2 Residential
Post-Development Model Parameters
Ultimate Conditions

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	No Depression (%)	Flow Path Length (m)	Equivalent Width (m)	Average Slope (%)
Phase 1B-1							
1B-01	0.17	0.49	41.4%	0%	15	113	2.0%
1B-02	0.24	0.54	48.6%	30%	18	132	4.5%
1B-03	0.15	0.45	35.7%	0%	43	35	1.5%
1B-04	0.22	0.50	42.9%	30%	18	124	5.0%
1B-05	0.14	0.50	42.9%	20%	15	91	3.0%
1B-06	0.19	0.46	37.1%	35%	20	94	5.0%
1B-07	0.24	0.51	44.3%	40%	25	97	4.0%
1B-08	0.23	0.59	55.7%	40%	25	94	4.5%
1B-09	0.23	0.62	60.0%	40%	24	95	4.5%
1B-10	0.21	0.62	60.0%	35%	23	93	4.5%
1B-11	0.35	0.47	38.6%	0%	13	267	3.0%
1B-12	0.20	0.60	57.1%	35%	22	93	5.0%
1B-13	0.28	0.62	60.0%	35%	24	117	4.5%
1B-14	0.25	0.63	61.4%	35%	24	105	4.0%
1B-15	0.47	0.63	61.4%	40%	23	200	4.5%
1B-16	4.61	0.25	7.1%	0%	213	217	2.0%
B1	0.70	0.32	17.1%	100%	27	257	4.0%
B2	1.26	0.30	14.3%	100%	27	471	3.5%
Phase 1B-2							
A-01	0.493	0.45	35.7%	100%	104	47	3.5%
A-02	0.242	0.67	67.1%	40%	22	109	4.0%
A-03	0.476	0.61	58.6%	100%	117	41	2.5%
A-04	0.450	0.69	70.0%	45%	24	186	4.5%
A-05	0.367	0.46	37.1%	100%	85	43	3.5%
A-06	0.377	0.71	72.9%	35%	27	140	4.0%
A-07	0.357	0.57	52.9%	100%	87	41	2.5%
A-08	0.205	0.57	52.9%	0%	14	151	2.0%
A-09	0.226	0.67	67.1%	30%	17	136	4.0%
A-10	0.430	0.48	40.0%	100%	101	43	4.0%
A-11	0.465	0.68	68.6%	35%	22	213	4.0%
A-12	0.692	0.47	38.6%	100%	184	38	3.0%
A-13	0.652	0.48	40.0%	100%	151	43	3.5%
A-14	0.510	0.68	68.6%	35%	21	242	4.0%
A-15	0.413	0.45	35.7%	100%	105	39	3.0%
A-16	0.239	0.66	65.7%	35%	14	174	4.0%
A-17	0.288	0.62	60.0%	15%	22	133	3.5%
A-18	0.274	0.45	35.7%	100%	128	21	3.5%
Future Development							
FUTURE	28.65	0.65	64.3%	40%	44	6446	2.0%
TOTAL DEVELOPMENT:	**45.95**						

West Capital Airpark - Phase 1B-2 Residential

Inlet Control Device Parameters

NOVATECH
Engineers, Planners & Landscape Architects

ICD Location	Captured Drainage Area ID	ICD Size & Inlet Rate					2-yr Approach Flow			
		Diameter 1 (mm)	Diameter 2* (mm)	Max. 2-year Head (m)	Calculated 2-yr ICD Flow Rate (L/s)	2-yr ICD Flow Rate ** (L/s)	Drainage Area (ha)	Runoff Coefficient (C)	Rational Method (L/s)	PCSWMM** (L/s)
Phase 1B-1										
ROW Catchbasins (in Sag)										
CB118-119	1B-15	127	127	1.80	93.3	84.0	0.470	0.63	63.2	85.7
CB126-127	1B-11	127	0	1.94	48.4	33.6	0.350	0.47	35.1	35.0
ROW Catchbasins (On-Grade)										
CB120-121	1B-14	94	0	2.09	27.6	24.8	0.250	0.63	33.6	51.1
CB122-123	1B-13	94	0	2.04	27.2	24.8	0.280	0.62	37.1	43.7
CB124-125	1B-12	94	0	2.00	27.0	22.0	0.200	0.60	25.6	29.4
CB128-129	1B-10	94	0	1.95	26.6	24.8	0.210	0.62	27.8	41.6
CB130-131	1B-09	94	0	1.95	26.6	24.6	0.230	0.62	30.4	39.7
CB132-133	1B-08	94	0	1.95	26.6	24.2	0.230	0.59	29.0	34.4
CB134-135	1B-07	94	0	1.95	26.6	20.8	0.240	0.51	26.1	27.6
CB136-137	1B-06	94	0	1.85	25.9	15.2	0.190	0.46	18.7	19.8
CB138-139	1B-05	94	94	1.95	26.6	14.7	0.140	0.50	14.9	19.0
CB140-141	1B-03	94	0	1.95	26.6	9.8	0.150	0.45	14.4	12.3
CB142-143	1B-01	94	0	1.94	26.6	10.2	0.170	0.49	17.8	15.7
CB157-158	1B-02	94	0	1.87	26.1	24.8	0.240	0.54	27.7	29.4
CB159-160	1B-04	83	83	1.76	39.4	17.5	0.220	0.50	23.5	21.3
Phase 1B-2										
ROW Catchbasins (in Sag)										
CB-161A-B	A-04	152	127	1.02	85.6	77.9	0.450	0.69	66.3	78.5
CB-163A-B	A-08	108	108	1.05	51.5	43.6	0.205	0.57	24.9	44.6
CB-164A-B	A-11	127	127	1.04	70.8	69.1	0.465	0.68	67.5	69.8
CB-165A-B	A-14	152	127	1.02	85.6	76.0	0.510	0.68	74.0	76.6
CB-166A-B	A-16	94	83	1.05	34.8	34.1	0.239	0.66	33.7	34.9
CB-167A-B	A-17	94	94	1.05	39.1	37.3	0.288	0.62	38.1	37.9
ROW Catchbasins (On-Grade)										
CB-162A-B	A-06	108	108	1.15	53.9	49.7	0.377	0.71	57.2	59.8
CB-168A-B	A-09	83	83	1.16	32.0	27.3	0.226	0.67	32.3	33.4
CB-169A-B	A-02	83	83	0.98	29.4	26.1	0.242	0.67	34.6	36.3
Rear Yard Catchbasins										
CB170	A-03	200	0	1.57	108.1	58.0	0.476	0.61	49.9	58.0
CB176	A-07	200	0	1.21	94.9	40.3	0.357	0.57	34.9	40.3
CB177	A-12	178	0	1.76	90.7	55.6	0.692	0.47	55.8	55.6
CB184	A-15	152	0	0.64	40.0	31.3	0.413	0.45	31.9	31.3
CB187	A-18	94	0	1.15	20.5	19.0	0.274	0.45	21.2	19.0
CB188	A-13	250	0	0.75	116.4	55.4	0.652	0.48	53.7	55.4
CB194	A-10	178	0	1.70	89.1	36.7	0.430	0.48	35.4	36.7
CB195	A-05	152	0	0.72	42.4	29.2	0.367	0.46	29.0	29.2
CB200	A-01	152	0	1.77	66.4	37.4	0.493	0.45	38.1	37.4

**Diameter 2 only specified where catchbasins are not interconnected*

***From PCSWMM Model, 2-year 4-hour Chicago storm distribution*

DATE: 2/8/2024
PREPARED BY: NOVATECH

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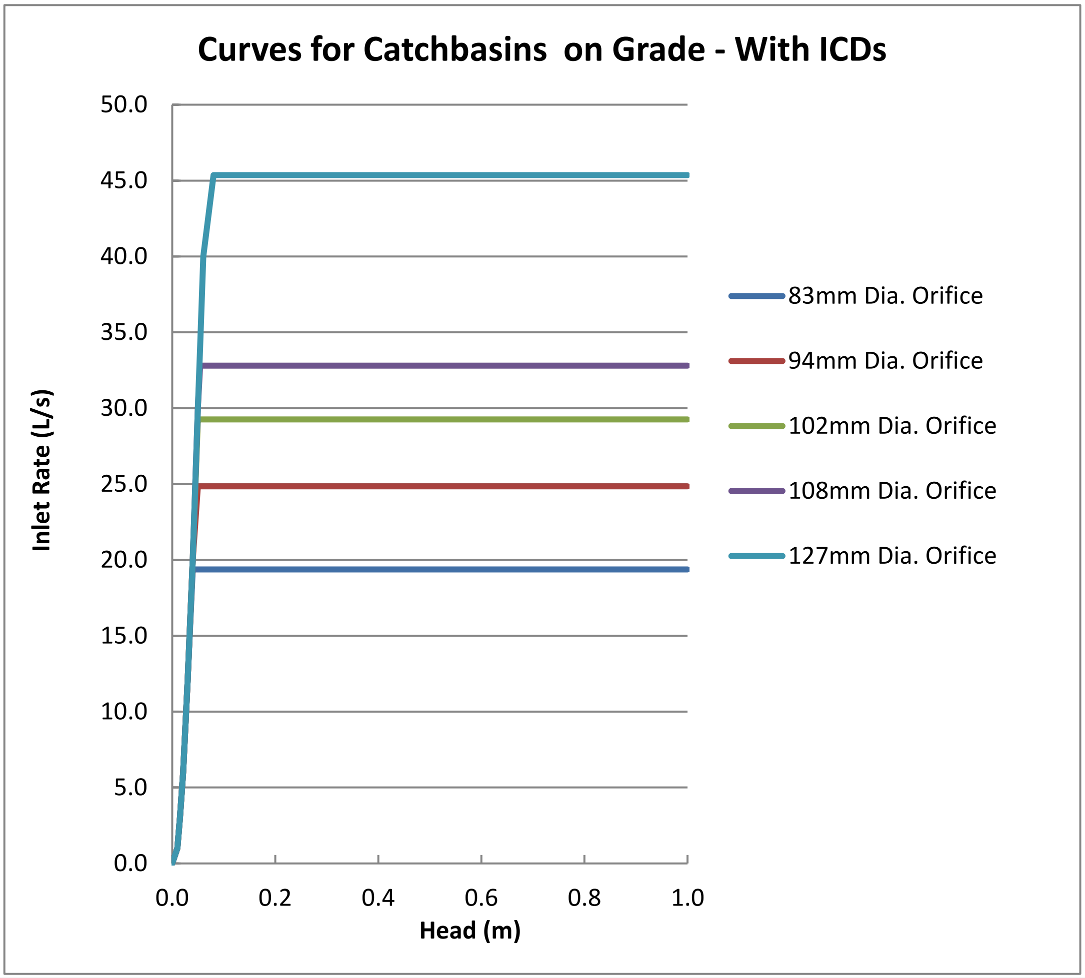
West Capital Airpark - Phase 1B-2 Residential

Catchbasin (On-Grade) with ICD Curves



Curb Inlet Catchbasins on Continuous Grade

Depth vs. Captured Flow Curve

A standard depth vs. captured flow curve for catch basins on a continuous grade was provided to Novatech by City staff for use in a dual-drainage model of an existing residential neighbourhood. This standard curve was derived using the inlet curves in Appendix 7A of the Ottawa Sewer Design Guidelines.

Novatech reviewed the methodology used to create this standard curve (described below) and determined that it was suitable for general use in other dual-drainage models.

- MTO Design Chart 4.04 provides the relationship between the gutter flow rate (Q_t) and flow spread (T) for Barrier Curb.
- MTO Design Chart 4.12 provides the relationship between flow spread (T) and flow depth (D).
- The relationship between the gutter flow rate (Q_t) and flow depth (D) was determined for different road slopes using the above charts and Manning’s equation (refer to pages 58-60 of the MTO Drainage Management Manual – Part 2);
- The relationship between approach flow (Q_t) and captured flow (Q_c) was determined for different road slopes using the design chart for Barrier Curb with Gutter (Appendix 7-A.2).
- Using the above information, a family of curves was developed to characterize the relationship between flow depth and captured flow for curb inlet catchbasins on different road slopes. The results of this exercise can be summarized as follows:
    - For a given flow depth, the gutter flow rate (Q_t) increases as the road slope increases.
    - The capture efficiency (Q_c) of curb inlet catchbasins decrease as the road slope increases.
    - The net result is that the relationship between flow depth and capture rate is largely independent of road slope: While approach flow vs. captured flow (Q_t vs. Q_c) varies significantly with road grade, flow depth vs. captured flow (D vs. Q_c) does not.

Since there was very little difference in the flow depth vs. captured flow curves for different road slopes, this family of curves was averaged to create a single standard curve for use in dual-drainage models.

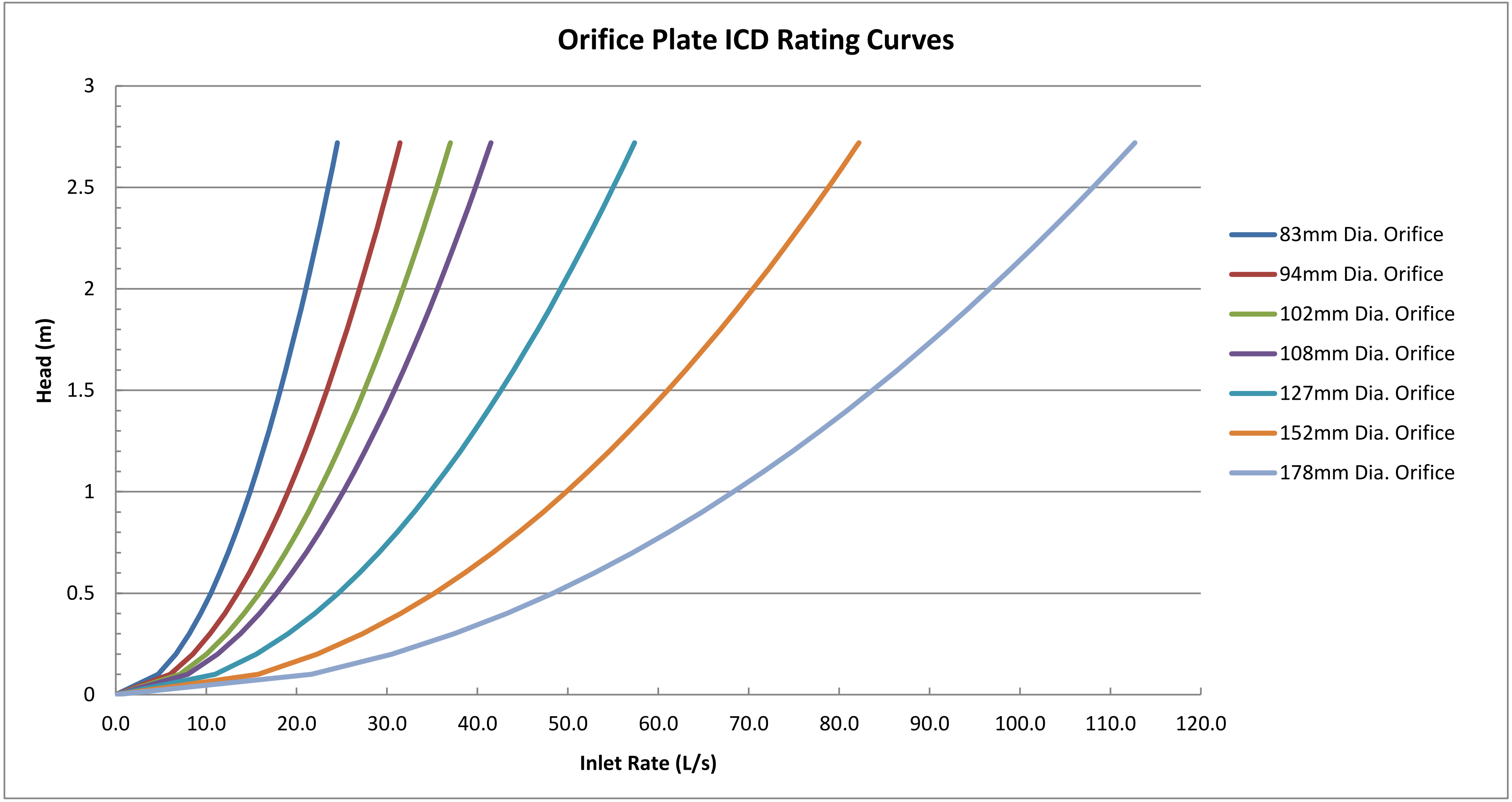
Inlet Control Devices

The standard depth vs. capture flow curve was modified to account for the installation of ICDs in curb inlet catchbasins on continuous grade. Separate inlet curves were created for each standard ICD orifice size by capping the inlet rate on the depth vs. capture flow curve at the maximum flow rate through the ICD at a head of 1.2m (depth from centerline of CB lead to top of CICB frame).

Date: 2/8/2024

West Capital Airpark - Phase 1B-2 Residential

ICD Rating Curves



Prepared By: Novatech Engineering Consultants
Date: 2/8/2024

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West Capital Airpark - Phase 1B-2 Residential

ROW Ponding Depths

Structure	T/G	Max. Static Ponding (Spill Depth)		2-yr Event (4hr)				5-yr Event (4hr)				100-yr Event (4hr)				100-yr Event (+20%) (4hr)			
	(m)	Elev. (m)	Depth (m)	Elev. (m)	Depth (m)	Cascading Flow?	Cascade Depth (m)	Elev. (m)	Depth (m)	Cascading Flow?	Cascade Depth (m)	Elev. (m)	Depth (m)	Cascading Flow?	Cascade Depth (m)	Elev. (m)	Depth (m)	Cascading Flow?	Cascade Depth (m)
Phase 1B-1																			
CB118-119	115.19	115.39	0.20	114.88	0.00	N	0.00	115.33	0.14	N	0.00	115.50	0.31	Y	0.11	115.56	0.37	Y	0.17
CB126-127	115.97	116.20	0.23	114.98	0.00	N	0.00	116.03	0.06	N	0.00	116.32	0.35	Y	0.12	116.37	0.40	Y	0.17
Phase 1B-2																			
ROW																			
CB-161A-B	117.07	117.32	0.25	116.90	0.00	N	0.00	117.17	0.10	N	0.00	117.35	0.28	Y	0.03	117.39	0.32	Y	0.07
CB-163A-B	116.12	116.20	0.08	115.84	0.00	N	0.00	116.24	0.12	Y	0.04	116.34	0.22	Y	0.14	116.38	0.26	Y	0.18
CB-164A-B	116.33	116.56	0.23	116.30	0.00	N	0.00	116.43	0.10	N	0.00	116.56	0.23	N	0.00	116.60	0.27	Y	0.04
CB-165A-B	115.71	115.77	0.06	115.50	0.00	N	0.00	115.79	0.08	Y	0.02	115.87	0.16	Y	0.10	115.89	0.18	Y	0.12
CB-166A-B	115.37	115.49	0.12	115.34	0.00	N	0.00	115.40	0.03	N	0.00	115.60	0.23	Y	0.11	115.64	0.27	Y	0.15
CB-167A-B	115.85	115.95	0.10	115.77	0.00	N	0.00	115.95	0.10	N	0.00	116.05	0.20	Y	0.10	116.07	0.22	Y	0.12
Rear Yards																			
RYCB171	117.60	-	-	117.54	0.00	N	-	117.71	0.11	N	-	117.88	0.28	N	-	117.91	0.31	N	-
RYCB178	116.75	-	-	116.52	0.00	N	-	116.85	0.10	N	-	117.00	0.25	N	-	117.05	0.30	N	-
RYCB183	116.09	-	-	116.00	0.00	N	-	116.19	0.10	N	-	116.38	0.29	N	-	116.44	0.35	N	-
RYCB186	114.86	-	-	114.69	0.00	N	-	114.92	0.06	N	-	114.97	0.11	N	-	114.99	0.13	N	-
RYCB189	115.30	-	-	115.16	0.00	N	-	115.40	0.10	N	-	115.60	0.30	N	-	115.65	0.35	N	-
RYCB193	115.75	-	-	115.46	0.00	N	-	115.81	0.06	N	-	115.97	0.22	N	-	116.02	0.27	N	-
RYCB196	116.55	-	-	116.50	0.00	N	-	116.66	0.11	N	-	116.78	0.23	N	-	116.83	0.28	N	-
RYCB199	116.85	-	-	116.76	0.00	N	-	116.97	0.12	N	-	117.12	0.27	N	-	117.17	0.32	N	-
RYCB201	117.09	-	-	116.39	0.00	N	-	116.71	0.00	N	-	117.37	0.28	N	-	117.41	0.32	N	-

West Capital Airpark - Phase 1B-2 Residential

Major Flow

Location	100-year					100-year +20%			
	Peak Flow (m^3/s)	Velocity (m/s)	Max. Static Depth (m)	Total Depth (static + dynamic) (m)	Velocity x Depth (m^2/s)	Peak Flow (m^3/s)	Velocity (m/s)	Total Depth (m)	Velocity x Depth (m^2/s)
Phase 1B-1									
Catchbasins at Low Points									
CB118-119	0.590	0.35	0.20	0.31	0.11	0.896	0.45	0.37	0.17
CB126-127	0.465	0.42	0.23	0.35	0.15	0.723	0.44	0.40	0.18
Catchbasins On-Grade									
CB120-121	0.466	0.68	-	0.13	0.09	0.867	0.94	0.17	0.16
CB122-123	0.428	0.64	-	0.13	0.08	0.871	0.94	0.17	0.16
CB124-125	0.366	0.66	-	0.12	0.08	0.859	0.95	0.17	0.16
CB128-129	0.379	0.63	-	0.12	0.08	0.575	0.73	0.14	0.10
CB130-131	0.341	0.58	-	0.12	0.07	0.518	0.68	0.14	0.10
CB132-133	0.291	0.55	-	0.11	0.06	0.447	0.64	0.13	0.08
CB134-135	0.244	0.51	-	0.10	0.05	0.379	0.59	0.12	0.07
CB136-137	0.195	0.49	-	0.09	0.04	0.306	0.56	0.11	0.06
CB138-139	0.166	0.32	-	0.08	0.03	0.257	0.35	0.10	0.03
CB140-141	0.075	0.34	-	0.06	0.02	0.106	0.35	0.07	0.02
CB142-143	0.105	0.00	-	0.07	0.00	0.139	0.00	0.08	0.00
CB157-158	0.107	0.15	-	0.17	0.03	0.133	0.15	0.18	0.03
CB159-160	0.120	0.23	-	0.08	0.02	0.160	0.25	0.09	0.02
High Points									
01+507	0.000	0.00	-	0.00	0.00	0.000	0.00	0.00	0.00
08+096	0.038	0.23	-	0.05	0.01	0.052	0.25	0.06	0.02
09+354	0.000	0.00	-	0.00	0.00	0.000	0.00	0.00	0.00
09+412	0.074	0.64	-	0.05	0.03	0.111	0.68	0.06	0.04
09+756	0.661	0.82	-	0.12	0.10	1.100	0.87	0.17	0.15
10+000	0.564	0.88	-	0.07	0.06	1.072	1.00	0.10	0.10
Phase 1B-2									
Catchbasins at Low Points									
CB-161A-B	0.310	0.34	0.25	0.28	0.10	0.404	0.34	0.32	0.11
CB-163A-B	0.406	0.44	0.08	0.22	0.10	0.658	0.46	0.26	0.12
CB-164A-B	0.218	0.09	0.23	0.23	0.02	0.266	0.15	0.27	0.04
CB-165A-B	0.272	0.33	0.06	0.16	0.05	0.374	0.41	0.18	0.07
CB-166A-B	0.301	0.23	0.12	0.23	0.05	0.518	0.34	0.27	0.09
CB-167A-B	0.208	0.51	0.10	0.20	0.10	0.289	0.56	0.22	0.12
Catchbasins On-Grade									
CB-162A-B	0.258	0.41	-	0.11	0.05	0.415	0.42	0.14	0.06
CB-168A-B	0.106	0.00	-	0.08	0.00	0.130	0.00	0.10	0.00
CB-169A-B	0.149	0.33	-	0.07	0.02	0.195	0.36	0.08	0.03
High Points									
01+722	0.218	0.51	-	0.09	0.05	0.390	0.63	0.11	0.07
01+777	0.121	0.41	-	0.07	0.03	0.169	0.42	0.08	0.03
09+412	0.074	0.64	-	0.05	0.03	0.111	0.68	0.06	0.04
09+756	0.661	0.82	-	0.12	0.10	1.100	0.87	0.17	0.15
10+018	0.200	0.88	-	0.10	0.09	0.421	1.00	0.13	0.13
10+070	0.143	0.33	-	0.07	0.02	0.240	0.41	0.09	0.04
10+093	0.045	0.33	-	0.04	0.01	0.093	0.36	0.05	0.02
10+140	0.104	0.21	-	0.19	0.04	0.138	0.26	0.21	0.05
10+171	0.000	0.00	-	0.00	0.00	0.000	0.00	0.00	0.00
11+166	0.076	0.13	-	0.03	0.00	0.137	0.29	0.07	0.02
11+251	0.000	0.00	-	0.00	0.00	0.000	0.00	0.00	0.00
11+305	0.000	0.00	-	0.00	0.00	0.000	0.00	0.00	0.00
11+411	0.016	0.13	-	0.01	0.00	0.085	0.23	0.04	0.01

West Capital Airpark - Phase 1B-2 Residential
HGL Elevations

INTERIM CONDITION

Manhole ID	Pipe / MH Information				HGL Information[1]		USF Information		Clearance from USF	
	D/S Pipe Size (mm)	D/S Pipe Invert Elev. (m)	D/S Pipe Obvert Elev. (m)	MH T/G Elev. (m)	100-year (m)	100-year (+20%) (m)	Minimum USF Elevation (m)	Design USF Elevation (m)	100-year (m)	100-year (+20%) (m)
Phase 1B-1										
MH201	610	114.32	114.93	118.15	114.50	114.50	114.80	-	-	-
MH213	305	114.62	114.93	117.97	114.77	114.77	115.07	116.08	1.31	1.31
MH215	254	114.76	115.01	117.99	114.77	114.77	115.07	116.14	1.37	1.37
MH217	254	114.64	114.89	117.88	114.65	114.65	114.95	116.02	1.37	1.37
MH219	305	114.47	114.78	117.76	114.65	114.65	114.95	116.02	1.37	1.37
MH227	686	114.13	114.82	117.99	114.37	114.37	114.67	-	-	-
MH229	686	113.93	114.62	117.77	114.24	114.24	114.54	115.80	1.56	1.56
MH233	686	113.75	114.44	117.60	114.08	114.08	114.38	115.60	1.52	1.52
MH235	686	113.55	114.24	117.38	113.89	113.89	114.19	115.38	1.49	1.49
MH237	686	113.37	114.06	117.19	113.72	113.73	114.02	115.20	1.48	1.47
MH241	686	113.19	113.88	117.02	113.57	113.57	113.87	115.01	1.44	1.44
MH243	686	112.87	113.56	116.67	113.29	113.29	113.59	114.76	1.47	1.47
MH245	762	112.52	113.28	116.34	112.96	112.97	113.26	114.34	1.38	1.37
MH247	762	112.36	113.12	116.14	112.80	112.80	113.10	114.25	1.45	1.45
MH249	762	112.19	112.95	115.96	112.65	112.65	112.95	114.01	1.36	1.36
MH251	762	111.98	112.74	115.74	112.45	112.46	112.75	113.80	1.35	1.34
MH253	838	111.79	112.63	115.62	112.33	112.36	112.63	113.60	1.27	1.24
MH259	838	111.54	112.38	115.35	112.13	112.36	112.43	113.31	1.18	0.95
MH260	838	111.39	112.23	115.57	112.13	112.36	112.43	113.36	1.23	1.00
MH261	533	111.22	111.75	114.47	112.14	112.36	112.44	-	-	-
MH263	533	111.19	111.72	114.39	112.13	112.36	112.43	-	-	-
MH265	838	111.12	111.96	114.39	112.13	112.35	112.43	-	-	-
MH267(1B)	254	113.38	113.63	116.06	113.59	113.59	113.89	-	-	-
Vortech-9000	533	111.20	111.73	114.47	112.13	112.36	112.43	-	-	-
Phase 1B-2										
MH266	381	115.02	115.40	117.89	115.33	115.34	115.70	115.96	0.63	0.62
MH267	457	114.34	114.80	117.29	114.63	114.64	115.10	115.36	0.73	0.72
MH268	533	114.14	114.67	117.39	114.52	114.57	114.97	115.36	0.84	0.79
MH269	686	113.20	113.89	116.97	114.38	114.44	114.68	115.01	0.63	0.57
MH270	686	113.02	113.71	117.07	114.19	114.24	114.49	115.01	0.82	0.77
MH271	762	112.81	113.57	116.49	113.86	113.90	114.16	114.56	0.70	0.66
MH272	762	112.65	113.41	116.57	113.70	113.73	114.00	114.61	0.91	0.88
MH273	914	112.36	113.27	116.04	113.22	113.23	113.57	113.90	0.68	0.67
MH274	914	112.25	113.16	116.02	112.99	113.00	113.46	113.86	0.87	0.86
MH275	1651	111.61	113.26	115.11	112.13	112.36	113.56	-	-	-
MH276	1651	111.52	113.17	115.31	112.13	112.36	113.47	-	-	-
MH277	1067	111.46	112.53	115.29	112.13	112.36	112.83	-	-	-
MH278	1651	111.42	113.07	115.23	112.13	112.36	113.37	-	-	-
MH279	457	113.89	114.35	116.22	114.61	114.67	114.91	-	-	-
MH280	533	112.92	113.45	115.71	113.26	113.27	113.75	113.90	0.64	0.63
MH281	381	114.97	115.35	117.33	115.46	115.48	115.76	-	-	-
Vortech-1929CIP-A	1067	111.48	112.55	115.39	112.13	112.36	112.85	-	-	-

(1) *HGL information is for a 3-hour Chicago Storm Distribution*

West Capital Airpark - Phase 1B-2 Residential
HGL Elevations

NOVATECH
Engineers, Planners & Landscape Architects

ULTIMATE CONDITION

Manhole ID	Pipe / MH Information				HGL Information[1]		USF Information		Clearance from USF	
	D/S Pipe Size (mm)	D/S Pipe Invert Elev. (m)	D/S Pipe Obvert Elev. (m)	MH T/G Elev. (m)	100-year (m)	100-year (+20%) (m)	Minimum USF Elevation (m)	Design USF Elevation (m)	100-year (m)	100-year (+20%) (m)
Phase 1B-1										
MH201	610	114.32	114.93	118.15	114.50	114.50	114.80	-	-	-
MH213	305	114.62	114.93	117.97	114.77	114.77	115.07	116.08	1.31	1.31
MH215	254	114.76	115.01	117.99	114.77	114.77	115.07	116.14	1.37	1.37
MH217	254	114.64	114.89	117.88	114.65	114.65	114.95	116.02	1.37	1.37
MH219	305	114.47	114.78	117.76	114.65	114.65	114.95	116.02	1.37	1.37
MH227	686	114.13	114.82	117.99	114.37	114.37	114.67	-	-	-
MH229	686	113.93	114.62	117.77	114.24	114.24	114.54	115.80	1.56	1.56
MH233	686	113.75	114.44	117.60	114.08	114.08	114.38	115.60	1.52	1.52
MH235	686	113.55	114.24	117.38	113.89	113.89	114.19	115.38	1.49	1.49
MH237	686	113.37	114.06	117.19	113.72	113.73	114.02	115.20	1.48	1.47
MH241	686	113.19	113.88	117.02	113.57	113.57	113.87	115.01	1.44	1.44
MH243	686	112.87	113.56	116.67	113.29	113.29	113.59	114.76	1.47	1.47
MH245	762	112.52	113.28	116.34	112.96	112.98	113.26	114.34	1.38	1.36
MH247	762	112.36	113.12	116.14	112.80	112.96	113.10	114.25	1.45	1.29
MH249	762	112.19	112.95	115.96	112.72	112.95	113.02	114.01	1.29	1.06
MH251	762	111.98	112.74	115.74	112.71	112.95	113.01	113.80	1.09	0.85
MH253	838	111.79	112.63	115.62	112.71	112.94	113.01	113.60	0.89	0.66
MH259	838	111.54	112.38	115.35	112.69	112.93	112.99	113.31	0.62	0.38
MH260	838	111.39	112.23	115.57	112.69	112.92	112.99	113.36	0.67	0.44
MH261	533	111.22	111.75	114.47	112.69	112.91	112.99	-	-	-
MH263	533	111.19	111.72	114.39	112.68	112.91	112.98	-	-	-
MH265	838	111.12	111.96	114.39	112.68	112.92	112.98	-	-	-
MH267(1B)	254	113.38	113.63	116.06	113.59	113.59	113.89	-	-	-
Vortech-9000	533	111.20	111.73	114.47	112.68	112.91	112.98	-	-	-
Phase 1B-2										
MH266	381	115.02	115.40	117.89	115.35	115.54	115.70	115.96	0.61	0.42
MH267	457	114.34	114.80	117.29	114.86	114.94	115.16	115.36	0.50	0.42
MH268	533	114.14	114.67	117.39	114.78	114.86	115.08	115.36	0.58	0.50
MH269	686	113.20	113.89	116.97	114.63	114.70	114.93	115.01	0.38	0.31
MH270	686	113.02	113.71	117.07	114.45	114.51	114.75	115.01	0.56	0.50
MH271	762	112.81	113.57	116.49	114.13	114.18	114.43	114.56	0.43	0.38
MH272	762	112.65	113.41	116.57	113.98	114.02	114.28	114.61	0.63	0.59
MH273	914	112.36	113.27	116.04	113.51	113.53	113.81	113.90	0.39	0.37
MH274	914	112.25	113.16	116.02	113.33	113.34	113.63	113.86	0.53	0.52
MH275	1651	111.61	113.26	115.11	113.15	113.22	113.56	-	-	-
MH276	1651	111.52	113.17	115.31	113.12	113.19	113.47	-	-	-
MH277	1067	111.46	112.53	115.29	113.09	113.17	113.39	-	-	-
MH278	1651	111.42	113.07	115.23	113.06	113.15	113.37	-	-	-
MH279	457	113.89	114.35	116.22	114.86	114.93	115.16	-	-	-
MH280	533	112.92	113.45	115.71	113.56	113.58	113.86	113.90	0.34	0.32
MH281	381	114.97	115.35	117.33	115.46	115.48	115.76	-	-	-
MH-FUT	1067	111.46	112.53	115.29	113.09	113.17	113.39	-	-	-
Vortech-1929CIP-A	1067	111.48	112.55	115.39	113.10	113.18	113.40	-	-	-
Vortech-1929CIP-B	1067	111.48	112.55	115.39	113.10	113.18	113.40	-	-	-

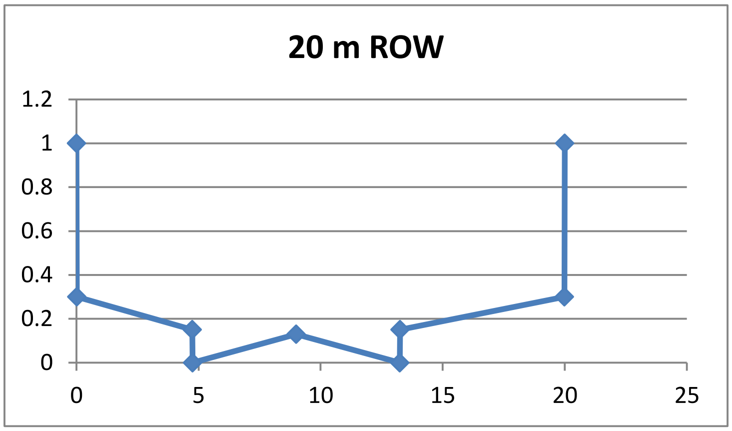
(1) *HGL information is for a 4-hour Chicago Storm Distribution*

West Capital Airpark - Phase 1B-2 Residential

Roadway Cross-Sections

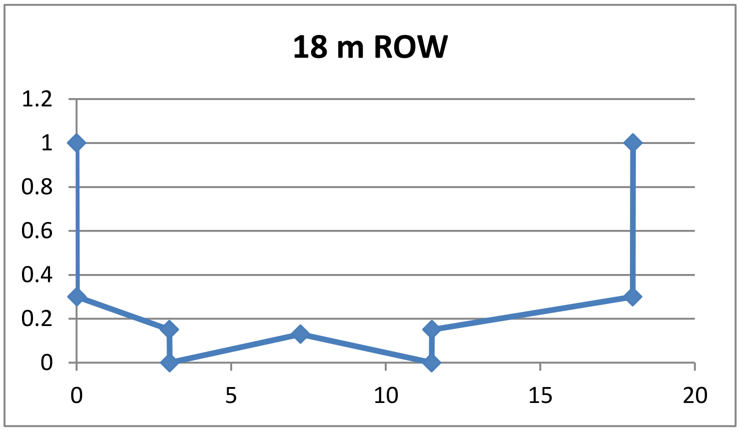
20m - ROW

0	1
0.01	0.3
4.75	0.15
4.76	0
9	0.13
13.24	0
13.25	0.15
19.99	0.3
20	1



18m - ROW

0	1
0.01	0.3
3	0.15
3.01	0
7.25	0.13
11.49	0
11.5	0.15
17.99	0.3
18	1



West Capital Airpark - Phase 1B-2 Residential
Design Storm Time Series Data
4-hour Chicago Design Storms

C25mm-4.stm		C2-4.stm		C5-4.stm	
Duration	Intensity	Duration	Intensity	Duration	Intensity
min	mm/hr	min	mm/hr	min	mm/hr
0:00	0	0:00	0	0:00	0
0:10	1.51	0:10	2.05	0:10	2.68
0:20	1.75	0:20	2.37	0:20	3.1
0:30	2.07	0:30	2.81	0:30	3.68
0:40	2.58	0:40	3.5	0:40	4.58
0:50	3.46	0:50	4.69	0:50	6.15
1:00	5.39	1:00	7.3	1:00	9.61
1:10	13.44	1:10	18.21	1:10	24.17
1:20	56.67	1:20	76.81	1:20	104.19
1:30	17.77	1:30	24.08	1:30	32.04
1:40	9.12	1:40	12.36	1:40	16.34
1:50	6.14	1:50	8.32	1:50	10.96
2:00	4.65	2:00	6.3	2:00	8.29
2:10	3.76	2:10	5.09	2:10	6.69
2:20	3.17	2:20	4.29	2:20	5.63
2:30	2.74	2:30	3.72	2:30	4.87
2:40	2.43	2:40	3.29	2:40	4.3
2:50	2.18	2:50	2.95	2:50	3.86
3:00	1.98	3:00	2.68	3:00	3.51
3:10	1.81	3:10	2.46	3:10	3.22
3:20	1.68	3:20	2.28	3:20	2.98
3:30	1.56	3:30	2.12	3:30	2.77
3:40	1.47	3:40	1.99	3:40	2.6
3:50	1.38	3:50	1.87	3:50	2.44
4:00	1.31	4:00	1.77	4:00	2.31

West Capital Airpark - Phase 1B-2 Residential

Design Storm Time Series Data

4-hour Chicago Design Storms

C100-4.stm

Duration min	Intensity mm/hr
0:00	0
0:10	4.39
0:20	5.07
0:30	6.05
0:40	7.54
0:50	10.16
1:00	15.97
1:10	40.65
1:20	178.56
1:30	54.05
1:40	27.32
1:50	18.24
2:00	13.74
2:10	11.06
2:20	9.29
2:30	8.02
2:40	7.08
2:50	6.35
3:00	5.76
3:10	5.28
3:20	4.88
3:30	4.54
3:40	4.25
3:50	3.99
4:00	3.77

C100-4+20%.stm

Duration min	Intensity mm/hr
0:00	0
0:10	5.27
0:20	6.08
0:30	7.26
0:40	9.05
0:50	12.19
1:00	19.16
1:10	48.78
1:20	214.27
1:30	64.86
1:40	32.78
1:50	21.89
2:00	16.49
2:10	13.27
2:20	11.15
2:30	9.62
2:40	8.5
2:50	7.62
3:00	6.91
3:10	6.34
3:20	5.86
3:30	5.45
3:40	5.1
3:50	4.79
4:00	4.52

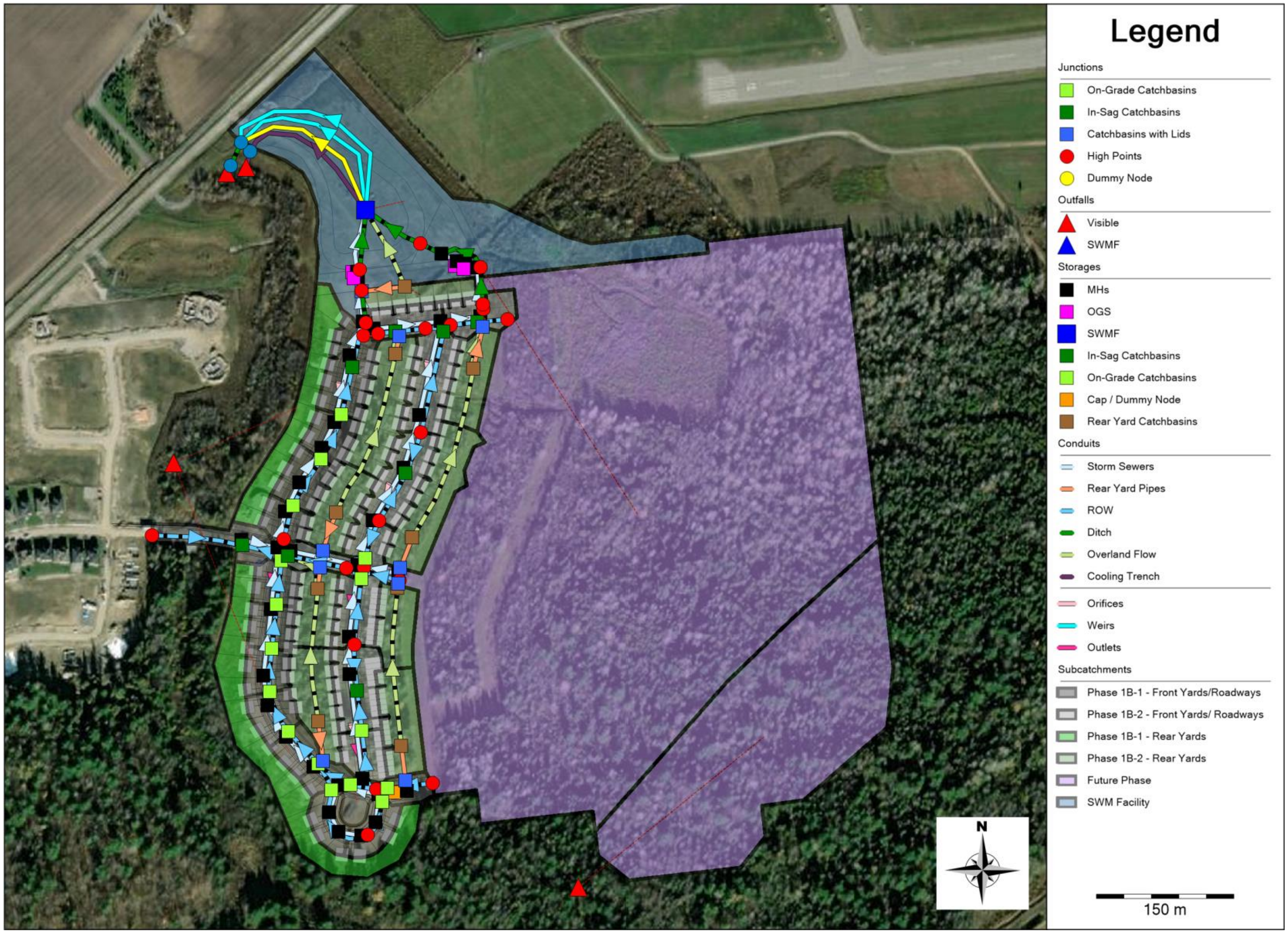
West Capital Airpark - Phase 1B-2 Residential

Design Storm Time Series Data

SCS Design Storms

S2-12.stm		S5-12.stm		S100-12.stm	
Duration	Intensity	Duration	Intensity	Duration	Intensity
min	mm/hr	min	mm/hr	min	mm/hr
0:00	0.00	0:00	0	0:00	0
0:30	1.27	0:30	1.69	0:30	2.82
1:00	0.59	1:00	0.79	1:00	1.31
1:30	1.10	1:30	1.46	1:30	2.44
2:00	1.10	2:00	1.46	2:00	2.44
2:30	1.44	2:30	1.91	2:30	3.19
3:00	1.27	3:00	1.69	3:00	2.82
3:30	1.69	3:30	2.25	3:30	3.76
4:00	1.69	4:00	2.25	4:00	3.76
4:30	2.29	4:30	3.03	4:30	5.07
5:00	2.88	5:00	3.82	5:00	6.39
5:30	4.57	5:30	6.07	5:30	10.14
6:00	36.24	6:00	48.08	6:00	80.38
6:30	9.23	6:30	12.25	6:30	20.47
7:00	4.06	7:00	5.39	7:00	9.01
7:30	2.71	7:30	3.59	7:30	6.01
8:00	2.37	8:00	3.15	8:00	5.26
8:30	1.86	8:30	2.47	8:30	4.13
9:00	1.95	9:00	2.58	9:00	4.32
9:30	1.27	9:30	1.69	9:30	2.82
10:00	1.02	10:00	1.35	10:00	2.25
10:30	1.44	10:30	1.91	10:30	3.19
11:00	0.93	11:00	1.24	11:00	2.07
11:30	0.85	11:30	1.12	11:30	1.88
12:00	0.85	12:00	1.12	12:00	1.88

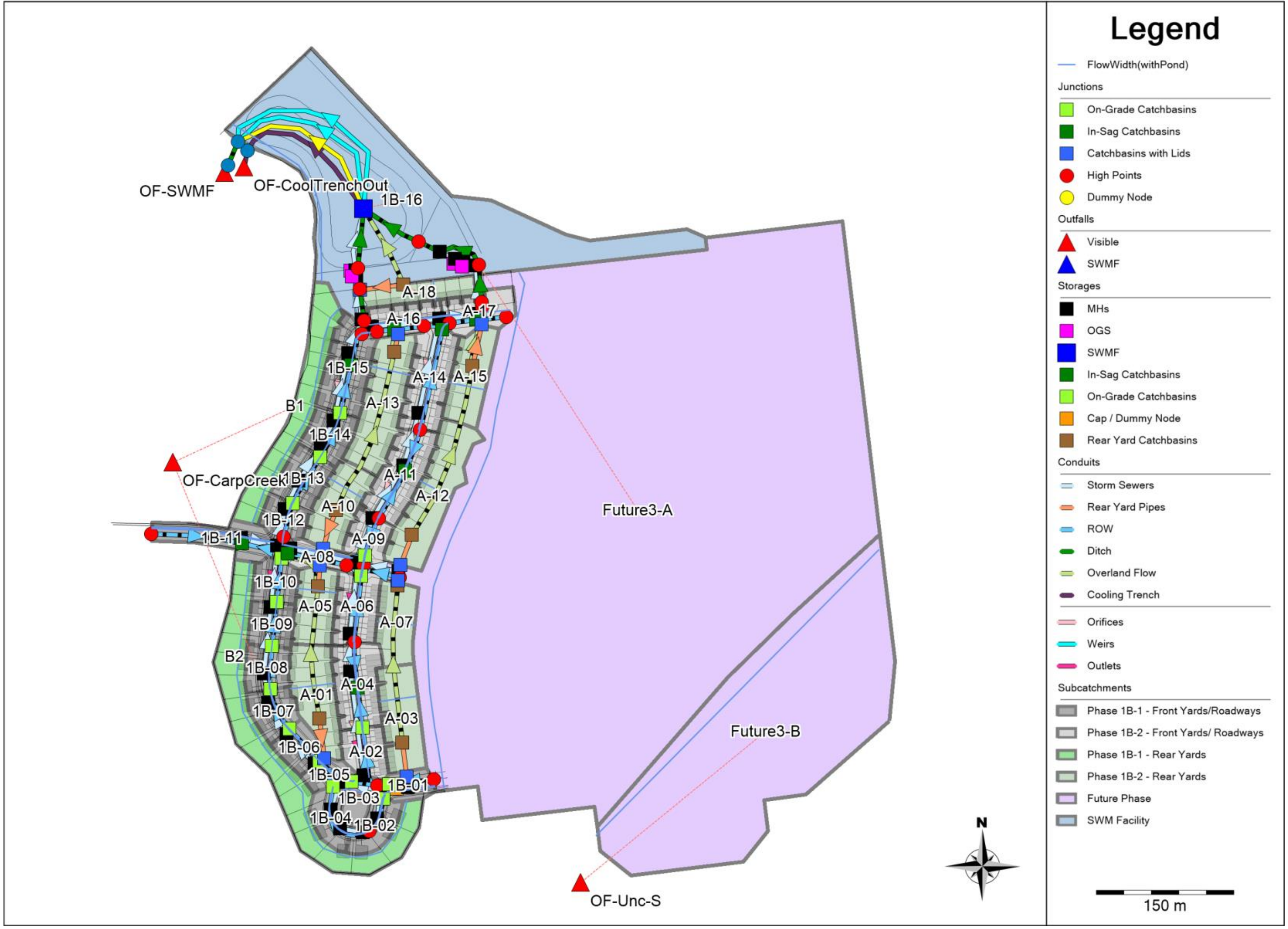
Overall Model Schematic



West Capital Airpark - Phase 1B-2 Residential (102085)
PCSWMM Model Schematics – Interim Conditions

NOVATECH
Engineers, Planners & Landscape Architects

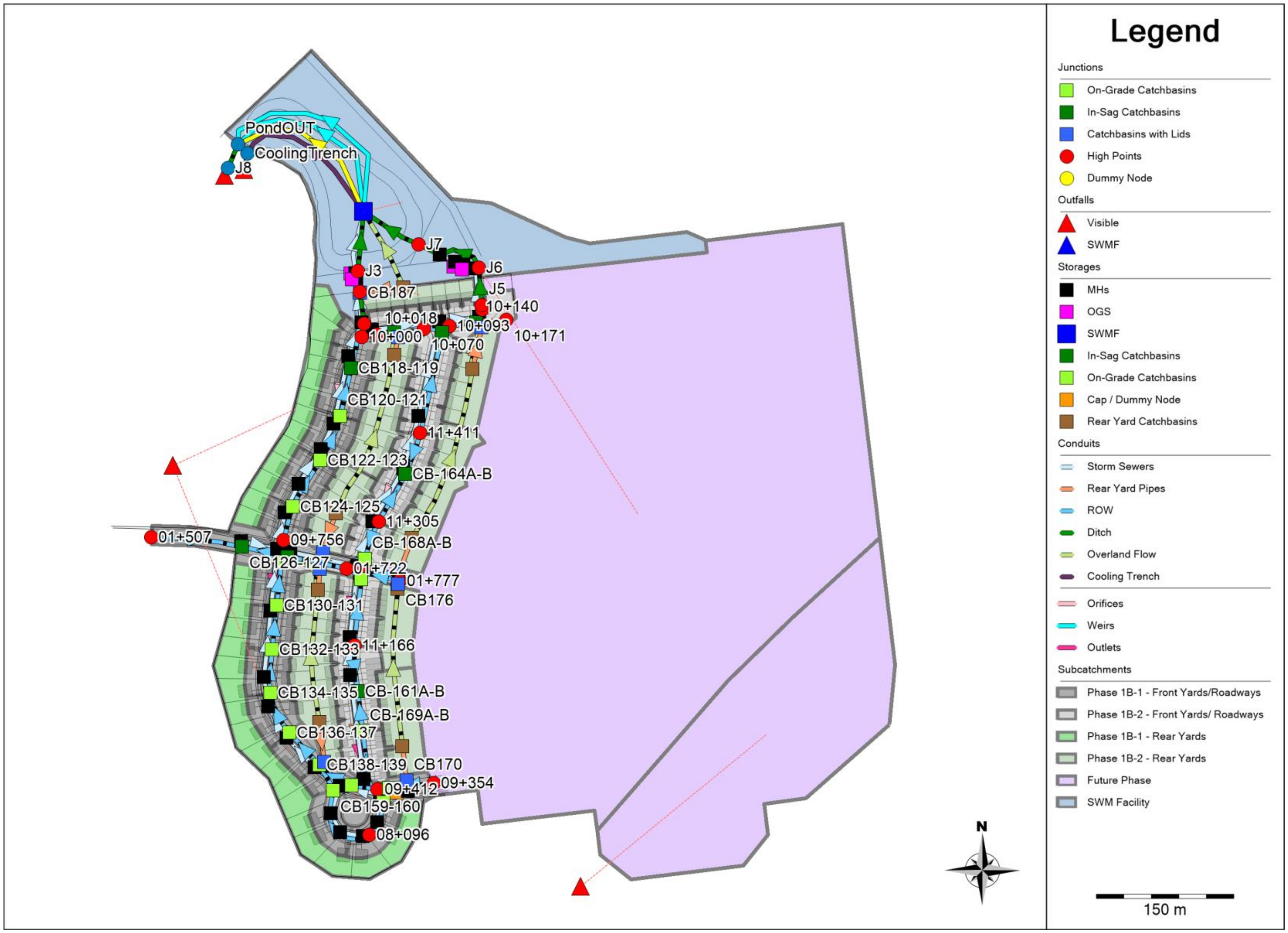
Subcatchments, Flow Widths and Outfalls



Date: 2024-02-08
M:\2002\102085\DATA\Phase 2B\Calculations\PCSWMM (EAST)\102085-Ph2B-PCSWMM Model Schematics-INT.docx

West Capital Airpark - Phase 1B-2 Residential (102085)
PCSWMM Model Schematics – Interim Conditions

Junctions



Date: 2024-02-08
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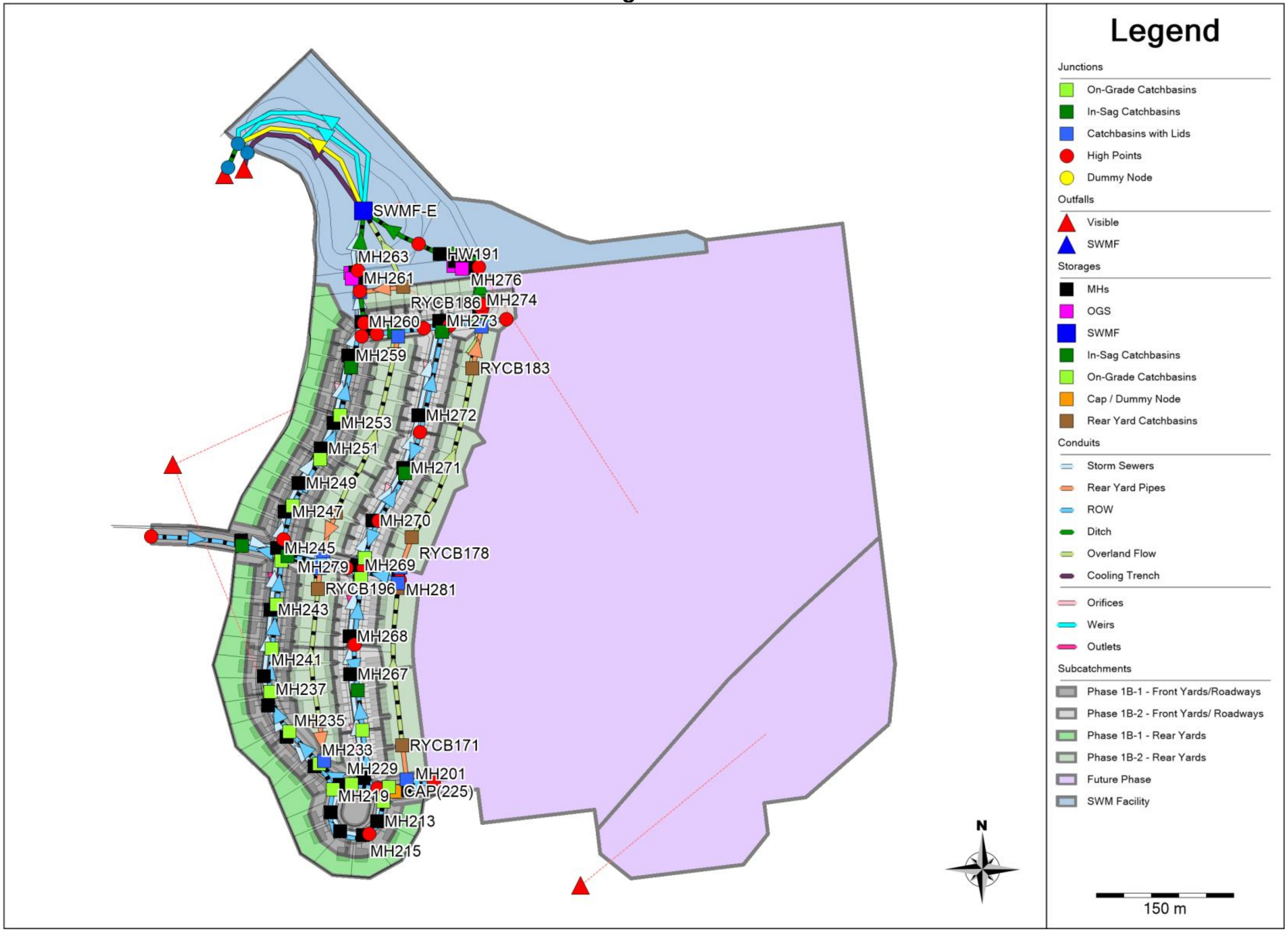
West Capital Airpark - Phase 1B-2 Residential (102085)
PCSWMM Model Schematics – Interim Conditions

NOVATECH
Engineers, Planners & Landscape Architects

Storage Nodes



Date: 2024-02-08
M:\2002\102085\DATA\Phase 2B\Calculations\PCSWMM (EAST)\102085-Ph2B-PCSWMM Model Schematics-INT.docx

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - INTERIM
(100-year, 4-hour Chicago Storm)

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------

EAST Carp Airport detailed design model, Phase 1B-1 & 1B-2
Phase 1 previously completed using SWMHYMO.
Including in PCSWMM model for HGL elevations, and to have a complete model of the entire development.

WARNING 04: minimum elevation drop used for Conduit CoolingTrench1
WARNING 04: minimum elevation drop used for Conduit CoolingTrench2
WARNING 04: minimum elevation drop used for Conduit Street1-E
WARNING 02: maximum depth increased for Node CB126-127
WARNING 02: maximum depth increased for Node CB-163A-B
WARNING 02: maximum depth increased for Node CB-166A-B

*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 38
Number of nodes ........... 117
Number of links ........... 164
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                    Data       Recording
Name                 Data Source                    Type       Interval
------------------------------------------------------------------------
Raingage             03-C100yr-4hr                  INTENSITY   10 min.


********************
Subcatchment Summary
********************
Name                       Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------------------
1B-01                      0.17    112.72     41.40    2.0000 Raingage             CB142-143
```

```
1B-02                      0.24    131.51     48.60    4.5000 Raingage             CB157-158
1B-03                      0.15     34.83     35.70    1.5000 Raingage             CB140-141
1B-04                      0.22    124.15     42.90    5.0000 Raingage             CB159-160
1B-05                      0.14     91.31     42.90    3.0000 Raingage             CB138-139
1B-06                      0.19     94.23     37.10    5.0000 Raingage             CB136-137
1B-07                      0.24     96.95     44.30    4.0000 Raingage             CB134-135
1B-08                      0.23     93.66     55.70    4.5000 Raingage             CB132-133
1B-09                      0.23     95.14     60.00    4.5000 Raingage             CB130-131
1B-10                      0.21     92.51     60.00    4.5000 Raingage             CB128-129
1B-11                      0.35    267.40     38.60    3.0000 Raingage             CB126-127
1B-12                      0.20     92.54     57.10    5.0000 Raingage             CB124-125
1B-13                      0.28    116.64     60.00    4.5000 Raingage             CB122-123
1B-14                      0.25    105.21     61.40    4.0000 Raingage             CB120-121
1B-15                      0.47    200.31     61.40    4.5000 Raingage             CB118-119
1B-16                      4.61    216.71      7.10    2.0000 Raingage             SWMF-E
A-01                       0.49     47.41     35.70    3.5000 Raingage             RYCB199
A-02                       0.24    109.06     67.10    4.0000 Raingage             CB-169A-B
A-03                       0.48     40.63     58.60    2.5000 Raingage             RYCB171
A-04                       0.45    186.04     70.00    4.5000 Raingage             CB-161A-B
A-05                       0.37     43.08     37.10    3.5000 Raingage             RYCB196
A-06                       0.38    139.55     72.90    4.0000 Raingage             CB-162A-B
A-07                       0.36     41.04     52.90    2.5000 Raingage             RYCB201
A-08                       0.20    151.34     52.90    2.0000 Raingage             CB-163A-B
A-09                       0.23    135.53     67.10    4.0000 Raingage             CB-168A-B
A-10                       0.43     42.55     40.00    4.0000 Raingage             RYCB193
A-11                       0.47    212.74     68.60    4.0000 Raingage             CB-164A-B
A-12                       0.69     37.57     38.60    3.0000 Raingage             RYCB178
A-13                       0.65     43.10     40.00    3.5000 Raingage             RYCB189
A-14                       0.51    241.58     68.60    4.0000 Raingage             CB-165A-B
A-15                       0.41     39.40     35.70    3.0000 Raingage             RYCB183
A-16                       0.24    173.73     65.70    4.0000 Raingage             CB-166A-B
A-17                       0.29    132.74     60.00    3.5000 Raingage             CB-167A-B
A-18                       0.27     21.34     35.70    3.5000 Raingage             RYCB186
B1                         0.70    257.13     17.10    4.0000 Raingage             OF-CarpCreek
B2                         1.26    470.50     14.30    3.5000 Raingage             OF-CarpCreek
Future3-A                 23.26    401.98      7.10    1.0000 Raingage             J6
Future3-B                  5.39    123.44      7.10    0.5000 Raingage             OF-Unc-S

************
Node Summary
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```
************
                                         Invert      Max.    Ponded    External
Name                 Type                 Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
01+507               JUNCTION            116.46      1.00       0.0
01+722               JUNCTION            116.72      1.00       0.0
01+777               JUNCTION            117.13      1.00       0.0
08+096               JUNCTION            117.98      1.00       0.0
09+354               JUNCTION            118.20      1.00       0.0
09+412               JUNCTION            117.90      1.00       0.0
09+756               JUNCTION            116.20      1.00       0.0
10+000               JUNCTION            115.39      1.00       0.0
10+018               JUNCTION            115.49      1.00       0.0
10+070               JUNCTION            115.77      1.00       0.0
10+093               JUNCTION            116.00      1.00       0.0
10+140               JUNCTION            115.86      1.00       0.0
10+171               JUNCTION            116.07      1.00       0.0
11+166               JUNCTION            117.32      1.00       0.0
11+251               JUNCTION            116.95      1.00       0.0
11+305               JUNCTION            116.95      1.00       0.0
11+411               JUNCTION            116.56      1.00       0.0
CB118-119            JUNCTION            113.33      2.86       0.0
CB120-121            JUNCTION            115.45      1.00       0.0
CB122-123            JUNCTION            115.71      1.00       0.0
CB124-125            JUNCTION            116.01      1.00       0.0
CB126-127            JUNCTION            113.97      3.00       0.0
CB128-129            JUNCTION            116.33      1.00       0.0
CB130-131            JUNCTION            116.56      1.00       0.0
CB132-133            JUNCTION            116.80      1.00       0.0
CB134-135            JUNCTION            117.04      1.00       0.0
CB136-137            JUNCTION            117.29      1.00       0.0
CB138-139            JUNCTION            117.53      1.00       0.0
CB140-141            JUNCTION            117.75      1.00       0.0
CB142-143            JUNCTION            117.96      1.00       0.0
CB157-158            JUNCTION            117.86      1.00       0.0
CB159-160            JUNCTION            117.57      1.00       0.0
CB-161A-B            JUNCTION            115.97      2.10       0.0
CB-162A-B            JUNCTION            116.72      1.00       0.0
CB-163A-B            JUNCTION            115.02      2.10       0.0
CB-164A-B            JUNCTION            115.23      2.10       0.0
CB-165A-B            JUNCTION            114.61      2.10       0.0
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CB-166A-B            JUNCTION            114.27      2.10       0.0
CB-167A-B            JUNCTION            114.75      2.10       0.0
CB-168A-B            JUNCTION            116.73      1.00       0.0
CB-169A-B            JUNCTION            117.38      1.00       0.0
CB170                JUNCTION            116.25      3.07       0.0
CB176                JUNCTION            115.65      2.71       0.0
CB177                JUNCTION            115.07      3.25       0.0
CB184                JUNCTION            115.00      2.12       0.0
CB187                JUNCTION            113.18      2.60       0.0
CB188                JUNCTION            114.31      2.28       0.0
CB194                JUNCTION            114.52      3.19       0.0
CB195                JUNCTION            115.62      2.20       0.0
CB200                JUNCTION            115.55      3.25       0.0
CoolingTrench        JUNCTION            109.24      3.47       0.0
J1                   JUNCTION            115.02      1.00       0.0
J2                   JUNCTION            114.65      1.00       0.0
J3                   JUNCTION            114.20      1.20       0.0
J4                   JUNCTION            115.95      1.00       0.0
J5                   JUNCTION            115.82      1.00       0.0
J6                   JUNCTION            114.93      1.00       0.0
J7                   JUNCTION            111.17      2.78       0.0
J8                   JUNCTION            110.87      1.20       0.0
PondOUT              JUNCTION            111.00      1.71       0.0
OF-CarpCreek         OUTFALL               0.00      0.00       0.0
OF-CoolTrenchOut     OUTFALL             110.35      0.20       0.0
OF-SWMF              OUTFALL             110.85      1.20       0.0
OF-Unc-S             OUTFALL               0.00      0.00       0.0
CAP(225)             STORAGE             114.27      3.82       0.0
HW191                STORAGE             111.36      4.15       0.0
MH201                STORAGE             114.32      3.83       0.0
MH213                STORAGE             114.62      3.35       0.0
MH215                STORAGE             114.76      3.23       0.0
MH217                STORAGE             114.64      3.24       0.0
MH219                STORAGE             114.47      3.29       0.0
MH227                STORAGE             114.13      3.86       0.0
MH229                STORAGE             113.93      3.84       0.0
MH233                STORAGE             113.75      3.85       0.0
MH235                STORAGE             113.55      3.83       0.0
MH237                STORAGE             113.37      3.82       0.0
MH241                STORAGE             113.19      3.83       0.0
MH243                STORAGE             112.87      3.80       0.0
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MH245                STORAGE             112.52      3.82       0.0
MH247                STORAGE             112.36      3.78       0.0
MH249                STORAGE             112.19      3.77       0.0
MH251                STORAGE             111.98      3.76       0.0
MH253                STORAGE             111.79      3.83       0.0
MH259                STORAGE             111.54      3.81       0.0
MH260                STORAGE             111.39      4.18       0.0
MH261                STORAGE             111.22      3.25       0.0
MH263                STORAGE             111.19      3.20       0.0
MH265                STORAGE             111.12      3.27       0.0
MH266                STORAGE             115.02      2.87       0.0
MH267                STORAGE             114.34      2.95       0.0
MH267(1B)            STORAGE             113.38      2.68       0.0
MH268                STORAGE             114.14      3.25       0.0
MH269                STORAGE             113.20      3.77       0.0
MH270                STORAGE             113.02      4.05       0.0
MH271                STORAGE             112.81      3.68       0.0
MH272                STORAGE             112.65      3.92       0.0
MH273                STORAGE             112.36      3.68       0.0
MH274                STORAGE             112.25      3.77       0.0
MH275                STORAGE             111.61      3.50       0.0
MH276                STORAGE             111.52      3.79       0.0
MH277                STORAGE             111.46      3.83       0.0
MH278                STORAGE             111.42      3.81       0.0
MH279                STORAGE             113.89      2.33       0.0
MH280                STORAGE             112.92      2.79       0.0
MH281                STORAGE             114.97      2.36       0.0
RYCB171              STORAGE             116.32      2.28       0.0
RYCB178              STORAGE             115.14      2.61       0.0
RYCB183              STORAGE             115.10      1.99       0.0
RYCB186              STORAGE             113.28      2.58       0.0
RYCB189              STORAGE             114.35      1.95       0.0
RYCB193              STORAGE             114.61      2.14       0.0
RYCB196              STORAGE             115.66      1.89       0.0
RYCB199              STORAGE             115.63      2.22       0.0
RYCB201              STORAGE             115.66      2.43       0.0
SWMF-E               STORAGE             109.24      3.47       0.0
Vortech-1929CIP-A    STORAGE             111.48      3.91       0.0
Vortech-9000         STORAGE             111.20      3.27       0.0
```

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************
Link Summary
************
Name             From Node        To Node          Type             Length    %Slope Roughness
----------------------------------------------------------------------------------------------
CAP-227          CAP(225)         MH227            CONDUIT            18.2    0.3846    0.0130
CoolingTrench1   SWMF-E           CoolingTrench    CONDUIT           355.0    0.0001    0.0130
CoolingTrench2   CoolingTrench    OF-CoolTrenchOut CONDUIT             9.5    0.0032    0.0130
Culvert          SWMF-E           PondOUT          CONDUIT            19.0    0.5263    0.0130
MH201-CAP        MH201            CAP(225)         CONDUIT            12.6    0.3968    0.0130
MH213-227        MH213            MH227            CONDUIT            30.6    0.3922    0.0130
MH215-213        MH215            MH213            CONDUIT            21.4    0.3738    0.0130
MH215-217        MH215            MH217            CONDUIT            25.0    0.4800    0.0130
MH217-219        MH217            MH219            CONDUIT            23.0    0.4348    0.0130
MH219-229        MH219            MH229            CONDUIT            31.0    0.5161    0.0130
MH227-229        MH227            MH229            CONDUIT            44.9    0.4009    0.0130
MH229-233        MH229            MH233            CONDUIT            33.6    0.4167    0.0130
MH233-235        MH233            MH235            CONDUIT            44.2    0.3846    0.0130
MH235-237        MH235            MH237            CONDUIT            39.3    0.4326    0.0130
MH237-241        MH237            MH241            CONDUIT            32.7    0.4587    0.0130
MH241-243        MH241            MH243            CONDUIT            72.4    0.3867    0.0130
MH243-245        MH243            MH245            CONDUIT            67.2    0.3869    0.0130
MH245-247        MH245            MH247            CONDUIT            40.3    0.2978    0.0130
MH247-249        MH247            MH249            CONDUIT            34.6    0.3757    0.0130
MH249-251        MH249            MH251            CONDUIT            44.7    0.3803    0.0130
MH251-253        MH251            MH253            CONDUIT            31.0    0.3548    0.0130
MH253-259        MH253            MH259            CONDUIT            74.9    0.3071    0.0130
MH259-260        MH259            MH260            CONDUIT            39.1    0.3069    0.0130
MH260-261        MH260            MH261            CONDUIT            47.7    0.3564    0.0130
MH261-OGS        MH261            Vortech-9000     CONDUIT             4.6    0.4348    0.0130
MH263-265        MH263            MH265            CONDUIT             5.4    0.3704    0.0130
MH265-HW2        MH265            SWMF-E           CONDUIT            21.1    0.4265    0.0130
MH266-267        MH266            MH267            CONDUIT           114.0    0.5702    0.0130
MH267(1B)-245    MH267(1B)        MH245            CONDUIT            40.1    0.9477    0.0130
MH267-268        MH267            MH268            CONDUIT            40.8    0.4167    0.0130
MH268-269        MH268            MH269            CONDUIT            78.2    0.3197    0.0130
MH269-270        MH269            MH270            CONDUIT            50.8    0.2559    0.0130
MH270-271        MH270            MH271            CONDUIT            66.4    0.2410    0.0130
MH271-272        MH271            MH272            CONDUIT            59.5    0.1849    0.0130
MH272-273        MH272            MH273            CONDUIT           104.9    0.1811    0.0130
MH273-274        MH273            MH274            CONDUIT            43.4    0.2535    0.0130
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MH274-275        MH274            MH275            CONDUIT           53.0    0.2453    0.0130
MH275-276        MH275            MH276            CONDUIT           15.9    0.3774    0.0130
MH276-OGSa       MH276            Vortech-1929CIP-A CONDUIT            4.4    0.4546    0.0130
MH277-278        MH277            MH278            CONDUIT            5.5    0.3636    0.0130
MH278-191        MH278            HW191            CONDUIT           17.7    0.3390    0.0130
MH279-269        MH279            MH269            CONDUIT           74.2    0.2156    0.0130
MH280-273        MH280            MH273            CONDUIT           73.6    0.2446    0.0130
MH281-269        MH281            MH269            CONDUIT           45.5    0.7033    0.0130
MS01             10+000           J1               CONDUIT            5.0    7.4203    0.0160
MS02             J1               J2               CONDUIT           34.9    1.0602    0.0350
MS03             J2               J3               CONDUIT           22.7    1.9828    0.0350
MS04             J3               SWMF-E           CONDUIT           19.0   16.8116    0.0350
MS05             J4               10+140           CONDUIT            5.0    1.8003    0.0130
MS06             J4               J5               CONDUIT            5.9    2.2039    0.0350
MS07             J5               J6               CONDUIT           54.6    1.6303    0.0350
MS08             J6               HW191            CONDUIT           49.0    7.3051    0.0350
MS09             HW191            J7               CONDUIT           25.5    0.7451    0.0350
MS10             J7               SWMF-E           CONDUIT           19.5    0.6154    0.0350
MS11             PondOUT          J8               CONDUIT           30.0    0.4333    0.0350
MS12             J8               OF-SWMF          CONDUIT            4.0    0.5000    0.0350
OGS-277          Vortech-1929CIP-A MH277            CONDUIT            2.0    0.5000    0.0130
OGS-MH263        Vortech-9000     MH263            CONDUIT            6.5    0.1550    0.0130
OVF-RYCB171      RYCB171          RYCB201          CONDUIT          172.0    0.2965    0.0350
OVF-RYCB178      RYCB178          RYCB183          CONDUIT          197.0    0.3350    0.0350
OVF-RYCB183      RYCB183          CB-167A-B        CONDUIT           53.0    0.4528    0.0350
OVF-RYCB186      RYCB186          SWMF-E           CONDUIT           44.0    8.6917    0.0350
OVF-RYCB189      RYCB189          CB-166A-B        CONDUIT           25.0   -0.2800    0.0350
OVF-RYCB193      RYCB193          RYCB189          CONDUIT          185.0    0.2432    0.0350
OVF-RYCB196      RYCB196          CB-163A-B        CONDUIT           30.0    1.4335    0.0350
OVF-RYCB199      RYCB199          RYCB196          CONDUIT          145.0    0.2069    0.0350
OVF-RYCB201      RYCB201          01+777           CONDUIT           11.0   -0.3636    0.0350
RYCB171-CB170    RYCB171          CB170            CONDUIT           37.5    0.1867    0.0130
RYCB178-CB177    RYCB178          CB177            CONDUIT           35.2    0.1989    0.0130
RYCB183-CB184    RYCB183          CB184            CONDUIT           46.5    0.2151    0.0130
RYCB186-CB187    RYCB186          CB187            CONDUIT           47.4    0.2110    0.0130
RYCB189-CB188    RYCB189          CB188            CONDUIT           19.4    0.2062    0.0130
RYCB193-CB194    RYCB193          CB194            CONDUIT           44.2    0.2036    0.0130
RYCB196-CB195    RYCB196          CB195            CONDUIT           23.0    0.1739    0.0130
RYCB199-CB200    RYCB199          CB200            CONDUIT           43.4    0.1843    0.0130
RYCB201-CB176    RYCB201          CB176            CONDUIT            3.7    0.2703    0.0130
Street10-A       10+018           10+000           CONDUIT           16.5    0.6061    0.0160
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Street10-B       10+018           CB-166A-B        CONDUIT           19.3    0.6218    0.0160
Street10-C       10+070           CB-166A-B        CONDUIT           32.7    1.2233    0.0160
Street10-D       10+070           CB-165A-B        CONDUIT            5.0    1.2001    0.0160
Street10-E       10+093           CB-165A-B        CONDUIT           11.0    2.6373    0.0160
Street10-F       10+093           CB-167A-B        CONDUIT           29.7    0.5051    0.0160
Street10-G       10+140           CB-167A-B        CONDUIT            2.2    0.4546    0.0160
Street10-H       10+171           10+140           CONDUIT           30.3    0.6931    0.0160
Street11-A       09+412           CB-169A-B        CONDUIT           63.2    0.8228    0.0160
Street11-B       CB-169A-B        CB-161A-B        CONDUIT           43.9    0.7062    0.0160
Street11-C       11+166           CB-161A-B        CONDUIT           50.2    0.4980    0.0160
Street11-D       11+166           CB-162A-B        CONDUIT           74.4    0.8065    0.0160
Street11-E       11+251           CB-162A-B        CONDUIT            2.0   11.5768    0.0160
Street11-F       11+251           CB-168A-B        CONDUIT            2.0   11.0672    0.0160
Street11-G       CB-168A-B        01+722           CONDUIT            5.0    0.2000    0.0160
Street11-H       11+305           CB-168A-B        CONDUIT           43.7    0.5034    0.0160
Street11-I       11+305           CB-164A-B        CONDUIT           59.2    1.0474    0.0160
Street11-J       11+411           CB-164A-B        CONDUIT           47.5    0.4842    0.0160
Street11-K       11+411           CB-165A-B        CONDUIT          111.6    0.7617    0.0160
Street1-A        01+507           CB126-127        CONDUIT           99.3    0.4935    0.0160
Street1-B        09+756           CB126-127        CONDUIT           35.0    0.6572    0.0160
Street1-C        09+756           CB-163A-B        CONDUIT            7.0    1.1429    0.0160
Street1-D        01+722           CB-163A-B        CONDUIT           64.9    0.9245    0.0160
Street1-E        CB-162A-B        01+722           CONDUIT            5.0    0.0061    0.0160
Street1-F        01+777           CB-162A-B        CONDUIT           45.1    0.9091    0.0160
Street8-A        CB142-143        CB157-158        CONDUIT           10.0    1.0001    0.0160
Street8-B        08+096           CB157-158        CONDUIT           40.1    0.2993    0.0160
Street8-C        08+096           CB159-160        CONDUIT           85.5    0.4795    0.0160
Street8-D        CB159-160        CB138-139        CONDUIT           15.0    0.2667    0.0160
Street9-A        10+000           CB118-119        CONDUIT           37.1    0.5391    0.0160
Street9-B        CB120-121        CB118-119        CONDUIT           53.2    0.4887    0.0160
Street9-C        CB122-123        CB120-121        CONDUIT           53.2    0.4887    0.0160
Street9-D        CB124-125        CB122-123        CONDUIT           58.8    0.5102    0.0160
Street9-E        09+756           CB124-125        CONDUIT           37.5    0.5067    0.0160
Street9-F        CB128-129        09+756           CONDUIT           23.8    0.5462    0.0160
Street9-G        CB130-131        CB128-129        CONDUIT           47.7    0.4822    0.0160
Street9-H        CB132-133        CB130-131        CONDUIT           48.2    0.4979    0.0160
Street9-I        CB134-135        CB132-133        CONDUIT           47.1    0.5096    0.0160
Street9-J        CB136-137        CB134-135        CONDUIT           48.3    0.5176    0.0160
Street9-K        CB138-139        CB136-137        CONDUIT           47.8    0.5021    0.0160
Street9-L        CB140-141        CB138-139        CONDUIT           41.9    0.5251    0.0160
Street9-M        09+412           CB140-141        CONDUIT           28.2    0.5319    0.0160
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Street9-N        CB142-143        09+412           CONDUIT            12.8    0.4688    0.0160
Street9-O        09+354           CB142-143        CONDUIT            49.1    0.4888    0.0160
OCB118           CB118-119        MH253            ORIFICE
OCB119           CB118-119        MH253            ORIFICE
OCB126-127       CB126-127        MH267(1B)        ORIFICE
OCB161A          CB-161A-B        MH266            ORIFICE
OCB161B          CB-161A-B        MH266            ORIFICE
OCB163A          CB-163A-B        MH279            ORIFICE
OCB163B          CB-163A-B        MH279            ORIFICE
OCB164A          CB-164A-B        MH270            ORIFICE
OCB164B          CB-164A-B        MH270            ORIFICE
OCB165A          CB-165A-B        MH272            ORIFICE
OCB165B          CB-165A-B        MH272            ORIFICE
OCB166A          CB-166A-B        MH280            ORIFICE
OCB166B          CB-166A-B        MH280            ORIFICE
OCB167A          CB-167A-B        MH274            ORIFICE
OCB167B          CB-167A-B        MH274            ORIFICE
ORYCB171         CB170            MH201            ORIFICE
ORYCB178         CB177            MH281            ORIFICE
ORYCB183         CB184            MH274            ORIFICE
ORYCB186         CB187            MH260            ORIFICE
ORYCB189         CB188            MH280            ORIFICE
ORYCB193         CB194            MH279            ORIFICE
ORYCB196         CB195            MH279            ORIFICE
ORYCB199         CB200            MH229            ORIFICE
ORYCB201         CB176            MH281            ORIFICE
MH261-265        MH261            MH265            WEIR
MH276-278        MH276            MH278            WEIR
W1               SWMF-E           PondOUT          WEIR
W2               SWMF-E           PondOUT          WEIR
OCB120-121       CB120-121        MH253            OUTLET
OCB122-123       CB122-123        MH249            OUTLET
OCB124-125       CB124-125        MH247            OUTLET
OCB128-129       CB128-129        MH243            OUTLET
OCB130-131       CB130-131        MH243            OUTLET
OCB132-133       CB132-133        MH241            OUTLET
OCB134-135       CB134-135        MH237            OUTLET
OCB136-137       CB136-137        MH235            OUTLET
OCB138-139       CB138-139        MH233            OUTLET
OCB140-141       CB140-141        MH227            OUTLET
OCB142-143       CB142-143        CAP(225)         OUTLET
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OCB157-158       CB157-158        MH213            OUTLET
OCB159-160       CB159-160        MH219            OUTLET
OCB162           CB-162A-B        MH268            OUTLET
OCB168           CB-168A-B        MH269            OUTLET
OCB169           CB-169A-B        MH266            OUTLET


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Cross Section Summary
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                                      Full     Full     Hyd.     Max.   No. of     Full
Conduit          Shape               Depth     Area     Rad.    Width  Barrels     Flow
---------------------------------------------------------------------------------------
CAP-227          CIRCULAR             0.61     0.29     0.15     0.61        1   397.98
CoolingTrench1   CIRCULAR             0.20     0.03     0.05     0.20        1     0.30
CoolingTrench2   CIRCULAR             0.20     0.03     0.05     0.20        1     1.86
Culvert          CIRCULAR             0.30     0.07     0.07     0.30        1    70.16
MH201-CAP        CIRCULAR             0.61     0.29     0.15     0.61        1   404.25
MH213-227        CIRCULAR             0.30     0.07     0.08     0.30        1    63.29
MH215-213        CIRCULAR             0.25     0.05     0.06     0.25        1    37.93
MH215-217        CIRCULAR             0.25     0.05     0.06     0.25        1    42.98
MH217-219        CIRCULAR             0.25     0.05     0.06     0.25        1    40.91
MH219-229        CIRCULAR             0.30     0.07     0.08     0.30        1    72.61
MH227-229        CIRCULAR             0.69     0.37     0.17     0.69        1   555.71
MH229-233        CIRCULAR             0.69     0.37     0.17     0.69        1   566.53
MH233-235        CIRCULAR             0.69     0.37     0.17     0.69        1   544.31
MH235-237        CIRCULAR             0.69     0.37     0.17     0.69        1   577.25
MH237-241        CIRCULAR             0.69     0.37     0.17     0.69        1   594.43
MH241-243        CIRCULAR             0.69     0.37     0.17     0.69        1   545.81
MH243-245        CIRCULAR             0.69     0.37     0.17     0.69        1   545.93
MH245-247        CIRCULAR             0.76     0.46     0.19     0.76        1   633.80
MH247-249        CIRCULAR             0.76     0.46     0.19     0.76        1   711.95
MH249-251        CIRCULAR             0.76     0.46     0.19     0.76        1   716.28
MH251-253        CIRCULAR             0.76     0.46     0.19     0.76        1   691.88
MH253-259        CIRCULAR             0.84     0.55     0.21     0.84        1   829.36
MH259-260        CIRCULAR             0.84     0.55     0.21     0.84        1   829.12
MH260-261        CIRCULAR             0.84     0.55     0.21     0.84        1   893.48
MH261-OGS        CIRCULAR             0.53     0.22     0.13     0.53        1   295.26
MH263-265        CIRCULAR             0.53     0.22     0.13     0.53        1   272.52
MH265-HW2        CIRCULAR             0.84     0.55     0.21     0.84        1   977.46
MH266-267        CIRCULAR             0.38     0.11     0.10     0.38        1   138.13
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MH267(1B)-245    CIRCULAR             0.25     0.05     0.06     0.25        1    60.40
MH267-268        CIRCULAR             0.46     0.16     0.11     0.46        1   191.78
MH268-269        CIRCULAR             0.53     0.22     0.13     0.53        1   253.19
MH269-270        CIRCULAR             0.69     0.37     0.17     0.69        1   443.99
MH270-271        CIRCULAR             0.69     0.37     0.17     0.69        1   430.83
MH271-272        CIRCULAR             0.76     0.46     0.19     0.76        1   499.40
MH272-273        CIRCULAR             0.76     0.46     0.19     0.76        1   494.31
MH273-274        CIRCULAR             0.91     0.66     0.23     0.91        1   949.75
MH274-275        CIRCULAR             0.91     0.66     0.23     0.91        1   934.31
MH275-276        CIRCULAR             1.65     2.14     0.41     1.65        1  5608.37
MH276-OGSa       CIRCULAR             1.07     0.89     0.27     1.07        1  1921.74
MH277-278        CIRCULAR             1.07     0.89     0.27     1.07        1  1718.86
MH278-191        CIRCULAR             1.65     2.14     0.41     1.65        1  5315.55
MH279-269        CIRCULAR             0.46     0.16     0.11     0.46        1   137.96
MH280-273        CIRCULAR             0.53     0.22     0.13     0.53        1   221.45
MH281-269        CIRCULAR             0.38     0.11     0.10     0.38        1   153.41
MS01             RECT_OPEN            1.00     3.00     0.60     3.00        1 36336.27
MS02             TRAPEZOIDAL          1.00     4.00     0.55     7.00        1  7862.69
MS03             TRAPEZOIDAL          1.00     4.00     0.55     7.00        1 10752.43
MS04             TRIANGULAR           1.20     3.60     0.56     6.00        1 28554.86
MS05             RECT_OPEN            1.00     3.00     0.60     3.00        1 22028.06
MS06             TRAPEZOIDAL          1.00     4.00     0.55     7.00        1 11336.24
MS07             TRAPEZOIDAL          1.00     4.00     0.55     7.00        1  9749.85
MS08             TRAPEZOIDAL          1.00     4.50     0.58     7.50        1 24033.65
MS09             TRAPEZOIDAL          2.00    16.00     1.09    14.00        1 41853.33
MS10             TRAPEZOIDAL          2.00    16.00     1.09    14.00        1 38035.98
MS11             TRIANGULAR           1.20     3.60     0.56     6.00        1  4584.46
MS12             TRIANGULAR           1.20     3.60     0.56     6.00        1  4924.51
OGS-277          CIRCULAR             1.07     0.89     0.27     1.07        1  2015.54
OGS-MH263        CIRCULAR             0.53     0.22     0.13     0.53        1   176.32
OVF-RYCB171      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1  2838.98
OVF-RYCB178      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1  3017.73
OVF-RYCB183      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1  3508.41
OVF-RYCB186      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1 15370.69
OVF-RYCB189      TRAPEZOIDAL          1.00     7.00     0.68    10.00        1  8168.09
OVF-RYCB193      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1  2571.35
OVF-RYCB196      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1  6242.18
OVF-RYCB199      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1  2371.47
OVF-RYCB201      TRAPEZOIDAL          1.00     3.50     0.51     6.50        1  3863.88
RYCB171-CB170    CIRCULAR             0.25     0.05     0.06     0.25        1    26.81
RYCB178-CB177    CIRCULAR             0.25     0.05     0.06     0.25        1    27.67
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RYCB183-CB184    CIRCULAR             0.25     0.05     0.06     0.25        1    28.77
RYCB186-CB187    CIRCULAR             0.25     0.05     0.06     0.25        1    28.50
RYCB189-CB188    CIRCULAR             0.25     0.05     0.06     0.25        1    28.17
RYCB193-CB194    CIRCULAR             0.25     0.05     0.06     0.25        1    28.00
RYCB196-CB195    CIRCULAR             0.25     0.05     0.06     0.25        1    25.87
RYCB199-CB200    CIRCULAR             0.25     0.05     0.06     0.25        1    26.64
RYCB201-CB176    CIRCULAR             0.25     0.05     0.06     0.25        1    32.25
Street10-A       20mROW               1.00    16.85     0.50    20.00        1 51519.37
Street10-B       20mROW               1.00    16.85     0.50    20.00        1 52182.47
Street10-C       20mROW               1.00    16.85     0.50    20.00        1 73194.91
Street10-D       20mROW               1.00    16.85     0.50    20.00        1 72496.12
Street10-E       20mROW               1.00    16.85     0.50    20.00        1 107469.85
Street10-F       20mROW               1.00    16.85     0.50    20.00        1 47030.40
Street10-G       20mROW               1.00    16.85     0.50    20.00        1 44616.90
Street10-H       20mROW               1.00    16.85     0.50    20.00        1 55093.71
Street11-A       18mROW               1.00    15.30     0.53    18.00        1 56690.64
Street11-B       18mROW               1.00    15.30     0.53    18.00        1 52518.81
Street11-C       18mROW               1.00    15.30     0.53    18.00        1 44104.38
Street11-D       18mROW               1.00    15.30     0.53    18.00        1 56125.09
Street11-E       18mROW               1.00    15.30     0.53    18.00        1 212645.03
Street11-F       18mROW               1.00    15.30     0.53    18.00        1 207911.71
Street11-G       18mROW               1.00    15.30     0.53    18.00        1 27949.64
Street11-H       18mROW               1.00    15.30     0.53    18.00        1 44343.93
Street11-I       18mROW               1.00    15.30     0.53    18.00        1 63959.90
Street11-J       18mROW               1.00    15.30     0.53    18.00        1 43489.11
Street11-K       18mROW               1.00    15.30     0.53    18.00        1 54543.69
Street1-A        20mROW               1.00    16.85     0.50    20.00        1 46487.32
Street1-B        20mROW               1.00    16.85     0.50    20.00        1 53646.71
Street1-C        20mROW               1.00    16.85     0.50    20.00        1 70748.73
Street1-D        20mROW               1.00    16.85     0.50    20.00        1 63631.34
Street1-E        20mROW               1.00    16.85     0.50    20.00        1  5166.91
Street1-F        20mROW               1.00    16.85     0.50    20.00        1 63098.80
Street8-A        18mROW               1.00    15.30     0.53    18.00        1 62498.80
Street8-B        18mROW               1.00    15.30     0.53    18.00        1 34188.52
Street8-C        18mROW               1.00    15.30     0.53    18.00        1 43278.50
Street8-D        18mROW               1.00    15.30     0.53    18.00        1 32273.49
Street9-A        20mROW               1.00    16.85     0.50    20.00        1 48589.19
Street9-B        20mROW               1.00    16.85     0.50    20.00        1 46263.87
Street9-C        20mROW               1.00    16.85     0.50    20.00        1 46263.87
Street9-D        20mROW               1.00    16.85     0.50    20.00        1 47269.75
Street9-E        20mROW               1.00    16.85     0.50    20.00        1 47105.59
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Street9-F        20mROW             1.00    16.85     0.50    20.00        1 48909.69
Street9-G        20mROW             1.00    16.85     0.50    20.00        1 45953.20
Street9-H        20mROW             1.00    16.85     0.50    20.00        1 46697.46
Street9-I        20mROW             1.00    16.85     0.50    20.00        1 47239.63
Street9-J        20mROW             1.00    16.85     0.50    20.00        1 47611.06
Street9-K        20mROW             1.00    16.85     0.50    20.00        1 46892.45
Street9-L        20mROW             1.00    16.85     0.50    20.00        1 47953.00
Street9-M        20mROW             1.00    16.85     0.50    20.00        1 48265.04
Street9-N        20mROW             1.00    16.85     0.50    20.00        1 45308.69
Street9-O        20mROW             1.00    16.85     0.50    20.00        1 46267.49


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Transect Summary
****************

Transect 18mROW
Area:
           0.0009     0.0034     0.0077     0.0137     0.0214
           0.0308     0.0417     0.0530     0.0657     0.0801
           0.0962     0.1139     0.1333     0.1543     0.1770
           0.2005     0.2240     0.2475     0.2710     0.2945
           0.3180     0.3415     0.3650     0.3885     0.4120
           0.4356     0.4591     0.4826     0.5061     0.5296
           0.5531     0.5766     0.6001     0.6237     0.6472
           0.6707     0.6942     0.7177     0.7412     0.7648
           0.7883     0.8118     0.8353     0.8588     0.8824
           0.9059     0.9294     0.9529     0.9765     1.0000
Hrad:
           0.0183     0.0366     0.0550     0.0733     0.0916
           0.1099     0.1371     0.1723     0.2020     0.2263
           0.2467     0.2639     0.2788     0.2920     0.3037
           0.3187     0.3354     0.3530     0.3715     0.3905
           0.4099     0.4295     0.4495     0.4695     0.4898
           0.5101     0.5305     0.5509     0.5714     0.5919
           0.6125     0.6330     0.6536     0.6741     0.6946
           0.7152     0.7357     0.7562     0.7766     0.7971
           0.8175     0.8379     0.8583     0.8786     0.8989
           0.9192     0.9394     0.9597     0.9798     1.0000
Width:
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           0.0726     0.1453     0.2179     0.2905     0.3631
           0.4358     0.4721     0.5073     0.5776     0.6478
           0.7180     0.7882     0.8584     0.9287     0.9989
           0.9989     0.9990     0.9990     0.9990     0.9990
           0.9991     0.9991     0.9991     0.9992     0.9992
           0.9992     0.9993     0.9993     0.9993     0.9994
           0.9994     0.9994     0.9995     0.9995     0.9995
           0.9996     0.9996     0.9996     0.9997     0.9997
           0.9997     0.9997     0.9998     0.9998     0.9998
           0.9999     0.9999     0.9999     1.0000     1.0000

Transect 20mROW
Area:
           0.0008     0.0031     0.0070     0.0124     0.0194
           0.0279     0.0378     0.0481     0.0600     0.0738
           0.0893     0.1067     0.1258     0.1468     0.1696
           0.1933     0.2170     0.2408     0.2645     0.2882
           0.3119     0.3356     0.3593     0.3831     0.4068
           0.4305     0.4542     0.4779     0.5017     0.5254
           0.5491     0.5728     0.5966     0.6203     0.6440
           0.6677     0.6915     0.7152     0.7389     0.7627
           0.7864     0.8101     0.8339     0.8576     0.8813
           0.9051     0.9288     0.9525     0.9763     1.0000
Hrad:
           0.0194     0.0389     0.0583     0.0777     0.0972
           0.1166     0.1454     0.1826     0.2126     0.2360
           0.2548     0.2701     0.2830     0.2941     0.3039
           0.3179     0.3339     0.3511     0.3692     0.3880
           0.4072     0.4268     0.4467     0.4667     0.4870
           0.5073     0.5278     0.5483     0.5688     0.5894
           0.6101     0.6307     0.6514     0.6720     0.6927
           0.7133     0.7339     0.7546     0.7752     0.7957
           0.8163     0.8368     0.8573     0.8778     0.8982
           0.9186     0.9390     0.9594     0.9797     1.0000
Width:
           0.0654     0.1307     0.1961     0.2615     0.3268
           0.3922     0.4249     0.4633     0.5398     0.6163
           0.6929     0.7694     0.8459     0.9225     0.9990
           0.9990     0.9991     0.9991     0.9991     0.9991
           0.9992     0.9992     0.9992     0.9993     0.9993
           0.9993     0.9993     0.9994     0.9994     0.9994
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            0.9995     0.9995     0.9995     0.9995     0.9996
            0.9996     0.9996     0.9997     0.9997     0.9997
            0.9997     0.9998     0.9998     0.9998     0.9999
            0.9999     0.9999     0.9999     1.0000     1.0000


  *********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  *********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... LPS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ...... HORTON
  Flow Routing Method ...... DYNWAVE
  Surcharge Method ......... EXTRAN
  Starting Date ............ 07/21/2022 00:00:00
  Ending Date .............. 07/22/2022 00:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:01:00
  Wet Time Step ............ 00:01:00
  Dry Time Step ............ 00:01:00
  Routing Time Step ........ 1.00 sec
  Variable Time Step ....... YES
  Maximum Trials ........... 8
  Number of Threads ........ 4
  Head Tolerance ........... 0.001500 m


  **************************        Volume         Depth
```

```
  Runoff Quantity Continuity     hectare-m            mm
  **************************     ---------       -------
  Total Precipitation ......         3.492        76.002
  Evaporation Loss .........         0.000         0.000
  Infiltration Loss ........         2.352        51.195
  Surface Runoff ...........         1.133        24.659
  Final Storage ............         0.008         0.170
  Continuity Error (%) .....        -0.030


  **************************        Volume        Volume
  Flow Routing Continuity        hectare-m      10^6 ltr
  **************************     ---------     ---------
  Dry Weather Inflow .......         0.000         0.000
  Wet Weather Inflow .......         1.133        11.330
  Groundwater Inflow .......         0.000         0.000
  RDII Inflow ..............         0.000         0.000
  External Inflow ..........         0.000         0.000
  External Outflow .........         1.131        11.313
  Flooding Loss ............         0.000         0.000
  Evaporation Loss .........         0.000         0.000
  Exfiltration Loss ........         0.000         0.000
  Initial Stored Volume ....         0.349         3.492
  Final Stored Volume ......         0.353         3.534
  Continuity Error (%) .....        -0.168


  *************************
  Highest Continuity Errors
  *************************
  Node MH265 (-5.11%)
  Node MH261 (4.95%)
  Node MH217 (1.89%)
  Node 01+722 (-1.68%)
  Node CB-169A-B (-1.58%)


  ***************************
  Time-Step Critical Elements
  ***************************
  Link OGS-277 (38.67%)
```

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - INTERIM
(100-year, 4-hour Chicago Storm)

```
  ********************************
  Highest Flow Instability Indexes
  ********************************
  Link MH276-278 (51)
  Link MH276-OGSa (46)
  Link MH277-278 (39)
  Link MH278-191 (38)
  Link MH275-276 (27)


  *************************
  Routing Time Step Summary
  *************************
  Minimum Time Step           :     0.50 sec
  Average Time Step           :     0.86 sec
  Maximum Time Step           :     1.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     2.73
  Percent Not Converging      :     0.01
  Time Step Frequencies       :
      1.000 -  0.871 sec      :    61.64 %
      0.871 -  0.758 sec      :     2.39 %
      0.758 -  0.660 sec      :    11.74 %
      0.660 -  0.574 sec      :    17.31 %
      0.574 -  0.500 sec      :     6.93 %


  ***************************
  Subcatchment Runoff Summary
  ***************************

  ------------------------------------------------------------------------------------------------------------------
-------------
                            Total      Total      Total      Total     Imperv       Perv      Total       Total
Peak  Runoff
                           Precip     Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff
Runoff   Coeff
  Subcatchment                 mm         mm         mm         mm         mm         mm         mm    10^6 ltr
LPS
```

```
  ------------------------------------------------------------------------------------------------------------------
-------------
  1B-01                     76.00       0.00       0.00      28.05      30.86      16.52      47.38        0.08
71.39   0.623
  1B-02                     76.00       0.00       0.00      24.48      36.46      14.63      51.09        0.12
106.65   0.672
  1B-03                     76.00       0.00       0.00      32.07      26.60      16.81      43.42        0.07
45.57   0.571
  1B-04                     76.00       0.00       0.00      27.20      32.18      16.24      48.42        0.11
96.30   0.637
  1B-05                     76.00       0.00       0.00      27.24      32.12      16.20      48.31        0.07
60.61   0.636
  1B-06                     76.00       0.00       0.00      30.06      27.86      17.79      45.65        0.09
79.84   0.601
  1B-07                     76.00       0.00       0.00      26.71      33.30      15.65      48.96        0.12
100.31   0.644
  1B-08                     76.00       0.00       0.00      21.14      41.87      12.56      54.43        0.13
102.70   0.716
  1B-09                     76.00       0.00       0.00      19.05      45.10      11.37      56.48        0.13
104.64   0.743
  1B-10                     76.00       0.00       0.00      19.04      45.06      11.39      56.45        0.12
95.91   0.743
  1B-11                     76.00       0.00       0.00      29.26      28.77      17.45      46.23        0.16
151.28   0.608
  1B-12                     76.00       0.00       0.00      20.41      42.88      12.23      55.11        0.11
90.95   0.725
  1B-13                     76.00       0.00       0.00      19.05      45.06      11.38      56.43        0.16
127.45   0.743
  1B-14                     76.00       0.00       0.00      18.39      46.11      10.98      57.08        0.14
114.06   0.751
  1B-15                     76.00       0.00       0.00      18.37      46.16      10.99      57.15        0.27
215.33   0.752
  1B-16                     76.00       0.00       0.00      53.68       5.29      16.93      22.22        1.02
347.10   0.292
  A-01                      76.00       0.00       0.00      32.93      27.16      15.95      43.10        0.21
132.09   0.567
  A-02                      76.00       0.00       0.00      15.63      50.44       9.40      59.84        0.14
112.96   0.787
  A-03                      76.00       0.00       0.00      21.00      44.57      10.47      55.04        0.26
169.18   0.724
  A-04                      76.00       0.00       0.00      14.24      52.67       8.58      61.25        0.28
211.65   0.806
  A-05                      76.00       0.00       0.00      31.78      28.23      16.04      44.27        0.16
106.07   0.582
```

```
  A-06                      76.00       0.00       0.00      12.88      54.73       7.74      62.48        0.24
177.90   0.822
  A-07                      76.00       0.00       0.00      23.66      40.24      12.15      52.38        0.19
123.78   0.689
  A-08                      76.00       0.00       0.00      22.43      39.44      13.40      52.83        0.11
91.85   0.695
  A-09                      76.00       0.00       0.00      15.59      50.34       9.45      59.78        0.14
106.37   0.787
  A-10                      76.00       0.00       0.00      30.41      30.43      15.20      45.63        0.20
126.61   0.600
  A-11                      76.00       0.00       0.00      14.91      51.51       8.98      60.49        0.28
218.12   0.796
  A-12                      76.00       0.00       0.00      32.94      29.36      13.73      43.08        0.30
168.65   0.567
  A-13                      76.00       0.00       0.00      31.41      30.42      14.19      44.62        0.29
172.48   0.587
  A-14                      76.00       0.00       0.00      14.90      51.51       8.99      60.50        0.31
239.49   0.796
  A-15                      76.00       0.00       0.00      33.12      27.16      15.75      42.91        0.18
108.23   0.565
  A-16                      76.00       0.00       0.00      16.23      49.34       9.87      59.21        0.14
112.56   0.779
  A-17                      76.00       0.00       0.00      19.06      44.87      11.37      56.24        0.16
130.89   0.740
  A-18                      76.00       0.00       0.00      33.42      27.16      15.45      42.61        0.12
69.56   0.561
  B1                        76.00       0.00       0.00      40.23      13.01      22.81      35.82        0.25
230.03   0.471
  B2                        76.00       0.00       0.00      41.70      10.88      23.47      34.35        0.43
394.40   0.452
  Future3-A                 76.00       0.00       0.00      61.64       5.29       8.97      14.25        3.32
1071.29   0.188
  Future3-B                 76.00       0.00       0.00      62.00       5.29       8.61      13.90        0.75
244.46   0.183


  ******************
  Node Depth Summary
  ******************

  ---------------------------------------------------------------------------------
                                 Average  Maximum  Maximum  Time of Max    Reported
                                   Depth    Depth      HGL   Occurrence   Max Depth
```

```
  Node                 Type       Meters   Meters   Meters  days hr:min      Meters
  ---------------------------------------------------------------------------------
  01+507               JUNCTION     0.00     0.00   116.46     0  00:00        0.00
  01+722               JUNCTION     0.01     0.09   116.81     0  01:30        0.09
  01+777               JUNCTION     0.00     0.07   117.20     0  01:31        0.07
  08+096               JUNCTION     0.00     0.05   118.03     0  01:31        0.05
  09+354               JUNCTION     0.00     0.00   118.20     0  00:00        0.00
  09+412               JUNCTION     0.00     0.05   117.95     0  01:30        0.05
  09+756               JUNCTION     0.01     0.12   116.32     0  01:31        0.12
  10+000               JUNCTION     0.00     0.07   115.46     0  01:32        0.07
  10+018               JUNCTION     0.00     0.10   115.59     0  01:31        0.10
  10+070               JUNCTION     0.00     0.07   115.84     0  01:30        0.07
  10+093               JUNCTION     0.00     0.04   116.04     0  01:31        0.04
  10+140               JUNCTION     0.01     0.19   116.05     0  01:30        0.19
  10+171               JUNCTION     0.00     0.00   116.07     0  00:00        0.00
  11+166               JUNCTION     0.00     0.03   117.35     0  01:32        0.03
  11+251               JUNCTION     0.00     0.00   116.95     0  00:00        0.00
  11+305               JUNCTION     0.00     0.00   116.95     0  00:00        0.00
  11+411               JUNCTION     0.00     0.01   116.57     0  01:33        0.01
  CB118-119            JUNCTION     0.12     2.17   115.50     0  01:32        2.17
  CB120-121            JUNCTION     0.01     0.13   115.58     0  01:31        0.13
  CB122-123            JUNCTION     0.01     0.13   115.84     0  01:30        0.13
  CB124-125            JUNCTION     0.01     0.12   116.13     0  01:31        0.12
  CB126-127            JUNCTION     0.20     2.35   116.32     0  01:35        2.35
  CB128-129            JUNCTION     0.00     0.12   116.45     0  01:30        0.12
  CB130-131            JUNCTION     0.00     0.12   116.68     0  01:30        0.12
  CB132-133            JUNCTION     0.00     0.11   116.91     0  01:30        0.11
  CB134-135            JUNCTION     0.00     0.10   117.14     0  01:30        0.10
  CB136-137            JUNCTION     0.00     0.09   117.38     0  01:30        0.09
  CB138-139            JUNCTION     0.00     0.08   117.61     0  01:30        0.08
  CB140-141            JUNCTION     0.00     0.06   117.81     0  01:30        0.06
  CB142-143            JUNCTION     0.00     0.07   118.03     0  01:30        0.07
  CB157-158            JUNCTION     0.01     0.17   118.03     0  01:30        0.17
  CB159-160            JUNCTION     0.00     0.08   117.65     0  01:30        0.07
  CB-161A-B            JUNCTION     0.08     1.38   117.35     0  01:34        1.38
  CB-162A-B            JUNCTION     0.01     0.11   116.83     0  01:30        0.11
  CB-163A-B            JUNCTION     0.07     1.32   116.34     0  01:30        1.32
  CB-164A-B            JUNCTION     0.08     1.33   116.56     0  01:31        1.33
  CB-165A-B            JUNCTION     0.05     1.26   115.87     0  01:30        1.25
  CB-166A-B            JUNCTION     0.07     1.33   115.60     0  01:31        1.33
  CB-167A-B            JUNCTION     0.07     1.30   116.05     0  01:30        1.30
```

```
CB-168A-B            JUNCTION     0.00     0.08   116.81     0  01:30         0.08
CB-169A-B            JUNCTION     0.00     0.07   117.45     0  01:30         0.07
CB170                JUNCTION     0.44     1.16   117.41     0  01:30         1.16
CB176                JUNCTION     0.44     1.64   117.29     0  01:30         1.64
CB177                JUNCTION     0.46     1.50   116.57     0  01:30         1.50
CB184                JUNCTION     0.44     1.17   116.17     0  01:32         1.17
CB187                JUNCTION     0.48     1.74   114.92     0  01:30         1.74
CB188                JUNCTION     0.45     0.92   115.23     0  01:31         0.92
CB194                JUNCTION     0.44     1.12   115.64     0  01:30         1.12
CB195                JUNCTION     0.44     1.08   116.70     0  01:30         1.08
CB200                JUNCTION     0.45     1.33   116.88     0  01:30         1.33
CoolingTrench        JUNCTION     2.21     2.22   111.46     0  03:35         2.22
J1                   JUNCTION     0.01     0.31   115.33     0  01:32         0.31
J2                   JUNCTION     0.01     0.26   114.91     0  01:33         0.25
J3                   JUNCTION     0.01     0.27   114.47     0  01:33         0.27
J4                   JUNCTION     0.00     0.09   116.04     0  01:30         0.09
J5                   JUNCTION     0.00     0.10   115.92     0  01:31         0.10
J6                   JUNCTION     0.02     0.22   115.15     0  01:30         0.22
J7                   JUNCTION     0.60     0.96   112.13     0  03:34         0.96
J8                   JUNCTION     0.57     0.57   111.44     0  03:34         0.57
PondOUT              JUNCTION     0.45     0.46   111.46     0  03:34         0.46
OF-CarpCreek         OUTFALL      0.00     0.00     0.00     0  00:00         0.00
OF-CoolTrenchOut     OUTFALL      1.09     1.09   111.44     0  00:00         1.09
OF-SWMF              OUTFALL      0.59     0.59   111.44     0  00:00         0.59
OF-Unc-S             OUTFALL      0.00     0.00     0.00     0  00:00         0.00
CAP(225)             STORAGE      0.02     0.20   114.47     0  01:30         0.20
HW191                STORAGE      0.42     0.77   112.13     0  03:34         0.77
MH201                STORAGE      0.02     0.18   114.50     0  01:30         0.18
MH213                STORAGE      0.02     0.15   114.77     0  01:25         0.15
MH215                STORAGE      0.00     0.01   114.77     0  01:23         0.01
MH217                STORAGE      0.00     0.01   114.65     0  01:58         0.01
MH219                STORAGE      0.01     0.18   114.65     0  01:36         0.18
MH227                STORAGE      0.03     0.24   114.37     0  01:30         0.24
MH229                STORAGE      0.03     0.31   114.24     0  01:31         0.31
MH233                STORAGE      0.03     0.33   114.08     0  01:31         0.33
MH235                STORAGE      0.03     0.34   113.89     0  01:31         0.34
MH237                STORAGE      0.03     0.35   113.72     0  01:32         0.35
MH241                STORAGE      0.04     0.38   113.57     0  01:32         0.38
MH243                STORAGE      0.04     0.42   113.29     0  01:33         0.42
MH245                STORAGE      0.05     0.44   112.96     0  01:33         0.44
MH247                STORAGE      0.05     0.44   112.80     0  01:33         0.44
```

```
MH249                STORAGE      0.05     0.46   112.65     0  01:34         0.46
MH251                STORAGE      0.06     0.47   112.45     0  01:34         0.47
MH253                STORAGE      0.13     0.54   112.33     0  01:35         0.54
MH259                STORAGE      0.27     0.59   112.13     0  03:35         0.59
MH260                STORAGE      0.39     0.74   112.13     0  03:35         0.74
MH261                STORAGE      0.56     0.92   112.14     0  03:35         0.92
MH263                STORAGE      0.59     0.94   112.13     0  03:35         0.94
MH265                STORAGE      0.65     1.01   112.13     0  03:35         1.01
MH266                STORAGE      0.03     0.31   115.33     0  01:35         0.31
MH267                STORAGE      0.03     0.29   114.63     0  01:37         0.29
MH267(1B)            STORAGE      0.02     0.21   113.59     0  01:36         0.21
MH268                STORAGE      0.04     0.38   114.52     0  01:38         0.38
MH269                STORAGE      0.07     1.18   114.38     0  01:38         1.18
MH270                STORAGE      0.08     1.17   114.19     0  01:38         1.17
MH271                STORAGE      0.08     1.05   113.86     0  01:39         1.05
MH272                STORAGE      0.08     1.05   113.70     0  01:39         1.05
MH273                STORAGE      0.08     0.86   113.22     0  01:39         0.86
MH274                STORAGE      0.07     0.74   112.99     0  01:39         0.74
MH275                STORAGE      0.22     0.52   112.13     0  03:34         0.52
MH276                STORAGE      0.28     0.61   112.13     0  03:34         0.61
MH277                STORAGE      0.33     0.67   112.13     0  03:34         0.67
MH278                STORAGE      0.37     0.71   112.13     0  03:34         0.71
MH279                STORAGE      0.05     0.72   114.61     0  01:38         0.72
MH280                STORAGE      0.03     0.34   113.26     0  01:39         0.34
MH281                STORAGE      0.03     0.49   115.46     0  01:31         0.49
RYCB171              STORAGE      0.39     1.56   117.88     0  01:30         1.56
RYCB178              STORAGE      0.41     1.86   117.00     0  01:30         1.86
RYCB183              STORAGE      0.35     1.28   116.38     0  01:32         1.27
RYCB186              STORAGE      0.38     1.69   114.97     0  01:30         1.69
RYCB189              STORAGE      0.42     1.25   115.60     0  01:31         1.25
RYCB193              STORAGE      0.36     1.36   115.97     0  01:30         1.36
RYCB196              STORAGE      0.40     1.12   116.78     0  01:30         1.12
RYCB199              STORAGE      0.38     1.49   117.12     0  01:30         1.49
RYCB201              STORAGE      0.43     1.71   117.37     0  01:30         1.71
SWMF-E               STORAGE      2.53     2.89   112.13     0  03:35         2.89
Vortech-1929CIP-A    STORAGE      0.31     0.65   112.13     0  03:34         0.65
Vortech-9000         STORAGE      0.58     0.93   112.13     0  03:35         0.93


*******************
Node Inflow Summary
```

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - INTERIM
(100-year, 4-hour Chicago Storm)

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

-------------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
Node                 Type           LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
-------------------------------------------------------------------------------------------------
01+507               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
01+722               JUNCTION      0.00   218.39     0  01:30           0       0.142      -1.655
01+777               JUNCTION      0.00   121.31     0  01:30           0      0.0411       1.582
08+096               JUNCTION      0.00    38.30     0  01:30           0       0.014       9.441
09+354               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
09+412               JUNCTION      0.00    74.43     0  01:30           0      0.0411       1.427
09+756               JUNCTION      0.00   661.49     0  01:30           0       0.481      -0.773
10+000               JUNCTION      0.00   563.69     0  01:32           0       0.455       0.062
10+018               JUNCTION      0.00   199.61     0  01:31           0        0.11       0.044
10+070               JUNCTION      0.00   142.76     0  01:30           0      0.0682      -2.366
10+093               JUNCTION      0.00    45.38     0  01:30           0      0.0202       1.682
10+140               JUNCTION      0.00   103.59     0  01:30           0      0.0852       0.028
10+171               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
11+166               JUNCTION      0.00    76.41     0  01:30           0      0.0118      21.371
11+251               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
11+305               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
11+411               JUNCTION      0.00    16.08     0  01:32           0     0.00165      62.334
CB118-119            JUNCTION    215.33   589.75     0  01:30       0.269       0.698       0.494
CB120-121            JUNCTION    114.06   465.92     0  01:30       0.143       0.529      -0.645
CB122-123            JUNCTION    127.45   427.61     0  01:30       0.158       0.486      -0.082
CB124-125            JUNCTION     90.95   366.13     0  01:30        0.11       0.414       0.013
CB126-127            JUNCTION    151.28   464.61     0  01:30       0.162       0.324       1.565
CB128-129            JUNCTION     95.91   379.03     0  01:30       0.119       0.336      -0.338
CB130-131            JUNCTION    104.64   341.36     0  01:30        0.13       0.306       0.065
CB132-133            JUNCTION    102.70   291.31     0  01:30       0.125       0.259      -0.027
CB134-135            JUNCTION    100.31   243.77     0  01:30       0.117        0.21       0.011
CB136-137            JUNCTION     79.84   194.99     0  01:30      0.0867       0.157       0.035
CB138-139            JUNCTION     60.61   165.94     0  01:30      0.0676       0.132      -0.055
CB140-141            JUNCTION     45.57    74.65     0  01:30      0.0651      0.0832       0.024
CB142-143            JUNCTION     71.39   104.64     0  01:30      0.0806       0.103      -0.142
CB157-158            JUNCTION    106.65   106.65     0  01:30       0.123       0.131      -0.313
CB159-160            JUNCTION     96.30   119.75     0  01:30       0.107       0.118      -0.593
CB-161A-B            JUNCTION    211.65   310.17     0  01:30       0.276       0.347       0.407
```

```
CB-162A-B            JUNCTION    177.90   258.30     0  01:30       0.236       0.283      -0.709
CB-163A-B            JUNCTION     91.85   405.79     0  01:30       0.108       0.354       0.440
CB-164A-B            JUNCTION    218.12   218.12     0  01:30       0.281       0.282      -0.098
CB-165A-B            JUNCTION    239.49   271.68     0  01:30       0.309       0.329      -0.127
CB-166A-B            JUNCTION    112.56   300.74     0  01:30       0.142       0.253       0.569
CB-167A-B            JUNCTION    130.89   208.39     0  01:30       0.162       0.251      -0.255
CB-168A-B            JUNCTION    106.37   106.37     0  01:30       0.135       0.135      -0.039
CB-169A-B            JUNCTION    112.96   149.13     0  01:30       0.145       0.167      -1.554
CB170                JUNCTION      0.00    69.54     0  01:30           0       0.223      -0.002
CB176                JUNCTION      0.00    91.36     0  01:30           0       0.193      -0.006
CB177                JUNCTION      0.00    68.23     0  01:30           0        0.25      -0.000
CB184                JUNCTION      0.00    41.15     0  01:32           0       0.145      -0.002
CB187                JUNCTION      0.00    21.44     0  01:30           0      0.0884       0.013
CB188                JUNCTION      0.00    85.73     0  01:31           0       0.289      -0.005
CB194                JUNCTION      0.00    53.82     0  01:30           0       0.168      -0.006
CB195                JUNCTION      0.00    38.26     0  01:30           0       0.127      -0.001
CB200                JUNCTION      0.00    45.69     0  01:30           0       0.166      -0.001
CoolingTrench        JUNCTION      0.00    14.30     0  03:35           0       0.718      -0.000
J1                   JUNCTION      0.00   562.84     0  01:32           0       0.455      -0.067
J2                   JUNCTION      0.00   562.76     0  01:33           0       0.455       0.030
J3                   JUNCTION      0.00   561.46     0  01:33           0       0.455      -0.161
J4                   JUNCTION      0.00    88.84     0  01:30           0      0.0791      -0.007
J5                   JUNCTION      0.00    88.68     0  01:30           0      0.0791       0.276
J6                   JUNCTION   1071.29  1147.47     0  01:30        3.32        3.39      -0.100
J7                   JUNCTION      0.00  1955.85     0  01:30           0        6.27       0.010
J8                   JUNCTION      0.00   182.50     0  03:35           0        9.16       0.000
PondOUT              JUNCTION      0.00   182.50     0  03:35           0        9.16       0.000
OF-CarpCreek         OUTFALL     624.43   624.43     0  01:30       0.684       0.684       0.000
OF-CoolTrenchOut     OUTFALL       0.00    14.30     0  03:35           0       0.718       0.000
OF-SWMF              OUTFALL       0.00   182.50     0  03:35           0        9.16       0.000
OF-Unc-S             OUTFALL     244.46   244.46     0  01:30       0.749       0.749       0.000
CAP(225)             STORAGE       0.00    94.34     0  01:30           0       0.278       0.000
HW191                STORAGE       0.00  1974.77     0  01:30           0        6.28       0.046
MH201                STORAGE       0.00    69.54     0  01:30           0       0.223      -0.001
MH213                STORAGE       0.00    24.80     0  01:20           0      0.0947      -0.001
MH215                STORAGE       0.00     0.41     0  01:22           0    0.000279       0.566
MH217                STORAGE       0.00     0.22     0  01:24           0    0.000272       1.927
MH219                STORAGE       0.00    38.82     0  01:36           0      0.0815      -0.001
MH227                STORAGE       0.00   143.82     0  01:30           0       0.429       0.008
MH229                STORAGE       0.00   228.31     0  01:30           0       0.677      -0.021
MH233                STORAGE       0.00   253.09     0  01:31           0       0.739      -0.002
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MH235                STORAGE       0.00   277.89     0  01:31           0       0.803      -0.026
MH237                STORAGE       0.00   302.70     0  01:31           0       0.879       0.050
MH241                STORAGE       0.00   327.50     0  01:32           0       0.962       0.041
MH243                STORAGE       0.00   377.09     0  01:32           0        1.14      -0.053
MH245                STORAGE       0.00   428.63     0  01:33           0         1.4      -0.000
MH247                STORAGE       0.00   453.45     0  01:33           0        1.49       0.013
MH249                STORAGE       0.00   478.22     0  01:34           0        1.59       0.091
MH251                STORAGE       0.00   478.20     0  01:34           0        1.59       0.025
MH253                STORAGE       0.00   603.00     0  01:34           0        2.04       0.161
MH259                STORAGE       0.00   602.83     0  01:34           0        2.03      -0.263
MH260                STORAGE       0.00   622.63     0  01:35           0        2.13      -0.232
MH261                STORAGE       0.00   620.22     0  01:35           0        2.19       5.205
MH263                STORAGE       0.00   328.33     0  01:27           0        1.21      -0.033
MH265                STORAGE       0.00   617.41     0  01:35           0        2.08      -4.861
MH266                STORAGE       0.00   134.73     0  01:34           0       0.435       0.000
MH267                STORAGE       0.00   134.64     0  01:36           0       0.435       0.022
MH267(1B)            STORAGE       0.00    52.08     0  01:35           0       0.266      -0.000
MH268                STORAGE       0.00   200.18     0  01:36           0       0.615       0.170
MH269                STORAGE       0.00   540.78     0  01:31           0        1.63      -0.066
MH270                STORAGE       0.00   608.57     0  01:35           0        1.91      -0.103
MH271                STORAGE       0.00   606.68     0  01:38           0        1.91       0.116
MH272                STORAGE       0.00   695.11     0  01:38           0        2.17       0.034
MH273                STORAGE       0.00   815.57     0  01:39           0        2.59       0.052
MH274                STORAGE       0.00   897.46     0  01:39           0        2.88      -0.000
MH275                STORAGE       0.00   897.38     0  01:40           0        2.88       0.064
MH276                STORAGE       0.00   896.81     0  01:40           0        3.43      -0.699
MH277                STORAGE       0.00   717.89     0  01:39           0        3.15       0.011
MH278                STORAGE       0.00   895.56     0  01:41           0        3.46       0.626
MH279                STORAGE       0.00   148.05     0  01:30           0       0.472      -0.015
MH280                STORAGE       0.00   123.86     0  01:31           0        0.42       0.495
MH281                STORAGE       0.00   159.58     0  01:30           0       0.444       0.002
RYCB171              STORAGE     169.18   169.18     0  01:30       0.262       0.262      -2.211
RYCB178              STORAGE     168.65   168.65     0  01:30       0.298       0.298      -0.870
RYCB183              STORAGE     108.23   180.88     0  01:30       0.177       0.228      -0.320
RYCB186              STORAGE      69.56    69.56     0  01:30       0.117       0.117      -0.831
RYCB189              STORAGE     172.48   217.54     0  01:30       0.291       0.334       0.666
RYCB193              STORAGE     126.61   126.61     0  01:30       0.196       0.196      -1.736
RYCB196              STORAGE     106.07   166.14     0  01:30       0.162       0.208      -0.866
RYCB199              STORAGE     132.09   132.09     0  01:30       0.213       0.213       0.080
RYCB201              STORAGE     123.78   219.46     0  01:30       0.187       0.232      -0.873
SWMF-E               STORAGE     347.10  3231.38     0  01:30        1.02        13.3       0.013
```

```
Vortech-1929CIP-A    STORAGE       0.00   718.12     0  01:39           0        3.15      -0.011
Vortech-9000         STORAGE       0.00   329.30     0  01:27           0        1.21       0.018


**********************
Node Surcharge Summary
**********************

Surcharging occurs when water rises above the top of the highest conduit.
---------------------------------------------------------------------
                                            Max. Height   Min. Depth
                                    Hours   Above Crown    Below Rim
Node                 Type      Surcharged        Meters       Meters
---------------------------------------------------------------------
CB170                JUNCTION        0.67         0.562        1.908
CB176                JUNCTION        0.50         1.043        1.067
CB177                JUNCTION        1.08         0.927        1.745
CB184                JUNCTION        0.95         0.619        0.949
CB187                JUNCTION        1.45         1.243        0.863
CB188                JUNCTION        0.66         0.260        1.356
CB194                JUNCTION        0.67         0.543        2.069
CB195                JUNCTION        0.85         0.525        1.123
CB200                JUNCTION        1.03         0.781        1.917
CoolingTrench        JUNCTION       24.00         0.908        1.252


*********************
Node Flooding Summary
*********************

No nodes were flooded.


**********************
Storage Volume Summary
**********************

--------------------------------------------------------------------------------------------------
                       Average     Avg  Evap Exfil       Maximum     Max    Time of Max    Maximum
                        Volume    Pcnt  Pcnt  Pcnt        Volume    Pcnt     Occurrence    Outflow
Storage Unit           1000 m3    Full  Loss  Loss       1000 m3    Full    days hr:min        LPS
```

```
--------------------------------------------------------------------------------------------------
CAP(225)                 0.000       0     0     0         0.000       0       0  00:00      94.34
HW191                    0.000       0     0     0         0.000       0       0  00:00    1955.85
MH201                    0.000       0     0     0         0.000       5       0  01:30      69.54
MH213                    0.000       0     0     0         0.000       4       0  01:25      24.84
MH215                    0.000       0     0     0         0.000       0       0  01:23       0.21
MH217                    0.000       0     0     0         0.000       0       0  01:58       0.12
MH219                    0.000       0     0     0         0.000       5       0  01:36      38.82
MH227                    0.000       1     0     0         0.000       6       0  01:30     143.83
MH229                    0.000       1     0     0         0.001       8       0  01:31     228.29
MH233                    0.000       1     0     0         0.001       9       0  01:31     253.09
MH235                    0.000       1     0     0         0.001       9       0  01:31     277.90
MH237                    0.000       1     0     0         0.001       9       0  01:32     302.70
MH241                    0.000       1     0     0         0.001      10       0  01:32     327.49
MH243                    0.000       1     0     0         0.001      11       0  01:33     377.07
MH245                    0.000       1     0     0         0.001      12       0  01:33     428.65
MH247                    0.000       1     0     0         0.001      12       0  01:33     453.42
MH249                    0.000       1     0     0         0.001      12       0  01:34     478.20
MH251                    0.000       2     0     0         0.001      13       0  01:34     478.14
MH253                    0.000       3     0     0         0.001      14       0  01:35     602.83
MH259                    0.001       7     0     0         0.002      16       0  03:35     601.50
MH260                    0.001       9     0     0         0.002      18       0  03:35     620.22
MH261                    0.001      17     0     0         0.002      28       0  03:35     618.02
MH263                    0.001      18     0     0         0.001      29       0  03:35     327.67
MH265                    0.002      20     0     0         0.003      31       0  03:35     615.93
MH266                    0.000       1     0     0         0.000      11       0  01:35     134.64
MH267                    0.000       1     0     0         0.000      10       0  01:37     134.58
MH267(1B)                0.000       1     0     0         0.000       8       0  01:36      52.05
MH268                    0.000       1     0     0         0.000      12       0  01:38     199.55
MH269                    0.000       2     0     0         0.002      31       0  01:38     530.96
MH270                    0.000       2     0     0         0.002      29       0  01:38     606.68
MH271                    0.000       2     0     0         0.002      29       0  01:39     605.93
MH272                    0.000       2     0     0         0.002      27       0  01:39     694.52
MH273                    0.000       2     0     0         0.004      23       0  01:39     815.50
MH274                    0.000       2     0     0         0.003      20       0  01:39     897.38
MH275                    0.002       6     0     0         0.005      15       0  03:34     896.81
MH276                    0.001       7     0     0         0.003      16       0  03:34     896.00
MH277                    0.001       9     0     0         0.003      18       0  03:34     717.44
MH278                    0.002      10     0     0         0.003      19       0  03:34     894.96
MH279                    0.000       2     0     0         0.001      31       0  01:38     153.97
MH280                    0.000       1     0     0         0.000      12       0  01:39     122.67
```

```
MH281                    0.000       1     0     0         0.001      21       0  01:31     158.99
RYCB171                  0.000       0     0     0         0.000       0       0  00:00     167.40
RYCB178                  0.000       0     0     0         0.000       0       0  00:00     143.60
RYCB183                  0.000       0     0     0         0.000       0       0  00:00     129.07
RYCB186                  0.000       0     0     0         0.000       0       0  00:00      68.00
RYCB189                  0.000       0     0     0         0.000       0       0  00:00     162.93
RYCB193                  0.000       0     0     0         0.000       0       0  00:00     101.32
RYCB196                  0.000       0     0     0         0.000       0       0  00:00     161.54
RYCB199                  0.000       0     0     0         0.000       0       0  00:00     107.51
RYCB201                  0.000       0     0     0         0.000       0       0  00:00     212.66
SWMF-E                   6.834      36     0     0        10.979      59       0  03:35     196.80
Vortech-1929CIP-A        0.000       8     0     0         0.001      17       0  03:34     717.89
Vortech-9000             0.001      18     0     0         0.001      29       0  03:35     328.33


***********************
Outfall Loading Summary
***********************

-----------------------------------------------------------
                       Flow       Avg       Max       Total
                       Freq      Flow      Flow      Volume
Outfall Node           Pcnt       LPS       LPS    10^6 ltr
-----------------------------------------------------------
OF-CarpCreek          24.78     53.27    624.43       0.684
OF-CoolTrenchOut      98.33      9.00     14.30       0.718
OF-SWMF               99.15    113.92    182.50       9.162
OF-Unc-S              33.00     41.37    244.46       0.749
-----------------------------------------------------------
System                63.82    217.56    965.40      11.312


********************
Link Flow Summary
********************

-----------------------------------------------------------------------------
                               Maximum  Time of Max   Maximum    Max/    Max/
                                |Flow|   Occurrence   |Veloc|    Full    Full
Link                 Type          LPS  days hr:min     m/sec    Flow   Depth
-----------------------------------------------------------------------------
```

```
  CAP-227              CONDUIT      94.34     0  01:30       1.14     0.24     0.33
  CoolingTrench1       CONDUIT      14.30     0  03:35       0.46    47.06     1.00
  CoolingTrench2       CONDUIT      14.30     0  03:35       0.46     7.70     1.00
  Culvert              CONDUIT     182.50     0  03:35       2.58     2.60     1.00
  MH201-CAP            CONDUIT      69.54     0  01:30       0.95     0.17     0.31
  MH213-227            CONDUIT      24.71     0  01:25       0.80     0.39     0.44
  MH215-213            CONDUIT       0.41     0  01:22       0.06     0.01     0.20
  MH215-217            CONDUIT       0.12     0  01:36       0.29     0.00     0.04
  MH217-219            CONDUIT       0.13     0  01:24       0.21     0.00     0.23
  MH219-229            CONDUIT      38.82     0  01:36       0.98     0.53     0.53
  MH227-229            CONDUIT     143.83     0  01:30       1.11     0.26     0.39
  MH229-233            CONDUIT     228.29     0  01:31       1.46     0.40     0.44
  MH233-235            CONDUIT     253.09     0  01:31       1.49     0.46     0.47
  MH235-237            CONDUIT     277.90     0  01:31       1.50     0.48     0.50
  MH237-241            CONDUIT     302.70     0  01:32       1.58     0.51     0.52
  MH241-243            CONDUIT     327.49     0  01:32       1.56     0.60     0.56
  MH243-245            CONDUIT     377.07     0  01:33       1.67     0.69     0.59
  MH245-247            CONDUIT     428.65     0  01:33       1.65     0.68     0.55
  MH247-249            CONDUIT     453.42     0  01:34       1.72     0.64     0.56
  MH249-251            CONDUIT     478.20     0  01:34       1.73     0.67     0.58
  MH251-253            CONDUIT     478.14     0  01:34       1.63     0.69     0.61
  MH253-259            CONDUIT     602.83     0  01:34       1.61     0.73     0.65
  MH259-260            CONDUIT     601.50     0  01:35       1.59     0.73     0.78
  MH260-261            CONDUIT     620.22     0  01:35       1.45     0.69     0.94
  MH261-OGS            CONDUIT     329.30     0  01:27       1.49     1.12     1.00
  MH263-265            CONDUIT     327.67     0  01:28       1.56     1.20     1.00
  MH265-HW2            CONDUIT     615.93     0  01:35       1.41     0.63     1.00
  MH266-267            CONDUIT     134.64     0  01:36       1.44     0.97     0.76
  MH267(1B)-245        CONDUIT      52.05     0  01:36       1.25     0.86     0.77
  MH267-268            CONDUIT     134.58     0  01:36       1.20     0.70     0.70
  MH268-269            CONDUIT     199.55     0  01:39       1.37     0.79     0.81
  MH269-270            CONDUIT     530.96     0  01:35       1.44     1.20     1.00
  MH270-271            CONDUIT     606.68     0  01:38       1.64     1.41     1.00
  MH271-272            CONDUIT     605.93     0  01:38       1.33     1.21     1.00
  MH272-273            CONDUIT     694.52     0  01:39       1.52     1.41     1.00
  MH273-274            CONDUIT     815.50     0  01:39       1.34     0.86     0.88
  MH274-275            CONDUIT     897.38     0  01:40       1.80     0.96     0.71
  MH275-276            CONDUIT     896.81     0  01:40       1.76     0.16     0.34
  MH276-OGSa           CONDUIT     718.12     0  01:39       1.75     0.37     0.58
  MH277-278            CONDUIT     717.44     0  01:39       1.53     0.42     0.64
  MH278-191            CONDUIT     894.96     0  01:41       1.54     0.17     0.45
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  MH279-269            CONDUIT     153.97     0  01:44       1.05     1.12     1.00
  MH280-273            CONDUIT     122.67     0  01:32       1.09     0.55     0.77
  MH281-269            CONDUIT     158.99     0  01:31       1.49     1.04     0.88
  MS01                 CONDUIT     562.84     0  01:32       1.00     0.02     0.19
  MS02                 CONDUIT     562.76     0  01:33       1.08     0.07     0.28
  MS03                 CONDUIT     561.46     0  01:33       1.18     0.05     0.27
  MS04                 CONDUIT     561.15     0  01:33       1.13     0.02     0.45
  MS05                 CONDUIT      88.84     0  01:30       0.21     0.00     0.14
  MS06                 CONDUIT      88.68     0  01:30       0.73     0.01     0.10
  MS07                 CONDUIT      86.60     0  01:31       0.42     0.01     0.16
  MS08                 CONDUIT    1133.67     0  01:30       1.24     0.05     0.42
  MS09                 CONDUIT    1955.85     0  01:30       1.04     0.05     0.43
  MS10                 CONDUIT    1941.84     0  01:30       0.92     0.05     0.51
  MS11                 CONDUIT     182.50     0  03:35       0.28     0.04     0.43
  MS12                 CONDUIT     182.50     0  03:35       0.22     0.04     0.48
  OGS-277              CONDUIT     717.89     0  01:39       1.62     0.36     0.62
  OGS-MH263            CONDUIT     328.33     0  01:27       1.52     1.86     1.00
  OVF-RYCB171          CONDUIT      97.86     0  01:30       0.41     0.03     0.28
  OVF-RYCB178          CONDUIT      75.37     0  01:30       0.37     0.02     0.27
  OVF-RYCB183          CONDUIT      87.93     0  01:32       0.51     0.03     0.24
  OVF-RYCB186          CONDUIT      46.56     0  01:30       0.14     0.00     0.50
  OVF-RYCB189          CONDUIT      77.45     0  01:30       0.13     0.01     0.27
  OVF-RYCB193          CONDUIT      47.49     0  01:30       0.23     0.02     0.26
  OVF-RYCB196          CONDUIT     123.27     0  01:30       0.81     0.02     0.23
  OVF-RYCB199          CONDUIT      61.84     0  01:30       0.33     0.03     0.25
  OVF-RYCB201          CONDUIT     121.31     0  01:30       0.67     0.03     0.18
  RYCB171-CB170        CONDUIT      69.54     0  01:30       1.37     2.59     1.00
  RYCB178-CB177        CONDUIT      68.23     0  01:30       1.35     2.47     1.00
  RYCB183-CB184        CONDUIT      41.15     0  01:32       0.81     1.43     1.00
  RYCB186-CB187        CONDUIT      21.44     0  01:30       0.42     0.75     1.00
  RYCB189-CB188        CONDUIT      85.73     0  01:31       1.69     3.04     1.00
  RYCB193-CB194        CONDUIT      53.82     0  01:30       1.06     1.92     1.00
  RYCB196-CB195        CONDUIT      38.26     0  01:30       0.76     1.48     1.00
  RYCB199-CB200        CONDUIT      45.69     0  01:30       0.90     1.72     1.00
  RYCB201-CB176        CONDUIT      91.36     0  01:30       1.80     2.83     1.00
  Street10-A           CHANNEL     199.10     0  01:32       0.88     0.00     0.08
  Street10-B           CHANNEL     199.61     0  01:31       0.23     0.00     0.17
  Street10-C           CHANNEL     139.39     0  01:30       0.22     0.00     0.15
  Street10-D           CHANNEL     142.76     0  01:30       0.33     0.00     0.11
  Street10-E           CHANNEL      42.30     0  01:31       0.33     0.00     0.10
  Street10-F           CHANNEL      45.38     0  01:30       0.10     0.00     0.12
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  Street10-G           CHANNEL    103.59      0  01:30      0.51    0.00    0.19
  Street10-H           CHANNEL      0.00      0  00:00      0.00    0.00    0.09
  Street11-A           CHANNEL     38.93      0  01:30      0.33    0.00    0.06
  Street11-B           CHANNEL     99.55      0  01:30      0.34    0.00    0.17
  Street11-C           CHANNEL     76.41      0  01:30      0.13    0.00    0.16
  Street11-D           CHANNEL     13.32      0  01:32      0.12    0.00    0.07
  Street11-E           CHANNEL      0.00      0  00:00      0.00    0.00    0.06
  Street11-F           CHANNEL      0.00      0  00:00      0.00    0.00    0.04
  Street11-G           CHANNEL     63.47      0  01:29      0.43    0.00    0.09
  Street11-H           CHANNEL      0.00      0  00:00      0.00    0.00    0.04
  Street11-I           CHANNEL      0.00      0  00:00      0.00    0.00    0.12
  Street11-J           CHANNEL     16.08      0  01:32      0.09    0.00    0.12
  Street11-K           CHANNEL      0.13      0  01:33      0.13    0.00    0.08
  Street1-A            CHANNEL      0.00      0  00:00      0.00    0.00    0.17
  Street1-B            CHANNEL    345.44      0  01:31      0.42    0.01    0.23
  Street1-C            CHANNEL    317.62      0  01:30      0.36    0.00    0.17
  Street1-D            CHANNEL    205.84      0  01:30      0.44    0.00    0.15
  Street1-E            CHANNEL    165.84      0  01:30      0.51    0.03    0.10
  Street1-F            CHANNEL    115.09      0  01:31      0.41    0.00    0.09
  Street8-A            CHANNEL     33.93      0  01:30      0.15    0.00    0.12
  Street8-B            CHANNEL     38.30      0  01:30      0.12    0.00    0.11
  Street8-C            CHANNEL     27.22      0  01:31      0.23    0.00    0.06
  Street8-D            CHANNEL     67.18      0  01:30      0.32    0.00    0.08
  Street9-A            CHANNEL    368.32      0  01:33      0.32    0.01    0.19
  Street9-B            CHANNEL    411.54      0  01:31      0.35    0.01    0.22
  Street9-C            CHANNEL    376.03      0  01:30      0.68    0.01    0.13
  Street9-D            CHANNEL    325.28      0  01:31      0.64    0.01    0.12
  Street9-E            CHANNEL    303.32      0  01:31      0.66    0.01    0.12
  Street9-F            CHANNEL    344.99      0  01:30      0.82    0.01    0.12
  Street9-G            CHANNEL    295.16      0  01:30      0.63    0.01    0.12
  Street9-H            CHANNEL    247.47      0  01:30      0.58    0.01    0.11
  Street9-I            CHANNEL    199.91      0  01:30      0.55    0.00    0.11
  Street9-J            CHANNEL    153.69      0  01:30      0.51    0.00    0.10
  Street9-K            CHANNEL    124.27      0  01:30      0.49    0.00    0.09
  Street9-L            CHANNEL     42.61      0  01:30      0.26    0.00    0.07
  Street9-M            CHANNEL     31.30      0  01:30      0.34    0.00    0.05
  Street9-N            CHANNEL     74.43      0  01:30      0.64    0.00    0.06
  Street9-O            CHANNEL      0.00      0  00:00      0.00    0.00    0.04
  OCB118               ORIFICE     50.07      0  01:32                      1.00
  OCB119               ORIFICE     50.07      0  01:32                      1.00
  OCB126-127           ORIFICE     52.08      0  01:35                      1.00
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  OCB161A              ORIFICE     56.44      0  01:34                      1.00
  OCB161B              ORIFICE     39.59      0  01:34                      1.00
  OCB163A              ORIFICE     28.02      0  01:30                      1.00
  OCB163B              ORIFICE     28.02      0  01:30                      1.00
  OCB164A              ORIFICE     38.84      0  01:31                      1.00
  OCB164B              ORIFICE     38.84      0  01:31                      1.00
  OCB165A              ORIFICE     53.61      0  01:30                      1.00
  OCB165B              ORIFICE     37.62      0  01:30                      1.00
  OCB166A              ORIFICE     21.41      0  01:31                      1.00
  OCB166B              ORIFICE     16.73      0  01:31                      1.00
  OCB167A              ORIFICE     21.10      0  01:30                      1.00
  OCB167B              ORIFICE     21.10      0  01:30                      1.00
  ORYCB171             ORIFICE     69.54      0  01:30                      1.00
  ORYCB178             ORIFICE     68.23      0  01:30                      1.00
  ORYCB183             ORIFICE     41.15      0  01:32                      1.00
  ORYCB186             ORIFICE     21.44      0  01:30                      1.00
  ORYCB189             ORIFICE     85.73      0  01:31                      1.00
  ORYCB193             ORIFICE     53.82      0  01:30                      1.00
  ORYCB196             ORIFICE     38.26      0  01:30                      1.00
  ORYCB199             ORIFICE     45.69      0  01:30                      1.00
  ORYCB201             ORIFICE     91.36      0  01:30                      1.00
  MH261-265            WEIR       352.29      0  01:45                      0.51
  MH276-278            WEIR       178.22      0  01:41                      0.08
  W1                   WEIR         0.00      0  00:00                      0.00
  W2                   WEIR         0.00      0  00:00                      0.00
  OCB120-121           DUMMY       24.80      0  01:21
  OCB122-123           DUMMY       24.80      0  01:21
  OCB124-125           DUMMY       24.80      0  01:22
  OCB128-129           DUMMY       24.80      0  01:21
  OCB130-131           DUMMY       24.80      0  01:21
  OCB132-133           DUMMY       24.80      0  01:21
  OCB134-135           DUMMY       24.80      0  01:22
  OCB136-137           DUMMY       24.80      0  01:23
  OCB138-139           DUMMY       24.80      0  01:23
  OCB140-141           DUMMY       24.80      0  01:27
  OCB142-143           DUMMY       24.80      0  01:25
  OCB157-158           DUMMY       24.80      0  01:20
  OCB159-160           DUMMY       38.70      0  01:23
  OCB162               DUMMY       65.60      0  01:21
  OCB168               DUMMY       38.70      0  01:21
  OCB169               DUMMY       38.70      0  01:21
```

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - INTERIM
(100-year, 4-hour Chicago Storm)

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***************************
Flow Classification Summary
***************************

-------------------------------------------------------------------------------------
                      Adjusted    ---------- Fraction of Time in Flow Class ----------
                       /Actual         Up    Down  Sub   Sup   Up    Down  Norm  Inlet
Conduit                 Length    Dry  Dry   Dry   Crit  Crit  Crit  Crit  Ltd   Ctrl
-------------------------------------------------------------------------------------
CAP-227                   1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
CoolingTrench1            1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
CoolingTrench2            1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
Culvert                   1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MH201-CAP                 1.00   0.01  0.00  0.00  0.99  0.00  0.00  0.00  0.94  0.00
MH213-227                 1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH215-213                 1.00   0.86  0.02  0.00  0.06  0.00  0.00  0.06  0.01  0.00
MH215-217                 1.00   0.06  0.82  0.00  0.12  0.00  0.00  0.00  0.93  0.00
MH217-219                 1.00   0.05  0.01  0.00  0.04  0.00  0.00  0.90  0.02  0.00
MH219-229                 1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH227-229                 1.00   0.01  0.00  0.00  0.13  0.00  0.00  0.87  0.03  0.00
MH229-233                 1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH233-235                 1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH235-237                 1.00   0.01  0.00  0.00  0.04  0.03  0.00  0.92  0.00  0.00
MH237-241                 1.00   0.01  0.00  0.00  0.03  0.00  0.00  0.97  0.00  0.00
MH241-243                 1.00   0.01  0.00  0.00  0.03  0.00  0.00  0.96  0.00  0.00
MH243-245                 1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH245-247                 1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH247-249                 1.00   0.01  0.00  0.00  0.02  0.00  0.00  0.97  0.00  0.00
MH249-251                 1.00   0.01  0.00  0.00  0.21  0.00  0.00  0.78  0.13  0.00
MH251-253                 1.00   0.01  0.00  0.00  0.41  0.00  0.00  0.59  0.11  0.00
MH253-259                 1.00   0.01  0.00  0.00  0.72  0.00  0.00  0.28  0.28  0.00
MH259-260                 1.00   0.00  0.01  0.00  0.95  0.00  0.00  0.04  0.25  0.00
MH260-261                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.03  0.00
MH261-OGS                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MH263-265                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MH265-HW2                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MH266-267                 1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH267(1B)-245             1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
MH267-268                 1.00   0.01  0.00  0.00  0.09  0.00  0.00  0.91  0.00  0.00
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MH268-269                 1.00   0.01  0.00  0.00  0.02  0.00  0.00  0.97  0.00  0.00
MH269-270                 1.00   0.01  0.00  0.00  0.07  0.00  0.00  0.92  0.00  0.00
MH270-271                 1.00   0.01  0.00  0.00  0.06  0.00  0.00  0.93  0.00  0.00
MH271-272                 1.00   0.01  0.00  0.00  0.18  0.00  0.00  0.81  0.00  0.00
MH272-273                 1.00   0.01  0.00  0.00  0.07  0.00  0.00  0.93  0.00  0.00
MH273-274                 1.00   0.01  0.00  0.00  0.99  0.00  0.00  0.00  0.83  0.00
MH274-275                 1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH275-276                 1.00   0.01  0.00  0.00  0.72  0.00  0.00  0.27  0.09  0.00
MH276-OGSa                1.00   0.01  0.00  0.00  0.79  0.00  0.00  0.20  0.04  0.00
MH277-278                 1.00   0.01  0.00  0.00  0.94  0.00  0.00  0.05  0.08  0.00
MH278-191                 1.00   0.00  0.00  0.00  0.98  0.02  0.00  0.00  0.01  0.00
MH279-269                 1.00   0.01  0.00  0.00  0.03  0.00  0.00  0.97  0.00  0.00
MH280-273                 1.00   0.01  0.00  0.00  0.05  0.00  0.00  0.94  0.00  0.00
MH281-269                 1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MS01                      1.00   0.64  0.13  0.00  0.23  0.00  0.00  0.00  0.94  0.00
MS02                      1.00   0.61  0.02  0.00  0.36  0.00  0.00  0.00  0.85  0.00
MS03                      1.00   0.07  0.55  0.00  0.38  0.00  0.00  0.00  0.94  0.00
MS04                      1.00   0.00  0.07  0.00  0.93  0.00  0.00  0.00  0.94  0.00
MS05                      1.00   0.06  0.90  0.00  0.04  0.00  0.00  0.00  0.92  0.00
MS06                      1.00   0.75  0.21  0.00  0.04  0.00  0.00  0.00  0.94  0.00
MS07                      1.00   0.02  0.73  0.00  0.25  0.00  0.00  0.00  0.94  0.00
MS08                      1.00   0.00  0.02  0.00  0.98  0.00  0.00  0.00  0.98  0.00
MS09                      1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.01  0.00
MS10                      1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MS11                      1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MS12                      1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
OGS-277                   1.00   0.01  0.00  0.00  0.85  0.02  0.00  0.12  0.03  0.00
OGS-MH263                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
OVF-RYCB171               1.00   0.97  0.00  0.00  0.02  0.00  0.00  0.02  0.00  0.00
OVF-RYCB178               1.00   0.96  0.01  0.00  0.03  0.00  0.00  0.00  0.94  0.00
OVF-RYCB183               1.00   0.95  0.00  0.00  0.04  0.00  0.00  0.00  0.93  0.00
OVF-RYCB186               1.00   0.00  0.96  0.00  0.04  0.00  0.00  0.00  0.94  0.00
OVF-RYCB189               1.00   0.95  0.00  0.00  0.04  0.00  0.00  0.00  0.92  0.00
OVF-RYCB193               1.00   0.95  0.01  0.00  0.03  0.00  0.00  0.00  0.94  0.00
OVF-RYCB196               1.00   0.95  0.01  0.00  0.03  0.00  0.00  0.00  0.94  0.00
OVF-RYCB199               1.00   0.96  0.00  0.00  0.04  0.00  0.00  0.00  0.00  0.00
OVF-RYCB201               1.00   0.38  0.00  0.00  0.02  0.00  0.00  0.60  0.00  0.00
RYCB171-CB170             1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB178-CB177             1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB183-CB184             1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB186-CB187             1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
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RYCB189-CB188           1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB193-CB194           1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB196-CB195           1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB199-CB200           1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB201-CB176           1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
Street10-A              1.00   0.07  0.00  0.00  0.69  0.25  0.00  0.00  0.01  0.00
Street10-B              1.00   0.06  0.01  0.00  0.04  0.00  0.00  0.90  0.01  0.00
Street10-C              1.00   0.06  0.00  0.00  0.04  0.00  0.00  0.90  0.02  0.00
Street10-D              1.00   0.06  0.00  0.00  0.03  0.00  0.00  0.91  0.00  0.00
Street10-E              1.00   0.06  0.01  0.00  0.02  0.00  0.00  0.91  0.01  0.00
Street10-F              1.00   0.06  0.01  0.00  0.04  0.00  0.00  0.90  0.01  0.00
Street10-G              1.00   0.06  0.00  0.00  0.04  0.00  0.00  0.90  0.00  0.00
Street10-H              1.00   0.06  0.94  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-A              1.00   0.01  0.02  0.00  0.65  0.32  0.00  0.00  0.16  0.00
Street11-B              1.00   0.57  0.00  0.00  0.05  0.00  0.00  0.38  0.03  0.00
Street11-C              1.00   0.06  0.01  0.00  0.04  0.00  0.00  0.89  0.02  0.00
Street11-D              1.00   0.01  0.06  0.00  0.55  0.39  0.00  0.00  0.13  0.00
Street11-E              1.00   0.53  0.47  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-F              1.00   0.67  0.33  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-G              1.00   0.01  0.66  0.00  0.31  0.02  0.00  0.00  0.93  0.00
Street11-H              1.00   0.67  0.33  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-I              1.00   0.95  0.05  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-J              1.00   0.06  0.01  0.00  0.04  0.00  0.00  0.89  0.02  0.00
Street11-K              1.00   0.06  0.01  0.00  0.02  0.00  0.00  0.91  0.01  0.00
Street1-A               1.00   0.91  0.09  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street1-B               1.00   0.01  0.00  0.00  0.08  0.00  0.00  0.90  0.03  0.00
Street1-C               1.00   0.01  0.00  0.00  0.05  0.00  0.00  0.94  0.01  0.00
Street1-D               1.00   0.01  0.00  0.00  0.05  0.00  0.00  0.94  0.03  0.00
Street1-E               1.00   0.01  0.00  0.00  0.98  0.02  0.00  0.00  0.00  0.00
Street1-F               1.00   0.32  0.06  0.00  0.61  0.01  0.00  0.00  0.14  0.00
Street8-A               1.00   0.59  0.13  0.00  0.27  0.01  0.00  0.00  0.96  0.00
Street8-B               1.00   0.01  0.06  0.00  0.52  0.42  0.00  0.00  0.11  0.00
Street8-C               1.00   0.01  0.06  0.00  0.52  0.42  0.00  0.00  0.12  0.00
Street8-D               1.00   0.58  0.01  0.00  0.38  0.04  0.00  0.00  0.01  0.00
Street9-A               1.00   0.76  0.01  0.00  0.05  0.00  0.00  0.18  0.92  0.00
Street9-B               1.00   0.65  0.00  0.00  0.05  0.00  0.00  0.30  0.03  0.00
Street9-C               1.00   0.62  0.04  0.00  0.33  0.01  0.00  0.00  0.94  0.00
Street9-D               1.00   0.60  0.02  0.00  0.38  0.00  0.00  0.00  0.99  0.00
Street9-E               1.00   0.01  0.01  0.00  0.74  0.24  0.00  0.00  0.15  0.00
Street9-F               1.00   0.01  0.67  0.00  0.15  0.18  0.00  0.00  0.84  0.00
Street9-G               1.00   0.64  0.03  0.00  0.31  0.03  0.00  0.00  0.03  0.00
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Street9-H               1.00   0.63  0.04  0.00  0.31  0.02  0.00  0.00  0.99  0.00
Street9-I               1.00   0.65  0.04  0.00  0.30  0.01  0.00  0.00  0.99  0.00
Street9-J               1.00   0.68  0.04  0.00  0.28  0.00  0.00  0.00  0.99  0.00
Street9-K               1.00   0.70  0.02  0.00  0.27  0.01  0.00  0.00  0.16  0.00
Street9-L               1.00   0.58  0.01  0.00  0.39  0.01  0.00  0.00  0.14  0.00
Street9-M               1.00   0.02  0.00  0.00  0.59  0.39  0.00  0.00  0.14  0.00
Street9-N               1.00   0.02  0.70  0.00  0.13  0.16  0.00  0.00  0.82  0.00
Street9-O               1.00   0.72  0.28  0.00  0.00  0.00  0.00  0.00  0.00  0.00


*************************
Conduit Surcharge Summary
*************************

----------------------------------------------------------------------------
                                                         Hours        Hours
                       --------- Hours Full --------   Above Full   Capacity
Conduit                Both Ends  Upstream  Dnstream   Normal Flow   Limited
----------------------------------------------------------------------------
CoolingTrench1             24.00     24.00     24.00     23.36        23.48
CoolingTrench2             24.00     24.00     24.00     22.07        22.08
Culvert                    24.00     24.00     24.00     16.82        16.82
MH260-261                   0.01      0.01      3.33      0.01         0.01
MH261-OGS                  10.77     10.77     11.26      0.22         0.17
MH263-265                  11.50     11.50     12.01      0.30         0.22
MH265-HW2                   5.75      5.75      7.75      0.01         0.01
MH269-270                   0.38      0.38      0.38      0.35         0.33
MH270-271                   0.38      0.40      0.38      0.50         0.38
MH271-272                   0.36      0.36      0.36      0.41         0.36
MH272-273                   0.01      0.39      0.01      0.46         0.01
MH279-269                   0.26      0.29      0.26      0.36         0.26
MH281-269                   0.01      0.26      0.01      0.14         0.01
OGS-MH263                  11.25     11.26     11.50      0.59         0.42
RYCB171-CB170              24.00     24.00     24.00      0.67         0.68
RYCB178-CB177              24.00     24.00     24.00      0.83         0.83
RYCB183-CB184              24.00     24.00     24.00      0.59         0.59
RYCB186-CB187              24.00     24.00     24.00      0.01         0.01
RYCB189-CB188              24.00     24.00     24.00      0.76         0.76
RYCB193-CB194              24.00     24.00     24.00      0.54         0.54
RYCB196-CB195              24.00     24.00     24.00      0.53         0.53
RYCB199-CB200              24.00     24.00     24.00      0.63         0.63
```

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  RYCB201-CB176              24.00     24.00     24.00      0.44         0.44


  Analysis begun on:  Thu Feb  8 13:50:10 2024
  Analysis ended on:  Thu Feb  8 13:50:19 2024
  Total elapsed time: 00:00:09
```

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EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------

EAST Carp Airport detailed design model, Phase 1B-1 & 1B-2
Phase 1 previously completed using SWMHYMO.
Including in PCSWMM model for HGL elevations, and to have a complete model of the entire development.

WARNING 04: minimum elevation drop used for Conduit CoolingTrench1
WARNING 04: minimum elevation drop used for Conduit CoolingTrench2
WARNING 04: minimum elevation drop used for Conduit Street1-E
WARNING 02: maximum depth increased for Node CB126-127
WARNING 02: maximum depth increased for Node CB-163A-B
WARNING 02: maximum depth increased for Node CB-166A-B

*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 38
Number of nodes ........... 117
Number of links ........... 164
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                    Data       Recording
Name                 Data Source                    Type       Interval 
------------------------------------------------------------------------
Raingage             07-SCS100yr-12hr               INTENSITY   30 min.


********************
Subcatchment Summary
********************
Name                       Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------------------
1B-01                      0.17    112.72     41.40    2.0000 Raingage             CB142-143
1B-02                      0.24    131.51     48.60    4.5000 Raingage             CB157-158
1B-03                      0.15     34.83     35.70    1.5000 Raingage             CB140-141
1B-04                      0.22    124.15     42.90    5.0000 Raingage             CB159-160
1B-05                      0.14     91.31     42.90    3.0000 Raingage             CB138-139
1B-06                      0.19     94.23     37.10    5.0000 Raingage             CB136-137
1B-07                      0.24     96.95     44.30    4.0000 Raingage             CB134-135
1B-08                      0.23     93.66     55.70    4.5000 Raingage             CB132-133
1B-09                      0.23     95.14     60.00    4.5000 Raingage             CB130-131
1B-10                      0.21     92.51     60.00    4.5000 Raingage             CB128-129
1B-11                      0.35    267.40     38.60    3.0000 Raingage             CB126-127
1B-12                      0.20     92.54     57.10    5.0000 Raingage             CB124-125
1B-13                      0.28    116.64     60.00    4.5000 Raingage             CB122-123
1B-14                      0.25    105.21     61.40    4.0000 Raingage             CB120-121
1B-15                      0.47    200.31     61.40    4.5000 Raingage             CB118-119
1B-16                      4.61    216.71      7.10    2.0000 Raingage             SWMF-E
A-01                       0.49     47.41     35.70    3.5000 Raingage             RYCB199
A-02                       0.24    109.06     67.10    4.0000 Raingage             CB-169A-B
A-03                       0.48     40.63     58.60    2.5000 Raingage             RYCB171
A-04                       0.45    186.04     70.00    4.5000 Raingage             CB-161A-B
A-05                       0.37     43.08     37.10    3.5000 Raingage             RYCB196
A-06                       0.38    139.55     72.90    4.0000 Raingage             CB-162A-B
A-07                       0.36     41.04     52.90    2.5000 Raingage             RYCB201
A-08                       0.20    151.34     52.90    2.0000 Raingage             CB-163A-B
A-09                       0.23    135.53     67.10    4.0000 Raingage             CB-168A-B
A-10                       0.43     42.55     40.00    4.0000 Raingage             RYCB193
A-11                       0.47    212.74     68.60    4.0000 Raingage             CB-164A-B
A-12                       0.69     37.57     38.60    3.0000 Raingage             RYCB178
A-13                       0.65     43.10     40.00    3.5000 Raingage             RYCB189
A-14                       0.51    241.58     68.60    4.0000 Raingage             CB-165A-B
A-15                       0.41     39.40     35.70    3.0000 Raingage             RYCB183
A-16                       0.24    173.73     65.70    4.0000 Raingage             CB-166A-B
A-17                       0.29    132.74     60.00    3.5000 Raingage             CB-167A-B
A-18                       0.27     21.34     35.70    3.5000 Raingage             RYCB186
B1                         0.70    257.13     17.10    4.0000 Raingage             OF-CarpCreek
B2                         1.26    470.50     14.30    3.5000 Raingage             OF-CarpCreek
Future3-A                 23.26    401.98      7.10    1.0000 Raingage             J6
Future3-B                  5.39    123.44      7.10    0.5000 Raingage             OF-Unc-S


************
Node Summary
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West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - INTERIM
(100-year, 12-hour SCS Type II Storm)

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************
                                         Invert      Max.    Ponded    External
Name                 Type                 Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
01+507               JUNCTION            116.46      1.00       0.0
01+722               JUNCTION            116.72      1.00       0.0
01+777               JUNCTION            117.13      1.00       0.0
08+096               JUNCTION            117.98      1.00       0.0
09+354               JUNCTION            118.20      1.00       0.0
09+412               JUNCTION            117.90      1.00       0.0
09+756               JUNCTION            116.20      1.00       0.0
10+000               JUNCTION            115.39      1.00       0.0
10+018               JUNCTION            115.49      1.00       0.0
10+070               JUNCTION            115.77      1.00       0.0
10+093               JUNCTION            116.00      1.00       0.0
10+140               JUNCTION            115.86      1.00       0.0
10+171               JUNCTION            116.07      1.00       0.0
11+166               JUNCTION            117.32      1.00       0.0
11+251               JUNCTION            116.95      1.00       0.0
11+305               JUNCTION            116.95      1.00       0.0
11+411               JUNCTION            116.56      1.00       0.0
CB118-119            JUNCTION            113.33      2.86       0.0
CB120-121            JUNCTION            115.45      1.00       0.0
CB122-123            JUNCTION            115.71      1.00       0.0
CB124-125            JUNCTION            116.01      1.00       0.0
CB126-127            JUNCTION            113.97      3.00       0.0
CB128-129            JUNCTION            116.33      1.00       0.0
CB130-131            JUNCTION            116.56      1.00       0.0
CB132-133            JUNCTION            116.80      1.00       0.0
CB134-135            JUNCTION            117.04      1.00       0.0
CB136-137            JUNCTION            117.29      1.00       0.0
CB138-139            JUNCTION            117.53      1.00       0.0
CB140-141            JUNCTION            117.75      1.00       0.0
CB142-143            JUNCTION            117.96      1.00       0.0
CB157-158            JUNCTION            117.86      1.00       0.0
CB159-160            JUNCTION            117.57      1.00       0.0
CB-161A-B            JUNCTION            115.97      2.10       0.0
CB-162A-B            JUNCTION            116.72      1.00       0.0
CB-163A-B            JUNCTION            115.02      2.10       0.0
CB-164A-B            JUNCTION            115.23      2.10       0.0
CB-165A-B            JUNCTION            114.61      2.10       0.0
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CB-166A-B            JUNCTION            114.27      2.10       0.0
CB-167A-B            JUNCTION            114.75      2.10       0.0
CB-168A-B            JUNCTION            116.73      1.00       0.0
CB-169A-B            JUNCTION            117.38      1.00       0.0
CB170                JUNCTION            116.25      3.07       0.0
CB176                JUNCTION            115.65      2.71       0.0
CB177                JUNCTION            115.07      3.25       0.0
CB184                JUNCTION            115.00      2.12       0.0
CB187                JUNCTION            113.18      2.60       0.0
CB188                JUNCTION            114.31      2.28       0.0
CB194                JUNCTION            114.52      3.19       0.0
CB195                JUNCTION            115.62      2.20       0.0
CB200                JUNCTION            115.55      3.25       0.0
CoolingTrench        JUNCTION            109.24      3.47       0.0
J1                   JUNCTION            115.02      1.00       0.0
J2                   JUNCTION            114.65      1.00       0.0
J3                   JUNCTION            114.20      1.20       0.0
J4                   JUNCTION            115.95      1.00       0.0
J5                   JUNCTION            115.82      1.00       0.0
J6                   JUNCTION            114.93      1.00       0.0
J7                   JUNCTION            111.17      2.78       0.0
J8                   JUNCTION            110.87      1.20       0.0
PondOUT              JUNCTION            111.00      1.71       0.0
OF-CarpCreek         OUTFALL               0.00      0.00       0.0
OF-CoolTrenchOut     OUTFALL             110.35      0.20       0.0
OF-SWMF              OUTFALL             110.85      1.20       0.0
OF-Unc-S             OUTFALL               0.00      0.00       0.0
CAP(225)             STORAGE             114.27      3.82       0.0
HW191                STORAGE             111.36      4.15       0.0
MH201                STORAGE             114.32      3.83       0.0
MH213                STORAGE             114.62      3.35       0.0
MH215                STORAGE             114.76      3.23       0.0
MH217                STORAGE             114.64      3.24       0.0
MH219                STORAGE             114.47      3.29       0.0
MH227                STORAGE             114.13      3.86       0.0
MH229                STORAGE             113.93      3.84       0.0
MH233                STORAGE             113.75      3.85       0.0
MH235                STORAGE             113.55      3.83       0.0
MH237                STORAGE             113.37      3.82       0.0
MH241                STORAGE             113.19      3.83       0.0
MH243                STORAGE             112.87      3.80       0.0
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  MH245               STORAGE             112.52      3.82       0.0
  MH247               STORAGE             112.36      3.78       0.0
  MH249               STORAGE             112.19      3.77       0.0
  MH251               STORAGE             111.98      3.76       0.0
  MH253               STORAGE             111.79      3.83       0.0
  MH259               STORAGE             111.54      3.81       0.0
  MH260               STORAGE             111.39      4.18       0.0
  MH261               STORAGE             111.22      3.25       0.0
  MH263               STORAGE             111.19      3.20       0.0
  MH265               STORAGE             111.12      3.27       0.0
  MH266               STORAGE             115.02      2.87       0.0
  MH267               STORAGE             114.34      2.95       0.0
  MH267(1B)           STORAGE             113.38      2.68       0.0
  MH268               STORAGE             114.14      3.25       0.0
  MH269               STORAGE             113.20      3.77       0.0
  MH270               STORAGE             113.02      4.05       0.0
  MH271               STORAGE             112.81      3.68       0.0
  MH272               STORAGE             112.65      3.92       0.0
  MH273               STORAGE             112.36      3.68       0.0
  MH274               STORAGE             112.25      3.77       0.0
  MH275               STORAGE             111.61      3.50       0.0
  MH276               STORAGE             111.52      3.79       0.0
  MH277               STORAGE             111.46      3.83       0.0
  MH278               STORAGE             111.42      3.81       0.0
  MH279               STORAGE             113.89      2.33       0.0
  MH280               STORAGE             112.92      2.79       0.0
  MH281               STORAGE             114.97      2.36       0.0
  RYCB171             STORAGE             116.32      2.28       0.0
  RYCB178             STORAGE             115.14      2.61       0.0
  RYCB183             STORAGE             115.10      1.99       0.0
  RYCB186             STORAGE             113.28      2.58       0.0
  RYCB189             STORAGE             114.35      1.95       0.0
  RYCB193             STORAGE             114.61      2.14       0.0
  RYCB196             STORAGE             115.66      1.89       0.0
  RYCB199             STORAGE             115.63      2.22       0.0
  RYCB201             STORAGE             115.66      2.43       0.0
  SWMF-E              STORAGE             109.24      3.47       0.0
  Vortech-1929CIP-A   STORAGE             111.48      3.91       0.0
  Vortech-9000        STORAGE             111.20      3.27       0.0
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  ************
  Link Summary
  ************
  Name             From Node        To Node          Type            Length    %Slope Roughness
  ---------------------------------------------------------------------------------------------
  CAP-227          CAP(225)         MH227            CONDUIT           18.2    0.3846    0.0130
  CoolingTrench1   SWMF-E           CoolingTrench    CONDUIT          355.0    0.0001    0.0130
  CoolingTrench2   CoolingTrench    OF-CoolTrenchOut CONDUIT            9.5    0.0032    0.0130
  Culvert          SWMF-E           PondOUT          CONDUIT           19.0    0.5263    0.0130
  MH201-CAP        MH201            CAP(225)         CONDUIT           12.6    0.3968    0.0130
  MH213-227        MH213            MH227            CONDUIT           30.6    0.3922    0.0130
  MH215-213        MH215            MH213            CONDUIT           21.4    0.3738    0.0130
  MH215-217        MH215            MH217            CONDUIT           25.0    0.4800    0.0130
  MH217-219        MH217            MH219            CONDUIT           23.0    0.4348    0.0130
  MH219-229        MH219            MH229            CONDUIT           31.0    0.5161    0.0130
  MH227-229        MH227            MH229            CONDUIT           44.9    0.4009    0.0130
  MH229-233        MH229            MH233            CONDUIT           33.6    0.4167    0.0130
  MH233-235        MH233            MH235            CONDUIT           44.2    0.3846    0.0130
  MH235-237        MH235            MH237            CONDUIT           39.3    0.4326    0.0130
  MH237-241        MH237            MH241            CONDUIT           32.7    0.4587    0.0130
  MH241-243        MH241            MH243            CONDUIT           72.4    0.3867    0.0130
  MH243-245        MH243            MH245            CONDUIT           67.2    0.3869    0.0130
  MH245-247        MH245            MH247            CONDUIT           40.3    0.2978    0.0130
  MH247-249        MH247            MH249            CONDUIT           34.6    0.3757    0.0130
  MH249-251        MH249            MH251            CONDUIT           44.7    0.3803    0.0130
  MH251-253        MH251            MH253            CONDUIT           31.0    0.3548    0.0130
  MH253-259        MH253            MH259            CONDUIT           74.9    0.3071    0.0130
  MH259-260        MH259            MH260            CONDUIT           39.1    0.3069    0.0130
  MH260-261        MH260            MH261            CONDUIT           47.7    0.3564    0.0130
  MH261-OGS        MH261            Vortech-9000     CONDUIT            4.6    0.4348    0.0130
  MH263-265        MH263            MH265            CONDUIT            5.4    0.3704    0.0130
  MH265-HW2        MH265            SWMF-E           CONDUIT           21.1    0.4265    0.0130
  MH266-267        MH266            MH267            CONDUIT          114.0    0.5702    0.0130
  MH267(1B)-245    MH267(1B)        MH245            CONDUIT           40.1    0.9477    0.0130
  MH267-268        MH267            MH268            CONDUIT           40.8    0.4167    0.0130
  MH268-269        MH268            MH269            CONDUIT           78.2    0.3197    0.0130
  MH269-270        MH269            MH270            CONDUIT           50.8    0.2559    0.0130
  MH270-271        MH270            MH271            CONDUIT           66.4    0.2410    0.0130
  MH271-272        MH271            MH272            CONDUIT           59.5    0.1849    0.0130
  MH272-273        MH272            MH273            CONDUIT          104.9    0.1811    0.0130
  MH273-274        MH273            MH274            CONDUIT           43.4    0.2535    0.0130
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MH274-275        MH274            MH275            CONDUIT           53.0    0.2453    0.0130
MH275-276        MH275            MH276            CONDUIT           15.9    0.3774    0.0130
MH276-OGSa       MH276            Vortech-1929CIP-A CONDUIT           4.4    0.4546    0.0130
MH277-278        MH277            MH278            CONDUIT            5.5    0.3636    0.0130
MH278-191        MH278            HW191            CONDUIT           17.7    0.3390    0.0130
MH279-269        MH279            MH269            CONDUIT           74.2    0.2156    0.0130
MH280-273        MH280            MH273            CONDUIT           73.6    0.2446    0.0130
MH281-269        MH281            MH269            CONDUIT           45.5    0.7033    0.0130
MS01             10+000           J1               CONDUIT            5.0    7.4203    0.0160
MS02             J1               J2               CONDUIT           34.9    1.0602    0.0350
MS03             J2               J3               CONDUIT           22.7    1.9828    0.0350
MS04             J3               SWMF-E           CONDUIT           19.0   16.8116    0.0350
MS05             J4               10+140           CONDUIT            5.0    1.8003    0.0130
MS06             J4               J5               CONDUIT            5.9    2.2039    0.0350
MS07             J5               J6               CONDUIT           54.6    1.6303    0.0350
MS08             J6               HW191            CONDUIT           49.0    7.3051    0.0350
MS09             HW191            J7               CONDUIT           25.5    0.7451    0.0350
MS10             J7               SWMF-E           CONDUIT           19.5    0.6154    0.0350
MS11             PondOUT          J8               CONDUIT           30.0    0.4333    0.0350
MS12             J8               OF-SWMF          CONDUIT            4.0    0.5000    0.0350
OGS-277          Vortech-1929CIP-A MH277            CONDUIT           2.0    0.5000    0.0130
OGS-MH263        Vortech-9000     MH263            CONDUIT            6.5    0.1550    0.0130
OVF-RYCB171      RYCB171          RYCB201          CONDUIT          172.0    0.2965    0.0350
OVF-RYCB178      RYCB178          RYCB183          CONDUIT          197.0    0.3350    0.0350
OVF-RYCB183      RYCB183          CB-167A-B        CONDUIT           53.0    0.4528    0.0350
OVF-RYCB186      RYCB186          SWMF-E           CONDUIT           44.0    8.6917    0.0350
OVF-RYCB189      RYCB189          CB-166A-B        CONDUIT           25.0   -0.2800    0.0350
OVF-RYCB193      RYCB193          RYCB189          CONDUIT          185.0    0.2432    0.0350
OVF-RYCB196      RYCB196          CB-163A-B        CONDUIT           30.0    1.4335    0.0350
OVF-RYCB199      RYCB199          RYCB196          CONDUIT          145.0    0.2069    0.0350
OVF-RYCB201      RYCB201          01+777           CONDUIT           11.0   -0.3636    0.0350
RYCB171-CB170    RYCB171          CB170            CONDUIT           37.5    0.1867    0.0130
RYCB178-CB177    RYCB178          CB177            CONDUIT           35.2    0.1989    0.0130
RYCB183-CB184    RYCB183          CB184            CONDUIT           46.5    0.2151    0.0130
RYCB186-CB187    RYCB186          CB187            CONDUIT           47.4    0.2110    0.0130
RYCB189-CB188    RYCB189          CB188            CONDUIT           19.4    0.2062    0.0130
RYCB193-CB194    RYCB193          CB194            CONDUIT           44.2    0.2036    0.0130
RYCB196-CB195    RYCB196          CB195            CONDUIT           23.0    0.1739    0.0130
RYCB199-CB200    RYCB199          CB200            CONDUIT           43.4    0.1843    0.0130
RYCB201-CB176    RYCB201          CB176            CONDUIT            3.7    0.2703    0.0130
Street10-A       10+018           10+000           CONDUIT           16.5    0.6061    0.0160
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Street10-B       10+018           CB-166A-B        CONDUIT           19.3    0.6218    0.0160
Street10-C       10+070           CB-166A-B        CONDUIT           32.7    1.2233    0.0160
Street10-D       10+070           CB-165A-B        CONDUIT            5.0    1.2001    0.0160
Street10-E       10+093           CB-165A-B        CONDUIT           11.0    2.6373    0.0160
Street10-F       10+093           CB-167A-B        CONDUIT           29.7    0.5051    0.0160
Street10-G       10+140           CB-167A-B        CONDUIT            2.2    0.4546    0.0160
Street10-H       10+171           10+140           CONDUIT           30.3    0.6931    0.0160
Street11-A       09+412           CB-169A-B        CONDUIT           63.2    0.8228    0.0160
Street11-B       CB-169A-B        CB-161A-B        CONDUIT           43.9    0.7062    0.0160
Street11-C       11+166           CB-161A-B        CONDUIT           50.2    0.4980    0.0160
Street11-D       11+166           CB-162A-B        CONDUIT           74.4    0.8065    0.0160
Street11-E       11+251           CB-162A-B        CONDUIT            2.0   11.5768    0.0160
Street11-F       11+251           CB-168A-B        CONDUIT            2.0   11.0672    0.0160
Street11-G       CB-168A-B        01+722           CONDUIT            5.0    0.2000    0.0160
Street11-H       11+305           CB-168A-B        CONDUIT           43.7    0.5034    0.0160
Street11-I       11+305           CB-164A-B        CONDUIT           59.2    1.0474    0.0160
Street11-J       11+411           CB-164A-B        CONDUIT           47.5    0.4842    0.0160
Street11-K       11+411           CB-165A-B        CONDUIT          111.6    0.7617    0.0160
Street1-A        01+507           CB126-127        CONDUIT           99.3    0.4935    0.0160
Street1-B        09+756           CB126-127        CONDUIT           35.0    0.6572    0.0160
Street1-C        09+756           CB-163A-B        CONDUIT            7.0    1.1429    0.0160
Street1-D        01+722           CB-163A-B        CONDUIT           64.9    0.9245    0.0160
Street1-E        CB-162A-B        01+722           CONDUIT            5.0    0.0061    0.0160
Street1-F        01+777           CB-162A-B        CONDUIT           45.1    0.9091    0.0160
Street8-A        CB142-143        CB157-158        CONDUIT           10.0    1.0001    0.0160
Street8-B        08+096           CB157-158        CONDUIT           40.1    0.2993    0.0160
Street8-C        08+096           CB159-160        CONDUIT           85.5    0.4795    0.0160
Street8-D        CB159-160        CB138-139        CONDUIT           15.0    0.2667    0.0160
Street9-A        10+000           CB118-119        CONDUIT           37.1    0.5391    0.0160
Street9-B        CB120-121        CB118-119        CONDUIT           53.2    0.4887    0.0160
Street9-C        CB122-123        CB120-121        CONDUIT           53.2    0.4887    0.0160
Street9-D        CB124-125        CB122-123        CONDUIT           58.8    0.5102    0.0160
Street9-E        09+756           CB124-125        CONDUIT           37.5    0.5067    0.0160
Street9-F        CB128-129        09+756           CONDUIT           23.8    0.5462    0.0160
Street9-G        CB130-131        CB128-129        CONDUIT           47.7    0.4822    0.0160
Street9-H        CB132-133        CB130-131        CONDUIT           48.2    0.4979    0.0160
Street9-I        CB134-135        CB132-133        CONDUIT           47.1    0.5096    0.0160
Street9-J        CB136-137        CB134-135        CONDUIT           48.3    0.5176    0.0160
Street9-K        CB138-139        CB136-137        CONDUIT           47.8    0.5021    0.0160
Street9-L        CB140-141        CB138-139        CONDUIT           41.9    0.5251    0.0160
Street9-M        09+412           CB140-141        CONDUIT           28.2    0.5319    0.0160
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Street9-N        CB142-143        09+412           CONDUIT           12.8    0.4688    0.0160
Street9-O        09+354           CB142-143        CONDUIT           49.1    0.4888    0.0160
OCB118           CB118-119        MH253            ORIFICE
OCB119           CB118-119        MH253            ORIFICE
OCB126-127       CB126-127        MH267(1B)        ORIFICE
OCB161A          CB-161A-B        MH266            ORIFICE
OCB161B          CB-161A-B        MH266            ORIFICE
OCB163A          CB-163A-B        MH279            ORIFICE
OCB163B          CB-163A-B        MH279            ORIFICE
OCB164A          CB-164A-B        MH270            ORIFICE
OCB164B          CB-164A-B        MH270            ORIFICE
OCB165A          CB-165A-B        MH272            ORIFICE
OCB165B          CB-165A-B        MH272            ORIFICE
OCB166A          CB-166A-B        MH280            ORIFICE
OCB166B          CB-166A-B        MH280            ORIFICE
OCB167A          CB-167A-B        MH274            ORIFICE
OCB167B          CB-167A-B        MH274            ORIFICE
ORYCB171         CB170            MH201            ORIFICE
ORYCB178         CB177            MH281            ORIFICE
ORYCB183         CB184            MH274            ORIFICE
ORYCB186         CB187            MH260            ORIFICE
ORYCB189         CB188            MH280            ORIFICE
ORYCB193         CB194            MH279            ORIFICE
ORYCB196         CB195            MH279            ORIFICE
ORYCB199         CB200            MH229            ORIFICE
ORYCB201         CB176            MH281            ORIFICE
MH261-265        MH261            MH265            WEIR
MH276-278        MH276            MH278            WEIR
W1               SWMF-E           PondOUT          WEIR
W2               SWMF-E           PondOUT          WEIR
OCB120-121       CB120-121        MH253            OUTLET
OCB122-123       CB122-123        MH249            OUTLET
OCB124-125       CB124-125        MH247            OUTLET
OCB128-129       CB128-129        MH243            OUTLET
OCB130-131       CB130-131        MH243            OUTLET
OCB132-133       CB132-133        MH241            OUTLET
OCB134-135       CB134-135        MH237            OUTLET
OCB136-137       CB136-137        MH235            OUTLET
OCB138-139       CB138-139        MH233            OUTLET
OCB140-141       CB140-141        MH227            OUTLET
OCB142-143       CB142-143        CAP(225)         OUTLET
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OCB157-158       CB157-158        MH213            OUTLET
OCB159-160       CB159-160        MH219            OUTLET
OCB162           CB-162A-B        MH268            OUTLET
OCB168           CB-168A-B        MH269            OUTLET
OCB169           CB-169A-B        MH266            OUTLET


*********************
Cross Section Summary
*********************
                                        Full     Full     Hyd.     Max.   No. of     Full
Conduit          Shape                 Depth     Area     Rad.    Width  Barrels     Flow
---------------------------------------------------------------------------------------
CAP-227          CIRCULAR               0.61     0.29     0.15     0.61        1   397.98
CoolingTrench1   CIRCULAR               0.20     0.03     0.05     0.20        1     0.30
CoolingTrench2   CIRCULAR               0.20     0.03     0.05     0.20        1     1.86
Culvert          CIRCULAR               0.30     0.07     0.07     0.30        1    70.16
MH201-CAP        CIRCULAR               0.61     0.29     0.15     0.61        1   404.25
MH213-227        CIRCULAR               0.30     0.07     0.08     0.30        1    63.29
MH215-213        CIRCULAR               0.25     0.05     0.06     0.25        1    37.93
MH215-217        CIRCULAR               0.25     0.05     0.06     0.25        1    42.98
MH217-219        CIRCULAR               0.25     0.05     0.06     0.25        1    40.91
MH219-229        CIRCULAR               0.30     0.07     0.08     0.30        1    72.61
MH227-229        CIRCULAR               0.69     0.37     0.17     0.69        1   555.71
MH229-233        CIRCULAR               0.69     0.37     0.17     0.69        1   566.53
MH233-235        CIRCULAR               0.69     0.37     0.17     0.69        1   544.31
MH235-237        CIRCULAR               0.69     0.37     0.17     0.69        1   577.25
MH237-241        CIRCULAR               0.69     0.37     0.17     0.69        1   594.43
MH241-243        CIRCULAR               0.69     0.37     0.17     0.69        1   545.81
MH243-245        CIRCULAR               0.69     0.37     0.17     0.69        1   545.93
MH245-247        CIRCULAR               0.76     0.46     0.19     0.76        1   633.80
MH247-249        CIRCULAR               0.76     0.46     0.19     0.76        1   711.95
MH249-251        CIRCULAR               0.76     0.46     0.19     0.76        1   716.28
MH251-253        CIRCULAR               0.76     0.46     0.19     0.76        1   691.88
MH253-259        CIRCULAR               0.84     0.55     0.21     0.84        1   829.36
MH259-260        CIRCULAR               0.84     0.55     0.21     0.84        1   829.12
MH260-261        CIRCULAR               0.84     0.55     0.21     0.84        1   893.48
MH261-OGS        CIRCULAR               0.53     0.22     0.13     0.53        1   295.26
MH263-265        CIRCULAR               0.53     0.22     0.13     0.53        1   272.52
MH265-HW2        CIRCULAR               0.84     0.55     0.21     0.84        1   977.46
MH266-267        CIRCULAR               0.38     0.11     0.10     0.38        1   138.13
```

```
MH267(1B)-245    CIRCULAR              0.25      0.05      0.06      0.25        1    60.40
MH267-268        CIRCULAR              0.46      0.16      0.11      0.46        1   191.78
MH268-269        CIRCULAR              0.53      0.22      0.13      0.53        1   253.19
MH269-270        CIRCULAR              0.69      0.37      0.17      0.69        1   443.99
MH270-271        CIRCULAR              0.69      0.37      0.17      0.69        1   430.83
MH271-272        CIRCULAR              0.76      0.46      0.19      0.76        1   499.40
MH272-273        CIRCULAR              0.76      0.46      0.19      0.76        1   494.31
MH273-274        CIRCULAR              0.91      0.66      0.23      0.91        1   949.75
MH274-275        CIRCULAR              0.91      0.66      0.23      0.91        1   934.31
MH275-276        CIRCULAR              1.65      2.14      0.41      1.65        1  5608.37
MH276-OGSa       CIRCULAR              1.07      0.89      0.27      1.07        1  1921.74
MH277-278        CIRCULAR              1.07      0.89      0.27      1.07        1  1718.86
MH278-191        CIRCULAR              1.65      2.14      0.41      1.65        1  5315.55
MH279-269        CIRCULAR              0.46      0.16      0.11      0.46        1   137.96
MH280-273        CIRCULAR              0.53      0.22      0.13      0.53        1   221.45
MH281-269        CIRCULAR              0.38      0.11      0.10      0.38        1   153.41
MS01             RECT_OPEN             1.00      3.00      0.60      3.00        1 36336.27
MS02             TRAPEZOIDAL           1.00      4.00      0.55      7.00        1  7862.69
MS03             TRAPEZOIDAL           1.00      4.00      0.55      7.00        1 10752.43
MS04             TRIANGULAR            1.20      3.60      0.56      6.00        1 28554.86
MS05             RECT_OPEN             1.00      3.00      0.60      3.00        1 22028.06
MS06             TRAPEZOIDAL           1.00      4.00      0.55      7.00        1 11336.24
MS07             TRAPEZOIDAL           1.00      4.00      0.55      7.00        1  9749.85
MS08             TRAPEZOIDAL           1.00      4.50      0.58      7.50        1 24033.65
MS09             TRAPEZOIDAL           2.00     16.00      1.09     14.00        1 41853.33
MS10             TRAPEZOIDAL           2.00     16.00      1.09     14.00        1 38035.98
MS11             TRIANGULAR            1.20      3.60      0.56      6.00        1  4584.46
MS12             TRIANGULAR            1.20      3.60      0.56      6.00        1  4924.51
OGS-277          CIRCULAR              1.07      0.89      0.27      1.07        1  2015.54
OGS-MH263        CIRCULAR              0.53      0.22      0.13      0.53        1   176.32
OVF-RYCB171      TRAPEZOIDAL           1.00      3.00      0.47      6.00        1  2838.98
OVF-RYCB178      TRAPEZOIDAL           1.00      3.00      0.47      6.00        1  3017.73
OVF-RYCB183      TRAPEZOIDAL           1.00      3.00      0.47      6.00        1  3508.41
OVF-RYCB186      TRAPEZOIDAL           1.00      3.00      0.47      6.00        1 15370.69
OVF-RYCB189      TRAPEZOIDAL           1.00      7.00      0.68     10.00        1  8168.09
OVF-RYCB193      TRAPEZOIDAL           1.00      3.00      0.47      6.00        1  2571.35
OVF-RYCB196      TRAPEZOIDAL           1.00      3.00      0.47      6.00        1  6242.18
OVF-RYCB199      TRAPEZOIDAL           1.00      3.00      0.47      6.00        1  2371.47
OVF-RYCB201      TRAPEZOIDAL           1.00      3.50      0.51      6.50        1  3863.88
RYCB171-CB170    CIRCULAR              0.25      0.05      0.06      0.25        1    26.81
RYCB178-CB177    CIRCULAR              0.25      0.05      0.06      0.25        1    27.67
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RYCB183-CB184    CIRCULAR              0.25      0.05      0.06      0.25        1    28.77
RYCB186-CB187    CIRCULAR              0.25      0.05      0.06      0.25        1    28.50
RYCB189-CB188    CIRCULAR              0.25      0.05      0.06      0.25        1    28.17
RYCB193-CB194    CIRCULAR              0.25      0.05      0.06      0.25        1    28.00
RYCB196-CB195    CIRCULAR              0.25      0.05      0.06      0.25        1    25.87
RYCB199-CB200    CIRCULAR              0.25      0.05      0.06      0.25        1    26.64
RYCB201-CB176    CIRCULAR              0.25      0.05      0.06      0.25        1    32.25
Street10-A       20mROW                1.00     16.85      0.50     20.00        1 51519.37
Street10-B       20mROW                1.00     16.85      0.50     20.00        1 52182.47
Street10-C       20mROW                1.00     16.85      0.50     20.00        1 73194.91
Street10-D       20mROW                1.00     16.85      0.50     20.00        1 72496.12
Street10-E       20mROW                1.00     16.85      0.50     20.00        1 107469.85
Street10-F       20mROW                1.00     16.85      0.50     20.00        1 47030.40
Street10-G       20mROW                1.00     16.85      0.50     20.00        1 44616.90
Street10-H       20mROW                1.00     16.85      0.50     20.00        1 55093.71
Street11-A       18mROW                1.00     15.30      0.53     18.00        1 56690.64
Street11-B       18mROW                1.00     15.30      0.53     18.00        1 52518.81
Street11-C       18mROW                1.00     15.30      0.53     18.00        1 44104.38
Street11-D       18mROW                1.00     15.30      0.53     18.00        1 56125.09
Street11-E       18mROW                1.00     15.30      0.53     18.00        1 212645.03
Street11-F       18mROW                1.00     15.30      0.53     18.00        1 207911.71
Street11-G       18mROW                1.00     15.30      0.53     18.00        1 27949.64
Street11-H       18mROW                1.00     15.30      0.53     18.00        1 44343.93
Street11-I       18mROW                1.00     15.30      0.53     18.00        1 63959.90
Street11-J       18mROW                1.00     15.30      0.53     18.00        1 43489.11
Street11-K       18mROW                1.00     15.30      0.53     18.00        1 54543.69
Street1-A        20mROW                1.00     16.85      0.50     20.00        1 46487.32
Street1-B        20mROW                1.00     16.85      0.50     20.00        1 53646.71
Street1-C        20mROW                1.00     16.85      0.50     20.00        1 70748.73
Street1-D        20mROW                1.00     16.85      0.50     20.00        1 63631.34
Street1-E        20mROW                1.00     16.85      0.50     20.00        1  5166.91
Street1-F        20mROW                1.00     16.85      0.50     20.00        1 63098.80
Street8-A        18mROW                1.00     15.30      0.53     18.00        1 62498.80
Street8-B        18mROW                1.00     15.30      0.53     18.00        1 34188.52
Street8-C        18mROW                1.00     15.30      0.53     18.00        1 43278.50
Street8-D        18mROW                1.00     15.30      0.53     18.00        1 32273.49
Street9-A        20mROW                1.00     16.85      0.50     20.00        1 48589.19
Street9-B        20mROW                1.00     16.85      0.50     20.00        1 46263.87
Street9-C        20mROW                1.00     16.85      0.50     20.00        1 46263.87
Street9-D        20mROW                1.00     16.85      0.50     20.00        1 47269.75
Street9-E        20mROW                1.00     16.85      0.50     20.00        1 47105.59
```

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Street9-F        20mROW               1.00    16.85     0.50    20.00        1 48909.69
Street9-G        20mROW               1.00    16.85     0.50    20.00        1 45953.20
Street9-H        20mROW               1.00    16.85     0.50    20.00        1 46697.46
Street9-I        20mROW               1.00    16.85     0.50    20.00        1 47239.63
Street9-J        20mROW               1.00    16.85     0.50    20.00        1 47611.06
Street9-K        20mROW               1.00    16.85     0.50    20.00        1 46892.45
Street9-L        20mROW               1.00    16.85     0.50    20.00        1 47953.00
Street9-M        20mROW               1.00    16.85     0.50    20.00        1 48265.04
Street9-N        20mROW               1.00    16.85     0.50    20.00        1 45308.69
Street9-O        20mROW               1.00    16.85     0.50    20.00        1 46267.49


****************
Transect Summary
****************

Transect 18mROW
Area:
           0.0009     0.0034     0.0077     0.0137     0.0214
           0.0308     0.0417     0.0530     0.0657     0.0801
           0.0962     0.1139     0.1333     0.1543     0.1770
           0.2005     0.2240     0.2475     0.2710     0.2945
           0.3180     0.3415     0.3650     0.3885     0.4120
           0.4356     0.4591     0.4826     0.5061     0.5296
           0.5531     0.5766     0.6001     0.6237     0.6472
           0.6707     0.6942     0.7177     0.7412     0.7648
           0.7883     0.8118     0.8353     0.8588     0.8824
           0.9059     0.9294     0.9529     0.9765     1.0000
Hrad:
           0.0183     0.0366     0.0550     0.0733     0.0916
           0.1099     0.1371     0.1723     0.2020     0.2263
           0.2467     0.2639     0.2788     0.2920     0.3037
           0.3187     0.3354     0.3530     0.3715     0.3905
           0.4099     0.4295     0.4495     0.4695     0.4898
           0.5101     0.5305     0.5509     0.5714     0.5919
           0.6125     0.6330     0.6536     0.6741     0.6946
           0.7152     0.7357     0.7562     0.7766     0.7971
           0.8175     0.8379     0.8583     0.8786     0.8989
           0.9192     0.9394     0.9597     0.9798     1.0000
Width:
```

```
           0.0726     0.1453     0.2179     0.2905     0.3631
           0.4358     0.4721     0.5073     0.5776     0.6478
           0.7180     0.7882     0.8584     0.9287     0.9989
           0.9989     0.9990     0.9990     0.9990     0.9990
           0.9991     0.9991     0.9991     0.9992     0.9992
           0.9992     0.9993     0.9993     0.9993     0.9994
           0.9994     0.9994     0.9995     0.9995     0.9995
           0.9996     0.9996     0.9996     0.9997     0.9997
           0.9997     0.9997     0.9998     0.9998     0.9998
           0.9999     0.9999     0.9999     1.0000     1.0000

Transect 20mROW
Area:
           0.0008     0.0031     0.0070     0.0124     0.0194
           0.0279     0.0378     0.0481     0.0600     0.0738
           0.0893     0.1067     0.1258     0.1468     0.1696
           0.1933     0.2170     0.2408     0.2645     0.2882
           0.3119     0.3356     0.3593     0.3831     0.4068
           0.4305     0.4542     0.4779     0.5017     0.5254
           0.5491     0.5728     0.5966     0.6203     0.6440
           0.6677     0.6915     0.7152     0.7389     0.7627
           0.7864     0.8101     0.8339     0.8576     0.8813
           0.9051     0.9288     0.9525     0.9763     1.0000
Hrad:
           0.0194     0.0389     0.0583     0.0777     0.0972
           0.1166     0.1454     0.1826     0.2126     0.2360
           0.2548     0.2701     0.2830     0.2941     0.3039
           0.3179     0.3339     0.3511     0.3692     0.3880
           0.4072     0.4268     0.4467     0.4667     0.4870
           0.5073     0.5278     0.5483     0.5688     0.5894
           0.6101     0.6307     0.6514     0.6720     0.6927
           0.7133     0.7339     0.7546     0.7752     0.7957
           0.8163     0.8368     0.8573     0.8778     0.8982
           0.9186     0.9390     0.9594     0.9797     1.0000
Width:
           0.0654     0.1307     0.1961     0.2615     0.3268
           0.3922     0.4249     0.4633     0.5398     0.6163
           0.6929     0.7694     0.8459     0.9225     0.9990
           0.9990     0.9991     0.9991     0.9991     0.9991
           0.9992     0.9992     0.9992     0.9993     0.9993
           0.9993     0.9993     0.9994     0.9994     0.9994
```

```
            0.9995     0.9995     0.9995     0.9995     0.9996
            0.9996     0.9996     0.9997     0.9997     0.9997
            0.9997     0.9998     0.9998     0.9998     0.9999
            0.9999     0.9999     0.9999     1.0000     1.0000


*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 07/21/2022 00:00:00
Ending Date .............. 07/22/2022 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
```

```
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         4.315        93.910
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         2.979        64.833
Surface Runoff ...........         1.329        28.918
Final Storage ............         0.008         0.170
Continuity Error (%) .....        -0.011


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         1.329        13.287
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         1.213        12.133
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.349         3.492
Final Stored Volume ......         0.466         4.660
Continuity Error (%) .....        -0.090


*************************
Highest Continuity Errors
*************************
Node MH276 (-3.53%)
Node MH278 (3.36%)
Node MH261 (1.70%)
Node MH265 (-1.49%)
Node RYCB196 (-1.00%)


***************************
Time-Step Critical Elements
***************************
Link OGS-277 (52.26%)
```

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - INTERIM
(100-year, 12-hour SCS Type II Storm)

```
  ********************************
  Highest Flow Instability Indexes
  ********************************
  Link MH261-265 (31)
  Link MH265-HW2 (15)
  Link MH263-265 (11)
  Link MH261-OGS (9)
  Link MH276-278 (4)


  *************************
  Routing Time Step Summary
  *************************
  Minimum Time Step           :     0.50 sec
  Average Time Step           :     0.83 sec
  Maximum Time Step           :     1.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     2.86
  Percent Not Converging      :     0.00
  Time Step Frequencies       :
      1.000 -  0.871 sec      :    55.07 %
      0.871 -  0.758 sec      :     3.87 %
      0.758 -  0.660 sec      :    11.43 %
      0.660 -  0.574 sec      :    22.08 %
      0.574 -  0.500 sec      :     7.55 %


  ***************************
  Subcatchment Runoff Summary
  ***************************

  --------------------------------------------------------------------------------------------------------------
-------------
                            Total      Total      Total      Total     Imperv       Perv      Total       Total
Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff
Runoff   Coeff
  Subcatchment                 mm         mm         mm         mm         mm         mm         mm    10^6 ltr
LPS
```

```
  --------------------------------------------------------------------------------------------------------------
-------------
  1B-01                     93.91       0.00       0.00      37.46      38.26      17.58      55.84        0.09
33.97   0.595
  1B-02                     93.91       0.00       0.00      32.71      45.14      15.57      60.71        0.15
48.75   0.646
  1B-03                     93.91       0.00       0.00      42.41      32.98      17.98      50.96        0.08
27.20   0.543
  1B-04                     93.91       0.00       0.00      36.35      39.85      17.29      57.13        0.13
44.20   0.608
  1B-05                     93.91       0.00       0.00      36.40      39.78      17.24      57.02        0.08
28.11   0.607
  1B-06                     93.91       0.00       0.00      40.15      34.49      18.93      53.42        0.10
37.68   0.569
  1B-07                     93.91       0.00       0.00      35.66      41.21      16.66      57.87        0.14
48.17   0.616
  1B-08                     93.91       0.00       0.00      28.24      51.81      13.37      65.18        0.15
47.34   0.694
  1B-09                     93.91       0.00       0.00      25.47      55.81      12.11      67.92        0.16
47.75   0.723
  1B-10                     93.91       0.00       0.00      25.45      55.77      12.13      67.89        0.14
43.60   0.723
  1B-11                     93.91       0.00       0.00      39.10      35.67      18.58      54.25        0.19
69.71   0.578
  1B-12                     93.91       0.00       0.00      27.29      53.07      13.01      66.09        0.13
41.30   0.704
  1B-13                     93.91       0.00       0.00      25.46      55.77      12.11      67.88        0.19
58.13   0.723
  1B-14                     93.91       0.00       0.00      24.58      57.07      11.68      68.75        0.17
52.03   0.732
  1B-15                     93.91       0.00       0.00      24.56      57.12      11.70      68.82        0.32
97.84   0.733
  1B-16                     93.91       0.00       0.00      68.84       6.56      18.40      24.96        1.15
322.64   0.266
  A-01                      93.91       0.00       0.00      43.30      33.54      17.09      50.63        0.25
82.18   0.539
  A-02                      93.91       0.00       0.00      20.90      62.42      10.01      72.43        0.18
50.93   0.771
  A-03                      93.91       0.00       0.00      27.67      55.04      11.21      66.26        0.32
90.58   0.706
  A-04                      93.91       0.00       0.00      19.04      65.17       9.14      74.31        0.33
95.22   0.791
  A-05                      93.91       0.00       0.00      41.90      34.85      17.17      52.03        0.19
64.36   0.554
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  A-06                       93.91       0.00       0.00      17.21      67.75       8.24      75.99         0.29
80.19   0.809
  A-07                       93.91       0.00       0.00      31.24      49.69      13.00      62.69         0.22
67.72   0.668
  A-08                       93.91       0.00       0.00      29.98      48.88      14.26      63.14         0.13
41.99   0.672
  A-09                       93.91       0.00       0.00      20.85      62.32      10.06      72.38         0.16
47.58   0.771
  A-10                       93.91       0.00       0.00      40.08      37.58      16.28      53.85         0.23
75.61   0.573
  A-11                       93.91       0.00       0.00      19.93      63.76       9.56      73.32         0.34
98.14   0.781
  A-12                       93.91       0.00       0.00      42.88      36.26      14.78      51.04         0.35
101.86   0.544
  A-13                       93.91       0.00       0.00      41.10      37.57      15.25      52.82         0.34
104.14   0.562
  A-14                       93.91       0.00       0.00      19.93      63.76       9.57      73.33         0.37
107.64   0.781
  A-15                       93.91       0.00       0.00      43.49      33.54      16.90      50.43         0.21
67.56   0.537
  A-16                       93.91       0.00       0.00      21.71      61.07      10.52      71.59         0.17
50.19   0.762
  A-17                       93.91       0.00       0.00      25.47      55.58      12.10      67.68         0.19
59.78   0.721
  A-18                       93.91       0.00       0.00      43.80      33.54      16.59      50.12         0.14
43.52   0.534
  B1                         93.91       0.00       0.00      53.56      16.07      24.30      40.37         0.28
129.94   0.430
  B2                         93.91       0.00       0.00      55.48      13.44      25.01      38.45         0.48
230.72   0.409
  Future3-A                  93.91       0.00       0.00      77.24       6.56      10.01      16.56         3.85
756.07   0.176
  Future3-B                  93.91       0.00       0.00      77.62       6.56       9.62      16.18         0.87
169.88   0.172


  ******************
  Node Depth Summary
  ******************

  ---------------------------------------------------------------------------------
                               Average  Maximum  Maximum  Time of Max    Reported
                                 Depth    Depth      HGL   Occurrence   Max Depth
```

```
  Node                 Type       Meters   Meters   Meters  days hr:min      Meters
  ---------------------------------------------------------------------------------
  01+507               JUNCTION     0.00     0.00   116.46     0  00:00        0.00
  01+722               JUNCTION     0.01     0.04   116.76     0  06:30        0.04
  01+777               JUNCTION     0.00     0.00   117.13     0  00:00        0.00
  08+096               JUNCTION     0.00     0.03   118.01     0  06:30        0.03
  09+354               JUNCTION     0.00     0.00   118.20     0  00:00        0.00
  09+412               JUNCTION     0.00     0.03   117.93     0  06:30        0.03
  09+756               JUNCTION     0.00     0.07   116.27     0  06:30        0.07
  10+000               JUNCTION     0.00     0.03   115.42     0  06:30        0.03
  10+018               JUNCTION     0.00     0.03   115.52     0  06:32        0.03
  10+070               JUNCTION     0.00     0.03   115.80     0  06:30        0.03
  10+093               JUNCTION     0.00     0.01   116.01     0  06:30        0.01
  10+140               JUNCTION     0.01     0.15   116.01     0  06:30        0.15
  10+171               JUNCTION     0.00     0.00   116.07     0  00:00        0.00
  11+166               JUNCTION     0.00     0.00   117.32     0  00:00        0.00
  11+251               JUNCTION     0.00     0.00   116.95     0  00:00        0.00
  11+305               JUNCTION     0.00     0.00   116.95     0  00:00        0.00
  11+411               JUNCTION     0.00     0.00   116.56     0  00:00        0.00
  CB118-119            JUNCTION     0.13     2.11   115.44     0  06:30        2.11
  CB120-121            JUNCTION     0.01     0.09   115.54     0  06:30        0.09
  CB122-123            JUNCTION     0.01     0.09   115.80     0  06:30        0.09
  CB124-125            JUNCTION     0.01     0.08   116.09     0  06:30        0.08
  CB126-127            JUNCTION     0.20     2.25   116.22     0  06:36        2.25
  CB128-129            JUNCTION     0.01     0.08   116.41     0  06:30        0.08
  CB130-131            JUNCTION     0.01     0.08   116.64     0  06:30        0.08
  CB132-133            JUNCTION     0.01     0.07   116.87     0  06:30        0.07
  CB134-135            JUNCTION     0.01     0.06   117.10     0  06:30        0.06
  CB136-137            JUNCTION     0.00     0.05   117.34     0  06:30        0.05
  CB138-139            JUNCTION     0.00     0.05   117.58     0  06:30        0.05
  CB140-141            JUNCTION     0.00     0.04   117.79     0  06:30        0.04
  CB142-143            JUNCTION     0.00     0.05   118.01     0  06:30        0.05
  CB157-158            JUNCTION     0.01     0.15   118.01     0  06:30        0.15
  CB159-160            JUNCTION     0.00     0.04   117.61     0  06:30        0.04
  CB-161A-B            JUNCTION     0.08     1.26   117.23     0  06:30        1.26
  CB-162A-B            JUNCTION     0.01     0.05   116.77     0  06:30        0.05
  CB-163A-B            JUNCTION     0.07     1.26   116.28     0  06:30        1.26
  CB-164A-B            JUNCTION     0.08     1.25   116.48     0  06:30        1.25
  CB-165A-B            JUNCTION     0.07     1.20   115.81     0  06:30        1.20
  CB-166A-B            JUNCTION     0.08     1.25   115.52     0  06:31        1.25
  CB-167A-B            JUNCTION     0.08     1.26   116.01     0  06:30        1.26
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CB-168A-B            JUNCTION      0.01      0.04   116.77      0  06:30         0.04
CB-169A-B            JUNCTION      0.01      0.04   117.42      0  06:30         0.04
CB170                JUNCTION      0.46      1.10   117.35      0  06:30         1.10
CB176                JUNCTION      0.45      1.37   117.02      0  06:30         1.37
CB177                JUNCTION      0.48      1.45   116.52      0  06:30         1.45
CB184                JUNCTION      0.46      1.11   116.11      0  06:31         1.11
CB187                JUNCTION      0.50      1.71   114.89      0  06:30         1.71
CB188                JUNCTION      0.46      0.88   115.19      0  06:31         0.88
CB194                JUNCTION      0.45      1.08   115.60      0  06:30         1.08
CB195                JUNCTION      0.45      1.03   116.65      0  06:30         1.03
CB200                JUNCTION      0.47      1.29   116.84      0  06:30         1.29
CoolingTrench        JUNCTION      2.21      2.22   111.46      0  08:32         2.22
J1                   JUNCTION      0.00      0.15   115.17      0  06:31         0.15
J2                   JUNCTION      0.00      0.12   114.77      0  06:31         0.12
J3                   JUNCTION      0.01      0.16   114.36      0  06:31         0.16
J4                   JUNCTION      0.00      0.06   116.01      0  06:30         0.06
J5                   JUNCTION      0.00      0.07   115.89      0  06:31         0.07
J6                   JUNCTION      0.03      0.18   115.11      0  06:30         0.18
J7                   JUNCTION      0.64      0.99   112.16      0  08:32         0.99
J8                   JUNCTION      0.57      0.57   111.44      0  08:32         0.57
PondOUT              JUNCTION      0.45      0.46   111.46      0  08:32         0.46
OF-CarpCreek         OUTFALL       0.00      0.00     0.00      0  00:00         0.00
OF-CoolTrenchOut     OUTFALL       1.09      1.09   111.44      0  00:00         1.09
OF-SWMF              OUTFALL       0.59      0.59   111.44      0  00:00         0.59
OF-Unc-S             OUTFALL       0.00      0.00     0.00      0  00:00         0.00
CAP(225)             STORAGE       0.03      0.20   114.47      0  06:30         0.20
HW191                STORAGE       0.45      0.80   112.16      0  08:32         0.80
MH201                STORAGE       0.03      0.18   114.50      0  06:30         0.18
MH213                STORAGE       0.03      0.15   114.77      0  06:06         0.15
MH215                STORAGE       0.00      0.01   114.77      0  06:05         0.01
MH217                STORAGE       0.00      0.01   114.65      0  06:48         0.01
MH219                STORAGE       0.02      0.17   114.64      0  06:30         0.17
MH227                STORAGE       0.04      0.24   114.37      0  06:30         0.24
MH229                STORAGE       0.05      0.30   114.23      0  06:30         0.30
MH233                STORAGE       0.05      0.33   114.08      0  06:30         0.33
MH235                STORAGE       0.05      0.34   113.89      0  06:31         0.34
MH237                STORAGE       0.05      0.35   113.72      0  06:31         0.35
MH241                STORAGE       0.06      0.38   113.57      0  06:31         0.38
MH243                STORAGE       0.07      0.42   113.29      0  06:32         0.42
MH245                STORAGE       0.07      0.44   112.96      0  06:32         0.44
MH247                STORAGE       0.07      0.44   112.80      0  06:32         0.44
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MH249                STORAGE       0.07      0.45   112.64      0  06:33         0.45
MH251                STORAGE       0.09      0.47   112.45      0  06:33         0.47
MH253                STORAGE       0.17      0.54   112.33      0  06:34         0.54
MH259                STORAGE       0.32      0.62   112.16      0  08:30         0.62
MH260                STORAGE       0.43      0.77   112.16      0  08:31         0.77
MH261                STORAGE       0.60      0.94   112.16      0  08:31         0.94
MH263                STORAGE       0.63      0.97   112.16      0  08:31         0.97
MH265                STORAGE       0.69      1.04   112.16      0  08:32         1.04
MH266                STORAGE       0.04      0.30   115.32      0  06:31         0.30
MH267                STORAGE       0.04      0.28   114.62      0  06:31         0.28
MH267(1B)            STORAGE       0.03      0.21   113.59      0  06:36         0.21
MH268                STORAGE       0.05      0.35   114.49      0  06:29         0.35
MH269                STORAGE       0.10      1.05   114.25      0  06:30         1.05
MH270                STORAGE       0.10      1.05   114.07      0  06:31         1.05
MH271                STORAGE       0.11      0.96   113.77      0  06:31         0.96
MH272                STORAGE       0.12      0.97   113.62      0  06:31         0.97
MH273                STORAGE       0.11      0.83   113.19      0  06:32         0.83
MH274                STORAGE       0.11      0.73   112.98      0  06:32         0.73
MH275                STORAGE       0.27      0.55   112.16      0  08:32         0.55
MH276                STORAGE       0.33      0.64   112.16      0  08:32         0.64
MH277                STORAGE       0.38      0.70   112.16      0  08:32         0.70
MH278                STORAGE       0.41      0.74   112.16      0  08:32         0.74
MH279                STORAGE       0.06      0.59   114.48      0  06:31         0.59
MH280                STORAGE       0.05      0.32   113.24      0  06:32         0.32
MH281                STORAGE       0.04      0.41   115.38      0  06:30         0.41
RYCB171              STORAGE       0.41      1.46   117.78      0  06:30         1.45
RYCB178              STORAGE       0.43      1.78   116.92      0  06:30         1.78
RYCB183              STORAGE       0.37      1.19   116.29      0  06:31         1.19
RYCB186              STORAGE       0.40      1.67   114.95      0  06:30         1.67
RYCB189              STORAGE       0.43      1.16   115.51      0  06:31         1.16
RYCB193              STORAGE       0.37      1.29   115.90      0  06:30         1.29
RYCB196              STORAGE       0.41      1.07   116.73      0  06:30         1.07
RYCB199              STORAGE       0.40      1.43   117.06      0  06:30         1.43
RYCB201              STORAGE       0.44      1.42   117.08      0  06:30         1.42
SWMF-E               STORAGE       2.57      2.92   112.16      0  08:32         2.92
Vortech-1929CIP-A    STORAGE       0.36      0.68   112.16      0  08:32         0.68
Vortech-9000         STORAGE       0.62      0.96   112.16      0  08:31         0.96


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Node Inflow Summary
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West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - INTERIM
(100-year, 12-hour SCS Type II Storm)

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                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
Node                 Type           LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
-------------------------------------------------------------------------------------------------
01+507               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
01+722               JUNCTION      0.00    26.03     0  06:30           0      0.0558      -0.164
01+777               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
08+096               JUNCTION      0.00     9.99     0  06:14           0     0.00772       9.114
09+354               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
09+412               JUNCTION      0.00    25.56     0  06:30           0      0.0266       0.859
09+756               JUNCTION      0.00   187.36     0  06:30           0       0.198      -0.876
10+000               JUNCTION      0.00   136.02     0  06:30           0      0.0863       0.079
10+018               JUNCTION      0.00     8.65     0  06:29           0     0.00181       4.930
10+070               JUNCTION      0.00    15.92     0  06:30           0     0.00835      -7.079
10+093               JUNCTION      0.00     5.18     0  06:26           0      0.0011      12.320
10+140               JUNCTION      0.00    47.40     0  06:30           0       0.038       0.007
10+171               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
11+166               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
11+251               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
11+305               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
11+411               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
CB118-119            JUNCTION     97.84   249.69     0  06:30       0.323       0.512       0.248
CB120-121            JUNCTION     52.03   181.16     0  06:30       0.172       0.329      -0.349
CB122-123            JUNCTION     58.13   157.32     0  06:30        0.19       0.297      -0.068
CB124-125            JUNCTION     41.30   127.07     0  06:30       0.132       0.218       0.003
CB126-127            JUNCTION     69.71   167.39     0  06:30        0.19       0.287       0.745
CB128-129            JUNCTION     43.60   146.58     0  06:30       0.143       0.274      -0.117
CB130-131            JUNCTION     47.75   129.59     0  06:30       0.156       0.259       0.036
CB132-133            JUNCTION     47.34   108.20     0  06:30        0.15       0.224      -0.015
CB134-135            JUNCTION     48.17    87.00     0  06:30       0.139       0.184       0.004
CB136-137            JUNCTION     37.68    65.05     0  06:30       0.101       0.134      -0.006
CB138-139            JUNCTION     28.11    53.39     0  06:30      0.0798       0.117      -0.025
CB140-141            JUNCTION     27.20    38.45     0  06:30      0.0764      0.0881       0.023
CB142-143            JUNCTION     33.97    50.58     0  06:30      0.0949       0.111      -0.070
CB157-158            JUNCTION     48.75    51.47     0  06:13       0.146       0.155      -0.217
CB159-160            JUNCTION     44.20    50.68     0  06:30       0.126       0.132      -0.143
CB-161A-B            JUNCTION     95.22   120.93     0  06:30       0.334        0.38       0.063
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CB-162A-B            JUNCTION     80.19    80.19     0  06:30       0.286       0.287      -0.008
CB-163A-B            JUNCTION     41.99   125.68     0  06:30       0.129       0.251       0.075
CB-164A-B            JUNCTION     98.14    98.14     0  06:30       0.341       0.341      -0.004
CB-165A-B            JUNCTION    107.64   109.36     0  06:30       0.374       0.375      -0.008
CB-166A-B            JUNCTION     50.19    83.75     0  06:29       0.171       0.186       0.732
CB-167A-B            JUNCTION     59.78    98.93     0  06:30       0.195       0.238      -0.038
CB-168A-B            JUNCTION     47.58    47.58     0  06:30       0.164       0.164      -0.010
CB-169A-B            JUNCTION     50.93    64.92     0  06:30       0.175        0.19      -0.177
CB170                JUNCTION      0.00    66.14     0  06:30           0       0.306      -0.001
CB176                JUNCTION      0.00    79.70     0  06:30           0       0.234       0.000
CB177                JUNCTION      0.00    66.37     0  06:30           0       0.334      -0.003
CB184                JUNCTION      0.00    39.24     0  06:31           0       0.191      -0.000
CB187                JUNCTION      0.00    21.22     0  06:30           0       0.119       0.013
CB188                JUNCTION      0.00    80.50     0  06:31           0       0.359       0.001
CB194                JUNCTION      0.00    51.86     0  06:30           0       0.222      -0.001
CB195                JUNCTION      0.00    36.69     0  06:30           0       0.171      -0.006
CB200                JUNCTION      0.00    44.53     0  06:30           0       0.223      -0.010
CoolingTrench        JUNCTION      0.00    14.56     0  08:33           0       0.762      -0.000
J1                   JUNCTION      0.00   135.56     0  06:30           0      0.0862      -0.126
J2                   JUNCTION      0.00   135.14     0  06:31           0      0.0863       0.041
J3                   JUNCTION      0.00   134.18     0  06:31           0      0.0863      -0.303
J4                   JUNCTION      0.00    43.03     0  06:30           0       0.032      -0.008
J5                   JUNCTION      0.00    42.89     0  06:30           0       0.032       0.138
J6                   JUNCTION    756.07   796.15     0  06:30        3.85        3.88      -0.078
J7                   JUNCTION      0.00  1621.82     0  06:30           0        7.58       0.143
J8                   JUNCTION      0.00   185.76     0  08:33           0        9.73       0.000
PondOUT              JUNCTION      0.00   185.76     0  08:32           0        9.73       0.001
OF-CarpCreek         OUTFALL     360.67   360.67     0  06:30       0.767       0.767       0.000
OF-CoolTrenchOut     OUTFALL       0.00    14.56     0  08:33           0       0.762       0.000
OF-SWMF              OUTFALL       0.00   185.76     0  08:33           0        9.73       0.000
OF-Unc-S             OUTFALL     169.88   169.88     0  06:30       0.872       0.872       0.000
CAP(225)             STORAGE       0.00    90.95     0  06:30           0       0.382      -0.000
HW191                STORAGE       0.00  1646.66     0  06:30           0         7.6       0.188
MH201                STORAGE       0.00    66.14     0  06:30           0       0.306      -0.001
MH213                STORAGE       0.00    24.80     0  06:03           0       0.132      -0.004
MH215                STORAGE       0.00     0.39     0  06:04           0    0.000342       0.220
MH217                STORAGE       0.00     0.12     0  06:21           0    0.000329       0.646
MH219                STORAGE       0.00    38.62     0  06:30           0       0.112      -0.001
MH227                STORAGE       0.00   140.07     0  06:30           0       0.585       0.022
MH229                STORAGE       0.00   223.10     0  06:30           0       0.919      -0.024
MH233                STORAGE       0.00   247.83     0  06:30           0           1      -0.002
```

```
MH235                STORAGE       0.00   272.60     0  06:31           0        1.09      -0.068
MH237                STORAGE       0.00   297.41     0  06:31           0         1.2       0.028
MH241                STORAGE       0.00   322.19     0  06:31           0        1.32      -0.022
MH243                STORAGE       0.00   371.76     0  06:31           0        1.58      -0.036
MH245                STORAGE       0.00   422.52     0  06:32           0        1.86      -0.001
MH247                STORAGE       0.00   447.32     0  06:32           0        1.97       0.013
MH249                STORAGE       0.00   472.11     0  06:32           0        2.11       0.057
MH251                STORAGE       0.00   472.05     0  06:33           0        2.11       0.026
MH253                STORAGE       0.00   595.13     0  06:33           0        2.68       0.174
MH259                STORAGE       0.00   594.71     0  06:33           0        2.67      -0.184
MH260                STORAGE       0.00   611.94     0  06:33           0         2.8      -0.057
MH261                STORAGE       0.00   607.39     0  06:29           0        2.81       1.728
MH263                STORAGE       0.00   320.35     0  06:09           0        1.75      -0.085
MH265                STORAGE       0.00   603.99     0  06:29           0        2.76      -1.469
MH266                STORAGE       0.00   130.19     0  06:30           0       0.524      -0.002
MH267                STORAGE       0.00   130.02     0  06:31           0       0.524       0.118
MH267(1B)            STORAGE       0.00    50.96     0  06:36           0       0.285      -0.000
MH268                STORAGE       0.00   193.75     0  06:30           0       0.778       0.026
MH269                STORAGE       0.00   517.74     0  06:30           0        2.08      -0.067
MH270                STORAGE       0.00   587.46     0  06:30           0        2.42       0.177
MH271                STORAGE       0.00   585.60     0  06:30           0        2.42       0.003
MH272                STORAGE       0.00   673.00     0  06:31           0        2.79      -0.009
MH273                STORAGE       0.00   788.20     0  06:31           0        3.32      -0.033
MH274                STORAGE       0.00   868.63     0  06:32           0        3.71      -0.000
MH275                STORAGE       0.00   868.34     0  06:32           0        3.71       0.056
MH276                STORAGE       0.00   867.97     0  06:32           0        3.82      -3.408
MH277                STORAGE       0.00   698.77     0  06:32           0        3.65      -0.007
MH278                STORAGE       0.00   866.90     0  06:32           0        3.95       3.482
MH279                STORAGE       0.00   143.25     0  06:30           0       0.595      -0.047
MH280                STORAGE       0.00   117.31     0  06:31           0       0.532      -0.104
MH281                STORAGE       0.00   146.05     0  06:30           0       0.568       0.000
RYCB171              STORAGE      90.58    90.58     0  06:30       0.315       0.315      -0.005
RYCB178              STORAGE     101.86   101.86     0  06:30       0.353       0.353      -0.390
RYCB183              STORAGE      67.56    95.21     0  06:30       0.208       0.229       0.575
RYCB186              STORAGE      43.52    43.52     0  06:30       0.137       0.137      -0.521
RYCB189              STORAGE     104.14   121.66     0  06:30       0.344       0.366       0.302
RYCB193              STORAGE      75.61    75.61     0  06:30       0.232       0.232      -0.780
RYCB196              STORAGE      64.36    96.43     0  06:30       0.191       0.218      -0.991
RYCB199              STORAGE      82.18    82.18     0  06:30        0.25        0.25      -0.194
RYCB201              STORAGE      67.72    80.34     0  06:30       0.224       0.234      -0.000
SWMF-E               STORAGE     322.64  2655.06     0  06:30        1.15          15       0.102
```

```
Vortech-1929CIP-A    STORAGE       0.00   698.93     0  06:32           0        3.65       0.010
Vortech-9000         STORAGE       0.00   321.36     0  06:09           0        1.75       0.082


**********************
Node Surcharge Summary
**********************

Surcharging occurs when water rises above the top of the highest conduit.
---------------------------------------------------------------------
                                            Max. Height   Min. Depth
                                   Hours    Above Crown    Below Rim
Node                 Type     Surcharged         Meters       Meters
---------------------------------------------------------------------
CB170                JUNCTION       0.76          0.499        1.971
CB176                JUNCTION       0.60          0.770        1.340
CB177                JUNCTION       1.14          0.872        1.800
CB184                JUNCTION       1.04          0.556        1.012
CB187                JUNCTION       1.49          1.216        0.890
CB188                JUNCTION       0.74          0.214        1.402
CB194                JUNCTION       0.93          0.498        2.114
CB195                JUNCTION       1.00          0.476        1.172
CB200                JUNCTION       1.09          0.738        1.960
CoolingTrench        JUNCTION      24.00          0.909        1.251


*********************
Node Flooding Summary
*********************

No nodes were flooded.


**********************
Storage Volume Summary
**********************

--------------------------------------------------------------------------------------------------
                       Average     Avg  Evap Exfil       Maximum     Max    Time of Max    Maximum
                        Volume    Pcnt  Pcnt  Pcnt        Volume    Pcnt     Occurrence    Outflow
Storage Unit           1000 m3    Full  Loss  Loss       1000 m3    Full    days hr:min        LPS
```

```
---------------------------------------------------------------------------------------------------
CAP(225)                 0.000        0     0     0         0.000       0       0  00:00      90.95
HW191                    0.000        0     0     0         0.000       0       0  00:00    1621.82
MH201                    0.000        1     0     0         0.000       5       0  06:30      66.15
MH213                    0.000        1     0     0         0.000       4       0  06:06      24.83
MH215                    0.000        0     0     0         0.000       0       0  06:05       0.20
MH217                    0.000        0     0     0         0.000       0       0  06:48       0.12
MH219                    0.000        1     0     0         0.000       5       0  06:30      38.56
MH227                    0.000        1     0     0         0.000       6       0  06:30     140.06
MH229                    0.000        1     0     0         0.001       8       0  06:30     223.03
MH233                    0.000        1     0     0         0.001       8       0  06:30     247.80
MH235                    0.000        1     0     0         0.001       9       0  06:31     272.61
MH237                    0.000        1     0     0         0.001       9       0  06:31     297.39
MH241                    0.000        2     0     0         0.001      10       0  06:31     322.16
MH243                    0.000        2     0     0         0.001      11       0  06:32     371.70
MH245                    0.000        2     0     0         0.001      12       0  06:32     422.52
MH247                    0.000        2     0     0         0.001      12       0  06:32     447.31
MH249                    0.000        2     0     0         0.001      12       0  06:33     472.05
MH251                    0.000        2     0     0         0.001      13       0  06:33     471.92
MH253                    0.000        4     0     0         0.001      14       0  06:34     594.71
MH259                    0.001        8     0     0         0.002      16       0  08:30     590.92
MH260                    0.001       10     0     0         0.002      18       0  08:31     607.39
MH261                    0.002       18     0     0         0.002      29       0  08:31     604.76
MH263                    0.001       20     0     0         0.001      30       0  08:31     319.33
MH265                    0.002       21     0     0         0.003      32       0  08:32     602.51
MH266                    0.000        1     0     0         0.000      10       0  06:31     130.02
MH267                    0.000        1     0     0         0.000      10       0  06:31     130.00
MH267(1B)                0.000        1     0     0         0.000       8       0  06:36      50.95
MH268                    0.000        2     0     0         0.000      11       0  06:29     193.81
MH269                    0.000        3     0     0         0.002      28       0  06:30     512.32
MH270                    0.000        3     0     0         0.002      26       0  06:31     585.60
MH271                    0.000        3     0     0         0.002      26       0  06:31     584.22
MH272                    0.000        3     0     0         0.002      25       0  06:31     671.31
MH273                    0.000        3     0     0         0.004      23       0  06:32     787.84
MH274                    0.000        3     0     0         0.003      19       0  06:32     868.34
MH275                    0.003        8     0     0         0.006      16       0  08:32     867.97
MH276                    0.002        9     0     0         0.003      17       0  08:32     867.38
MH277                    0.002       10     0     0         0.003      18       0  08:32     698.46
MH278                    0.002       11     0     0         0.003      19       0  08:32     866.03
MH279                    0.000        3     0     0         0.001      25       0  06:31     151.84
MH280                    0.000        2     0     0         0.000      12       0  06:32     119.91
```

```
MH281                    0.000        2     0     0         0.000      17       0  06:30     144.86
RYCB171                  0.000        0     0     0         0.000       0       0  00:00      79.08
RYCB178                  0.000        0     0     0         0.000       0       0  00:00      94.44
RYCB183                  0.000        0     0     0         0.000       0       0  00:00      79.80
RYCB186                  0.000        0     0     0         0.000       0       0  00:00      42.92
RYCB189                  0.000        0     0     0         0.000       0       0  00:00      98.78
RYCB193                  0.000        0     0     0         0.000       0       0  00:00      69.60
RYCB196                  0.000        0     0     0         0.000       0       0  00:00      94.62
RYCB199                  0.000        0     0     0         0.000       0       0  00:00      76.79
RYCB201                  0.000        0     0     0         0.000       0       0  00:00      79.70
SWMF-E                   7.286       39     0     0        11.293      60       0  08:32     200.32
Vortech-1929CIP-A        0.000        9     0     0         0.001      17       0  08:32     698.77
Vortech-9000             0.001       19     0     0         0.001      29       0  08:31     320.35


***********************
Outfall Loading Summary
***********************

------------------------------------------------------------
                        Flow       Avg       Max       Total
                        Freq      Flow      Flow      Volume
Outfall Node            Pcnt       LPS       LPS    10^6 ltr
------------------------------------------------------------
OF-CarpCreek           59.12     23.44    360.67       0.767
OF-CoolTrenchOut       97.00      9.68     14.56       0.762
OF-SWMF                98.33    121.82    185.76       9.731
OF-Unc-S               62.89     23.62    169.88       0.872
------------------------------------------------------------
System                 79.34    178.56    670.25      12.133


********************
Link Flow Summary
********************

------------------------------------------------------------------------------
                                Maximum  Time of Max   Maximum    Max/    Max/
                                 |Flow|   Occurrence   |Veloc|    Full    Full
Link                 Type           LPS  days hr:min     m/sec    Flow   Depth
------------------------------------------------------------------------------
```

```
  CAP-227              CONDUIT     90.95     0  06:31       1.13    0.23    0.32
  CoolingTrench1       CONDUIT     14.56     0  08:33       0.46   47.90    1.00
  CoolingTrench2       CONDUIT     14.56     0  08:33       0.46    7.84    1.00
  Culvert              CONDUIT    185.76     0  08:32       2.63    2.65    1.00
  MH201-CAP            CONDUIT     66.15     0  06:30       0.95    0.16    0.31
  MH213-227            CONDUIT     24.71     0  06:06       0.80    0.39    0.44
  MH215-213            CONDUIT      0.39     0  06:04       0.06    0.01    0.20
  MH215-217            CONDUIT      0.12     0  06:21       0.28    0.00    0.04
  MH217-219            CONDUIT      0.12     0  06:40       0.21    0.00    0.23
  MH219-229            CONDUIT     38.56     0  06:30       0.98    0.53    0.53
  MH227-229            CONDUIT    140.06     0  06:30       1.10    0.25    0.38
  MH229-233            CONDUIT    223.03     0  06:30       1.45    0.39    0.43
  MH233-235            CONDUIT    247.80     0  06:31       1.48    0.46    0.46
  MH235-237            CONDUIT    272.61     0  06:31       1.49    0.47    0.49
  MH237-241            CONDUIT    297.39     0  06:31       1.57    0.50    0.51
  MH241-243            CONDUIT    322.16     0  06:31       1.55    0.59    0.55
  MH243-245            CONDUIT    371.70     0  06:32       1.66    0.68    0.58
  MH245-247            CONDUIT    422.52     0  06:32       1.65    0.67    0.55
  MH247-249            CONDUIT    447.31     0  06:32       1.71    0.63    0.56
  MH249-251            CONDUIT    472.05     0  06:33       1.72    0.66    0.58
  MH251-253            CONDUIT    471.92     0  06:33       1.63    0.68    0.61
  MH253-259            CONDUIT    594.71     0  06:33       1.59    0.72    0.66
  MH259-260            CONDUIT    590.92     0  06:33       1.56    0.71    0.81
  MH260-261            CONDUIT    607.39     0  06:29       1.40    0.68    0.96
  MH261-OGS            CONDUIT    321.36     0  06:09       1.44    1.09    1.00
  MH263-265            CONDUIT    319.33     0  06:09       1.46    1.17    1.00
  MH265-HW2            CONDUIT    602.51     0  06:29       1.30    0.62    1.00
  MH266-267            CONDUIT    130.02     0  06:31       1.43    0.94    0.74
  MH267(1B)-245        CONDUIT     50.95     0  06:36       1.25    0.84    0.76
  MH267-268            CONDUIT    130.00     0  06:31       1.19    0.68    0.66
  MH268-269            CONDUIT    193.81     0  06:30       1.37    0.77    0.67
  MH269-270            CONDUIT    512.32     0  06:30       1.39    1.15    1.00
  MH270-271            CONDUIT    585.60     0  06:30       1.58    1.36    1.00
  MH271-272            CONDUIT    584.22     0  06:31       1.28    1.17    1.00
  MH272-273            CONDUIT    671.31     0  06:31       1.48    1.36    0.98
  MH273-274            CONDUIT    787.84     0  06:32       1.32    0.83    0.85
  MH274-275            CONDUIT    868.34     0  06:32       1.78    0.93    0.70
  MH275-276            CONDUIT    867.97     0  06:32       1.79    0.15    0.35
  MH276-OGSa           CONDUIT    698.93     0  06:32       1.87    0.36    0.61
  MH277-278            CONDUIT    698.46     0  06:32       1.68    0.41    0.66
  MH278-191            CONDUIT    866.03     0  06:32       1.62    0.16    0.47
```

```
  MH279-269            CONDUIT    151.84     0  06:33       1.05    1.10    1.00
  MH280-273            CONDUIT    119.91     0  06:37       1.11    0.54    0.73
  MH281-269            CONDUIT    144.86     0  06:30       1.38    0.94    0.87
  MS01                 CONDUIT    135.56     0  06:30       0.60    0.00    0.09
  MS02                 CONDUIT    135.14     0  06:31       0.71    0.02    0.14
  MS03                 CONDUIT    134.18     0  06:31       0.67    0.01    0.14
  MS04                 CONDUIT    133.78     0  06:32       0.25    0.00    0.46
  MS05                 CONDUIT     43.03     0  06:30       0.13    0.00    0.11
  MS06                 CONDUIT     42.89     0  06:30       0.57    0.00    0.06
  MS07                 CONDUIT     42.10     0  06:31       0.26    0.00    0.12
  MS08                 CONDUIT    789.86     0  06:30       0.91    0.03    0.44
  MS09                 CONDUIT   1621.82     0  06:30       0.83    0.04    0.45
  MS10                 CONDUIT   1599.01     0  06:30       0.63    0.04    0.52
  MS11                 CONDUIT    185.76     0  08:33       0.28    0.04    0.43
  MS12                 CONDUIT    185.76     0  08:33       0.22    0.04    0.48
  OGS-277              CONDUIT    698.77     0  06:32       1.75    0.35    0.64
  OGS-MH263            CONDUIT    320.35     0  06:09       1.44    1.82    1.00
  OVF-RYCB171          CONDUIT     12.94     0  06:30       0.26    0.00    0.13
  OVF-RYCB178          CONDUIT     28.07     0  06:30       0.27    0.01    0.19
  OVF-RYCB183          CONDUIT     40.56     0  06:30       0.40    0.01    0.18
  OVF-RYCB186          CONDUIT     21.70     0  06:30       0.04    0.00    0.50
  OVF-RYCB189          CONDUIT     18.98     0  06:29       0.13    0.00    0.18
  OVF-RYCB193          CONDUIT     17.74     0  06:30       0.18    0.01    0.18
  OVF-RYCB196          CONDUIT     57.93     0  06:30       0.68    0.01    0.17
  OVF-RYCB199          CONDUIT     32.27     0  06:30       0.28    0.01    0.20
  OVF-RYCB201          CONDUIT      0.00     0  00:00       0.00    0.00    0.00
  RYCB171-CB170        CONDUIT     66.14     0  06:30       1.31    2.47    1.00
  RYCB178-CB177        CONDUIT     66.37     0  06:30       1.31    2.40    1.00
  RYCB183-CB184        CONDUIT     39.24     0  06:31       0.77    1.36    1.00
  RYCB186-CB187        CONDUIT     21.22     0  06:30       0.42    0.74    1.00
  RYCB189-CB188        CONDUIT     80.50     0  06:31       1.59    2.86    1.00
  RYCB193-CB194        CONDUIT     51.86     0  06:30       1.02    1.85    1.00
  RYCB196-CB195        CONDUIT     36.69     0  06:30       0.72    1.42    1.00
  RYCB199-CB200        CONDUIT     44.53     0  06:30       0.88    1.67    1.00
  RYCB201-CB176        CONDUIT     79.70     0  06:30       1.57    2.47    1.00
  Street10-A           CHANNEL      5.32     0  06:32       0.23    0.00    0.03
  Street10-B           CHANNEL      8.65     0  06:29       0.10    0.00    0.09
  Street10-C           CHANNEL     15.29     0  06:30       0.12    0.00    0.09
  Street10-D           CHANNEL     15.92     0  06:30       0.24    0.00    0.06
  Street10-E           CHANNEL      2.27     0  06:30       0.30    0.00    0.06
  Street10-F           CHANNEL      5.18     0  06:26       0.08    0.00    0.09
```

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - INTERIM
(100-year, 12-hour SCS Type II Storm)

```
Street10-G           CHANNEL     47.40     0  06:30      0.29    0.00    0.16
Street10-H           CHANNEL      0.00     0  00:00      0.00    0.00    0.08
Street11-A           CHANNEL     14.03     0  06:30      0.31    0.00    0.04
Street11-B           CHANNEL     25.71     0  06:30      0.36    0.00    0.10
Street11-C           CHANNEL      0.00     0  00:00      0.00    0.00    0.08
Street11-D           CHANNEL      0.00     0  00:00      0.00    0.00    0.03
Street11-E           CHANNEL      0.00     0  00:00      0.00    0.00    0.03
Street11-F           CHANNEL      0.00     0  00:00      0.00    0.00    0.02
Street11-G           CHANNEL      9.85     0  06:30      0.26    0.00    0.04
Street11-H           CHANNEL      0.00     0  00:00      0.00    0.00    0.02
Street11-I           CHANNEL      0.00     0  00:00      0.00    0.00    0.08
Street11-J           CHANNEL      0.00     0  00:00      0.00    0.00    0.08
Street11-K           CHANNEL      0.00     0  00:00      0.00    0.00    0.05
Street1-A            CHANNEL      0.00     0  00:00      0.00    0.00    0.12
Street1-B            CHANNEL     98.55     0  06:30      0.33    0.00    0.16
Street1-C            CHANNEL     66.68     0  06:30      0.38    0.00    0.12
Street1-D            CHANNEL     26.01     0  06:30      0.41    0.00    0.10
Street1-E            CHANNEL     16.18     0  06:30      0.22    0.00    0.05
Street1-F            CHANNEL      0.00     0  00:00      0.00    0.00    0.03
Street8-A            CHANNEL     16.62     0  06:30      0.15    0.00    0.10
Street8-B            CHANNEL      9.99     0  06:14      0.07    0.00    0.09
Street8-C            CHANNEL      6.52     0  06:30      0.19    0.00    0.03
Street8-D            CHANNEL     12.05     0  06:30      0.22    0.00    0.04
Street9-A            CHANNEL    132.37     0  06:30      0.20    0.00    0.14
Street9-B            CHANNEL    152.19     0  06:30      0.39    0.00    0.17
Street9-C            CHANNEL    129.34     0  06:30      0.49    0.00    0.09
Street9-D            CHANNEL     99.42     0  06:30      0.45    0.00    0.08
Street9-E            CHANNEL     86.53     0  06:30      0.46    0.00    0.08
Street9-F            CHANNEL    120.72     0  06:30      0.69    0.00    0.08
Street9-G            CHANNEL    103.05     0  06:30      0.47    0.00    0.08
Street9-H            CHANNEL     81.90     0  06:30      0.43    0.00    0.08
Street9-I            CHANNEL     60.91     0  06:30      0.39    0.00    0.07
Street9-J            CHANNEL     38.87     0  06:30      0.34    0.00    0.06
Street9-K            CHANNEL     27.42     0  06:30      0.31    0.00    0.05
Street9-L            CHANNEL     13.25     0  06:30      0.23    0.00    0.04
Street9-M            CHANNEL     11.28     0  06:30      0.29    0.00    0.04
Street9-N            CHANNEL     25.56     0  06:30      0.46    0.00    0.04
Street9-O            CHANNEL      0.00     0  00:00      0.00    0.00    0.02
OCB118               ORIFICE     49.35     0  06:30                      1.00
OCB119               ORIFICE     49.35     0  06:30                      1.00
OCB126-127           ORIFICE     50.96     0  06:36                      1.00
```

```
OCB161A              ORIFICE     53.76     0  06:30                      1.00
OCB161B              ORIFICE     37.73     0  06:30                      1.00
OCB163A              ORIFICE     27.35     0  06:30                      1.00
OCB163B              ORIFICE     27.35     0  06:30                      1.00
OCB164A              ORIFICE     37.57     0  06:30                      1.00
OCB164B              ORIFICE     37.57     0  06:30                      1.00
OCB165A              ORIFICE     52.26     0  06:30                      1.00
OCB165B              ORIFICE     36.69     0  06:30                      1.00
OCB166A              ORIFICE     20.66     0  06:31                      1.00
OCB166B              ORIFICE     16.15     0  06:31                      1.00
OCB167A              ORIFICE     20.82     0  06:30                      1.00
OCB167B              ORIFICE     20.82     0  06:30                      1.00
ORYCB171             ORIFICE     66.14     0  06:30                      1.00
ORYCB178             ORIFICE     66.37     0  06:30                      1.00
ORYCB183             ORIFICE     39.24     0  06:31                      1.00
ORYCB186             ORIFICE     21.22     0  06:30                      1.00
ORYCB189             ORIFICE     80.50     0  06:31                      1.00
ORYCB193             ORIFICE     51.86     0  06:30                      1.00
ORYCB196             ORIFICE     36.69     0  06:30                      1.00
ORYCB199             ORIFICE     44.53     0  06:30                      1.00
ORYCB201             ORIFICE     79.70     0  06:30                      1.00
MH261-265            WEIR       371.79     0  06:36                      0.53
MH276-278            WEIR       168.50     0  06:31                      0.09
W1                   WEIR         0.00     0  00:00                      0.00
W2                   WEIR         0.00     0  00:00                      0.00
OCB120-121           DUMMY       24.80     0  06:05
OCB122-123           DUMMY       24.80     0  06:05
OCB124-125           DUMMY       24.80     0  06:11
OCB128-129           DUMMY       24.80     0  06:05
OCB130-131           DUMMY       24.80     0  06:07
OCB132-133           DUMMY       24.80     0  06:09
OCB134-135           DUMMY       24.80     0  06:11
OCB136-137           DUMMY       24.80     0  06:15
OCB138-139           DUMMY       24.80     0  06:19
OCB140-141           DUMMY       24.51     0  06:30
OCB142-143           DUMMY       24.80     0  06:18
OCB157-158           DUMMY       24.80     0  06:03
OCB159-160           DUMMY       38.49     0  06:30
OCB162               DUMMY       63.99     0  06:30
OCB168               DUMMY       37.72     0  06:30
OCB169               DUMMY       38.70     0  06:20
```

```
***************************
Flow Classification Summary
***************************

-------------------------------------------------------------------------------------
                      Adjusted    ---------- Fraction of Time in Flow Class ----------
                       /Actual          Up    Down  Sub   Sup   Up    Down  Norm  Inlet
Conduit                 Length    Dry   Dry   Dry   Crit  Crit  Crit  Crit  Ltd   Ctrl
-------------------------------------------------------------------------------------
CAP-227                   1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
CoolingTrench1            1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
CoolingTrench2            1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
Culvert                   1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MH201-CAP                 1.00   0.02  0.00  0.00  0.98  0.00  0.00  0.00  0.93  0.00
MH213-227                 1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
MH215-213                 1.00   0.87  0.00  0.00  0.07  0.00  0.00  0.06  0.01  0.00
MH215-217                 1.00   0.23  0.64  0.00  0.12  0.00  0.00  0.00  0.74  0.00
MH217-219                 1.00   0.23  0.00  0.00  0.05  0.00  0.00  0.73  0.03  0.00
MH219-229                 1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
MH227-229                 1.00   0.02  0.00  0.00  0.13  0.00  0.00  0.85  0.03  0.00
MH229-233                 1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
MH233-235                 1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
MH235-237                 1.00   0.02  0.00  0.00  0.05  0.02  0.00  0.92  0.00  0.00
MH237-241                 1.00   0.02  0.00  0.00  0.04  0.00  0.00  0.95  0.00  0.00
MH241-243                 1.00   0.02  0.00  0.00  0.04  0.00  0.00  0.94  0.00  0.00
MH243-245                 1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
MH245-247                 1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
MH247-249                 1.00   0.02  0.00  0.00  0.02  0.00  0.00  0.96  0.00  0.00
MH249-251                 1.00   0.02  0.00  0.00  0.21  0.00  0.00  0.77  0.13  0.00
MH251-253                 1.00   0.02  0.00  0.00  0.47  0.00  0.00  0.51  0.15  0.00
MH253-259                 1.00   0.02  0.00  0.00  0.77  0.00  0.00  0.21  0.28  0.00
MH259-260                 1.00   0.00  0.02  0.00  0.78  0.00  0.00  0.20  0.01  0.00
MH260-261                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.20  0.00
MH261-OGS                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MH263-265                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MH265-HW2                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MH266-267                 1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
MH267(1B)-245             1.00   0.04  0.00  0.00  0.00  0.00  0.00  0.96  0.00  0.00
MH267-268                 1.00   0.02  0.00  0.00  0.08  0.00  0.00  0.90  0.01  0.00
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MH268-269                 1.00   0.02  0.00  0.00  0.01  0.00  0.00  0.97  0.00  0.00
MH269-270                 1.00   0.02  0.00  0.00  0.07  0.00  0.00  0.91  0.00  0.00
MH270-271                 1.00   0.02  0.00  0.00  0.07  0.00  0.00  0.91  0.00  0.00
MH271-272                 1.00   0.02  0.00  0.00  0.22  0.00  0.00  0.76  0.01  0.00
MH272-273                 1.00   0.02  0.00  0.00  0.07  0.00  0.00  0.91  0.00  0.00
MH273-274                 1.00   0.02  0.00  0.00  0.98  0.00  0.00  0.00  0.51  0.00
MH274-275                 1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
MH275-276                 1.00   0.02  0.00  0.00  0.75  0.02  0.00  0.21  0.07  0.00
MH276-OGSa                1.00   0.02  0.00  0.00  0.76  0.00  0.00  0.21  0.00  0.00
MH277-278                 1.00   0.02  0.00  0.00  0.77  0.00  0.00  0.20  0.00  0.00
MH278-191                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.04  0.00
MH279-269                 1.00   0.02  0.00  0.00  0.02  0.00  0.00  0.96  0.00  0.00
MH280-273                 1.00   0.02  0.00  0.00  0.04  0.00  0.00  0.94  0.01  0.00
MH281-269                 1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
MS01                      1.00   0.64  0.14  0.00  0.22  0.00  0.00  0.00  0.73  0.00
MS02                      1.00   0.61  0.03  0.00  0.36  0.00  0.00  0.00  0.66  0.00
MS03                      1.00   0.25  0.37  0.00  0.38  0.00  0.00  0.00  0.73  0.00
MS04                      1.00   0.00  0.25  0.00  0.75  0.00  0.00  0.00  0.73  0.00
MS05                      1.00   0.23  0.73  0.00  0.04  0.00  0.00  0.00  0.72  0.00
MS06                      1.00   0.75  0.21  0.00  0.04  0.00  0.00  0.00  0.73  0.00
MS07                      1.00   0.04  0.71  0.00  0.25  0.00  0.00  0.00  0.74  0.00
MS08                      1.00   0.00  0.04  0.00  0.96  0.00  0.00  0.00  0.95  0.00
MS09                      1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MS10                      1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MS11                      1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MS12                      1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
OGS-277                   1.00   0.02  0.00  0.00  0.77  0.01  0.00  0.20  0.00  0.00
OGS-MH263                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
OVF-RYCB171               1.00   0.96  0.00  0.00  0.00  0.00  0.00  0.04  0.00  0.00
OVF-RYCB178               1.00   0.96  0.01  0.00  0.04  0.00  0.00  0.00  0.74  0.00
OVF-RYCB183               1.00   0.95  0.01  0.00  0.04  0.00  0.00  0.00  0.73  0.00
OVF-RYCB186               1.00   0.00  0.96  0.00  0.04  0.00  0.00  0.00  0.74  0.00
OVF-RYCB189               1.00   0.95  0.00  0.00  0.04  0.00  0.00  0.01  0.72  0.00
OVF-RYCB193               1.00   0.96  0.01  0.00  0.03  0.00  0.00  0.00  0.74  0.00
OVF-RYCB196               1.00   0.96  0.00  0.00  0.04  0.00  0.00  0.00  0.74  0.00
OVF-RYCB199               1.00   0.96  0.00  0.00  0.04  0.00  0.00  0.00  0.00  0.00
OVF-RYCB201               1.00   1.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
RYCB171-CB170             1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB178-CB177             1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB183-CB184             1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB186-CB187             1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
```

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RYCB189-CB188           1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB193-CB194           1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB196-CB195           1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB199-CB200           1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB201-CB176           1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
Street10-A              1.00   0.25  0.01  0.00  0.51  0.23  0.00  0.00  0.01  0.00
Street10-B              1.00   0.23  0.03  0.00  0.02  0.00  0.00  0.72  0.01  0.00
Street10-C              1.00   0.23  0.01  0.00  0.03  0.00  0.00  0.72  0.02  0.00
Street10-D              1.00   0.23  0.01  0.00  0.02  0.00  0.00  0.73  0.00  0.00
Street10-E              1.00   0.23  0.02  0.00  0.01  0.00  0.00  0.73  0.01  0.00
Street10-F              1.00   0.23  0.02  0.00  0.03  0.00  0.00  0.72  0.01  0.00
Street10-G              1.00   0.23  0.00  0.00  0.05  0.00  0.00  0.72  0.00  0.00
Street10-H              1.00   0.23  0.77  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-A              1.00   0.02  0.04  0.00  0.77  0.17  0.00  0.00  0.46  0.00
Street11-B              1.00   0.31  0.00  0.00  0.04  0.00  0.00  0.65  0.02  0.00
Street11-C              1.00   0.96  0.04  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-D              1.00   0.29  0.71  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-E              1.00   0.29  0.71  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-F              1.00   0.35  0.65  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-G              1.00   0.02  0.33  0.00  0.59  0.06  0.00  0.00  0.75  0.00
Street11-H              1.00   0.35  0.65  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-I              1.00   0.96  0.04  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-J              1.00   0.96  0.04  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-K              1.00   0.97  0.03  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street1-A               1.00   0.92  0.08  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street1-B               1.00   0.03  0.00  0.00  0.08  0.00  0.00  0.89  0.05  0.00
Street1-C               1.00   0.03  0.00  0.00  0.04  0.00  0.00  0.93  0.01  0.00
Street1-D               1.00   0.02  0.00  0.00  0.04  0.00  0.00  0.94  0.02  0.00
Street1-E               1.00   0.02  0.00  0.00  0.94  0.05  0.00  0.00  0.00  0.00
Street1-F               1.00   0.29  0.71  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street8-A               1.00   0.35  0.05  0.00  0.60  0.01  0.00  0.00  0.93  0.00
Street8-B               1.00   0.02  0.22  0.00  0.64  0.12  0.00  0.00  0.25  0.00
Street8-C               1.00   0.02  0.22  0.00  0.64  0.12  0.00  0.00  0.27  0.00
Street8-D               1.00   0.35  0.01  0.00  0.34  0.30  0.00  0.00  0.01  0.00
Street9-A               1.00   0.77  0.02  0.00  0.03  0.00  0.00  0.18  0.72  0.00
Street9-B               1.00   0.34  0.00  0.00  0.05  0.00  0.00  0.61  0.03  0.00
Street9-C               1.00   0.31  0.03  0.00  0.54  0.12  0.00  0.00  0.74  0.00
Street9-D               1.00   0.31  0.02  0.00  0.66  0.00  0.00  0.00  0.98  0.00
Street9-E               1.00   0.02  0.01  0.00  0.81  0.16  0.00  0.00  0.49  0.00
Street9-F               1.00   0.02  0.34  0.00  0.11  0.54  0.00  0.00  0.48  0.00
Street9-G               1.00   0.33  0.02  0.00  0.47  0.18  0.00  0.00  0.03  0.00
```

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Street9-H               1.00   0.33  0.03  0.00  0.60  0.05  0.00  0.00  0.98  0.00
Street9-I               1.00   0.34  0.03  0.00  0.59  0.04  0.00  0.00  0.97  0.00
Street9-J               1.00   0.35  0.03  0.00  0.62  0.00  0.00  0.00  0.97  0.00
Street9-K               1.00   0.37  0.01  0.00  0.39  0.23  0.00  0.00  0.96  0.00
Street9-L               1.00   0.32  0.03  0.00  0.42  0.24  0.00  0.00  0.45  0.00
Street9-M               1.00   0.04  0.02  0.00  0.54  0.40  0.00  0.00  0.34  0.00
Street9-N               1.00   0.04  0.36  0.00  0.11  0.49  0.00  0.00  0.51  0.00
Street9-O               1.00   0.40  0.60  0.00  0.00  0.00  0.00  0.00  0.00  0.00


*************************
Conduit Surcharge Summary
*************************

----------------------------------------------------------------------------
                                                         Hours        Hours
                       --------- Hours Full --------   Above Full   Capacity
Conduit                Both Ends  Upstream  Dnstream   Normal Flow   Limited
----------------------------------------------------------------------------
CoolingTrench1               24.00     24.00     24.00     22.90        23.05
CoolingTrench2               24.00     24.00     24.00     21.55        21.57
Culvert                      24.00     24.00     24.00     17.88        17.88
MH260-261                     0.01      0.01      4.76      0.01         0.01
MH261-OGS                    12.43     12.43     12.92      0.25         0.22
MH263-265                    13.16     13.16     13.67      0.35         0.28
MH265-HW2                     7.36      7.36      9.33      0.01         0.02
MH269-270                     0.41      0.41      0.41      0.36         0.37
MH270-271                     0.40      0.44      0.40      0.56         0.40
MH271-272                     0.38      0.38      0.38      0.43         0.38
MH272-273                     0.01      0.44      0.01      0.53         0.01
MH279-269                     0.14      0.20      0.14      0.34         0.14
MH281-269                     0.01      0.06      0.01      0.01         0.01
OGS-MH263                    12.91     12.92     13.16      0.62         0.52
RYCB171-CB170                24.00     24.00     24.00      0.78         0.78
RYCB178-CB177                24.00     24.00     24.00      1.02         1.02
RYCB183-CB184                24.00     24.00     24.00      0.70         0.70
RYCB186-CB187                24.00     24.00     24.00      0.01         0.01
RYCB189-CB188                24.00     24.00     24.00      0.99         0.99
RYCB193-CB194                24.00     24.00     24.00      0.66         0.67
RYCB196-CB195                24.00     24.00     24.00      0.65         0.65
RYCB199-CB200                24.00     24.00     24.00      0.80         0.80
```

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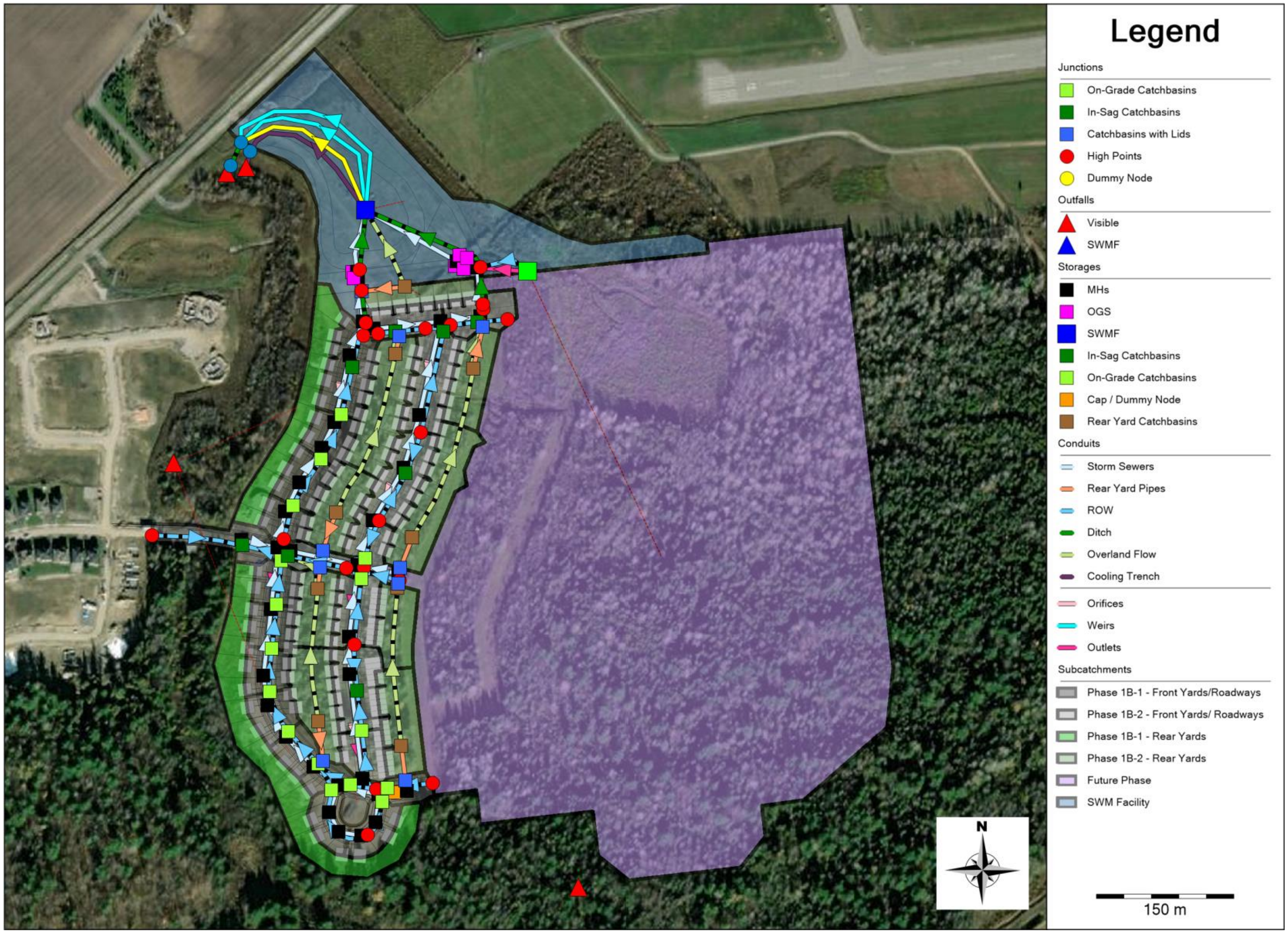
  RYCB201-CB176              24.00     24.00     24.00      0.56         0.56


  Analysis begun on:  Thu Feb  8 17:08:02 2024
  Analysis ended on:  Thu Feb  8 17:08:11 2024
  Total elapsed time: 00:00:09
```

West Capital Airpark - Phase 1B-2 Residential (102085)
PCSWMM Model Schematics – Ultimate Conditions

NOVATECH
Engineers, Planners & Landscape Architects

Overall Model Schematic



Date: 2024-02-08
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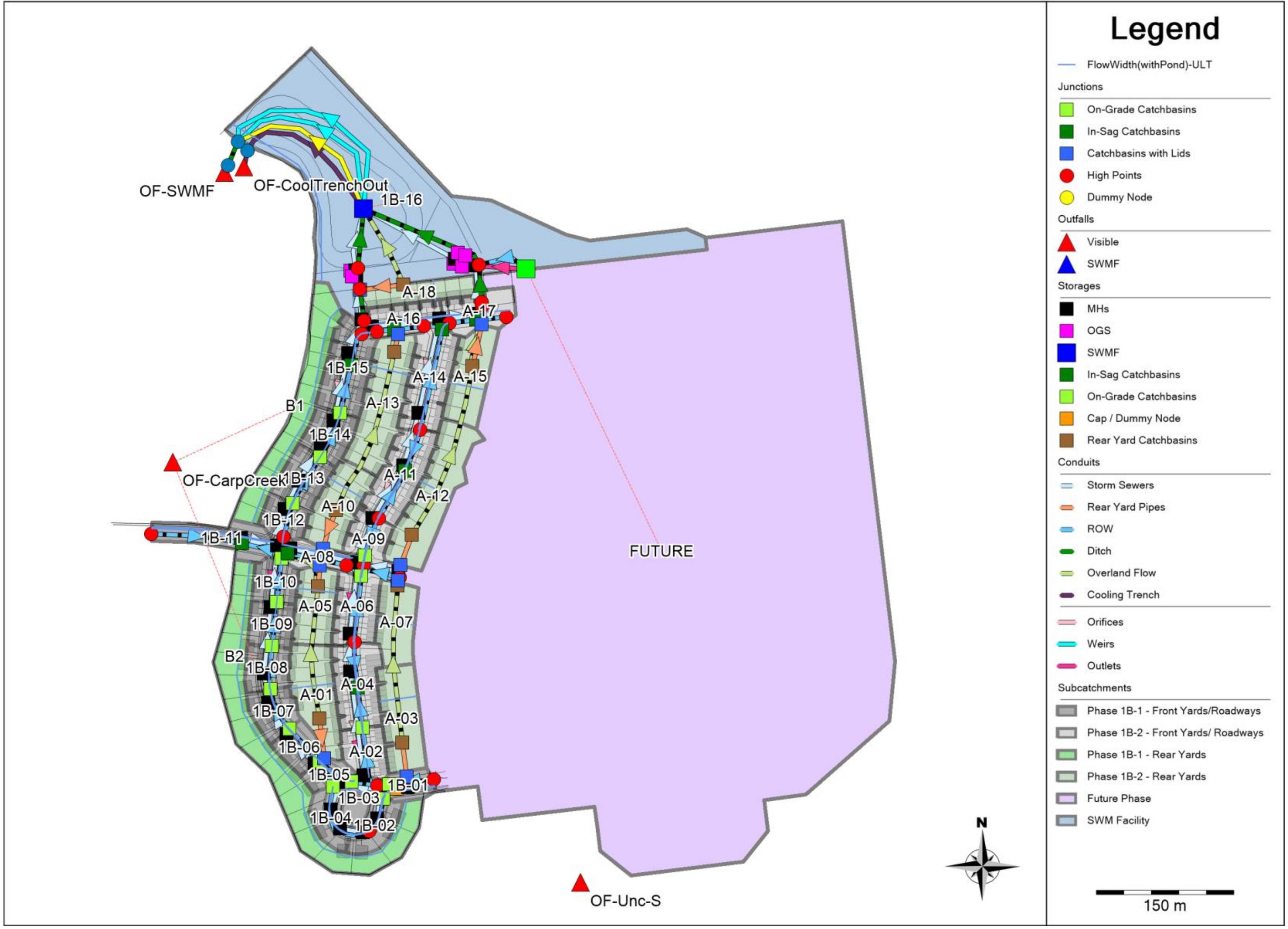
West Capital Airpark - Phase 1B-2 Residential (102085)
PCSWMM Model Schematics – Ultimate Conditions

NOVATECH
Engineers, Planners & Landscape Architects

Subcatchments, Flow Widths and Outfalls



Date: 2024-02-08
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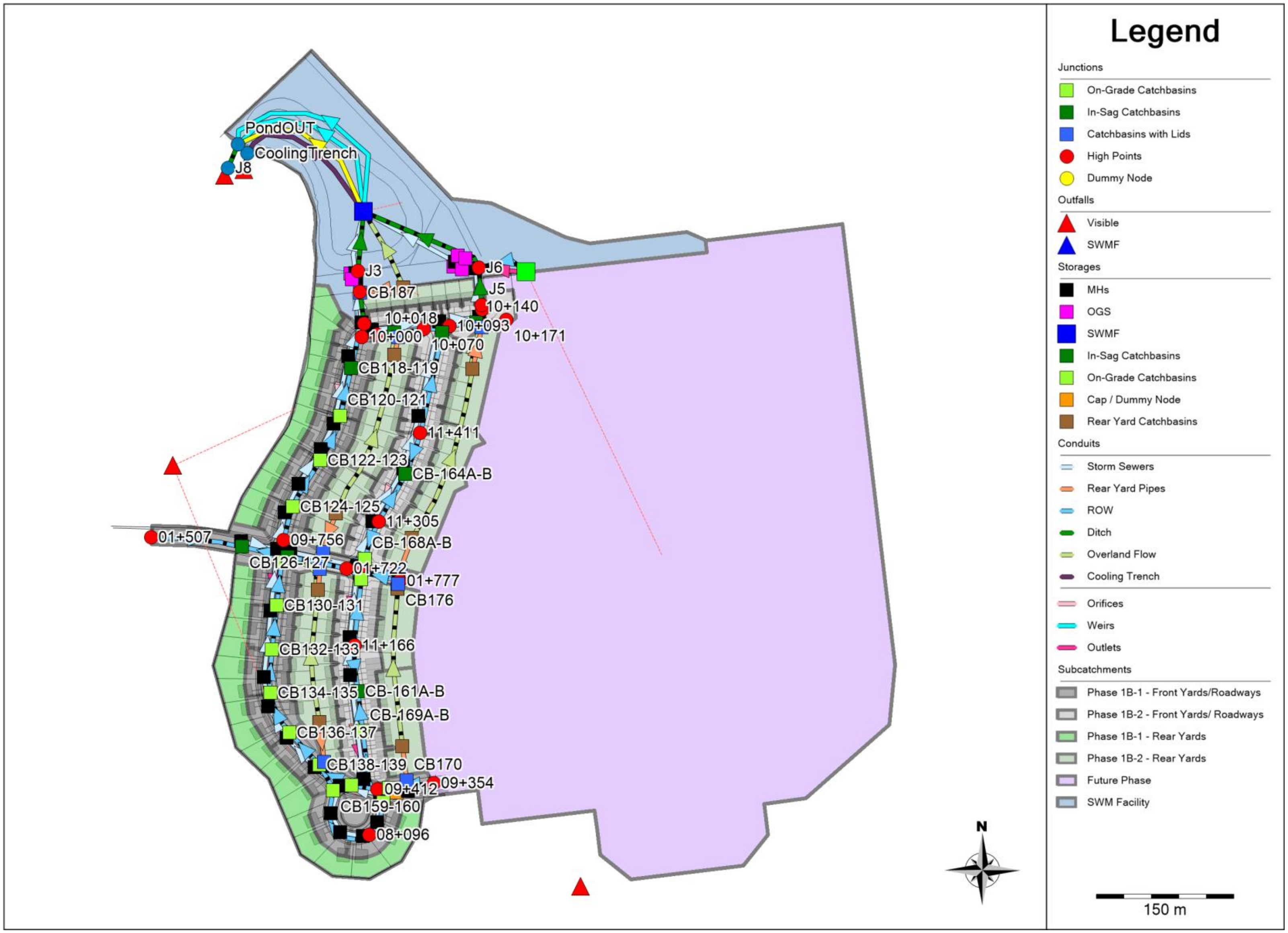
West Capital Airpark - Phase 1B-2 Residential (102085)
PCSWMM Model Schematics – Ultimate Conditions

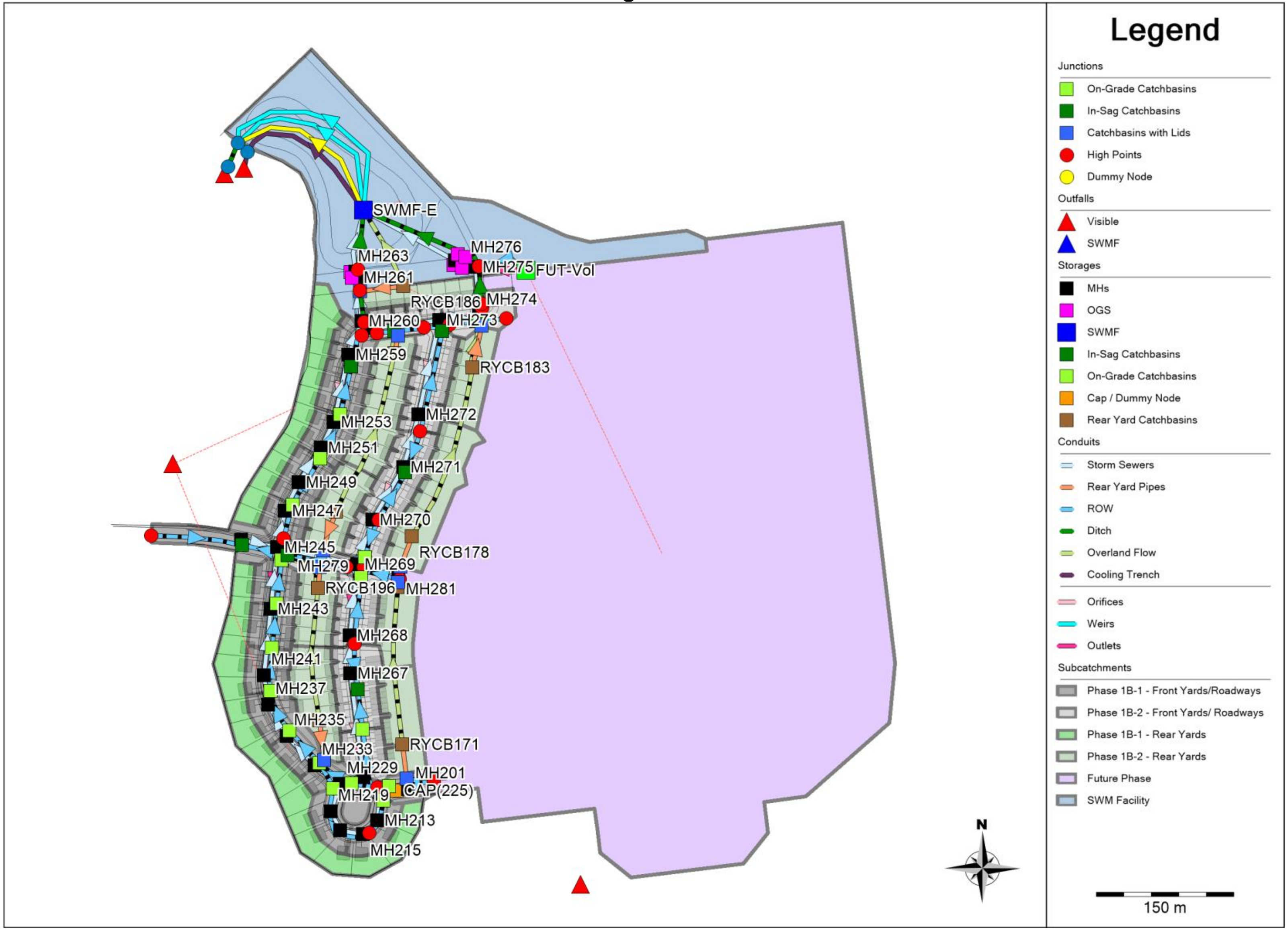
NOVATECH
Engineers, Planners & Landscape Architects

Junctions



West Capital Airpark - Phase 1B-2 Residential (102085)
PCSWMM Model Schematics – Ultimate Conditions

Storage Nodes



Date: 2024-02-08
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West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - ULTIMATE
(100-year, 4-hour Chicago Storm)

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------

EAST Carp Airport detailed design model, Phase 1B-1 & 1B-2
Phase 1 previously completed using SWMHYMO.
Including in PCSWMM model for HGL elevations, and to have a complete model of the entire development.

WARNING 04: minimum elevation drop used for Conduit CoolingTrench1
WARNING 04: minimum elevation drop used for Conduit CoolingTrench2
WARNING 04: minimum elevation drop used for Conduit Street1-E
WARNING 02: maximum depth increased for Node CB126-127
WARNING 02: maximum depth increased for Node CB-163A-B
WARNING 02: maximum depth increased for Node CB-166A-B

*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 37
Number of nodes ........... 118
Number of links ........... 167
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                    Data       Recording
Name                 Data Source                    Type       Interval
------------------------------------------------------------------------
Raingage             03-C100yr-4hr                  INTENSITY   10 min.


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Subcatchment Summary
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Name                       Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------------------
1B-01                      0.17    112.72     41.40    2.0000 Raingage             CB142-143



1B-02                      0.24    131.51     48.60    4.5000 Raingage             CB157-158
1B-03                      0.15     34.83     35.70    1.5000 Raingage             CB140-141
1B-04                      0.22    124.15     42.90    5.0000 Raingage             CB159-160
1B-05                      0.14     91.31     42.90    3.0000 Raingage             CB138-139
1B-06                      0.19     94.23     37.10    5.0000 Raingage             CB136-137
1B-07                      0.24     96.95     44.30    4.0000 Raingage             CB134-135
1B-08                      0.23     93.66     55.70    4.5000 Raingage             CB132-133
1B-09                      0.23     95.14     60.00    4.5000 Raingage             CB130-131
1B-10                      0.21     92.51     60.00    4.5000 Raingage             CB128-129
1B-11                      0.35    267.40     38.60    3.0000 Raingage             CB126-127
1B-12                      0.20     92.54     57.10    5.0000 Raingage             CB124-125
1B-13                      0.28    116.64     60.00    4.5000 Raingage             CB122-123
1B-14                      0.25    105.21     61.40    4.0000 Raingage             CB120-121
1B-15                      0.47    200.31     61.40    4.5000 Raingage             CB118-119
1B-16                      4.61    216.71      7.10    2.0000 Raingage             SWMF-E
A-01                       0.49     47.41     35.70    3.5000 Raingage             RYCB199
A-02                       0.24    109.06     67.10    4.0000 Raingage             CB-169A-B
A-03                       0.48     40.63     58.60    2.5000 Raingage             RYCB171
A-04                       0.45    186.04     70.00    4.5000 Raingage             CB-161A-B
A-05                       0.37     43.08     37.10    3.5000 Raingage             RYCB196
A-06                       0.38    139.55     72.90    4.0000 Raingage             CB-162A-B
A-07                       0.36     41.04     52.90    2.5000 Raingage             RYCB201
A-08                       0.20    151.34     52.90    2.0000 Raingage             CB-163A-B
A-09                       0.23    135.53     67.10    4.0000 Raingage             CB-168A-B
A-10                       0.43     42.55     40.00    4.0000 Raingage             RYCB193
A-11                       0.47    212.74     68.60    4.0000 Raingage             CB-164A-B
A-12                       0.69     37.57     38.60    3.0000 Raingage             RYCB178
A-13                       0.65     43.10     40.00    3.5000 Raingage             RYCB189
A-14                       0.51    241.58     68.60    4.0000 Raingage             CB-165A-B
A-15                       0.41     39.40     35.70    3.0000 Raingage             RYCB183
A-16                       0.24    173.73     65.70    4.0000 Raingage             CB-166A-B
A-17                       0.29    132.74     60.00    3.5000 Raingage             CB-167A-B
A-18                       0.27     21.34     35.70    3.5000 Raingage             RYCB186
B1                         0.70    257.13     17.10    4.0000 Raingage             OF-CarpCreek
B2                         1.26    470.50     14.30    3.5000 Raingage             OF-CarpCreek
FUTURE                    28.65   6446.00     64.30    2.0000 Raingage             FUT-Vol


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Node Summary
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West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - ULTIMATE
(100-year, 4-hour Chicago Storm)

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                                         Invert      Max.    Ponded    External
Name                 Type                 Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
01+507               JUNCTION            116.46      1.00       0.0
01+722               JUNCTION            116.72      1.00       0.0
01+777               JUNCTION            117.13      1.00       0.0
08+096               JUNCTION            117.98      1.00       0.0
09+354               JUNCTION            118.20      1.00       0.0
09+412               JUNCTION            117.90      1.00       0.0
09+756               JUNCTION            116.20      1.00       0.0
10+000               JUNCTION            115.39      1.00       0.0
10+018               JUNCTION            115.49      1.00       0.0
10+070               JUNCTION            115.77      1.00       0.0
10+093               JUNCTION            116.00      1.00       0.0
10+140               JUNCTION            115.86      1.00       0.0
10+171               JUNCTION            116.07      1.00       0.0
11+166               JUNCTION            117.32      1.00       0.0
11+251               JUNCTION            116.95      1.00       0.0
11+305               JUNCTION            116.95      1.00       0.0
11+411               JUNCTION            116.56      1.00       0.0
CB118-119            JUNCTION            113.33      2.86       0.0
CB120-121            JUNCTION            115.45      1.00       0.0
CB122-123            JUNCTION            115.71      1.00       0.0
CB124-125            JUNCTION            116.01      1.00       0.0
CB126-127            JUNCTION            113.97      3.00       0.0
CB128-129            JUNCTION            116.33      1.00       0.0
CB130-131            JUNCTION            116.56      1.00       0.0
CB132-133            JUNCTION            116.80      1.00       0.0
CB134-135            JUNCTION            117.04      1.00       0.0
CB136-137            JUNCTION            117.29      1.00       0.0
CB138-139            JUNCTION            117.53      1.00       0.0
CB140-141            JUNCTION            117.75      1.00       0.0
CB142-143            JUNCTION            117.96      1.00       0.0
CB157-158            JUNCTION            117.86      1.00       0.0
CB159-160            JUNCTION            117.57      1.00       0.0
CB-161A-B            JUNCTION            115.97      2.10       0.0
CB-162A-B            JUNCTION            116.72      1.00       0.0
CB-163A-B            JUNCTION            115.02      2.10       0.0
CB-164A-B            JUNCTION            115.23      2.10       0.0
CB-165A-B            JUNCTION            114.61      2.10       0.0
CB-166A-B            JUNCTION            114.27      2.10       0.0
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CB-167A-B            JUNCTION            114.75      2.10       0.0
CB-168A-B            JUNCTION            116.73      1.00       0.0
CB-169A-B            JUNCTION            117.38      1.00       0.0
CB170                JUNCTION            116.25      3.07       0.0
CB176                JUNCTION            115.65      2.71       0.0
CB177                JUNCTION            115.07      3.25       0.0
CB184                JUNCTION            115.00      2.12       0.0
CB187                JUNCTION            113.18      2.60       0.0
CB188                JUNCTION            114.31      2.28       0.0
CB194                JUNCTION            114.52      3.19       0.0
CB195                JUNCTION            115.62      2.20       0.0
CB200                JUNCTION            115.55      3.25       0.0
CoolingTrench        JUNCTION            109.24      3.47       0.0
J1                   JUNCTION            115.02      1.00       0.0
J2                   JUNCTION            114.65      1.00       0.0
J3                   JUNCTION            114.20      1.20       0.0
J4                   JUNCTION            115.95      1.00       0.0
J5                   JUNCTION            115.82      1.00       0.0
J6                   JUNCTION            114.93      1.00       0.0
J8                   JUNCTION            110.87      1.20       0.0
PondOUT              JUNCTION            111.00      1.71       0.0
OF-CarpCreek         OUTFALL               0.00      0.00       0.0
OF-CoolTrenchOut     OUTFALL             110.35      0.20       0.0
OF-SWMF              OUTFALL             110.85      1.20       0.0
OF-Unc-S             OUTFALL               0.00      0.00       0.0
CAP(225)             STORAGE             114.27      3.82       0.0
FUT-Vol              STORAGE             113.90      2.10       0.0
MH201                STORAGE             114.32      3.83       0.0
MH213                STORAGE             114.62      3.35       0.0
MH215                STORAGE             114.76      3.23       0.0
MH217                STORAGE             114.64      3.24       0.0
MH219                STORAGE             114.47      3.29       0.0
MH227                STORAGE             114.13      3.86       0.0
MH229                STORAGE             113.93      3.84       0.0
MH233                STORAGE             113.75      3.85       0.0
MH235                STORAGE             113.55      3.83       0.0
MH237                STORAGE             113.37      3.82       0.0
MH241                STORAGE             113.19      3.83       0.0
MH243                STORAGE             112.87      3.80       0.0
MH245                STORAGE             112.52      3.82       0.0
MH247                STORAGE             112.36      3.78       0.0
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MH249              STORAGE          112.19      3.77       0.0
MH251              STORAGE          111.98      3.76       0.0
MH253              STORAGE          111.79      3.83       0.0
MH259              STORAGE          111.54      3.81       0.0
MH260              STORAGE          111.39      4.18       0.0
MH261              STORAGE          111.22      3.25       0.0
MH263              STORAGE          111.19      3.20       0.0
MH265              STORAGE          111.12      3.27       0.0
MH266              STORAGE          115.02      2.87       0.0
MH267              STORAGE          114.34      2.95       0.0
MH267(1B)          STORAGE          113.38      2.68       0.0
MH268              STORAGE          114.14      3.25       0.0
MH269              STORAGE          113.20      3.77       0.0
MH270              STORAGE          113.02      4.05       0.0
MH271              STORAGE          112.81      3.68       0.0
MH272              STORAGE          112.65      3.92       0.0
MH273              STORAGE          112.36      3.68       0.0
MH274              STORAGE          112.25      3.77       0.0
MH275              STORAGE          111.61      3.50       0.0
MH276              STORAGE          111.52      3.79       0.0
MH277              STORAGE          111.46      3.83       0.0
MH278              STORAGE          111.42      3.81       0.0
MH279              STORAGE          113.89      2.33       0.0
MH280              STORAGE          112.92      2.79       0.0
MH281              STORAGE          114.97      2.36       0.0
MH-FUT             STORAGE          111.46      3.83       0.0
RYCB171            STORAGE          116.32      2.28       0.0
RYCB178            STORAGE          115.14      2.61       0.0
RYCB183            STORAGE          115.10      1.99       0.0
RYCB186            STORAGE          113.28      2.58       0.0
RYCB189            STORAGE          114.35      1.95       0.0
RYCB193            STORAGE          114.61      2.14       0.0
RYCB196            STORAGE          115.66      1.89       0.0
RYCB199            STORAGE          115.63      2.22       0.0
RYCB201            STORAGE          115.66      2.43       0.0
SWMF-E             STORAGE          109.24      3.71       0.0
Vortech-1929CIP-A  STORAGE          111.48      3.91       0.0
Vortech-1929CIP-B  STORAGE          111.48      3.91       0.0
Vortech-9000       STORAGE          111.20      3.27       0.0
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Link Summary
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Name             From Node        To Node          Type            Length    %Slope Roughness
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CAP-227          CAP(225)         MH227            CONDUIT           18.2    0.3846    0.0130
CoolingTrench1   SWMF-E           CoolingTrench    CONDUIT          355.0    0.0001    0.0130
CoolingTrench2   CoolingTrench    OF-CoolTrenchOut CONDUIT            9.5    0.0032    0.0130
Culvert          SWMF-E           PondOUT          CONDUIT           19.0    0.5263    0.0130
FUT-Maj          FUT-Vol          J6               CONDUIT           10.0    4.2037    0.0130
MH201-CAP        MH201            CAP(225)         CONDUIT           12.6    0.3968    0.0130
MH213-227        MH213            MH227            CONDUIT           30.6    0.3922    0.0130
MH215-213        MH215            MH213            CONDUIT           21.4    0.3738    0.0130
MH215-217        MH215            MH217            CONDUIT           25.0    0.4800    0.0130
MH217-219        MH217            MH219            CONDUIT           23.0    0.4348    0.0130
MH219-229        MH219            MH229            CONDUIT           31.0    0.5161    0.0130
MH227-229        MH227            MH229            CONDUIT           44.9    0.4009    0.0130
MH229-233        MH229            MH233            CONDUIT           33.6    0.4167    0.0130
MH233-235        MH233            MH235            CONDUIT           44.2    0.3846    0.0130
MH235-237        MH235            MH237            CONDUIT           39.3    0.4326    0.0130
MH237-241        MH237            MH241            CONDUIT           32.7    0.4587    0.0130
MH241-243        MH241            MH243            CONDUIT           72.4    0.3867    0.0130
MH243-245        MH243            MH245            CONDUIT           67.2    0.3869    0.0130
MH245-247        MH245            MH247            CONDUIT           40.3    0.2978    0.0130
MH247-249        MH247            MH249            CONDUIT           34.6    0.3757    0.0130
MH249-251        MH249            MH251            CONDUIT           44.7    0.3803    0.0130
MH251-253        MH251            MH253            CONDUIT           31.0    0.3548    0.0130
MH253-259        MH253            MH259            CONDUIT           74.9    0.3071    0.0130
MH259-260        MH259            MH260            CONDUIT           39.1    0.3069    0.0130
MH260-261        MH260            MH261            CONDUIT           47.7    0.3564    0.0130
MH261-OGS        MH261            Vortech-9000     CONDUIT            4.6    0.4348    0.0130
MH263-265        MH263            MH265            CONDUIT            5.4    0.3704    0.0130
MH265-HW2        MH265            SWMF-E           CONDUIT           21.1    0.4265    0.0130
MH266-267        MH266            MH267            CONDUIT          114.0    0.5702    0.0130
MH267(1B)-245    MH267(1B)        MH245            CONDUIT           40.1    0.9477    0.0130
MH267-268        MH267            MH268            CONDUIT           40.8    0.4167    0.0130
MH268-269        MH268            MH269            CONDUIT           78.2    0.3197    0.0130
MH269-270        MH269            MH270            CONDUIT           50.8    0.2559    0.0130
MH270-271        MH270            MH271            CONDUIT           66.4    0.2410    0.0130
MH271-272        MH271            MH272            CONDUIT           59.5    0.1849    0.0130
MH272-273        MH272            MH273            CONDUIT          104.9    0.1811    0.0130
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MH273-274        MH273            MH274            CONDUIT            43.4    0.2535    0.0130
MH274-275        MH274            MH275            CONDUIT            53.0    0.2453    0.0130
MH275-276        MH275            MH276            CONDUIT            15.9    0.3774    0.0130
MH276-OGSa       MH276            Vortech-1929CIP-A CONDUIT            4.4    0.4546    0.0130
MH276-OGSb       MH276            Vortech-1929CIP-B CONDUIT            4.4    0.4546    0.0130
MH277-278        MH277            MH278            CONDUIT             5.5    0.3636    0.0130
MH278-191        MH278            SWMF-E           CONDUIT            17.7    0.3390    0.0130
MH279-269        MH279            MH269            CONDUIT            74.2    0.2156    0.0130
MH280-273        MH280            MH273            CONDUIT            73.6    0.2446    0.0130
MH281-269        MH281            MH269            CONDUIT            45.5    0.7033    0.0130
MHFut-278        MH-FUT           MH278            CONDUIT             5.5    0.3636    0.0130
MS01             10+000           J1               CONDUIT             5.0    7.4203    0.0160
MS02             J1               J2               CONDUIT            34.9    1.0602    0.0350
MS03             J2               J3               CONDUIT            22.7    1.9828    0.0350
MS04             J3               SWMF-E           CONDUIT            19.0   16.8116    0.0350
MS05             J4               10+140           CONDUIT             5.0    1.8003    0.0130
MS06             J4               J5               CONDUIT             5.9    2.2039    0.0350
MS07             J5               J6               CONDUIT            54.6    1.6303    0.0350
MS08             J6               SWMF-E           CONDUIT            49.0    7.3051    0.0350
MS11             PondOUT          J8               CONDUIT            30.0    0.4333    0.0350
MS12             J8               OF-SWMF          CONDUIT             4.0    0.5000    0.0350
OGS-277          Vortech-1929CIP-A MH277            CONDUIT             2.0    0.5000    0.0130
OGS-MH263        Vortech-9000     MH263            CONDUIT             6.5    0.1550    0.0130
OGS-MHFut        Vortech-1929CIP-B MH-FUT           CONDUIT             2.0    0.5000    0.0130
OVF-RYCB171      RYCB171          RYCB201          CONDUIT           172.0    0.2965    0.0350
OVF-RYCB178      RYCB178          RYCB183          CONDUIT           197.0    0.3350    0.0350
OVF-RYCB183      RYCB183          CB-167A-B        CONDUIT            53.0    0.4528    0.0350
OVF-RYCB186      RYCB186          SWMF-E           CONDUIT            44.0    8.6917    0.0350
OVF-RYCB189      RYCB189          CB-166A-B        CONDUIT            25.0   -0.2800    0.0350
OVF-RYCB193      RYCB193          RYCB189          CONDUIT           185.0    0.2432    0.0350
OVF-RYCB196      RYCB196          CB-163A-B        CONDUIT            30.0    1.4335    0.0350
OVF-RYCB199      RYCB199          RYCB196          CONDUIT           145.0    0.2069    0.0350
OVF-RYCB201      RYCB201          01+777           CONDUIT            11.0   -0.3636    0.0350
RYCB171-CB170    RYCB171          CB170            CONDUIT            37.5    0.1867    0.0130
RYCB178-CB177    RYCB178          CB177            CONDUIT            35.2    0.1989    0.0130
RYCB183-CB184    RYCB183          CB184            CONDUIT            46.5    0.2151    0.0130
RYCB186-CB187    RYCB186          CB187            CONDUIT            47.4    0.2110    0.0130
RYCB189-CB188    RYCB189          CB188            CONDUIT            19.4    0.2062    0.0130
RYCB193-CB194    RYCB193          CB194            CONDUIT            44.2    0.2036    0.0130
RYCB196-CB195    RYCB196          CB195            CONDUIT            23.0    0.1739    0.0130
RYCB199-CB200    RYCB199          CB200            CONDUIT            43.4    0.1843    0.0130
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RYCB201-CB176    RYCB201          CB176            CONDUIT             3.7    0.2703    0.0130
Street10-A       10+018           10+000           CONDUIT            16.5    0.6061    0.0160
Street10-B       10+018           CB-166A-B        CONDUIT            19.3    0.6218    0.0160
Street10-C       10+070           CB-166A-B        CONDUIT            32.7    1.2233    0.0160
Street10-D       10+070           CB-165A-B        CONDUIT             5.0    1.2001    0.0160
Street10-E       10+093           CB-165A-B        CONDUIT            11.0    2.6373    0.0160
Street10-F       10+093           CB-167A-B        CONDUIT            29.7    0.5051    0.0160
Street10-G       10+140           CB-167A-B        CONDUIT             2.2    0.4546    0.0160
Street10-H       10+171           10+140           CONDUIT            30.3    0.6931    0.0160
Street11-A       09+412           CB-169A-B        CONDUIT            63.2    0.8228    0.0160
Street11-B       CB-169A-B        CB-161A-B        CONDUIT            43.9    0.7062    0.0160
Street11-C       11+166           CB-161A-B        CONDUIT            50.2    0.4980    0.0160
Street11-D       11+166           CB-162A-B        CONDUIT            74.4    0.8065    0.0160
Street11-E       11+251           CB-162A-B        CONDUIT             2.0   11.5768    0.0160
Street11-F       11+251           CB-168A-B        CONDUIT             2.0   11.0672    0.0160
Street11-G       CB-168A-B        01+722           CONDUIT             5.0    0.2000    0.0160
Street11-H       11+305           CB-168A-B        CONDUIT            43.7    0.5034    0.0160
Street11-I       11+305           CB-164A-B        CONDUIT            59.2    1.0474    0.0160
Street11-J       11+411           CB-164A-B        CONDUIT            47.5    0.4842    0.0160
Street11-K       11+411           CB-165A-B        CONDUIT           111.6    0.7617    0.0160
Street1-A        01+507           CB126-127        CONDUIT            99.3    0.4935    0.0160
Street1-B        09+756           CB126-127        CONDUIT            35.0    0.6572    0.0160
Street1-C        09+756           CB-163A-B        CONDUIT             7.0    1.1429    0.0160
Street1-D        01+722           CB-163A-B        CONDUIT            64.9    0.9245    0.0160
Street1-E        CB-162A-B        01+722           CONDUIT             5.0    0.0061    0.0160
Street1-F        01+777           CB-162A-B        CONDUIT            45.1    0.9091    0.0160
Street8-A        CB142-143        CB157-158        CONDUIT            10.0    1.0001    0.0160
Street8-B        08+096           CB157-158        CONDUIT            40.1    0.2993    0.0160
Street8-C        08+096           CB159-160        CONDUIT            85.5    0.4795    0.0160
Street8-D        CB159-160        CB138-139        CONDUIT            15.0    0.2667    0.0160
Street9-A        10+000           CB118-119        CONDUIT            37.1    0.5391    0.0160
Street9-B        CB120-121        CB118-119        CONDUIT            53.2    0.4887    0.0160
Street9-C        CB122-123        CB120-121        CONDUIT            53.2    0.4887    0.0160
Street9-D        CB124-125        CB122-123        CONDUIT            58.8    0.5102    0.0160
Street9-E        09+756           CB124-125        CONDUIT            37.5    0.5067    0.0160
Street9-F        CB128-129        09+756           CONDUIT            23.8    0.5462    0.0160
Street9-G        CB130-131        CB128-129        CONDUIT            47.7    0.4822    0.0160
Street9-H        CB132-133        CB130-131        CONDUIT            48.2    0.4979    0.0160
Street9-I        CB134-135        CB132-133        CONDUIT            47.1    0.5096    0.0160
Street9-J        CB136-137        CB134-135        CONDUIT            48.3    0.5176    0.0160
Street9-K        CB138-139        CB136-137        CONDUIT            47.8    0.5021    0.0160
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  Street9-L        CB140-141        CB138-139        CONDUIT           41.9    0.5251    0.0160
  Street9-M        09+412           CB140-141        CONDUIT           28.2    0.5319    0.0160
  Street9-N        CB142-143        09+412           CONDUIT           12.8    0.4688    0.0160
  Street9-O        09+354           CB142-143        CONDUIT           49.1    0.4888    0.0160
  OCB118           CB118-119        MH253            ORIFICE
  OCB119           CB118-119        MH253            ORIFICE
  OCB126-127       CB126-127        MH267(1B)        ORIFICE
  OCB161A          CB-161A-B        MH266            ORIFICE
  OCB161B          CB-161A-B        MH266            ORIFICE
  OCB163A          CB-163A-B        MH279            ORIFICE
  OCB163B          CB-163A-B        MH279            ORIFICE
  OCB164A          CB-164A-B        MH270            ORIFICE
  OCB164B          CB-164A-B        MH270            ORIFICE
  OCB165A          CB-165A-B        MH272            ORIFICE
  OCB165B          CB-165A-B        MH272            ORIFICE
  OCB166A          CB-166A-B        MH280            ORIFICE
  OCB166B          CB-166A-B        MH280            ORIFICE
  OCB167A          CB-167A-B        MH274            ORIFICE
  OCB167B          CB-167A-B        MH274            ORIFICE
  ORYCB171         CB170            MH201            ORIFICE
  ORYCB178         CB177            MH281            ORIFICE
  ORYCB183         CB184            MH274            ORIFICE
  ORYCB186         CB187            MH260            ORIFICE
  ORYCB189         CB188            MH280            ORIFICE
  ORYCB193         CB194            MH279            ORIFICE
  ORYCB196         CB195            MH279            ORIFICE
  ORYCB199         CB200            MH229            ORIFICE
  ORYCB201         CB176            MH281            ORIFICE
  MH261-265        MH261            MH265            WEIR
  MH276-278        MH276            MH278            WEIR
  W1               SWMF-E           PondOUT          WEIR
  W2               SWMF-E           PondOUT          WEIR
  OCB120-121       CB120-121        MH253            OUTLET
  OCB122-123       CB122-123        MH249            OUTLET
  OCB124-125       CB124-125        MH247            OUTLET
  OCB128-129       CB128-129        MH243            OUTLET
  OCB130-131       CB130-131        MH243            OUTLET
  OCB132-133       CB132-133        MH241            OUTLET
  OCB134-135       CB134-135        MH237            OUTLET
  OCB136-137       CB136-137        MH235            OUTLET
  OCB138-139       CB138-139        MH233            OUTLET
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  OCB140-141       CB140-141        MH227            OUTLET
  OCB142-143       CB142-143        CAP(225)         OUTLET
  OCB157-158       CB157-158        MH213            OUTLET
  OCB159-160       CB159-160        MH219            OUTLET
  OCB162           CB-162A-B        MH268            OUTLET
  OCB168           CB-168A-B        MH269            OUTLET
  OCB169           CB-169A-B        MH266            OUTLET
  O-FUT            FUT-Vol          MH275            OUTLET


  *********************
  Cross Section Summary
  *********************
                                        Full     Full     Hyd.     Max.   No. of     Full
  Conduit          Shape               Depth     Area     Rad.    Width  Barrels     Flow
  ---------------------------------------------------------------------------------------
  CAP-227          CIRCULAR             0.61     0.29     0.15     0.61        1   397.98
  CoolingTrench1   CIRCULAR             0.20     0.03     0.05     0.20        1     0.30
  CoolingTrench2   CIRCULAR             0.20     0.03     0.05     0.20        1     1.86
  Culvert          CIRCULAR             0.30     0.07     0.07     0.30        1    70.16
  FUT-Maj          RECT_OPEN            1.00     3.00     0.60     3.00        1 33660.55
  MH201-CAP        CIRCULAR             0.61     0.29     0.15     0.61        1   404.25
  MH213-227        CIRCULAR             0.30     0.07     0.08     0.30        1    63.29
  MH215-213        CIRCULAR             0.25     0.05     0.06     0.25        1    37.93
  MH215-217        CIRCULAR             0.25     0.05     0.06     0.25        1    42.98
  MH217-219        CIRCULAR             0.25     0.05     0.06     0.25        1    40.91
  MH219-229        CIRCULAR             0.30     0.07     0.08     0.30        1    72.61
  MH227-229        CIRCULAR             0.69     0.37     0.17     0.69        1   555.71
  MH229-233        CIRCULAR             0.69     0.37     0.17     0.69        1   566.53
  MH233-235        CIRCULAR             0.69     0.37     0.17     0.69        1   544.31
  MH235-237        CIRCULAR             0.69     0.37     0.17     0.69        1   577.25
  MH237-241        CIRCULAR             0.69     0.37     0.17     0.69        1   594.43
  MH241-243        CIRCULAR             0.69     0.37     0.17     0.69        1   545.81
  MH243-245        CIRCULAR             0.69     0.37     0.17     0.69        1   545.93
  MH245-247        CIRCULAR             0.76     0.46     0.19     0.76        1   633.80
  MH247-249        CIRCULAR             0.76     0.46     0.19     0.76        1   711.95
  MH249-251        CIRCULAR             0.76     0.46     0.19     0.76        1   716.28
  MH251-253        CIRCULAR             0.76     0.46     0.19     0.76        1   691.88
  MH253-259        CIRCULAR             0.84     0.55     0.21     0.84        1   829.36
  MH259-260        CIRCULAR             0.84     0.55     0.21     0.84        1   829.12
  MH260-261        CIRCULAR             0.84     0.55     0.21     0.84        1   893.48
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  MH261-OGS        CIRCULAR             0.53     0.22     0.13     0.53        1   295.26
  MH263-265        CIRCULAR             0.53     0.22     0.13     0.53        1   272.52
  MH265-HW2        CIRCULAR             0.84     0.55     0.21     0.84        1   977.46
  MH266-267        CIRCULAR             0.38     0.11     0.10     0.38        1   138.13
  MH267(1B)-245    CIRCULAR             0.25     0.05     0.06     0.25        1    60.40
  MH267-268        CIRCULAR             0.46     0.16     0.11     0.46        1   191.78
  MH268-269        CIRCULAR             0.53     0.22     0.13     0.53        1   253.19
  MH269-270        CIRCULAR             0.69     0.37     0.17     0.69        1   443.99
  MH270-271        CIRCULAR             0.69     0.37     0.17     0.69        1   430.83
  MH271-272        CIRCULAR             0.76     0.46     0.19     0.76        1   499.40
  MH272-273        CIRCULAR             0.76     0.46     0.19     0.76        1   494.31
  MH273-274        CIRCULAR             0.91     0.66     0.23     0.91        1   949.75
  MH274-275        CIRCULAR             0.91     0.66     0.23     0.91        1   934.31
  MH275-276        CIRCULAR             1.65     2.14     0.41     1.65        1  5608.37
  MH276-OGSa       CIRCULAR             1.07     0.89     0.27     1.07        1  1921.74
  MH276-OGSb       CIRCULAR             1.07     0.89     0.27     1.07        1  1921.74
  MH277-278        CIRCULAR             1.07     0.89     0.27     1.07        1  1718.86
  MH278-191        CIRCULAR             1.65     2.14     0.41     1.65        1  5315.55
  MH279-269        CIRCULAR             0.46     0.16     0.11     0.46        1   137.96
  MH280-273        CIRCULAR             0.53     0.22     0.13     0.53        1   221.45
  MH281-269        CIRCULAR             0.38     0.11     0.10     0.38        1   153.41
  MHFut-278        CIRCULAR             1.07     0.89     0.27     1.07        1  1718.86
  MS01             RECT_OPEN            1.00     3.00     0.60     3.00        1 36336.27
  MS02             TRAPEZOIDAL          1.00     4.00     0.55     7.00        1  7862.69
  MS03             TRAPEZOIDAL          1.00     4.00     0.55     7.00        1 10752.43
  MS04             TRIANGULAR           1.20     3.60     0.56     6.00        1 28554.86
  MS05             RECT_OPEN            1.00     3.00     0.60     3.00        1 22028.06
  MS06             TRAPEZOIDAL          1.00     4.00     0.55     7.00        1 11336.24
  MS07             TRAPEZOIDAL          1.00     4.00     0.55     7.00        1  9749.85
  MS08             TRAPEZOIDAL          1.00     4.50     0.58     7.50        1 24033.65
  MS11             TRIANGULAR           1.20     3.60     0.56     6.00        1  4584.46
  MS12             TRIANGULAR           1.20     3.60     0.56     6.00        1  4924.51
  OGS-277          CIRCULAR             1.07     0.89     0.27     1.07        1  2015.54
  OGS-MH263        CIRCULAR             0.53     0.22     0.13     0.53        1   176.32
  OGS-MHFut        CIRCULAR             1.07     0.89     0.27     1.07        1  2015.54
  OVF-RYCB171      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1  2838.98
  OVF-RYCB178      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1  3017.73
  OVF-RYCB183      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1  3508.41
  OVF-RYCB186      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1 15370.69
  OVF-RYCB189      TRAPEZOIDAL          1.00     7.00     0.68    10.00        1  8168.09
  OVF-RYCB193      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1  2571.35
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  OVF-RYCB196      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1  6242.18
  OVF-RYCB199      TRAPEZOIDAL          1.00     3.00     0.47     6.00        1  2371.47
  OVF-RYCB201      TRAPEZOIDAL          1.00     3.50     0.51     6.50        1  3863.88
  RYCB171-CB170    CIRCULAR             0.25     0.05     0.06     0.25        1    26.81
  RYCB178-CB177    CIRCULAR             0.25     0.05     0.06     0.25        1    27.67
  RYCB183-CB184    CIRCULAR             0.25     0.05     0.06     0.25        1    28.77
  RYCB186-CB187    CIRCULAR             0.25     0.05     0.06     0.25        1    28.50
  RYCB189-CB188    CIRCULAR             0.25     0.05     0.06     0.25        1    28.17
  RYCB193-CB194    CIRCULAR             0.25     0.05     0.06     0.25        1    28.00
  RYCB196-CB195    CIRCULAR             0.25     0.05     0.06     0.25        1    25.87
  RYCB199-CB200    CIRCULAR             0.25     0.05     0.06     0.25        1    26.64
  RYCB201-CB176    CIRCULAR             0.25     0.05     0.06     0.25        1    32.25
  Street10-A       20mROW               1.00    16.85     0.50    20.00        1 51519.37
  Street10-B       20mROW               1.00    16.85     0.50    20.00        1 52182.47
  Street10-C       20mROW               1.00    16.85     0.50    20.00        1 73194.91
  Street10-D       20mROW               1.00    16.85     0.50    20.00        1 72496.12
  Street10-E       20mROW               1.00    16.85     0.50    20.00        1 107469.85
  Street10-F       20mROW               1.00    16.85     0.50    20.00        1 47030.40
  Street10-G       20mROW               1.00    16.85     0.50    20.00        1 44616.90
  Street10-H       20mROW               1.00    16.85     0.50    20.00        1 55093.71
  Street11-A       18mROW               1.00    15.30     0.53    18.00        1 56690.64
  Street11-B       18mROW               1.00    15.30     0.53    18.00        1 52518.81
  Street11-C       18mROW               1.00    15.30     0.53    18.00        1 44104.38
  Street11-D       18mROW               1.00    15.30     0.53    18.00        1 56125.09
  Street11-E       18mROW               1.00    15.30     0.53    18.00        1 212645.03
  Street11-F       18mROW               1.00    15.30     0.53    18.00        1 207911.71
  Street11-G       18mROW               1.00    15.30     0.53    18.00        1 27949.64
  Street11-H       18mROW               1.00    15.30     0.53    18.00        1 44343.93
  Street11-I       18mROW               1.00    15.30     0.53    18.00        1 63959.90
  Street11-J       18mROW               1.00    15.30     0.53    18.00        1 43489.11
  Street11-K       18mROW               1.00    15.30     0.53    18.00        1 54543.69
  Street1-A        20mROW               1.00    16.85     0.50    20.00        1 46487.32
  Street1-B        20mROW               1.00    16.85     0.50    20.00        1 53646.71
  Street1-C        20mROW               1.00    16.85     0.50    20.00        1 70748.73
  Street1-D        20mROW               1.00    16.85     0.50    20.00        1 63631.34
  Street1-E        20mROW               1.00    16.85     0.50    20.00        1  5166.91
  Street1-F        20mROW               1.00    16.85     0.50    20.00        1 63098.80
  Street8-A        18mROW               1.00    15.30     0.53    18.00        1 62498.80
  Street8-B        18mROW               1.00    15.30     0.53    18.00        1 34188.52
  Street8-C        18mROW               1.00    15.30     0.53    18.00        1 43278.50
  Street8-D        18mROW               1.00    15.30     0.53    18.00        1 32273.49
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Street9-A        20mROW              1.00    16.85     0.50    20.00        1 48589.19
Street9-B        20mROW              1.00    16.85     0.50    20.00        1 46263.87
Street9-C        20mROW              1.00    16.85     0.50    20.00        1 46263.87
Street9-D        20mROW              1.00    16.85     0.50    20.00        1 47269.75
Street9-E        20mROW              1.00    16.85     0.50    20.00        1 47105.59
Street9-F        20mROW              1.00    16.85     0.50    20.00        1 48909.69
Street9-G        20mROW              1.00    16.85     0.50    20.00        1 45953.20
Street9-H        20mROW              1.00    16.85     0.50    20.00        1 46697.46
Street9-I        20mROW              1.00    16.85     0.50    20.00        1 47239.63
Street9-J        20mROW              1.00    16.85     0.50    20.00        1 47611.06
Street9-K        20mROW              1.00    16.85     0.50    20.00        1 46892.45
Street9-L        20mROW              1.00    16.85     0.50    20.00        1 47953.00
Street9-M        20mROW              1.00    16.85     0.50    20.00        1 48265.04
Street9-N        20mROW              1.00    16.85     0.50    20.00        1 45308.69
Street9-O        20mROW              1.00    16.85     0.50    20.00        1 46267.49


****************
Transect Summary
****************

Transect 18mROW
Area:
            0.0009     0.0034     0.0077     0.0137     0.0214
            0.0308     0.0417     0.0530     0.0657     0.0801
            0.0962     0.1139     0.1333     0.1543     0.1770
            0.2005     0.2240     0.2475     0.2710     0.2945
            0.3180     0.3415     0.3650     0.3885     0.4120
            0.4356     0.4591     0.4826     0.5061     0.5296
            0.5531     0.5766     0.6001     0.6237     0.6472
            0.6707     0.6942     0.7177     0.7412     0.7648
            0.7883     0.8118     0.8353     0.8588     0.8824
            0.9059     0.9294     0.9529     0.9765     1.0000
Hrad:
            0.0183     0.0366     0.0550     0.0733     0.0916
            0.1099     0.1371     0.1723     0.2020     0.2263
            0.2467     0.2639     0.2788     0.2920     0.3037
            0.3187     0.3354     0.3530     0.3715     0.3905
            0.4099     0.4295     0.4495     0.4695     0.4898
            0.5101     0.5305     0.5509     0.5714     0.5919
```

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            0.6125     0.6330     0.6536     0.6741     0.6946
            0.7152     0.7357     0.7562     0.7766     0.7971
            0.8175     0.8379     0.8583     0.8786     0.8989
            0.9192     0.9394     0.9597     0.9798     1.0000
Width:
            0.0726     0.1453     0.2179     0.2905     0.3631
            0.4358     0.4721     0.5073     0.5776     0.6478
            0.7180     0.7882     0.8584     0.9287     0.9989
            0.9989     0.9990     0.9990     0.9990     0.9990
            0.9991     0.9991     0.9991     0.9992     0.9992
            0.9992     0.9993     0.9993     0.9993     0.9994
            0.9994     0.9994     0.9995     0.9995     0.9995
            0.9996     0.9996     0.9996     0.9997     0.9997
            0.9997     0.9997     0.9998     0.9998     0.9998
            0.9999     0.9999     0.9999     1.0000     1.0000

Transect 20mROW
Area:
            0.0008     0.0031     0.0070     0.0124     0.0194
            0.0279     0.0378     0.0481     0.0600     0.0738
            0.0893     0.1067     0.1258     0.1468     0.1696
            0.1933     0.2170     0.2408     0.2645     0.2882
            0.3119     0.3356     0.3593     0.3831     0.4068
            0.4305     0.4542     0.4779     0.5017     0.5254
            0.5491     0.5728     0.5966     0.6203     0.6440
            0.6677     0.6915     0.7152     0.7389     0.7627
            0.7864     0.8101     0.8339     0.8576     0.8813
            0.9051     0.9288     0.9525     0.9763     1.0000
Hrad:
            0.0194     0.0389     0.0583     0.0777     0.0972
            0.1166     0.1454     0.1826     0.2126     0.2360
            0.2548     0.2701     0.2830     0.2941     0.3039
            0.3179     0.3339     0.3511     0.3692     0.3880
            0.4072     0.4268     0.4467     0.4667     0.4870
            0.5073     0.5278     0.5483     0.5688     0.5894
            0.6101     0.6307     0.6514     0.6720     0.6927
            0.7133     0.7339     0.7546     0.7752     0.7957
            0.8163     0.8368     0.8573     0.8778     0.8982
            0.9186     0.9390     0.9594     0.9797     1.0000
Width:
            0.0654     0.1307     0.1961     0.2615     0.3268
```

```
            0.3922     0.4249     0.4633     0.5398     0.6163
            0.6929     0.7694     0.8459     0.9225     0.9990
            0.9990     0.9991     0.9991     0.9991     0.9991
            0.9992     0.9992     0.9992     0.9993     0.9993
            0.9993     0.9993     0.9994     0.9994     0.9994
            0.9995     0.9995     0.9995     0.9995     0.9996
            0.9996     0.9996     0.9997     0.9997     0.9997
            0.9997     0.9998     0.9998     0.9998     0.9999
            0.9999     0.9999     0.9999     1.0000     1.0000


  *********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  *********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... LPS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ...... HORTON
  Flow Routing Method ...... DYNWAVE
  Surcharge Method ......... EXTRAN
  Starting Date ............ 07/21/2022 00:00:00
  Ending Date .............. 07/22/2022 00:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:01:00
  Wet Time Step ............ 00:01:00
  Dry Time Step ............ 00:01:00
  Routing Time Step ........ 1.00 sec
  Variable Time Step ....... YES
  Maximum Trials ........... 8
```

```
  Number of Threads ........ 4
  Head Tolerance ........... 0.001500 m


  **************************        Volume         Depth
  Runoff Quantity Continuity     hectare-m            mm
  **************************     ---------       -------
  Total Precipitation ......         3.492        76.002
  Evaporation Loss .........         0.000         0.000
  Infiltration Loss ........         1.081        23.517
  Surface Runoff ...........         2.392        52.064
  Final Storage ............         0.022         0.478
  Continuity Error (%) .....        -0.077


  **************************        Volume        Volume
  Flow Routing Continuity        hectare-m      10^6 ltr
  **************************     ---------     ---------
  Dry Weather Inflow .......         0.000         0.000
  Wet Weather Inflow .......         2.392        23.924
  Groundwater Inflow .......         0.000         0.000
  RDII Inflow ..............         0.000         0.000
  External Inflow ..........         0.000         0.000
  External Outflow .........         2.206        22.062
  Flooding Loss ............         0.000         0.000
  Evaporation Loss .........         0.000         0.000
  Exfiltration Loss ........         0.000         0.000
  Initial Stored Volume ....         0.406         4.063
  Final Stored Volume ......         0.595         5.948
  Continuity Error (%) .....        -0.081


  *************************
  Highest Continuity Errors
  *************************
  Node MH217 (1.90%)
  Node MH261 (1.88%)
  Node 01+722 (-1.68%)
  Node CB126-127 (1.59%)
  Node CB-169A-B (-1.59%)
```

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - ULTIMATE
(100-year, 4-hour Chicago Storm)

```
  ***************************
  Time-Step Critical Elements
  ***************************
  Link OGS-277 (4.57%)
  Link OGS-MHFut (3.68%)
  Link MH276-OGSb (2.76%)


  ********************************
  Highest Flow Instability Indexes
  ********************************
  Link O-FUT (22)
  Link MH261-265 (15)
  Link OGS-MHFut (13)
  Link MH276-OGSb (13)
  Link MHFut-278 (13)


  *************************
  Routing Time Step Summary
  *************************
  Minimum Time Step           :     0.19 sec
  Average Time Step           :     0.95 sec
  Maximum Time Step           :     1.00 sec
  Percent in Steady State     :    -0.00
  Average Iterations per Step :     3.69
  Percent Not Converging      :    10.16
  Time Step Frequencies       :
      1.000 -  0.871 sec      :    88.72 %
      0.871 -  0.758 sec      :     0.82 %
      0.758 -  0.660 sec      :     0.95 %
      0.660 -  0.574 sec      :     2.49 %
      0.574 -  0.500 sec      :     7.02 %


  ***************************
  Subcatchment Runoff Summary
  ***************************

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

```
                            Total      Total      Total      Total     Imperv       Perv      Total       Total
Peak  Runoff
                           Precip     Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff
Runoff   Coeff
  Subcatchment                 mm         mm         mm         mm         mm         mm         mm    10^6 ltr
LPS
  ---------------------------------------------------------------------------------------------------------------------
-------------
  1B-01                     76.00       0.00       0.00      28.05      30.86      16.52      47.38        0.08
71.39   0.623
  1B-02                     76.00       0.00       0.00      24.48      36.46      14.63      51.09        0.12
106.65   0.672
  1B-03                     76.00       0.00       0.00      32.07      26.60      16.81      43.42        0.07
45.57   0.571
  1B-04                     76.00       0.00       0.00      27.20      32.18      16.24      48.42        0.11
96.30   0.637
  1B-05                     76.00       0.00       0.00      27.24      32.12      16.20      48.31        0.07
60.61   0.636
  1B-06                     76.00       0.00       0.00      30.06      27.86      17.79      45.65        0.09
79.84   0.601
  1B-07                     76.00       0.00       0.00      26.71      33.30      15.65      48.96        0.12
100.31   0.644
  1B-08                     76.00       0.00       0.00      21.14      41.87      12.56      54.43        0.13
102.70   0.716
  1B-09                     76.00       0.00       0.00      19.05      45.10      11.37      56.48        0.13
104.64   0.743
  1B-10                     76.00       0.00       0.00      19.04      45.06      11.39      56.45        0.12
95.91   0.743
  1B-11                     76.00       0.00       0.00      29.26      28.77      17.45      46.23        0.16
151.28   0.608
  1B-12                     76.00       0.00       0.00      20.41      42.88      12.23      55.11        0.11
90.95   0.725
  1B-13                     76.00       0.00       0.00      19.05      45.06      11.38      56.43        0.16
127.45   0.743
  1B-14                     76.00       0.00       0.00      18.39      46.11      10.98      57.08        0.14
114.06   0.751
  1B-15                     76.00       0.00       0.00      18.37      46.16      10.99      57.15        0.27
215.33   0.752
  1B-16                     76.00       0.00       0.00      53.68       5.29      16.93      22.22        1.02
347.10   0.292
  A-01                      76.00       0.00       0.00      32.93      27.16      15.95      43.10        0.21
132.09   0.567
  A-02                      76.00       0.00       0.00      15.63      50.44       9.40      59.84        0.14
112.96   0.787
```

```
  A-03                       76.00       0.00       0.00      21.00      44.57      10.47      55.04        0.26
169.18   0.724
  A-04                       76.00       0.00       0.00      14.24      52.67       8.58      61.25        0.28
211.65   0.806
  A-05                       76.00       0.00       0.00      31.78      28.23      16.04      44.27        0.16
106.07   0.582
  A-06                       76.00       0.00       0.00      12.88      54.73       7.74      62.48        0.24
177.90   0.822
  A-07                       76.00       0.00       0.00      23.66      40.24      12.15      52.38        0.19
123.78   0.689
  A-08                       76.00       0.00       0.00      22.43      39.44      13.40      52.83        0.11
91.85   0.695
  A-09                       76.00       0.00       0.00      15.59      50.34       9.45      59.78        0.14
106.37   0.787
  A-10                       76.00       0.00       0.00      30.41      30.43      15.20      45.63        0.20
126.61   0.600
  A-11                       76.00       0.00       0.00      14.91      51.51       8.98      60.49        0.28
218.12   0.796
  A-12                       76.00       0.00       0.00      32.94      29.36      13.73      43.08        0.30
168.65   0.567
  A-13                       76.00       0.00       0.00      31.41      30.42      14.19      44.62        0.29
172.48   0.587
  A-14                       76.00       0.00       0.00      14.90      51.51       8.99      60.50        0.31
239.49   0.796
  A-15                       76.00       0.00       0.00      33.12      27.16      15.75      42.91        0.18
108.23   0.565
  A-16                       76.00       0.00       0.00      16.23      49.34       9.87      59.21        0.14
112.56   0.779
  A-17                       76.00       0.00       0.00      19.06      44.87      11.37      56.24        0.16
130.89   0.740
  A-18                       76.00       0.00       0.00      33.42      27.16      15.45      42.61        0.12
69.56   0.561
  B1                         76.00       0.00       0.00      40.23      13.01      22.81      35.82        0.25
230.03   0.471
  B2                         76.00       0.00       0.00      41.70      10.88      23.47      34.35        0.43
394.40   0.452
  FUTURE                     76.00       0.00       0.00      17.32      48.31       9.82      58.14       16.66
12152.47   0.765


  ******************
  Node Depth Summary
  ******************
```

```
  ---------------------------------------------------------------------------------
                                 Average  Maximum  Maximum  Time of Max    Reported
                                   Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type       Meters   Meters   Meters  days hr:min      Meters
  ---------------------------------------------------------------------------------
  01+507               JUNCTION     0.00     0.00   116.46     0  00:00        0.00
  01+722               JUNCTION     0.00     0.09   116.81     0  01:30        0.09
  01+777               JUNCTION     0.00     0.07   117.20     0  01:31        0.07
  08+096               JUNCTION     0.00     0.05   118.03     0  01:31        0.05
  09+354               JUNCTION     0.00     0.00   118.20     0  00:00        0.00
  09+412               JUNCTION     0.00     0.05   117.95     0  01:30        0.05
  09+756               JUNCTION     0.00     0.12   116.32     0  01:31        0.12
  10+000               JUNCTION     0.00     0.07   115.46     0  01:32        0.07
  10+018               JUNCTION     0.00     0.10   115.59     0  01:31        0.10
  10+070               JUNCTION     0.00     0.07   115.84     0  01:30        0.07
  10+093               JUNCTION     0.00     0.04   116.04     0  01:31        0.04
  10+140               JUNCTION     0.00     0.19   116.05     0  01:30        0.19
  10+171               JUNCTION     0.00     0.00   116.07     0  00:00        0.00
  11+166               JUNCTION     0.00     0.03   117.35     0  01:32        0.03
  11+251               JUNCTION     0.00     0.00   116.95     0  00:00        0.00
  11+305               JUNCTION     0.00     0.00   116.95     0  00:00        0.00
  11+411               JUNCTION     0.00     0.01   116.57     0  01:33        0.01
  CB118-119            JUNCTION     0.08     2.17   115.50     0  01:32        2.17
  CB120-121            JUNCTION     0.00     0.13   115.58     0  01:31        0.13
  CB122-123            JUNCTION     0.00     0.13   115.84     0  01:30        0.13
  CB124-125            JUNCTION     0.00     0.12   116.13     0  01:31        0.12
  CB126-127            JUNCTION     0.13     2.35   116.32     0  01:35        2.35
  CB128-129            JUNCTION     0.00     0.12   116.45     0  01:30        0.12
  CB130-131            JUNCTION     0.00     0.12   116.68     0  01:30        0.12
  CB132-133            JUNCTION     0.00     0.11   116.91     0  01:30        0.11
  CB134-135            JUNCTION     0.00     0.10   117.14     0  01:30        0.10
  CB136-137            JUNCTION     0.00     0.09   117.38     0  01:30        0.09
  CB138-139            JUNCTION     0.00     0.08   117.61     0  01:30        0.08
  CB140-141            JUNCTION     0.00     0.06   117.81     0  01:30        0.06
  CB142-143            JUNCTION     0.00     0.07   118.03     0  01:30        0.07
  CB157-158            JUNCTION     0.00     0.17   118.03     0  01:30        0.17
  CB159-160            JUNCTION     0.00     0.08   117.65     0  01:30        0.07
  CB-161A-B            JUNCTION     0.05     1.38   117.35     0  01:34        1.38
  CB-162A-B            JUNCTION     0.00     0.11   116.83     0  01:30        0.11
  CB-163A-B            JUNCTION     0.04     1.32   116.34     0  01:30        1.32
```

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - ULTIMATE
(100-year, 4-hour Chicago Storm)

```
  CB-164A-B            JUNCTION      0.05      1.33    116.56      0  01:31          1.33
  CB-165A-B            JUNCTION      0.04      1.26    115.87      0  01:30          1.25
  CB-166A-B            JUNCTION      0.04      1.33    115.60      0  01:31          1.33
  CB-167A-B            JUNCTION      0.04      1.30    116.05      0  01:30          1.30
  CB-168A-B            JUNCTION      0.00      0.08    116.81      0  01:30          0.08
  CB-169A-B            JUNCTION      0.00      0.07    117.45      0  01:30          0.07
  CB170                JUNCTION      0.43      1.16    117.41      0  01:30          1.16
  CB176                JUNCTION      0.43      1.64    117.29      0  01:30          1.64
  CB177                JUNCTION      0.44      1.50    116.57      0  01:30          1.50
  CB184                JUNCTION      0.43      1.17    116.17      0  01:32          1.17
  CB187                JUNCTION      0.45      1.74    114.92      0  01:30          1.74
  CB188                JUNCTION      0.44      0.92    115.23      0  01:31          0.92
  CB194                JUNCTION      0.43      1.12    115.64      0  01:30          1.12
  CB195                JUNCTION      0.43      1.08    116.70      0  01:30          1.08
  CB200                JUNCTION      0.44      1.33    116.88      0  01:30          1.33
  CoolingTrench        JUNCTION      2.21      2.23    111.47      0  02:22          2.23
  J1                   JUNCTION      0.00      0.31    115.33      0  01:32          0.31
  J2                   JUNCTION      0.00      0.26    114.91      0  01:33          0.25
  J3                   JUNCTION      0.01      0.28    114.48      0  01:33          0.27
  J4                   JUNCTION      0.00      0.09    116.04      0  01:30          0.09
  J5                   JUNCTION      0.00      0.11    115.93      0  01:30          0.10
  J6                   JUNCTION      0.00      0.16    115.09      0  01:36          0.16
  J8                   JUNCTION      0.57      0.60    111.47      0  02:22          0.60
  PondOUT              JUNCTION      0.48      0.66    111.66      0  02:22          0.66
  OF-CarpCreek         OUTFALL       0.00      0.00      0.00      0  00:00          0.00
  OF-CoolTrenchOut     OUTFALL       1.09      1.09    111.44      0  00:00          1.09
  OF-SWMF              OUTFALL       0.59      0.59    111.44      0  00:00          0.59
  OF-Unc-S             OUTFALL       0.00      0.00      0.00      0  00:00          0.00
  CAP(225)             STORAGE       0.02      0.20    114.47      0  01:30          0.20
  FUT-Vol              STORAGE       0.07      1.52    115.42      0  01:36          1.52
  MH201                STORAGE       0.01      0.18    114.50      0  01:30          0.18
  MH213                STORAGE       0.01      0.15    114.77      0  01:25          0.15
  MH215                STORAGE       0.00      0.01    114.77      0  01:23          0.01
  MH217                STORAGE       0.00      0.01    114.65      0  01:58          0.01
  MH219                STORAGE       0.01      0.18    114.65      0  01:36          0.18
  MH227                STORAGE       0.02      0.24    114.37      0  01:30          0.24
  MH229                STORAGE       0.02      0.31    114.24      0  01:31          0.31
  MH233                STORAGE       0.03      0.33    114.08      0  01:31          0.33
  MH235                STORAGE       0.03      0.34    113.89      0  01:31          0.34
  MH237                STORAGE       0.03      0.35    113.72      0  01:32          0.35
  MH241                STORAGE       0.03      0.38    113.57      0  01:32          0.38
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  MH243                STORAGE       0.03      0.42    113.29      0  01:33          0.42
  MH245                STORAGE       0.04      0.44    112.96      0  01:33          0.44
  MH247                STORAGE       0.05      0.44    112.80      0  01:39          0.44
  MH249                STORAGE       0.09      0.53    112.72      0  02:11          0.53
  MH251                STORAGE       0.17      0.73    112.71      0  02:12          0.73
  MH253                STORAGE       0.29      0.92    112.71      0  02:12          0.91
  MH259                STORAGE       0.49      1.15    112.69      0  02:11          1.15
  MH260                STORAGE       0.63      1.30    112.69      0  02:12          1.30
  MH261                STORAGE       0.80      1.47    112.69      0  02:26          1.46
  MH263                STORAGE       0.82      1.49    112.68      0  02:22          1.49
  MH265                STORAGE       0.89      1.56    112.68      0  02:19          1.56
  MH266                STORAGE       0.02      0.33    115.35      0  01:38          0.33
  MH267                STORAGE       0.02      0.52    114.86      0  01:39          0.52
  MH267(1B)            STORAGE       0.02      0.21    113.59      0  01:36          0.21
  MH268                STORAGE       0.03      0.64    114.78      0  01:39          0.64
  MH269                STORAGE       0.06      1.43    114.63      0  01:38          1.43
  MH270                STORAGE       0.06      1.43    114.45      0  01:39          1.43
  MH271                STORAGE       0.06      1.32    114.13      0  01:39          1.32
  MH272                STORAGE       0.07      1.33    113.98      0  01:39          1.33
  MH273                STORAGE       0.08      1.15    113.51      0  01:40          1.15
  MH274                STORAGE       0.10      1.08    113.33      0  01:40          1.08
  MH275                STORAGE       0.47      1.54    113.15      0  01:40          1.54
  MH276                STORAGE       0.55      1.60    113.12      0  01:40          1.60
  MH277                STORAGE       0.61      1.63    113.09      0  01:40          1.63
  MH278                STORAGE       0.64      1.64    113.06      0  01:40          1.64
  MH279                STORAGE       0.04      0.97    114.86      0  01:39          0.97
  MH280                STORAGE       0.03      0.64    113.56      0  01:40          0.64
  MH281                STORAGE       0.02      0.49    115.46      0  01:31          0.49
  MH-FUT               STORAGE       0.61      1.63    113.09      0  01:40          1.63
  RYCB171              STORAGE       0.37      1.56    117.88      0  01:30          1.56
  RYCB178              STORAGE       0.38      1.86    117.00      0  01:30          1.86
  RYCB183              STORAGE       0.34      1.28    116.38      0  01:32          1.28
  RYCB186              STORAGE       0.35      1.69    114.97      0  01:30          1.69
  RYCB189              STORAGE       0.40      1.25    115.60      0  01:31          1.25
  RYCB193              STORAGE       0.34      1.36    115.97      0  01:30          1.36
  RYCB196              STORAGE       0.39      1.12    116.78      0  01:30          1.12
  RYCB199              STORAGE       0.36      1.49    117.12      0  01:30          1.49
  RYCB201              STORAGE       0.42      1.71    117.37      0  01:30          1.71
  SWMF-E               STORAGE       2.77      3.43    112.67      0  02:22          3.43
  Vortech-1929CIP-A    STORAGE       0.59      1.62    113.10      0  01:40          1.62
  Vortech-1929CIP-B    STORAGE       0.59      1.62    113.10      0  01:40          1.62
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Vortech-9000         STORAGE      0.81     1.48   112.68     0  02:21        1.48


*******************
Node Inflow Summary
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-------------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
Node                 Type           LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
-------------------------------------------------------------------------------------------------
01+507               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
01+722               JUNCTION      0.00   217.95     0  01:30           0       0.142      -1.648
01+777               JUNCTION      0.00   121.39     0  01:30           0      0.0411       1.594
08+096               JUNCTION      0.00    38.30     0  01:30           0       0.014       9.498
09+354               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
09+412               JUNCTION      0.00    74.42     0  01:30           0      0.0411       1.434
09+756               JUNCTION      0.00   661.27     0  01:30           0       0.481      -0.772
10+000               JUNCTION      0.00   564.63     0  01:32           0       0.456       0.062
10+018               JUNCTION      0.00   200.85     0  01:31           0        0.11       0.051
10+070               JUNCTION      0.00   142.98     0  01:30           0      0.0689      -2.400
10+093               JUNCTION      0.00    45.22     0  01:30           0      0.0201       1.705
10+140               JUNCTION      0.00   103.56     0  01:30           0      0.0852       0.047
10+171               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
11+166               JUNCTION      0.00    76.51     0  01:30           0      0.0118      21.370
11+251               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
11+305               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
11+411               JUNCTION      0.00    16.04     0  01:32           0     0.00165      62.381
CB118-119            JUNCTION    215.33   589.72     0  01:30       0.269       0.698       0.508
CB120-121            JUNCTION    114.06   465.83     0  01:30       0.143       0.529      -0.642
CB122-123            JUNCTION    127.45   427.59     0  01:30       0.158       0.486      -0.078
CB124-125            JUNCTION     90.95   366.05     0  01:30        0.11       0.414       0.017
CB126-127            JUNCTION    151.28   464.52     0  01:30       0.162       0.324       1.616
CB128-129            JUNCTION     95.91   378.98     0  01:30       0.119       0.336      -0.333
CB130-131            JUNCTION    104.64   341.31     0  01:30        0.13       0.306       0.070
CB132-133            JUNCTION    102.70   291.25     0  01:30       0.125       0.259      -0.022
CB134-135            JUNCTION    100.31   243.71     0  01:30       0.118        0.21       0.016
CB136-137            JUNCTION     79.84   194.94     0  01:30      0.0867       0.157       0.041
CB138-139            JUNCTION     60.61   165.91     0  01:30      0.0676       0.132      -0.049
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CB140-141            JUNCTION     45.57    74.63     0  01:30      0.0651      0.0832       0.028
CB142-143            JUNCTION     71.39   104.61     0  01:30      0.0806       0.103      -0.139
CB157-158            JUNCTION    106.65   106.65     0  01:30       0.123       0.131      -0.298
CB159-160            JUNCTION     96.30   119.70     0  01:30       0.107       0.118      -0.586
CB-161A-B            JUNCTION    211.65   310.10     0  01:30       0.276       0.347       0.431
CB-162A-B            JUNCTION    177.90   257.91     0  01:30       0.236       0.283      -0.704
CB-163A-B            JUNCTION     91.85   405.53     0  01:30       0.108       0.354       0.441
CB-164A-B            JUNCTION    218.12   218.12     0  01:30       0.281       0.282      -0.063
CB-165A-B            JUNCTION    239.49   271.19     0  01:30       0.309       0.329      -0.350
CB-166A-B            JUNCTION    112.56   301.14     0  01:30       0.142       0.254       0.670
CB-167A-B            JUNCTION    130.89   208.32     0  01:30       0.162       0.251      -0.218
CB-168A-B            JUNCTION    106.37   106.37     0  01:30       0.135       0.135      -0.036
CB-169A-B            JUNCTION    112.96   149.08     0  01:30       0.145       0.167      -1.565
CB170                JUNCTION      0.00    69.54     0  01:30           0       0.223       0.001
CB176                JUNCTION      0.00    91.37     0  01:30           0       0.193      -0.016
CB177                JUNCTION      0.00    68.23     0  01:30           0        0.25       0.010
CB184                JUNCTION      0.00    41.15     0  01:32           0       0.145       0.015
CB187                JUNCTION      0.00    21.44     0  01:30           0      0.0885       0.034
CB188                JUNCTION      0.00    85.74     0  01:31           0       0.289      -0.001
CB194                JUNCTION      0.00    53.82     0  01:30           0       0.168      -0.002
CB195                JUNCTION      0.00    38.26     0  01:30           0       0.127       0.005
CB200                JUNCTION      0.00    45.69     0  01:30           0       0.167       0.016
CoolingTrench        JUNCTION      0.00    19.06     0  02:22           0        1.06       0.000
J1                   JUNCTION      0.00   563.82     0  01:32           0       0.456      -0.065
J2                   JUNCTION      0.00   563.76     0  01:33           0       0.456       0.029
J3                   JUNCTION      0.00   562.51     0  01:33           0       0.456      -0.207
J4                   JUNCTION      0.00    88.67     0  01:30           0      0.0792      -0.005
J5                   JUNCTION      0.00    88.52     0  01:30           0      0.0791      -0.345
J6                   JUNCTION      0.00   587.84     0  01:35           0       0.485      -0.418
J8                   JUNCTION      0.00   940.26     0  02:22           0        20.3       0.000
PondOUT              JUNCTION      0.00   940.26     0  02:22           0        20.3       0.001
OF-CarpCreek         OUTFALL     624.43   624.43     0  01:30       0.684       0.684       0.000
OF-CoolTrenchOut     OUTFALL       0.00    19.06     0  02:22           0        1.06       0.000
OF-SWMF              OUTFALL       0.00   940.26     0  02:22           0        20.3       0.000
OF-Unc-S             OUTFALL       0.00     0.00     0  00:00           0           0       0.000 ltr
CAP(225)             STORAGE       0.00    94.34     0  01:30           0       0.278       0.001
FUT-Vol              STORAGE   12152.47 12152.47     0  01:30        16.7        16.7       0.034
MH201                STORAGE       0.00    69.54     0  01:30           0       0.223      -0.001
MH213                STORAGE       0.00    24.80     0  01:20           0      0.0947      -0.003
MH215                STORAGE       0.00     0.41     0  01:22           0    0.000279       0.576
MH217                STORAGE       0.00     0.22     0  01:24           0    0.000272       1.936
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MH219                STORAGE       0.00    38.82     0  01:36           0      0.0815      -0.004
MH227                STORAGE       0.00   143.83     0  01:30           0       0.429       0.007
MH229                STORAGE       0.00   228.31     0  01:30           0       0.677      -0.020
MH233                STORAGE       0.00   253.09     0  01:31           0       0.739      -0.002
MH235                STORAGE       0.00   277.90     0  01:31           0       0.803      -0.028
MH237                STORAGE       0.00   302.71     0  01:31           0       0.879       0.050
MH241                STORAGE       0.00   327.50     0  01:32           0       0.962       0.039
MH243                STORAGE       0.00   377.10     0  01:32           0        1.14      -0.050
MH245                STORAGE       0.00   428.63     0  01:33           0         1.4       0.377
MH247                STORAGE       0.00   453.40     0  01:33           0        1.48       0.004
MH249                STORAGE       0.00   478.06     0  01:34           0        1.59       0.096
MH251                STORAGE       0.00   477.70     0  01:34           0         1.6      -0.207
MH253                STORAGE       0.00   601.70     0  01:33           0        2.05       0.090
MH259                STORAGE       0.00   598.19     0  01:33           0        2.05      -0.221
MH260                STORAGE       0.00   606.45     0  01:30           0        2.14       0.076
MH261                STORAGE       0.00   636.84     0  02:03           0        2.64       1.919
MH263                STORAGE       0.00   239.20     0  01:28           0        1.15      -0.044
MH265                STORAGE       0.00   820.53     0  01:52           0        2.59      -1.554
MH266                STORAGE       0.00   134.73     0  01:34           0       0.434       0.244
MH267                STORAGE       0.00   136.54     0  01:32           0       0.433      -0.182
MH267(1B)            STORAGE       0.00    52.08     0  01:35           0       0.266       0.000
MH268                STORAGE       0.00   198.16     0  01:29           0       0.614       0.255
MH269                STORAGE       0.00   526.09     0  01:28           0        1.63      -0.084
MH270                STORAGE       0.00   597.25     0  01:38           0        1.91      -0.083
MH271                STORAGE       0.00   595.17     0  01:38           0        1.91      -0.225
MH272                STORAGE       0.00   682.74     0  01:39           0        2.18       0.325
MH273                STORAGE       0.00   802.33     0  01:39           0        2.59      -0.288
MH274                STORAGE       0.00   883.74     0  01:40           0        2.89       0.058
MH275                STORAGE       0.00  4847.23     0  01:40           0        19.1      -0.007
MH276                STORAGE       0.00  4847.51     0  01:40           0        19.1      -0.021
MH277                STORAGE       0.00  2053.71     0  01:40           0        8.65       0.003
MH278                STORAGE       0.00  4848.93     0  01:40           0        19.1       0.106
MH279                STORAGE       0.00   148.05     0  01:30           0       0.472       0.115
MH280                STORAGE       0.00   123.88     0  01:31           0        0.42       0.301
MH281                STORAGE       0.00   159.58     0  01:30           0       0.444       0.003
MH-FUT               STORAGE       0.00  2059.52     0  01:40           0        8.65       0.003
RYCB171              STORAGE     169.18   169.18     0  01:30       0.262       0.262      -2.191
RYCB178              STORAGE     168.65   168.65     0  01:30       0.298       0.298      -0.865
RYCB183              STORAGE     108.23   180.82     0  01:30       0.177       0.228      -0.321
RYCB186              STORAGE      69.56    69.56     0  01:30       0.117       0.117      -0.894
RYCB189              STORAGE     172.48   217.50     0  01:30       0.291       0.334       0.662
```

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RYCB193              STORAGE     126.61   126.61     0  01:30       0.196       0.196      -1.739
RYCB196              STORAGE     106.07   166.11     0  01:30       0.162       0.208      -0.839
RYCB199              STORAGE     132.09   132.09     0  01:30       0.213       0.213       0.082
RYCB201              STORAGE     123.78   219.63     0  01:30       0.187       0.232      -0.865
SWMF-E               STORAGE     347.10  6797.17     0  01:34        1.02        27.2       0.044
Vortech-1929CIP-A    STORAGE       0.00  2053.69     0  01:40           0        8.65      -0.000
Vortech-1929CIP-B    STORAGE       0.00  2055.10     0  01:40           0        8.65      -0.000
Vortech-9000         STORAGE       0.00   240.32     0  01:28           0        1.15       0.186


**********************
Node Surcharge Summary
**********************

Surcharging occurs when water rises above the top of the highest conduit.
---------------------------------------------------------------------
                                             Max. Height   Min. Depth
                                    Hours    Above Crown    Below Rim
Node                 Type      Surcharged         Meters       Meters
---------------------------------------------------------------------
CB170                JUNCTION        0.67          0.562        1.908
CB176                JUNCTION        0.50          1.043        1.067
CB177                JUNCTION        1.08          0.927        1.745
CB184                JUNCTION        0.95          0.619        0.949
CB187                JUNCTION        1.45          1.243        0.863
CB188                JUNCTION        0.66          0.260        1.356
CB194                JUNCTION        0.67          0.543        2.069
CB195                JUNCTION        0.84          0.525        1.123
CB200                JUNCTION        1.03          0.781        1.917
CoolingTrench        JUNCTION       24.00          0.922        1.238


*********************
Node Flooding Summary
*********************

No nodes were flooded.


**********************
Storage Volume Summary
```

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - ULTIMATE
(100-year, 4-hour Chicago Storm)

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

--------------------------------------------------------------------------------------------------
                      Average     Avg  Evap Exfil       Maximum     Max    Time of Max    Maximum
                       Volume    Pcnt  Pcnt  Pcnt        Volume    Pcnt     Occurrence    Outflow
Storage Unit          1000 m3    Full  Loss  Loss       1000 m3    Full    days hr:min        LPS
--------------------------------------------------------------------------------------------------
CAP(225)                0.000       0     0     0         0.000       0       0  00:00      94.34
FUT-Vol                 0.076       1     0     0         3.974      29       0  01:36    4480.31
MH201                   0.000       0     0     0         0.000       5       0  01:30      69.54
MH213                   0.000       0     0     0         0.000       4       0  01:25      24.84
MH215                   0.000       0     0     0         0.000       0       0  01:23       0.20
MH217                   0.000       0     0     0         0.000       0       0  01:58       0.12
MH219                   0.000       0     0     0         0.000       5       0  01:36      38.82
MH227                   0.000       1     0     0         0.000       6       0  01:30     143.84
MH229                   0.000       1     0     0         0.001       8       0  01:31     228.29
MH233                   0.000       1     0     0         0.001       9       0  01:31     253.10
MH235                   0.000       1     0     0         0.001       9       0  01:31     277.91
MH237                   0.000       1     0     0         0.001       9       0  01:32     302.70
MH241                   0.000       1     0     0         0.001      10       0  01:32     327.50
MH243                   0.000       1     0     0         0.001      11       0  01:33     377.08
MH245                   0.000       1     0     0         0.001      12       0  01:33     428.60
MH247                   0.000       1     0     0         0.001      12       0  01:39     453.26
MH249                   0.000       2     0     0         0.001      14       0  02:11     477.70
MH251                   0.000       5     0     0         0.001      19       0  02:12     476.79
MH253                   0.001       7     0     0         0.002      24       0  02:12     598.19
MH259                   0.001      13     0     0         0.003      30       0  02:11     585.08
MH260                   0.002      15     0     0         0.003      31       0  02:12     593.66
MH261                   0.002      24     0     0         0.004      45       0  02:26     820.43
MH263                   0.001      26     0     0         0.002      47       0  02:22     238.04
MH265                   0.002      27     0     0         0.004      48       0  02:19     633.21
MH266                   0.000       1     0     0         0.000      12       0  01:38     136.54
MH267                   0.000       1     0     0         0.001      18       0  01:39     141.15
MH267(1B)               0.000       1     0     0         0.000       8       0  01:36      52.05
MH268                   0.000       1     0     0         0.001      20       0  01:39     197.74
MH269                   0.000       2     0     0         0.003      38       0  01:38     519.75
MH270                   0.000       2     0     0         0.003      35       0  01:39     595.17
MH271                   0.000       2     0     0         0.002      36       0  01:39     593.62
MH272                   0.000       2     0     0         0.002      34       0  01:39     681.62
MH273                   0.000       2     0     0         0.005      31       0  01:40     801.99
MH274                   0.000       3     0     0         0.005      29       0  01:40     883.81
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MH275                   0.005      13     0     0         0.016      44       0  01:40    4847.51
MH276                   0.002      14     0     0         0.007      42       0  01:40    4849.59
MH277                   0.003      16     0     0         0.007      42       0  01:40    2053.55
MH278                   0.003      17     0     0         0.007      43       0  01:40    4847.28
MH279                   0.000       2     0     0         0.001      42       0  01:39     146.61
MH280                   0.000       1     0     0         0.001      23       0  01:40     122.42
MH281                   0.000       1     0     0         0.001      21       0  01:31     158.99
MH-FUT                  0.001      16     0     0         0.002      43       0  01:40    2054.56
RYCB171                 0.000       0     0     0         0.000       0       0  00:00     167.50
RYCB178                 0.000       0     0     0         0.000       0       0  00:00     143.61
RYCB183                 0.000       0     0     0         0.000       0       0  00:00     129.13
RYCB186                 0.000       0     0     0         0.000       0       0  00:00      67.57
RYCB189                 0.000       0     0     0         0.000       0       0  00:00     163.57
RYCB193                 0.000       0     0     0         0.000       0       0  00:00     101.35
RYCB196                 0.000       0     0     0         0.000       0       0  00:00     161.57
RYCB199                 0.000       0     0     0         0.000       0       0  00:00     107.53
RYCB201                 0.000       0     0     0         0.000       0       0  00:00     212.74
SWMF-E                 11.511      44     0     0        21.536      82       0  02:22     959.32
Vortech-1929CIP-A       0.001      15     0     0         0.002      41       0  01:40    2053.71
Vortech-1929CIP-B       0.001      15     0     0         0.002      41       0  01:40    2059.52
Vortech-9000            0.001      25     0     0         0.002      45       0  02:21     239.20


***********************
Outfall Loading Summary
***********************

-----------------------------------------------------------
                         Flow       Avg       Max       Total
                         Freq      Flow      Flow      Volume
Outfall Node             Pcnt       LPS       LPS    10^6 ltr
-----------------------------------------------------------
OF-CarpCreek            21.94     36.77    624.43       0.684
OF-CoolTrenchOut        98.86     12.38     19.06       1.063
OF-SWMF                 99.03    243.51    940.26      20.316
OF-Unc-S                 0.00      0.00      0.00       0.000
-----------------------------------------------------------
System                  54.96    292.66    977.65      22.062


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West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - ULTIMATE
(100-year, 4-hour Chicago Storm)

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  Link Flow Summary
  ********************

  -----------------------------------------------------------------------------
                               Maximum  Time of Max   Maximum    Max/     Max/
                                |Flow|   Occurrence   |Veloc|    Full     Full
  Link                 Type        LPS  days hr:min     m/sec    Flow    Depth
  -----------------------------------------------------------------------------
  CAP-227              CONDUIT    94.34     0  01:30      1.14    0.24     0.33
  CoolingTrench1       CONDUIT    19.06     0  02:22      0.61   62.71     1.00
  CoolingTrench2       CONDUIT    19.06     0  02:22      0.61   10.26     1.00
  Culvert              CONDUIT   223.48     0  02:22      3.16    3.19     1.00
  FUT-Maj              CONDUIT   516.89     0  01:36      1.54    0.02     0.11
  MH201-CAP            CONDUIT    69.54     0  01:30      0.95    0.17     0.31
  MH213-227            CONDUIT    24.71     0  01:25      0.80    0.39     0.44
  MH215-213            CONDUIT     0.41     0  01:22      0.06    0.01     0.20
  MH215-217            CONDUIT     0.12     0  01:36      0.29    0.00     0.04
  MH217-219            CONDUIT     0.12     0  01:24      0.21    0.00     0.23
  MH219-229            CONDUIT    38.82     0  01:36      0.98    0.53     0.53
  MH227-229            CONDUIT   143.84     0  01:30      1.11    0.26     0.39
  MH229-233            CONDUIT   228.29     0  01:31      1.46    0.40     0.44
  MH233-235            CONDUIT   253.10     0  01:31      1.49    0.46     0.47
  MH235-237            CONDUIT   277.91     0  01:31      1.50    0.48     0.50
  MH237-241            CONDUIT   302.70     0  01:32      1.58    0.51     0.52
  MH241-243            CONDUIT   327.50     0  01:32      1.56    0.60     0.56
  MH243-245            CONDUIT   377.08     0  01:33      1.67    0.69     0.59
  MH245-247            CONDUIT   428.60     0  01:33      1.65    0.68     0.55
  MH247-249            CONDUIT   453.26     0  01:34      1.72    0.64     0.57
  MH249-251            CONDUIT   477.70     0  01:34      1.73    0.67     0.80
  MH251-253            CONDUIT   476.79     0  01:33      1.63    0.69     0.98
  MH253-259            CONDUIT   598.19     0  01:33      1.58    0.72     1.00
  MH259-260            CONDUIT   585.08     0  01:31      1.44    0.71     1.00
  MH260-261            CONDUIT   593.66     0  01:31      1.22    0.66     1.00
  MH261-OGS            CONDUIT   240.32     0  01:28      1.08    0.81     1.00
  MH263-265            CONDUIT   238.04     0  01:28      1.07    0.87     1.00
  MH265-HW2            CONDUIT   583.53     0  01:32      1.06    0.60     1.00
  MH266-267            CONDUIT   136.54     0  01:32      1.44    0.99     0.93
  MH267(1B)-245        CONDUIT    52.05     0  01:36      1.25    0.86     0.77
  MH267-268            CONDUIT   141.15     0  01:42      1.20    0.74     1.00
  MH268-269            CONDUIT   197.74     0  01:40      1.36    0.78     1.00
  MH269-270            CONDUIT   519.75     0  01:38      1.41    1.17     1.00

  MH270-271            CONDUIT   595.17     0  01:38      1.61    1.38     1.00
  MH271-272            CONDUIT   593.62     0  01:39      1.30    1.19     1.00
  MH272-273            CONDUIT   681.62     0  01:39      1.49    1.38     1.00
  MH273-274            CONDUIT   801.99     0  01:40      1.22    0.84     1.00
  MH274-275            CONDUIT   883.81     0  01:40      1.65    0.95     1.00
  MH275-276            CONDUIT  4847.51     0  01:40      2.36    0.86     0.94
  MH276-OGSa           CONDUIT  2053.69     0  01:40      2.30    1.07     1.00
  MH276-OGSb           CONDUIT  2055.10     0  01:40      2.30    1.07     1.00
  MH277-278            CONDUIT  2053.55     0  01:41      2.30    1.19     1.00
  MH278-191            CONDUIT  4847.28     0  01:40      2.54    0.91     0.88
  MH279-269            CONDUIT   146.61     0  01:42      1.04    1.06     1.00
  MH280-273            CONDUIT   122.42     0  01:32      0.93    0.55     1.00
  MH281-269            CONDUIT   158.99     0  01:31      1.49    1.04     0.88
  MHFut-278            CONDUIT  2054.56     0  01:40      2.30    1.20     1.00
  MS01                 CONDUIT   563.82     0  01:32      1.00    0.02     0.19
  MS02                 CONDUIT   563.76     0  01:33      1.08    0.07     0.28
  MS03                 CONDUIT   562.51     0  01:33      1.18    0.05     0.27
  MS04                 CONDUIT   562.18     0  01:33      0.65    0.02     0.58
  MS05                 CONDUIT    88.67     0  01:30      0.21    0.00     0.14
  MS06                 CONDUIT    88.52     0  01:30      0.70    0.01     0.10
  MS07                 CONDUIT    94.25     0  01:31      0.84    0.01     0.12
  MS08                 CONDUIT   587.26     0  01:36      0.55    0.02     0.52
  MS11                 CONDUIT   940.26     0  02:22      0.95    0.21     0.52
  MS12                 CONDUIT   940.26     0  02:22      1.06    0.19     0.50
  OGS-277              CONDUIT  2053.71     0  01:40      2.30    1.02     1.00
  OGS-MH263            CONDUIT   239.20     0  01:28      1.07    1.36     1.00
  OGS-MHFut            CONDUIT  2059.52     0  01:40      2.30    1.02     1.00
  OVF-RYCB171          CONDUIT    97.97     0  01:30      0.41    0.03     0.28
  OVF-RYCB178          CONDUIT    75.38     0  01:30      0.37    0.02     0.27
  OVF-RYCB183          CONDUIT    87.99     0  01:32      0.51    0.03     0.24
  OVF-RYCB186          CONDUIT    46.14     0  01:30      0.07    0.00     0.54
  OVF-RYCB189          CONDUIT    78.06     0  01:30      0.12    0.01     0.27
  OVF-RYCB193          CONDUIT    47.52     0  01:30      0.23    0.02     0.26
  OVF-RYCB196          CONDUIT   123.31     0  01:30      0.81    0.02     0.23
  OVF-RYCB199          CONDUIT    61.86     0  01:30      0.33    0.03     0.25
  OVF-RYCB201          CONDUIT   121.39     0  01:30      0.67    0.03     0.18
  RYCB171-CB170        CONDUIT    69.54     0  01:30      1.37    2.59     1.00
  RYCB178-CB177        CONDUIT    68.23     0  01:30      1.35    2.47     1.00
  RYCB183-CB184        CONDUIT    41.15     0  01:32      0.81    1.43     1.00
  RYCB186-CB187        CONDUIT    21.44     0  01:30      0.42    0.75     1.00
  RYCB189-CB188        CONDUIT    85.74     0  01:31      1.69    3.04     1.00
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RYCB193-CB194        CONDUIT     53.82     0  01:30      1.06     1.92    1.00
RYCB196-CB195        CONDUIT     38.26     0  01:30      0.76     1.48    1.00
RYCB199-CB200        CONDUIT     45.69     0  01:30      0.90     1.72    1.00
RYCB201-CB176        CONDUIT     91.37     0  01:30      1.80     2.83    1.00
Street10-A           CHANNEL    200.30     0  01:32      0.88     0.00    0.08
Street10-B           CHANNEL    200.85     0  01:31      0.23     0.00    0.17
Street10-C           CHANNEL    139.69     0  01:30      0.22     0.00    0.15
Street10-D           CHANNEL    142.98     0  01:30      0.33     0.00    0.12
Street10-E           CHANNEL     42.13     0  01:31      0.33     0.00    0.10
Street10-F           CHANNEL     45.22     0  01:30      0.10     0.00    0.12
Street10-G           CHANNEL    103.56     0  01:30      0.51     0.00    0.19
Street10-H           CHANNEL      0.00     0  00:00      0.00     0.00    0.09
Street11-A           CHANNEL     38.95     0  01:30      0.33     0.00    0.06
Street11-B           CHANNEL     99.56     0  01:30      0.33     0.00    0.17
Street11-C           CHANNEL     76.51     0  01:30      0.12     0.00    0.16
Street11-D           CHANNEL     13.38     0  01:32      0.12     0.00    0.07
Street11-E           CHANNEL      0.00     0  00:00      0.00     0.00    0.06
Street11-F           CHANNEL      0.00     0  00:00      0.00     0.00    0.04
Street11-G           CHANNEL     63.49     0  01:29      0.43     0.00    0.09
Street11-H           CHANNEL      0.00     0  00:00      0.00     0.00    0.04
Street11-I           CHANNEL      0.00     0  00:00      0.00     0.00    0.12
Street11-J           CHANNEL     16.04     0  01:32      0.09     0.00    0.12
Street11-K           CHANNEL      0.13     0  01:33      0.13     0.00    0.08
Street1-A            CHANNEL      0.00     0  00:00      0.00     0.00    0.17
Street1-B            CHANNEL    345.43     0  01:31      0.42     0.01    0.23
Street1-C            CHANNEL    317.38     0  01:30      0.36     0.00    0.17
Street1-D            CHANNEL    205.59     0  01:30      0.44     0.00    0.15
Street1-E            CHANNEL    165.65     0  01:30      0.51     0.03    0.10
Street1-F            CHANNEL    115.23     0  01:31      0.41     0.00    0.09
Street8-A            CHANNEL     33.92     0  01:30      0.15     0.00    0.12
Street8-B            CHANNEL     38.30     0  01:30      0.12     0.00    0.11
Street8-C            CHANNEL     27.23     0  01:31      0.23     0.00    0.06
Street8-D            CHANNEL     67.18     0  01:30      0.32     0.00    0.08
Street9-A            CHANNEL    368.38     0  01:33      0.32     0.01    0.19
Street9-B            CHANNEL    411.69     0  01:31      0.34     0.01    0.22
Street9-C            CHANNEL    376.10     0  01:30      0.68     0.01    0.13
Street9-D            CHANNEL    325.32     0  01:31      0.64     0.01    0.12
Street9-E            CHANNEL    303.31     0  01:31      0.66     0.01    0.12
Street9-F            CHANNEL    344.98     0  01:30      0.82     0.01    0.12
Street9-G            CHANNEL    295.22     0  01:30      0.63     0.01    0.12
Street9-H            CHANNEL    247.51     0  01:30      0.58     0.01    0.11
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Street9-I            CHANNEL    199.95     0  01:30      0.55     0.00    0.11
Street9-J            CHANNEL    153.72     0  01:30      0.51     0.00    0.10
Street9-K            CHANNEL    124.31     0  01:30      0.49     0.00    0.09
Street9-L            CHANNEL     42.63     0  01:30      0.26     0.00    0.07
Street9-M            CHANNEL     31.32     0  01:30      0.34     0.00    0.05
Street9-N            CHANNEL     74.42     0  01:30      0.64     0.00    0.06
Street9-O            CHANNEL      0.00     0  00:00      0.00     0.00    0.04
OCB118               ORIFICE     50.07     0  01:32                       1.00
OCB119               ORIFICE     50.07     0  01:32                       1.00
OCB126-127           ORIFICE     52.08     0  01:35                       1.00
OCB161A              ORIFICE     56.44     0  01:34                       1.00
OCB161B              ORIFICE     39.59     0  01:34                       1.00
OCB163A              ORIFICE     28.02     0  01:30                       1.00
OCB163B              ORIFICE     28.02     0  01:30                       1.00
OCB164A              ORIFICE     38.84     0  01:31                       1.00
OCB164B              ORIFICE     38.84     0  01:31                       1.00
OCB165A              ORIFICE     53.61     0  01:30                       1.00
OCB165B              ORIFICE     37.63     0  01:30                       1.00
OCB166A              ORIFICE     21.41     0  01:31                       1.00
OCB166B              ORIFICE     16.73     0  01:31                       1.00
OCB167A              ORIFICE     21.10     0  01:30                       1.00
OCB167B              ORIFICE     21.10     0  01:30                       1.00
ORYCB171             ORIFICE     69.54     0  01:30                       1.00
ORYCB178             ORIFICE     68.23     0  01:30                       1.00
ORYCB183             ORIFICE     41.15     0  01:32                       1.00
ORYCB186             ORIFICE     21.44     0  01:30                       1.00
ORYCB189             ORIFICE     85.74     0  01:31                       1.00
ORYCB193             ORIFICE     53.82     0  01:30                       1.00
ORYCB196             ORIFICE     38.26     0  01:30                       1.00
ORYCB199             ORIFICE     45.69     0  01:30                       1.00
ORYCB201             ORIFICE     91.37     0  01:30                       1.00
MH261-265            WEIR       737.82     0  01:52                       1.00
MH276-278            WEIR       740.83     0  01:40                       0.12
W1                   WEIR       716.78     0  02:22                       0.92
W2                   WEIR         0.00     0  00:00                       0.00
OCB120-121           DUMMY       24.80     0  01:21
OCB122-123           DUMMY       24.80     0  01:21
OCB124-125           DUMMY       24.80     0  01:22
OCB128-129           DUMMY       24.80     0  01:21
OCB130-131           DUMMY       24.80     0  01:21
OCB132-133           DUMMY       24.80     0  01:21
```

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OCB134-135          DUMMY       24.80     0  01:22
OCB136-137          DUMMY       24.80     0  01:23
OCB138-139          DUMMY       24.80     0  01:23
OCB140-141          DUMMY       24.80     0  01:27
OCB142-143          DUMMY       24.80     0  01:25
OCB157-158          DUMMY       24.80     0  01:20
OCB159-160          DUMMY       38.70     0  01:23
OCB162              DUMMY       65.60     0  01:21
OCB168              DUMMY       38.70     0  01:21
OCB169              DUMMY       38.70     0  01:21
O-FUT               DUMMY     3963.42     0  01:20


***************************
Flow Classification Summary
***************************

-------------------------------------------------------------------------------------
                   Adjusted    ---------- Fraction of Time in Flow Class ----------
                   /Actual         Up    Down  Sub   Sup   Up    Down  Norm  Inlet
Conduit             Length    Dry  Dry   Dry   Crit  Crit  Crit  Crit  Ltd   Ctrl
-------------------------------------------------------------------------------------
CAP-227                1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
CoolingTrench1         1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
CoolingTrench2         1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
Culvert                1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
FUT-Maj                1.00   0.77  0.21  0.00  0.00  0.01  0.00  0.00  0.94  0.00
MH201-CAP              1.00   0.01  0.00  0.00  0.99  0.00  0.00  0.00  0.94  0.00
MH213-227              1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH215-213              1.00   0.90  0.02  0.00  0.04  0.00  0.00  0.04  0.01  0.00
MH215-217              1.00   0.08  0.85  0.00  0.07  0.00  0.00  0.00  0.93  0.00
MH217-219              1.00   0.07  0.01  0.00  0.02  0.00  0.00  0.90  0.02  0.00
MH219-229              1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH227-229              1.00   0.01  0.00  0.00  0.09  0.00  0.00  0.90  0.03  0.00
MH229-233              1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH233-235              1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH235-237              1.00   0.01  0.00  0.00  0.02  0.02  0.00  0.95  0.00  0.00
MH237-241              1.00   0.01  0.00  0.00  0.01  0.00  0.00  0.98  0.00  0.00
MH241-243              1.00   0.01  0.00  0.00  0.02  0.00  0.00  0.98  0.00  0.00
MH243-245              1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MH245-247              1.00   0.01  0.00  0.00  0.18  0.00  0.00  0.82  0.08  0.00
```

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MH247-249              1.00   0.01  0.00  0.00  0.28  0.00  0.00  0.71  0.09  0.00
MH249-251              1.00   0.01  0.00  0.00  0.46  0.00  0.00  0.53  0.16  0.00
MH251-253              1.00   0.01  0.00  0.00  0.61  0.00  0.00  0.38  0.12  0.00
MH253-259              1.00   0.01  0.00  0.00  0.92  0.00  0.00  0.07  0.25  0.00
MH259-260              1.00   0.00  0.01  0.00  0.94  0.00  0.00  0.06  0.01  0.00
MH260-261              1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.02  0.00
MH261-OGS              1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MH263-265              1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MH265-HW2              1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MH266-267              1.00   0.01  0.00  0.00  0.01  0.00  0.00  0.98  0.00  0.00
MH267(1B)-245          1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
MH267-268              1.00   0.01  0.00  0.00  0.06  0.00  0.00  0.93  0.00  0.00
MH268-269              1.00   0.01  0.00  0.00  0.02  0.00  0.00  0.98  0.00  0.00
MH269-270              1.00   0.01  0.00  0.00  0.05  0.00  0.00  0.95  0.00  0.00
MH270-271              1.00   0.01  0.00  0.00  0.04  0.00  0.00  0.95  0.00  0.00
MH271-272              1.00   0.01  0.00  0.00  0.09  0.00  0.00  0.90  0.00  0.00
MH272-273              1.00   0.01  0.00  0.00  0.12  0.00  0.00  0.87  0.03  0.00
MH273-274              1.00   0.01  0.00  0.00  0.99  0.00  0.00  0.00  0.77  0.00
MH274-275              1.00   0.01  0.00  0.00  0.39  0.00  0.00  0.61  0.12  0.00
MH275-276              1.00   0.01  0.00  0.00  0.93  0.01  0.00  0.05  0.02  0.00
MH276-OGSa             1.00   0.01  0.00  0.00  0.98  0.00  0.00  0.02  0.00  0.00
MH276-OGSb             1.00   0.01  0.00  0.00  0.98  0.00  0.00  0.02  0.00  0.00
MH277-278              1.00   0.01  0.00  0.00  0.99  0.00  0.00  0.00  0.00  0.00
MH278-191              1.00   0.00  0.00  0.00  0.91  0.00  0.00  0.09  0.00  0.00
MH279-269              1.00   0.01  0.00  0.00  0.02  0.00  0.00  0.97  0.00  0.00
MH280-273              1.00   0.01  0.00  0.00  0.03  0.00  0.00  0.96  0.00  0.00
MH281-269              1.00   0.01  0.00  0.00  0.00  0.00  0.00  0.99  0.00  0.00
MHFut-278              1.00   0.01  0.00  0.00  0.99  0.00  0.00  0.00  0.00  0.00
MS01                   1.00   0.72  0.11  0.00  0.17  0.00  0.00  0.00  0.94  0.00
MS02                   1.00   0.69  0.03  0.00  0.28  0.00  0.00  0.00  0.86  0.00
MS03                   1.00   0.08  0.61  0.00  0.31  0.00  0.00  0.00  0.94  0.00
MS04                   1.00   0.00  0.08  0.00  0.92  0.00  0.00  0.00  0.94  0.00
MS05                   1.00   0.08  0.90  0.00  0.02  0.00  0.00  0.00  0.92  0.00
MS06                   1.00   0.82  0.16  0.00  0.02  0.00  0.00  0.00  0.94  0.00
MS07                   1.00   0.77  0.05  0.00  0.18  0.00  0.00  0.00  0.93  0.00
MS08                   1.00   0.00  0.77  0.00  0.23  0.00  0.00  0.00  0.94  0.00
MS11                   1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
MS12                   1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
OGS-277                1.00   0.01  0.00  0.00  0.99  0.00  0.00  0.00  0.00  0.00
OGS-MH263              1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
OGS-MHFut              1.00   0.01  0.00  0.00  0.99  0.00  0.00  0.00  0.00  0.00
```

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  OVF-RYCB171            1.00   0.98   0.00   0.00   0.01   0.00   0.00   0.01   0.00   0.00
  OVF-RYCB178            1.00   0.98   0.00   0.00   0.02   0.00   0.00   0.00   0.94   0.00
  OVF-RYCB183            1.00   0.97   0.00   0.00   0.02   0.00   0.00   0.00   0.93   0.00
  OVF-RYCB186            1.00   0.00   0.98   0.00   0.02   0.00   0.00   0.00   0.94   0.00
  OVF-RYCB189            1.00   0.97   0.00   0.00   0.02   0.00   0.00   0.00   0.92   0.00
  OVF-RYCB193            1.00   0.97   0.01   0.00   0.02   0.00   0.00   0.00   0.94   0.00
  OVF-RYCB196            1.00   0.97   0.01   0.00   0.02   0.00   0.00   0.00   0.94   0.00
  OVF-RYCB199            1.00   0.98   0.00   0.00   0.02   0.00   0.00   0.00   0.00   0.00
  OVF-RYCB201            1.00   0.44   0.00   0.00   0.01   0.00   0.00   0.55   0.00   0.00
  RYCB171-CB170          1.00   0.00   0.00   0.00   1.00   0.00   0.00   0.00   0.00   0.00
  RYCB178-CB177          1.00   0.00   0.00   0.00   1.00   0.00   0.00   0.00   0.00   0.00
  RYCB183-CB184          1.00   0.00   0.00   0.00   1.00   0.00   0.00   0.00   0.00   0.00
  RYCB186-CB187          1.00   0.00   0.00   0.00   1.00   0.00   0.00   0.00   0.00   0.00
  RYCB189-CB188          1.00   0.00   0.00   0.00   1.00   0.00   0.00   0.00   0.00   0.00
  RYCB193-CB194          1.00   0.00   0.00   0.00   1.00   0.00   0.00   0.00   0.00   0.00
  RYCB196-CB195          1.00   0.00   0.00   0.00   1.00   0.00   0.00   0.00   0.00   0.00
  RYCB199-CB200          1.00   0.00   0.00   0.00   1.00   0.00   0.00   0.00   0.00   0.00
  RYCB201-CB176          1.00   0.00   0.00   0.00   1.00   0.00   0.00   0.00   0.00   0.00
  Street10-A             1.00   0.08   0.00   0.00   0.73   0.19   0.00   0.00   0.01   0.00
  Street10-B             1.00   0.08   0.00   0.00   0.02   0.00   0.00   0.90   0.01   0.00
  Street10-C             1.00   0.08   0.00   0.00   0.02   0.00   0.00   0.90   0.02   0.00
  Street10-D             1.00   0.08   0.00   0.00   0.02   0.00   0.00   0.90   0.00   0.00
  Street10-E             1.00   0.08   0.00   0.00   0.01   0.00   0.00   0.90   0.01   0.00
  Street10-F             1.00   0.08   0.00   0.00   0.02   0.00   0.00   0.90   0.01   0.00
  Street10-G             1.00   0.08   0.00   0.00   0.02   0.00   0.00   0.90   0.00   0.00
  Street10-H             1.00   0.08   0.92   0.00   0.00   0.00   0.00   0.00   0.00   0.00
  Street11-A             1.00   0.01   0.02   0.00   0.67   0.30   0.00   0.00   0.16   0.00
  Street11-B             1.00   0.61   0.00   0.00   0.03   0.00   0.00   0.36   0.03   0.00
  Street11-C             1.00   0.08   0.01   0.00   0.02   0.00   0.00   0.89   0.02   0.00
  Street11-D             1.00   0.01   0.08   0.00   0.54   0.37   0.00   0.00   0.13   0.00
  Street11-E             1.00   0.57   0.43   0.00   0.00   0.00   0.00   0.00   0.00   0.00
  Street11-F             1.00   0.71   0.29   0.00   0.00   0.00   0.00   0.00   0.00   0.00
  Street11-G             1.00   0.01   0.71   0.00   0.26   0.03   0.00   0.00   0.93   0.00
  Street11-H             1.00   0.71   0.29   0.00   0.00   0.00   0.00   0.00   0.00   0.00
  Street11-I             1.00   0.97   0.03   0.00   0.00   0.00   0.00   0.00   0.00   0.00
  Street11-J             1.00   0.08   0.01   0.00   0.02   0.00   0.00   0.89   0.02   0.00
  Street11-K             1.00   0.08   0.01   0.00   0.01   0.00   0.00   0.90   0.01   0.00
  Street1-A              1.00   0.95   0.05   0.00   0.00   0.00   0.00   0.00   0.00   0.00
  Street1-B              1.00   0.02   0.00   0.00   0.05   0.00   0.00   0.93   0.03   0.00
  Street1-C              1.00   0.02   0.00   0.00   0.03   0.00   0.00   0.96   0.01   0.00
  Street1-D              1.00   0.01   0.00   0.00   0.03   0.00   0.00   0.96   0.03   0.00
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  Street1-E              1.00   0.01   0.00   0.00   0.97   0.02   0.00   0.00   0.00   0.00
  Street1-F              1.00   0.36   0.08   0.00   0.56   0.01   0.00   0.00   0.14   0.00
  Street8-A              1.00   0.64   0.12   0.00   0.23   0.01   0.00   0.00   0.96   0.00
  Street8-B              1.00   0.01   0.07   0.00   0.51   0.41   0.00   0.00   0.11   0.00
  Street8-C              1.00   0.01   0.07   0.00   0.51   0.41   0.00   0.00   0.12   0.00
  Street8-D              1.00   0.63   0.01   0.00   0.32   0.04   0.00   0.00   0.01   0.00
  Street9-A              1.00   0.82   0.00   0.00   0.03   0.00   0.00   0.15   0.01   0.00
  Street9-B              1.00   0.70   0.00   0.00   0.03   0.00   0.00   0.27   0.03   0.00
  Street9-C              1.00   0.67   0.04   0.00   0.28   0.02   0.00   0.00   0.94   0.00
  Street9-D              1.00   0.65   0.02   0.00   0.33   0.00   0.00   0.00   0.99   0.00
  Street9-E              1.00   0.01   0.01   0.00   0.77   0.22   0.00   0.00   0.15   0.00
  Street9-F              1.00   0.01   0.71   0.00   0.11   0.17   0.00   0.00   0.84   0.00
  Street9-G              1.00   0.69   0.02   0.00   0.26   0.03   0.00   0.00   0.03   0.00
  Street9-H              1.00   0.68   0.03   0.00   0.26   0.02   0.00   0.00   0.99   0.00
  Street9-I              1.00   0.70   0.03   0.00   0.26   0.01   0.00   0.00   0.99   0.00
  Street9-J              1.00   0.72   0.03   0.00   0.25   0.00   0.00   0.00   0.99   0.00
  Street9-K              1.00   0.74   0.01   0.00   0.23   0.01   0.00   0.00   0.16   0.00
  Street9-L              1.00   0.63   0.02   0.00   0.34   0.01   0.00   0.00   0.14   0.00
  Street9-M              1.00   0.02   0.01   0.00   0.60   0.37   0.00   0.00   0.14   0.00
  Street9-N              1.00   0.02   0.74   0.00   0.09   0.15   0.00   0.00   0.82   0.00
  Street9-O              1.00   0.76   0.24   0.00   0.00   0.00   0.00   0.00   0.00   0.00


  *************************
  Conduit Surcharge Summary
  *************************

  ----------------------------------------------------------------------------
                                                            Hours        Hours 
                         --------- Hours Full --------   Above Full   Capacity
  Conduit                Both Ends  Upstream  Dnstream   Normal Flow   Limited
  ----------------------------------------------------------------------------
  CoolingTrench1             24.00     24.00     24.00      23.63        23.72
  CoolingTrench2             24.00     24.00     24.00      23.35        23.37
  Culvert                    24.00     24.00     24.00      22.84        22.84
  MH251-253                   0.01      0.01      1.17       0.01         0.01
  MH253-259                   1.22      1.22      3.72       0.01         0.01
  MH259-260                   3.96      3.96      5.72       0.01         0.01
  MH260-261                   6.40      6.40     10.16       0.01         0.01
  MH261-OGS                  17.80     17.80     18.37       0.01         0.01
  MH263-265                  18.66     18.66     19.26       0.01         0.04
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  MH265-HW2                 12.36     12.36     14.62      0.01         0.01
  MH266-267                  0.01      0.01      0.15      0.01         0.01
  MH267-268                  0.12      0.12      0.19      0.01         0.01
  MH268-269                  0.16      0.16      0.27      0.01         0.01
  MH269-270                  0.48      0.48      0.50      0.38         0.39
  MH270-271                  0.51      0.51      0.52      0.51         0.48
  MH271-272                  0.50      0.50      0.53      0.41         0.42
  MH272-273                  0.56      0.57      0.60      0.48         0.54
  MH273-274                  0.50      0.50      0.58      0.01         0.45
  MH274-275                  0.58      0.58      0.75      0.01         0.39
  MH276-OGSa                 2.22      2.22      2.43      0.66         0.67
  MH276-OGSb                 2.22      2.22      2.43      0.66         0.68
  MH277-278                  2.88      2.88      3.05      0.79         0.80
  MH279-269                  0.39      0.40      0.39      0.38         0.39
  MH280-273                  0.35      0.35      0.51      0.01         0.01
  MH281-269                  0.01      0.26      0.01      0.14         0.01
  MHFut-278                  2.88      2.88      3.05      0.79         0.80
  MS04                       0.01      0.01      5.79      0.01         0.01
  MS08                       0.01      0.01      4.02      0.01         0.01
  OGS-277                    2.66      2.66      2.77      0.46         0.48
  OGS-MH263                 18.37     18.37     18.66      0.30         0.20
  OGS-MHFut                  2.66      2.66      2.77      0.46         0.36
  OVF-RYCB186                0.01      0.01     22.39      0.01         0.01
  RYCB171-CB170             24.00     24.00     24.00      0.67         0.68
  RYCB178-CB177             24.00     24.00     24.00      0.83         0.83
  RYCB183-CB184             24.00     24.00     24.00      0.59         0.59
  RYCB186-CB187             24.00     24.00     24.00      0.01         0.01
  RYCB189-CB188             24.00     24.00     24.00      0.76         0.76
  RYCB193-CB194             24.00     24.00     24.00      0.54         0.54
  RYCB196-CB195             24.00     24.00     24.00      0.53         0.53
  RYCB199-CB200             24.00     24.00     24.00      0.63         0.63
  RYCB201-CB176             24.00     24.00     24.00      0.44         0.44


  Analysis begun on:  Thu Feb  8 15:21:41 2024
  Analysis ended on:  Thu Feb  8 15:21:50 2024
  Total elapsed time: 00:00:09
```

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - ULTIMATE
(100-year, 12-hour SCS Type II Storm)

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------

EAST Carp Airport detailed design model, Phase 1B-1 & 1B-2
Phase 1 previously completed using SWMHYMO.
Including in PCSWMM model for HGL elevations, and to have a complete model of the entire development.

WARNING 04: minimum elevation drop used for Conduit CoolingTrench1
WARNING 04: minimum elevation drop used for Conduit CoolingTrench2
WARNING 04: minimum elevation drop used for Conduit Street1-E
WARNING 02: maximum depth increased for Node CB126-127
WARNING 02: maximum depth increased for Node CB-163A-B
WARNING 02: maximum depth increased for Node CB-166A-B

*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 37
Number of nodes ........... 118
Number of links ........... 167
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                    Data       Recording
Name                 Data Source                    Type       Interval
------------------------------------------------------------------------
Raingage             07-SCS100yr-12hr               INTENSITY   30 min.


********************
Subcatchment Summary
********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
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1B-01                       0.17    112.72     41.40    2.0000 Raingage             CB142-143




1B-02                       0.24    131.51     48.60    4.5000 Raingage             CB157-158
1B-03                       0.15     34.83     35.70    1.5000 Raingage             CB140-141
1B-04                       0.22    124.15     42.90    5.0000 Raingage             CB159-160
1B-05                       0.14     91.31     42.90    3.0000 Raingage             CB138-139
1B-06                       0.19     94.23     37.10    5.0000 Raingage             CB136-137
1B-07                       0.24     96.95     44.30    4.0000 Raingage             CB134-135
1B-08                       0.23     93.66     55.70    4.5000 Raingage             CB132-133
1B-09                       0.23     95.14     60.00    4.5000 Raingage             CB130-131
1B-10                       0.21     92.51     60.00    4.5000 Raingage             CB128-129
1B-11                       0.35    267.40     38.60    3.0000 Raingage             CB126-127
1B-12                       0.20     92.54     57.10    5.0000 Raingage             CB124-125
1B-13                       0.28    116.64     60.00    4.5000 Raingage             CB122-123
1B-14                       0.25    105.21     61.40    4.0000 Raingage             CB120-121
1B-15                       0.47    200.31     61.40    4.5000 Raingage             CB118-119
1B-16                       4.61    216.71      7.10    2.0000 Raingage             SWMF-E
A-01                        0.49     47.41     35.70    3.5000 Raingage             RYCB199
A-02                        0.24    109.06     67.10    4.0000 Raingage             CB-169A-B
A-03                        0.48     40.63     58.60    2.5000 Raingage             RYCB171
A-04                        0.45    186.04     70.00    4.5000 Raingage             CB-161A-B
A-05                        0.37     43.08     37.10    3.5000 Raingage             RYCB196
A-06                        0.38    139.55     72.90    4.0000 Raingage             CB-162A-B
A-07                        0.36     41.04     52.90    2.5000 Raingage             RYCB201
A-08                        0.20    151.34     52.90    2.0000 Raingage             CB-163A-B
A-09                        0.23    135.53     67.10    4.0000 Raingage             CB-168A-B
A-10                        0.43     42.55     40.00    4.0000 Raingage             RYCB193
A-11                        0.47    212.74     68.60    4.0000 Raingage             CB-164A-B
A-12                        0.69     37.57     38.60    3.0000 Raingage             RYCB178
A-13                        0.65     43.10     40.00    3.5000 Raingage             RYCB189
A-14                        0.51    241.58     68.60    4.0000 Raingage             CB-165A-B
A-15                        0.41     39.40     35.70    3.0000 Raingage             RYCB183
A-16                        0.24    173.73     65.70    4.0000 Raingage             CB-166A-B
A-17                        0.29    132.74     60.00    3.5000 Raingage             CB-167A-B
A-18                        0.27     21.34     35.70    3.5000 Raingage             RYCB186
B1                          0.70    257.13     17.10    4.0000 Raingage             OF-CarpCreek
B2                          1.26    470.50     14.30    3.5000 Raingage             OF-CarpCreek
FUTURE                     28.65   6446.00     64.30    2.0000 Raingage             FUT-Vol


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Node Summary
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West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - ULTIMATE
(100-year, 12-hour SCS Type II Storm)

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                                         Invert      Max.    Ponded    External
Name                 Type                 Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
01+507               JUNCTION            116.46      1.00       0.0
01+722               JUNCTION            116.72      1.00       0.0
01+777               JUNCTION            117.13      1.00       0.0
08+096               JUNCTION            117.98      1.00       0.0
09+354               JUNCTION            118.20      1.00       0.0
09+412               JUNCTION            117.90      1.00       0.0
09+756               JUNCTION            116.20      1.00       0.0
10+000               JUNCTION            115.39      1.00       0.0
10+018               JUNCTION            115.49      1.00       0.0
10+070               JUNCTION            115.77      1.00       0.0
10+093               JUNCTION            116.00      1.00       0.0
10+140               JUNCTION            115.86      1.00       0.0
10+171               JUNCTION            116.07      1.00       0.0
11+166               JUNCTION            117.32      1.00       0.0
11+251               JUNCTION            116.95      1.00       0.0
11+305               JUNCTION            116.95      1.00       0.0
11+411               JUNCTION            116.56      1.00       0.0
CB118-119            JUNCTION            113.33      2.86       0.0
CB120-121            JUNCTION            115.45      1.00       0.0
CB122-123            JUNCTION            115.71      1.00       0.0
CB124-125            JUNCTION            116.01      1.00       0.0
CB126-127            JUNCTION            113.97      3.00       0.0
CB128-129            JUNCTION            116.33      1.00       0.0
CB130-131            JUNCTION            116.56      1.00       0.0
CB132-133            JUNCTION            116.80      1.00       0.0
CB134-135            JUNCTION            117.04      1.00       0.0
CB136-137            JUNCTION            117.29      1.00       0.0
CB138-139            JUNCTION            117.53      1.00       0.0
CB140-141            JUNCTION            117.75      1.00       0.0
CB142-143            JUNCTION            117.96      1.00       0.0
CB157-158            JUNCTION            117.86      1.00       0.0
CB159-160            JUNCTION            117.57      1.00       0.0
CB-161A-B            JUNCTION            115.97      2.10       0.0
CB-162A-B            JUNCTION            116.72      1.00       0.0
CB-163A-B            JUNCTION            115.02      2.10       0.0
CB-164A-B            JUNCTION            115.23      2.10       0.0
CB-165A-B            JUNCTION            114.61      2.10       0.0
CB-166A-B            JUNCTION            114.27      2.10       0.0
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CB-167A-B            JUNCTION            114.75      2.10       0.0
CB-168A-B            JUNCTION            116.73      1.00       0.0
CB-169A-B            JUNCTION            117.38      1.00       0.0
CB170                JUNCTION            116.25      3.07       0.0
CB176                JUNCTION            115.65      2.71       0.0
CB177                JUNCTION            115.07      3.25       0.0
CB184                JUNCTION            115.00      2.12       0.0
CB187                JUNCTION            113.18      2.60       0.0
CB188                JUNCTION            114.31      2.28       0.0
CB194                JUNCTION            114.52      3.19       0.0
CB195                JUNCTION            115.62      2.20       0.0
CB200                JUNCTION            115.55      3.25       0.0
CoolingTrench        JUNCTION            109.24      3.47       0.0
J1                   JUNCTION            115.02      1.00       0.0
J2                   JUNCTION            114.65      1.00       0.0
J3                   JUNCTION            114.20      1.20       0.0
J4                   JUNCTION            115.95      1.00       0.0
J5                   JUNCTION            115.82      1.00       0.0
J6                   JUNCTION            114.93      1.00       0.0
J8                   JUNCTION            110.87      1.20       0.0
PondOUT              JUNCTION            111.00      1.71       0.0
OF-CarpCreek         OUTFALL               0.00      0.00       0.0
OF-CoolTrenchOut     OUTFALL             110.35      0.20       0.0
OF-SWMF              OUTFALL             110.85      1.20       0.0
OF-Unc-S             OUTFALL               0.00      0.00       0.0
CAP(225)             STORAGE             114.27      3.82       0.0
FUT-Vol              STORAGE             113.90      2.10       0.0
MH201                STORAGE             114.32      3.83       0.0
MH213                STORAGE             114.62      3.35       0.0
MH215                STORAGE             114.76      3.23       0.0
MH217                STORAGE             114.64      3.24       0.0
MH219                STORAGE             114.47      3.29       0.0
MH227                STORAGE             114.13      3.86       0.0
MH229                STORAGE             113.93      3.84       0.0
MH233                STORAGE             113.75      3.85       0.0
MH235                STORAGE             113.55      3.83       0.0
MH237                STORAGE             113.37      3.82       0.0
MH241                STORAGE             113.19      3.83       0.0
MH243                STORAGE             112.87      3.80       0.0
MH245                STORAGE             112.52      3.82       0.0
MH247                STORAGE             112.36      3.78       0.0
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MH249              STORAGE            112.19      3.77       0.0
MH251              STORAGE            111.98      3.76       0.0
MH253              STORAGE            111.79      3.83       0.0
MH259              STORAGE            111.54      3.81       0.0
MH260              STORAGE            111.39      4.18       0.0
MH261              STORAGE            111.22      3.25       0.0
MH263              STORAGE            111.19      3.20       0.0
MH265              STORAGE            111.12      3.27       0.0
MH266              STORAGE            115.02      2.87       0.0
MH267              STORAGE            114.34      2.95       0.0
MH267(1B)          STORAGE            113.38      2.68       0.0
MH268              STORAGE            114.14      3.25       0.0
MH269              STORAGE            113.20      3.77       0.0
MH270              STORAGE            113.02      4.05       0.0
MH271              STORAGE            112.81      3.68       0.0
MH272              STORAGE            112.65      3.92       0.0
MH273              STORAGE            112.36      3.68       0.0
MH274              STORAGE            112.25      3.77       0.0
MH275              STORAGE            111.61      3.50       0.0
MH276              STORAGE            111.52      3.79       0.0
MH277              STORAGE            111.46      3.83       0.0
MH278              STORAGE            111.42      3.81       0.0
MH279              STORAGE            113.89      2.33       0.0
MH280              STORAGE            112.92      2.79       0.0
MH281              STORAGE            114.97      2.36       0.0
MH-FUT             STORAGE            111.46      3.83       0.0
RYCB171            STORAGE            116.32      2.28       0.0
RYCB178            STORAGE            115.14      2.61       0.0
RYCB183            STORAGE            115.10      1.99       0.0
RYCB186            STORAGE            113.28      2.58       0.0
RYCB189            STORAGE            114.35      1.95       0.0
RYCB193            STORAGE            114.61      2.14       0.0
RYCB196            STORAGE            115.66      1.89       0.0
RYCB199            STORAGE            115.63      2.22       0.0
RYCB201            STORAGE            115.66      2.43       0.0
SWMF-E             STORAGE            109.24      3.71       0.0
Vortech-1929CIP-A  STORAGE            111.48      3.91       0.0
Vortech-1929CIP-B  STORAGE            111.48      3.91       0.0
Vortech-9000       STORAGE            111.20      3.27       0.0
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Link Summary
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Name             From Node        To Node          Type            Length    %Slope Roughness
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CAP-227          CAP(225)         MH227            CONDUIT           18.2    0.3846    0.0130
CoolingTrench1   SWMF-E           CoolingTrench    CONDUIT          355.0    0.0001    0.0130
CoolingTrench2   CoolingTrench    OF-CoolTrenchOut CONDUIT            9.5    0.0032    0.0130
Culvert          SWMF-E           PondOUT          CONDUIT           19.0    0.5263    0.0130
FUT-Maj          FUT-Vol          J6               CONDUIT           10.0    4.2037    0.0130
MH201-CAP        MH201            CAP(225)         CONDUIT           12.6    0.3968    0.0130
MH213-227        MH213            MH227            CONDUIT           30.6    0.3922    0.0130
MH215-213        MH215            MH213            CONDUIT           21.4    0.3738    0.0130
MH215-217        MH215            MH217            CONDUIT           25.0    0.4800    0.0130
MH217-219        MH217            MH219            CONDUIT           23.0    0.4348    0.0130
MH219-229        MH219            MH229            CONDUIT           31.0    0.5161    0.0130
MH227-229        MH227            MH229            CONDUIT           44.9    0.4009    0.0130
MH229-233        MH229            MH233            CONDUIT           33.6    0.4167    0.0130
MH233-235        MH233            MH235            CONDUIT           44.2    0.3846    0.0130
MH235-237        MH235            MH237            CONDUIT           39.3    0.4326    0.0130
MH237-241        MH237            MH241            CONDUIT           32.7    0.4587    0.0130
MH241-243        MH241            MH243            CONDUIT           72.4    0.3867    0.0130
MH243-245        MH243            MH245            CONDUIT           67.2    0.3869    0.0130
MH245-247        MH245            MH247            CONDUIT           40.3    0.2978    0.0130
MH247-249        MH247            MH249            CONDUIT           34.6    0.3757    0.0130
MH249-251        MH249            MH251            CONDUIT           44.7    0.3803    0.0130
MH251-253        MH251            MH253            CONDUIT           31.0    0.3548    0.0130
MH253-259        MH253            MH259            CONDUIT           74.9    0.3071    0.0130
MH259-260        MH259            MH260            CONDUIT           39.1    0.3069    0.0130
MH260-261        MH260            MH261            CONDUIT           47.7    0.3564    0.0130
MH261-OGS        MH261            Vortech-9000     CONDUIT            4.6    0.4348    0.0130
MH263-265        MH263            MH265            CONDUIT            5.4    0.3704    0.0130
MH265-HW2        MH265            SWMF-E           CONDUIT           21.1    0.4265    0.0130
MH266-267        MH266            MH267            CONDUIT          114.0    0.5702    0.0130
MH267(1B)-245    MH267(1B)        MH245            CONDUIT           40.1    0.9477    0.0130
MH267-268        MH267            MH268            CONDUIT           40.8    0.4167    0.0130
MH268-269        MH268            MH269            CONDUIT           78.2    0.3197    0.0130
MH269-270        MH269            MH270            CONDUIT           50.8    0.2559    0.0130
MH270-271        MH270            MH271            CONDUIT           66.4    0.2410    0.0130
MH271-272        MH271            MH272            CONDUIT           59.5    0.1849    0.0130
MH272-273        MH272            MH273            CONDUIT          104.9    0.1811    0.0130
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MH273-274         MH273           MH274           CONDUIT          43.4    0.2535    0.0130
MH274-275         MH274           MH275           CONDUIT          53.0    0.2453    0.0130
MH275-276         MH275           MH276           CONDUIT          15.9    0.3774    0.0130
MH276-OGSa        MH276           Vortech-1929CIP-A CONDUIT           4.4    0.4546    0.0130
MH276-OGSb        MH276           Vortech-1929CIP-B CONDUIT           4.4    0.4546    0.0130
MH277-278         MH277           MH278           CONDUIT           5.5    0.3636    0.0130
MH278-191         MH278           SWMF-E          CONDUIT          17.7    0.3390    0.0130
MH279-269         MH279           MH269           CONDUIT          74.2    0.2156    0.0130
MH280-273         MH280           MH273           CONDUIT          73.6    0.2446    0.0130
MH281-269         MH281           MH269           CONDUIT          45.5    0.7033    0.0130
MHFut-278         MH-FUT          MH278           CONDUIT           5.5    0.3636    0.0130
MS01              10+000          J1              CONDUIT           5.0    7.4203    0.0160
MS02              J1              J2              CONDUIT          34.9    1.0602    0.0350
MS03              J2              J3              CONDUIT          22.7    1.9828    0.0350
MS04              J3              SWMF-E          CONDUIT          19.0   16.8116    0.0350
MS05              J4              10+140          CONDUIT           5.0    1.8003    0.0130
MS06              J4              J5              CONDUIT           5.9    2.2039    0.0350
MS07              J5              J6              CONDUIT          54.6    1.6303    0.0350
MS08              J6              SWMF-E          CONDUIT          49.0    7.3051    0.0350
MS11              PondOUT         J8              CONDUIT          30.0    0.4333    0.0350
MS12              J8              OF-SWMF         CONDUIT           4.0    0.5000    0.0350
OGS-277           Vortech-1929CIP-A MH277           CONDUIT           2.0    0.5000    0.0130
OGS-MH263         Vortech-9000    MH263           CONDUIT           6.5    0.1550    0.0130
OGS-MHFut         Vortech-1929CIP-B MH-FUT          CONDUIT           2.0    0.5000    0.0130
OVF-RYCB171       RYCB171         RYCB201         CONDUIT         172.0    0.2965    0.0350
OVF-RYCB178       RYCB178         RYCB183         CONDUIT         197.0    0.3350    0.0350
OVF-RYCB183       RYCB183         CB-167A-B       CONDUIT          53.0    0.4528    0.0350
OVF-RYCB186       RYCB186         SWMF-E          CONDUIT          44.0    8.6917    0.0350
OVF-RYCB189       RYCB189         CB-166A-B       CONDUIT          25.0   -0.2800    0.0350
OVF-RYCB193       RYCB193         RYCB189         CONDUIT         185.0    0.2432    0.0350
OVF-RYCB196       RYCB196         CB-163A-B       CONDUIT          30.0    1.4335    0.0350
OVF-RYCB199       RYCB199         RYCB196         CONDUIT         145.0    0.2069    0.0350
OVF-RYCB201       RYCB201         01+777          CONDUIT          11.0   -0.3636    0.0350
RYCB171-CB170     RYCB171         CB170           CONDUIT          37.5    0.1867    0.0130
RYCB178-CB177     RYCB178         CB177           CONDUIT          35.2    0.1989    0.0130
RYCB183-CB184     RYCB183         CB184           CONDUIT          46.5    0.2151    0.0130
RYCB186-CB187     RYCB186         CB187           CONDUIT          47.4    0.2110    0.0130
RYCB189-CB188     RYCB189         CB188           CONDUIT          19.4    0.2062    0.0130
RYCB193-CB194     RYCB193         CB194           CONDUIT          44.2    0.2036    0.0130
RYCB196-CB195     RYCB196         CB195           CONDUIT          23.0    0.1739    0.0130
RYCB199-CB200     RYCB199         CB200           CONDUIT          43.4    0.1843    0.0130
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RYCB201-CB176     RYCB201         CB176           CONDUIT           3.7    0.2703    0.0130
Street10-A        10+018          10+000          CONDUIT          16.5    0.6061    0.0160
Street10-B        10+018          CB-166A-B       CONDUIT          19.3    0.6218    0.0160
Street10-C        10+070          CB-166A-B       CONDUIT          32.7    1.2233    0.0160
Street10-D        10+070          CB-165A-B       CONDUIT           5.0    1.2001    0.0160
Street10-E        10+093          CB-165A-B       CONDUIT          11.0    2.6373    0.0160
Street10-F        10+093          CB-167A-B       CONDUIT          29.7    0.5051    0.0160
Street10-G        10+140          CB-167A-B       CONDUIT           2.2    0.4546    0.0160
Street10-H        10+171          10+140          CONDUIT          30.3    0.6931    0.0160
Street11-A        09+412          CB-169A-B       CONDUIT          63.2    0.8228    0.0160
Street11-B        CB-169A-B       CB-161A-B       CONDUIT          43.9    0.7062    0.0160
Street11-C        11+166          CB-161A-B       CONDUIT          50.2    0.4980    0.0160
Street11-D        11+166          CB-162A-B       CONDUIT          74.4    0.8065    0.0160
Street11-E        11+251          CB-162A-B       CONDUIT           2.0   11.5768    0.0160
Street11-F        11+251          CB-168A-B       CONDUIT           2.0   11.0672    0.0160
Street11-G        CB-168A-B       01+722          CONDUIT           5.0    0.2000    0.0160
Street11-H        11+305          CB-168A-B       CONDUIT          43.7    0.5034    0.0160
Street11-I        11+305          CB-164A-B       CONDUIT          59.2    1.0474    0.0160
Street11-J        11+411          CB-164A-B       CONDUIT          47.5    0.4842    0.0160
Street11-K        11+411          CB-165A-B       CONDUIT         111.6    0.7617    0.0160
Street1-A         01+507          CB126-127       CONDUIT          99.3    0.4935    0.0160
Street1-B         09+756          CB126-127       CONDUIT          35.0    0.6572    0.0160
Street1-C         09+756          CB-163A-B       CONDUIT           7.0    1.1429    0.0160
Street1-D         01+722          CB-163A-B       CONDUIT          64.9    0.9245    0.0160
Street1-E         CB-162A-B       01+722          CONDUIT           5.0    0.0061    0.0160
Street1-F         01+777          CB-162A-B       CONDUIT          45.1    0.9091    0.0160
Street8-A         CB142-143       CB157-158       CONDUIT          10.0    1.0001    0.0160
Street8-B         08+096          CB157-158       CONDUIT          40.1    0.2993    0.0160
Street8-C         08+096          CB159-160       CONDUIT          85.5    0.4795    0.0160
Street8-D         CB159-160       CB138-139       CONDUIT          15.0    0.2667    0.0160
Street9-A         10+000          CB118-119       CONDUIT          37.1    0.5391    0.0160
Street9-B         CB120-121       CB118-119       CONDUIT          53.2    0.4887    0.0160
Street9-C         CB122-123       CB120-121       CONDUIT          53.2    0.4887    0.0160
Street9-D         CB124-125       CB122-123       CONDUIT          58.8    0.5102    0.0160
Street9-E         09+756          CB124-125       CONDUIT          37.5    0.5067    0.0160
Street9-F         CB128-129       09+756          CONDUIT          23.8    0.5462    0.0160
Street9-G         CB130-131       CB128-129       CONDUIT          47.7    0.4822    0.0160
Street9-H         CB132-133       CB130-131       CONDUIT          48.2    0.4979    0.0160
Street9-I         CB134-135       CB132-133       CONDUIT          47.1    0.5096    0.0160
Street9-J         CB136-137       CB134-135       CONDUIT          48.3    0.5176    0.0160
Street9-K         CB138-139       CB136-137       CONDUIT          47.8    0.5021    0.0160
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Street9-L        CB140-141        CB138-139        CONDUIT            41.9    0.5251    0.0160
Street9-M        09+412           CB140-141        CONDUIT            28.2    0.5319    0.0160
Street9-N        CB142-143        09+412           CONDUIT            12.8    0.4688    0.0160
Street9-O        09+354           CB142-143        CONDUIT            49.1    0.4888    0.0160
OCB118           CB118-119        MH253            ORIFICE
OCB119           CB118-119        MH253            ORIFICE
OCB126-127       CB126-127        MH267(1B)        ORIFICE
OCB161A          CB-161A-B        MH266            ORIFICE
OCB161B          CB-161A-B        MH266            ORIFICE
OCB163A          CB-163A-B        MH279            ORIFICE
OCB163B          CB-163A-B        MH279            ORIFICE
OCB164A          CB-164A-B        MH270            ORIFICE
OCB164B          CB-164A-B        MH270            ORIFICE
OCB165A          CB-165A-B        MH272            ORIFICE
OCB165B          CB-165A-B        MH272            ORIFICE
OCB166A          CB-166A-B        MH280            ORIFICE
OCB166B          CB-166A-B        MH280            ORIFICE
OCB167A          CB-167A-B        MH274            ORIFICE
OCB167B          CB-167A-B        MH274            ORIFICE
ORYCB171         CB170            MH201            ORIFICE
ORYCB178         CB177            MH281            ORIFICE
ORYCB183         CB184            MH274            ORIFICE
ORYCB186         CB187            MH260            ORIFICE
ORYCB189         CB188            MH280            ORIFICE
ORYCB193         CB194            MH279            ORIFICE
ORYCB196         CB195            MH279            ORIFICE
ORYCB199         CB200            MH229            ORIFICE
ORYCB201         CB176            MH281            ORIFICE
MH261-265        MH261            MH265            WEIR
MH276-278        MH276            MH278            WEIR
W1               SWMF-E           PondOUT          WEIR
W2               SWMF-E           PondOUT          WEIR
OCB120-121       CB120-121        MH253            OUTLET
OCB122-123       CB122-123        MH249            OUTLET
OCB124-125       CB124-125        MH247            OUTLET
OCB128-129       CB128-129        MH243            OUTLET
OCB130-131       CB130-131        MH243            OUTLET
OCB132-133       CB132-133        MH241            OUTLET
OCB134-135       CB134-135        MH237            OUTLET
OCB136-137       CB136-137        MH235            OUTLET
OCB138-139       CB138-139        MH233            OUTLET
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OCB140-141       CB140-141        MH227            OUTLET
OCB142-143       CB142-143        CAP(225)         OUTLET
OCB157-158       CB157-158        MH213            OUTLET
OCB159-160       CB159-160        MH219            OUTLET
OCB162           CB-162A-B        MH268            OUTLET
OCB168           CB-168A-B        MH269            OUTLET
OCB169           CB-169A-B        MH266            OUTLET
O-FUT            FUT-Vol          MH275            OUTLET


*********************
Cross Section Summary
*********************
                                       Full     Full     Hyd.     Max.   No. of     Full
Conduit          Shape                Depth     Area     Rad.    Width  Barrels     Flow
----------------------------------------------------------------------------------------
CAP-227          CIRCULAR              0.61     0.29     0.15     0.61        1   397.98
CoolingTrench1   CIRCULAR              0.20     0.03     0.05     0.20        1     0.30
CoolingTrench2   CIRCULAR              0.20     0.03     0.05     0.20        1     1.86
Culvert          CIRCULAR              0.30     0.07     0.07     0.30        1    70.16
FUT-Maj          RECT_OPEN             1.00     3.00     0.60     3.00        1 33660.55
MH201-CAP        CIRCULAR              0.61     0.29     0.15     0.61        1   404.25
MH213-227        CIRCULAR              0.30     0.07     0.08     0.30        1    63.29
MH215-213        CIRCULAR              0.25     0.05     0.06     0.25        1    37.93
MH215-217        CIRCULAR              0.25     0.05     0.06     0.25        1    42.98
MH217-219        CIRCULAR              0.25     0.05     0.06     0.25        1    40.91
MH219-229        CIRCULAR              0.30     0.07     0.08     0.30        1    72.61
MH227-229        CIRCULAR              0.69     0.37     0.17     0.69        1   555.71
MH229-233        CIRCULAR              0.69     0.37     0.17     0.69        1   566.53
MH233-235        CIRCULAR              0.69     0.37     0.17     0.69        1   544.31
MH235-237        CIRCULAR              0.69     0.37     0.17     0.69        1   577.25
MH237-241        CIRCULAR              0.69     0.37     0.17     0.69        1   594.43
MH241-243        CIRCULAR              0.69     0.37     0.17     0.69        1   545.81
MH243-245        CIRCULAR              0.69     0.37     0.17     0.69        1   545.93
MH245-247        CIRCULAR              0.76     0.46     0.19     0.76        1   633.80
MH247-249        CIRCULAR              0.76     0.46     0.19     0.76        1   711.95
MH249-251        CIRCULAR              0.76     0.46     0.19     0.76        1   716.28
MH251-253        CIRCULAR              0.76     0.46     0.19     0.76        1   691.88
MH253-259        CIRCULAR              0.84     0.55     0.21     0.84        1   829.36
MH259-260        CIRCULAR              0.84     0.55     0.21     0.84        1   829.12
MH260-261        CIRCULAR              0.84     0.55     0.21     0.84        1   893.48
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MH261-OGS        CIRCULAR              0.53     0.22     0.13     0.53         1   295.26
MH263-265        CIRCULAR              0.53     0.22     0.13     0.53         1   272.52
MH265-HW2        CIRCULAR              0.84     0.55     0.21     0.84         1   977.46
MH266-267        CIRCULAR              0.38     0.11     0.10     0.38         1   138.13
MH267(1B)-245    CIRCULAR              0.25     0.05     0.06     0.25         1    60.40
MH267-268        CIRCULAR              0.46     0.16     0.11     0.46         1   191.78
MH268-269        CIRCULAR              0.53     0.22     0.13     0.53         1   253.19
MH269-270        CIRCULAR              0.69     0.37     0.17     0.69         1   443.99
MH270-271        CIRCULAR              0.69     0.37     0.17     0.69         1   430.83
MH271-272        CIRCULAR              0.76     0.46     0.19     0.76         1   499.40
MH272-273        CIRCULAR              0.76     0.46     0.19     0.76         1   494.31
MH273-274        CIRCULAR              0.91     0.66     0.23     0.91         1   949.75
MH274-275        CIRCULAR              0.91     0.66     0.23     0.91         1   934.31
MH275-276        CIRCULAR              1.65     2.14     0.41     1.65         1  5608.37
MH276-OGSa       CIRCULAR              1.07     0.89     0.27     1.07         1  1921.74
MH276-OGSb       CIRCULAR              1.07     0.89     0.27     1.07         1  1921.74
MH277-278        CIRCULAR              1.07     0.89     0.27     1.07         1  1718.86
MH278-191        CIRCULAR              1.65     2.14     0.41     1.65         1  5315.55
MH279-269        CIRCULAR              0.46     0.16     0.11     0.46         1   137.96
MH280-273        CIRCULAR              0.53     0.22     0.13     0.53         1   221.45
MH281-269        CIRCULAR              0.38     0.11     0.10     0.38         1   153.41
MHFut-278        CIRCULAR              1.07     0.89     0.27     1.07         1  1718.86
MS01             RECT_OPEN             1.00     3.00     0.60     3.00         1 36336.27
MS02             TRAPEZOIDAL           1.00     4.00     0.55     7.00         1  7862.69
MS03             TRAPEZOIDAL           1.00     4.00     0.55     7.00         1 10752.43
MS04             TRIANGULAR            1.20     3.60     0.56     6.00         1 28554.86
MS05             RECT_OPEN             1.00     3.00     0.60     3.00         1 22028.06
MS06             TRAPEZOIDAL           1.00     4.00     0.55     7.00         1 11336.24
MS07             TRAPEZOIDAL           1.00     4.00     0.55     7.00         1  9749.85
MS08             TRAPEZOIDAL           1.00     4.50     0.58     7.50         1 24033.65
MS11             TRIANGULAR            1.20     3.60     0.56     6.00         1  4584.46
MS12             TRIANGULAR            1.20     3.60     0.56     6.00         1  4924.51
OGS-277          CIRCULAR              1.07     0.89     0.27     1.07         1  2015.54
OGS-MH263        CIRCULAR              0.53     0.22     0.13     0.53         1   176.32
OGS-MHFut        CIRCULAR              1.07     0.89     0.27     1.07         1  2015.54
OVF-RYCB171      TRAPEZOIDAL           1.00     3.00     0.47     6.00         1  2838.98
OVF-RYCB178      TRAPEZOIDAL           1.00     3.00     0.47     6.00         1  3017.73
OVF-RYCB183      TRAPEZOIDAL           1.00     3.00     0.47     6.00         1  3508.41
OVF-RYCB186      TRAPEZOIDAL           1.00     3.00     0.47     6.00         1 15370.69
OVF-RYCB189      TRAPEZOIDAL           1.00     7.00     0.68    10.00         1  8168.09
OVF-RYCB193      TRAPEZOIDAL           1.00     3.00     0.47     6.00         1  2571.35
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OVF-RYCB196      TRAPEZOIDAL           1.00     3.00     0.47     6.00         1  6242.18
OVF-RYCB199      TRAPEZOIDAL           1.00     3.00     0.47     6.00         1  2371.47
OVF-RYCB201      TRAPEZOIDAL           1.00     3.50     0.51     6.50         1  3863.88
RYCB171-CB170    CIRCULAR              0.25     0.05     0.06     0.25         1    26.81
RYCB178-CB177    CIRCULAR              0.25     0.05     0.06     0.25         1    27.67
RYCB183-CB184    CIRCULAR              0.25     0.05     0.06     0.25         1    28.77
RYCB186-CB187    CIRCULAR              0.25     0.05     0.06     0.25         1    28.50
RYCB189-CB188    CIRCULAR              0.25     0.05     0.06     0.25         1    28.17
RYCB193-CB194    CIRCULAR              0.25     0.05     0.06     0.25         1    28.00
RYCB196-CB195    CIRCULAR              0.25     0.05     0.06     0.25         1    25.87
RYCB199-CB200    CIRCULAR              0.25     0.05     0.06     0.25         1    26.64
RYCB201-CB176    CIRCULAR              0.25     0.05     0.06     0.25         1    32.25
Street10-A       20mROW                1.00    16.85     0.50    20.00         1 51519.37
Street10-B       20mROW                1.00    16.85     0.50    20.00         1 52182.47
Street10-C       20mROW                1.00    16.85     0.50    20.00         1 73194.91
Street10-D       20mROW                1.00    16.85     0.50    20.00         1 72496.12
Street10-E       20mROW                1.00    16.85     0.50    20.00         1 107469.85
Street10-F       20mROW                1.00    16.85     0.50    20.00         1 47030.40
Street10-G       20mROW                1.00    16.85     0.50    20.00         1 44616.90
Street10-H       20mROW                1.00    16.85     0.50    20.00         1 55093.71
Street11-A       18mROW                1.00    15.30     0.53    18.00         1 56690.64
Street11-B       18mROW                1.00    15.30     0.53    18.00         1 52518.81
Street11-C       18mROW                1.00    15.30     0.53    18.00         1 44104.38
Street11-D       18mROW                1.00    15.30     0.53    18.00         1 56125.09
Street11-E       18mROW                1.00    15.30     0.53    18.00         1 212645.03
Street11-F       18mROW                1.00    15.30     0.53    18.00         1 207911.71
Street11-G       18mROW                1.00    15.30     0.53    18.00         1 27949.64
Street11-H       18mROW                1.00    15.30     0.53    18.00         1 44343.93
Street11-I       18mROW                1.00    15.30     0.53    18.00         1 63959.90
Street11-J       18mROW                1.00    15.30     0.53    18.00         1 43489.11
Street11-K       18mROW                1.00    15.30     0.53    18.00         1 54543.69
Street1-A        20mROW                1.00    16.85     0.50    20.00         1 46487.32
Street1-B        20mROW                1.00    16.85     0.50    20.00         1 53646.71
Street1-C        20mROW                1.00    16.85     0.50    20.00         1 70748.73
Street1-D        20mROW                1.00    16.85     0.50    20.00         1 63631.34
Street1-E        20mROW                1.00    16.85     0.50    20.00         1  5166.91
Street1-F        20mROW                1.00    16.85     0.50    20.00         1 63098.80
Street8-A        18mROW                1.00    15.30     0.53    18.00         1 62498.80
Street8-B        18mROW                1.00    15.30     0.53    18.00         1 34188.52
Street8-C        18mROW                1.00    15.30     0.53    18.00         1 43278.50
Street8-D        18mROW                1.00    15.30     0.53    18.00         1 32273.49
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Street9-A        20mROW              1.00    16.85     0.50    20.00        1 48589.19
Street9-B        20mROW              1.00    16.85     0.50    20.00        1 46263.87
Street9-C        20mROW              1.00    16.85     0.50    20.00        1 46263.87
Street9-D        20mROW              1.00    16.85     0.50    20.00        1 47269.75
Street9-E        20mROW              1.00    16.85     0.50    20.00        1 47105.59
Street9-F        20mROW              1.00    16.85     0.50    20.00        1 48909.69
Street9-G        20mROW              1.00    16.85     0.50    20.00        1 45953.20
Street9-H        20mROW              1.00    16.85     0.50    20.00        1 46697.46
Street9-I        20mROW              1.00    16.85     0.50    20.00        1 47239.63
Street9-J        20mROW              1.00    16.85     0.50    20.00        1 47611.06
Street9-K        20mROW              1.00    16.85     0.50    20.00        1 46892.45
Street9-L        20mROW              1.00    16.85     0.50    20.00        1 47953.00
Street9-M        20mROW              1.00    16.85     0.50    20.00        1 48265.04
Street9-N        20mROW              1.00    16.85     0.50    20.00        1 45308.69
Street9-O        20mROW              1.00    16.85     0.50    20.00        1 46267.49


****************
Transect Summary
****************

Transect 18mROW
Area:
            0.0009     0.0034     0.0077     0.0137     0.0214
            0.0308     0.0417     0.0530     0.0657     0.0801
            0.0962     0.1139     0.1333     0.1543     0.1770
            0.2005     0.2240     0.2475     0.2710     0.2945
            0.3180     0.3415     0.3650     0.3885     0.4120
            0.4356     0.4591     0.4826     0.5061     0.5296
            0.5531     0.5766     0.6001     0.6237     0.6472
            0.6707     0.6942     0.7177     0.7412     0.7648
            0.7883     0.8118     0.8353     0.8588     0.8824
            0.9059     0.9294     0.9529     0.9765     1.0000
Hrad:
            0.0183     0.0366     0.0550     0.0733     0.0916
            0.1099     0.1371     0.1723     0.2020     0.2263
            0.2467     0.2639     0.2788     0.2920     0.3037
            0.3187     0.3354     0.3530     0.3715     0.3905
            0.4099     0.4295     0.4495     0.4695     0.4898
            0.5101     0.5305     0.5509     0.5714     0.5919
```

```
            0.6125     0.6330     0.6536     0.6741     0.6946
            0.7152     0.7357     0.7562     0.7766     0.7971
            0.8175     0.8379     0.8583     0.8786     0.8989
            0.9192     0.9394     0.9597     0.9798     1.0000
Width:
            0.0726     0.1453     0.2179     0.2905     0.3631
            0.4358     0.4721     0.5073     0.5776     0.6478
            0.7180     0.7882     0.8584     0.9287     0.9989
            0.9989     0.9990     0.9990     0.9990     0.9990
            0.9991     0.9991     0.9991     0.9992     0.9992
            0.9992     0.9993     0.9993     0.9993     0.9994
            0.9994     0.9994     0.9995     0.9995     0.9995
            0.9996     0.9996     0.9996     0.9997     0.9997
            0.9997     0.9997     0.9998     0.9998     0.9998
            0.9999     0.9999     0.9999     1.0000     1.0000

Transect 20mROW
Area:
            0.0008     0.0031     0.0070     0.0124     0.0194
            0.0279     0.0378     0.0481     0.0600     0.0738
            0.0893     0.1067     0.1258     0.1468     0.1696
            0.1933     0.2170     0.2408     0.2645     0.2882
            0.3119     0.3356     0.3593     0.3831     0.4068
            0.4305     0.4542     0.4779     0.5017     0.5254
            0.5491     0.5728     0.5966     0.6203     0.6440
            0.6677     0.6915     0.7152     0.7389     0.7627
            0.7864     0.8101     0.8339     0.8576     0.8813
            0.9051     0.9288     0.9525     0.9763     1.0000
Hrad:
            0.0194     0.0389     0.0583     0.0777     0.0972
            0.1166     0.1454     0.1826     0.2126     0.2360
            0.2548     0.2701     0.2830     0.2941     0.3039
            0.3179     0.3339     0.3511     0.3692     0.3880
            0.4072     0.4268     0.4467     0.4667     0.4870
            0.5073     0.5278     0.5483     0.5688     0.5894
            0.6101     0.6307     0.6514     0.6720     0.6927
            0.7133     0.7339     0.7546     0.7752     0.7957
            0.8163     0.8368     0.8573     0.8778     0.8982
            0.9186     0.9390     0.9594     0.9797     1.0000
Width:
            0.0654     0.1307     0.1961     0.2615     0.3268
```

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            0.3922     0.4249     0.4633     0.5398     0.6163
            0.6929     0.7694     0.8459     0.9225     0.9990
            0.9990     0.9991     0.9991     0.9991     0.9991
            0.9992     0.9992     0.9992     0.9993     0.9993
            0.9993     0.9993     0.9994     0.9994     0.9994
            0.9995     0.9995     0.9995     0.9995     0.9996
            0.9996     0.9996     0.9997     0.9997     0.9997
            0.9997     0.9998     0.9998     0.9998     0.9999
            0.9999     0.9999     0.9999     1.0000     1.0000


*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 07/21/2022 00:00:00
Ending Date .............. 07/22/2022 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
```

```
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         4.315        93.910
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         1.425        31.008
Surface Runoff ...........         2.869        62.449
Final Storage ............         0.022         0.479
Continuity Error (%) .....        -0.028


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         2.869        28.695
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         2.410        24.096
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.406         4.063
Final Stored Volume ......         0.867         8.670
Continuity Error (%) .....        -0.026


*************************
Highest Continuity Errors
*************************
Node MH261 (3.96%)
Node MH265 (-3.66%)


***************************
Time-Step Critical Elements
```

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  ***************************
  Link OGS-MHFut (28.58%)
  Link OGS-277 (18.45%)
  Link MH276-OGSa (1.99%)


  ********************************
  Highest Flow Instability Indexes
  ********************************
  Link O-FUT (15)
  Link MH261-265 (14)
  Link OGS-MHFut (13)
  Link MH276-OGSb (13)
  Link MHFut-278 (13)


  *************************
  Routing Time Step Summary
  *************************
  Minimum Time Step           :     0.27 sec
  Average Time Step           :     0.81 sec
  Maximum Time Step           :     1.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     3.57
  Percent Not Converging      :     3.95
  Time Step Frequencies       :
      1.000 -  0.871 sec      :    52.38 %
      0.871 -  0.758 sec      :     7.32 %
      0.758 -  0.660 sec      :     8.37 %
      0.660 -  0.574 sec      :     3.93 %
      0.574 -  0.500 sec      :    28.00 %


  ***************************
  Subcatchment Runoff Summary
  ***************************

  -----------------------------------------------------------------------------------------------------------------
-------------
                            Total      Total      Total      Total     Imperv       Perv      Total       Total
Peak  Runoff
```

```
                           Precip     Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff
Runoff   Coeff
  Subcatchment                 mm        mm         mm         mm         mm         mm         mm    10^6 ltr
LPS
  -----------------------------------------------------------------------------------------------------------------
-------------
  1B-01                     93.91      0.00       0.00      37.46      38.26      17.58      55.84        0.09
33.97   0.595
  1B-02                     93.91      0.00       0.00      32.71      45.14      15.57      60.71        0.15
48.75   0.646
  1B-03                     93.91      0.00       0.00      42.41      32.98      17.98      50.96        0.08
27.20   0.543
  1B-04                     93.91      0.00       0.00      36.35      39.85      17.29      57.13        0.13
44.20   0.608
  1B-05                     93.91      0.00       0.00      36.40      39.78      17.24      57.02        0.08
28.11   0.607
  1B-06                     93.91      0.00       0.00      40.15      34.49      18.93      53.42        0.10
37.68   0.569
  1B-07                     93.91      0.00       0.00      35.66      41.21      16.66      57.87        0.14
48.17   0.616
  1B-08                     93.91      0.00       0.00      28.24      51.81      13.37      65.18        0.15
47.34   0.694
  1B-09                     93.91      0.00       0.00      25.47      55.81      12.11      67.92        0.16
47.75   0.723
  1B-10                     93.91      0.00       0.00      25.45      55.77      12.13      67.89        0.14
43.60   0.723
  1B-11                     93.91      0.00       0.00      39.10      35.67      18.58      54.25        0.19
69.71   0.578
  1B-12                     93.91      0.00       0.00      27.29      53.07      13.01      66.09        0.13
41.30   0.704
  1B-13                     93.91      0.00       0.00      25.46      55.77      12.11      67.88        0.19
58.13   0.723
  1B-14                     93.91      0.00       0.00      24.58      57.07      11.68      68.75        0.17
52.03   0.732
  1B-15                     93.91      0.00       0.00      24.56      57.12      11.70      68.82        0.32
97.84   0.733
  1B-16                     93.91      0.00       0.00      68.84       6.56      18.40      24.96        1.15
322.64   0.266
  A-01                      93.91      0.00       0.00      43.30      33.54      17.09      50.63        0.25
82.18   0.539
  A-02                      93.91      0.00       0.00      20.90      62.42      10.01      72.43        0.18
50.93   0.771
  A-03                      93.91      0.00       0.00      27.67      55.04      11.21      66.26        0.32
90.58   0.706
```

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  A-04                        93.91       0.00       0.00      19.04      65.17       9.14      74.31        0.33
95.22   0.791
  A-05                        93.91       0.00       0.00      41.90      34.85      17.17      52.03        0.19
64.36   0.554
  A-06                        93.91       0.00       0.00      17.21      67.75       8.24      75.99        0.29
80.19   0.809
  A-07                        93.91       0.00       0.00      31.24      49.69      13.00      62.69        0.22
67.72   0.668
  A-08                        93.91       0.00       0.00      29.98      48.88      14.26      63.14        0.13
41.99   0.672
  A-09                        93.91       0.00       0.00      20.85      62.32      10.06      72.38        0.16
47.58   0.771
  A-10                        93.91       0.00       0.00      40.08      37.58      16.28      53.85        0.23
75.61   0.573
  A-11                        93.91       0.00       0.00      19.93      63.76       9.56      73.32        0.34
98.14   0.781
  A-12                        93.91       0.00       0.00      42.88      36.26      14.78      51.04        0.35
101.86   0.544
  A-13                        93.91       0.00       0.00      41.10      37.57      15.25      52.82        0.34
104.14   0.562
  A-14                        93.91       0.00       0.00      19.93      63.76       9.57      73.33        0.37
107.64   0.781
  A-15                        93.91       0.00       0.00      43.49      33.54      16.90      50.43        0.21
67.56   0.537
  A-16                        93.91       0.00       0.00      21.71      61.07      10.52      71.59        0.17
50.19   0.762
  A-17                        93.91       0.00       0.00      25.47      55.58      12.10      67.68        0.19
59.78   0.721
  A-18                        93.91       0.00       0.00      43.80      33.54      16.59      50.12        0.14
43.52   0.534
  B1                          93.91       0.00       0.00      53.56      16.07      24.30      40.37        0.28
129.94   0.430
  B2                          93.91       0.00       0.00      55.48      13.44      25.01      38.45        0.48
230.72   0.409
  FUTURE                      93.91       0.00       0.00      23.06      59.80      10.47      70.27       20.13
5933.42   0.748


  ******************
  Node Depth Summary
  ******************

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

```
                               Average  Maximum  Maximum  Time of Max    Reported
                                 Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type     Meters   Meters   Meters  days hr:min      Meters
  --------------------------------------------------------------------------------
  01+507               JUNCTION    0.00     0.00   116.46     0  00:00        0.00
  01+722               JUNCTION    0.01     0.04   116.76     0  06:30        0.04
  01+777               JUNCTION    0.00     0.00   117.13     0  00:00        0.00
  08+096               JUNCTION    0.00     0.03   118.01     0  06:30        0.03
  09+354               JUNCTION    0.00     0.00   118.20     0  00:00        0.00
  09+412               JUNCTION    0.00     0.03   117.93     0  06:30        0.03
  09+756               JUNCTION    0.00     0.07   116.27     0  06:30        0.07
  10+000               JUNCTION    0.00     0.03   115.42     0  06:30        0.03
  10+018               JUNCTION    0.00     0.03   115.52     0  06:32        0.03
  10+070               JUNCTION    0.00     0.03   115.80     0  06:30        0.03
  10+093               JUNCTION    0.00     0.01   116.01     0  06:30        0.01
  10+140               JUNCTION    0.00     0.15   116.01     0  06:30        0.15
  10+171               JUNCTION    0.00     0.00   116.07     0  00:00        0.00
  11+166               JUNCTION    0.00     0.00   117.32     0  00:00        0.00
  11+251               JUNCTION    0.00     0.00   116.95     0  00:00        0.00
  11+305               JUNCTION    0.00     0.00   116.95     0  00:00        0.00
  11+411               JUNCTION    0.00     0.00   116.56     0  00:00        0.00
  CB118-119            JUNCTION    0.08     2.11   115.44     0  06:30        2.11
  CB120-121            JUNCTION    0.01     0.09   115.54     0  06:30        0.09
  CB122-123            JUNCTION    0.01     0.09   115.80     0  06:30        0.09
  CB124-125            JUNCTION    0.00     0.08   116.09     0  06:30        0.08
  CB126-127            JUNCTION    0.11     2.25   116.22     0  06:36        2.25
  CB128-129            JUNCTION    0.01     0.08   116.41     0  06:30        0.08
  CB130-131            JUNCTION    0.01     0.08   116.64     0  06:30        0.08
  CB132-133            JUNCTION    0.00     0.07   116.87     0  06:30        0.07
  CB134-135            JUNCTION    0.00     0.06   117.10     0  06:30        0.06
  CB136-137            JUNCTION    0.00     0.05   117.34     0  06:30        0.05
  CB138-139            JUNCTION    0.00     0.05   117.58     0  06:30        0.05
  CB140-141            JUNCTION    0.00     0.04   117.79     0  06:30        0.04
  CB142-143            JUNCTION    0.00     0.05   118.01     0  06:30        0.05
  CB157-158            JUNCTION    0.01     0.15   118.01     0  06:30        0.15
  CB159-160            JUNCTION    0.00     0.04   117.61     0  06:30        0.04
  CB-161A-B            JUNCTION    0.05     1.26   117.23     0  06:30        1.26
  CB-162A-B            JUNCTION    0.01     0.05   116.77     0  06:30        0.05
  CB-163A-B            JUNCTION    0.04     1.26   116.28     0  06:30        1.26
  CB-164A-B            JUNCTION    0.05     1.25   116.48     0  06:30        1.25
  CB-165A-B            JUNCTION    0.05     1.20   115.81     0  06:30        1.20
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  CB-166A-B            JUNCTION      0.05      1.25    115.52      0  06:31         1.25
  CB-167A-B            JUNCTION      0.05      1.26    116.01      0  06:30         1.26
  CB-168A-B            JUNCTION      0.00      0.04    116.77      0  06:30         0.04
  CB-169A-B            JUNCTION      0.00      0.04    117.42      0  06:30         0.04
  CB170                JUNCTION      0.44      1.10    117.35      0  06:31         1.10
  CB176                JUNCTION      0.43      1.37    117.02      0  06:30         1.37
  CB177                JUNCTION      0.45      1.45    116.52      0  06:31         1.45
  CB184                JUNCTION      0.44      1.11    116.11      0  06:31         1.11
  CB187                JUNCTION      0.46      1.71    114.89      0  06:30         1.71
  CB188                JUNCTION      0.44      0.88    115.19      0  06:31         0.88
  CB194                JUNCTION      0.44      1.08    115.60      0  06:31         1.08
  CB195                JUNCTION      0.43      1.03    116.65      0  06:30         1.03
  CB200                JUNCTION      0.45      1.29    116.84      0  06:31         1.29
  CoolingTrench        JUNCTION      2.22      2.23    111.47      0  07:09         2.23
  J1                   JUNCTION      0.00      0.15    115.17      0  06:31         0.15
  J2                   JUNCTION      0.00      0.12    114.77      0  06:31         0.12
  J3                   JUNCTION      0.00      0.16    114.36      0  06:32         0.16
  J4                   JUNCTION      0.00      0.06    116.01      0  06:30         0.06
  J5                   JUNCTION      0.00      0.07    115.89      0  06:31         0.07
  J6                   JUNCTION      0.00      0.03    114.96      0  06:32         0.03
  J8                   JUNCTION      0.57      0.61    111.48      0  07:09         0.61
  PondOUT              JUNCTION      0.48      0.68    111.68      0  07:09         0.68
  OF-CarpCreek         OUTFALL       0.00      0.00      0.00      0  00:00         0.00
  OF-CoolTrenchOut     OUTFALL       1.09      1.09    111.44      0  00:00         1.09
  OF-SWMF              OUTFALL       0.59      0.59    111.44      0  00:00         0.59
  OF-Unc-S             OUTFALL       0.00      0.00      0.00      0  00:00         0.00
  CAP(225)             STORAGE       0.03      0.20    114.47      0  06:30         0.20
  FUT-Vol              STORAGE       0.07      1.40    115.30      0  06:31         1.40
  MH201                STORAGE       0.03      0.18    114.50      0  06:30         0.18
  MH213                STORAGE       0.02      0.15    114.77      0  06:06         0.15
  MH215                STORAGE       0.00      0.01    114.77      0  06:05         0.01
  MH217                STORAGE       0.00      0.01    114.65      0  06:48         0.01
  MH219                STORAGE       0.02      0.17    114.64      0  06:30         0.17
  MH227                STORAGE       0.03      0.24    114.37      0  06:30         0.24
  MH229                STORAGE       0.04      0.30    114.23      0  06:30         0.30
  MH233                STORAGE       0.04      0.33    114.08      0  06:30         0.33
  MH235                STORAGE       0.04      0.34    113.89      0  06:31         0.34
  MH237                STORAGE       0.05      0.35    113.72      0  06:31         0.35
  MH241                STORAGE       0.05      0.38    113.57      0  06:31         0.38
  MH243                STORAGE       0.06      0.42    113.29      0  06:32         0.42
  MH245                STORAGE       0.06      0.47    112.99      0  06:34         0.47
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  MH247                STORAGE       0.08      0.54    112.90      0  06:36         0.54
  MH249                STORAGE       0.13      0.68    112.87      0  06:36         0.68
  MH251                STORAGE       0.24      0.84    112.82      0  06:36         0.84
  MH253                STORAGE       0.37      0.99    112.78      0  06:50         0.99
  MH259                STORAGE       0.55      1.20    112.74      0  06:50         1.20
  MH260                STORAGE       0.67      1.34    112.73      0  07:02         1.34
  MH261                STORAGE       0.84      1.51    112.73      0  07:13         1.50
  MH263                STORAGE       0.87      1.53    112.72      0  07:02         1.53
  MH265                STORAGE       0.94      1.60    112.72      0  07:06         1.60
  MH266                STORAGE       0.04      0.30    115.32      0  06:26         0.30
  MH267                STORAGE       0.04      0.37    114.71      0  06:31         0.37
  MH267(1B)            STORAGE       0.02      0.21    113.59      0  06:36         0.21
  MH268                STORAGE       0.05      0.51    114.65      0  06:30         0.51
  MH269                STORAGE       0.08      1.33    114.53      0  06:30         1.33
  MH270                STORAGE       0.09      1.34    114.36      0  06:31         1.34
  MH271                STORAGE       0.09      1.25    114.06      0  06:31         1.25
  MH272                STORAGE       0.10      1.27    113.92      0  06:31         1.27
  MH273                STORAGE       0.11      1.12    113.48      0  06:32         1.12
  MH274                STORAGE       0.13      1.06    113.31      0  06:32         1.06
  MH275                STORAGE       0.55      1.54    113.15      0  06:32         1.54
  MH276                STORAGE       0.60      1.59    113.11      0  06:33         1.59
  MH277                STORAGE       0.66      1.62    113.08      0  06:33         1.62
  MH278                STORAGE       0.70      1.63    113.05      0  06:33         1.63
  MH279                STORAGE       0.05      0.86    114.75      0  06:31         0.86
  MH280                STORAGE       0.05      0.61    113.53      0  06:32         0.61
  MH281                STORAGE       0.04      0.41    115.38      0  06:30         0.41
  MH-FUT               STORAGE       0.66      1.62    113.08      0  06:33         1.62
  RYCB171              STORAGE       0.38      1.46    117.78      0  06:30         1.45
  RYCB178              STORAGE       0.39      1.78    116.92      0  06:30         1.78
  RYCB183              STORAGE       0.34      1.19    116.29      0  06:31         1.19
  RYCB186              STORAGE       0.36      1.67    114.95      0  06:30         1.67
  RYCB189              STORAGE       0.41      1.16    115.51      0  06:31         1.16
  RYCB193              STORAGE       0.35      1.29    115.90      0  06:30         1.29
  RYCB196              STORAGE       0.40      1.07    116.73      0  06:30         1.07
  RYCB199              STORAGE       0.37      1.43    117.06      0  06:30         1.43
  RYCB201              STORAGE       0.42      1.42    117.08      0  06:30         1.42
  SWMF-E               STORAGE       2.82      3.47    112.71      0  07:09         3.47
  Vortech-1929CIP-A    STORAGE       0.64      1.61    113.09      0  06:32         1.61
  Vortech-1929CIP-B    STORAGE       0.64      1.61    113.09      0  06:32         1.61
  Vortech-9000         STORAGE       0.86      1.52    112.72      0  07:02         1.52
```

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - ULTIMATE
(100-year, 12-hour SCS Type II Storm)

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*******************
Node Inflow Summary
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-------------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
Node                 Type           LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
-------------------------------------------------------------------------------------------------
01+507               JUNCTION      0.00     0.00    0   00:00           0           0       0.000 ltr
01+722               JUNCTION      0.00    26.03    0   06:30           0      0.0558      -0.161
01+777               JUNCTION      0.00     0.00    0   00:00           0           0       0.000 ltr
08+096               JUNCTION      0.00    10.00    0   06:14           0     0.00772       9.131
09+354               JUNCTION      0.00     0.00    0   00:00           0           0       0.000 ltr
09+412               JUNCTION      0.00    25.56    0   06:30           0      0.0266       0.862
09+756               JUNCTION      0.00   187.36    0   06:30           0       0.198      -0.873
10+000               JUNCTION      0.00   135.98    0   06:30           0      0.0862       0.078
10+018               JUNCTION      0.00     8.64    0   06:29           0     0.00181       4.982
10+070               JUNCTION      0.00    15.90    0   06:30           0     0.00834      -7.077
10+093               JUNCTION      0.00     5.26    0   06:27           0     0.00109      12.474
10+140               JUNCTION      0.00    47.25    0   06:30           0       0.038       0.026
10+171               JUNCTION      0.00     0.00    0   00:00           0           0       0.000 ltr
11+166               JUNCTION      0.00     0.00    0   00:00           0           0       0.000 ltr
11+251               JUNCTION      0.00     0.00    0   00:00           0           0       0.000 ltr
11+305               JUNCTION      0.00     0.00    0   00:00           0           0       0.000 ltr
11+411               JUNCTION      0.00     0.00    0   00:00           0           0       0.000 ltr
CB118-119            JUNCTION     97.84   249.66    0   06:30       0.323       0.512       0.275
CB120-121            JUNCTION     52.03   181.14    0   06:30       0.172       0.329      -0.348
CB122-123            JUNCTION     58.13   157.30    0   06:30        0.19       0.297      -0.066
CB124-125            JUNCTION     41.30   127.05    0   06:30       0.132       0.218       0.006
CB126-127            JUNCTION     69.71   167.37    0   06:30        0.19       0.287       0.779
CB128-129            JUNCTION     43.60   146.57    0   06:30       0.143       0.274      -0.115
CB130-131            JUNCTION     47.75   129.58    0   06:30       0.156       0.259       0.039
CB132-133            JUNCTION     47.34   108.19    0   06:30        0.15       0.224      -0.013
CB134-135            JUNCTION     48.17    86.99    0   06:30       0.139       0.184       0.006
CB136-137            JUNCTION     37.68    65.05    0   06:30       0.101       0.134      -0.004
CB138-139            JUNCTION     28.11    53.38    0   06:30      0.0798       0.117      -0.023
CB140-141            JUNCTION     27.20    38.45    0   06:30      0.0764      0.0881       0.024
CB142-143            JUNCTION     33.97    50.58    0   06:30      0.0949       0.111      -0.069
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CB157-158            JUNCTION     48.75    51.47    0   06:13       0.146       0.155      -0.210
CB159-160            JUNCTION     44.20    50.68    0   06:30       0.126       0.132      -0.142
CB-161A-B            JUNCTION     95.22   120.93    0   06:30       0.334        0.38       0.070
CB-162A-B            JUNCTION     80.19    80.19    0   06:30       0.287       0.287      -0.007
CB-163A-B            JUNCTION     41.99   125.66    0   06:30       0.129       0.251       0.118
CB-164A-B            JUNCTION     98.14    98.14    0   06:30       0.341       0.341       0.009
CB-165A-B            JUNCTION    107.64   109.27    0   06:30       0.374       0.375       0.005
CB-166A-B            JUNCTION     50.19    83.77    0   06:29       0.171       0.186       0.750
CB-167A-B            JUNCTION     59.78    98.91    0   06:30       0.195       0.238      -0.022
CB-168A-B            JUNCTION     47.58    47.58    0   06:30       0.164       0.164      -0.010
CB-169A-B            JUNCTION     50.93    64.92    0   06:30       0.175        0.19      -0.176
CB170                JUNCTION      0.00    66.14    0   06:30           0       0.306       0.002
CB176                JUNCTION      0.00    79.69    0   06:30           0       0.234       0.004
CB177                JUNCTION      0.00    66.37    0   06:30           0       0.334       0.010
CB184                JUNCTION      0.00    39.25    0   06:31           0       0.191       0.015
CB187                JUNCTION      0.00    21.21    0   06:30           0       0.119       0.028
CB188                JUNCTION      0.00    80.50    0   06:31           0       0.359       0.002
CB194                JUNCTION      0.00    51.86    0   06:30           0       0.222       0.003
CB195                JUNCTION      0.00    36.69    0   06:30           0       0.171       0.013
CB200                JUNCTION      0.00    44.53    0   06:30           0       0.223       0.015
CoolingTrench        JUNCTION      0.00    19.36    0   07:09           0        1.05       0.000
J1                   JUNCTION      0.00   135.53    0   06:30           0      0.0861      -0.124
J2                   JUNCTION      0.00   135.12    0   06:31           0      0.0862       0.033
J3                   JUNCTION      0.00   134.17    0   06:31           0      0.0862       0.064
J4                   JUNCTION      0.00    42.90    0   06:30           0       0.032      -0.012
J5                   JUNCTION      0.00    42.76    0   06:30           0       0.032      -0.065
J6                   JUNCTION      0.00    42.15    0   06:31           0       0.032      -0.469
J8                   JUNCTION      0.00  1033.33    0   07:09           0        22.3       0.000
PondOUT              JUNCTION      0.00  1033.33    0   07:09           0        22.3       0.002
OF-CarpCreek         OUTFALL     360.67   360.67    0   06:30       0.767       0.767       0.000
OF-CoolTrenchOut     OUTFALL       0.00    19.36    0   07:09           0        1.05       0.000
OF-SWMF              OUTFALL       0.00  1033.33    0   07:09           0        22.3       0.000
OF-Unc-S             OUTFALL       0.00     0.00    0   00:00           0           0       0.000 ltr
CAP(225)             STORAGE       0.00    90.95    0   06:30           0       0.382       0.000
FUT-Vol              STORAGE    5933.42  5933.42    0   06:30        20.1        20.1       0.019
MH201                STORAGE       0.00    66.15    0   06:31           0       0.306      -0.001
MH213                STORAGE       0.00    24.80    0   06:03           0       0.132      -0.004
MH215                STORAGE       0.00     0.39    0   06:04           0    0.000342       0.233
MH217                STORAGE       0.00     0.12    0   06:21           0    0.000329       0.650
MH219                STORAGE       0.00    38.62    0   06:30           0       0.112      -0.001
MH227                STORAGE       0.00   140.07    0   06:30           0       0.585       0.023
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MH229                STORAGE       0.00    223.10    0  06:30           0       0.919      -0.024
MH233                STORAGE       0.00    247.83    0  06:30           0           1      -0.002
MH235                STORAGE       0.00    272.60    0  06:31           0        1.09      -0.072
MH237                STORAGE       0.00    297.41    0  06:31           0         1.2       0.026
MH241                STORAGE       0.00    322.19    0  06:31           0        1.32      -0.028
MH243                STORAGE       0.00    371.76    0  06:31           0        1.58       0.188
MH245                STORAGE       0.00    422.52    0  06:32           0        1.86       0.184
MH247                STORAGE       0.00    446.30    0  06:32           0        1.97      -0.026
MH249                STORAGE       0.00    466.96    0  06:28           0        2.11       0.055
MH251                STORAGE       0.00    460.99    0  06:24           0        2.12      -0.194
MH253                STORAGE       0.00    572.94    0  06:25           0        2.69      -0.013
MH259                STORAGE       0.00    566.35    0  06:33           0        2.69       0.221
MH260                STORAGE       0.00    580.35    0  06:34           0         2.8       0.419
MH261                STORAGE       0.00    574.85    0  06:33           0        3.19       4.119
MH263                STORAGE       0.00    178.49    0  06:10           0        1.27       0.041
MH265                STORAGE       0.00    966.66    0  06:39           0        3.06      -3.528
MH266                STORAGE       0.00    130.19    0  06:30           0       0.524       0.144
MH267                STORAGE       0.00    130.72    0  06:28           0       0.524       0.018
MH267(1B)            STORAGE       0.00     50.95    0  06:36           0       0.285       0.000
MH268                STORAGE       0.00    191.76    0  06:23           0       0.777       0.129
MH269                STORAGE       0.00    506.62    0  06:30           0        2.08      -0.076
MH270                STORAGE       0.00    577.54    0  06:30           0        2.42       0.127
MH271                STORAGE       0.00    575.14    0  06:30           0        2.42      -0.241
MH272                STORAGE       0.00    662.03    0  06:31           0        2.79       0.159
MH273                STORAGE       0.00    777.31    0  06:31           0        3.32      -0.179
MH274                STORAGE       0.00    857.52    0  06:32           0        3.72       0.045
MH275                STORAGE       0.00   4820.93    0  06:32           0        23.8       0.023
MH276                STORAGE       0.00   4821.17    0  06:32           0        23.8      -0.016
MH277                STORAGE       0.00   2048.50    0  06:32           0          11       0.009
MH278                STORAGE       0.00   4822.49    0  06:33           0        23.8       0.101
MH279                STORAGE       0.00    143.25    0  06:30           0       0.595      -0.034
MH280                STORAGE       0.00    117.42    0  06:31           0       0.532       0.112
MH281                STORAGE       0.00    146.03    0  06:30           0       0.568      -0.001
MH-FUT               STORAGE       0.00   2054.21    0  06:33           0        11.1       0.009
RYCB171              STORAGE      90.58     90.58    0  06:30       0.315       0.315       0.004
RYCB178              STORAGE     101.86    101.86    0  06:30       0.353       0.353      -0.386
RYCB183              STORAGE      67.56     95.19    0  06:30       0.208       0.229       0.585
RYCB186              STORAGE      43.52     43.52    0  06:30       0.137       0.137      -0.133
RYCB189              STORAGE     104.14    121.64    0  06:30       0.344       0.366       0.316
RYCB193              STORAGE      75.61     75.61    0  06:30       0.232       0.232      -0.773
RYCB196              STORAGE      64.36     96.41    0  06:30       0.191       0.218      -0.987
```

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RYCB199              STORAGE      82.18     82.18    0  06:30        0.25        0.25      -0.192
RYCB201              STORAGE      67.72     80.33    0  06:30       0.224       0.234      -0.001
SWMF-E               STORAGE     322.64   5873.62    0  06:30        1.15        31.8       0.157
Vortech-1929CIP-A    STORAGE       0.00   2048.49    0  06:32           0        11.1       0.005
Vortech-1929CIP-B    STORAGE       0.00   2049.82    0  06:33           0        11.1       0.005
Vortech-9000         STORAGE       0.00    179.52    0  06:10           0        1.27       0.141


**********************
Node Surcharge Summary
**********************

Surcharging occurs when water rises above the top of the highest conduit.
---------------------------------------------------------------------
                                           Max. Height   Min. Depth
                                 Hours     Above Crown    Below Rim
Node                 Type       Surcharged      Meters       Meters
---------------------------------------------------------------------
CB170                JUNCTION        0.76        0.500        1.970
CB176                JUNCTION        0.60        0.769        1.341
CB177                JUNCTION        1.14        0.873        1.799
CB184                JUNCTION        1.04        0.557        1.011
CB187                JUNCTION        1.49        1.216        0.890
CB188                JUNCTION        0.74        0.216        1.400
CB194                JUNCTION        0.93        0.500        2.112
CB195                JUNCTION        1.00        0.476        1.172
CB200                JUNCTION        1.09        0.738        1.960
CoolingTrench        JUNCTION       24.00        0.923        1.237


*********************
Node Flooding Summary
*********************

No nodes were flooded.


**********************
Storage Volume Summary
**********************
```

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - ULTIMATE
(100-year, 12-hour SCS Type II Storm)

```
  ------------------------------------------------------------------------------------------------------
                          Average     Avg  Evap Exfil       Maximum     Max    Time of Max    Maximum
                           Volume    Pcnt  Pcnt  Pcnt        Volume    Pcnt     Occurrence    Outflow
  Storage Unit            1000 m3    Full  Loss  Loss       1000 m3    Full    days hr:min        LPS
  ------------------------------------------------------------------------------------------------------
  CAP(225)                  0.000       0     0     0         0.000       0       0  00:00      90.95
  FUT-Vol                   0.023       0     0     0         2.059      15       0  06:31    3963.42
  MH201                     0.000       1     0     0         0.000       5       0  06:30      66.15
  MH213                     0.000       1     0     0         0.000       4       0  06:06      24.83
  MH215                     0.000       0     0     0         0.000       0       0  06:05       0.20
  MH217                     0.000       0     0     0         0.000       0       0  06:48       0.12
  MH219                     0.000       1     0     0         0.000       5       0  06:30      38.56
  MH227                     0.000       1     0     0         0.000       6       0  06:30     140.06
  MH229                     0.000       1     0     0         0.001       8       0  06:30     223.03
  MH233                     0.000       1     0     0         0.001       8       0  06:30     247.80
  MH235                     0.000       1     0     0         0.001       9       0  06:31     272.61
  MH237                     0.000       1     0     0         0.001       9       0  06:31     297.39
  MH241                     0.000       1     0     0         0.001      10       0  06:31     322.16
  MH243                     0.000       1     0     0         0.001      11       0  06:32     371.70
  MH245                     0.000       2     0     0         0.001      12       0  06:34     421.50
  MH247                     0.000       2     0     0         0.001      14       0  06:36     442.16
  MH249                     0.000       4     0     0         0.001      18       0  06:36     460.99
  MH251                     0.000       6     0     0         0.001      22       0  06:36     449.81
  MH253                     0.001      10     0     0         0.002      26       0  06:50     566.35
  MH259                     0.001      14     0     0         0.003      32       0  06:50     559.33
  MH260                     0.002      16     0     0         0.003      32       0  07:02     574.85
  MH261                     0.002      26     0     0         0.004      46       0  07:13     967.96
  MH263                     0.001      27     0     0         0.002      48       0  07:02     177.40
  MH265                     0.002      29     0     0         0.004      49       0  07:06     567.66
  MH266                     0.000       1     0     0         0.000      10       0  06:26     130.72
  MH267                     0.000       1     0     0         0.000      13       0  06:31     137.32
  MH267(1B)                 0.000       1     0     0         0.000       8       0  06:36      50.95
  MH268                     0.000       1     0     0         0.001      16       0  06:30     187.80
  MH269                     0.000       2     0     0         0.002      35       0  06:30     502.40
  MH270                     0.000       2     0     0         0.002      33       0  06:31     575.14
  MH271                     0.000       3     0     0         0.002      34       0  06:31     573.25
  MH272                     0.000       3     0     0         0.002      32       0  06:31     660.36
  MH273                     0.000       3     0     0         0.005      30       0  06:32     776.77
  MH274                     0.001       4     0     0         0.005      28       0  06:32     857.51
  MH275                     0.006      16     0     0         0.016      44       0  06:32    4821.17
  MH276                     0.003      16     0     0         0.007      42       0  06:33    4823.05
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  MH277                     0.003      17     0     0         0.007      42       0  06:33    2048.37
  MH278                     0.003      18     0     0         0.007      43       0  06:33    4820.99
  MH279                     0.000       2     0     0         0.001      37       0  06:31     148.46
  MH280                     0.000       2     0     0         0.001      22       0  06:32     120.72
  MH281                     0.000       2     0     0         0.000      17       0  06:30     144.85
  MH-FUT                    0.001      17     0     0         0.002      42       0  06:33    2049.33
  RYCB171                   0.000       0     0     0         0.000       0       0  00:00      79.09
  RYCB178                   0.000       0     0     0         0.000       0       0  00:00      94.44
  RYCB183                   0.000       0     0     0         0.000       0       0  00:00      79.81
  RYCB186                   0.000       0     0     0         0.000       0       0  00:00      42.75
  RYCB189                   0.000       0     0     0         0.000       0       0  00:00      98.81
  RYCB193                   0.000       0     0     0         0.000       0       0  00:00      69.61
  RYCB196                   0.000       0     0     0         0.000       0       0  00:00      94.63
  RYCB199                   0.000       0     0     0         0.000       0       0  00:00      76.79
  RYCB201                   0.000       0     0     0         0.000       0       0  00:00      79.69
  SWMF-E                   12.259      46     0     0        22.199      84       0  07:09    1052.69
  Vortech-1929CIP-A         0.001      16     0     0         0.002      41       0  06:32    2048.50
  Vortech-1929CIP-B         0.001      16     0     0         0.002      41       0  06:32    2054.21
  Vortech-9000              0.001      26     0     0         0.002      47       0  07:02     178.49


  ***********************
  Outfall Loading Summary
  ***********************

  -----------------------------------------------------------
                         Flow       Avg       Max       Total
                         Freq      Flow      Flow      Volume
  Outfall Node           Pcnt       LPS       LPS    10^6 ltr
  -----------------------------------------------------------
  OF-CarpCreek          60.62     12.88    360.67       0.767
  OF-CoolTrenchOut      97.83     12.70     19.36       1.050
  OF-SWMF               98.01    279.61   1033.33      22.279
  OF-Unc-S               0.00      0.00      0.00       0.000
  -----------------------------------------------------------
  System                64.12    305.20   1084.51      24.096


  ********************
  Link Flow Summary
  ********************
```

West Capital Airpark - Phase 1B-2 Residential
PCSWMM Model Output - ULTIMATE
(100-year, 12-hour SCS Type II Storm)

```
-----------------------------------------------------------------------------
                              Maximum  Time of Max   Maximum    Max/    Max/
                               |Flow|   Occurrence   |Veloc|    Full    Full
Link                 Type         LPS  days hr:min     m/sec    Flow   Depth
-----------------------------------------------------------------------------
CAP-227              CONDUIT     90.95     0  06:31      1.13    0.23    0.32
CoolingTrench1       CONDUIT     19.36     0  07:09      0.62   63.70    1.00
CoolingTrench2       CONDUIT     19.36     0  07:09      0.62   10.42    1.00
Culvert              CONDUIT    225.41     0  07:08      3.19    3.21    1.00
FUT-Maj              CONDUIT      0.00     0  00:00      0.00    0.00    0.02
MH201-CAP            CONDUIT     66.15     0  06:30      0.95    0.16    0.31
MH213-227            CONDUIT     24.71     0  06:07      0.79    0.39    0.44
MH215-213            CONDUIT      0.39     0  06:04      0.06    0.01    0.20
MH215-217            CONDUIT      0.12     0  06:21      0.28    0.00    0.04
MH217-219            CONDUIT      0.12     0  06:40      0.21    0.00    0.23
MH219-229            CONDUIT     38.56     0  06:30      0.98    0.53    0.53
MH227-229            CONDUIT    140.06     0  06:30      1.10    0.25    0.38
MH229-233            CONDUIT    223.03     0  06:30      1.45    0.39    0.43
MH233-235            CONDUIT    247.80     0  06:31      1.48    0.46    0.46
MH235-237            CONDUIT    272.61     0  06:31      1.49    0.47    0.49
MH237-241            CONDUIT    297.39     0  06:31      1.57    0.50    0.51
MH241-243            CONDUIT    322.16     0  06:31      1.55    0.59    0.55
MH243-245            CONDUIT    371.70     0  06:32      1.66    0.68    0.58
MH245-247            CONDUIT    421.50     0  06:32      1.63    0.67    0.63
MH247-249            CONDUIT    442.16     0  06:28      1.68    0.62    0.77
MH249-251            CONDUIT    460.99     0  06:24      1.69    0.64    0.94
MH251-253            CONDUIT    449.81     0  06:24      1.57    0.65    1.00
MH253-259            CONDUIT    566.35     0  06:33      1.46    0.68    1.00
MH259-260            CONDUIT    559.33     0  06:34      1.21    0.67    1.00
MH260-261            CONDUIT    574.85     0  06:33      1.04    0.64    1.00
MH261-OGS            CONDUIT    179.52     0  06:10      0.80    0.61    1.00
MH263-265            CONDUIT    177.40     0  06:10      0.80    0.65    1.00
MH265-HW2            CONDUIT    567.66     0  06:33      1.03    0.58    1.00
MH266-267            CONDUIT    130.72     0  06:28      1.43    0.95    0.84
MH267(1B)-245        CONDUIT     50.95     0  06:36      1.25    0.84    0.76
MH267-268            CONDUIT    137.32     0  06:32      1.20    0.72    0.91
MH268-269            CONDUIT    187.80     0  06:19      1.34    0.74    0.98
MH269-270            CONDUIT    502.40     0  06:30      1.36    1.13    1.00
MH270-271            CONDUIT    575.14     0  06:30      1.56    1.33    1.00
MH271-272            CONDUIT    573.25     0  06:31      1.26    1.15    1.00
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MH272-273            CONDUIT    660.36     0  06:31      1.45    1.34    1.00
MH273-274            CONDUIT    776.77     0  06:32      1.18    0.82    1.00
MH274-275            CONDUIT    857.51     0  06:32      1.69    0.92    1.00
MH275-276            CONDUIT   4821.17     0  06:32      2.31    0.86    0.94
MH276-OGSa           CONDUIT   2048.49     0  06:32      2.29    1.07    1.00
MH276-OGSb           CONDUIT   2049.82     0  06:33      2.29    1.07    1.00
MH277-278            CONDUIT   2048.37     0  06:32      2.29    1.19    1.00
MH278-191            CONDUIT   4820.99     0  06:33      2.53    0.91    0.88
MH279-269            CONDUIT    148.46     0  06:39      1.02    1.08    1.00
MH280-273            CONDUIT    120.72     0  06:37      0.93    0.55    1.00
MH281-269            CONDUIT    144.85     0  06:30      1.38    0.94    0.87
MHFut-278            CONDUIT   2049.33     0  06:33      2.29    1.19    1.00
MS01                 CONDUIT    135.53     0  06:30      0.60    0.00    0.09
MS02                 CONDUIT    135.12     0  06:31      0.71    0.02    0.14
MS03                 CONDUIT    134.17     0  06:31      0.67    0.01    0.14
MS04                 CONDUIT    133.67     0  06:32      0.12    0.00    0.57
MS05                 CONDUIT     42.90     0  06:30      0.13    0.00    0.11
MS06                 CONDUIT     42.76     0  06:30      0.54    0.00    0.07
MS07                 CONDUIT     42.15     0  06:31      0.69    0.00    0.05
MS08                 CONDUIT     41.01     0  06:32      0.03    0.00    0.52
MS11                 CONDUIT   1033.33     0  07:09      1.00    0.23    0.54
MS12                 CONDUIT   1033.33     0  07:09      1.15    0.21    0.50
OGS-277              CONDUIT   2048.50     0  06:32      2.29    1.02    1.00
OGS-MH263            CONDUIT    178.49     0  06:10      0.80    1.01    1.00
OGS-MHFut            CONDUIT   2054.21     0  06:33      2.30    1.02    1.00
OVF-RYCB171          CONDUIT     12.94     0  06:30      0.26    0.00    0.13
OVF-RYCB178          CONDUIT     28.07     0  06:30      0.27    0.01    0.19
OVF-RYCB183          CONDUIT     40.57     0  06:30      0.40    0.01    0.18
OVF-RYCB186          CONDUIT     21.53     0  06:30      0.02    0.00    0.54
OVF-RYCB189          CONDUIT     19.01     0  06:29      0.13    0.00    0.18
OVF-RYCB193          CONDUIT     17.75     0  06:30      0.18    0.01    0.18
OVF-RYCB196          CONDUIT     57.94     0  06:30      0.68    0.01    0.17
OVF-RYCB199          CONDUIT     32.27     0  06:30      0.28    0.01    0.20
OVF-RYCB201          CONDUIT      0.00     0  00:00      0.00    0.00    0.00
RYCB171-CB170        CONDUIT     66.14     0  06:30      1.31    2.47    1.00
RYCB178-CB177        CONDUIT     66.37     0  06:30      1.31    2.40    1.00
RYCB183-CB184        CONDUIT     39.25     0  06:31      0.77    1.36    1.00
RYCB186-CB187        CONDUIT     21.21     0  06:30      0.42    0.74    1.00
RYCB189-CB188        CONDUIT     80.50     0  06:31      1.59    2.86    1.00
RYCB193-CB194        CONDUIT     51.86     0  06:30      1.02    1.85    1.00
RYCB196-CB195        CONDUIT     36.69     0  06:30      0.72    1.42    1.00
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  RYCB199-CB200        CONDUIT     44.53     0  06:30      0.88     1.67     1.00
  RYCB201-CB176        CONDUIT     79.69     0  06:30      1.57     2.47     1.00
  Street10-A           CHANNEL      5.29     0  06:32      0.23     0.00     0.03
  Street10-B           CHANNEL      8.64     0  06:29      0.10     0.00     0.09
  Street10-C           CHANNEL     15.27     0  06:30      0.12     0.00     0.09
  Street10-D           CHANNEL     15.90     0  06:30      0.25     0.00     0.06
  Street10-E           CHANNEL      2.26     0  06:30      0.30     0.00     0.05
  Street10-F           CHANNEL      5.26     0  06:27      0.08     0.00     0.09
  Street10-G           CHANNEL     47.25     0  06:30      0.29     0.00     0.16
  Street10-H           CHANNEL      0.00     0  00:00      0.00     0.00     0.08
  Street11-A           CHANNEL     14.03     0  06:30      0.31     0.00     0.04
  Street11-B           CHANNEL     25.72     0  06:30      0.36     0.00     0.10
  Street11-C           CHANNEL      0.00     0  00:00      0.00     0.00     0.08
  Street11-D           CHANNEL      0.00     0  00:00      0.00     0.00     0.03
  Street11-E           CHANNEL      0.00     0  00:00      0.00     0.00     0.03
  Street11-F           CHANNEL      0.00     0  00:00      0.00     0.00     0.02
  Street11-G           CHANNEL      9.85     0  06:30      0.26     0.00     0.04
  Street11-H           CHANNEL      0.00     0  00:00      0.00     0.00     0.02
  Street11-I           CHANNEL      0.00     0  00:00      0.00     0.00     0.08
  Street11-J           CHANNEL      0.00     0  00:00      0.00     0.00     0.08
  Street11-K           CHANNEL      0.00     0  00:00      0.00     0.00     0.05
  Street1-A            CHANNEL      0.00     0  00:00      0.00     0.00     0.12
  Street1-B            CHANNEL     98.56     0  06:30      0.33     0.00     0.16
  Street1-C            CHANNEL     66.68     0  06:30      0.38     0.00     0.12
  Street1-D            CHANNEL     26.01     0  06:30      0.41     0.00     0.10
  Street1-E            CHANNEL     16.18     0  06:30      0.22     0.00     0.05
  Street1-F            CHANNEL      0.00     0  00:00      0.00     0.00     0.03
  Street8-A            CHANNEL     16.62     0  06:30      0.15     0.00     0.10
  Street8-B            CHANNEL     10.00     0  06:14      0.07     0.00     0.09
  Street8-C            CHANNEL      6.52     0  06:30      0.19     0.00     0.03
  Street8-D            CHANNEL     12.05     0  06:30      0.22     0.00     0.04
  Street9-A            CHANNEL    132.35     0  06:30      0.20     0.00     0.14
  Street9-B            CHANNEL    152.21     0  06:30      0.39     0.00     0.17
  Street9-C            CHANNEL    129.35     0  06:30      0.49     0.00     0.09
  Street9-D            CHANNEL     99.44     0  06:30      0.45     0.00     0.08
  Street9-E            CHANNEL     86.55     0  06:30      0.46     0.00     0.08
  Street9-F            CHANNEL    120.72     0  06:30      0.69     0.00     0.08
  Street9-G            CHANNEL    103.06     0  06:30      0.47     0.00     0.08
  Street9-H            CHANNEL     81.91     0  06:30      0.43     0.00     0.08
  Street9-I            CHANNEL     60.91     0  06:30      0.39     0.00     0.07
  Street9-J            CHANNEL     38.88     0  06:30      0.34     0.00     0.06
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  Street9-K            CHANNEL     27.42     0  06:30      0.31     0.00     0.05
  Street9-L            CHANNEL     13.26     0  06:30      0.23     0.00     0.04
  Street9-M            CHANNEL     11.28     0  06:30      0.29     0.00     0.04
  Street9-N            CHANNEL     25.56     0  06:30      0.46     0.00     0.04
  Street9-O            CHANNEL      0.00     0  00:00      0.00     0.00     0.02
  OCB118               ORIFICE     49.35     0  06:30                        1.00
  OCB119               ORIFICE     49.35     0  06:30                        1.00
  OCB126-127           ORIFICE     50.95     0  06:36                        1.00
  OCB161A              ORIFICE     53.76     0  06:30                        1.00
  OCB161B              ORIFICE     37.73     0  06:30                        1.00
  OCB163A              ORIFICE     27.35     0  06:30                        1.00
  OCB163B              ORIFICE     27.35     0  06:30                        1.00
  OCB164A              ORIFICE     37.57     0  06:30                        1.00
  OCB164B              ORIFICE     37.57     0  06:30                        1.00
  OCB165A              ORIFICE     52.26     0  06:30                        1.00
  OCB165B              ORIFICE     36.69     0  06:30                        1.00
  OCB166A              ORIFICE     20.66     0  06:31                        1.00
  OCB166B              ORIFICE     16.15     0  06:31                        1.00
  OCB167A              ORIFICE     20.82     0  06:30                        1.00
  OCB167B              ORIFICE     20.82     0  06:30                        1.00
  ORYCB171             ORIFICE     66.15     0  06:31                        1.00
  ORYCB178             ORIFICE     66.37     0  06:30                        1.00
  ORYCB183             ORIFICE     39.26     0  06:31                        1.00
  ORYCB186             ORIFICE     21.21     0  06:30                        1.00
  ORYCB189             ORIFICE     80.62     0  06:31                        1.00
  ORYCB193             ORIFICE     51.86     0  06:30                        1.00
  ORYCB196             ORIFICE     36.69     0  06:30                        1.00
  ORYCB199             ORIFICE     44.53     0  06:30                        1.00
  ORYCB201             ORIFICE     79.68     0  06:30                        1.00
  MH261-265            WEIR       879.03     0  06:39                        1.00
  MH276-278            WEIR       724.82     0  06:33                        0.12
  W1                   WEIR       807.93     0  07:09                        1.00
  W2                   WEIR         0.00     0  00:00                        0.00
  OCB120-121           DUMMY       24.80     0  06:05
  OCB122-123           DUMMY       24.80     0  06:05
  OCB124-125           DUMMY       24.80     0  06:11
  OCB128-129           DUMMY       24.80     0  06:05
  OCB130-131           DUMMY       24.80     0  06:07
  OCB132-133           DUMMY       24.80     0  06:09
  OCB134-135           DUMMY       24.80     0  06:11
  OCB136-137           DUMMY       24.80     0  06:15
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  OCB138-139          DUMMY       24.80     0  06:19
  OCB140-141          DUMMY       24.51     0  06:30
  OCB142-143          DUMMY       24.80     0  06:18
  OCB157-158          DUMMY       24.80     0  06:03
  OCB159-160          DUMMY       38.49     0  06:30
  OCB162              DUMMY       63.99     0  06:30
  OCB168              DUMMY       37.72     0  06:30
  OCB169              DUMMY       38.70     0  06:20
  O-FUT               DUMMY     3963.42     0  06:05


  ***************************
  Flow Classification Summary
  ***************************

  ---------------------------------------------------------------------------------------
                      Adjusted    ---------- Fraction of Time in Flow Class ---------- 
                       /Actual         Up    Down  Sub   Sup   Up    Down  Norm  Inlet 
  Conduit               Length    Dry  Dry   Dry   Crit  Crit  Crit  Crit  Ltd   Ctrl  
  ---------------------------------------------------------------------------------------
  CAP-227                 1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
  CoolingTrench1          1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
  CoolingTrench2          1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
  Culvert                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
  FUT-Maj                 1.00   0.74  0.26  0.00  0.00  0.00  0.00  0.00  0.00  0.00
  MH201-CAP               1.00   0.02  0.00  0.00  0.98  0.00  0.00  0.00  0.93  0.00
  MH213-227               1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
  MH215-213               1.00   0.93  0.00  0.00  0.04  0.00  0.00  0.03  0.01  0.00
  MH215-217               1.00   0.27  0.67  0.00  0.07  0.00  0.00  0.00  0.74  0.00
  MH217-219               1.00   0.26  0.00  0.00  0.02  0.00  0.00  0.71  0.03  0.00
  MH219-229               1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
  MH227-229               1.00   0.02  0.00  0.00  0.08  0.00  0.00  0.90  0.03  0.00
  MH229-233               1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
  MH233-235               1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
  MH235-237               1.00   0.02  0.00  0.00  0.02  0.02  0.00  0.94  0.00  0.00
  MH237-241               1.00   0.02  0.00  0.00  0.02  0.00  0.00  0.97  0.00  0.00
  MH241-243               1.00   0.02  0.00  0.00  0.02  0.00  0.00  0.96  0.00  0.00
  MH243-245               1.00   0.02  0.00  0.00  0.01  0.00  0.00  0.98  0.00  0.00
  MH245-247               1.00   0.02  0.00  0.00  0.17  0.00  0.00  0.81  0.06  0.00
  MH247-249               1.00   0.02  0.00  0.00  0.40  0.00  0.00  0.58  0.15  0.00
  MH249-251               1.00   0.02  0.00  0.00  0.55  0.00  0.00  0.43  0.16  0.00
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  MH251-253               1.00   0.02  0.00  0.00  0.68  0.00  0.00  0.30  0.12  0.00
  MH253-259               1.00   0.02  0.00  0.00  0.76  0.00  0.00  0.23  0.01  0.00
  MH259-260               1.00   0.00  0.02  0.00  0.92  0.00  0.00  0.06  0.11  0.00
  MH260-261               1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
  MH261-OGS               1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
  MH263-265               1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
  MH265-HW2               1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
  MH266-267               1.00   0.02  0.00  0.00  0.01  0.00  0.00  0.98  0.00  0.00
  MH267(1B)-245           1.00   0.04  0.00  0.00  0.00  0.00  0.00  0.96  0.00  0.00
  MH267-268               1.00   0.02  0.00  0.00  0.04  0.00  0.00  0.94  0.01  0.00
  MH268-269               1.00   0.02  0.00  0.00  0.01  0.00  0.00  0.97  0.00  0.00
  MH269-270               1.00   0.02  0.00  0.00  0.04  0.00  0.00  0.95  0.00  0.00
  MH270-271               1.00   0.02  0.00  0.00  0.03  0.00  0.00  0.95  0.00  0.00
  MH271-272               1.00   0.02  0.00  0.00  0.11  0.00  0.00  0.87  0.00  0.00
  MH272-273               1.00   0.02  0.00  0.00  0.11  0.00  0.00  0.87  0.05  0.00
  MH273-274               1.00   0.02  0.00  0.00  0.98  0.00  0.00  0.00  0.58  0.00
  MH274-275               1.00   0.02  0.00  0.00  0.49  0.00  0.00  0.50  0.14  0.00
  MH275-276               1.00   0.02  0.00  0.00  0.74  0.00  0.00  0.25  0.00  0.00
  MH276-OGSa              1.00   0.02  0.00  0.00  0.91  0.03  0.00  0.05  0.00  0.00
  MH276-OGSb              1.00   0.02  0.00  0.00  0.91  0.03  0.00  0.05  0.00  0.00
  MH277-278               1.00   0.02  0.00  0.00  0.98  0.00  0.00  0.00  0.00  0.00
  MH278-191               1.00   0.00  0.00  0.00  0.74  0.00  0.00  0.26  0.00  0.00
  MH279-269               1.00   0.02  0.00  0.00  0.02  0.00  0.00  0.97  0.00  0.00
  MH280-273               1.00   0.02  0.00  0.00  0.03  0.00  0.00  0.96  0.00  0.00
  MH281-269               1.00   0.02  0.00  0.00  0.00  0.00  0.00  0.98  0.00  0.00
  MHFut-278               1.00   0.02  0.00  0.00  0.98  0.00  0.00  0.00  0.00  0.00
  MS01                    1.00   0.65  0.18  0.00  0.17  0.00  0.00  0.00  0.73  0.00
  MS02                    1.00   0.63  0.02  0.00  0.35  0.00  0.00  0.00  0.66  0.00
  MS03                    1.00   0.28  0.35  0.00  0.37  0.00  0.00  0.00  0.73  0.00
  MS04                    1.00   0.00  0.28  0.00  0.72  0.00  0.00  0.00  0.73  0.00
  MS05                    1.00   0.27  0.71  0.00  0.02  0.00  0.00  0.00  0.72  0.00
  MS06                    1.00   0.82  0.16  0.00  0.02  0.00  0.00  0.00  0.73  0.00
  MS07                    1.00   0.74  0.08  0.00  0.17  0.01  0.00  0.00  0.72  0.00
  MS08                    1.00   0.00  0.74  0.00  0.26  0.00  0.00  0.00  0.74  0.00
  MS11                    1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
  MS12                    1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
  OGS-277                 1.00   0.02  0.00  0.00  0.97  0.00  0.00  0.01  0.00  0.00
  OGS-MH263               1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
  OGS-MHFut               1.00   0.02  0.00  0.00  0.97  0.00  0.00  0.01  0.00  0.00
  OVF-RYCB171             1.00   0.98  0.00  0.00  0.00  0.00  0.00  0.02  0.00  0.00
  OVF-RYCB178             1.00   0.98  0.00  0.00  0.02  0.00  0.00  0.00  0.74  0.00
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OVF-RYCB183            1.00   0.98  0.00  0.00  0.02  0.00  0.00  0.00  0.73  0.00
OVF-RYCB186            1.00   0.00  0.98  0.00  0.02  0.00  0.00  0.00  0.74  0.00
OVF-RYCB189            1.00   0.98  0.00  0.00  0.02  0.00  0.00  0.00  0.72  0.00
OVF-RYCB193            1.00   0.98  0.01  0.00  0.02  0.00  0.00  0.00  0.74  0.00
OVF-RYCB196            1.00   0.98  0.00  0.00  0.02  0.00  0.00  0.00  0.74  0.00
OVF-RYCB199            1.00   0.98  0.00  0.00  0.02  0.00  0.00  0.00  0.00  0.00
OVF-RYCB201            1.00   1.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
RYCB171-CB170          1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB178-CB177          1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB183-CB184          1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB186-CB187          1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB189-CB188          1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB193-CB194          1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB196-CB195          1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB199-CB200          1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
RYCB201-CB176          1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00
Street10-A             1.00   0.28  0.00  0.00  0.53  0.19  0.00  0.00  0.01  0.00
Street10-B             1.00   0.27  0.01  0.00  0.01  0.00  0.00  0.71  0.01  0.00
Street10-C             1.00   0.27  0.01  0.00  0.02  0.00  0.00  0.71  0.02  0.00
Street10-D             1.00   0.27  0.00  0.00  0.01  0.00  0.00  0.72  0.00  0.00
Street10-E             1.00   0.27  0.01  0.00  0.01  0.00  0.00  0.72  0.01  0.00
Street10-F             1.00   0.27  0.01  0.00  0.01  0.00  0.00  0.71  0.01  0.00
Street10-G             1.00   0.27  0.00  0.00  0.02  0.00  0.00  0.71  0.00  0.00
Street10-H             1.00   0.27  0.73  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-A             1.00   0.02  0.04  0.00  0.78  0.16  0.00  0.00  0.46  0.00
Street11-B             1.00   0.30  0.00  0.00  0.02  0.00  0.00  0.68  0.02  0.00
Street11-C             1.00   0.98  0.02  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-D             1.00   0.27  0.73  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-E             1.00   0.27  0.73  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-F             1.00   0.34  0.66  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-G             1.00   0.02  0.32  0.00  0.60  0.07  0.00  0.00  0.75  0.00
Street11-H             1.00   0.34  0.66  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-I             1.00   0.98  0.02  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-J             1.00   0.98  0.02  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street11-K             1.00   0.98  0.02  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street1-A              1.00   0.96  0.04  0.00  0.00  0.00  0.00  0.00  0.00  0.00
Street1-B              1.00   0.03  0.00  0.00  0.04  0.00  0.00  0.93  0.05  0.00
Street1-C              1.00   0.03  0.00  0.00  0.02  0.00  0.00  0.95  0.01  0.00
Street1-D              1.00   0.02  0.00  0.00  0.02  0.00  0.00  0.96  0.02  0.00
Street1-E              1.00   0.02  0.00  0.00  0.93  0.05  0.00  0.00  0.00  0.00
Street1-F              1.00   0.27  0.73  0.00  0.00  0.00  0.00  0.00  0.00  0.00
```

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Street8-A              1.00   0.34  0.05  0.00  0.61  0.01  0.00  0.00  0.93  0.00
Street8-B              1.00   0.02  0.25  0.00  0.61  0.12  0.00  0.00  0.25  0.00
Street8-C              1.00   0.02  0.26  0.00  0.61  0.12  0.00  0.00  0.27  0.00
Street8-D              1.00   0.34  0.01  0.00  0.28  0.37  0.00  0.00  0.01  0.00
Street9-A              1.00   0.83  0.01  0.00  0.02  0.00  0.00  0.15  0.72  0.00
Street9-B              1.00   0.33  0.00  0.00  0.02  0.00  0.00  0.65  0.03  0.00
Street9-C              1.00   0.30  0.03  0.00  0.53  0.14  0.00  0.00  0.74  0.00
Street9-D              1.00   0.30  0.02  0.00  0.67  0.00  0.00  0.00  0.98  0.00
Street9-E              1.00   0.02  0.01  0.00  0.82  0.15  0.00  0.00  0.49  0.00
Street9-F              1.00   0.02  0.33  0.00  0.08  0.57  0.00  0.00  0.48  0.00
Street9-G              1.00   0.32  0.02  0.00  0.44  0.22  0.00  0.00  0.03  0.00
Street9-H              1.00   0.31  0.03  0.00  0.61  0.05  0.00  0.00  0.98  0.00
Street9-I              1.00   0.32  0.03  0.00  0.61  0.04  0.00  0.00  0.97  0.00
Street9-J              1.00   0.34  0.03  0.00  0.63  0.00  0.00  0.00  0.97  0.00
Street9-K              1.00   0.36  0.01  0.00  0.34  0.29  0.00  0.00  0.96  0.00
Street9-L              1.00   0.31  0.03  0.00  0.37  0.30  0.00  0.00  0.45  0.00
Street9-M              1.00   0.04  0.02  0.00  0.51  0.43  0.00  0.00  0.34  0.00
Street9-N              1.00   0.04  0.35  0.00  0.08  0.54  0.00  0.00  0.51  0.00
Street9-O              1.00   0.39  0.61  0.00  0.00  0.00  0.00  0.00  0.00  0.00


*************************
Conduit Surcharge Summary
*************************

----------------------------------------------------------------------------
                                                           Hours        Hours
                       --------- Hours Full --------   Above Full   Capacity
Conduit                 Both Ends  Upstream  Dnstream   Normal Flow    Limited
----------------------------------------------------------------------------
CoolingTrench1              24.00     24.00     24.00       23.25        23.36
CoolingTrench2              24.00     24.00     24.00       22.53        22.55
Culvert                     24.00     24.00     24.00       20.24        20.24
MH249-251                    0.01      0.01      0.14        0.01         0.01
MH251-253                    0.58      0.58      1.68        0.01         0.01
MH253-259                    1.73      1.73      4.77        0.01         0.01
MH259-260                    5.14      5.14      7.39        0.01         0.01
MH260-261                    8.04      8.04     11.80        0.01         0.01
MH261-OGS                   17.96     17.96     17.99        0.01         0.01
MH263-265                   18.06     18.06     18.18        0.01         0.04
MH265-HW2                   14.01     14.01     16.29        0.01         0.01
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MH267-268                   0.01      0.01      0.06      0.01         0.01
MH268-269                   0.01      0.01      0.20      0.01         0.01
MH269-270                   0.53      0.53      0.55      0.37         0.42
MH270-271                   0.56      0.56      0.57      0.56         0.54
MH271-272                   0.56      0.56      0.59      0.43         0.43
MH272-273                   0.61      0.61      0.64      0.52         0.58
MH273-274                   0.58      0.58      0.65      0.01         0.48
MH274-275                   0.65      0.65      0.69      0.01         0.39
MH276-OGSa                  2.60      2.60      2.80      0.69         0.69
MH276-OGSb                  2.59      2.59      2.80      0.69         0.68
MH277-278                   3.28      3.28      3.54      0.75         0.75
MH279-269                   0.40      0.42      0.40      0.30         0.40
MH280-273                   0.33      0.33      0.58      0.01         0.01
MH281-269                   0.01      0.06      0.01      0.01         0.01
MHFut-278                   3.28      3.28      3.54      0.74         0.76
MS04                        0.01      0.01      7.41      0.01         0.01
MS08                        0.01      0.01     17.47      0.01         0.01
OGS-277                     3.03      3.03      3.15      0.45         0.46
OGS-MH263                  17.99     17.99     18.06      0.03         0.03
OGS-MHFut                   3.03      3.03      3.15      0.45         0.35
OVF-RYCB186                 0.01      0.01     17.71      0.01         0.01
RYCB171-CB170              24.00     24.00     24.00      0.78         0.78
RYCB178-CB177              24.00     24.00     24.00      1.02         1.02
RYCB183-CB184              24.00     24.00     24.00      0.70         0.70
RYCB186-CB187              24.00     24.00     24.00      0.01         0.01
RYCB189-CB188              24.00     24.00     24.00      0.99         0.99
RYCB193-CB194              24.00     24.00     24.00      0.66         0.66
RYCB196-CB195              24.00     24.00     24.00      0.65         0.65
RYCB199-CB200              24.00     24.00     24.00      0.80         0.80
RYCB201-CB176              24.00     24.00     24.00      0.56         0.56


Analysis begun on:  Thu Feb  8 17:17:54 2024
Analysis ended on:  Thu Feb  8 17:18:04 2024
Total elapsed time: 00:00:10
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APPENDIX E
Stormwater Management Pond and Water Quality Treatment

1) Vortechs Model 9000 Sizing (from Phase 1B-1 Design)
2) Correspondence with Echelon Environmental for Sizing of Phase 1B-2 OGS Units
3) Parallel Vortechs Model 1929CIP Sizing
4) East Pond Stage-Area-Storage Curves
5) Access Road Culvert Sizing - HY-8 Output
6) East Pond Phase 1B-2 Inlet Riprap Sizing
7) East Pond Cooling Trench Calculations

Phase 1B-1 - OGS Sizing

VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON AN AVERAGE PARTICLE SIZE OF 80 MICRONS
WEST CAPITAL AIRPARK
CARP, ON
MODEL 9000 OFF-LINE
2

CONTECH
CONSTRUCTION PRODUCTS INC.

Design Ratio[1] = **(6.9 hectares) x (0.65) x (2.775) / (5.9 m2) = 2.1**

Bypass occurs at an elevation of 112.04m (at approximately 31 l/s/m2)

Rainfall Intensity mm/hr	Operating Rate[2] % of capacity	Flow Treated (l/s)	% Total Rainfall Volume[3]	Rmvl. Effcy[4] (%)	Rel. Effcy (%)
0.5	1.6	6.2	10.7%	98.0%	10.5%
1.0	3.1	12.4	9.3%	98.0%	9.1%
1.5	4.7	18.6	10.3%	98.0%	10.1%
2.0	6.3	24.8	8.6%	98.0%	8.4%
2.5	7.8	31.0	6.7%	97.6%	6.6%
3.0	9.4	37.2	5.8%	96.3%	5.6%
3.6	10.9	43.4	5.0%	96.0%	4.8%
4.1	12.5	49.6	4.4%	94.7%	4.1%
4.6	14.1	55.8	2.3%	92.8%	2.2%
5.1	15.6	62.0	4.2%	91.8%	3.8%
6.4	19.6	77.5	7.4%	88.0%	6.5%
7.6	23.5	93.0	4.0%	85.7%	3.5%
8.9	27.4	108.5	3.5%	83.8%	2.9%
10.2	31.3	124.0	1.8%	81.7%	1.5%
11.4	35.2	139.5	3.8%	79.4%	3.0%
12.7	39.1	155.0	1.4%	76.8%	1.1%
19.1	58.7	232.5	4.9%	59.3%	2.9%
25.4	78.2	310.0	1.9%	38.2%	0.7%
38.1	117.3	465.1	1.4%	8.0%	0.1%
					87.4%

% rain falling at >38.1 mm/hr or bypassing treatment = 2.5%
Assumed removal efficiency for bypassed flows = 0.0%
Estimated reduction in efficiency[5] = 6.5%
Predicted Net Annual Load Removal Efficiency = **81%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area
- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 l/s/m^2.
3 - Based on 10 years of rainfall data from Canadian Station 6105976, Ottawa CDA, ON
4 - Based on Contech Construction Products laboratory verified removal of an average particle size of 80 microns (see Vortechs Guide).
5- Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Calculated by:	JAK	11/7	Checked by:

Melanie Schroeder

From:	Shane <shane@echelonenvironmental.ca>
Sent:	Thursday, February 1, 2024 2:35 PM
To:	Aden Rongve
Cc:	Mike Petepiece; Melanie Schroeder; Alex McAuley; Mitch Parker
Subject:	RE: Carp Airport Phase 2B - Vortech Unit Sizing Request
Attachments:	VX TSSR - Carp Airport Subdivision - Parallel VC1929 CIP.pdf

Hello Aden,

Please see attached revised sizing based on the new parameters. There is no change to the selected model.

Thank you,

Shane Jensen
Project Manager
416-460-6328

From: Aden Rongve <a.rongve@novatech-eng.com>
Sent: Tuesday, January 30, 2024 1:41 PM
To: Shane <shane@echelonenvironmental.ca>
Cc: Mike Petepiece <m.petepiece@novatech-eng.com>; Melanie Schroeder <m.schroeder@novatech-eng.com>; Alex McAuley <a.mcauley@novatech-eng.com>; Mitch Parker <m.parker@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Shane,

As a follow up to the email below, we are providing the following drawing to assist with confirming the sizing. Please find attached.

- East Stormwater Management Facility – Phase 1B-2 Inlet Details (102085-SWMF5 rev5)

Thank you.

Aden Rongve, P.Eng., Project Engineer
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 ext 324 | Cell: 306.371.8110

From: Aden Rongve
Sent: Tuesday, January 30, 2024 10:40 AM
To: shane@echelonenvironmental.ca
Cc: Mike Petepiece <m.petepiece@novatech-eng.com>; Melanie Schroeder <m.schroeder@novatech-eng.com>; Alex McAuley <a.mcauley@novatech-eng.com>; Mitch Parker <m.parker@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Shane,

As discussed on the phone, there have been some minor changes to the C values of the proposed development. We would like to confirm if these changes have any impact on the treatment units selected (VX1929CIP).

Updated drainage parameters:

- Area tributary to units: 34.56 ha
- % Imperviousness: 62.5%
- C Value: 0.64
- Peak Flow 25mm Event: 3,340 L/s
- Peak Flow 100-year Event: 4,789 L/s (A portion of this will bypass the treatment units by overtopping the weir)
- Inlet Pipe Size: 1050mm
- Inlet Pipe Invert Elevation: 111.50
- Outlet Pipe Size: 1050mm
- Outlet Pipe Invert Elevation: 111.48
- T/G at the units: 115.40±
- 2-year Event downstream boundary condition (represents 2-year peak HGL in pond): 111.66
- TSS Removal: 80%

Note that the peak flows are for the ultimate buildout scenario (2 treatment units), with the flow being split equally between the units. It is also likely that our model is overestimating the peak flow in the 25mm event. Let us know if this may have impacts on the sizing.

Please let us know if you require any additional information.

Thank you.

Aden Rongve, P.Eng., Project Engineer
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 ext 324 | Cell: 306.371.8110

From: Shane <shane@echelonenvironmental.ca>
Sent: Tuesday, May 9, 2023 10:46 AM
To: Melanie Schroeder <m.schroeder@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Good morning Melanie,

The budget price for the VX1929CIP would be $225,000 each. This includes the technology transfer fee, contract and structural drawings, and frame and covers. Diversion structures, connecting pipes, cast in place work and installation of internals is not included.

Please note that this price is based on current rates and the unit to be installed in a future phase will need to be repriced for tender.

Please let me know if you have any questions.

Thank you,

Shane Jensen
Project Manager

Cell: 416-460-6328

From: Melanie Schroeder <m.schroeder@novatech-eng.com>
Sent: Monday, May 08, 2023 4:37 PM
To: Shane <shane@echelonenvironmental.ca>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Thank you. I appreciate it!

Melanie Schroeder, B.A.Sc., E.I.T. | Water Resources (She/Her)
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 296

From: Shane <shane@echelonenvironmental.ca>
Sent: Monday, May 8, 2023 4:36 PM
To: Melanie Schroeder <m.schroeder@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hi Melanie,

Sorry I was out on vacation. I will get it for you tomorrow.

Regards,

Shane Jensen
Project Manager
Cell: 416-460-6328

From: Melanie Schroeder <m.schroeder@novatech-eng.com>
Sent: Monday, May 08, 2023 4:34 PM
To: Shane <shane@echelonenvironmental.ca>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hi Shane,

Just wanted to follow up on the pricing for the Vortech units.

Thanks,

Melanie Schroeder, B.A.Sc., E.I.T. | Water Resources (She/Her)
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 296

From: Shane <shane@echelonenvironmental.ca>
Sent: Friday, April 21, 2023 5:10 PM
To: Melanie Schroeder <m.schroeder@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hello Melanie,

Please see attached sizings for the Vortechs and CDS options. As requested the OGS were designed to ultimately treat the entire site, with 1 OGS being installed at the start of the project and the second in the future.

Vortechs:
Selected model will be a VX1929CIP in parallel, the diversion structure would need to be at least 3m wide to allow for a 3m long weir. Included in the sizing is a sample drawing and typical layout drawing.

CDS:
Selected model is a PMSU5653_10 in parallel, with a diversion weir 3m long (same as Vortechs). Sizing includes sample drawing of the CDS and typical layout drawing.

Please note that as the design progresses I will need to complete a hydraulic analysis for a single unit and double unit to confirm the weir height. Will also have to look at the best approach to design the diversion structure to minimize any rework in future the future phase.

The manufacturer forgot to confirm pricing, I will send that over for the Vortechs units.

The CDS budget price, assuming a 2m typical depth to invert, is $115,000 each, diversion structures are not included.

Please let me know if you have any questions.

Thank you,

Shane Jensen
Project Manager
Cell: 416-460-6328

From: Melanie Schroeder <m.schroeder@novatech-eng.com>
Sent: Monday, April 17, 2023 11:28 AM
To: Shane <shane@echelonenvironmental.ca>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hi Shane,

I checked my high level / conceptual model and the total runoff from both sites are:

- Peak flow – 25mm event = 2,744 L/s
- Peak flow – 100-year event = 12,227 L/s

Note that these flows might be lower at detailed design due to routing. The conceptual model has lumped catchments for each phase and assumes all the runoff goes to the OGS unit whereas in larger storms some of the runoff will be redirected to the pond by major flows and not go through the OGS unit. These flows also do not account for a bypass in the 100-year event.

Thanks,

Melanie Schroeder, B.A.Sc., E.I.T. | Water Resources (She/Her)
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 296

From: Shane <shane@echelonenvironmental.ca>
Sent: Friday, April 14, 2023 4:18 PM
To: Melanie Schroeder <m.schroeder@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hello Melanie,

I will work on the 2 options. Is it ok to add the peak flow from 2b and future?

Regards,

Shane Jensen
Project Manager
Cell: 416-460-6328

From: Melanie Schroeder <m.schroeder@novatech-eng.com>
Sent: Friday, April 14, 2023 3:52 PM
To: Shane <shane@echelonenvironmental.ca>
Subject: Re: Carp Airport Phase 2B - Vortech Unit Sizing Request

Thanks for the info Shane!

I forwarded the information you provided to the project managers, and they wanted to know if it was possible to split the flows from both Phase 2B and the future phase 50/50 between two parallel units. The first unit would be constructed for Phase 2B and be oversized. The second would be installed after the first unit is at capacity (due to some of the future lands being developed) and would accommodate the rest of the future lands. We would like to see the sizing options with using CDS and vortech units (i.e., one option with two parallel vortech units and one option with two parallel CDS units).

The overall drainage information for both phases going to the units would be as follows:
Area tributary to units: 35.81 ha
Overall % Impervious: 59.9%
Overall C value: 0.62
TSS removal = 80%

Let me know if you have any questions or require any additional information.

Thanks,

Melanie Schroeder, B.A.Sc., E.I.T. | Water Resources (She/Her)
NOVATECH
Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 296

From: Shane <shane@echelonenvironmental.ca>
Sent: Monday, April 10, 2023 3:12 PM
To: Melanie Schroeder <m.schroeder@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hello Melanie,

I hope you had a good long weekend.

I have been working with the manufacturer on this design. The site is a little too large to have a new Vortechs on the main line for the future phase. We recommend having the future on a second line that will connect when it is installed. The selected Vortechs unit is a VX 2436CIP (Cast in Place), the area is too large to have a precast option.

The VX 2436CIP would need to have a minimum 2400mm long diversion weir in the diversion structure.

As an alternate I also ran a CDS sizing as an option, the CDS is deeper, but it is a precast model and has a lower cost. Please let me know if you have any questions.

VX 2436CIP = $270,000 for the Technology transfer fee, structural Vault design, internals. The concrete work, installation and assemble of the internals is by others.

CDS option: PMSU5678_10 - $150,000, this includes precast, internals. Installation, by others.

Please note that the budget price does not include the diversion structures or connecting pipe.

Once the best option is selected please let me know when you go into a more detailed design.
Thank you,

Shane Jensen
Project Manager
Cell: 416-460-6328

From: Melanie Schroeder <m.schroeder@novatech-eng.com>
Sent: Monday, April 03, 2023 5:03 PM
To: Shane <shane@echelonenvironmental.ca>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hi Shane,

I think it will likely be similar to the Phase 2B unit since they will be in a similar location with a similar outlet. Phase 2B had 2.87m from T/G to outlet invert, so hopefully any additional unit will be in the same ballpark of depth to invert.

Thanks,

Melanie Schroeder, B.A.Sc., E.I.T. | Water Resources (She/Her)

NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 296

From: Shane <shane@echelonenvironmental.ca>
Sent: Monday, April 3, 2023 2:58 PM
To: Melanie Schroeder <m.schroeder@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hello Melanie,

1 more question. Do you have an approximate top of grade to outlet invert?

Thank you,

Shane Jensen
Project Manager
Cell: 416-460-6328

From: Melanie Schroeder <m.schroeder@novatech-eng.com>
Sent: Friday, March 31, 2023 12:05 PM
To: Shane <shane@echelonenvironmental.ca>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

The anticipated peak flow from the 28.65ha area for the 25mm event (design event) is approximately 2,500 L/s. This is based on a high-level modelling exercise and may change at detailed design in the future. The 100-year flow will be approximately 9,650 L/s, which the majority will go through the by-pass.

Let me know if you require any other information.

Thanks,

Melanie Schroeder, B.A.Sc., E.I.T. | Water Resources (She/Her)
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 296

From: Shane <shane@echelonenvironmental.ca>
Sent: Thursday, March 30, 2023 2:26 PM
To: Melanie Schroeder <m.schroeder@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Ok, is it possible to provide an approximate peak flow? Once I get that I can see what model sizes we are looking at. We can adjust once the modeling is completed.

Regards,

Shane Jensen
Project Manager
Cell: 416-460-6328

From: Melanie Schroeder <m.schroeder@novatech-eng.com>
Sent: Thursday, March 30, 2023 2:24 PM
To: Shane <shane@echelonenvironmental.ca>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Thanks Shane!

The 28.65ha is just for the future phase. With the 7.162ha for Phase 2B the total tributary area would be 35.812ha.

It would be good to know if we could have them on the same sewer line. We do have the space for 2 sewer lines that connect downstream before entering the pond, but it would be nice to know our options.

Thanks,

Melanie Schroeder, B.A.Sc., E.I.T. | Water Resources (She/Her)
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 296

From: Shane <shane@echelonenvironmental.ca>
Sent: Thursday, March 30, 2023 1:27 PM
To: Melanie Schroeder <m.schroeder@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hello Melanie,

Thank you for the sizing request. I will discuss some options with the manufacturer.

IS the 28.65ha future phase inclusive of the 2B phase? I would need the flow to correctly size the Vortechs to ensure we hit the right rainfall capture rate.

I will look into the possibility of having a parallel Vortechs, with 1 unit being installed for the 2B and the second being installed in the future, which would allow for 1 sewer line for both sites.

Regards,

Shane Jensen
Project Manager
Cell: 416-460-6328

From: Melanie Schroeder <m.schroeder@novatech-eng.com>
Sent: Thursday, March 30, 2023 12:26 PM

To: Shane <shane@echelonenvironmental.ca>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hi Shane,

We wanted to look into options for future servicing of future phases for the proposed development. Both phases will discharge into a dry pond at the same inlet. We would want any treatment units to be offline Vortech units with bypass.

We wanted to consider the following options:

1. One large unit to service both phases
2. A separate unit for each phase

What would be some potential limitations to either option? Are there any considerations we would need to account for in the design?

One of our concerns with having one larger unit is how to accommodate the bypass for both units without impacting the upstream phases (especially the phase that will be built prior to any detailed design being done for the future phase). We are also concerned bout how large of a unit may be required and if a unit can even be made that large.

If we have two units, will they need to be connected to separate storm sewer systems and then connect downstream? Or could they be along the same pipe run and share a bypass manhole? Or could one be further downstream along the same pipe run? How would this impact the bypass to either unit?

The Phase 2B info and OGS sizing was discussed in the previous email chain. I am still working on getting some preliminary flows for the future phase, but I have the following info for the future phase:
Area tributary to unit: 28.65 ha
Overall % Impervious: 64.3%
Overall C value: 0.65
TSS removal = 70%

Let me know your thoughts about either option or if you think one large unit may not be feasible due to the large tributary area.

Thanks,

Melanie Schroeder, B.A.Sc., E.I.T. | Water Resources (She/Her)
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 296

From: Melanie Schroeder
Sent: Thursday, January 19, 2023 11:37 AM
To: Shane <shane@echelonenvironmental.ca>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Thanks for the updated sizing, Shane!
I appreciate the quick response.

Thanks,

Melanie Schroeder, B.A.Sc., E.I.T. | Water Resources
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 296 | Fax: 613.254.5867

From: Shane <shane@echelonenvironmental.ca>
Sent: Thursday, January 19, 2023 9:24 AM
To: Melanie Schroeder <m.schroeder@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Good morning Melanie,

Please see attached revised sizing. We ran 2 scenarios for your consideration.

VX9000 Offline – Achieves 80% TSS removal using an 80um PSD, original was using a 50um.
VX16000 Inline - Achieves 80% TSS removal using a 50um PSD.

Please let me know if you have any questions.

Thank you,

Shane Jensen
Project Manager
Cell: 416-460-6328

From: Melanie Schroeder <m.schroeder@novatech-eng.com>
Sent: Tuesday, January 17, 2023 11:30 AM
To: Shane <shane@echelonenvironmental.ca>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hi Shane,

Yes, only the TSS removal target has changed. All the other design information for the Vortech unit remains the same.

Thanks,

Melanie Schroeder, B.A.Sc., E.I.T. | Water Resources
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 296 | Fax: 613.254.5867

From: Shane <shane@echelonenvironmental.ca>
Sent: Tuesday, January 17, 2023 10:32 AM
To: Melanie Schroeder <m.schroeder@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hi Melanie,

Just to confirm, only the TSS removal target is changing, everything else remains the same?

Thank you,

Shane Jensen
Project Manager
Cell: 416-460-6328

From: Melanie Schroeder <m.schroeder@novatech-eng.com>
Sent: Tuesday, January 17, 2023 10:11 AM
To: Shane <shane@echelonenvironmental.ca>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Hi Shane,

I just got word that our quality treatment level has been updated to 80% TSS removal. Can you please provide updated sizing for this new treatment level.

Thank you so much,

Melanie Schroeder, B.A.Sc., E.I.T. | Water Resources
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 296 | Fax: 613.254.5867

From: Shane <shane@echelonenvironmental.ca>
Sent: Wednesday, January 11, 2023 10:43 AM
To: Melanie Schroeder <m.schroeder@novatech-eng.com>
Subject: RE: Carp Airport Phase 2B - Vortech Unit Sizing Request

Good morning Melanie,

Apologies for the delay.

Please see attached sizing for the Vortechs, the selected model is an Vortechs 9000 offline. Please note that the inlet pipe must enter the Vortechs at the corner perpendicular to the wall, I marked the sample drawing to illustrate.

If you have any questions please feel free to call.

Thank you,

Shane Jensen
Project Manager
Cell: 416-460-6328

From: Melanie Schroeder <m.schroeder@novatech-eng.com>
Sent: Friday, January 06, 2023 9:32 AM
To: Shane <shane@echelonenvironmental.ca>
Subject: Carp Airport Phase 2B - Vortech Unit Sizing Request

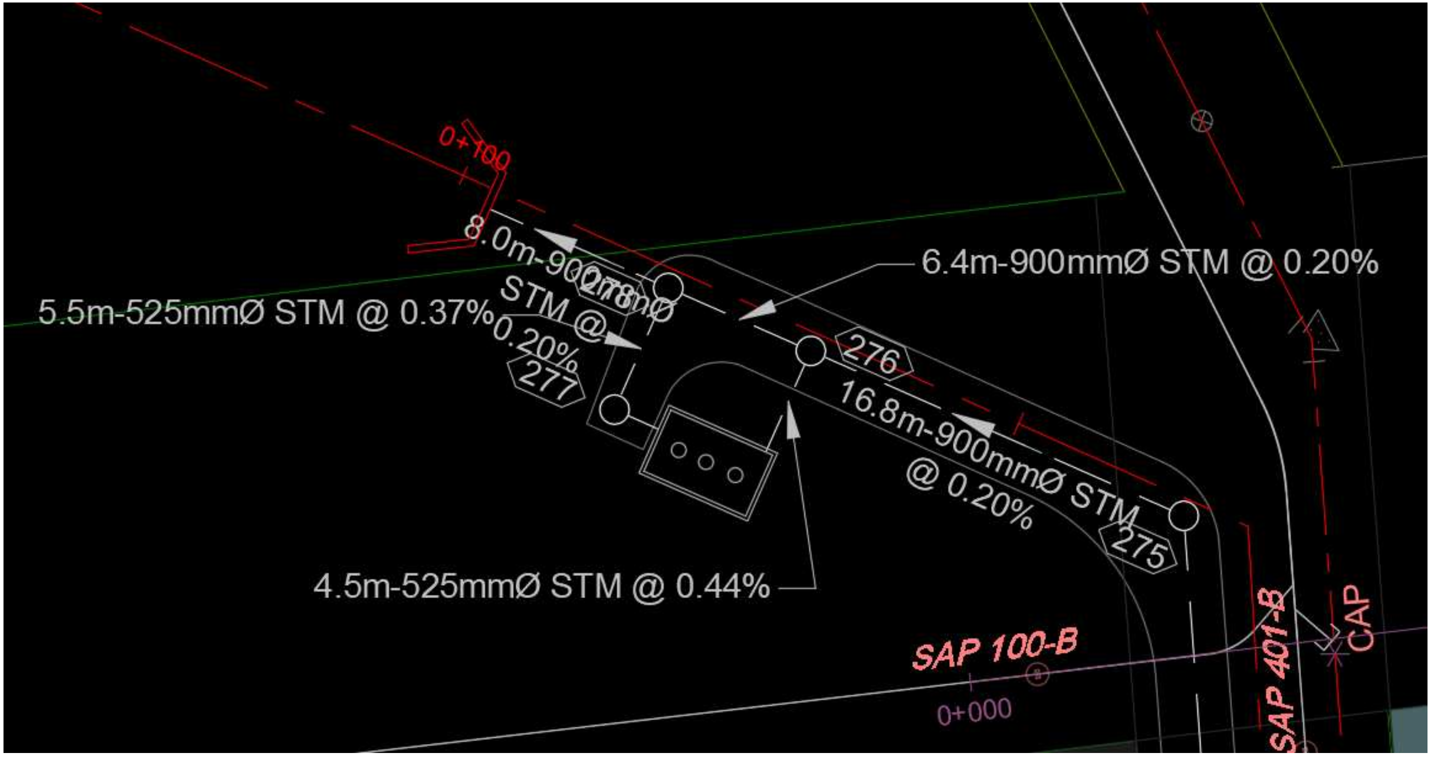
Hi Shane,

I'm looking to get a Vortech unit sized for a residential site outletting to an existing dry pond. There a bypass manhole sending all flows from the 25mm storm event from the current Phase of the subdivision (7.162 ha) through the water quality unit, with higher flows going over the bypass weir. I've included both the 25mm peak flows and the 100-year flows which will still go through the unit in case that's needed. Details as follows:

<u>Carp Airport Subdivision (1500 Thomas Argue Road, Ottawa)</u>
Area tributary to unit: 7.162 ha
Overall % Impervious: 42.2%
Overall C value: 0.50
TSS removal = 70%
25mm peak flow = 266 L/s
100-year flow = 394 L/s (total 100-year flow = 778 L/s but 384 L/s by-passes the unit)
Inlet pipe size = 525 mm
Inlet pipe invert = 112.18 m
Outlet pipe size = 525 mm
Outlet pipe invert = 112.16 m
T/G at the unit = 115.03m
Approx ground water elevation between111.59-112.55 based on nearest surrounding borehole info

The outlet is above the 100-year water level in the pond, so there is no downstream boundary condition.

The following is a screenshot of the design drawing for the location of the unit.



Please let me know if you need any further information.

Thank you very much,

Melanie Schroeder, B.A.Sc., E.I.T. | Water Resources

NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 296 | Fax: 613.254.5867

Phase 1B-2 & Future Development - OGS Sizing

VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON AN AVERAGE PARTICLE SIZE OF 80 MICRONS

CONTECH®
ENGINEERED SOLUTIONS

Carp Airport
Ottawa, ON
(2) Model 1929CIP In-Parallel
Whole Site

Design Ratio[1] = $\frac{(34.56 \text{ hectares}) \times (0.64) \times (2.775)}{(52.7 \text{ m2})}$ **= 1.16**

Bypass occurs at an elevation of 0.33 m (at approximately 7 l/s/m2)

Rainfall Intensity mm/hr	Operating Rate[2] % of capacity	Flow Treated (l/s)	% Total Rainfall Volume[3]	Rmvl. Effcy[4] (%)	Rel. Effcy (%)
0.5	0.9	15.2	9.2%	98.0%	9.0%
1.0	1.7	30.3	10.6%	98.0%	10.4%
1.5	2.6	45.5	9.9%	98.0%	9.7%
2.0	3.4	60.7	8.4%	97.9%	8.2%
2.5	4.3	75.9	7.7%	97.1%	7.5%
3.0	5.1	91.0	5.9%	96.3%	5.7%
3.5	6.0	106.2	4.4%	96.3%	4.2%
4.0	6.8	121.4	4.7%	95.6%	4.5%
4.5	7.7	136.6	3.3%	95.0%	3.2%
5.0	8.5	151.7	3.0%	93.7%	2.8%
6.0	10.3	183.9	5.4%	91.9%	5.0%
7.0	11.2	199.0	4.1%	91.0%	3.7%
8.0	11.4	203.7	3.0%	91.0%	2.7%
9.0	11.5	204.9	2.1%	91.0%	1.9%
10.0	12.5	222.3	1.6%	89.6%	1.4%
15.0	13.5	240.9	3.7%	88.7%	3.3%
20.0	15.0	266.9	2.0%	87.6%	1.8%
25.0	16.0	285.0	0.5%	86.7%	0.5%
30.0	15.7	280.0	0.2%	86.7%	0.2%
35.0	16.3	291.6	0.1%	85.4%	0.1%
40.0	16.8	298.9	0.1%	85.4%	0.1%
					85.8%

Predicted Annual Runoff Volume Treated =	90.0%
Assumed removal efficiency for bypassed flows =	0.0%
Removal Efficiency Adjustment[5] =	0.0%
Predicted Net Annual Load Removal Efficiency =	**86%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area
- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 l/s/m^2.

3 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa CDA, ON

4 - Based on Contech Stormwater Solutions laboratory verified removal of an average particle size of 80 microns (see Technical Bulletin #1).

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

Calculated by: NP 2/1/2024

Checked by:

West Capital Airpark Phase 1B-2 Residential
Stage-Area-Storage Information for East SWM Facility

As-Built Pond Volumes (Interim Condition)

Contour Elev. (m)	Depth (m)	Area[1] (m^2)	Volume[2] (m^3)
110.75	0.00	98	0
111.00	0.25	3,826	491
111.05	0.30	4,960	710
111.25	0.50	6,952	1,901
111.50	0.75	9,260	3,928
111.75	1.00	10,966	6,456
112.00	1.25	12,097	9,339
112.25	1.50	12,892	12,463
112.50	1.75	13,682	15,784
112.71	1.96	14,385	18,731

[1] *Contour areas extracted from Autodesk Civil 3D surface from as-built survey.*

[2] *Average-end-area method.*

Potential Future Expansion Pond Volumes (Ultimate Condition)

Contour Elev. (m)	Depth (m)	Area[1] (m^2)	Volume[2] (m^3)
110.75	0.00	106	0
110.80	0.05	177	7
110.90	0.15	245	28
111.00	0.25	3,877	234
111.10	0.35	7,862	821
111.20	0.45	8,666	1,648
111.30	0.55	9,568	2,559
111.40	0.65	10,510	3,563
111.50	0.75	11,349	4,656
111.60	0.85	12,054	5,826
111.70	0.95	12,672	7,063
111.80	1.05	13,241	8,358
111.90	1.15	13,744	9,708
112.00	1.25	14,206	11,105
112.10	1.35	14,635	12,547
112.20	1.45	15,067	14,032
112.30	1.55	15,434	15,557
112.40	1.65	15,806	17,119
112.50	1.75	16,181	18,719
112.60	1.85	16,558	20,356
112.71	1.96	17,026	22,203

[1] *Contour areas extracted from Autodesk Civil 3D surface for potential future expansion.*

[2] *Average-end-area method.*

Date: 2/8/2024
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HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0.35 cms

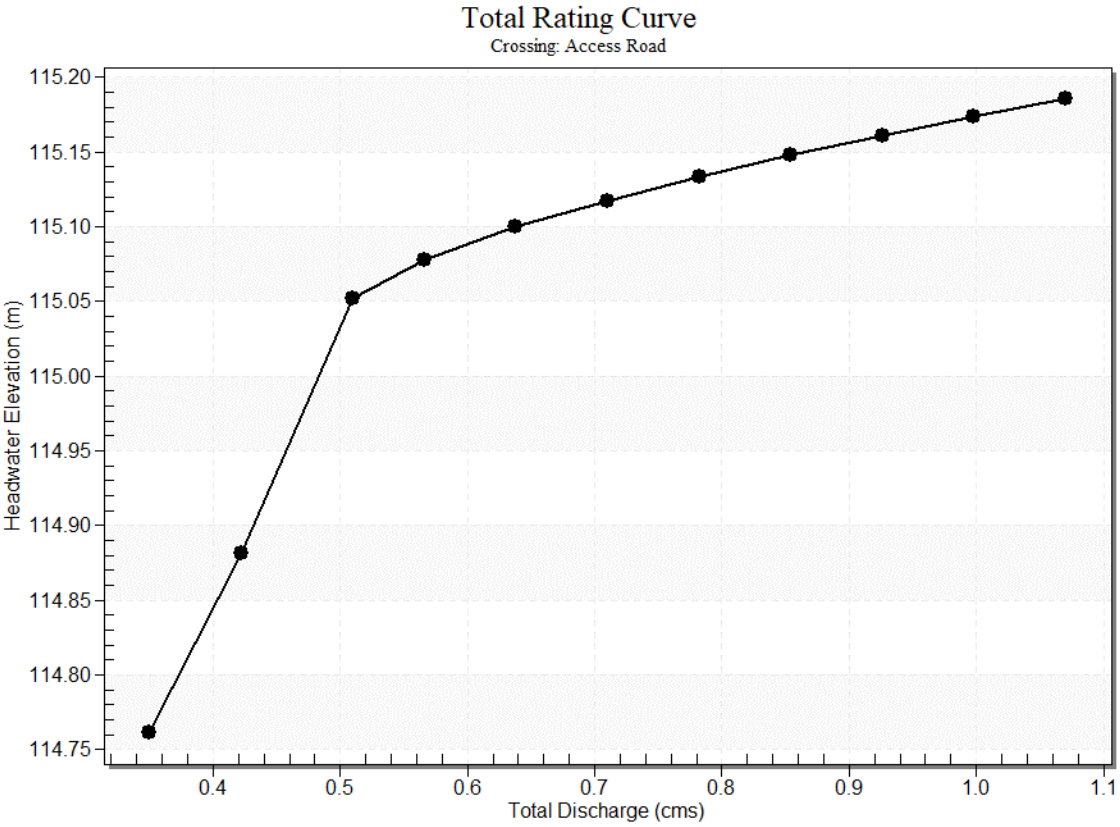
Design Flow: 0.51 cms

Maximum Flow: 1.07 cms

Table 1 - Summary of Culvert Flows at Crossing: Access Road

Headwater Elevation (m)	Total Discharge (cms)	Culvert 1 Discharge (cms)	Roadway Discharge (cms)	Iterations
114.76	0.35	0.35	0.00	1
114.88	0.42	0.42	0.00	1
115.05	0.51	0.51	0.00	28
115.08	0.57	0.52	0.04	7
115.10	0.64	0.53	0.11	6
115.12	0.71	0.54	0.17	5
115.13	0.78	0.54	0.24	4
115.15	0.85	0.55	0.30	4
115.16	0.93	0.56	0.37	4
115.17	1.00	0.56	0.43	3
115.19	1.07	0.57	0.50	3
115.05	0.51	0.51	0.00	Overtopping

Rating Curve Plot for Crossing: Access Road



Culvert Data: Culvert 1

Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.35 cms	0.35 cms	114.76	0.66	0.424	5-S2n	0.30	0.39	0.31	0.24	2.33	0.64
0.42 cms	0.42 cms	114.88	0.78	0.547	5-S2n	0.34	0.43	0.35	0.27	2.44	0.68
0.51 cms	0.51 cms	115.05	0.95	0.778	5-S2n	0.38	0.47	0.40	0.30	2.56	0.72
0.57 cms	0.52 cms	115.08	0.98	0.799	5-S2n	0.39	0.47	0.40	0.31	2.57	0.74
0.64 cms	0.53 cms	115.10	1.00	0.816	5-S2n	0.39	0.48	0.41	0.33	2.59	0.76
0.71 cms	0.54 cms	115.12	1.02	0.831	5-S2n	0.40	0.48	0.41	0.35	2.60	0.79
0.78 cms	0.54 cms	115.13	1.03	0.843	5-S2n	0.40	0.48	0.42	0.37	2.60	0.81
0.85 cms	0.55 cms	115.15	1.05	0.855	5-S2n	0.41	0.48	0.42	0.39	2.61	0.83
0.93 cms	0.56 cms	115.16	1.06	0.866	5-S2n	0.41	0.49	0.42	0.40	2.62	0.84
1.00 cms	0.56 cms	115.17	1.07	0.875	5-S2n	0.41	0.49	0.42	0.42	2.62	0.86
1.07 cms	0.57 cms	115.19	1.09	0.885	5-S2n	0.41	0.49	0.43	0.43	2.63	0.88

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

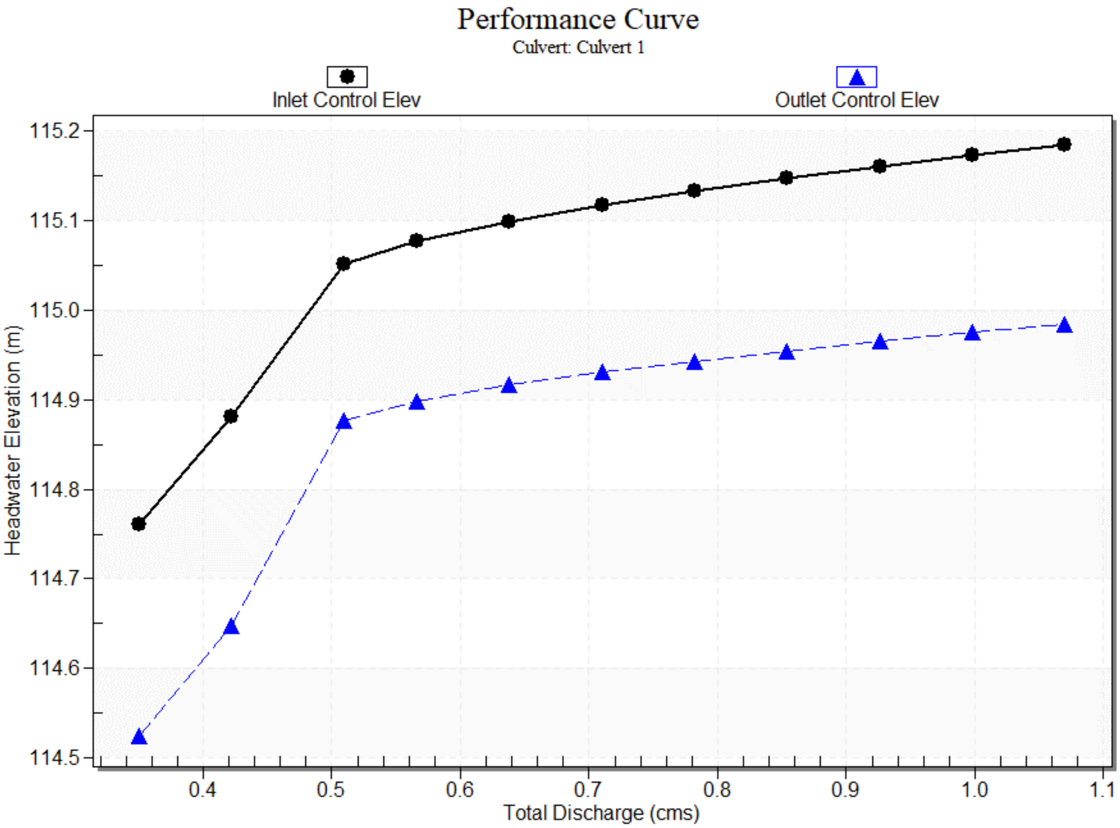
Inlet Elevation (invert): 114.10 m,

Outlet Elevation (invert): 113.95 m

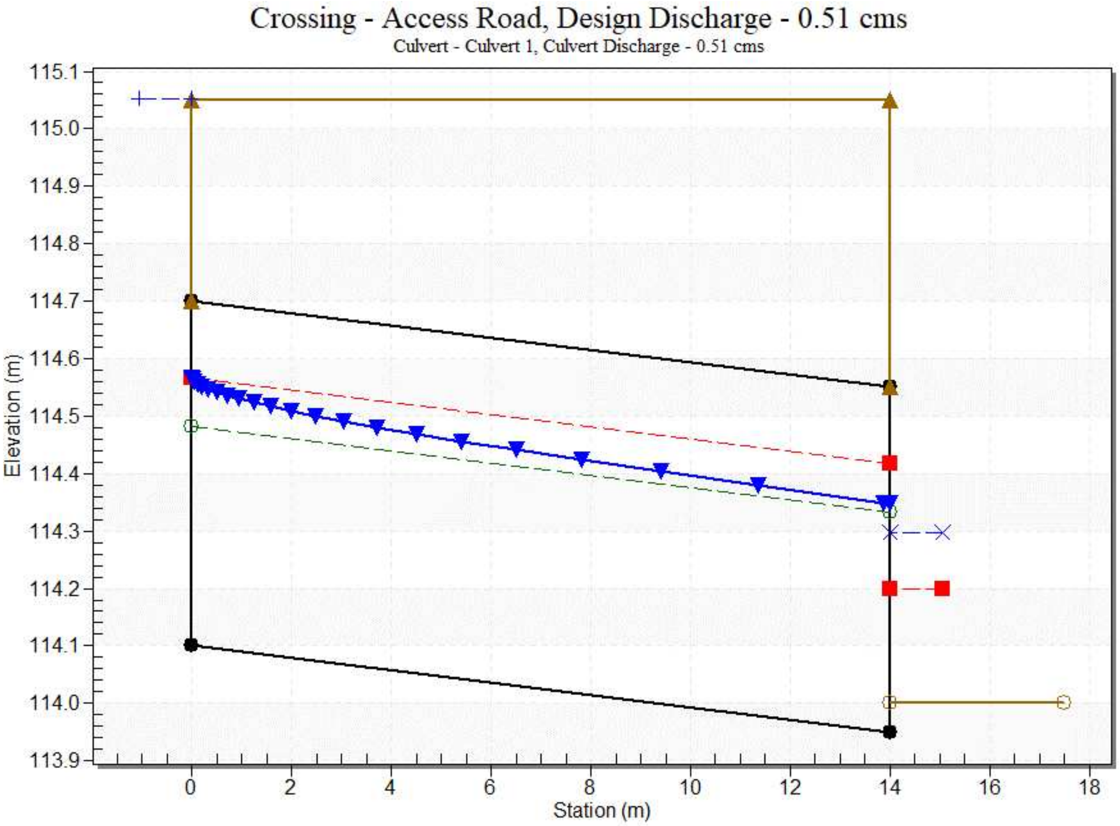
Culvert Length: 14.00 m,

Culvert Slope: 0.0107

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 114.10 m

Outlet Station: 14.00 m

Outlet Elevation: 113.95 m

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 600.00 mm

Barrel Material: Smooth HDPE

Embedment: 0.00 mm

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Tailwater Data for Crossing: Access Road

Table 3 - Downstream Channel Rating Curve (Crossing: Access Road)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.35	114.24	0.24	0.64	11.97	0.48
0.42	114.27	0.27	0.68	13.22	0.48
0.51	114.30	0.30	0.72	14.60	0.49
0.57	114.31	0.31	0.74	15.41	0.49
0.64	114.33	0.33	0.76	16.39	0.50
0.71	114.35	0.35	0.79	17.32	0.50
0.78	114.37	0.37	0.81	18.19	0.50
0.85	114.39	0.39	0.83	19.02	0.51
0.93	114.40	0.40	0.84	19.81	0.51
1.00	114.42	0.42	0.86	20.57	0.51
1.07	114.43	0.43	0.88	21.29	0.51

Tailwater Channel Data - Access Road

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.50 m

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0050

Channel Manning's n: 0.0350

Channel Invert Elevation: 114.00 m

Roadway Data for Crossing: Access Road

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 6.80 m

Crest Elevation: 115.05 m

Roadway Surface: Gravel

Roadway Top Width: 14.00 m

West Capital Airpark - Phase 1B-2 Residential (102085)
Pond Inlet Riprap Sizing

Minor System Pond Inlet (HW 191)

100-year Flow (Q)	4.847	m^3/s (from PCSWMM - Ultimate)
Inlet Pipe Diameter (D)	1.650	m
Inlet Pipe Invert	111.36	m
Tailwater Elevation	112.64	m (HGL in SWMF from PCSWMM - Ultimate)
Tailwater Depth	1.28	m
Riprap Size (D_{50})	143	mm
Min. Riprap Size (Table 10.1)	150	mm
Apron Length	6.6	m
Apron Width	9.4	m
Apron Depth	0.50	m

HEC-14 Equation 10.4

$$D_{50} = 0.2\,D\left(\frac{Q}{\sqrt{g}D^{2.5}}\right)^{4/3}\left(\frac{D}{TW}\right)$$

where,

D_{50} = riprap size, m (ft)
Q = design discharge, m^3/s (ft^3/s)
D = culvert diameter (circular), m (ft)
TW = tailwater depth, m (ft)
g = acceleration due to gravity, 9.81 m/s^2 (32.2 ft/s^2)

Width (at apron end) = 3D + (2/3)L

HEC-14 - Table 10.1. Example Riprap Classes and Apron Dimensions

Class	D_{50} (mm)	D_{50} (in)	Apron Length[1]	Apron Depth
1	125	5	4D	$3.5D_{50}$
2	150	6	4D	$3.3D_{50}$
3	250	10	5D	$2.4D_{50}$
4	350	14	6D	$2.2D_{50}$
5	500	20	7D	$2.0D_{50}$
6	550	22	8D	$2.0D_{50}$

[1] *D is the culvert rise.*

Major System Pond Inlet (Swale)

MTO Highway Drainage Design Standards (January 2008)
WC-3 Scour and Armouring - Section 3.3

Stone Sizes For Scour And Erosion Protection – Low Volume Roads							
Velocity (m/s)	< 2.0	< 2.6	< 3.0	< 3.5	< 4.0	< 4.7	< 5.2
Nominal Stone Size(1) (mm)	100	200	300	400	500	800	1000
Notes 1) Maximum stone size to be 1.5 times the nominal stone size. 80% of stones (by mass) must have a diameter of at least 60% of nominal stone size.							

Swale Velocity	0.55	m/s (from PCSWMM - Ultimate)
Minimum Riprap Size	100	mm

NOTE: To use 150mm dia. riprap for both major and minor inlet

5mm Runoff Volume to East SWMF Cooling Trench

Assumed that only the developped area that drains to the SWM facility will require cooling.
(Future Development Area that is undevelopped in the interim condition does not require cooling)

Phase 1B-1 and 1B-2 Draiange Areas to the East SWMF

Subcatchment ID	Area (ha)	5mm Runoff Depth [1] (mm)	Runoff Volume (m^3)
1B-01	0.170	1.42	2.4
1B-02	0.240	1.90	4.6
1B-03	0.150	1.23	1.8
1B-04	0.220	1.68	3.7
1B-05	0.140	1.61	2.3
1B-06	0.190	1.48	2.8
1B-07	0.240	1.80	4.3
1B-08	0.230	2.26	5.2
1B-09	0.230	2.44	5.6
1B-10	0.210	2.39	5.0
1B-11	0.350	1.33	4.7
1B-12	0.200	2.28	4.6
1B-13	0.280	2.39	6.7
1B-14	0.250	2.45	6.1
1B-15	0.470	2.49	11.7
1B-16	4.610	0.24	11.1
A-01	0.493	1.79	8.8
A-02	0.242	2.73	6.6
A-03	0.476	2.93	13.9
A-04	0.450	2.90	13.1
A-05	0.367	1.86	6.8
A-06	0.377	2.90	10.9
A-07	0.357	2.65	9.5
A-08	0.205	1.82	3.7
A-09	0.226	2.62	5.9
A-10	0.430	2.00	8.6
A-11	0.465	2.73	12.7
A-12	0.692	1.93	13.4
A-13	0.652	2.00	13.0
A-14	0.510	2.73	13.9
A-15	0.413	1.79	7.4
A-16	0.239	2.62	6.3
A-17	0.288	2.20	6.3
A-18	0.274	1.79	4.9
Total	***15.336***	**-**	***248.3***

(1) *5mm runoff depth obtained from the Interim Condition PCSWMM model using the 5mm 4-hour Chicago Storm event.*

West Capital Airpark
East Residential Community: Cooling Trench Design

ASSUMPTIONS

General:

1) Provide cooling of runoff from the first 5mm of rainfall for a given storm event.
2) First 5mm of runoff at inlet to cooling trench has been heated to 35°C.
3) Runoff subsequent to first 5mm is below target temperature (25°C) and does not require temperature mitigation.
4) Runoff volume to be treated calculated using PCSWMM subcatchment runoff from the 5mm storm event.
5) Cooling trench will always be filled with standing water (clay soil, below invert of Carp Creek / water table)
6) Heat transfer to stone occurs rapidly, approaching equilibrium (average) temperature at outlet.
7) Groundwater (pumped) is used to reduce temperature in trench following precipitation event.

Initial Conditions:

8) Max. initial temperature in cooling trench of 15°C.
9) Temperature of cooling trench regulated by introducing groundwater (5°C) if required.
10) The number of iterations used in the heat transfer calculations is based on the ratio of runoff volume / trench volume.

Runoff Volume (5mm event) = 248 m^3
Cooling trench volume = 127 m^3
# of turnovers in trench = 1.9
# of interations in heat transfer calculations = 2

Heat Transfer Calculations:

11) Heat transfer between water and stone is based on total heat capacity (Joules) using volume of water and stone in the trench.
12) For each iteration (turnover volume), it is assumed that water flowing into the trench mixes fully with the water in the trench resulting in an average water temperature throughout the trench.
13) The water in the trench then transfers heat to the stone in the trench, reaching an equilibrium temperature prior to discharging to Carp Creek. The validity of this assumtion is checked by comparing the thermal time constant for heat transfer beetween the water and stone to the travel time from the inlet to the outlet.
14) The next iteration (turnover volume) uses the outlet temperature from the previous iteration as the starting temperature in the heat transfer calculation.
15) Assume negligible heat transfer to soil during storm event.

East SWMF

Cooling Trench Dimensions	Original Trench	Additonal Trench	Total
Length	250 m	105 m	355 m
Width	3 m	4 m	N/A m
Depth	0.3 m	0.3 m	0.3 m
Volume (Total)	225 m^3	126 m^3	351 m^3
Packing Space (p_s)	63.75%	63.75%	63.75%
Volume of Stone	143 m^3	80 m^3	224 m^3
Void Space (Volume of Water)	82 m^3	46 m^3	127 m^3

Physical & Heat Transfer Properties	**Stone**	**Water**	**Clay**
Density (ρ) - kg/m^3	2,360	994	1,680
Heat Capacity (C_p) - J·kg^{-1}°C^{-1}	908	4,178	920

Total Heat Capacity in Trench (Stone+Water)	**Stone**	**Water**	**Total**
Volume (m^3)	224	127	351
Mass (kg)	528,100	126,487	654,587
Heat Capacity (Q) - J·°C	479,514,800	528,461,800	-
kJ·°C	**480,000**	**528,000**	**1,008,000**

Ratio of heat capacity (Stone / Water) = 1.10

Assuming that there is sufficient time for the water and stone approach an equilibrium temperature, for every 1°C that the water is cooled, the temperature of the stone will increase by 1.1°C.

Check assumption (Travel time vs. thermal time constant)

Travel Time (Flow Length / Velocity)		
Cross-Sectional Flow Area	0.326	m
Average Flow Velocity	0.053	m/s
Peak Flow Velocity	0.371	m/s
Flow Length	355	m
Travel Time (Peak Flow)=	***0.27***	***hrs***
Travel Time (Average)=	***1.87***	***hrs***
Thermal Time Constant (Water-->Stone)	$\tau_{water\text{-}stone}$ =	*ρ Cp V / (h As)*
Stone Density (ρ)	2,360	kg/m3
Thermal Conductivity (k_{stone})	1.295	W/(m°C)
Surface Heat Transfer Coefficient (h)	40	W/(m^2 °C)
Avg. Stone Diameter (D_{50})	0.050	m
Avg. Stone surface area (A_s)	0.008	m^2
Avg. Stone Volume (V)	0.00007	m^3
τ_{Stone} =	**446**	***sec***
τ_{Stone} =	**0.12**	**hrs**

*Note: assumed 3m wide to be more conservative

The thermal time constant (0.12 hrs) represents the time to transfer approximately 63.2% of the heat from the water to the stone under transient conditions, following an exponential decay curve.

The travel time through the stone trench at peak flow (0.27 hrs) is approximately 2.3x the thermal time constant.
The average travel time (1.87 hrs) is approximately 15x the thermal time constant.
Based on the proposed trench dimensions and stone size, it is reasonable to assume that the water and stone will reach an equilibrium temperature at the outlet of the cooling trench.

HEAT TRANSFER CALCULATIONS (5mm EVENT)

Peak Flow =	121	L/s
Runoff Volume =	248	m^3
Event Duration =	4	hrs
Average Flowrate =	17	L/s
Storage Volume in Cooling Trench =	127	m^3
# of Volume Turnovers in Cooling Trench =	1.9	
Initial Temperature in Trench =	15.0	°C

First Turnover (127 m^3)

Inlet Water Temperature	35 °C	
Temperature of Water in Trench	15.0 °C	
Average Water Temperature (after mixing / before heat transfer to stone)	**25 °C**	
Heat Transfer (Water to Stone)	**Stone**	**Water**
Initial Temperature	15.0 °C	25 °C
Net Change	5.2 °C	-4.8 °C
Equilibrium Temperature at outlet (after 127m^3 / 1 turnover)	**20.2 °C**	**20.2 °C**

Remainder (121 m^3)

Inlet Water Temperature	35 °C	*121 m^3*
Temperature of Water in Trench	20.2 °C	*133 m^3*
Average Water Temperature (after mixing / before heat transfer to stone)	**27.3 °C**	
Heat Transfer (Water to Stone)	**Stone**	**Water**
Initial Temperature	20.2 °C	27.3 °C
Net Change	3.7 °C	-3.3 °C
Equilibrium Temperature at outlet (after 5mm event)	**23.9 °C**	**23.9 °C**

The temperature in the cooling trench will increase from 15 °C at the start of the storm event to 23.9°C after cooling 5mm of runoff. (Assuming a constant inflow temperature of 35 °C). The net increase in heat energy in the trench can be calculated as follows:

Increase in Heat = [Heat Capacity (Stone) + Heat Capacity (Water)] x Increase in Temperature
= (480,000 kJ/°C + 528,000 kJ/ °C) x (23.9°C - 15°C)
= 8,986,095 kJ

The cooling trench will be monitored using temperature monitoring devices at the inlet, midpoint and outlet maintenance structures. Temperature monitoring will also take place both upstream and downstream of the SWM facility outlets within Carp Creek. If monitoring indicates that the performance of the cooling trench is not meeting the requirements set out by the Carp River Watershed / Subwatershed Study for Aquatic Habitat (Table 8.2.2) for areas identified as a cold water fish habitat, options for modification and/or expansion of the cooling trench design will be developed.

APPENDIX F
Water Balance and Infiltration Calculations

1) Water Balance Calculations from Phase 1 Design (R-2015-060, April 2015)
2) Interim Infiltration Swale Volume Calculations
3) Infiltration Trenches Summary
4) Annual Infiltration Volume Summary

2015 Water Balance
Land Use Parameters

WEST CAPITAL AIRPARK
BMP LAND USE PARAMETERS

NOVATECH
ENGINEERING
CONSULTANTS LTD.

Rural Land Use		**ET**	**INFIL**	**RUNOFF**
Pasture / Meadow	Beach Formations (Sand / Sand & Gravel)	510	300	134
	Fine to Medium Sand	520	250	174
	Sandy Silt	527	229	188
	Thick Organic Deposits (Peat)	530	175	239
	Sensitive Marine Silty Clay	530	100	314
	Thin Discontinuous Organic Deposits	530	135	279
	Paleozolic Bedrock	530	120	294
	Glacial Till / Precambrian Bedrock	530	73	341
Agricultural	Beach Formations (Sand / Sand & Gravel)	400	290	254
	Fine to Medium Sand	410	230	304
	Thick Organic Deposits (Peat)	420	160	364
	Sensitive Marine Silty Clay	420	110	414
	Thin Discontinuous Organic Deposits	420	130	394
	Paleozolic Bedrock	420	125	399
	Glacial Till / Precambrian Bedrock	420	80	444
Woodland	Beach Formations (Sand / Sand & Gravel)	530	310	104
	Fine to Medium Sand	540	275	129
	Sandy Silt	550	250	144
	Thick Organic Deposits (Peat)	550	220	174
	Sensitive Marine Silty Clay	550	150	244
	Thin Discontinuous Organic Deposits	550	145	249
	Paleozolic Bedrock	550	140	254
	Glacial Till / Precambrian Bedrock	550	125	269
Water / Wetland	Clay / Silty Clay	660	50	234

Urban Land Use		**ET**	**INFIL**	**RUNOFF**
Open Space / Meadow	Beach Formations (Sand / Sand & Gravel)	510	300	134
	Fine to Medium Sand	520	250	174
	Sandy Silt	527	229	188
	Thick Organic Deposits (Peat)	530	175	239
	Sensitive Marine Silty Clay	530	170	244
	Thin Discontinuous Organic Deposits	530	135	279
	Paleozolic Bedrock	530	120	294
	Glacial Till / Precambrian Bedrock	530	73	341
Urban Grassed Area	Beach Formations (Sand / Sand & Gravel)	495	290	159
	Fine to Medium Sand	510	230	204
	Sandy Silt	520	200	224
	Thick Organic Deposits (Peat)	525	160	259
	Sensitive Marine Silty Clay	525	145	274
	Thin Discontinuous Organic Deposits	525	130	289
	Paleozolic Bedrock	525	125	294
	Glacial Till / Precambrian Bedrock	525	90	329
Woodland	Beach Formations (Sand / Sand & Gravel)	530	310	104
	Fine to Medium Sand	540	275	129
	Sandy Silt	550	250	144
	Thick Organic Deposits (Peat)	550	220	174
	Sensitive Marine Silty Clay	550	150	244
	Thin Discontinuous Organic Deposits	550	145	249
	Paleozolic Bedrock	550	140	254
	Glacial Till / Precambrian Bedrock	550	125	269
Water / Wetland / SWMF	Clay / Silty Clay	660	50	234
Impervious Areas	N/A	95	0	849

Prepared By: Novatech Engineering Consultants
Date: 25/09/2013 M:\2002\102085\DATA\Calculations\SWM\Water Balance - BMP WEST-EAST\20130923-Revised - BMP-Water Balance

WEST CAPITAL AIRPARK
BMP CALCULATIONS

2015 Water Balance
West Residential

NOVATECH ENGINEERING CONSULTANTS LTD.

WEST RESIDENTIAL WATER BALANCE

Existing Conditions

Area	Land Use	Soil Type	Area		Individual				Weighted (by Area)			
			ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
A-1	Pasture/Meadow	Sand/Sandy Silt	12.27	52.6%	944	527	229	188	497	277	121	99
A-2	Pasture/Meadow	Sand/Sandy Silt	6.25	26.8%	944	527	229	188	253	141	61	50
A-3	Pasture/Meadow	Sand/Sandy Silt	1.87	8.0%	944	527	229	188	76	42	18	15
A-4	Woodland	Sand/Sandy Silt	2.92	12.5%	944	550	250	144	118	69	31	18
	Totals		**23.3**	**100.0%**					**944**	**530**	**232**	**182**

WEST RESIDENTIAL WATER BALANCE

Developed Conditions

Land Use	Soil Type	Area		Individual				Weighted (by Area)			
		ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
Woodland	Sand/Sandy Silt	2.03	8.7%	944.00	550.00	250.00	144.00	82.21	47.90	21.77	12.54
SMWF *(surface area @ maximum storage)*	Topsoil over Sand/Sandy Silt	0.88	3.8%	944.00	660.00	50.00	234.00	35.68	24.94	1.89	8.84
SWMF Block *(grassed area, minus SWMF)*	Topsoil over Sand/Sandy Silt	0.55	2.4%	944.00	520.00	200.00	224.00	22.23	12.25	4.71	5.28
Rearyards and Frontyards *(grass)*	Topsoil over Sand/Sandy Silt	12.26	52.6%	944.00	520.00	200.00	224.00	496.51	273.50	105.19	117.82
Rear Rooftops *(directed to grassed rearyards)*	Topsoil over Sand/Sandy Silt	2.34	10.0%	944.00	95.00	200.00	649.00	94.57	9.52	20.04	65.02
Front Rooftops *(directed to impervious areas)*	Topsoil over Sand/Sandy Silt	2.34	10.0%	944.00	95.00	0.00	849.00	94.57	9.52	0.00	85.06
Impervious Areas *(roads, driveways)*	Topsoil over Sand/Sandy Silt	2.92	12.5%	944.00	95.00	0.00	849.00	118.22	11.90	0.00	106.32
Totals		**23.3**	**100%**					**944.00**	**389.52**	**153.60**	**400.87**

Pre vs. Post-Development

Component	Pre (mm/yr)	Post (mm/yr)	% Change
Precipitation	944	944	0.0%
Evapotranspiration	530	390	26.5% Decrease
Infiltration	232	154	33.7% Decrease
Runoff	182	401	119.7% Increase

Pre vs. Post-Development (West and East Areas)

Component	Pre			Post (with infiltration BMPs in the East Area)			Total % Change
	West (mm/yr)	East (mm/yr)	Both Areas (mm/yr)	West (mm/yr)	East (mm/yr)	Both Areas (mm/yr)	
Precipitation	944	944	**944**	944	944	**944**	0.0%
Evapotranspiration	530	550	**544**	390	478	**453**	16.8% Decrease
Infiltration	232	250	**245**	154	280	**243**	0.5% Decrease
Runoff	182	144	**155**	401	187	**248**	60.0% Increase

EAST CAPITAL AIRPARK
BMP CALCULATIONS

2015 Water Balance
East Residential

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EAST RESIDENTIAL WATER BALANCE
Existing Conditions

Area	Land Use	Soil Type	Area		Individual				Weighted (by Area)			
			ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
A-1	Woodland	Sand/Sandy Silt	40.62	69.8%	944	550	250	144	659	384	175	101
A-2	Woodland	Sand/Sandy Silt	5.36	9.2%	944	550	250	144	87	51	23	13
E-1	Woodland	Sand/Sandy Silt	12.21	21.0%	944	550	250	144	198	115	52	30
	Totals		**58.2**	**100.0%**					**944**	**550**	**250**	**144**

EAST RESIDENTIAL WATER BALANCE
Developed Conditions

NO Infiltration BMPs

Land Use	Soil Type	Area		Individual				Weighted (by Area)			
		ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
Woodland	Sand/Sandy Silt	12.24	21.0%	944.00	550.00	250.00	144.00	198.57	115.69	52.59	30.29
SMWF *(surface area @ maximum storage)*	Topsoil over Sand/Sandy Silt	1.68	2.9%	944.00	660.00	50.00	234.00	27.19	19.01	1.44	6.74
SWMF Block *(grassed area, minus SWMF)*	Topsoil over Sand/Sandy Silt	1.95	3.4%	944.00	520.00	200.00	224.00	31.70	17.46	6.72	7.52
Taxiway E *(with BMP infiltration)*	Topsoil over Sand/Sandy Silt	1.23	2.1%	944.00	520.00	382.10	41.90	19.95	10.99	8.08	0.89
Grassed Areas *(without infiltration trenches)*	Topsoil over Sand/Sandy Silt	22.83	39.2%	944.00	520.00	200.00	224.00	370.36	204.01	78.47	87.88
Rear Rooftops and Front Rooftops *(directed to grassed areas without infiltration trenches)*	Topsoil over Sand/Sandy Silt	8.57	14.7%	944.00	95.00	200.00	649.00	139.03	13.99	29.46	95.58
Impervious Areas *(roads, taxiways, driveways) (directed to roadside ditches without infiltration trenches)**	Topsoil over Sand/Sandy Silt	7.88	13.5%	944.00	95.00	100.00	749.00	127.86	12.87	13.54	101.45
Impervious Areas *(roads, driveways) (directed to storm sewers)*	Topsoil over Sand/Sandy Silt	1.81	3.1%	944.00	95.00	0.00	849.00	29.34	2.95	0.00	26.39
Totals		**58.2**	**100%**					**944.00**	**396.97**	**190.29**	**356.74**

*Roadside ditches are assumed to provide 50% infiltration through the grass for runoff from impervious areas (roads, taxiway, driveways)

With Infiltration BMPs

Land Use	Soil Type	Area		Individual				Weighted (by Area)			
		ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
Woodland	Sand/Sandy Silt	12.24	21.0%	944.00	550.00	250.00	144.00	198.57	115.69	52.59	30.29
SMWF	Topsoil over Sand/Sandy Silt	1.68	2.9%	944.00	660.00	50.00	234.00	27.19	19.01	1.44	6.74
SWMF Block *(grassed area, minus SWMF)*	Topsoil over Sand/Sandy Silt	1.95	3.4%	944.00	520.00	200.00	224.00	31.70	17.46	6.72	7.52
Area Draining to Roadside Ditches with Infiltration Trenches*	Topsoil over Sand/Sandy Silt	26.50	45.5%	944.00	520.00	382.10	41.90	429.87	236.79	174.00	19.08
Grassed Areas *(without infiltration trenches)*	Topsoil over Sand/Sandy Silt	8.63	14.8%	944.00	520.00	200.00	224.00	139.93	77.08	29.65	33.20
Rear Rooftops and Front Rooftops *(directed to grassed areas without infiltration trenches)*	Topsoil over Sand/Sandy Silt	3.41	5.9%	944.00	95.00	200.00	649.00	55.35	5.57	11.73	38.05
Impervious Areas (roads, taxiways, driveways) *(directed to roadside ditches without infiltration trenches)***	Topsoil over Sand/Sandy Silt	1.98	3.4%	944.00	95.00	100.00	749.00	32.05	3.23	3.39	25.43
Impervious Areas (roads, driveways) *(directed to storm sewers)*	Topsoil over Sand/Sandy Silt	1.81	3.1%	944.00	95.00	0.00	849.00	29.34	2.95	0.00	26.39
Totals		**58.2**	**100%**					**944.00**	**477.79**	**279.51**	**186.70**

*0.4m x 0.4m Infiltration trenches (40% void ratio) to be installed below 77% of roadside ditches (including Taxiway E), which stores the first 1.4 mm for each rain event

**Roadside ditches are assumed to provide 50% infiltration through the grass for runoff from impervious areas (roads, taxiway, driveways)

Pre vs. Post-Development (with infiltration BMPs)

Component	Pre (mm/yr)	Post (mm/yr)	% Change
Precipitation	944	944	0.0%
Evapotranspiration	550	478	13.1% Decrease
Infiltration	250	280	11.8% Increase
Runoff	144	187	29.7% Increase

Pre vs. Post-Development (NO infiltration BMPs)

Component	Pre (mm/yr)	Post (mm/yr)	% Change
Precipitation	944	944	0.0%
Evapotranspiration	550	397	27.8% Decrease
Infiltration	250	190	23.9% Decrease
Runoff	144	357	147.7% Increase

Pre vs. Post-Development (West and East Areas)

Component	Pre			Post (with infiltration BMPs in the East Area)			Total % Change
	West (mm/yr)	East (mm/yr)	Both Areas (mm/yr)	West (mm/yr)	East (mm/yr)	Both Areas (mm/yr)	
Precipitation	944	944	**944**	944	944	**944**	0.0%
Evapotranspiration	530	550	**544**	390	478	**453**	16.8% Decrease
Infiltration	232	250	**245**	154	280	**243**	0.5% Decrease
Runoff	182	144	**155**	401	187	**248**	60.0% Increase

Carp Airport Phase 1B-2 (102085)
Interim Infiltration Swale Volumes

Check Dam No.	Length of Swale (m)	Max Depth (m)	Ponding Area[1] (m^2)	Volume[2] (m^3)
1	25	0.20	24.07	2.4
2	46	0.20	92.19	9.2
3	47	0.20	56.63	5.7
4	45	0.20	45.91	4.6
5	46	0.20	85.46	8.5
6	46	0.20	86.16	8.6
7	46	0.20	63.72	6.4
8	47	0.20	102.71	10.3
9	46	0.20	102.90	10.3
10	47	0.20	83.25	8.3
11	61	0.20	301.49	30.1
12	52	0.20	73.22	7.3
13	28	0.20	49.10	4.9
Total	**566**	**0.20**	**1166.81**	**116.7**

[1] *Static Ponding Area from Drawing 102085-INF2.*

[2] *Average-end-area method.*

West Capital Airpark - Phase 1B-2 Residential (102085)
Infiltration Trenches (summary)

STM Area ID	Drainage Area	Infiltration Trench Diemnsions (subdrain & clearstone)					Storage Volumes[1]			Infiltration Rate[2]	Drawdown /Retention Time
	(ha)	Subdrain Dia. (mm)	Length (m)	Width (m)	Height (m)	Area (m^2)	Subdrain (m^3)	Clearstone (m^3)	Total (m^3)	(L/s)	(days)
WEST RESIDENTIAL DEVELOPMENT											
Infiltration Trenches in Rear Yards (Phase 2A)											
A-17	0.202	250	67.2	1.45	1.00	97.4	3.3	37.7	41.0	0.68	0.70
A-19A	0.323	250	86.8	1.45	1.00	125.9	4.3	48.6	52.9	0.87	0.70
A-20A	0.210	250	25.7	1.45	1.00	37.3	1.3	14.4	15.7	0.26	0.70
A-23	0.125	250	24.9	1.45	1.00	36.1	1.2	14.0	15.2	0.25	0.70
A-27A	0.104	250	35.8	1.45	1.00	51.9	1.8	20.1	21.8	0.36	0.70
A-35	0.333	250	32.0	1.45	1.00	46.4	1.6	17.9	19.5	0.32	0.70
TOTAL (Rear Yards)	**1.297**	**-**	**272.4**	**-**	**-**	**395.0**	**13.4**	**152.6**	**166.0**	**2.74**	**0.70**
EAST RESIDENTIAL DEVELOPMENT											
Infiltration Trenches in Rear Yards (Phase 1B-2)											
A-01	0.493	250	105.9	1.45	1.00	153.6	5.2	59.3	64.5	1.07	0.70
A-03	0.476	250	104.5	1.45	1.00	151.5	5.1	58.6	63.7	1.05	0.70
A-05	0.367	250	69.9	1.45	1.00	101.4	3.4	39.2	42.6	0.70	0.70
A-07	0.357	250	73.5	1.45	1.00	106.6	3.6	41.2	44.8	0.74	0.70
A-10	0.430	250	80.1	1.45	1.00	116.1	3.9	44.9	48.8	0.81	0.70
A-12	0.692	250	151.9	1.45	1.00	220.3	7.5	85.1	92.6	1.53	0.70
A-13	0.652	250	117.0	1.45	1.00	169.7	5.7	65.6	71.3	1.18	0.70
A-15	0.413	250	77.5	1.45	1.00	112.4	3.8	43.4	47.2	0.78	0.70
A-18	0.274	250	92.0	1.45	1.00	133.4	4.5	51.6	56.1	0.93	0.70
TOTAL (Rear Yards)	**4.154**	**-**	**872.3**	**-**	**-**	**1264.8**	**42.8**	**488.8**	**531.6**	**8.78**	**0.70**
Rock Check Dams in Future Lands (Existing Conditions)											
Future3-A	23.26	13x Rock Check Dams (116.7 m^3 total storage provided)				849	-	-	116.7	5.90	0.23

[1] *Assumed 40% void ratio for Clearstone.*

[2] *Assumed 25 mm/hr pecolation rate (50 mm/hr divided by 2 to account for clogging).*

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Carp Airport Phase 1B-2 (102085)
Infiltration Calculations

Novatech
Engineers, Planners & Landscape Architects

Location	**Infiltration System Summary**		**Annual Infiltration**			
	Volume of Infiltration System (m^3)	**Contributing Drainage Area to Infiltration System (ha)**	**Infiltration Depth[1] (mm)**	**% of Annual Rainfall (515mm) Infiltrated[2] (%)**	**Amount of Annual Rainfall Infiltrated[3] (mm/year)**	**Volume of Rainfall Infiltrated / Year[4] (m^3/year)**
WEST RESIDENTIAL DEVELOPMENT						
Rear Yard Infiltration Trenches (Ph2A)	166.0	1.297	12.8	75%	388.4	5,037
EAST RESIDENTIAL DEVELOPMENT						
Rear Yard Infiltration Trenches (Ph2B)	531.6	4.154	12.8	75%	388.4	16,133
Rock Check Dams (East - Existing)	116.7	23.260	0.5	7%	37.0	8,602

[1] *Infiltration Depth = Storage volume of the infiltration system / contributing draiange area to the infiltration system.*

[2] *The percent of annual rainfall captured within the infiltration depth - based on 30-years (1971 - 2000) of daily climate data (May - October).*

[3] *The average annual volume infiltrated based on the infiltration depth over 30-years (1971 - 2000) of daily climate data (May - October).*

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WEST CAPITAL AIRPARK
BMP LAND USE PARAMETERS
BASED ON FERNBANK EMP FOR CARP RIVER WATERSHED

NOVATECH
Engineers, Planners & Landscape Architects

Rural Land Use		**ET**	**INFIL**	**RUNOFF**
Pasture / Meadow	Beach Formations (Sand / Sand & Gravel)	510	300	134
	Fine to Medium Sand	520	250	174
	Sandy Silt	527	229	188
	Thick Organic Deposits (Peat)	530	175	239
	Sensitive Marine Silty Clay	530	100	314
	Thin Discontinuous Organic Deposits	530	135	279
	Paleozolic Bedrock	530	120	294
	Glacial Till / Precambrian Bedrock	530	73	341
Agricultural	Beach Formations (Sand / Sand & Gravel)	400	290	254
	Fine to Medium Sand	410	230	304
	Thick Organic Deposits (Peat)	420	160	364
	Sensitive Marine Silty Clay	420	110	414
	Thin Discontinuous Organic Deposits	420	130	394
	Paleozolic Bedrock	420	125	399
	Glacial Till / Precambrian Bedrock	420	80	444
Woodland	Beach Formations (Sand / Sand & Gravel)	530	310	104
	Fine to Medium Sand	540	275	129
	Sandy Silt	550	250	144
	Thick Organic Deposits (Peat)	550	220	174
	Sensitive Marine Silty Clay	550	150	244
	Thin Discontinuous Organic Deposits	550	145	249
	Paleozolic Bedrock	550	140	254
	Glacial Till / Precambrian Bedrock	550	125	269
Water / Wetland	Clay / Silty Clay	660	50	234

Urban Land Use		**ET**	**INFIL**	**RUNOFF**
Open Space / Meadow	Beach Formations (Sand / Sand & Gravel)	510	300	134
	Fine to Medium Sand	520	250	174
	Sandy Silt	527	229	188
	Thick Organic Deposits (Peat)	530	175	239
	Sensitive Marine Silty Clay	530	170	244
	Thin Discontinuous Organic Deposits	530	135	279
	Paleozolic Bedrock	530	120	294
	Glacial Till / Precambrian Bedrock	530	73	341
Urban Grassed Area	Beach Formations (Sand / Sand & Gravel)	495	290	159
	Fine to Medium Sand	510	230	204
	Sandy Silt	520	200	224
	Thick Organic Deposits (Peat)	525	160	259
	Sensitive Marine Silty Clay	525	145	274
	Thin Discontinuous Organic Deposits	525	130	289
	Paleozolic Bedrock	525	125	294
	Glacial Till / Precambrian Bedrock	525	90	329
Woodland	Beach Formations (Sand / Sand & Gravel)	530	310	104
	Fine to Medium Sand	540	275	129
	Sandy Silt	550	250	144
	Thick Organic Deposits (Peat)	550	220	174
	Sensitive Marine Silty Clay	550	150	244
	Thin Discontinuous Organic Deposits	550	145	249
	Paleozolic Bedrock	550	140	254
	Glacial Till / Precambrian Bedrock	550	125	269
Water / Wetland / SWMF	Clay / Silty Clay	660	50	234
Impervious Areas	N/A	95	0	849

Prepared By: Novatech Engineering Consultants
Date: 1/22/2024

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WEST CAPITAL AIRPARK - PHASE 2A RESIDENTIAL
BMP CALCULATIONS

WEST RESIDENTIAL WATER BALANCE (with Infiltration Trenches)

Existing Conditions

Area	Land Use	Soil Type	Area		Individual				Weighted (by Area)			
			ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
A-1	Pasture/Meadow	Sand/Sandy Silt	12.27	52.6%	944	527	229	188	497	277	121	99
A-2	Pasture/Meadow	Sand/Sandy Silt	6.25	26.8%	944	527	229	188	253	141	61	50
A-3	Pasture/Meadow	Sand/Sandy Silt	1.87	8.0%	944	527	229	188	76	42	18	15
A-4	Woodland	Sand/Sandy Silt	2.92	12.5%	944	550	250	144	118	69	31	18
	Totals		**23.31**	**100.0%**					**944**	**530**	**232**	**182**

Developed Conditions (with Infiltration BMPs)

Land Use	Soil Type	Area		Individual				Weighted (by Area)			
		ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
Woodland	Sand/Sandy Silt	2.03	8.7%	944	550	250	144	82.2	47.9	21.8	12.5
SMWF *(surface area @ maximum storage)*	Topsoil over Sand/Sandy Silt	0.88	3.8%	944	660	50	234	35.6	24.9	1.9	8.8
SWMF Block *(grassed area, minus SWMF)*	Topsoil over Sand/Sandy Silt	0.55	2.4%	944	520	200	224	22.3	12.3	4.7	5.3
Rearyards and Frontyards *(grass)*	Topsoil over Sand/Sandy Silt	10.96	47.0%	944	520	200	224	443.7	244.4	94.0	105.3
Rearyards (directed to infiltration trenches)*	Topsoil over Sand/Sandy Silt	1.30	5.6%	944	520	388	36	52.6	29.0	21.6	2.0
Rear Rooftops *(directed to grassed rearyards)*	Topsoil over Sand/Sandy Silt	2.34	10.0%	944	95	200	649	94.7	9.5	20.1	65.1
Front Rooftops *(directed to impervious areas)*	Topsoil over Sand/Sandy Silt	2.34	10.0%	944	95	0	849	94.7	9.5	0.0	85.2
Impervious Areas *(roads, driveways)*	Topsoil over Sand/Sandy Silt	2.92	12.5%	944	95	0	849	118.2	11.9	0.0	106.3
Totals		**23.32**	**100%**					**944.0**	**389.4**	**164.1**	**390.6**

**Storage provided in infiltration trenches will infiltrate 388 mm/year; refer to Infiltration Calculations.*

Pre vs. Post-Development (West)

Component	Pre (mm/yr)	Post (mm/yr)	% Change
Precipitation	944	944	0.0%
Evapotranspiration	530	389	26.5% Decrease
Infiltration	232	164	29.2% Decrease
Runoff	182	391	114.0% Increase

EAST RESIDENTIAL WATER BALANCE

Existing Conditions *Taken from original Phase 1 SWM Report

Area	Land Use	Soil Type	Area		Individual				Weighted (by Area)			
			ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
A-1	Woodland	Sand/Sandy Silt	40.62	69.8%	944	550	250	144	659	384	175	101
A-2	Woodland	Sand/Sandy Silt	5.36	9.2%	944	550	250	144	87	51	23	13
E-1	Woodland	Sand/Sandy Silt	12.21	21.0%	944	550	250	144	198	115	52	30
	Totals		**58.19**	**100.0%**					**944**	**550**	**250**	**144**

Developed Conditions (with Infiltration BMPs)

Land Use	Soil Type	Area		Individual				Weighted (by Area)			
		ha	%	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)	Precip (mm)	ET (mm)	Infil (mm)	Runoff (mm)
Woodland	Sand/Sandy Silt	12.24	21.0%	944	550	250	144	198.6	115.7	52.6	30.3
SMWF *(surface area @ maximum storage)*	Topsoil over Sand/Sandy Silt	1.68	2.9%	944	660	50	234	27.3	19.1	1.4	6.8
SWMF Block *(grassed area, minus SWMF)*	Topsoil over Sand/Sandy Silt	2.96	5.1%	944	520	200	224	48.0	26.5	10.2	11.4
PHASE 1B-1											
Rearyards and Frontyards (grass) (not draining to infiltration trench)	Topsoil over Sand/Sandy Silt	3.39	5.8%	944	520	200	224	55.0	30.3	11.7	13.1
Rear Rooftops (directed to grassed rearyards w/ no infiltration trench)	Topsoil over Sand/Sandy Silt	0.29	0.5%	944	95	200	649	4.7	0.5	1.0	3.2
Front Rooftops (directed to impervious areas)	Topsoil over Sand/Sandy Silt	0.56	1.0%	944	95	0	849	9.1	0.9	0.0	8.2
Impervious Areas *(roads, driveways) (directed to storm sewers)*	Topsoil over Sand/Sandy Silt	1.26	2.2%	944	95	0	849	20.4	2.1	0.0	18.4
PHASE 1B-2											
Frontyards (grass) (not draining to infiltration trench)	Topsoil over Sand/Sandy Silt	1.10	1.9%	944	520	200	224	17.9	9.8	3.8	4.2
*Rearyards (grass) (draining to infiltration trench)	Topsoil over Sand/Sandy Silt	3.01	5.2%	944	520	388	36	48.9	26.9	20.1	1.8
*Rear Rooftops (directed to grassed rearyards w/ infiltration trench)	Topsoil over Sand/Sandy Silt	1.14	2.0%	944	95	388	461	18.5	1.9	7.6	9.0
Front Rooftops (directed to impervious areas)	Topsoil over Sand/Sandy Silt	0.66	1.1%	944	95	0	849	10.7	1.1	0.0	9.6
Impervious Areas *(roads, driveways) (directed to storm sewers)*	Topsoil over Sand/Sandy Silt	1.24	2.1%	944	95	0	849	20.1	2.0	0.0	18.1
FUTURE PHASES											
*Future Lands w/ Rock Check dams (Woodland)	Topsoil over Sand/Sandy Silt	28.65	49.2%	944	550	287	107	464.8	270.8	141.3	52.7
Totals		**58.19**	**100%**					**944.0**	**507.5**	**249.7**	**186.8**

**Storage provided in rear yard infiltration trenches will infiltrate 388 mm/year; Interim Infiltration measures (rock check dams) will infiltrate an additional 37mm/year (from the baseline 250mm for woodland areas); Refer to Infiltration Calculations*

Pre vs. Post-Development East

Component	Pre (mm/yr)	Post (mm/yr)	% Change
Precipitation	944	944	0.0%
Evapotranspiration	550	508	7.7% Decrease
Infiltration	250	250	0.1% Decrease
Runoff	144	187	29.7% Increase

Summary Pre vs Post-Development Water Balance (Overall)

Location	Area (ha)	Total Precipitation (mm/yr)	Infiltration (mm/yr)		Runoff (mm/yr)		Actual ET (mm/yr)	
			PRE	POST	PRE	POST	PRE	POST
West Residential Community	23.32	944	232	164	182	391	530	389
East Residential Community	58.19		250	250	144	187	550	508
Total (Weighted by Area)	**81.51**	**944**	**245**	**225**	**155**	**245**	**544**	**474**

APPENDIX G

Servicing Report Checklist

Project Name: West Capital Airpark Phase 1B-2 Residential
Project Number: 102085-22
Date: July 2023

Development Servicing Study Checklist

1.0 General Content	**Addressed (Y/N/NA)**	**Section**	**Comments**
Executive Summary (for larger reports only).	**N/A**		
Date and revision number of the report.	**Y**		Title Page
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y		Draft Plan of Subdivision, Figure 1, and Figure 2
Plan showing the site and location of all existing services.	Y		Figure 3, Figure 4 and Figure 5
Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Y		Section 1.0
Summary of Pre-consultation Meetings with City and other approval agencies.	N		
Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Y		Environmental Assessment, Hydraulic Network Analysis and Water Storage Facility Design Report
Statement of objectives and servicing criteria.	Y		Section 1.0
Identification of existing and proposed infrastructure available in the immediate area.	Y		General Plan of Services (102085-GP13 and 102085-GP14)
Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Y		Section 3.0 - reference to ECA approval for SWM Facility
Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y		Grading Plans (102085-GR13, 102085-GR14102085-GR15)

Development Servicing Study Checklist

1.0 General Content	Addressed (Y/N/NA)	Section	Comments
Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	Y		
Proposed phasing of the development, if applicable.	Y		Figure 2
Reference to geotechnical studies and recommendations concerning servicing.	Y		Refer to Geotechnical Investigation (Paterson)
All preliminary and formal site plan submissions should have the following information:			
Metric scale	Y		
North arrow (including construction North)	Y		
Key plan	Y		
Name and contact information of applicant and property owner	Y		
Property limits including bearings and	Y		
Existing and proposed structures and	Y		
Easements, road widening and rights-of-	Y		
Adjacent street names	Y		

Development Servicing Study Checklist

2.0 Water	**Addressed (Y/N/NA)**	**Section**	**Comments**
Confirm consistency with Master Servicing Study, if available.	N/A		Section 4.0
Availability of public infrastructure to service proposed development.	Y		Section 4.0
Identification of system constraints.	Y		Section 4.0
Identify boundary conditions.	Y		Section 4.0
Confirmation of adequate domestic supply and pressure.	Y		Section 4.0
Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter’s Survey. Output should show available fire flow at locations throughout the development.	Y		Section 4.0
Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Y		Section 4.0
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	Y		Section 4.0
Address reliability requirements such as appropriate location of shut-off valves.	Y		Section 4.0
Check on the necessity of a pressure zone boundary modification.	Y		Section 4.0
Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	Y		Section 4.0
Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Y		Section 4.0
Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	Y		Section 4.0
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y		Section 4.0
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Y		Section 4.0

Development Servicing Study Checklist

3.0 Wastewater	**Addressed (Y/N/NA)**	**Section**	**Comments**
Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Y		Refer to Sanitary Collection System report (Clearford, July 2023) and Section 5.0
Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A		
Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	Y		Refer to Sanitary Collection System report (Clearford, July 2023) and Section 5.0
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y		Refer to Sanitary Collection System report (Clearford, July 2023) and Section 5.0
Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Y		Refer to Sanitary Collection System report (Clearford, July 2023) and Section 5.0
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix ‘C’) format.	Y		Refer to Sanitary Collection System report (Clearford, July 2023) and Section 5.0
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y		Refer to Sanitary Collection System report (Clearford, July 2023) and Section 5.0
Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N		
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	Y		Refer to Sanitary Collection System report (Clearford, July 2023) and Section 5.0
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A		
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A		
Special considerations such as contamination, corrosive environment etc.	Y		Refer to Geotechnical Investigation (Paterson)

Development Servicing Study Checklist

4.0 Stormwater	Addressed (Y/N/NA)	Section	Comments
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Analysis of the available capacity in existing public infrastructure.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Set-back from private sewage disposal systems.	Y		
Watercourse and hazard lands setbacks.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Any proposed diversion of drainage catchment areas from one outlet to another.	N/A		
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A		

Development Servicing Study Checklist

4.0 Stormwater	**Addressed (Y/N/NA)**	**Section**	**Comments**
Identification of municipal drains and related approval requirements.	N/A		
Description of how the conveyance and storage capacity will be achieved for the development.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Inclusion of hydraulic analysis including HGL elevations.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y		Refer to Stormwater Management Report dated July 2023 and Section 6.0
Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A		
Identification of fill constrains related to floodplain and geotechnical investigation.	Y		Refer to Geotechnical Investigation

Development Servicing Study Checklist

5.0 Approval and Permit Requirements	**Addressed (Y/N/NA)**	**Section**	**Comments**
Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Y		Refer to existing ECA approval - Appendix F
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N		
Changes to Municipal Drains.	N/A		
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A		

6.0 Conclusion	**Addressed (Y/N/NA)**	**Section**	**Comments**
Clearly stated conclusions and recommendations.	N/A		Section 9.0
Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	N/A		
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y		Report and Drawings

APPENDIX H
Existing Approvals

1) East Stormwater Management Facility MOECC ECA# 244-C6UGGS

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 2447-C6UGGS
Issue Date: September 24, 2021

1514947 Ontario Inc.
1500 Thomas Argue Road
Ottawa, Ontario
K0A 1L0

Site Location: West Capital Airpark - Phase 1B Residential
1500 Thomas Argue Road
Part of Lots 13 and 14, Concession 4, Huntly
City of Ottawa, Ontario

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the establishment of stormwater management Works to serve Phase 1B of the West Capital Airpark East Residential Community, located in the City of Ottawa, including treatment and disposal of stormwater run-off from the development, to provide Enhanced Level water quality control and erosion protection, with a maximum outflow water temperature of 25 degrees Celcius, before entering Carp Creek, and to attenuate post-development peak flows to pre-development peak flows for all storm events up to and including the 100-year storm event, consisting of the following:

- **hydrodynamic separator (catchment area 6.9 hectares):** one (1) hydrodynamic separator, Vortechs Model 9000 or Equivalent Equipment, located on Stormwater Management East Pond Block 157, having a sediment storage capacity of 3.67 cubic metres, and a maximum treatment flow rate of 396 litres per second, discharging to the Stormwater Management East Pond located on the north-west corner of the East Residential Community on Block 157; and

- **stormwater management facility (catchment area 47.2 hectares):** one (1) dry pond, located at the north-west corner of the East Residential Community on Block 157, having a total storage volume of 17,020 cubic metres, at a total depth of approximately 1.66 metres, discharging via an outlet control structure to a 0.3 metres deep subsurface stone cooling trench, having a total volume of approximately 82 cubic metres, and an outfall weir at a maximum discharge rate of 1,180 litres per second and an outfall swale to Carp Creek;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted application and supporting documents listed in Schedule "A" forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this entire document and any schedules attached to it, and the application;
2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;
3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;
4. "EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;
5. "Equivalent Equipment" means a substituted equipment or like-for-like equipment that meets the required quality and performance standards of the approved named equipment.
6. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;
7. "Owner" means 1514947 Ontario Inc., and includes its successors and assignees;
8. "OWRA" means the *Ontario Water Resources Act, R.S.O. 1990, c. O.40* , as amended;
9. "Works" means the sewage Works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

4. Where there is a conflict between the documents listed in Schedule "A" and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

2. EXPIRY OF APPROVAL

1. This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.

2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. CHANGE OF OWNER

1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

    a. change of Owner;

    b. change of address of the Owner;

    c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or

    d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act,* R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.

3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. OPERATION AND MAINTENANCE

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.

2. The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the Works do not constitute a safety or health hazard to the general public.

3. The Owner shall undertake an inspection of the condition of the Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the Works to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the Works, as applicable. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.

4. The Owner shall construct, operate and maintain the Works with the objective that the effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam or discoloration on the receiving waters.

5. The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's administrative office for inspection by the Ministry. The logbook shall include the following:

    a. the name of the Works; and

    b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the Works.

6. The Owner shall prepare an operations manual prior to the commencement of operation of the Works that includes, but is not necessarily limited to, the following information:

    a. operating and maintenance procedures for routine operation of the Works;

    b. inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;

d. contingency plans and procedures for dealing with potential spills and any other abnormal situations and for notifying the District Manager; and

e. procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

7. The Owner shall maintain the operations manual current and retain a copy at the Owner's administrative office for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

5. TEMPORARY EROSION AND SEDIMENT CONTROL

1. The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

2. The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

6. REPORTING

1. One (1) week prior to the start-up of the operation of the Works, the Owner shall notify the District Manager (in writing) of the pending start-up date.

2. The Owner shall, upon request, make all reports, manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

3. The Owner shall prepare a performance report within ninety (90) days following the end of the period being reported upon, and submit the report(s) to the District Manager when requested. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be prepared to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

    a. a description of any operating problems encountered and corrective actions taken;

    b. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works, including an estimate of the quantity of any materials removed from the Works;

c. a summary of any complaints received during the reporting period and any steps taken to address the complaints;

d. a summary of all spill or abnormal discharge events; and

e. any other information the District Manager requires from time to time.

7. RECORD KEEPING

1. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation, maintenance and monitoring activities required by this Approval.

Schedule "A"

1. Application for Environmental Compliance Approval, dated August 18, 2021, received on August 24, 2021, submitted by 1514947 Ontario Inc.;
2. Transfer of Review Letter of Recommendation, dated August 24, 2021, and signed by Damien Whittaker, P.Eng., Senior Engineer - Infrastructure Applications; Development Review, Rural Branch; City of Ottawa, including the following supporting documents:
    a. Final Plans and Specifications prepared by Novatech
    b. Stormwater Management Report prepared by Novatech
3. Email received on September 7, 2021, from Susan Gordon, Novatech

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from the Works are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the Works. The Condition also ensures that adequate storage is maintained in the Works at all times as required by the design. Furthermore, this Condition is included to ensure that the Works are operated and maintained to function as designed.

5. Condition 5 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction until they are no longer required.

6. Condition 6 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.

7. Condition 7 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment,
Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 24th day of September, 2021

A. Ahmed

Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

MM/
c: District Manager, MECP Ottawa District Office
City Clerk, City of Ottawa (D07-16-18-0007)
Damien Whittaker, City of Ottawa
Susan Gordon, Novatech

DRAWINGS

KEY PLAN
N.T.S.

M:\2002\102085\CAD_PHASES2B&3\Civil\102085-2B3-LP-model.dwg, Layout Plan, Jun 26, 2024 - 1:35pm, arongve

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
5.	ISSUED FOR REGISTRATION AND ECA (NO CHANGES)	JUN 28/24	ARM
4.	REVISED PER CITY COMMENTS (NO CHANGES)	FEB 20/24	ARM
3.	ISSUED WITH ADDENDUM #2 (NO CHANGES)	JAN 5/24	ARM
2.	ISSUED FOR TENDER (NO CHANGES)	DEC 7/23	ARM
1.	ISSUED FOR REVIEW	JUL 28/23	ARM

SCALE
N.T.S.

DESIGN AAR
CHECKED ARM
DRAWN AAR
CHECKED ARM
APPROVED SMG

A. A. RONGVE
100616298
June 28, 2024

A.R. MCAULEY
100141256
June 28, 2024

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

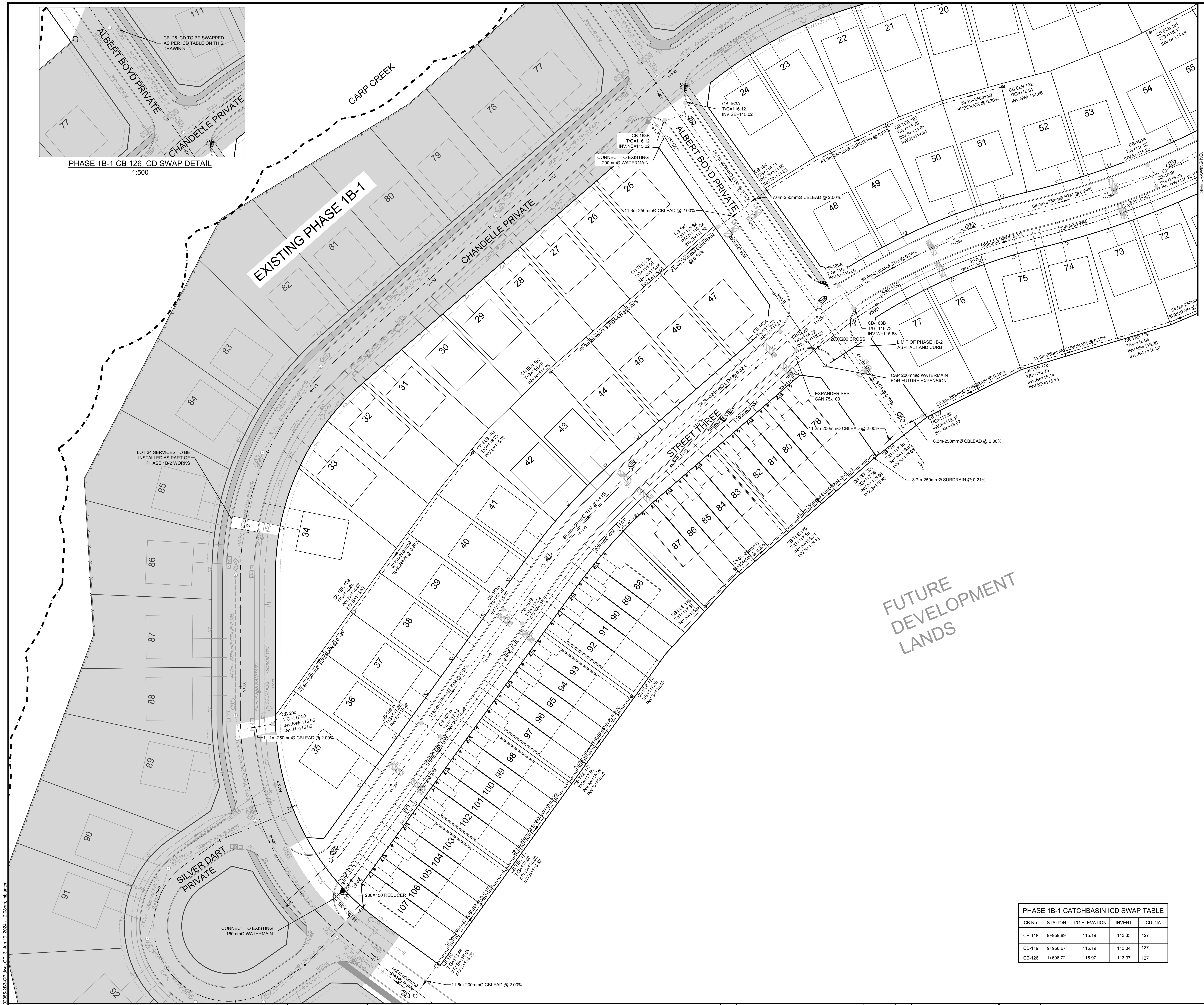
Telephone	(613) 254-9643
Facsimile	(613) 254-5867
Website	www.novatech-eng.com

LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
DRAWING LAYOUT PLAN -
PHASE 1B-2

PROJECT No. 102085
REV REV # 5
DRAWING No. 102085-LP2

PLANB1.DWG - 1000mmx707mm



PHASE 1B-1 CB 126 ICD SWAP DETAIL
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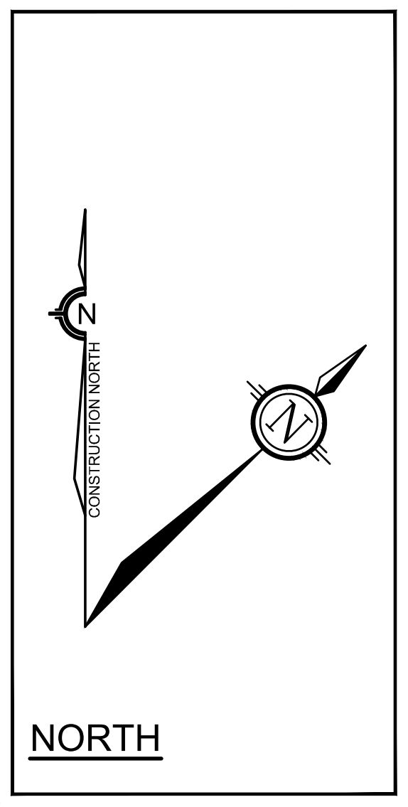

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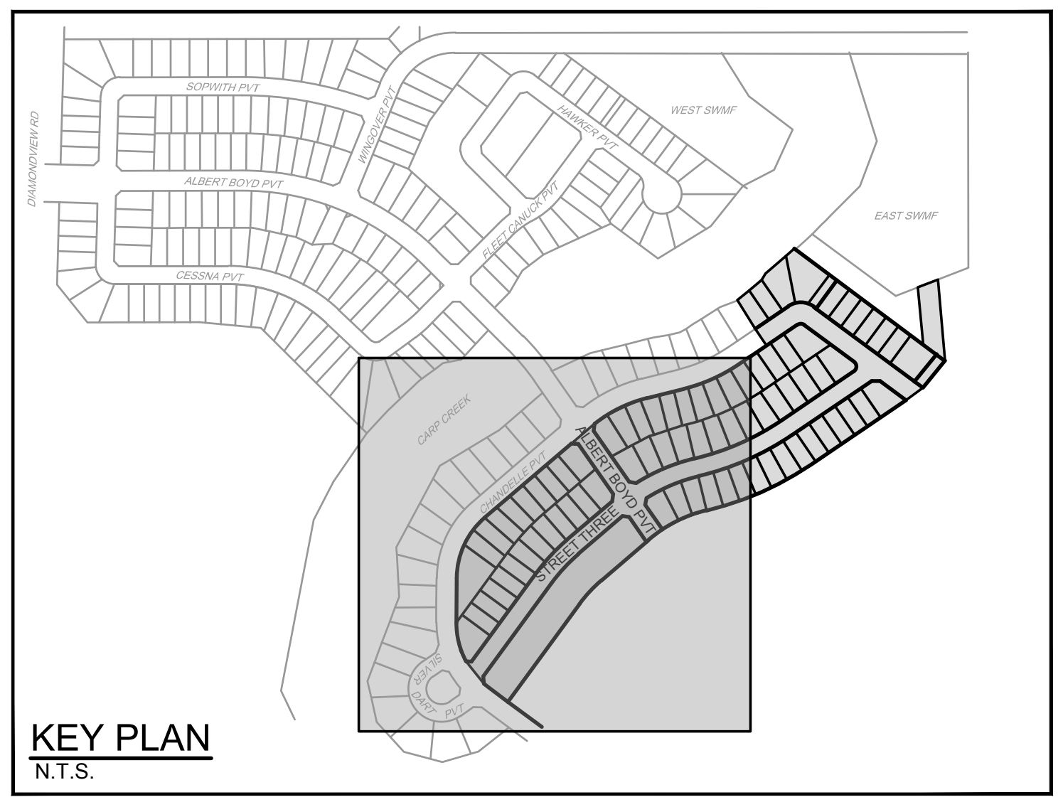

KEY PLAN
N.T.S.

LEGEND

200mmØ WM	PROPOSED WATERMAIN AND DIAMETER
⊗ V&VB	PROPOSED VALVE & VALVE BOX
HYD	PROPOSED HYDRANT C/W VALVE & LEAD
T/F = 98.45	PROPOSED TOP OF BOTTOM FLANGE
200mmØ WM	EXISTING WATERMAIN AND DIAMETER
⊗ *V&VB*	EXISTING VALVE & VALVE BOX
HYD	EXISTING HYDRANT C/W VALVE & LEAD
SBS SANITARY	PROPOSED SMALL BORE SEWER-SANITARY AND DIRECTION OF FLOW
● SAP 1-A	PROPOSED SANITARY SYSTEM ACCESS POINT
SBS SANITARY	EXISTING SMALL BORE SEWER- SANITARY AND DIRECTION OF FLOW
● *SAP 1-A*	EXISTING SANITARY SYSTEM ACCESS POINT
	PROPOSED STORM SEWER AND DIRECTION OF FLOW
	PROPOSED REAR YARD SUBDRAIN, INFILTRATION TRENCH AND DIRECTION OF FLOW
	EXISTING STORM SEWER
222 ○	PROPOSED STORM MANHOLE
222 ○	EXISTING STORM MANHOLE
▽	PROPOSED SERVICE LOCATION
▽	SERVICE LOCATION - SERVICE INSTALLED AS PART OF PHASE 1B-1 WORKS
▼	PROPOSED SERVICE LOCATION (WATER AND STORM)
◆	PROPOSED SERVICE LOCATION (SANITARY ONLY)
▨	1.8m CONCRETE SIDEWALK
CB ⊡	PROPOSED CATCHBASIN
CB ■	PROPOSED CATCHBASIN WITH INLET CONTROL DEVICE
⊡	EXISTING ROADSIDE CATCHBASIN
⊕ CB ELB	PROPOSED LANDSCAPE CATCHBASIN ELBOW
○ CB TEE	PROPOSED LANDSCAPE CATCHBASIN TEE
SB ▨	PROPOSED SEEPAGE BARRIER

CATCHBASIN TABLE

CB No.	STATION	T/G ELEVATION	INVERT	ICD DIA.	OUTLET DIAMETER
CB-161A	11+115.31	117.07	Out=115.97	152	200
CB-161B	11+115.22	117.22	Out=115.97	127	200
CB-162A	11+238.29	116.77	Out=115.67	108	200
CB-162B	11+238.17	116.72	Out=115.62	108	200
CB-163A	1+656.85	116.12	Out=115.02	108	200
CB-163B	1+657.60	116.12	Out=115.02	108	200
CB-164A	11+365.08	116.33	Out=115.23	127	200
CB-164B	11+365.08	116.33	Out=115.23	127	200
CB-165A	11+520.63	115.71	Out=114.61	152	200
CB-165B	11+523.18	115.79	Out=114.69	127	200
CB-166A	10+037.41	115.37	Out=114.27	94	200
CB-166B	11+512.01	115.37	Out=114.27	83	200
CB-167A	10+127.29	115.85	Out=114.75	94	200
CB-167B	10+127.29	115.85	Out=114.75	94	200
CB-168A	11+261.42	116.76	Out=115.66	83	200
CB-168B	11+261.28	116.73	Out=115.63	83	200
CB-169-A	11+071.35	117.38	Out=116.28	83	200
CB-169-B	11+071.36	117.53	Out=116.28	83	200
CB 170	9+382.72	118.48	Out=116.65 In=116.25	200(LEAD)	200
CB 176	1+781.37	117.36	Out=116.05 In=115.65	200 (LEAD)	200
CB 177	1+780.07	117.32	Out=115.47 In=115.07	178	250
CB 184	10+132.39	116.12	Out=115.40 In=115.00	152	250
CB 187	10+005.76	114.78	In=113.18 Out=113.58	94	250
CB 188	10+041.03	115.59	Out=114.72 In=114.31	250 (LEAD)	250
CB 194	1+694.10	116.71	Out=114.92 In=114.52	178	250
CB 195	1+694.48	116.82	Out=116.02 In=115.62	152	250
CB 200	9+487.97	117.80	Out=115.95 In=115.55	152	250

PHASE 1B-1 CATCHBASIN ICD SWAP TABLE

CB No.	STATION	T/G ELEVATION	INVERT	ICD DIA.
CB-118	9+959.89	115.19	113.33	127
CB-119	9+958.67	115.19	113.34	127
CB-126	1+606.72	115.97	113.97	127

REFER TO 102085-ND1B2 FOR ADDITIONAL NOTES

NOTE:
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CLEARFORD
WATER SYSTEMS INC.

CLEARFORD
W. G. STEFAN
27 JUN 2024

WEST CAPITAL
Developments

No.	REVISION	DATE	BY
8.	ISSUED FOR REGISTRATION AND ECA	JUN 19/24	ARM
7.	REVISED PER CITY COMMENTS	FEB 20/24	ARM
6.	REVISED PER CITY COMMENTS	FEB 9/24	ARM
5.	ISSUED WITH ADDENDUM #2	JAN 5/24	ARM
4.	ISSUED FOR TENDER	DEC 7/23	ARM
3.	ISSUED FOR REVIEW	JUL 25/23	ARM
2.	ISSUED FOR COORDINATION	JUL 11/23	ARM
1.	ISSUED FOR COORDINATION	JAN 18/23	ARM

SCALE
1:500
1:500
0 5 10 15 20

DESIGN MNP
CHECKED ARM
DRAWN MNP
CHECKED ARM
APPROVED SMG

A. A. RONGVE
100616298
June 28, 2024

A.R. MCAULEY
100141256
June 28, 2024

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone	(613) 254-9643
Facsimile	(613) 254-5867
Website	www.novatech-eng.com

LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
GENERAL PLAN OF SERVICES - PHASE 1B-2

PROJECT No. 102085
REV
REV # 8
DRAWING No. 102085-GP13

PLANB1.DWG - 1000mmx707mm

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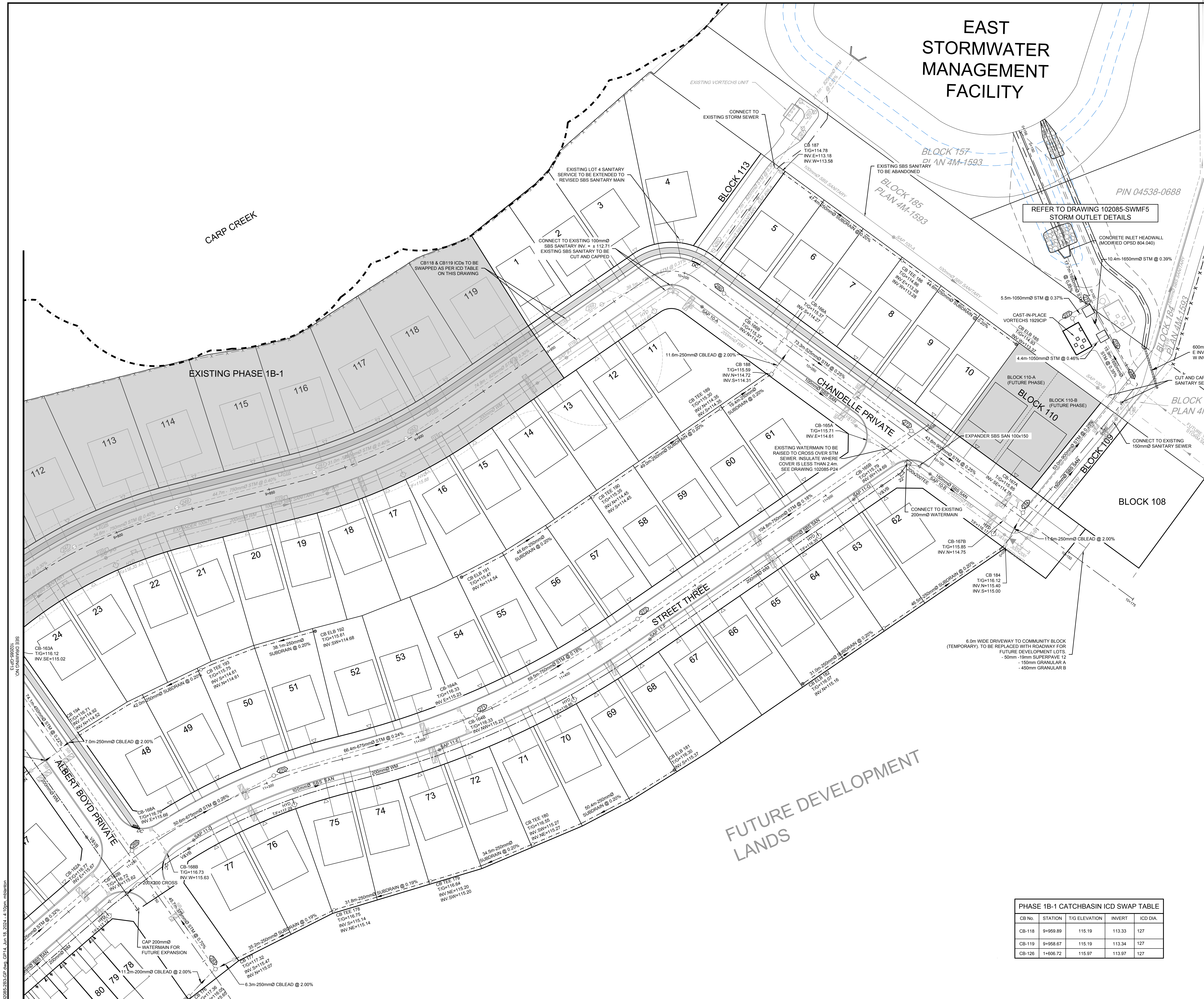

PHASE 1B-1 CATCHBASIN ICD SWAP TABLE

CB No.	STATION	T/G ELEVATION	INVERT	ICD DIA.
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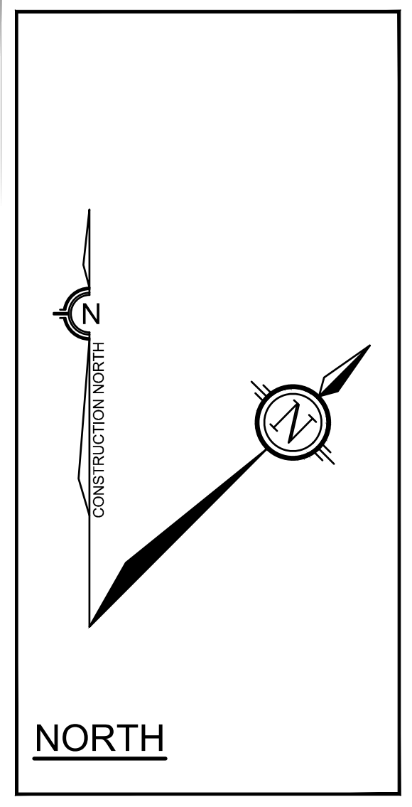
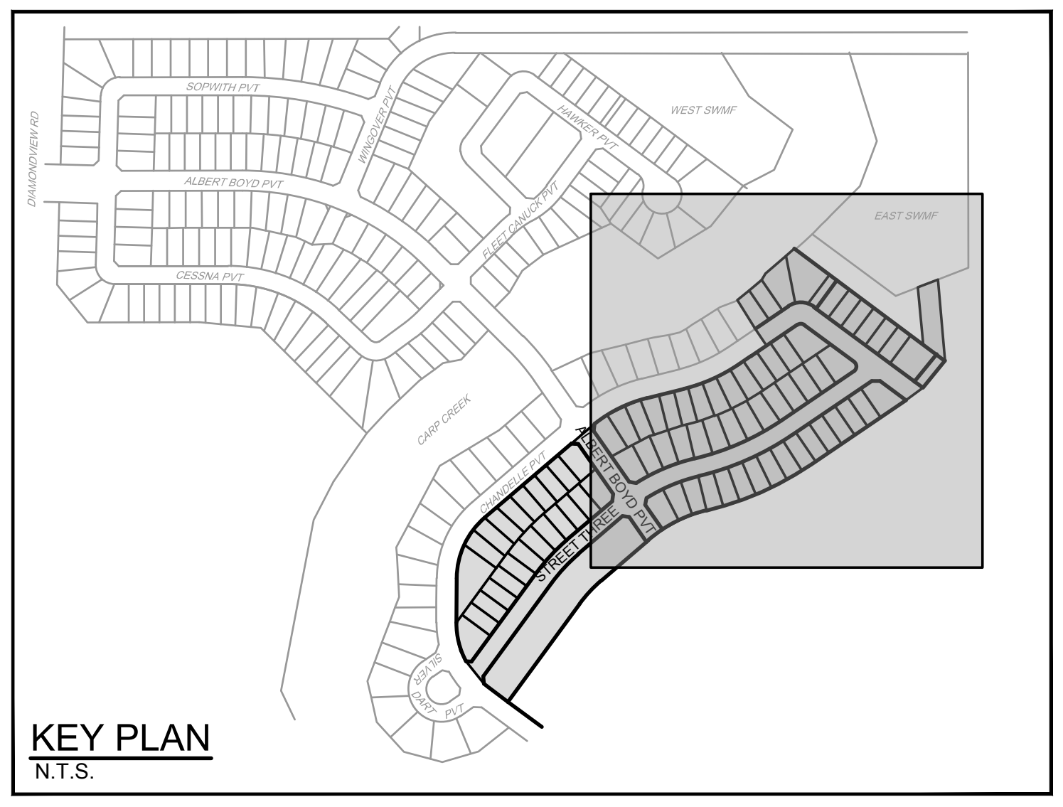


NORTH



KEY PLAN
N.T.S.

LEGEND

200mmØ WM	PROPOSED WATERMAIN AND DIAMETER
⊗ V&VB	PROPOSED VALVE & VALVE BOX
⌖ HYD	PROPOSED HYDRANT C/W VALVE & LEAD
T/F = 98.45	PROPOSED TOP OF BOTTOM FLANGE
200mmØ WM	EXISTING WATERMAIN AND DIAMETER
⊗ *V&VB*	EXISTING VALVE & VALVE BOX
⌖ *HYD*	EXISTING HYDRANT C/W VALVE & LEAD
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◉SAP 1-A	PROPOSED SANITARY SYSTEM ACCESS POINT
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— ◄ —	PROPOSED STORM SEWER AND DIRECTION OF FLOW
— · ◄	PROPOSED REAR YARD SUBDRAIN, INFILTRATION TRENCH AND DIRECTION OF FLOW
— — —	EXISTING STORM SEWER
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CATCHBASIN TABLE

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CB-163B	1+657.60	116.12	Out=115.02	108	200
CB-164A	11+365.08	116.33	Out=115.23	127	200
CB-164B	11+365.08	116.33	Out=115.23	127	200
CB-165A	11+520.63	115.71	Out=114.61	152	200
CB-165B	11+523.18	115.79	Out=114.69	127	200
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CB-167B	10+127.29	115.85	Out=114.75	94	200
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CB-168B	11+261.28	116.73	Out=115.63	83	200
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CB 194	1+694.10	116.71	Out=114.92 In=114.52	178	250
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CB 200	9+487.97	117.80	Out=115.95 In=115.55	152	250

REFER TO 102085-ND1B2 FOR ADDITIONAL NOTES

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CLEARFORD WATER SYSTEMS INC.

CLEARFORD
W. G. STEFAN
27-JUN-2024

WEST CAPITAL Developments

No.	REVISION	DATE	BY
10.	ISSUED FOR REGISTRATION AND ECA	JUN 19/24	ARM
9.	REVISED POND INLET SWALE	MAY 14/24	ARM
8.	REVISED PER CITY COMMENTS	FEB 20/24	ARM
7.	REVISED PER CITY COMMENTS	FEB 9/24	ARM
6.	ISSUED WITH ADDENDUM #4	JAN 12/24	ARM
5.	ISSUED WITH ADDENDUM #2	JAN 5/24	ARM
4.	ISSUED FOR TENDER	DEC 7/23	ARM
3.	ISSUED FOR REVIEW	JUL 25/23	ARM
2.	ISSUED FOR COORDINATION	JUL 11/23	ARM
1.	ISSUED FOR COORDINATION	JAN 18/23	ARM

SCALE
1:500
1:500
0 5 10 15 20

DESIGN	MNP
CHECKED	ARM
DRAWN	MNP
CHECKED	ARM
APPROVED	SMG

A. A. RONGVE
100616298
June 28, 2024

A.R. MCAULEY
100141256
June 28, 2024

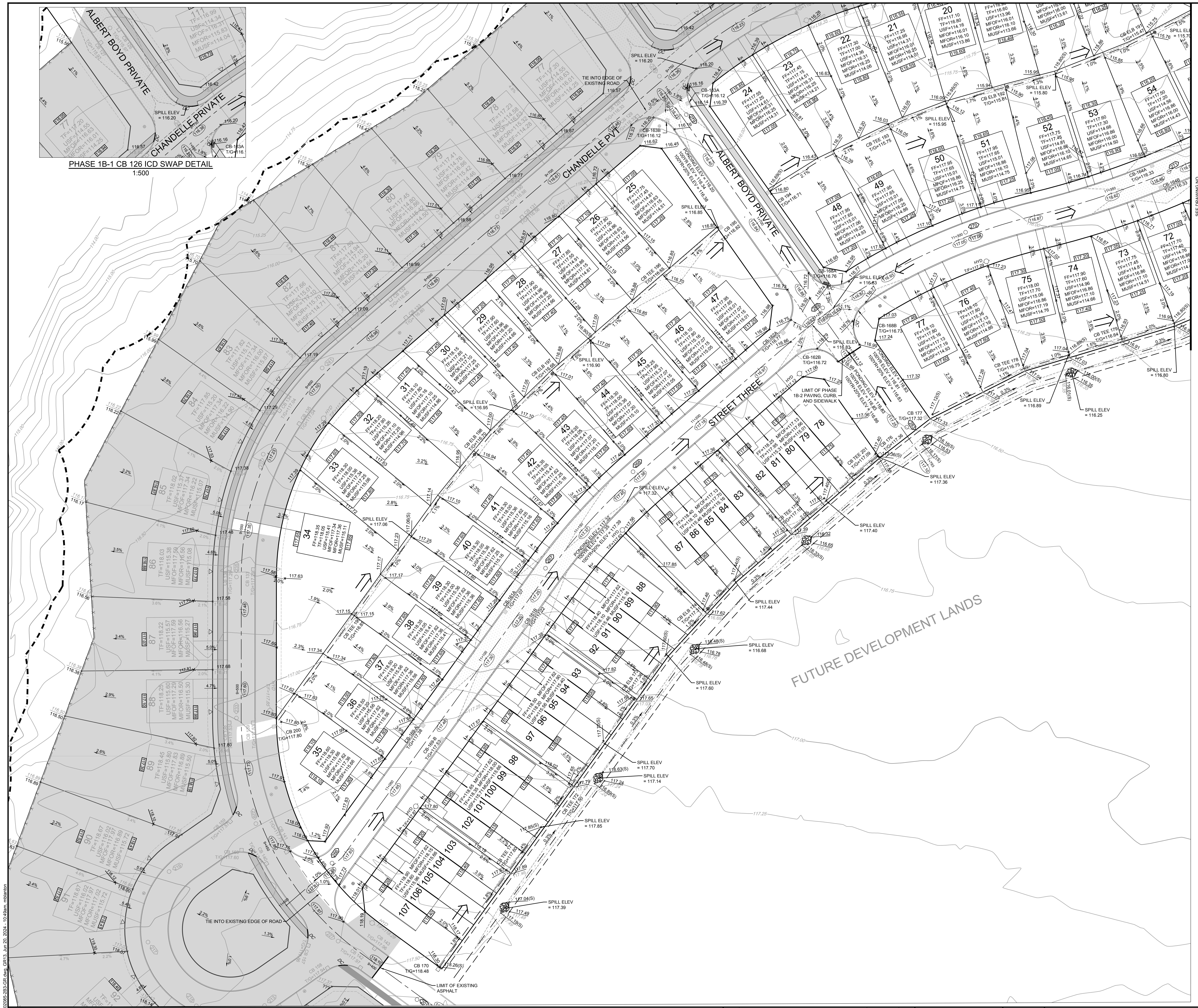
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

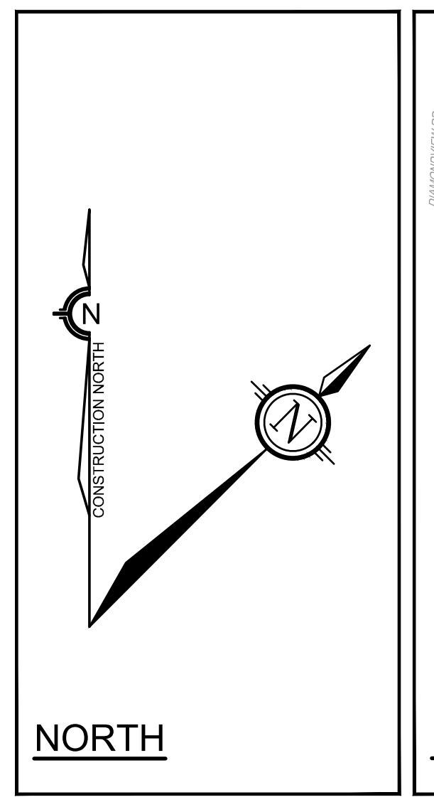
LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
GENERAL PLAN OF SERVICES
- PHASE 1B-2

PROJECT No. 1020852
REV
REV # 10
DRAWING No.
102085-GP14

PLANB1.DWG - 1000mmx707mm





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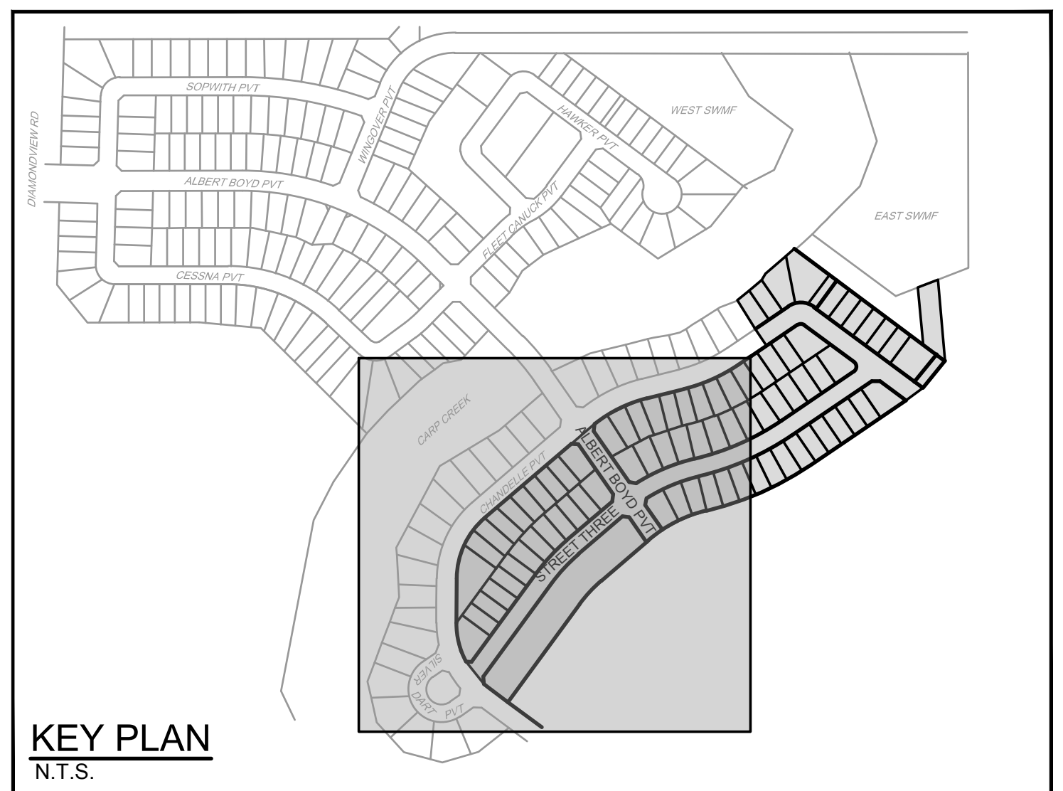

KEY PLAN
N.T.S.

LEGEND

1.5%	℄ REARYARD SWALE AND DIRECTION OF FLOW
117.00 116.50	PROPOSED ELEVATION *EXISTING ELEVATION*
127.55(S)	PROPOSED SWALE ELEVATION
0.6%	PROPOSED GRADING DIRECTION AND SLOPE
TF=117.03	TOP OF FOUNDATION ELEVATION (STANDARD 8' BASEMENT HEIGHT)
MUSF=114.28	MINIMUM UNDERSIDE OF FOOTING ELEVATION
MFOF=116.63	MINIMUM FOUNDATION OPENING FRONT ELEVATION
MFOR=115.32	MINIMUM FOUNDATION OPENING REAR ELEVATION
116.63	PROPOSED TERRACE ELEVATION
116.93	PROPOSED CENTRELINE OF ROAD ELEVATION
116.96	PROPOSED CENTRELINE OF ROAD ELEVATION - HIGH POINT
116.90	PROPOSED CENTRELINE OF ROAD ELEVATION - LOW POINT
HYD T/F=127.55	PROPOSED HYDRANT LOCATION PROPOSED TOP OF BOTTOM FLANGE
WS	PROPOSED WATER SAMPLING STATION
☐ CB	PROPOSED CATCHBASIN
▨ CB	PROPOSED CATCHBASIN WITH INLET CONTROL DEVICE
CB ELB	PROPOSED LANDSCAPE CATCHBASIN ELBOW
○ CB TEE	PROPOSED LANDSCAPE CATCHBASIN TEE
○ 100	PROPOSED STORM MANHOLE
	TERRACING
⟸	MAJOR OVERLAND FLOW
	DEVELOPMENT SETBACK
— X — X —	PROPOSED 1.5m CHAINLINK FENCE
	PROPOSED 1.5m UTILITY EASEMENT
	PROPOSED TOP OF SLOPE
	PROPOSED ROCK FLOW CHECK DAM (MODIFIED OPSD 219.211)
	MAXIMUM STATIC PONDING CONTOUR

REFER TO 102085-ND1B2 FOR ADDITIONAL NOTES

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No.	REVISION	DATE	BY
7.	ISSUED FOR REGISTRATION AND ECA	JUN 28/24	ARM
6.	ADDITIONAL ORIGINAL GROUND SURFACE CONTOUR INTERVALS ADDED	APR 24/24	ARM
5.	REVISED PER CITY COMMENTS	FEB 20/24	ARM
4.	ISSUED WITH ADDENDUM #2	JAN 5/24	ARM
3.	ISSUED FOR TENDER (NO CHANGES)	DEC 7/23	ARM
2.	ISSUED FOR REVIEW	JULY 28/23	ARM
1.	ISSUED FOR COORDINATION	JAN 18/23	ARM

SCALE
1:500
1:500
0 5 10 15 20

DESIGN MNP
CHECKED ARM
DRAWN MNP
CHECKED ARM
APPROVED SMG

LICENSED PROFESSIONAL ENGINEER
A. A. RONGVE
100616298
June 28, 2024
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
A.R. MCAULEY
100141256
June 28, 2024
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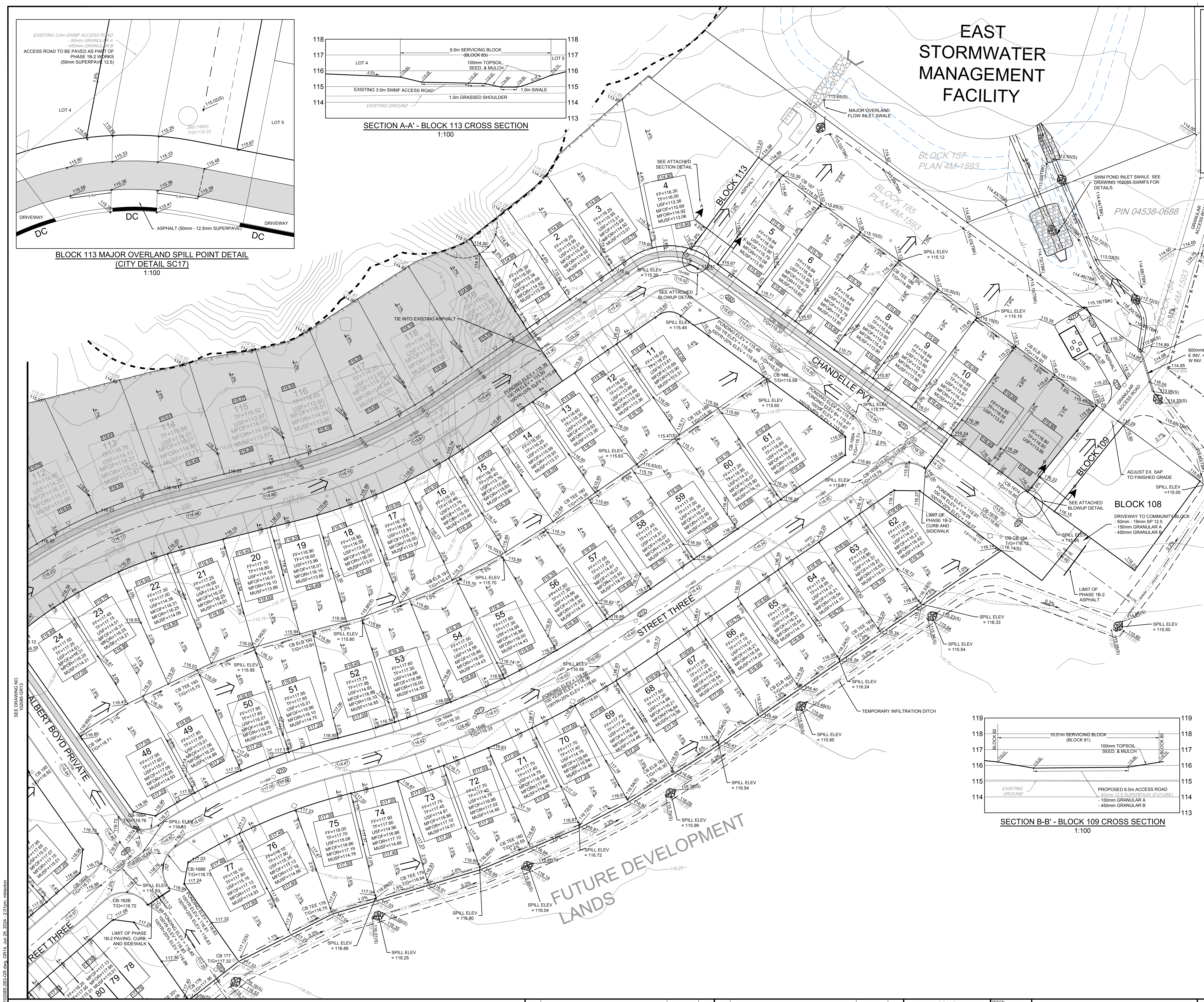
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
GRADING PLAN - PHASE 1B-2

PROJECT No. 102085
REV REV # 7
DRAWING No. 102085-GR13

PLANB1.DWG - 1000mmx707mm



BLOCK 113 MAJOR OVERLAND SPILL POINT DETAIL (CITY DETAIL SC17)

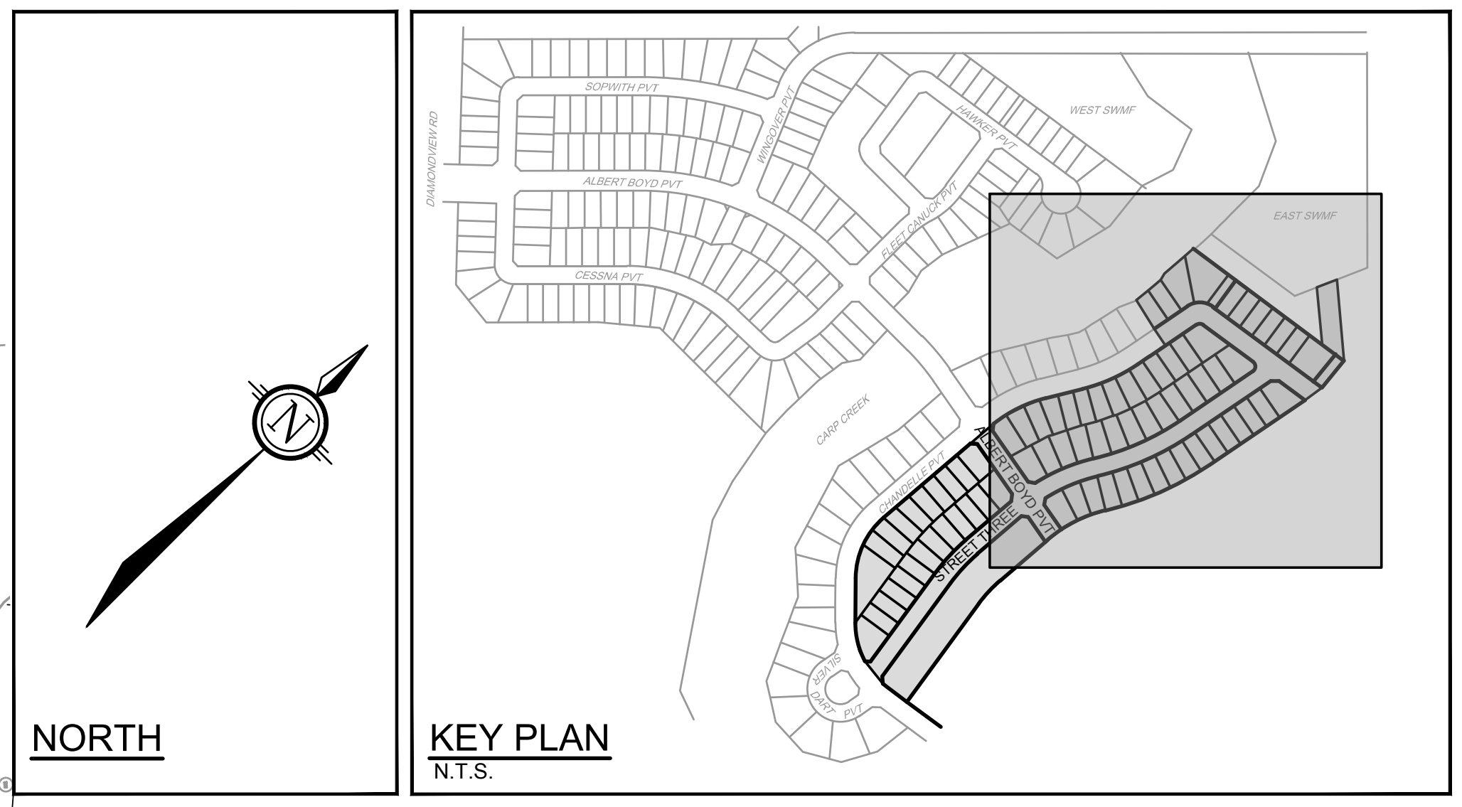
1:100

SECTION A-A' - BLOCK 113 CROSS SECTION

1:100

SECTION B-B' - BLOCK 109 CROSS SECTION

1:100



1.5%	℄ REARYARD SWALE AND DIRECTION OF FLOW
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WS	PROPOSED WATER SAMPLING STATION
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	TERRACING
⟸	MAJOR OVERLAND FLOW
	DEVELOPMENT SETBACK
— X — X —	PROPOSED 1.5m CHAINLINK FENCE
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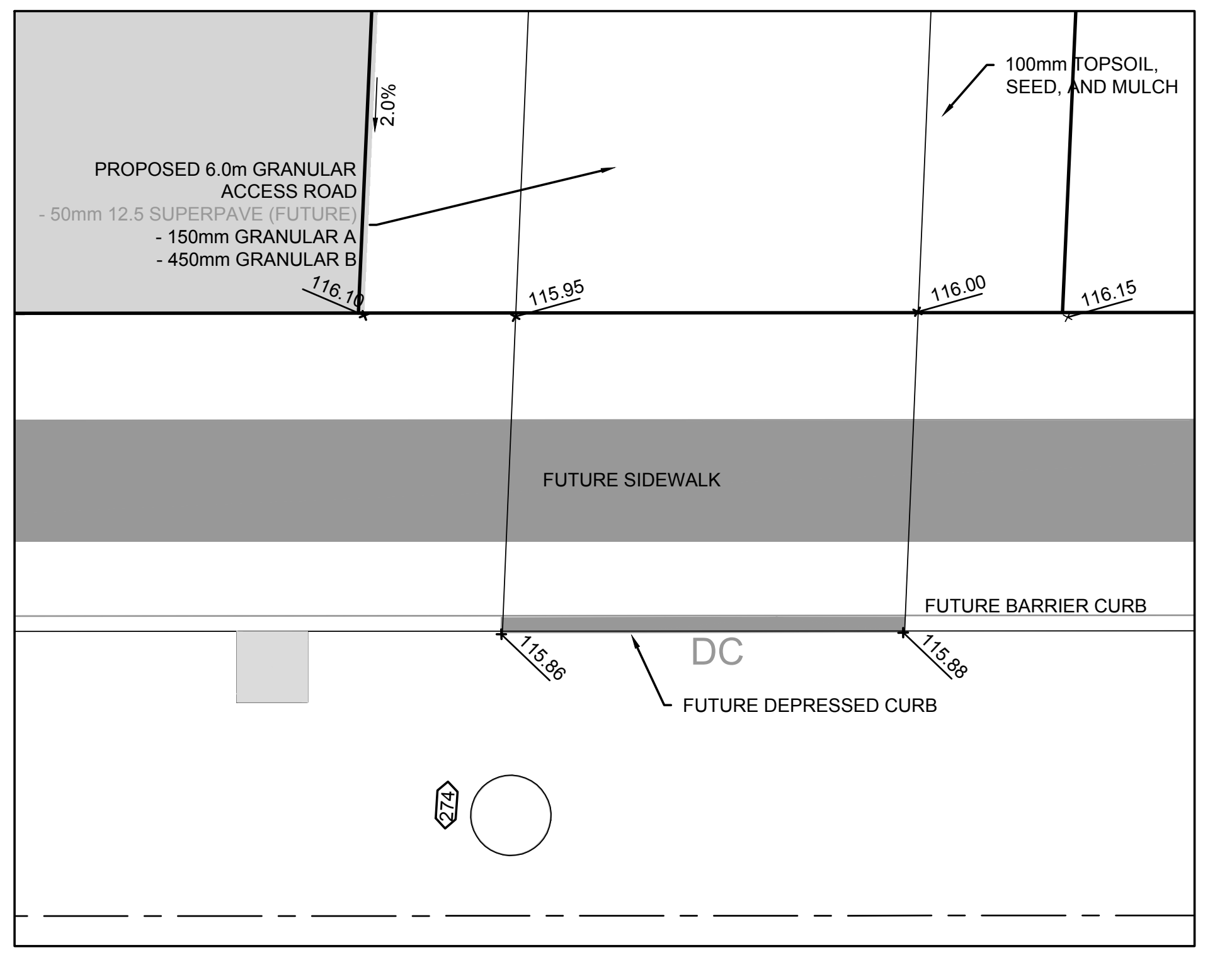
	PROPOSED TOP OF SLOPE
	PROPOSED ROCK FLOW CHECK DAM (MODIFIED OPSD 219.211)
	MAXIMUM STATIC PONDING CONTOUR



BLOCK 109 SWMF ACCESS ROAD AND MAJOR OVERLAND SPILL POINT DETAIL

1:100

REFER TO 102085-ND1B2 FOR ADDITIONAL NOTES

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6.	REVISED PER CITY COMMENTS	FEB 20/24	ARM
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4.	ISSUED WITH ADDENDUM #2	JAN 5/24	ARM
3.	ISSUED FOR TENDER	DEC 7/23	ARM
2.	ISSUED FOR REVIEW	JUL 28/23	ARM
1.	ISSUED FOR COORDINATION	JAN 18/23	ARM

SCALE
1:500
1:500
0 5 10 15 20

DESIGN MNP
CHECKED ARM
DRAWN MNP
CHECKED ARM
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A. A. RONGVE
100616298
June 28, 2024

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LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
GRADING PLAN - PHASE 1B-2

PROJECT No. 102085
REV REV # 9
DRAWING No. 102085-GR14

PLANB1.DWG - 1000mmx707mm

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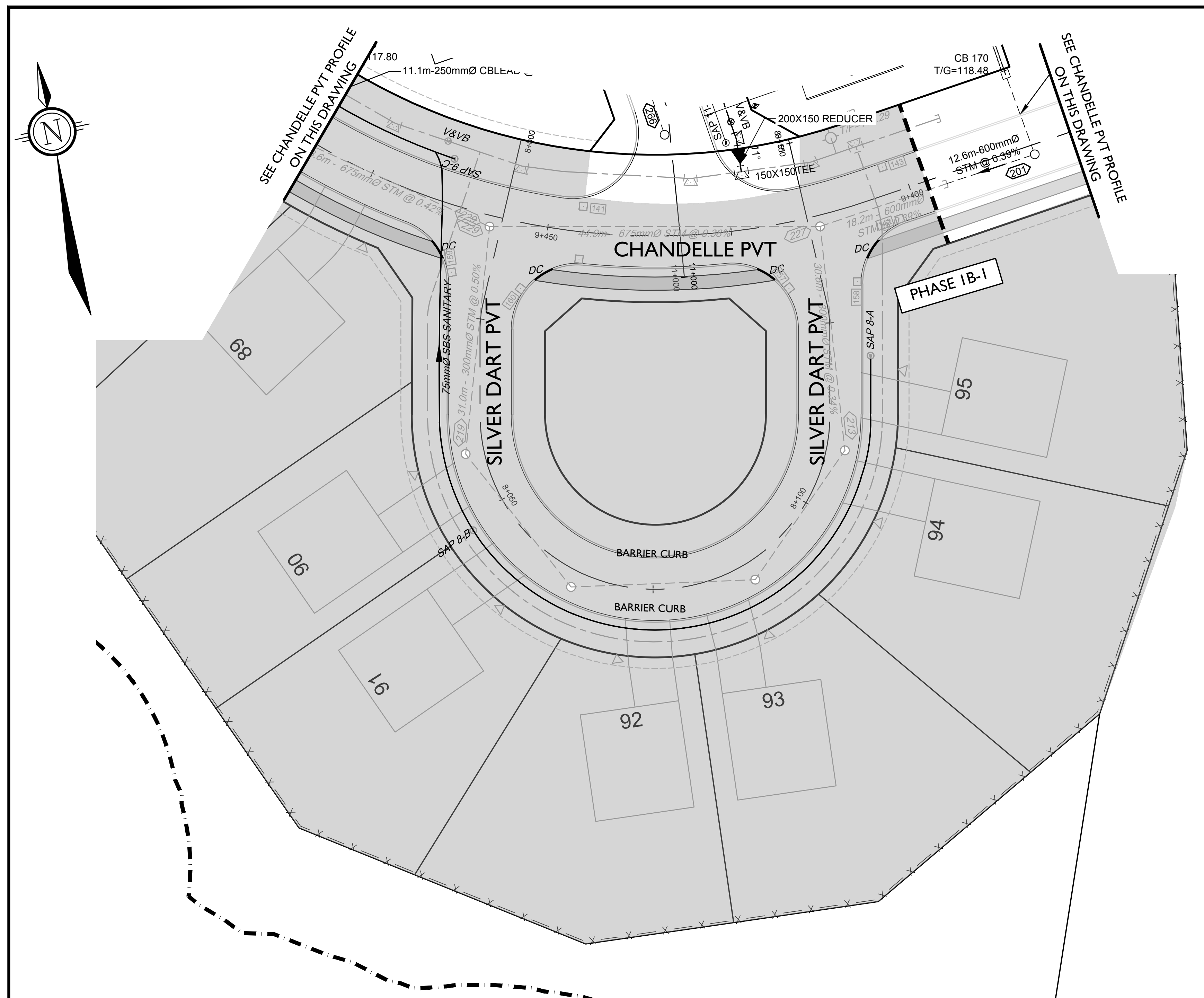
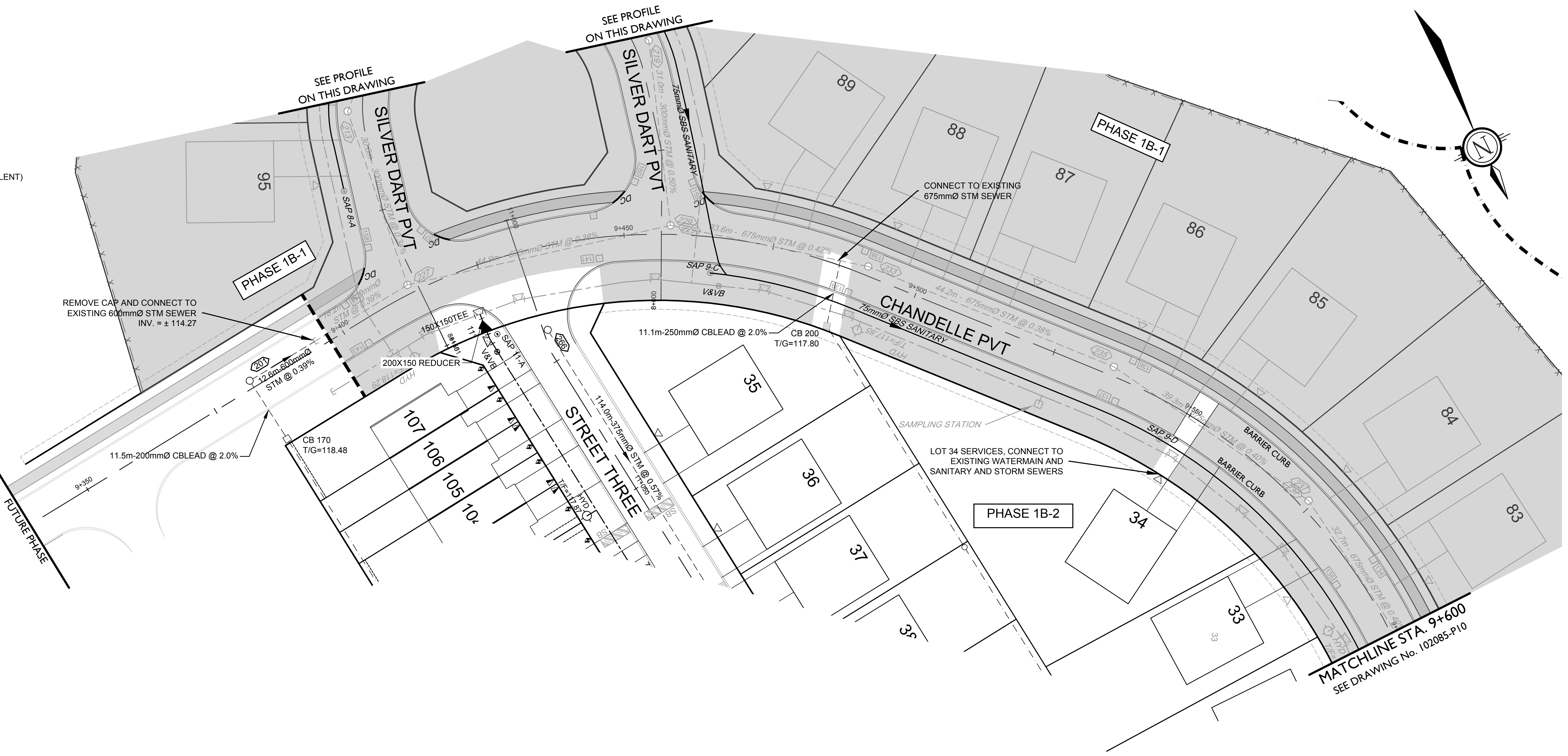


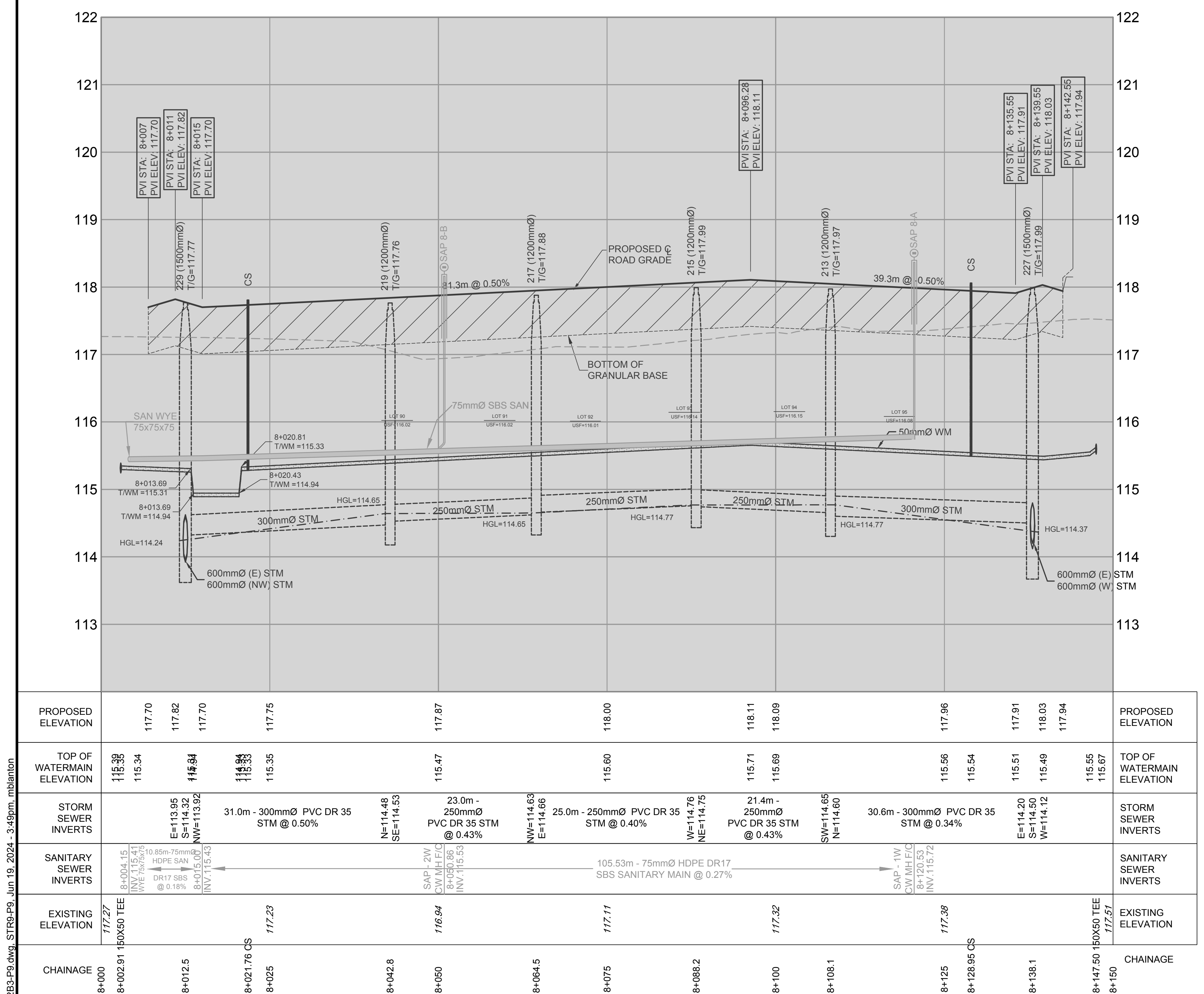
SILVER DART PVT

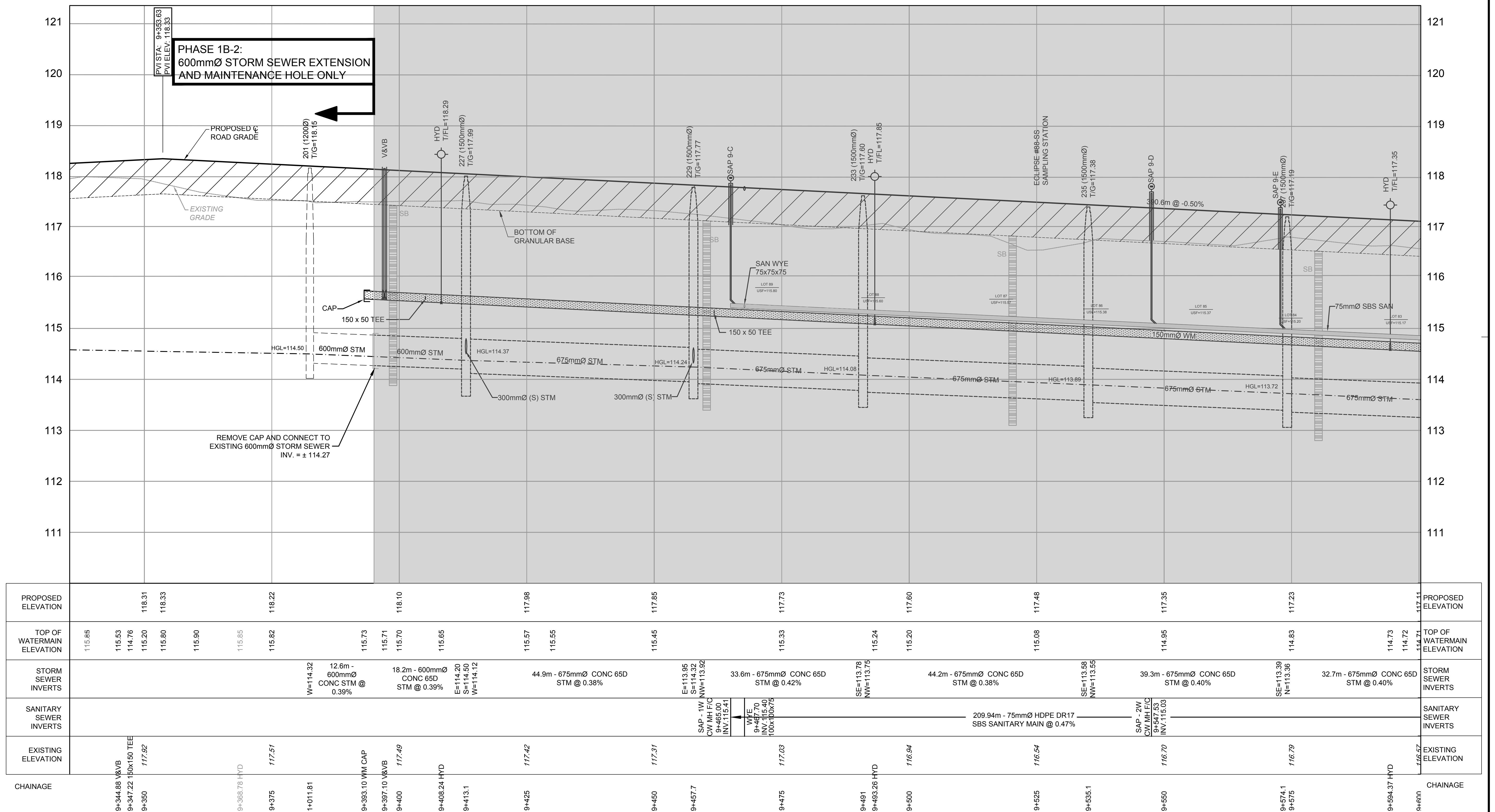
LEGEND

—⊗—	PROPOSED VALVE LOCATION
V&VB	VALVE & VALVE BOX
V&VC	VALVE & VALVE CHAMBER
—►—	REDUCER
HYD	PROPOSED HYDRANT LOCATION COMPLETE WITH VALVES
▢	PROPOSED WATER SAMPLING STATION (ECLIPSE #88-22 OR APPROVED EQUIVALENT) COMPLETE WITH VALVES PROPOSED BEND AND THRUSTBLOCK
11°	PROPOSED BEND AND THRUSTBLOCK (SEE PLAN AND PROFILES)
SAP 2-D	PROPOSED SANITARY SYSTEM ACCESS POINT
SBS SANITARY	PROPOSED SMALL BORE SEWER-SANITARY
107	PROPOSED STORM MH & SEWER
— — —	PROPOSED CB LEAD
CB 2	PROPOSED ROAD CATCHBASIN
RYCB 12	PROPOSED REARYARD CATCHBASIN
CBMH 10	PROPOSED CATCHBASIN MANHOLE
▼	PROPOSED SERVICE LOCATION FOR HANGAR LOTS
▽	PROPOSED SERVICE LOCATION FOR ALL OTHER LOTS
►	PROPOSED DIRECTION OF FLOW
▭	1.8m CONCRETE SIDEWALK
——►	PROPOSED DITCH
SB ▨	SEEPAGE BARRIER AS PER CITY OF OTTAWA DETAIL S8.
▒	STONEDUST PATH
— ST —	PROPOSED DITCH COMPLETE WITH CLEAR STONE TRENCH
— S —	PROPOSED DITCH COMPLETE WITH SUBDRAIN



CHANDELLE PVT





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NOTE:
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CLEARFORD WATER SYSTEMS INC.

CLEARFORD
W. G. STEFAN
27 JUN 2024

WEST CAPITAL Developments

No.	REVISION	DATE	BY	No.	REVISION	DATE	BY
19	ISSUED FOR REGISTRATION AND ECA	JUN 19/24	ARM	11	ISSUED FOR TENDER (PH1B CREEK SIDE STM SEWERS)	FEB 23/21	AAR
18	REVISED PER CITY COMMENTS (NO CHANGES)	FEB 20/24	ARM	10	REVISED AS PER CLEARFORD COMMENTS	APR 1/15	DJC
17	ISSUED WITH ADDENDUM #2 (NO CHANGES)	JAN 5/24	ARM	9	ISSUED FOR TENDER	FEB 26/14	DJC
16	ISSUED FOR TENDER - PHASE 1B-2 (NO CHANGES)	DEC 7/23	ARM	8	ISSUED FOR PHASE 1 RESIDENTIAL REGISTRATION	OCT 15/14	DJC
15	ISSUED FOR REVIEW - PHASE 1B-2	JUL 28/23	ARM	7	REVISED PER CITY / MVC COMMENTS	SEPT 26/13	DJC
14	REVISED PER CITY & CLEARFORD COMMENTS	SEPT 23/21	ARM	6	REVISED PER CITY / MVC COMMENTS	MAY 28/13	MSP
13	REVISED PER PHASE 1B LIMITS	JUL 12/21	ARM	5	REVISED FOR ISSUE TO MOE	MAR 09/12	MSP
12	IFC (PH1B CREEK SIDE STM SEWER MAINS)	MAR 22/21	AAR	4	REVISED PER CITY COMMENTS / ISSUED TO MOE	MAR 08/12	MSP

SCALE
1:500 HORIZONTAL
1:50 VERTICAL

DESIGN	CAH/MSP
CHECKED	MSP/SMG
DRAWN	CAH
CHECKED	MSP
APPROVED	JGR

NOVATECH
A. A. RONGVE
100616298
June 28, 2024

NOVATECH
A.R. MCAULEY
100141256
June 28, 2024

NOVATECH
Engineers, Planners & Landscape Architects
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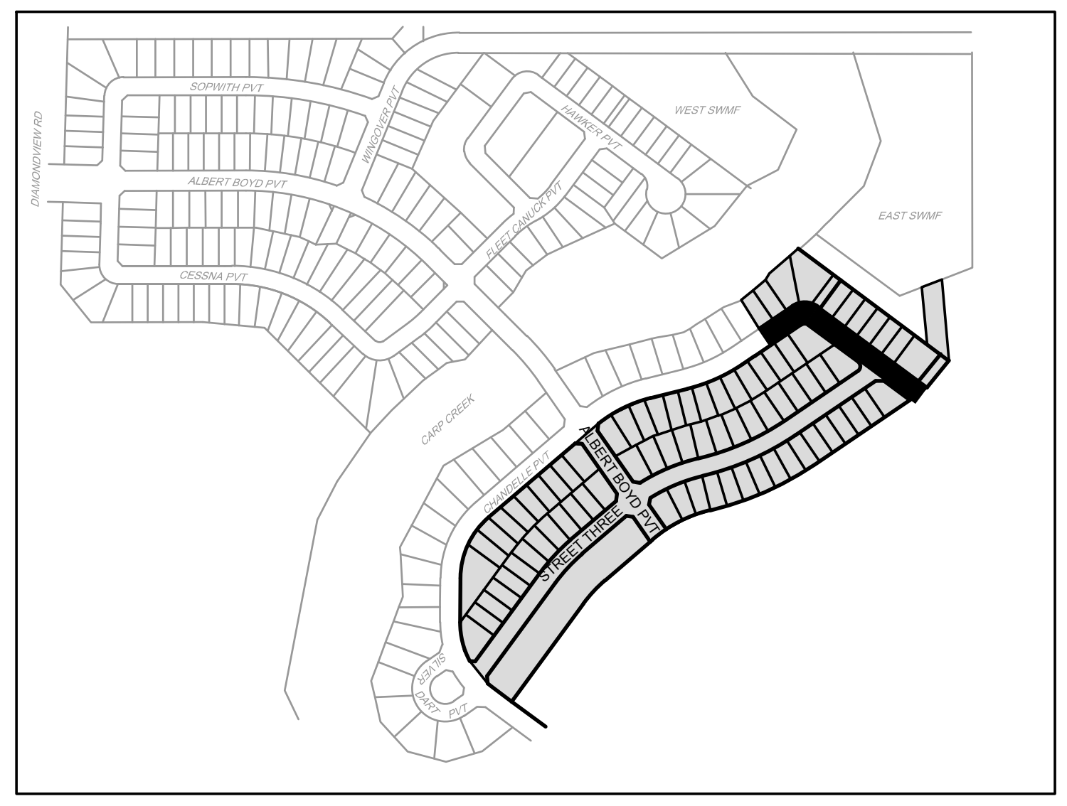
Facsimile (613) 254-5867
Website www.novatech-eng.com

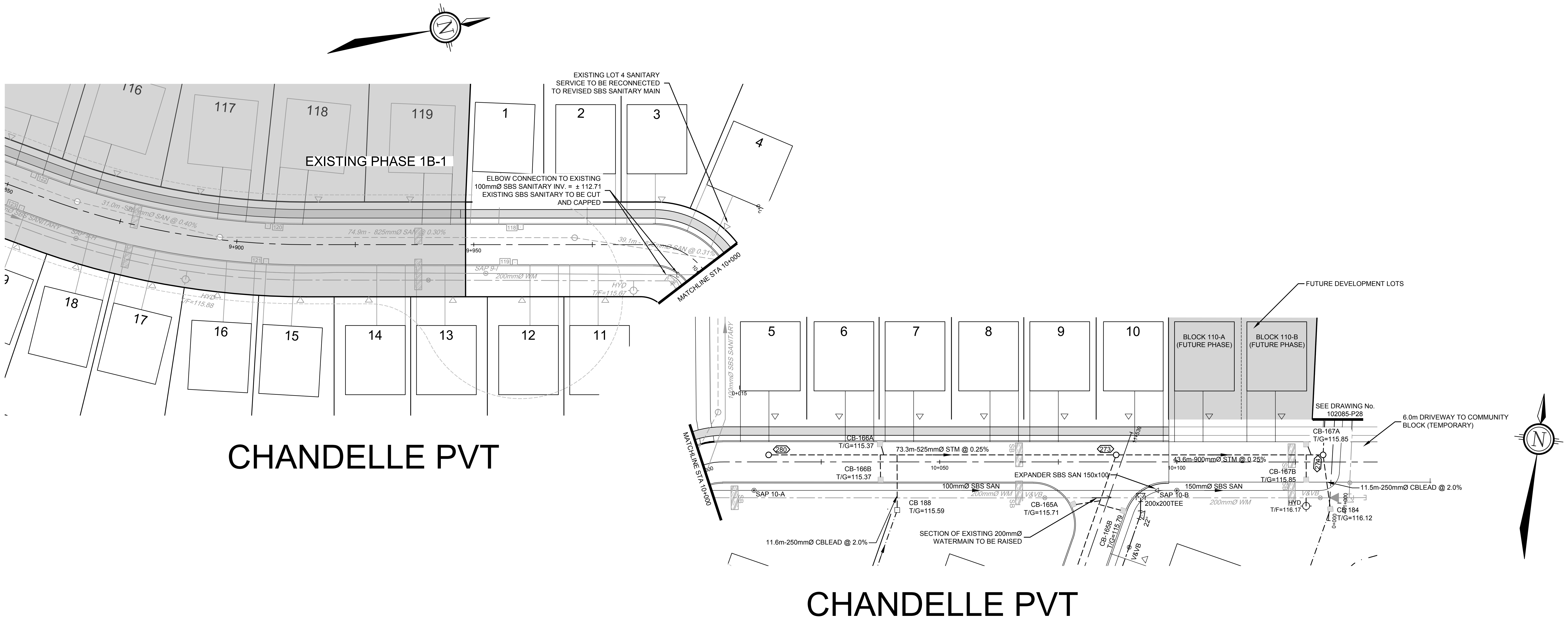
CITY OF OTTAWA
WEST CAPITAL AIRPARK

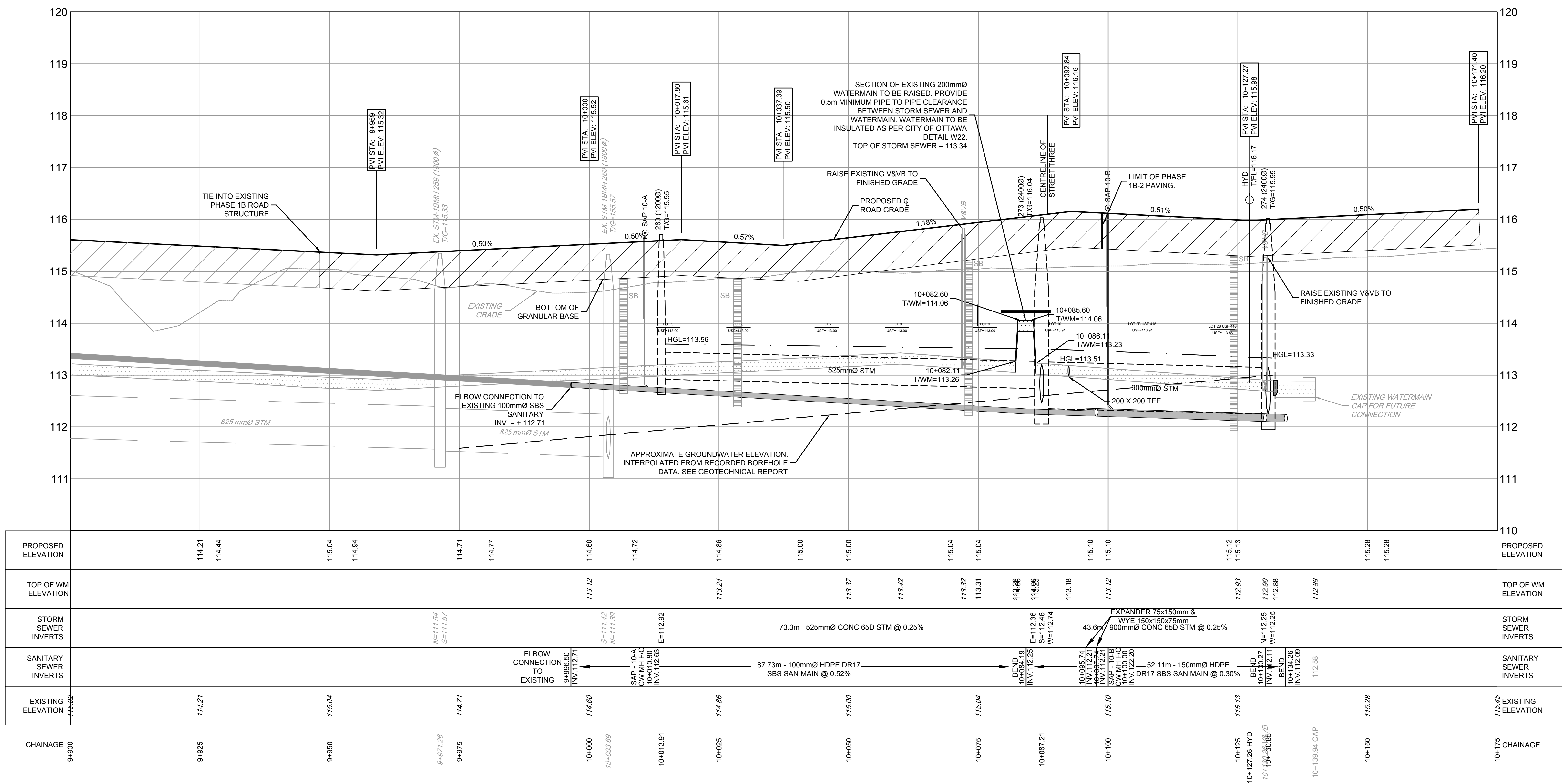
PLAN & PROFILE
SILVER DART PRIVATE
STA. 8+000 TO 8+150
CHANDELLE PRIVATE
STA. 9+335 TO 9+600

PROJECT No. 102085-08
REV: REV # 19
DRAWING No. 102085-P9

PLANB1.DWG - 1000mmx707mm







LEGEND

200mmØ WM	PROPOSED WATERMAIN AND DIAMETER
⊗ V&VB	PROPOSED VALVE & VALVE BOX
HYD	PROPOSED HYDRANT C/W VALVE & LEAD
T/F = 98.45	PROPOSED TOP OF BOTTOM FLANGE
200mmØ WM	EXISTING WATERMAIN AND DIAMETER
⊗ V&VB	EXISTING VALVE & VALVE BOX
HYD	EXISTING HYDRANT C/W VALVE & LEAD
SBS SANITARY	PROPOSED SMALL BORE SEWER-SANITARY AND DIRECTION OF FLOW
SAP 1-A	PROPOSED SANITARY SYSTEM ACCESS POINT
SBS SANITARY	EXISTING SMALL BORE SEWER- SANITARY AND DIRECTION OF FLOW
SAP 1-A	EXISTING SANITARY SYSTEM ACCESS POINT
	PROPOSED STORM SEWER AND DIRECTION OF FLOW
	PROPOSED REAR YARD SUBDRAIN, INFILTRATION TRENCH AND DIRECTION OF FLOW
	EXISTING STORM SEWER
222 ○	PROPOSED STORM MANHOLE
○	EXISTING STORM MANHOLE
▽	PROPOSED SERVICE LOCATION
▽	SERVICE LOCATION - SERVICE INSTALLED AS PART OF PHASE 1B-1 WORKS
▼	PROPOSED SERVICE LOCATION (WATER AND STORM)
◆	PROPOSED SERVICE LOCATION (SANITARY ONLY)
▭	1.8m CONCRETE SIDEWALK
CB ⊡	PROPOSED CATCHBASIN
CB ■	PROPOSED CATCHBASIN WITH INLET CONTROL DEVICE
⊡	EXISTING ROADSIDE CATCHBASIN
⊕ CB ELB	PROPOSED LANDSCAPE CATCHBASIN ELBOW
○ CB TEE	PROPOSED LANDSCAPE CATCHBASIN TEE
SB ▨	PROPOSED SEEPAGE BARRIER

REFER TO 102085-ND1B2 FOR ADDITIONAL NOTES

M:\2002\102085\CAD_PHASES2B&3\Civil\102085-2B3-P24-28.dwg, P24, Jun 18, 2024 - 10:07am mparker

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CLEARFORD WATER SYSTEMS INC.

CLEARFORD

W. G. STEFAN
27 JUN 2024

WEST CAPITAL Developments

No.	REVISION	DATE	BY
8.	ISSUED FOR REGISTRATION AND ECA	JUN 19/24	ARM
7.	REVISED PER CITY COMMENTS	FEB 20/24	ARM
6.	REVISED PER CITY COMMENTS	FEB 9/24	ARM
5.	ISSUED WITH ADDENDUM #2	JAN 5/24	ARM
4.	ISSUED FOR TENDER	DEC 7/23	ARM
3.	ISSUED FOR REVIEW	JUL 25/23	ARM
2.	ISSUED FOR COORDINATION	JUL 11/23	ARM
1.	ISSUED FOR COORDINATION	JAN 18/23	ARM

SCALE
1:500

1:500
0 5 10 15 20

DESIGN	MNP
CHECKED	ARM
DRAWN	ARM
CHECKED	ARM
APPROVED	SMG

A. A. RONGVE
100616298
June 28, 2024

A.R. MCAULEY
100141256
June 28, 2024

NOVATECH
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Ottawa, Ontario, Canada K2M 1P6

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Facsimile	(613) 254-5867
Website	www.novatech-eng.com

LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

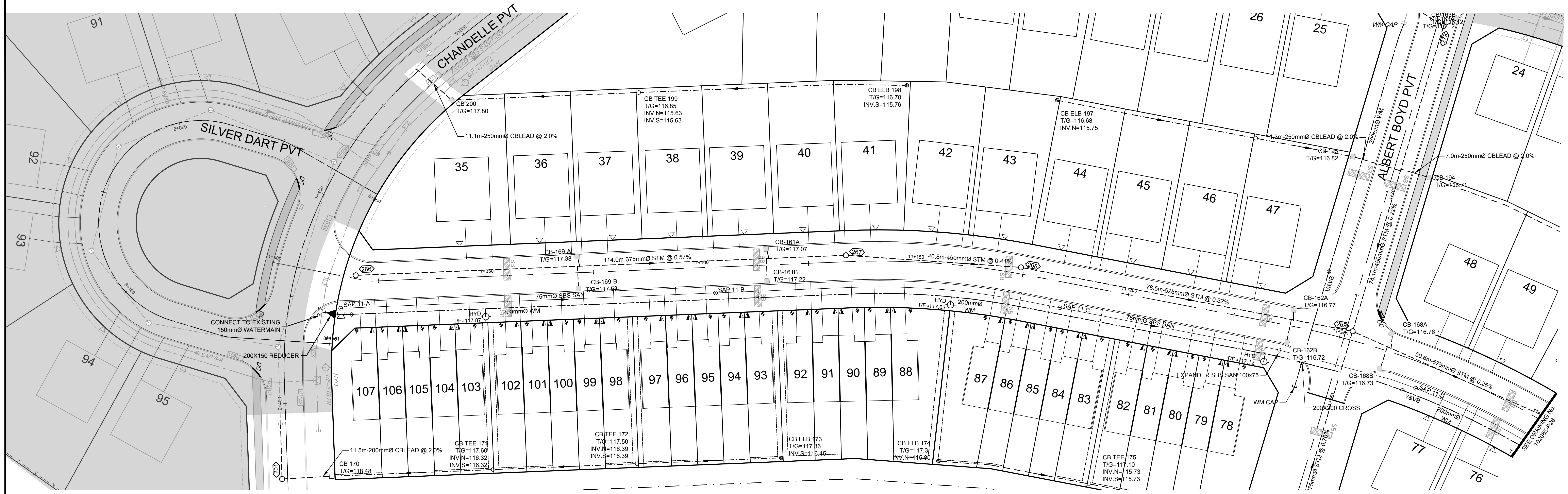
DRAWING NAME
PLAN & PROFILE - PHASE 1B-2
CHANDELLE PRIVATE
STA 9+900 TO STA 10+175

PROJECT No.
102085

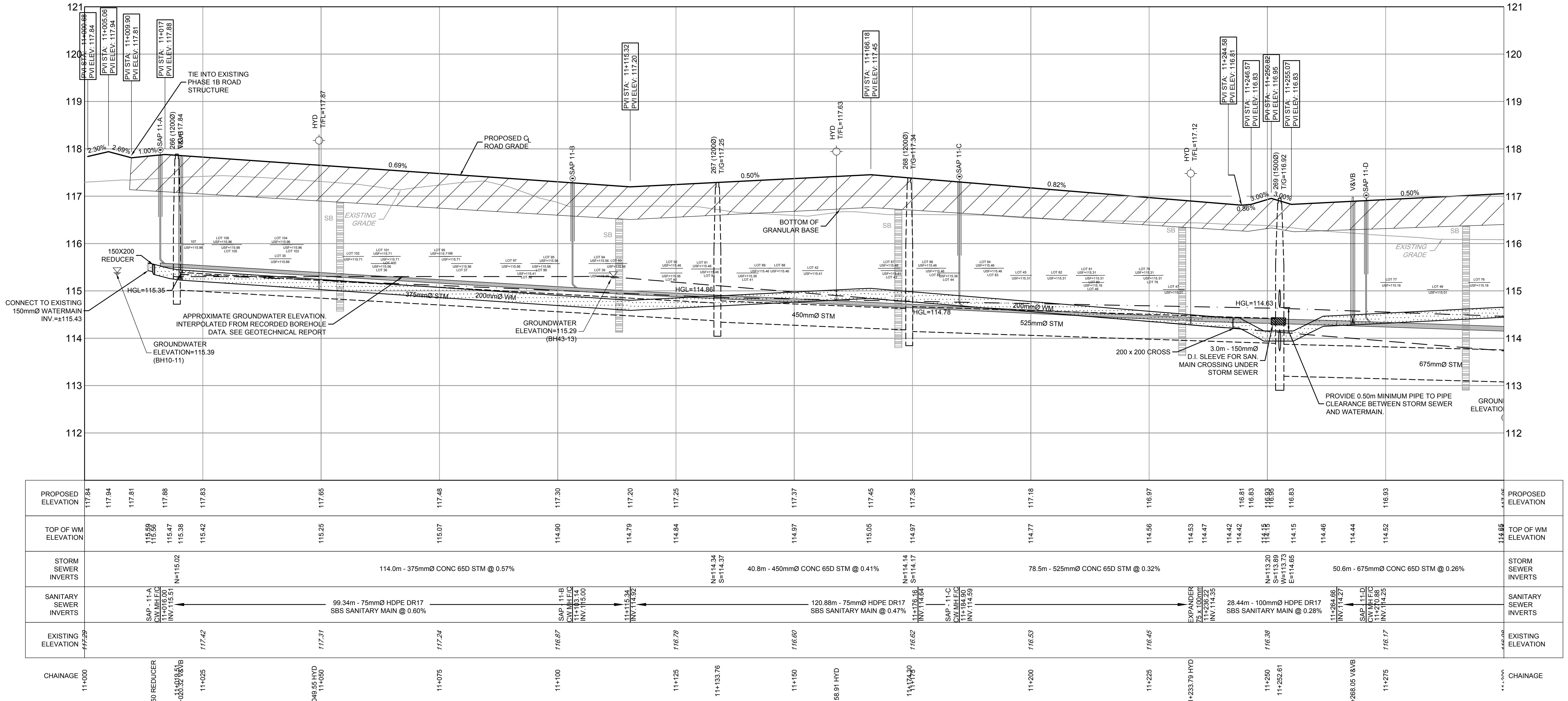
REV
REV # 8

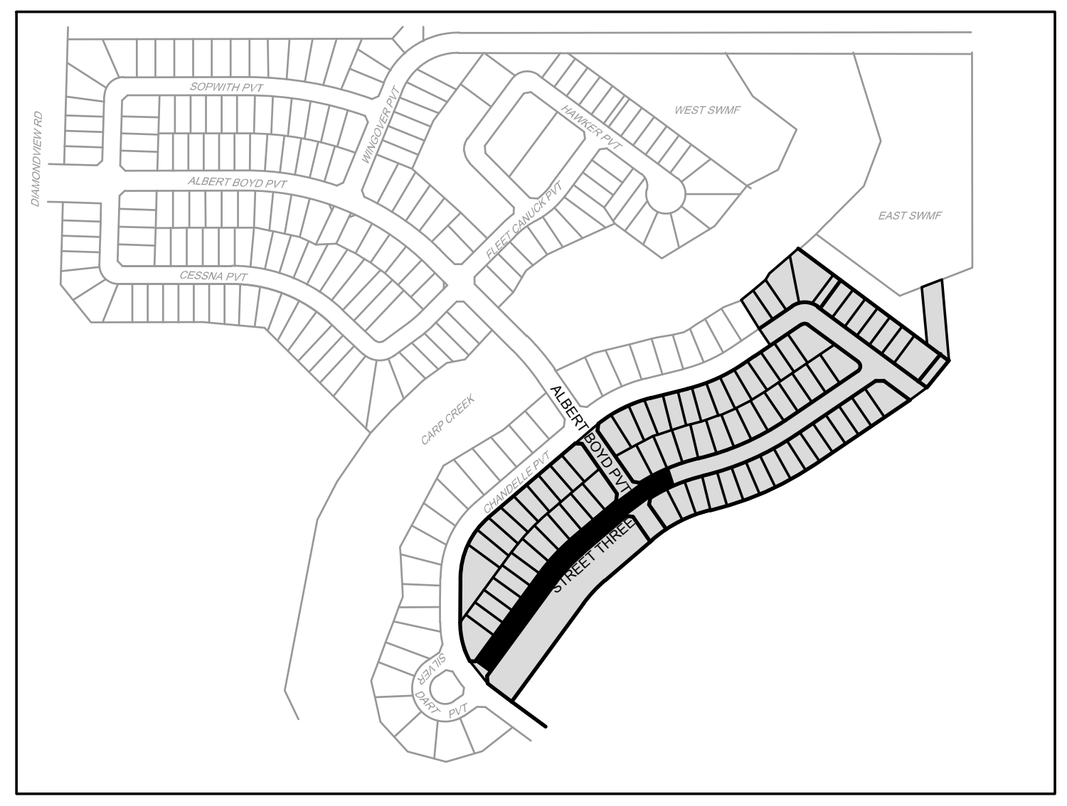
DRAWING No.
102085-P24

PLANB1.DWG - 1000mmx707mm



STREET THREE





LEGEND

200mmØ WM	PROPOSED WATERMAIN AND DIAMETER
⊗ V&VB	PROPOSED VALVE & VALVE BOX
HYD	PROPOSED HYDRANT C/W VALVE & LEAD
T/F = 98.45	PROPOSED TOP OF BOTTOM FLANGE
200mmØ WM	EXISTING WATERMAIN AND DIAMETER
⊗ V&VB	EXISTING VALVE & VALVE BOX
HYD	EXISTING HYDRANT C/W VALVE & LEAD
SBS SANITARY	PROPOSED SMALL BORE SEWER- SANITARY AND DIRECTION OF FLOW
SAP 1-A	PROPOSED SANITARY SYSTEM ACCESS POINT
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SAP 1-A	EXISTING SANITARY SYSTEM ACCESS POINT
	PROPOSED STORM SEWER AND DIRECTION OF FLOW
	PROPOSED REAR YARD SUBDRAIN, INFILTRATION TRENCH AND DIRECTION OF FLOW
	EXISTING STORM SEWER
222 ○	PROPOSED STORM MANHOLE
○	EXISTING STORM MANHOLE
▽	PROPOSED SERVICE LOCATION
▽	SERVICE LOCATION - SERVICE INSTALLED AS PART OF PHASE 1B-1 WORKS
▼	PROPOSED SERVICE LOCATION (WATER AND STORM)
◆	PROPOSED SERVICE LOCATION (SANITARY ONLY)
▭	1.8m CONCRETE SIDEWALK
CB ⊡	PROPOSED CATCHBASIN
CB ▢	PROPOSED CATCHBASIN WITH INLET CONTROL DEVICE
⊡	EXISTING ROADSIDE CATCHBASIN
CB ELB	PROPOSED LANDSCAPE CATCHBASIN ELBOW
○ CB TEE	PROPOSED LANDSCAPE CATCHBASIN TEE
SB ▨	PROPOSED SEEPAGE BARRIER

REFER TO 102085-ND1B2 FOR ADDITIONAL NOTES

M:\2002\102085\CAD_PHASES2B&3\Civil\102085-2B3-P24-28.dwg, P25, Jun 18, 2024 - 10:07am, mparker

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CLEARFORD WATER SYSTEMS INC.

CLEARFORD

W. G. STEFAN
27JUN2024

WEST CAPITAL Developments

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3.	ISSUED FOR REVIEW	JUL 25/23	ARM
2.	ISSUED FOR COORDINATION	JUL 11/23	ARM
1.	ISSUED FOR COORDINATION	JAN 18/23	ARM

SCALE
1:500

1:500
0 5 10 15 20

DESIGN MNP
CHECKED ARM
DRAWN MNP
CHECKED ARM
APPROVED SMG

A. A. RONGVE
100616298
June 28, 2024

A.R. MCAULEY
100141256
June 28, 2024

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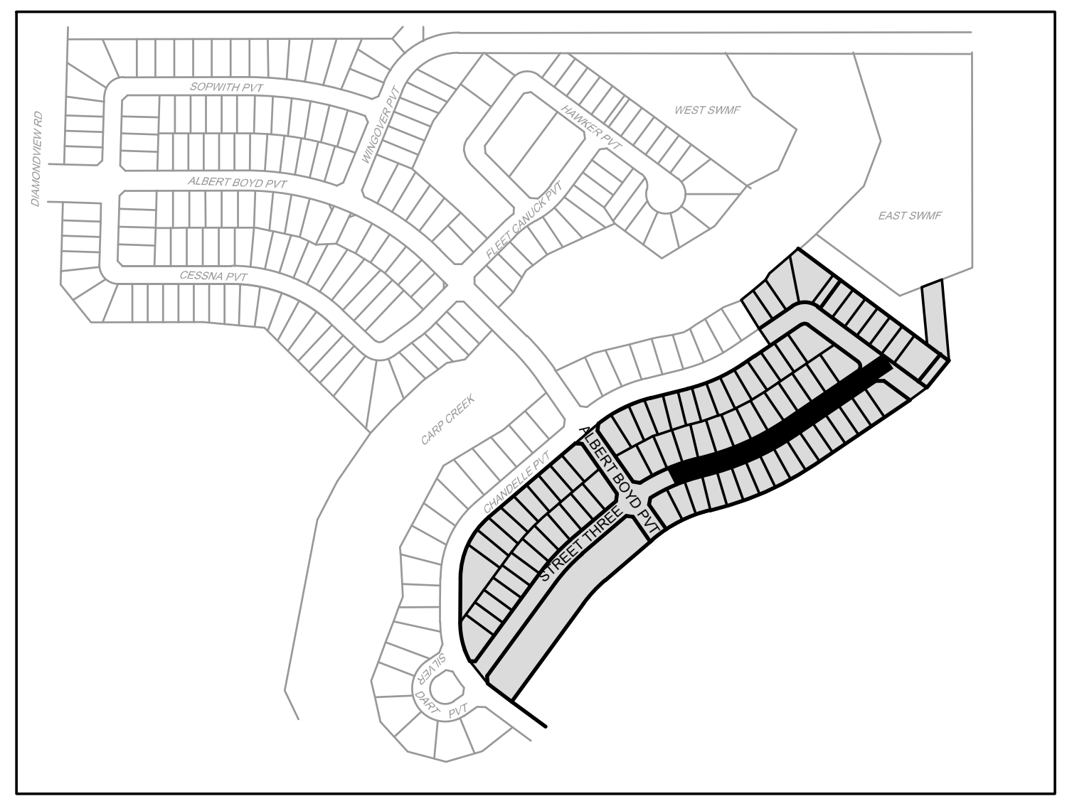
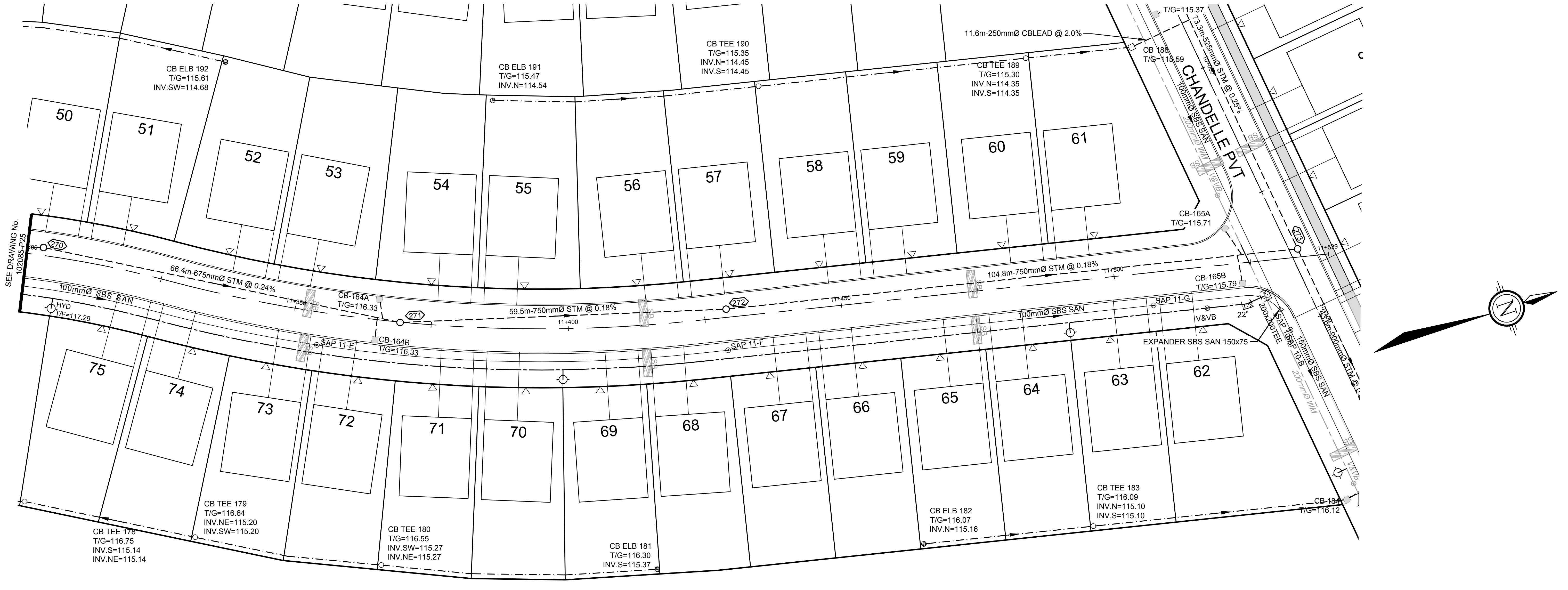
LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
PLAN & PROFILE - PHASE 1B-2
STREET THREE
STA 11+000 TO STA 11+300

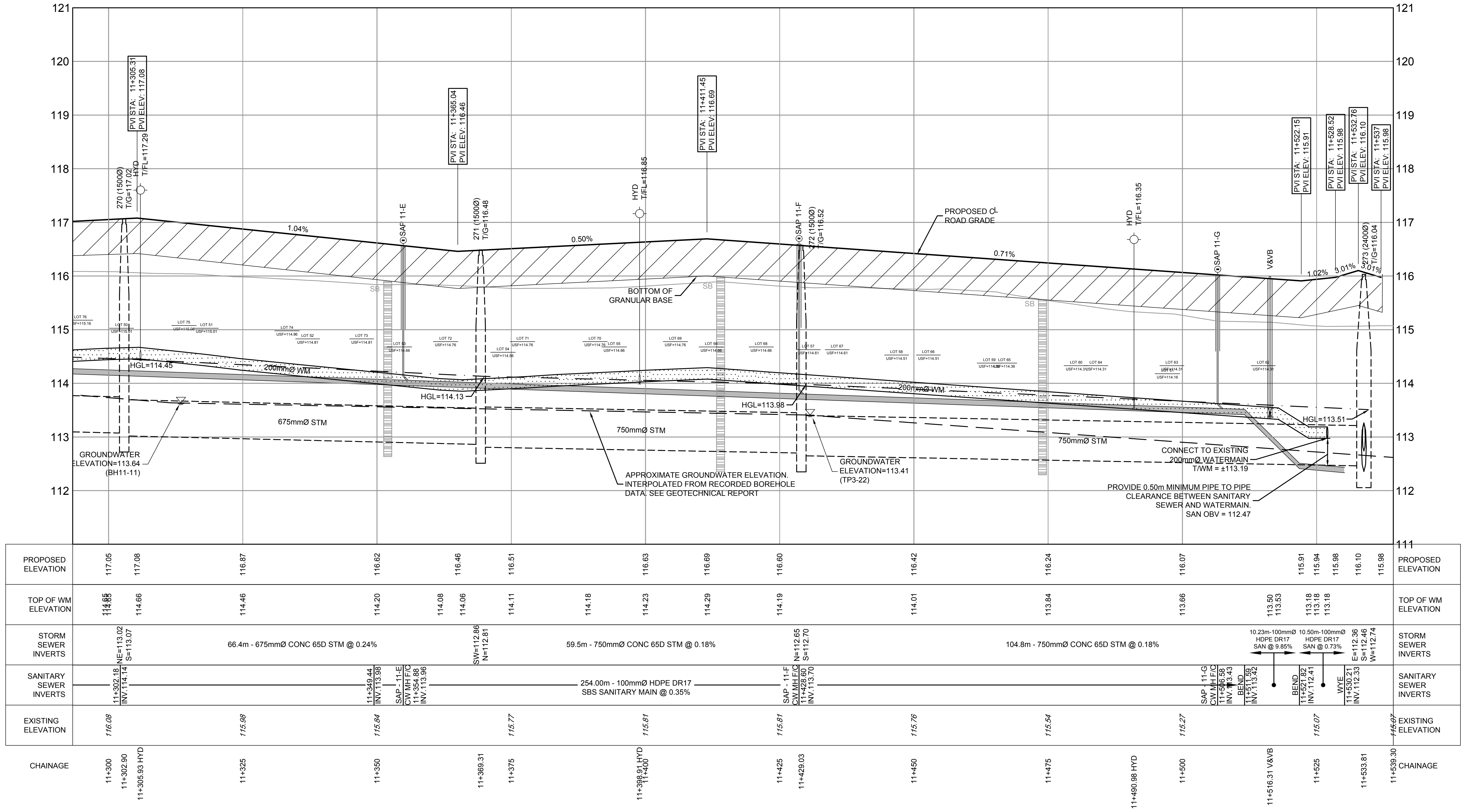
PROJECT No. 102085
REV REV # 8
DRAWING No. 102085-P25

PLANB1.DWG - 1000mmx707mm





STREET THREE



LEGEND

200mmØ WM	PROPOSED WATERMAIN AND DIAMETER
⊗ V&VB	PROPOSED VALVE & VALVE BOX
⌖ HYD	PROPOSED HYDRANT C/W VALVE & LEAD
T/F = 98.45	PROPOSED TOP OF BOTTOM FLANGE
200mmØ WM	EXISTING WATERMAIN AND DIAMETER
⊗ V&VB	EXISTING VALVE & VALVE BOX
⌖ HYD	EXISTING HYDRANT C/W VALVE & LEAD
SBS SANITARY	PROPOSED SMALL BORE SEWER- SANITARY AND DIRECTION OF FLOW
◉ SAP 1-A	PROPOSED SANITARY SYSTEM ACCESS POINT
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— ◄ —	PROPOSED STORM SEWER AND DIRECTION OF FLOW
— · ◄	PROPOSED REAR YARD SUBDRAIN, INFILTRATION TRENCH AND DIRECTION OF FLOW
— — —	EXISTING STORM SEWER
222 ○	PROPOSED STORM MANHOLE
○	EXISTING STORM MANHOLE
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▽	SERVICE LOCATION - SERVICE INSTALLED AS PART OF PHASE 1B-1 WORKS
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⊡	EXISTING ROADSIDE CATCHBASIN
⊕ CB ELB	PROPOSED LANDSCAPE CATCHBASIN ELBOW
○ CB TEE	PROPOSED LANDSCAPE CATCHBASIN TEE
SB ▨	PROPOSED SEEPAGE BARRIER

REFER TO 102085-ND1B2 FOR ADDITIONAL NOTES

M:\2002\102085\CAD_PHASES2B&3\Civil\102085-2B3-P24-28.dwg, P26, Jun 18, 2024 - 10:07am, mparker

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CLEARFORD
WATER SYSTEMS INC.

CLEARFORD
W. G. STEFAN
27 JUN 2024

WEST CAPITAL
Developments

No.	REVISION	DATE	BY
8.	ISSUED FOR REGISTRATION AND ECA	JUN 19/24	ARM
7.	REVISED PER CITY COMMENTS	FEB 20/24	ARM
6.	REVISED PER CITY COMMENTS	FEB 9/24	ARM
5.	ISSUED WITH ADDENDUM #2	JAN 5/24	ARM
4.	ISSUED FOR TENDER	DEC 7/23	ARM
3.	ISSUED FOR REVIEW	JUL 25/23	ARM
2.	ISSUED FOR COORDINATION	JUL 11/23	ARM
1.	ISSUED FOR COORDINATION	JAN 18/23	ARM

SCALE
1:500

1:500
0 5 10 15 20

DESIGN MNP
CHECKED ARM
DRAWN MNP
CHECKED ARM
APPROVED SMG

A. A. RONGVE
100616298
June 28, 2024

A.R. MCAULEY
100141256
June 28, 2024

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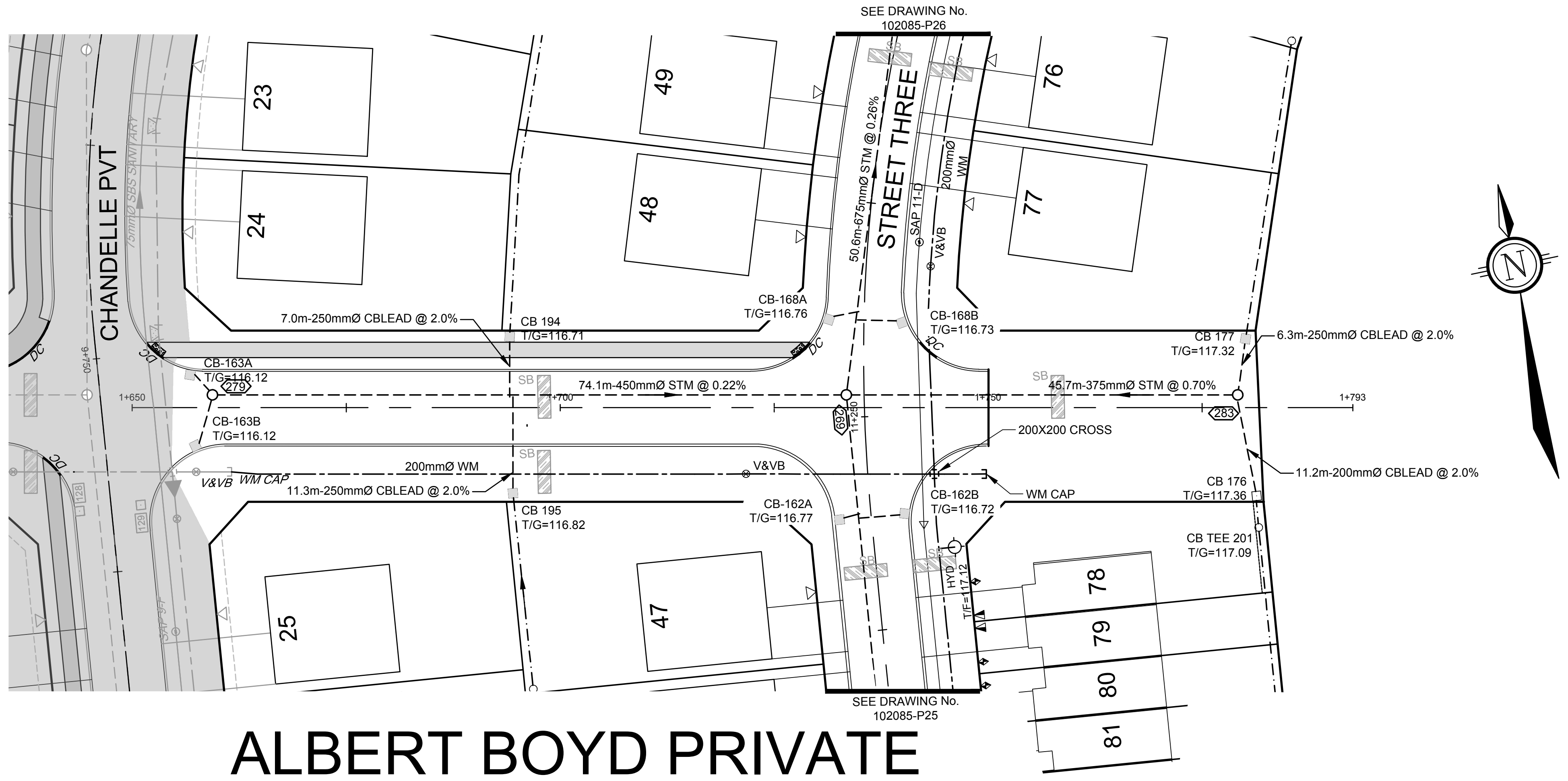
LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

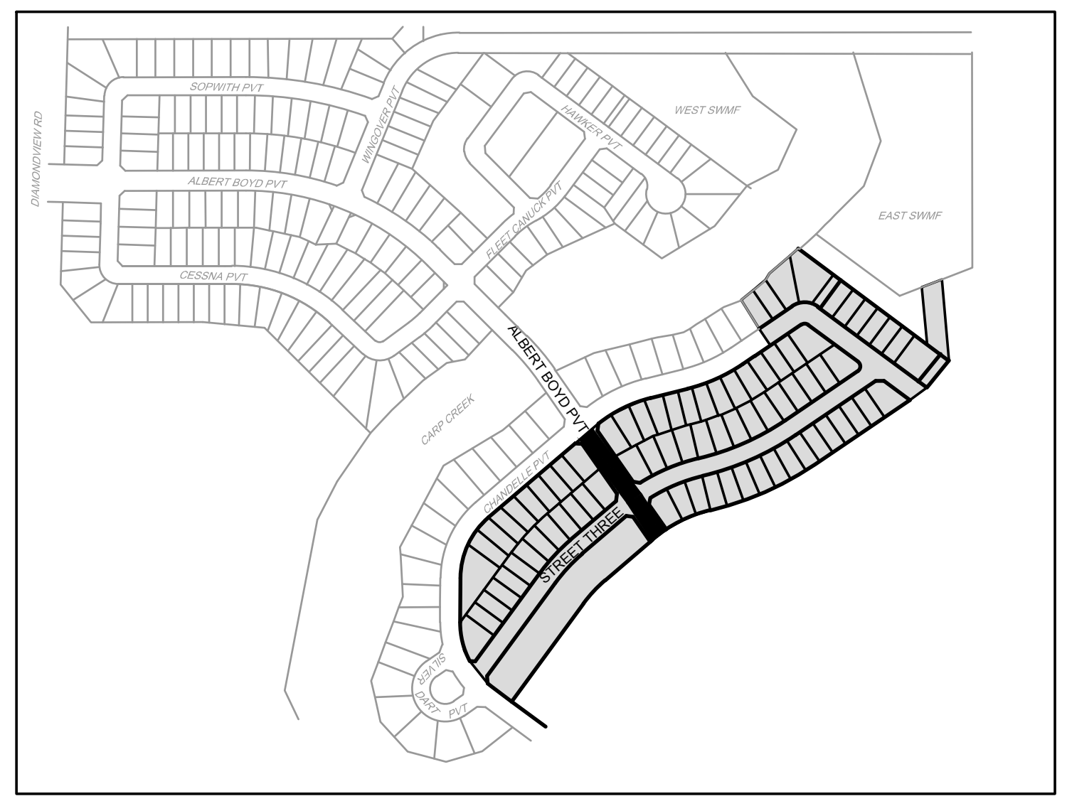
DRAWING NAME
PLAN & PROFILE - PHASE 1B-2
STREET THREE
STA 11+300 TO STA 11+539

PROJECT No. 102085
REV REV # 8
DRAWING No. 102085-P26

PLANB1.DWG - 1000mmx707mm



ALBERT BOYD PRIVATE



LEGEND

200mmØ WM	PROPOSED WATERMAIN AND DIAMETER
⊗ V&VB	PROPOSED VALVE & VALVE BOX
HYD	PROPOSED HYDRANT C/W VALVE & LEAD
T/F = 98.45	PROPOSED TOP OF BOTTOM FLANGE
200mmØ WM	EXISTING WATERMAIN AND DIAMETER
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▽	SERVICE LOCATION - SERVICE INSTALLED AS PART OF PHASE 1B-1 WORKS
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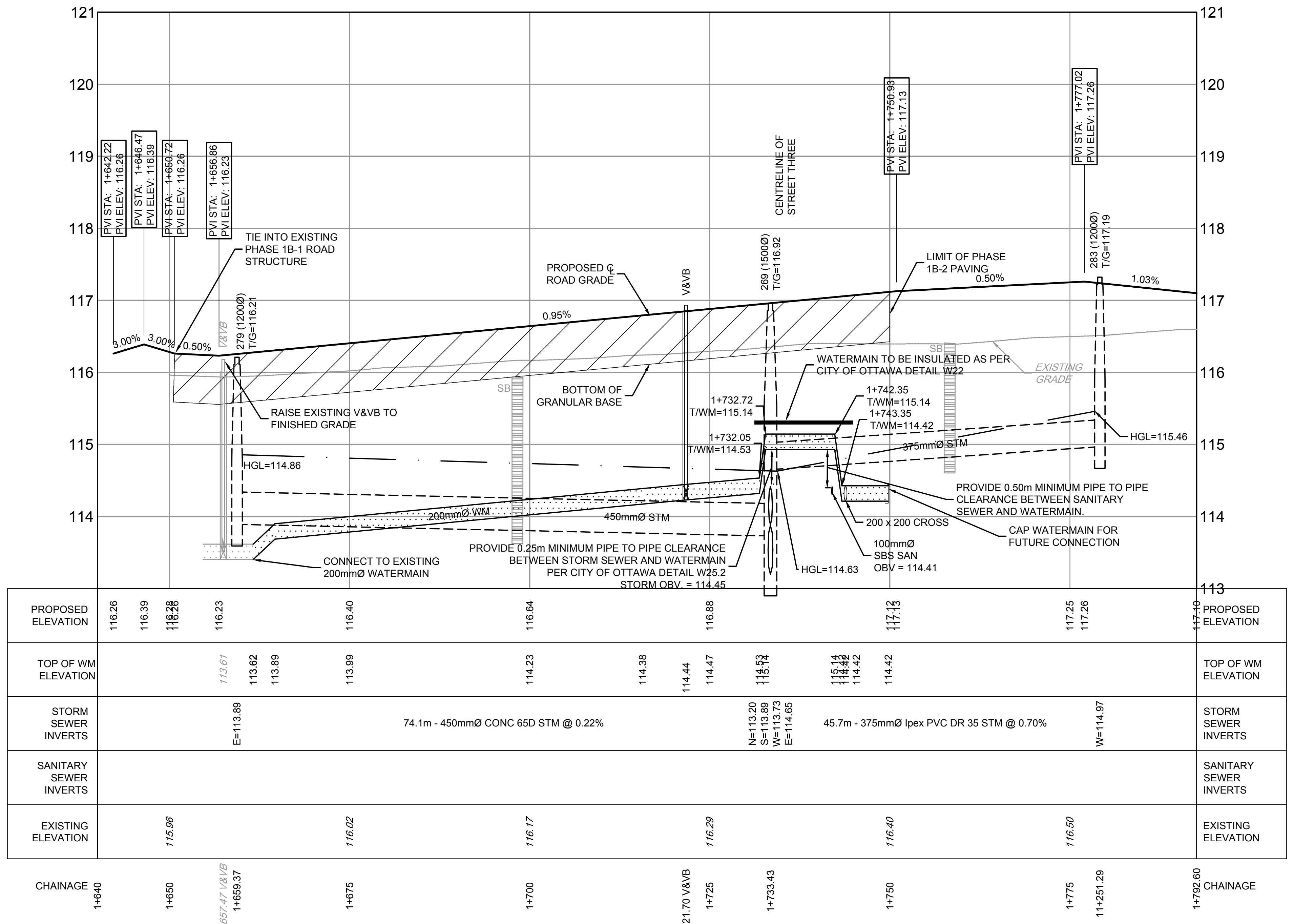
SB ▨	PROPOSED SEEPAGE BARRIER



PROPOSED ELEVATION	116.26 116.39 116.28 116.26 116.23 116.40 116.64 116.88 117.12 117.13 117.25 117.26 117.10
TOP OF WM ELEVATION	113.61 113.62 113.89 113.99 114.23 114.38 114.44 114.47 114.53 115.14 115.14 114.42 114.42 114.42
STORM SEWER INVERTS	E=113.89 · 74.1m - 450mmØ CONC 65D STM @ 0.22% · N=113.20 S=113.89 W=113.73 E=114.65 · 45.7m - 375mmØ Ipex PVC DR 35 STM @ 0.70% · W=114.97
SANITARY SEWER INVERTS	
EXISTING ELEVATION	115.96 116.02 116.17 116.29 116.40 116.50
CHAINAGE	1+640 1+650 1+657.47 V&VB 1+659.37 1+675 1+700 1+721.70 V&VB 1+725 1+733.43 1+750 1+775 11+251.29 1+792.60

REFER TO 102085-ND1B2 FOR ADDITIONAL NOTES

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CLEARFORD WATER SYSTEMS INC.

CLEARFORD

W. G. STEFAN
27 JUN 2024

WEST CAPITAL Developments

No.	REVISION	DATE	BY
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4.	ISSUED FOR TENDER	DEC 7/23	ARM
3.	ISSUED FOR REVIEW	JUL 25/23	ARM
2.	ISSUED FOR COORDINATION	JUL 11/23	ARM
1.	ISSUED FOR COORDINATION	JAN 18/23	ARM

SCALE
1:500
1:500
0 5 10 15 20

DESIGN MNP
CHECKED ARM
DRAWN MNP
CHECKED ARM
APPROVED SMG

A. A. RONGVE
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June 28, 2024

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Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
PLAN & PROFILE - PHASE 1B-2
ALBERT BOYD PRIVATE
STA 1+640 TO STA 1+792

PROJECT No. 102085
REV REV # 8
DRAWING No. 102085-P27

PLANB1.DWG - 1000mmx707mm

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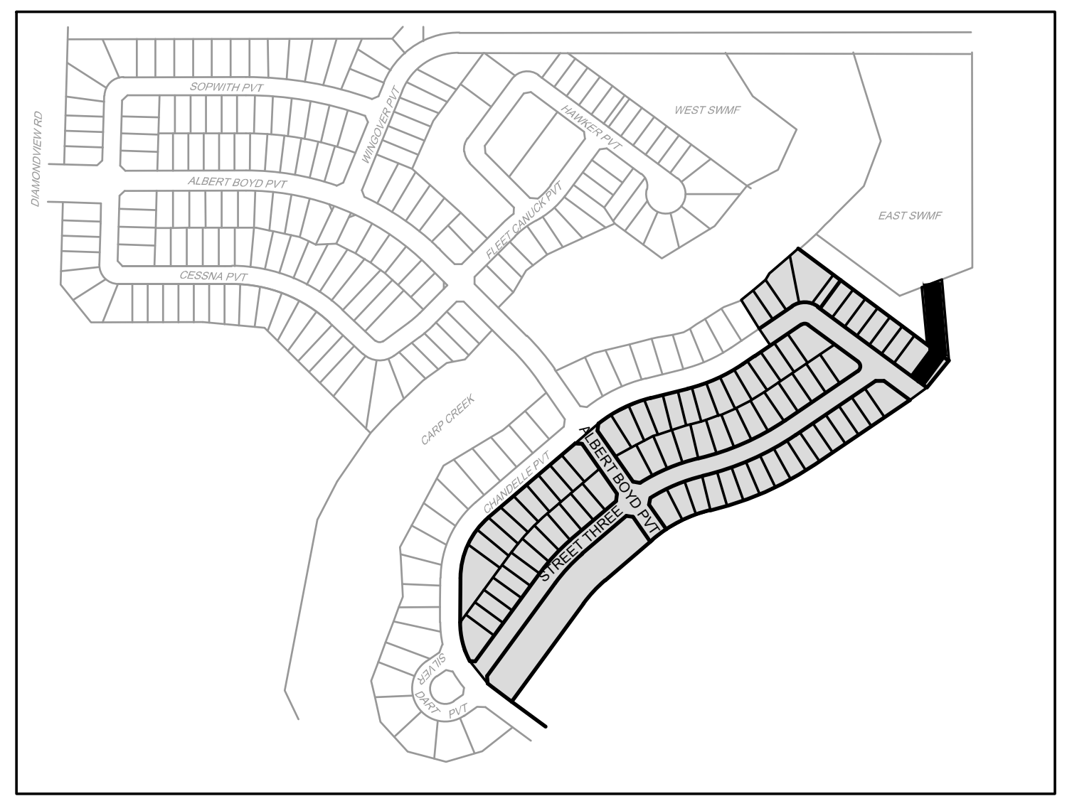
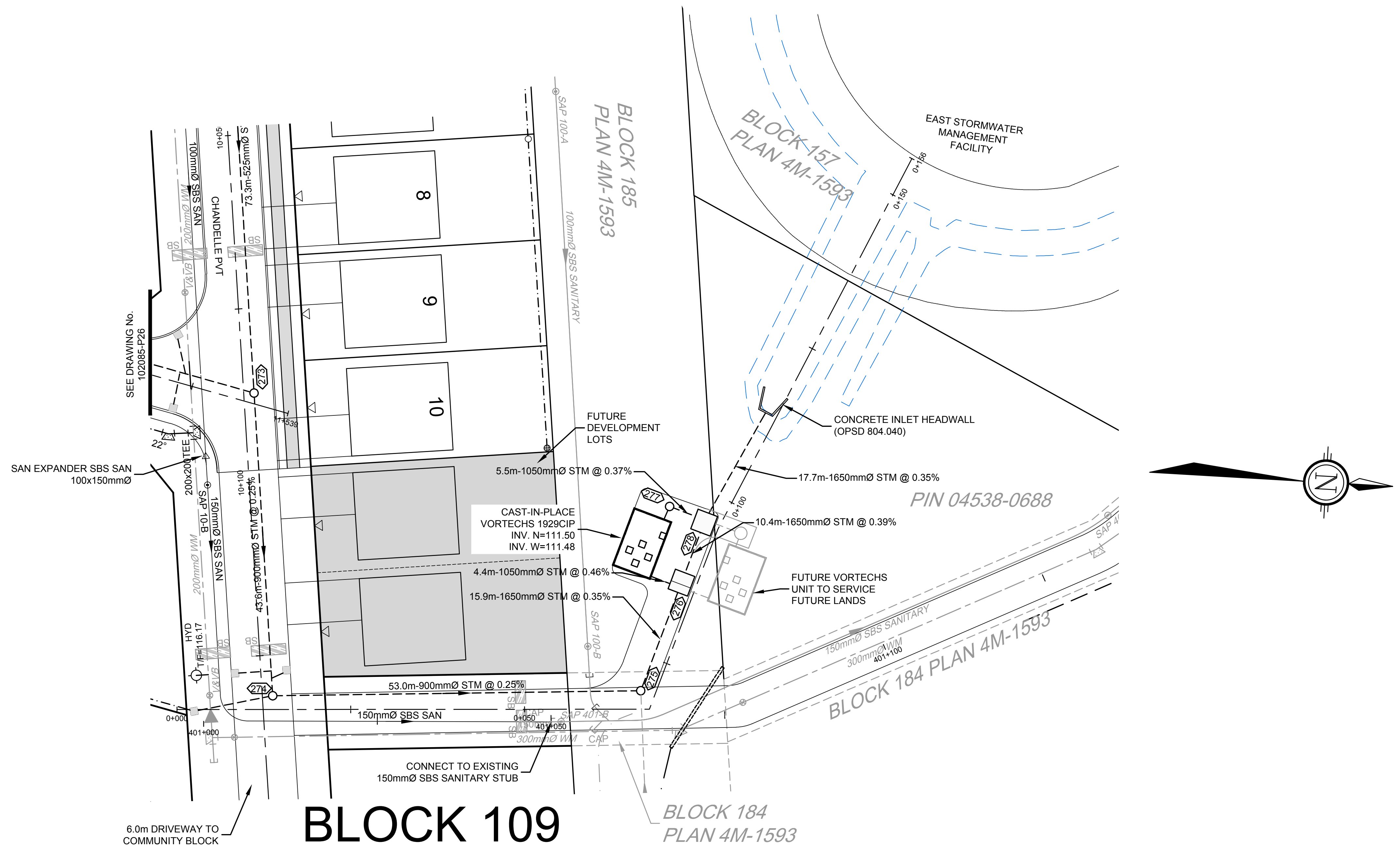
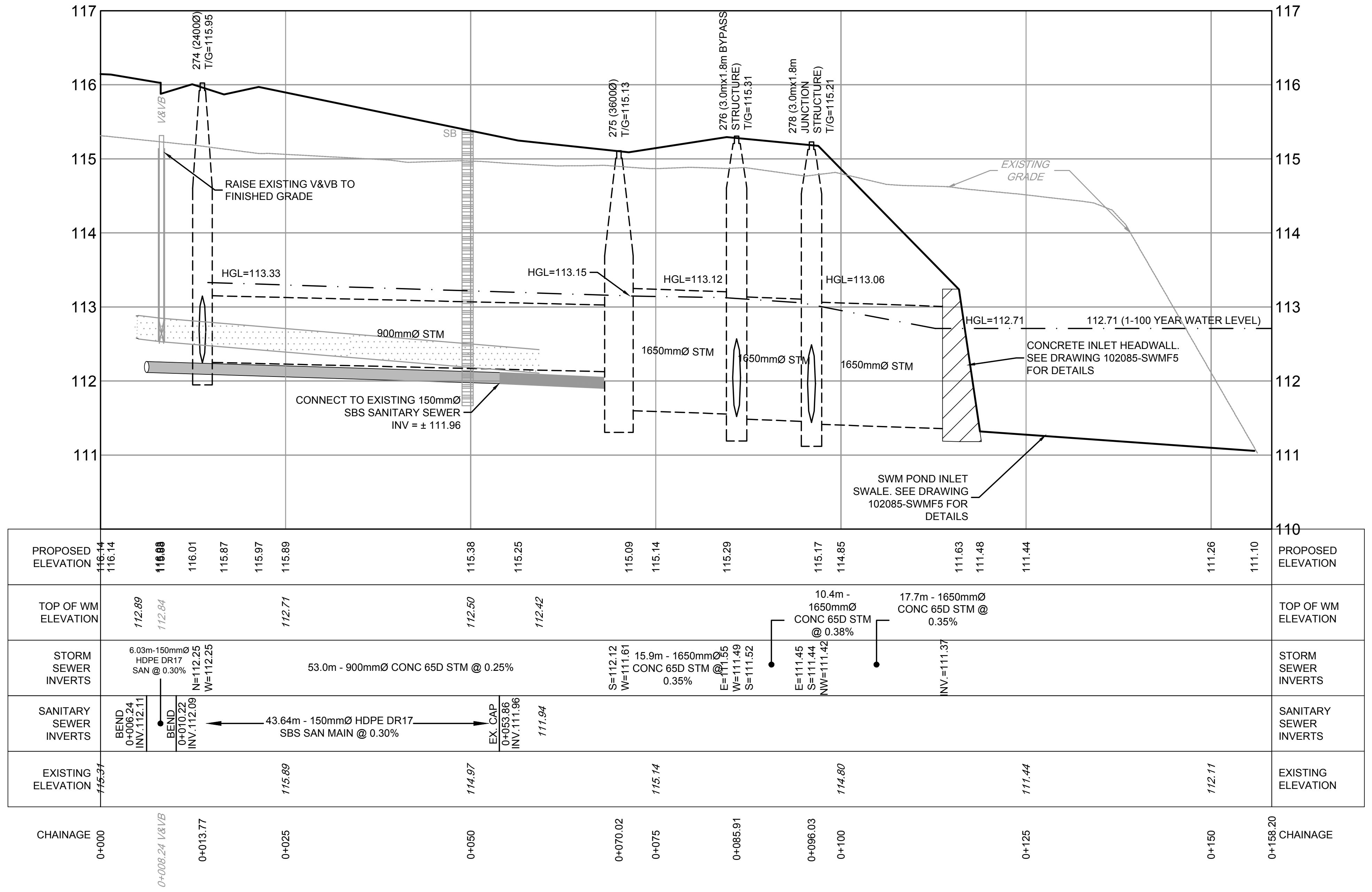




LEGEND

200mmØ WM	PROPOSED WATERMAIN AND DIAMETER
⊗ V&VB	PROPOSED VALVE & VALVE BOX
HYD	PROPOSED HYDRANT C/W VALVE & LEAD
T/F = 98.45	PROPOSED TOP OF BOTTOM FLANGE
200mmØ WM	EXISTING WATERMAIN AND DIAMETER
⊗ V&VB	EXISTING VALVE & VALVE BOX
HYD	EXISTING HYDRANT C/W VALVE & LEAD
SBS SANITARY	PROPOSED SMALL BORE SEWER-SANITARY AND DIRECTION OF FLOW
SAP 1-A	PROPOSED SANITARY SYSTEM ACCESS POINT
SBS SANITARY	EXISTING SMALL BORE SEWER- SANITARY AND DIRECTION OF FLOW
SAP 1-A	EXISTING SANITARY SYSTEM ACCESS POINT
— ◄ —	PROPOSED STORM SEWER AND DIRECTION OF FLOW
— · ◄ —	PROPOSED REAR YARD SUBDRAIN, INFILTRATION TRENCH AND DIRECTION OF FLOW
— — —	EXISTING STORM SEWER
222 ○	PROPOSED STORM MANHOLE
○	EXISTING STORM MANHOLE

▽	PROPOSED SERVICE LOCATION
▽	SERVICE LOCATION - SERVICE INSTALLED AS PART OF PHASE 1B-1 WORKS
▼	PROPOSED SERVICE LOCATION (WATER AND STORM)
◆	PROPOSED SERVICE LOCATION (SANITARY ONLY)
▭	1.8m CONCRETE SIDEWALK
CB ⊡	PROPOSED CATCHBASIN
CB ▨	PROPOSED CATCHBASIN WITH INLET CONTROL DEVICE
⊡	EXISTING ROADSIDE CATCHBASIN
⊕ CB ELB	PROPOSED LANDSCAPE CATCHBASIN ELBOW
○ CB TEE	PROPOSED LANDSCAPE CATCHBASIN TEE
SB ▨	PROPOSED SEEPAGE BARRIER



REFER TO 102085-ND1B2 FOR ADDITIONAL NOTES

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

CLEARFORD WATER SYSTEMS INC.

CLEARFORD

W. G. STEFAN
27 JUN 2024

WEST CAPITAL Developments

No.	REVISION	DATE	BY
9.	ISSUED FOR REGISTRATION AND ECA	JUN 19/24	ARM
8.	REVISED POND INLET SWALE	MAY 14/24	ARM
7.	REVISED PER CITY COMMENTS	FEB 20/24	ARM
6.	REVISED PER CITY COMMENTS	FEB 9/24	ARM
5.	ISSUED WITH ADDENDUM #2	JAN 5/24	ARM
4.	ISSUED FOR TENDER	DEC 7/23	ARM
3.	ISSUED FOR REVIEW	JUL 25/23	ARM
2.	ISSUED FOR COORDINATION	JUL 11/23	ARM
1.	ISSUED FOR COORDINATION	JAN 18/23	ARM

SCALE
1:500
1:500
0 5 10 15 20

DESIGN	MNP
CHECKED	ARM
DRAWN	MNP
CHECKED	ARM
APPROVED	SMG

A. A. RONGVE
100616298
June 28, 2024

A.R. MCAULEY
100141256
June 28, 2024

NOVATECH
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Ottawa, Ontario, Canada K2M 1P6

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LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
PLAN & PROFILE - PHASE 1B-2
BLOCK 109 & STORM SEWER
OUTLET

PROJECT No. 102085
REV REV # 9
DRAWING No. 102085-P28

PLANB1.DWG - 1000mmx707mm

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GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA, MINISTRY OF THE ENVIRONMENT AND THE MISSISSIPPI VALLEY CONSERVATION AUTHORITY BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
8. TO PROTECT BREEDING BIRDS, NO TREE OR SHRUB REMOVAL IS TO OCCUR BETWEEN APRIL 1ST AND AUGUST 15TH (MUNCASTER ENVIRONMENTAL PLANNING).
9. NO IN-STREAM WORKS WITHIN THE WATERCOURSE IS TO OCCUR BETWEEN MARCH 15TH AND JUNE 30TH (MUNCASTER ENVIRONMENTAL PLANNING.
10. REFER TO STORMWATER MANAGEMENT REPORT(R-2023-010) PREPARED BY NOVATECH ENGINEERING CONSULTANTS LTD.
11. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
12. PROVIDE LINE/PARKING PAINTING.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC.

GRADING NOTES:

1. ALL WORKS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH CURRENT CITY OF OTTAWA AND ONTARIO PROVINCIAL STANDARDS.
2. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
3. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
4. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
5. ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC1.1).
6. MATCH EXISTING ELEVATIONS AT ALL BOUNDARIES WITH ADJACENT LOTS.
7. SIDEWALK CROSSFALL NOT TO EXCEED 2%.
8. MINIMUM REARYARD SWALE GRADE IS 1.5%. MINIMUM REARYARD SWALE GRADE WITH THE INSTALLATION OF A SUBDRAIN SYSTEM IS 1.0%. SWALES TO BE 0.9m OFFSET FROM REAR PROPERTY LINE.
9. ALL DRIVEWAY SLOPES ARE TO BE BETWEEN 2% AND 6%.
10. IF MINIMUM PERMISSIBLE USF (MUSF) IS TO BE USED FOR A LOT, THEN TOP OF FOUNDATION, LOT GRADING, ETC IS TO BE ADJUSTED ACCORDINGLY.
11. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON THIS PLAN.

SEWER NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM MANHOLE (1200Ø)	701.010	OPSD
CB, FRAME & COVER	400.020	OPSD
STORM MH FRAME	401.010	OPSD
STORM MH COVER	S24.1	CITY OF OTTAWA
SEWER TRENCH - BEDDING (GRANULAR A) COVER (GRANULAR A OR GRANULAR B TYPE I, WITH MAXIMUM PARTICLE SIZE=25mm)		
STORM SEWER (250mmØ to 375mmØ)	PVC DR 35	
STORM SEWER (450mmØ to 1650mmØ)	CONC 65-D	
CATCHBASIN LEAD	PVC DR 35	
ROAD SUBDRAIN (6m STUBS (3mx2) AT EACH CB)	R1	CITY OF OTTAWA

2. INSULATE ALL STORM PIPES THAT HAVE LESS THAN 1.5m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
3. SERVICES ARE TO BE CONSTRUCTED TO 2.0m PAST PROPERTY LINE AT A MINIMUM SLOPE OF 1.0%.
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
5. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
6. STORM MANHOLES AND CBMHS ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED.
7. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.
8. THE CONTRACTOR IS ADVISED THAT THE EXISTING VORTECHS UNIT WILL REMAIN IN SERVICE DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN FREE OF DEBRIS, MONITOR ON A REGULAR BASIS, AND CLEAN AS REQUIRED AND ONCE CONSTRUCTION IS COMPLETE.

GEOTECHNICAL NOTES:

1. REFER TO GEOTECHNICAL INVESTIGATION REPORT (PG2450-2, REVISION 1, DATED JANUARY 16, 2023), PREPARED BY GEMTEC FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
2. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED ROADWAYS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
3. EXPOSED SUBGRADE IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. THE SUBGRADE SHOULD BE SHAPED AND CROWNED TO PROMOTE DRAINAGE OF THE ROADWAY GRANULARS.
6. FOR AREAS OF THE ROADWAY THAT REQUIRE THE SUBGRADE TO BE RAISED, IT IS CONSIDERED THAT SOME OF THE DRIER NATIVE MATERIALS COULD BE USED FOR THIS PURPOSE OR THE MATERIAL COULD CONSIST OF OPSS SELECT SUBGRADE MATERIAL OR OPSS GRANULAR B TYPE I OR TYPE II. ANY MATERIALS PROPOSED FOR THIS USE MUST BE APPROVED BY THE GEOTECHNICAL ENGINEER BEFORE PLACEMENT.
7. GEOTECHNICAL INSPECTION OF SUBGRADE AND CONFIRMATION OF PAVEMENT STRUCTURE IS REQUIRED BEFORE PLACEMENT OF ANY GRANULAR MATERIAL.
8. GRANULAR MATERIALS (GRANULAR A AND GRANULAR B) SHOULD BE COMPACTED IN ACCORDANCE WITH THE GEOTECHNICAL INVESTIGATION REPORT.

WATERMAIN NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
WATERMAIN CROSSING BELOW SEWER	W25	CITY OF OTTAWA
WATERMAIN	PVC DR 18	
HYDRANT	WSD-24	CITY OF OTTAWA
VALVE AND VALVE BOX	WSD-19	CITY OF OTTAWA

2. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS.
3. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
4. PROVIDE MINIMUM 0.3m CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS.
5. WATER SERVICE IS TO BE CONSTRUCTED 2.0m PAST PROPERTY LINE, PLUS AN 8m COIL, UNLESS OTHERWISE INDICATED.

PAVEMENT STRUCTURE NOTES:

REFER TO GEOTECHNICAL NOTES.

1. ALL ROADWAYS TO HAVE 3% CROSSFALL INCLUDING SUBGRADE AND GRANULAR BASE.
2. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS ARE PER CITY OF OTTAWA STANDARD DETAIL (R10).
3. PERFORATED PIPE SUB-DRAINS TO BE PROVIDED AT SUBGRADE LEVEL EXTENDING FROM THE CATCHBASIN FOR A DISTANCE OF 3.0m, PARALLEL TO THE CURB IN TWO DIRECTIONS. REFER TO CITY OF OTTAWA SUBDRAIN INSTALLATION DETAIL (R1).
4. TYPICAL ROADSIDE CATCHBASIN'S SHALL BE INSULATED AS PER CITY OF OTTAWA STANDARD W23, WHERE REQUIRED.
5. PROVIDE LINE PAINTING.

PAVEMENT STRUCTURE:

RESIDENTIAL ROADWAYS:

40mm ASPHALTIC CONCRETE (WEAR COURSE, SUPERPAVE 12.5, PG 58 - 34)
50mm ASPHALTIC CONCRETE (BINDER COURSE, SUPERPAVE 19.0, PG 58 - 34)
150mm OPSS GRANULAR "A" CRUSHED STONE
450mm OPSS GRANULAR "B" TYPE II
690mm

EROSION AND SEDIMENT CONTROL NOTES:

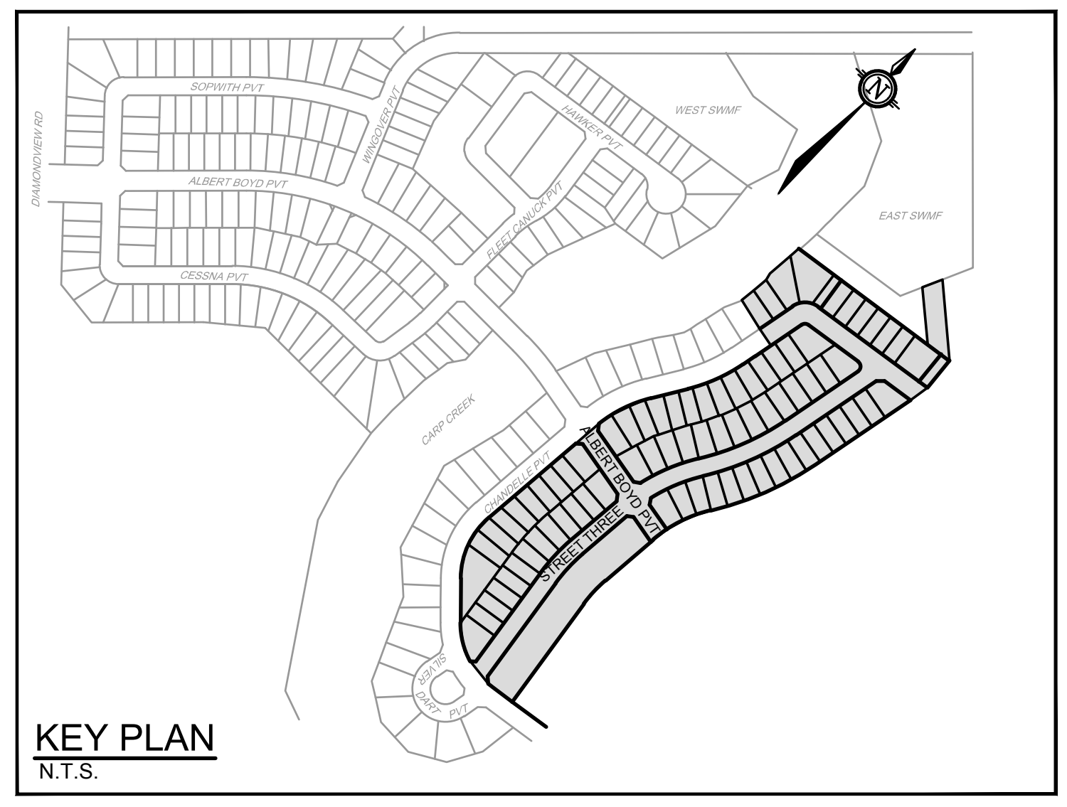
(REFER TO DRAWING 102085-ESC FOR EROSION AND SEDIMENT CONTROL NOTES)

SEEPAGE BARRIERS NOTES:

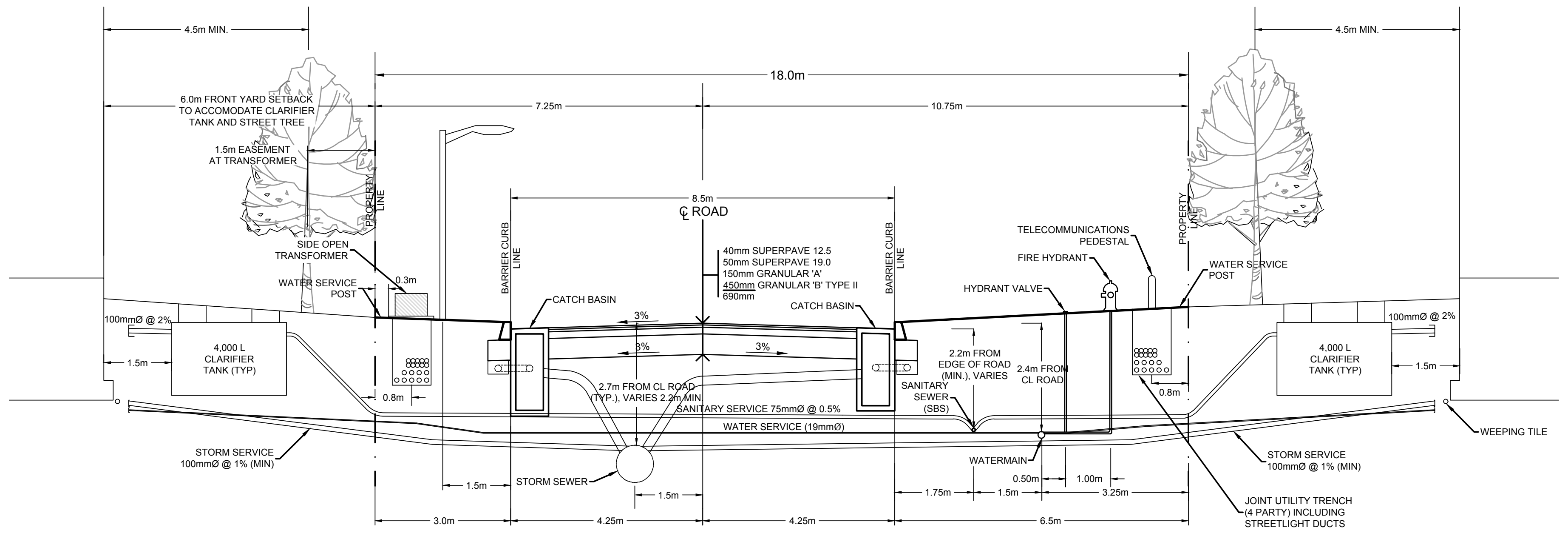
1. INSTALL SEEPAGE BARRIERS AS PER CITY OF OTTAWA STANDARD (S8).
2. SEEPAGE BARRIER SHALL EXTEND FROM TRENCH WALL TO TRENCH WALL, AND FROM SEWER SUB GRADE LEVEL TO TERMINATE EITHER WITHIN THE NATIVE SOIL BACK FILL OR TOP OF THE EXISTING SUB SURFACE ROCK.
3. SEEPAGE BARRIERS SHALL CONSIST OF 1.5m WIDE WEATHERED DRY (COMPATIBLE) SILTY CLAY COMPACTED IN THIN LIFTS TO AT LEAST 95% STANDARD PROCTOR DENSITY.
4. REFER TO PLAN AND PROFILE DRAWINGS FOR LOCATION OF SEEPAGE BARRIERS.

LOT DEVELOPMENT NOTES:

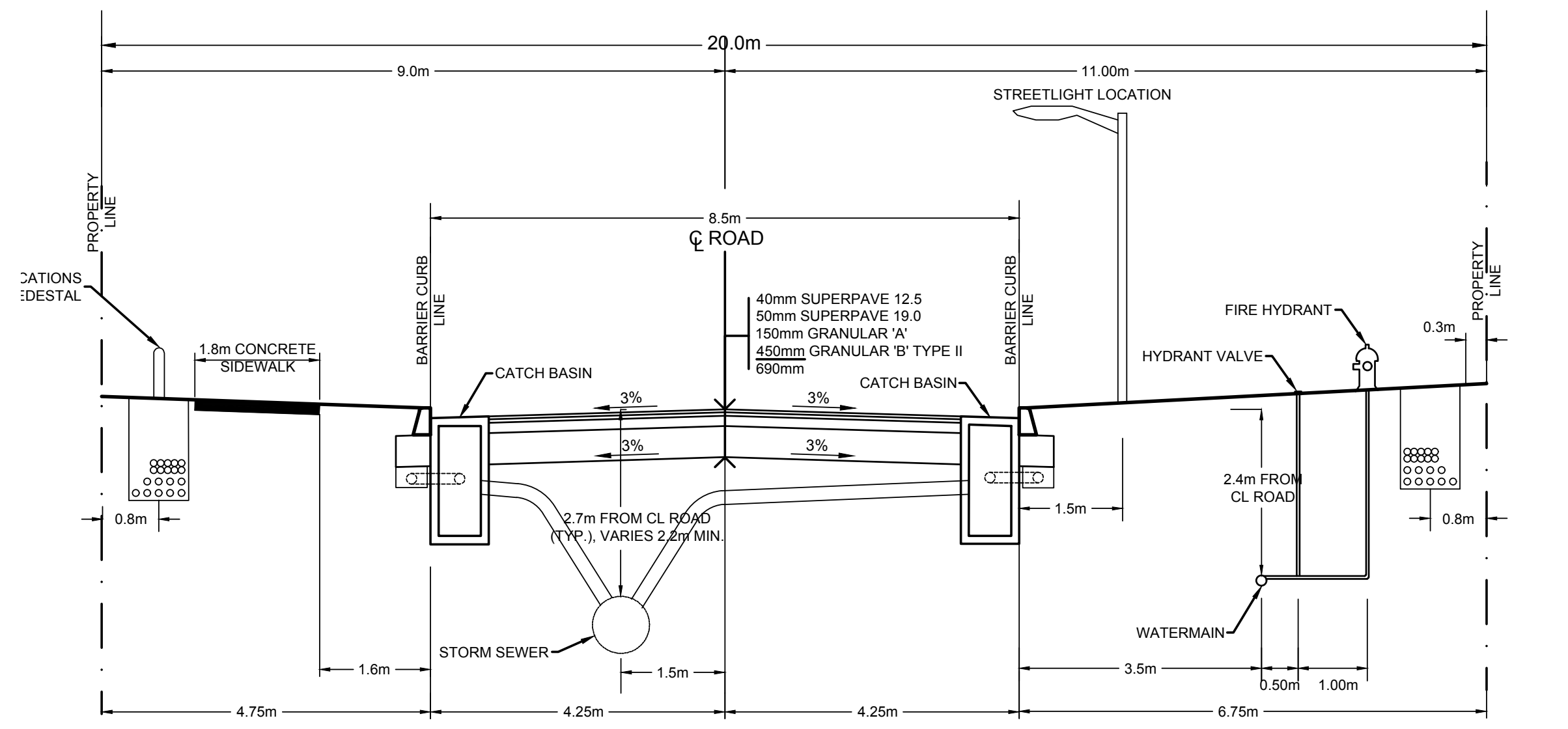
1. HOUSE FOOTPRINTS ARE CONCEPTUAL ONLY AND ARE TO BE FINALIZED AT THE TIME OF APPLICATION FOR BUILDING PERMIT.
2. MAINTAIN A MINIMUM 200mm CLEARANCE BETWEEN THE PROPOSED TOP OF FOUNDATION AND THE FINISHED GRADE AT THE STRUCTURE. MAINTAIN POSITIVE SURFACE DRAINAGE AWAY FROM THE FOUNDATION WALL.
3. HOUSE SETBACK REQUIRED PER ZONING BY-LAW: (URBAN RESIDENTIAL)
    - FRONT YARD - 4.0m (min) (DWELLING UNIT)
    - FRONT YARD - 6.0m (min) (GARAGE)
    - REAR YARD - 7.5m (min)
    - EXTERIOR SIDE YARD - 4.0m (min)
    - INTERIOR SIDE YARD - 1.2m (min)
4. HOUSE SETBACK REQUIRED PER ZONING BY-LAW: (TOWNHOMES)
    - FRONT YARD - 4.0m (min) (DWELLING UNIT)
    - FRONT YARD - 6.0m (min) (GARAGE)
    - REAR YARD - 7.5m (min)
    - EXTERIOR SIDE YARD - 4.0m (min)
    - INTERIOR SIDE YARD - 1.5m (min)
5. ROOF LEADERS ARE TO BE DIRECTED TO GRASSED AREAS.



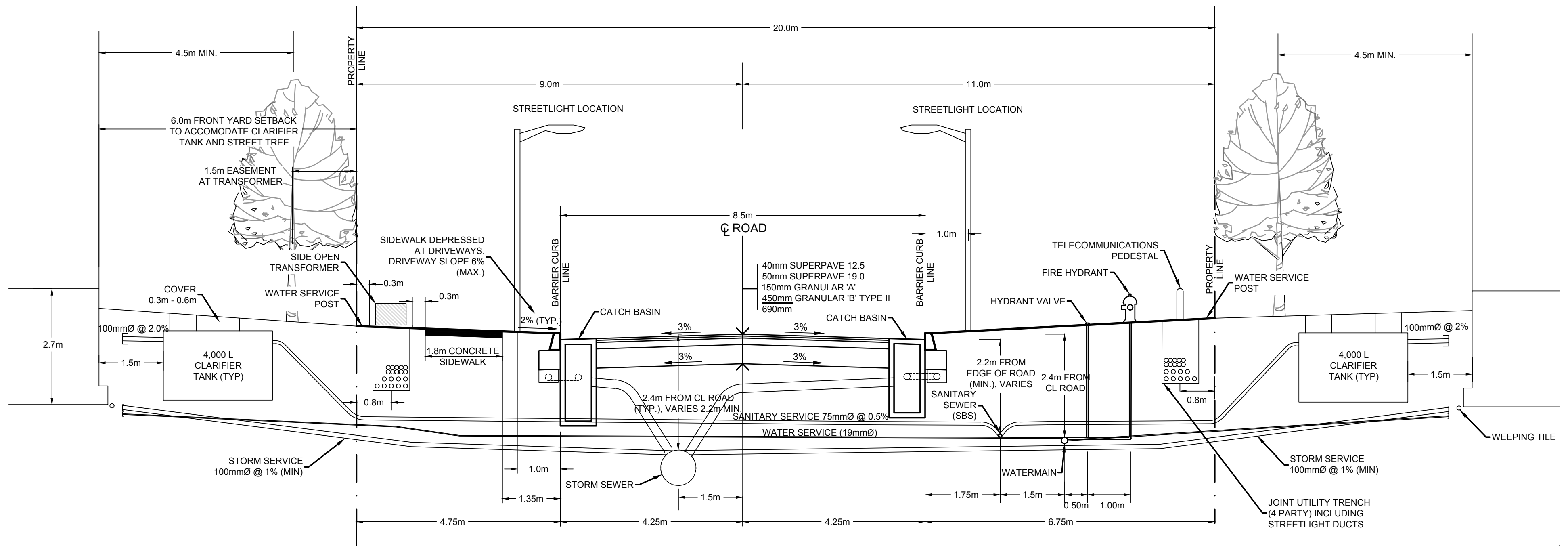
KEY PLAN
N.T.S.



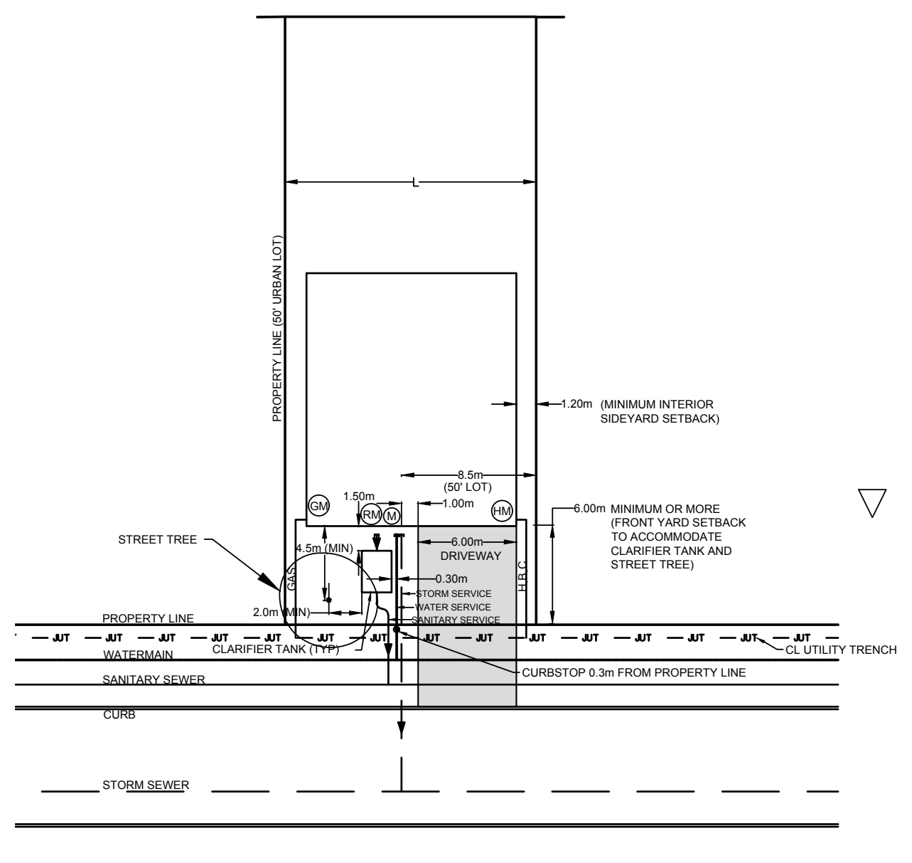
RESIDENTIAL ROAD 18.0m ROAD ALLOWANCE
URBAN SECTION 4 PARTY JOINT USE TRENCH
STREET THREE
1:100



RESIDENTIAL ROAD 20.0m ROAD ALLOWANCE
URBAN SECTION 4 PARTY JOINT USE TRENCH
ALBERT BOYD PVT.
1:100



RESIDENTIAL ROAD 20.0m ROAD ALLOWANCE
URBAN SECTION 4 PARTY JOINT USE TRENCH
CHANDELLE PVT
1:100



SERVICE LATERALS SHOULD BE AS FOLLOWS:

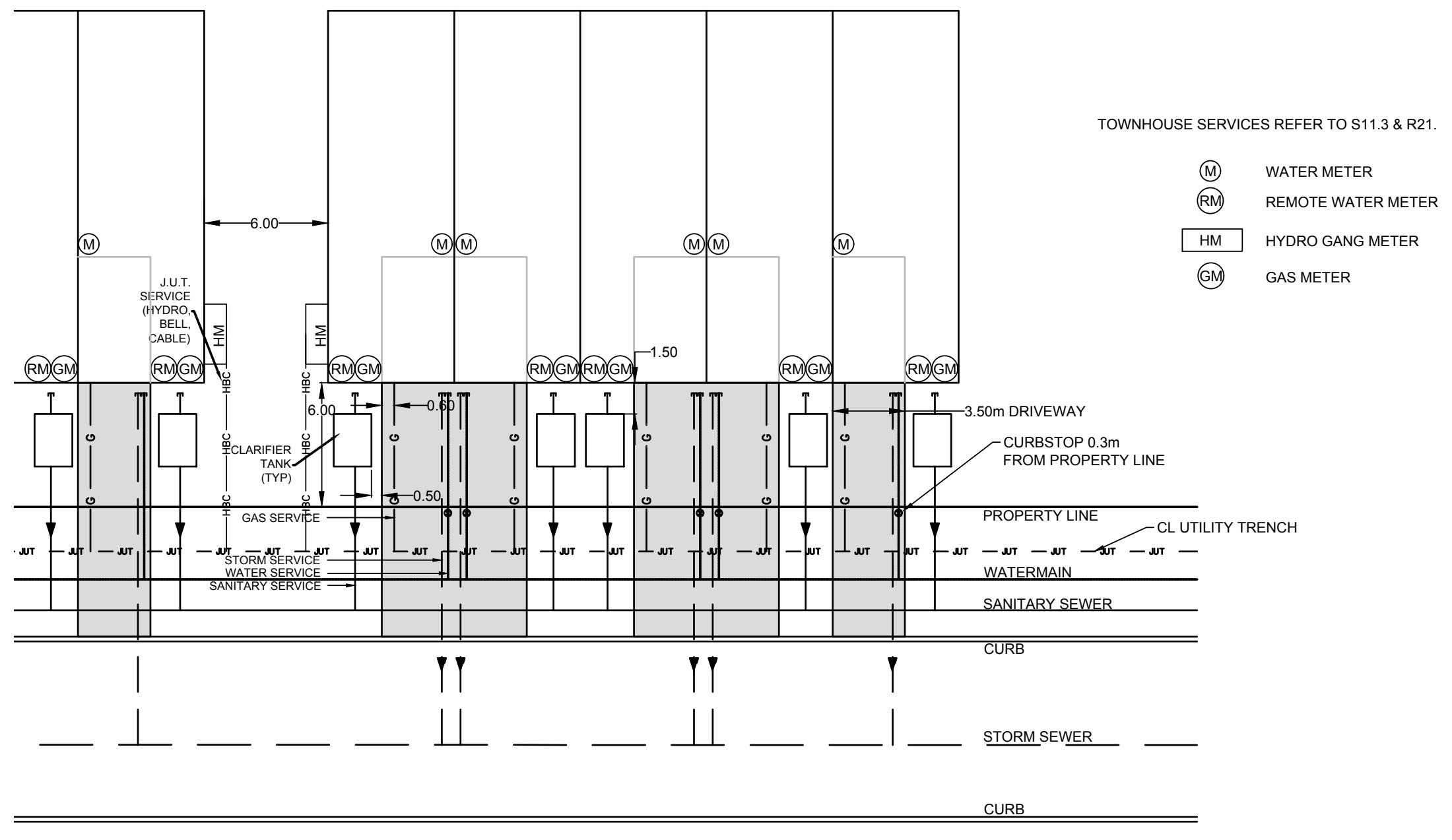
SANITARY-
-INLET- 1- 100mmØ @ 2.0% (MIN)
-TANK- 4000L SEPTIC TANK (MIN)
-OUTLET- 1- 75mmØ DR17 HDPE @ 0.5% (MIN)
STORM- 1- 100mmØ @ 1.0% (MIN)
WATER- 1- 19mmØ (TYPE K COPPER)

NOTES:
1. REFER TO CLEARFORD SBS DETAILS FOR TYPICAL CONNECTION TO CLARIFIER TANK.
2. ALL SERVICE LATERALS ARE TO BE EXTENDED 2.0m PAST PROPERY LINE.

TOWNHOUSE SERVICES REFER TO S11.3 & R21.

Ⓜ	WATER METER
(RM)	REMOTE WATER METER
(HM)	HYDRO METER
(GM)	GAS METER

TYPICAL LOT SERVICING DETAIL - URBAN LOT
N.T.S.



TYPICAL LOT SERVICING DETAIL - TOWNHOUSE
N.T.S.

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CLEARFORD
WATER SYSTEMS INC.

CLEARFORD
W. G. STEFAN
27JUN2024

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Developments

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SCALE

DESIGN	MNP
CHECKED	ARM
DRAWN	MNP
CHECKED	ARM
APPROVED	SMG

A. A. RONGVE
100616298
June 28, 2024

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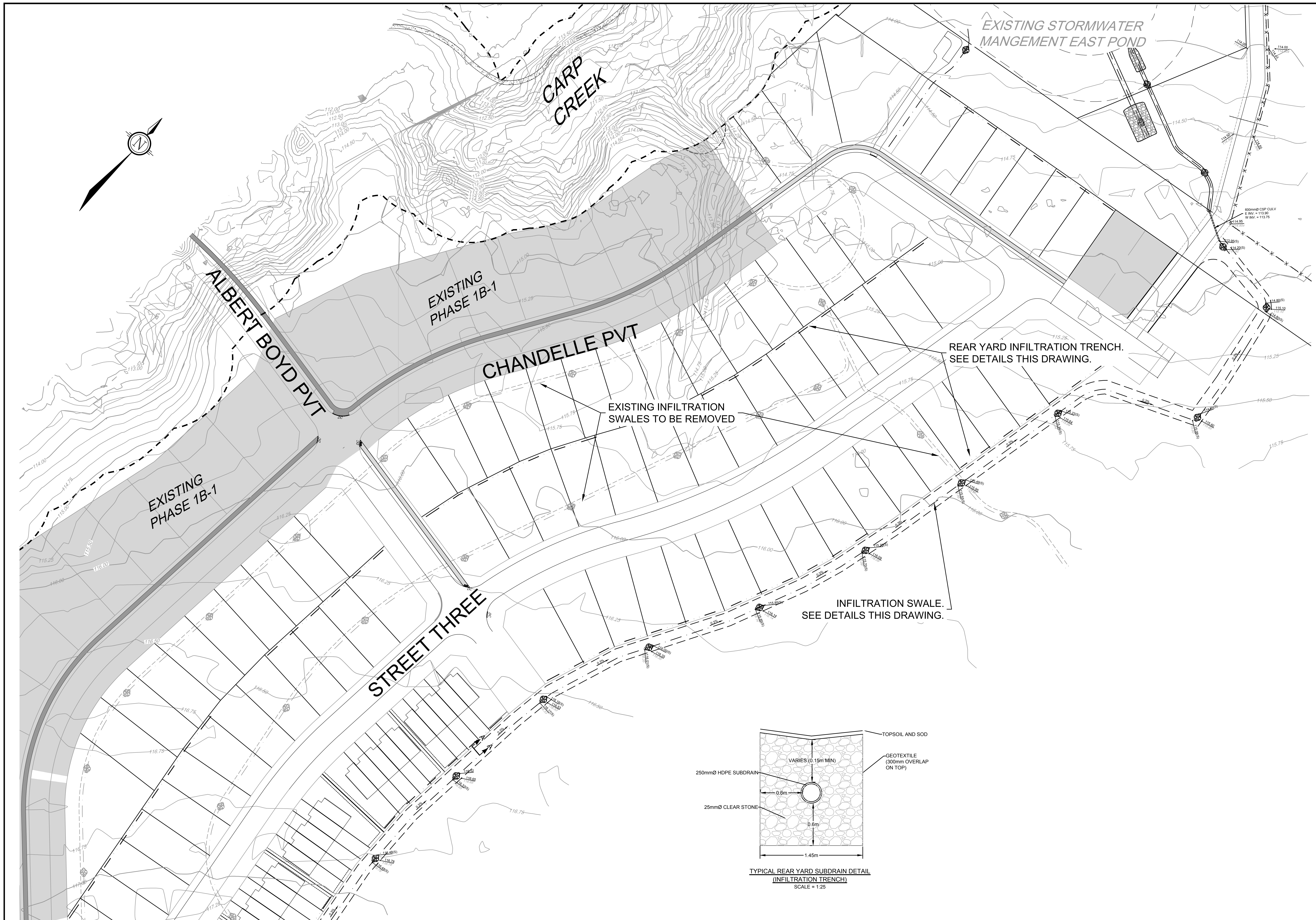
LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
PHASE 1B-2 RESIDENTIAL
NOTES AND DETAILS PLAN

PROJECT No.	102085
REV	REV # 8
DRAWING No.	102085-ND1B2

PLANB1.DWG - 1000mmx707mm

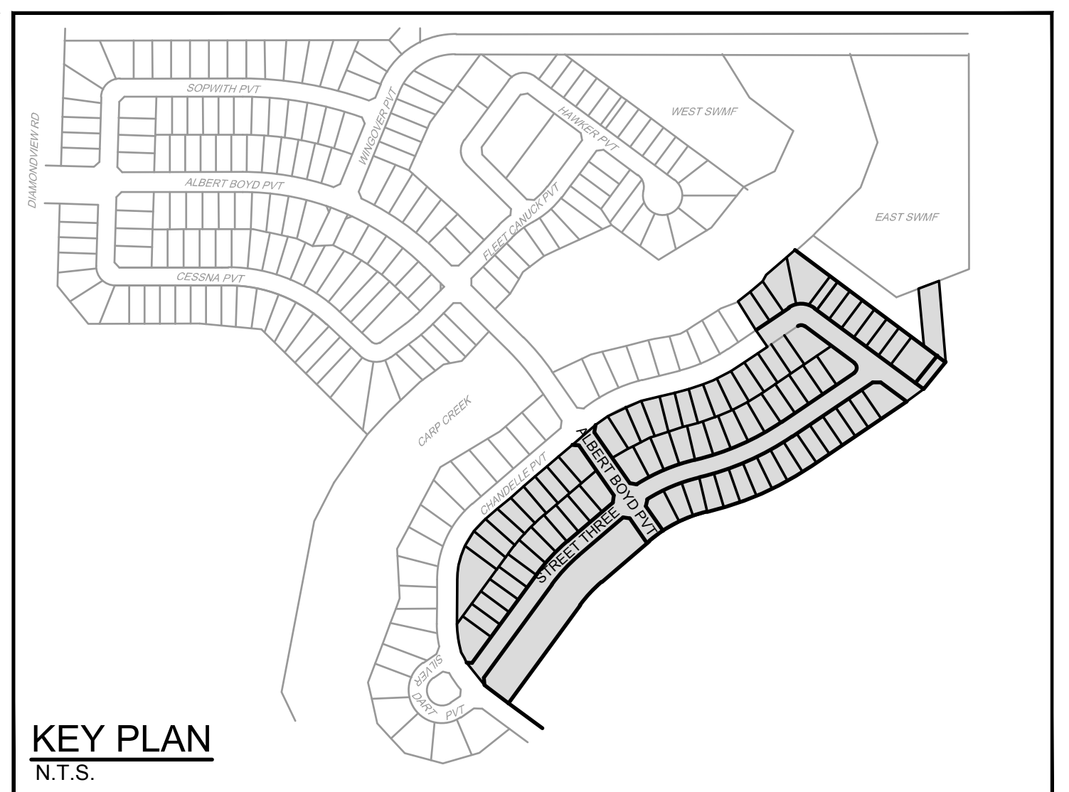


REAR YARD INFILTRATION TRENCH. SEE DETAILS THIS DRAWING.

EXISTING INFILTRATION SWALES TO BE REMOVED

INFILTRATION SWALE. SEE DETAILS THIS DRAWING.

TYPICAL REAR YARD SUBDRAIN DETAIL
(INFILTRATION TRENCH)
SCALE = 1:25

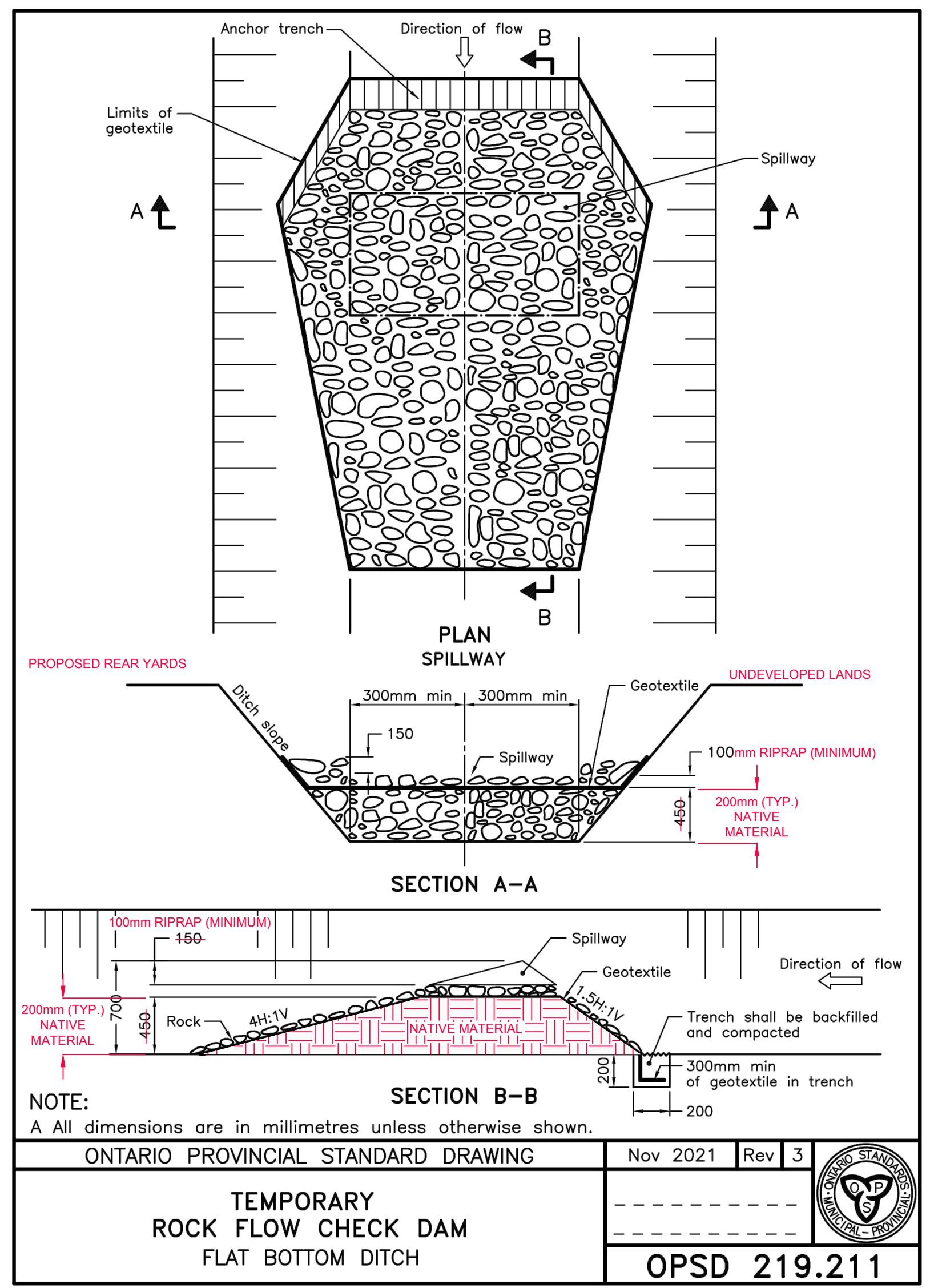


NORTH

KEY PLAN
N.T.S.

LEGEND

— · · —	PROPOSED REAR YARD INFILTRATION TRENCH
— · —	PROPOSED CENTRELINE OF INFILTRATION SWALE
— — —	PROPOSED TOP OF BERM
— · —	CENTRELINE OF EXISTING INFILTRATION SWALE
- - - -	EXISTING TOP OF BERM
115.30(S) / *115.60*	PROPOSED SWALE ELEVATION *EXISTING ELEVATION*
0.6% →	PROPOSED GRADING DIRECTION AND SLOPE
▨	PROPOSED EARTH CHECK DAM (OPSD 219.211)
●	EXISTING ROCK FLOW CHECK DAM TO BE REMOVED



NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2021 | Rev 3

TEMPORARY
ROCK FLOW CHECK DAM
FLAT BOTTOM DITCH

OPSD 219.211

MODIFIED BY NOVATECH

NOTES:

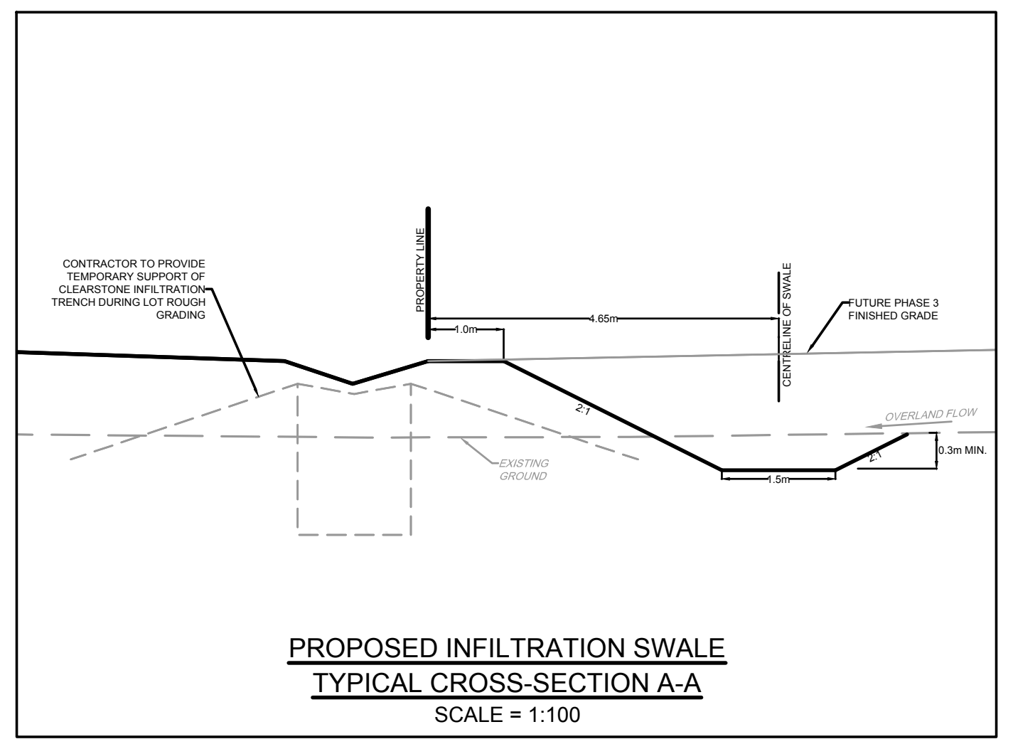
1. INFILTRATION TRENCHES SHOULD BE CONSTRUCTED AT THE END OF THE DEVELOPMENT CONSTRUCTION.

2. SMEARING OF THE NATIVE MATERIAL AT THE INTERFACE WITH THE INFILTRATION TRENCH FLOOR MUST BE AVOIDED AND/OR CORRECTED BY RAKING OR ROTO-TILING.

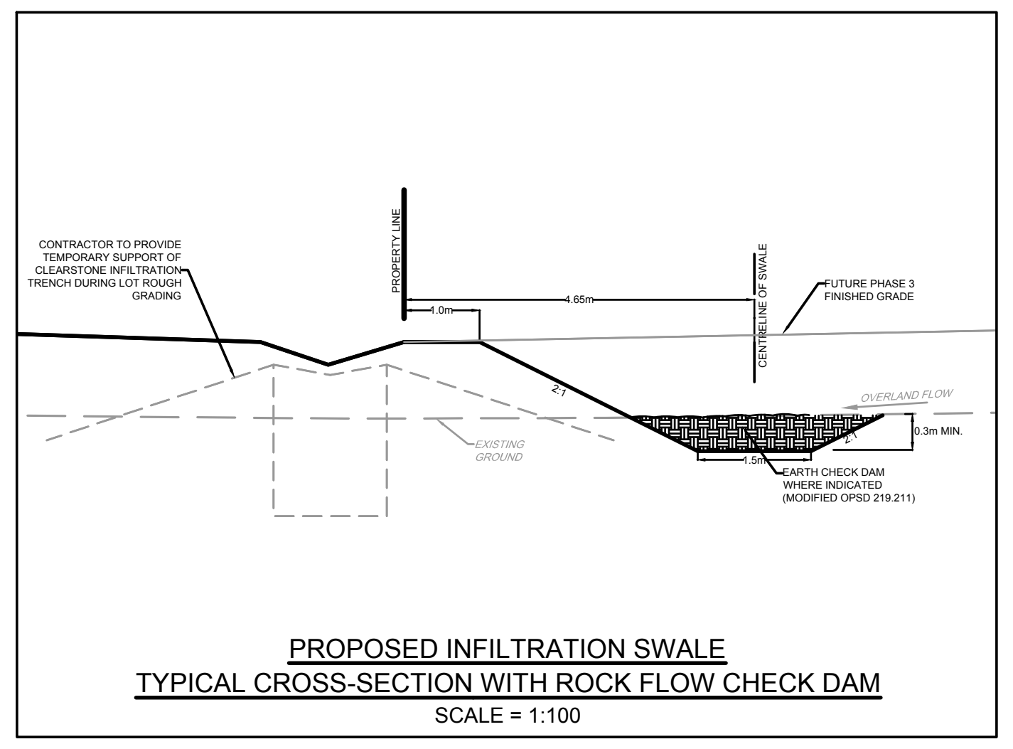
3. COMPACTION OF THE INFILTRATION TRENCH DURING CONSTRUCTION MUST BE MINIMIZED.

4. DURING CONSTRUCTION, EROSION AND SEDIMENT CONTROL MEASURES ARE REQUIRED TO PROTECT THE INLETS. THIS INCLUDES, BUT IS NOT LIMITED TO FILTER BAGS PLACED UNDER THE LID OF EACH MANHOLE AND ROADWAY AND REARYARD CATCHBASIN. FILTER BAGS MUST ALWAYS BE IN PLACE AND REGULARLY INSPECTED UNTIL SOD OR VEGETATION HAS FULLY ESTABLISHED. ROUTINE MAINTENANCE DURING CONSTRUCTION MAY ALSO BE REQUIRED TO PROTECT THE SUBDRAINS FROM CLOGGING.

5. OCCASIONAL POST-CONSTRUCTION MAINTENANCE WILL BE REQUIRED TO REMOVE ACCUMULATED SEDIMENTS FROM THE INFILTRATION AND EXFILTRATION TRENCHES TO PREVENT CLOGGING. THIS MAY INCLUDE CATCH BASIN CLEANOUT AND SUBDRAIN PIPE FLUSHING.



PROPOSED INFILTRATION SWALE
TYPICAL CROSS-SECTION A-A
SCALE = 1:100



PROPOSED INFILTRATION SWALE
TYPICAL CROSS-SECTION WITH ROCK FLOW CHECK DAM
SCALE = 1:100

NOTE:
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WEST CAPITAL
Developments

No.	REVISION	DATE	BY
7.	ISSUED FOR REGISTRATION AND ECA	JUN 28/24	ARM
6.	REVISED POND INLET SWALE	MAY 14/24	ARM
5.	REVISED PER CITY COMMENTS	FEB 20/24	ARM
4.	ISSUED WITH ADDENDUM #2	JAN 5/24	ARM
3.	ISSUED FOR TENDER	DEC 7/23	ARM
2.	ISSUED FOR REVIEW	JUL 28/23	ARM
1.	ISSUED FOR COORDINATION	JAN 18/23	ARM

SCALE
1:750

1:750
0 10 20 30

DESIGN	ARM
CHECKED	ARM
DRAWN	MNP
CHECKED	ARM
APPROVED	SMG

A. A. RONGVE
100616298
June 28, 2024

A.R. MCAULEY
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June 28, 2024

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CITY OF OTTAWA
WEST CAPITAL AIRPARK

PHASE 1B-2 RESIDENTIAL
INFILTRATION MEASURES
PLAN

PROJECT No.	102085-08
REV	REV # 7
DRAWING No.	102085-INF2

PLANB1.DWG - 1000mmx707mm

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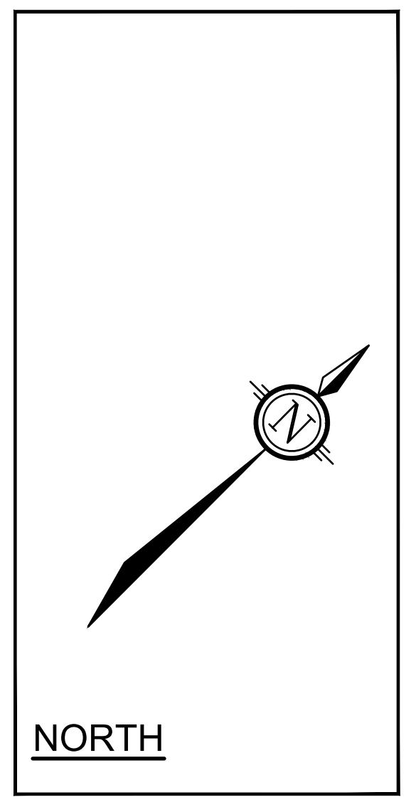

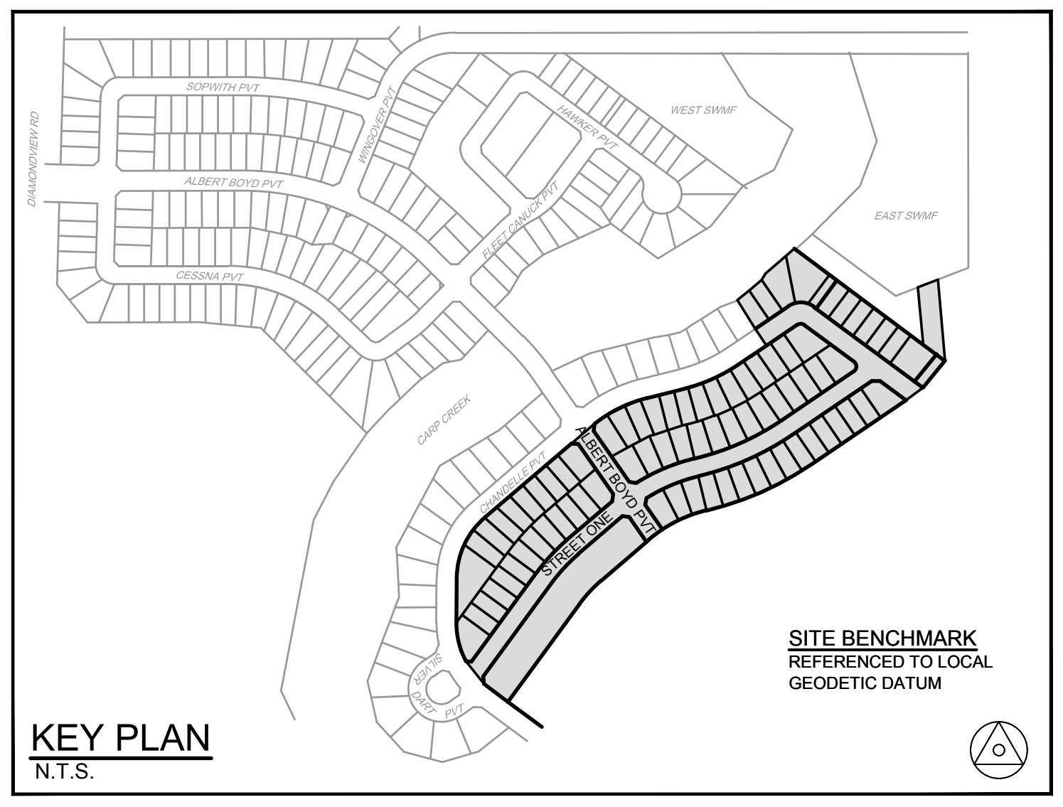

LEGEND

☐ CB	PROPOSED CATCHBASIN
○ 100	PROPOSED STORM MANHOLE
0.39	PHASE 1B-2 DRAINAGE AREA (ha)
A-1	AREA ID
0.60	RUNOFF COEFFICIENT
0.39	EXISTING PHASE 1B-1 DRAINAGE AREA (ha)
A-1	AREA ID
0.60	RUNOFF COEFFICIENT
▬ ▬ ▬	DRAINAGE AREA
▨	EXISTING PHASE 1B-1
←	OVERLAND FLOW ROUTE

NOTE:
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No.	REVISION	DATE	BY
3.	ISSUED FOR REGISTRATION AND ECA	JUN 28/24	ARM
2.	REVISED PER CITY COMMENTS	FEB 20/24	ARM
1.	ISSUED FOR REVIEW	JUL 28/23	ARM

SCALE
1:750

1:750
0 10 20 30

DESIGN	MNP
CHECKED	ARM
DRAWN	MNP
CHECKED	ARM
APPROVED	SMG

A. A. RONGVE
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June 28, 2024

A.R. MCAULEY
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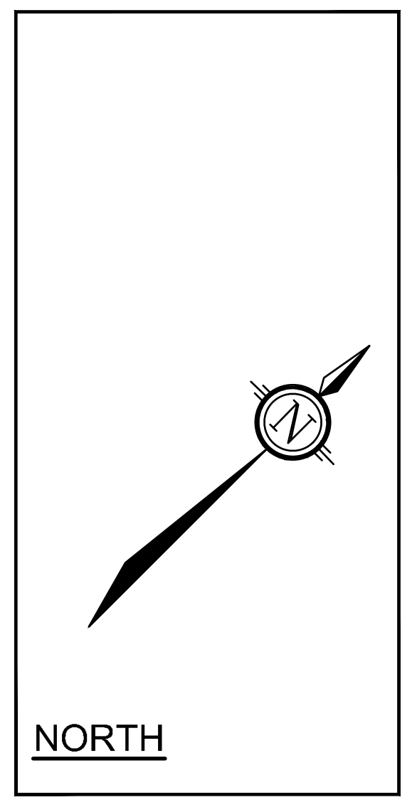
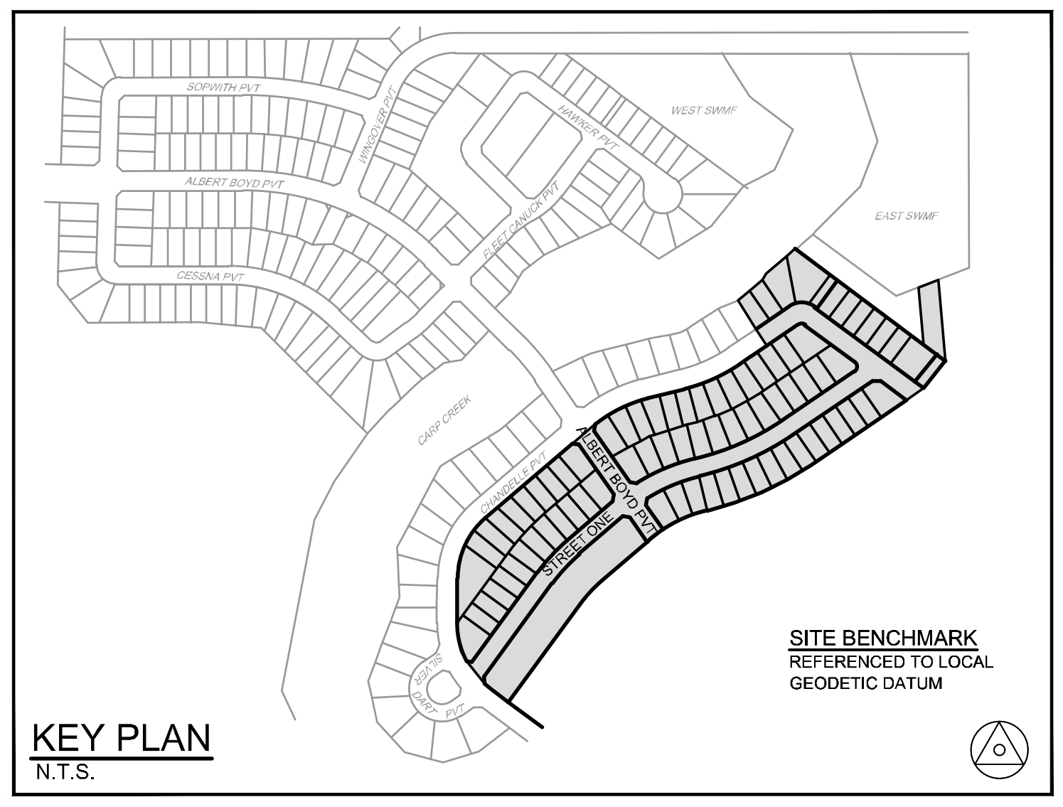
LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
PHASE 1B-2 STORMWATER MANAGEMENT PLAN

PROJECT No.	102085
REV	REV # 3
DRAWING No.	102085-SWM7

PLANB1.DWG - 1000mmx707mm





LEGEND

0.39	PHASE 1B-2 DRAINAGE AREA (ha)
A-1	AREA ID
0.60	ADJUSTED RUNOFF COEFFICIENT
0.39	EXISTING PHASE 1B-1 DRAINAGE AREA (ha)
A-1	AREA ID
0.60	RUNOFF COEFFICIENT
▬ ▬ ▬	DRAINAGE AREA
⬚	BUILDING SETBACK AS PER ZONING (SEE TABLES BELOW)
🟩	ZONING - PERVIOUS AREA
⬛	ZONING - IMPERVIOUS AREA

ZONING TABLES

I Exception Number	II Applicable Zone	Exception Provisions III Additional Land Uses Permitted	IV Land Uses Prohibited	V Provisions
SINGLE FAMILY HOMES				
357r	T1B[357r]	- detached dwelling - home-based business - park	All uses except additional permitted uses and the following: - airport and related facilities	- in this zone, land that is legally transferable, but does not comply with the definition of a lot, will: (i) be considered to have frontage if it fronts on a private street; and (ii) need to comply with all zone provisions as if it were a lot - minimum lot area: 530 m2 - minimum lot width: 15 m - maximum lot coverage: 40% - minimum front yard setback: (i) 4.0 m for detached dwelling unit; (ii) 6.0 m for a single car garage. - minimum corner side yard setback: 4 m - minimum rear yard setback: 7.5 m - minimum interior side setback: 1.2 m - maximum building height: 10 m - minimum dwelling unit area: (i) ground floor: 90 m2 (ii) entire dwelling: 130 m2 - minimum landscaping area: 30%
TOWNHOMES				
358r (By-law 2019-40) (By-law 2012-334)	T1B[358r] T1B[358r]-h	- home-based business - townhouse dwelling - planned unit development	All uses except for additional permitted uses	- in this zone, land that is legally transferable, but does not comply with the definition of a lot, will: (i) be considered to have frontage if it fronts on a private street; and (ii) need to comply with all zone provisions as if it were a lot - minimum lot area: 180 m2 - minimum lot width: 6.0 m - maximum lot coverage: 60% - minimum front yard setback: (i) 4.metres for dwelling unit; (ii) 6.metres for garage. - minimum corner side yard setback: 4 m - minimum interior side yard setback for end units: 1.5 m - minimum rear yard setback: 7.5 m - maximum building height: 2 storeys - minimum dwelling unit area: no minimum - minimum landscaping area: 30% - minimum parking spaces: (i) 2 for each dwelling unit; (ii) 1 for each home-base business. - on any lands zoned T1B[1565]-h, the holding symbol cannot be removed until such time as one of the following is met: 1. the pit is exhausted and the licence surrendered; or 2. an impact assessment study is completed which demonstrates that the mineral aggregate operation will not be negatively impacted by the proposed residential development.

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SCALE
1:750
1:750
0 10 20 30

DESIGN MNP
CHECKED ARM
DRAWN MNP
CHECKED ARM
APPROVED SMG

LICENSED PROFESSIONAL ENGINEER
A. A. RONGVE
100616298
June 28, 2024
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
A.R. MCAULEY
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Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
PHASE 1B-2 STORMWATER MANAGEMENT PLAN - COEFFICIENT CALCULATIONS

PROJECT No. 102085
REV REV # 2
DRAWING No. 102085-SWM-CC

PLANB1.DWG - 1000mmx707mm

VORTECHS 1929CIP CAST-IN-PLACE LAYOUT DETAIL
SCALE 1:50

VORTECHS 1929CIP CAST-IN-PLACE LAYOUT DETAIL
SCALE 1:50

VORTECHS 1929CIP LAYOUT DETAIL
SCALE 1:50

SWM POND INLET SWALE
SCALE 1:200

SECTION G-G' - SWM POND INLET SWALE
SCALE 1:75

SECTION F-F' - SWM POND INLET SWALE
SCALE 1:75

SECTION H-H' - MAJOR OVERLAND FLOW INLET SWALE DETAIL
SCALE: 1:100

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5.	ISSUED WITH ADDENDUM #4	JAN 12/24	ARM
4.	ISSUED WITH ADDENDUM #2	JAN 5/24	ARM
3.	ISSUED FOR TENDER	DEC 7/23	ARM
2.	ISSUED FOR REVIEW	JUL 28/23	ARM
1.	ISSUED FOR COORDINATION	JAN 18/23	ARM

SCALE

DESIGN	MNP
CHECKED	ARM
DRAWN	MNP
CHECKED	ARM
APPROVED	XXX

A. A. RONGVE
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LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
EAST STORMWATER MANAGEMENT FACILITY - PHASE 1B-2 INLET DETAILS

PROJECT No. 102085
REV: REV # 8
DRAWING No. 102085-SWMF5

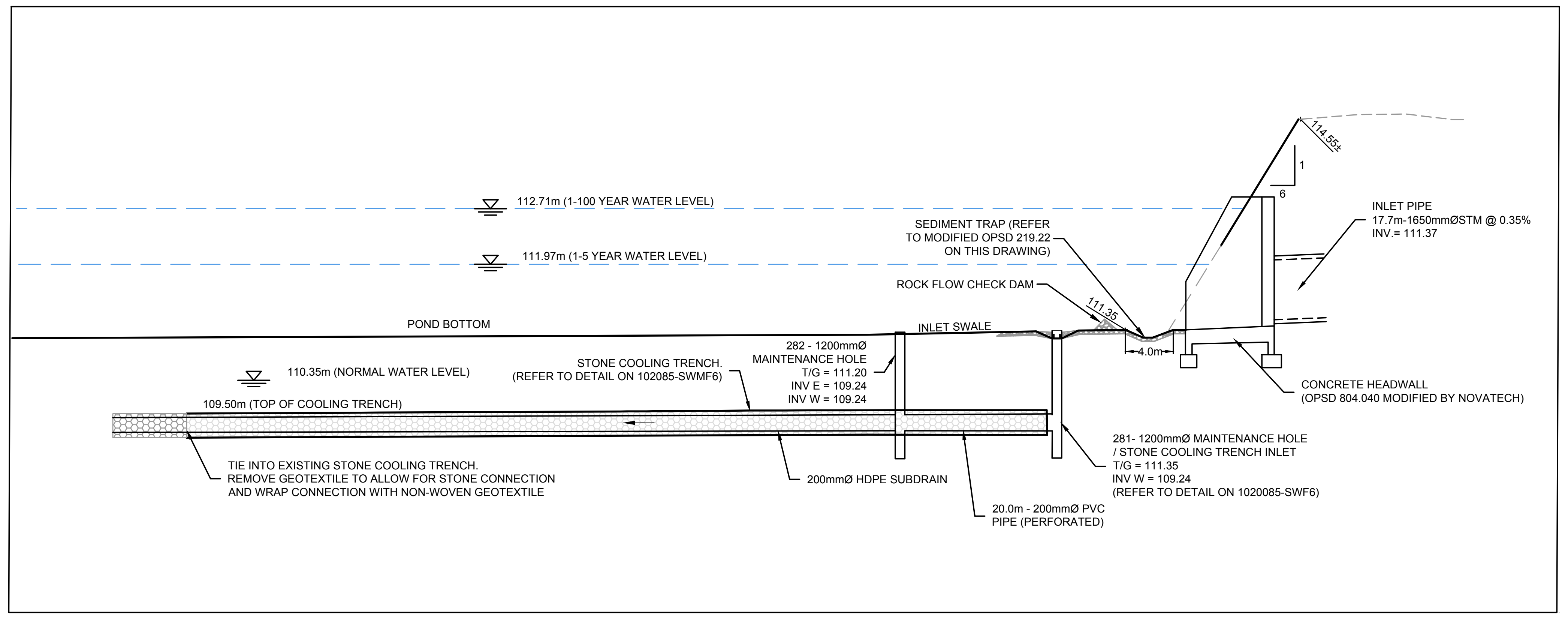
PLANB1.DWG - 1000mmx707mm

COOLING TRENCH NOTES:

1. ALL DISTURBED AREAS TO BE REINSTATED WITH TOPSOIL, HYDROSEED AND MULCH - UNLESS OTHERWISE NOTED.

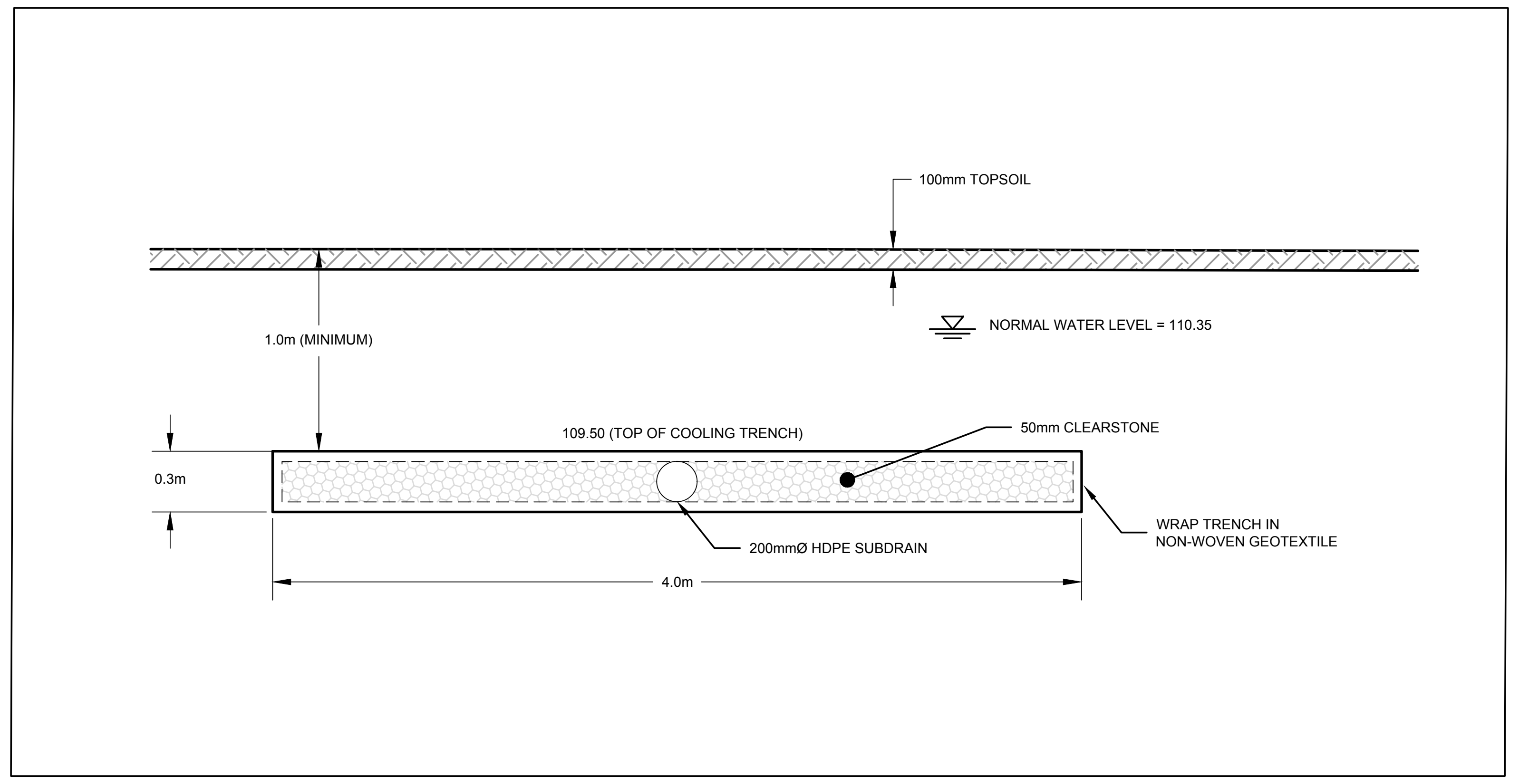
2. MAINTENANCE HOLE STRUCTURES WITHIN COOLING TRENCH SWM FACILITY TO BE AS PER OPSD 701.010. MAINTENANCE HOLE COVERS TO BE SOLID AS PER OPSD 401.060.

3. CUSTOM GRATES AT INLET AND OUTLET MAINTENANCE HOLES OF COOLING TRENCH TO BE DETAILED WITH SHOP DRAWINGS PRIOR TO ENGINEER REVIEW.



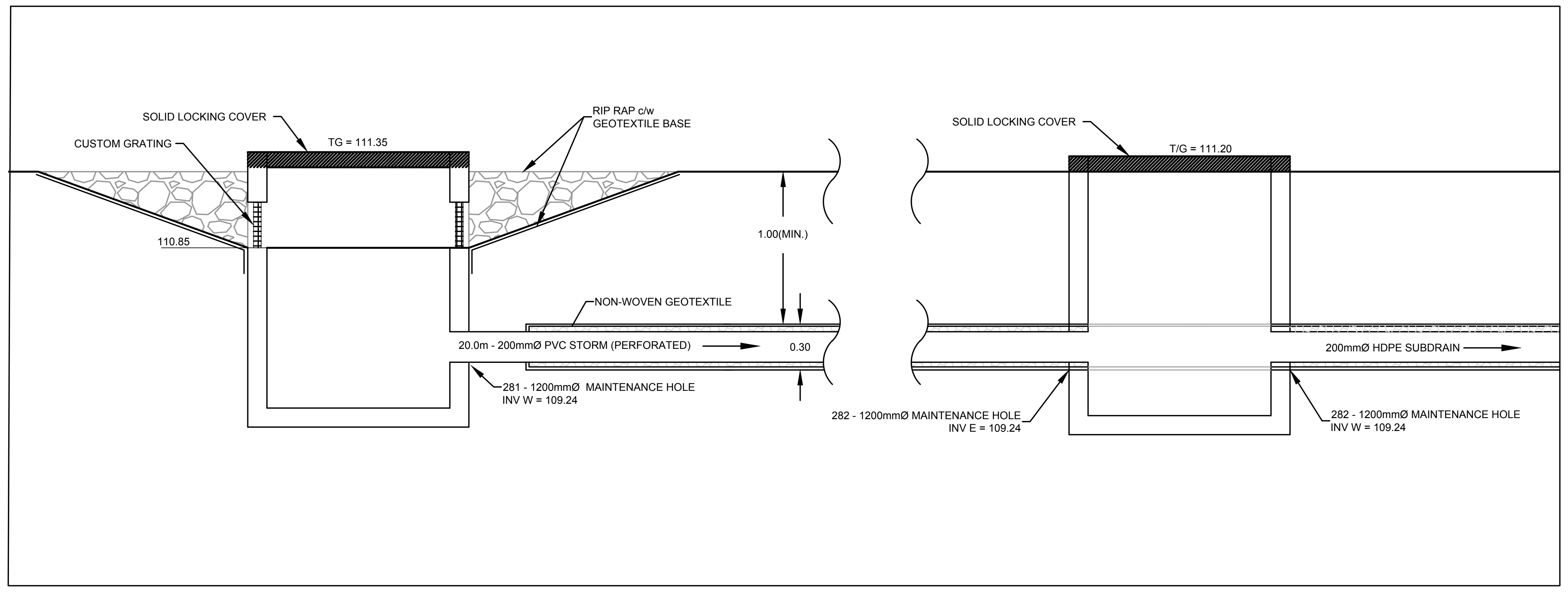
STONE COOLING TRENCH CROSS-SECTION

SCALE: N.T.S.



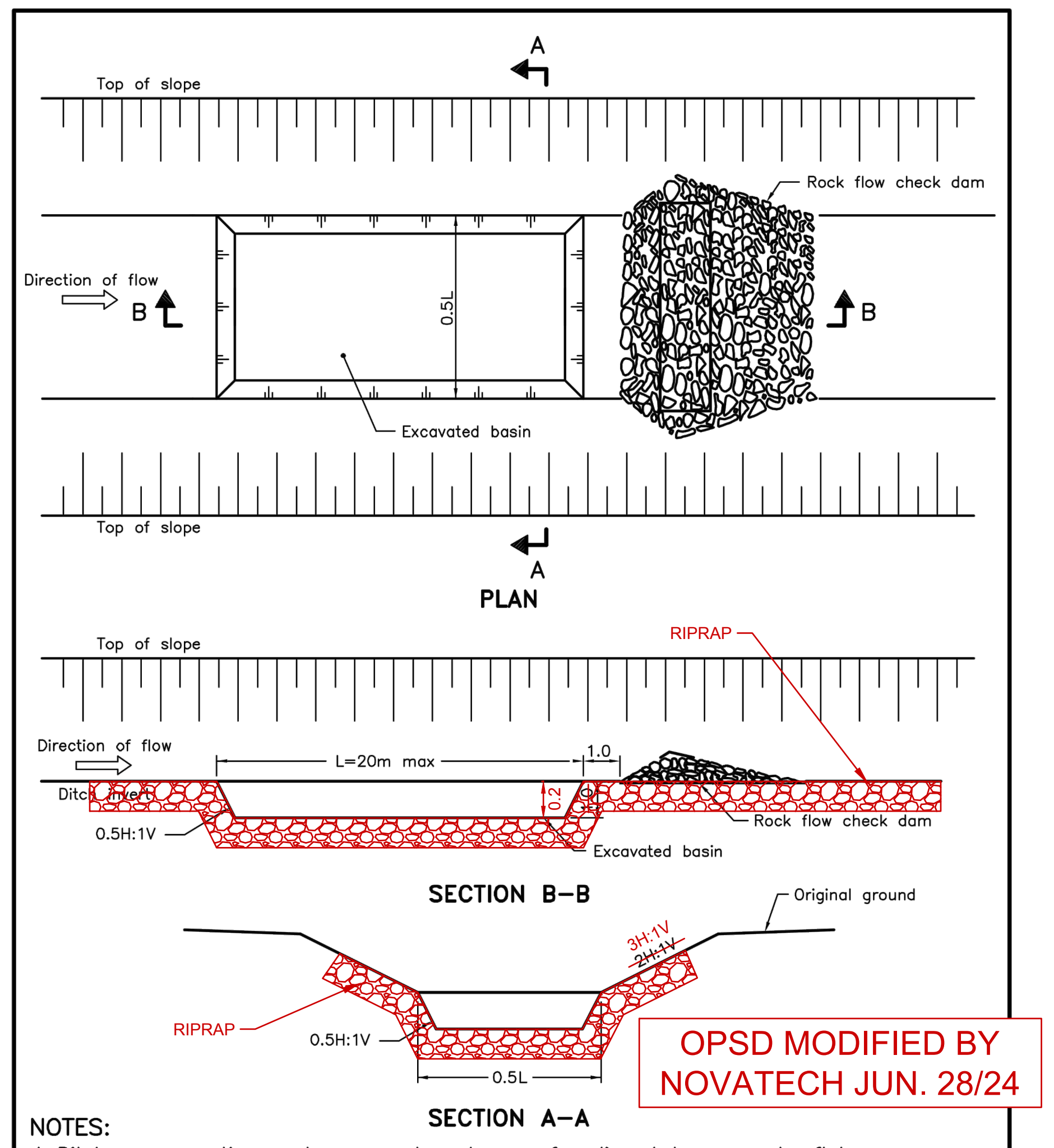
STONE COOLING TRENCH DETAIL

SCALE 1:50



MAINTENANCE HOLE AND STONE COOLING TRENCH INLET DETAIL

SCALE 1:50



OPSD MODIFIED BY NOVATECH JUN. 28/24

NOTES:

A Ditch cross–section upstream or downstream of sediment trap may be flat bottom or V–shaped. Flat bottom shown.

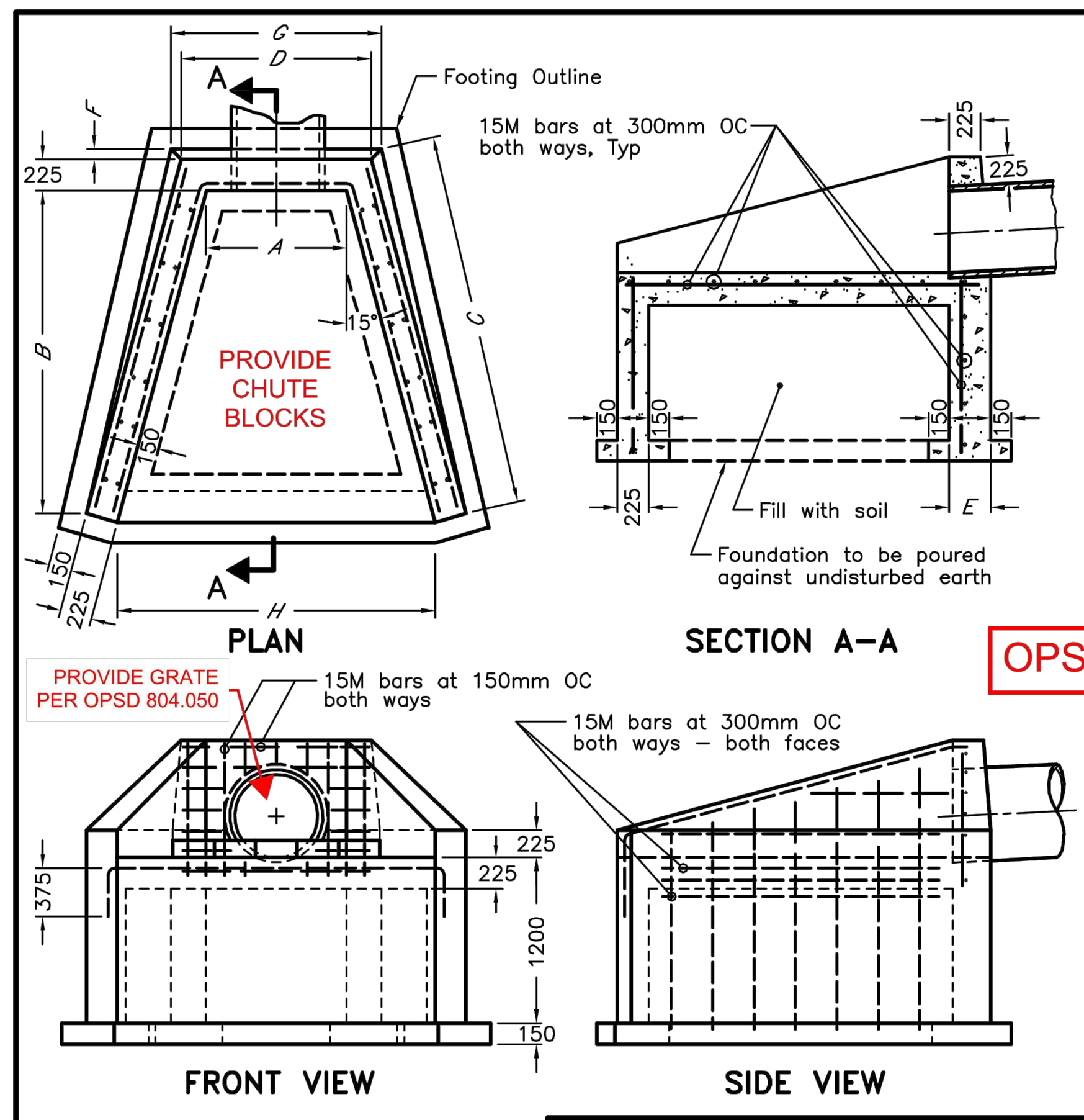
B This OPSD shall be read in conjuction with OPSD 219.210 or 219.211.

C All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2015 | Rev 2

SEDIMENT TRAP IN DITCH

OPSD 219.220



PIPE DIA	ENDWALL DIMENSIONS							
	A	B	C	D	E	F	G	H
600	1050	2400	2725	1400	300	75	1525	2350
675	1125	2400	2725	1475	300	75	1600	2425
750	1200	2400	2725	1550	300	75	1675	2500
825	1275	2400	2725	1625	300	75	1755	2575
900	1350	2400	2725	1700	300	75	1825	2650
975	1425	2400	2725	1775	375	150	1975	2725
1050	1500	3000	3400	1850	375	150	2050	3100
1200	1650	3000	3400	2000	375	150	2200	3250
1350	1800	3000	3400	2150	375	150	2350	3400
1500	1950	3000	3400	2300	375	150	2500	3550
1650	2100	3000	3400	2450	375	150	2650	3700
1800	2250	3000	3400	2600	375	150	2800	3850
2400	3000	3000	3400	3350	375	150	3550	4600

OPSD MODIFIED BY NOVATECH JAN. 12/24

NOTES:

A This OPSD to be read in conjunction with OPSD 3940.150.

B Class of concrete: 30MPa.

C Cover to reinforcing bars: 75mm ±20mm.

D Granular backfill to be placed to 300mm min thickness on all sides.

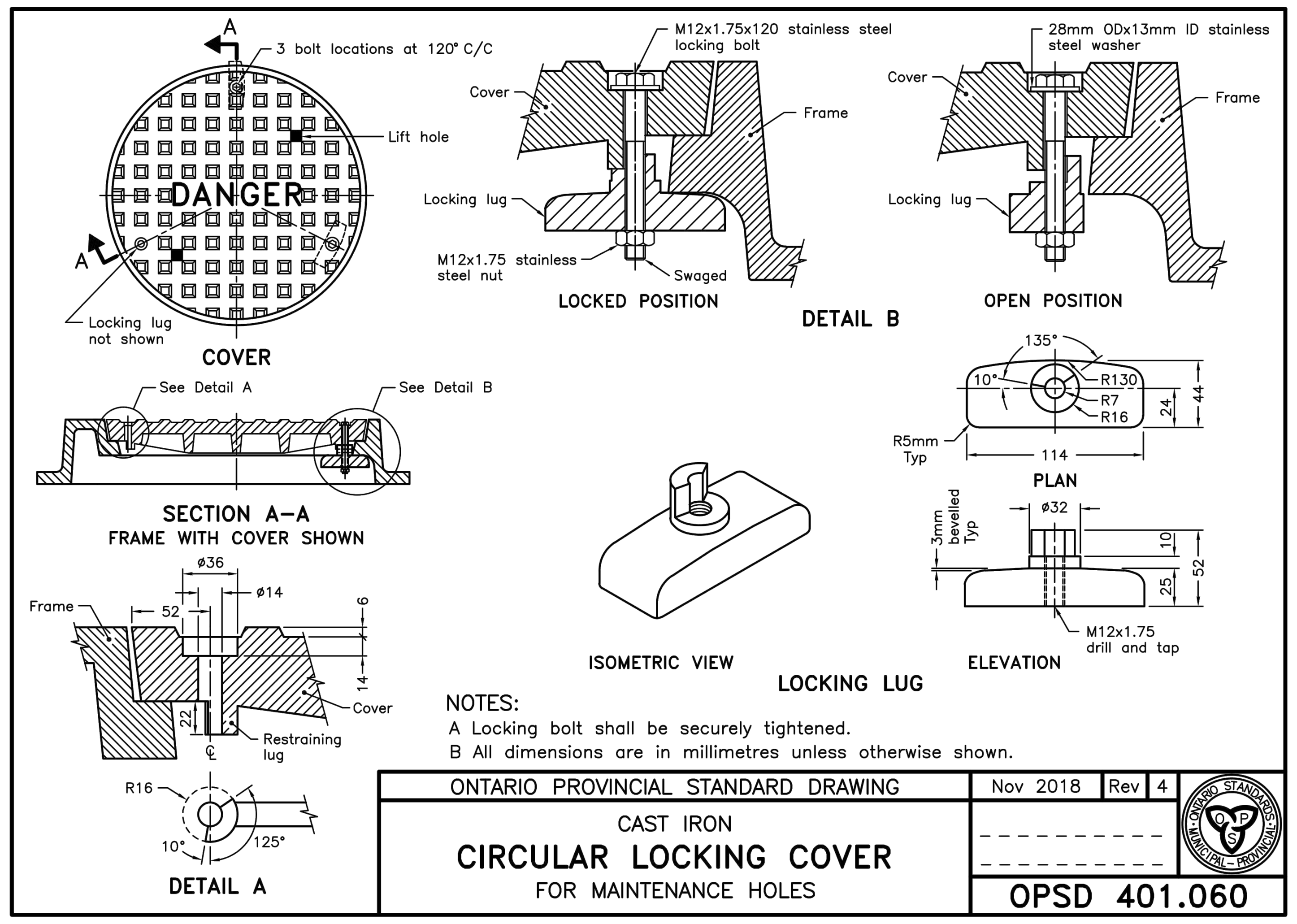
E All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2017 | Rev 1

CONCRETE HEADWALL

FOR SEWER OR CULVERT PIPE OUTLET

OPSD 804.040



NOTES:

A Locking bolt shall be securely tightened.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2018 | Rev 4

CAST IRON

CIRCULAR LOCKING COVER

FOR MAINTENANCE HOLES

OPSD 401.060

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M:\2002\102085\CAD_PHASES2B&3\Civil\102085-2B3-SWMF.dwg, SWMF6, Jun 27, 2024 - 2:16pm, arongve

No.	REVISION	DATE	BY
4.	ISSUED FOR REGISTRATION AND ECA	JUN 28/24	ARM
3.	REVISED POND INLET SWALE	MAY 14/24	ARM
2.	REVISED PER CITY COMMENTS (NO CHANGES)	FEB 20/24	ARM
1.	ISSUED WITH ADDENDUM #4	JAN 12/24	ARM

SCALE

DESIGN MNP
CHECKED ARM
DRAWN MNP
CHECKED ARM
APPROVED XXX

LICENSED PROFESSIONAL ENGINEER
A. A. RONGVE
100616298
June 28, 2024
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
A.R. MCAULEY
100141256
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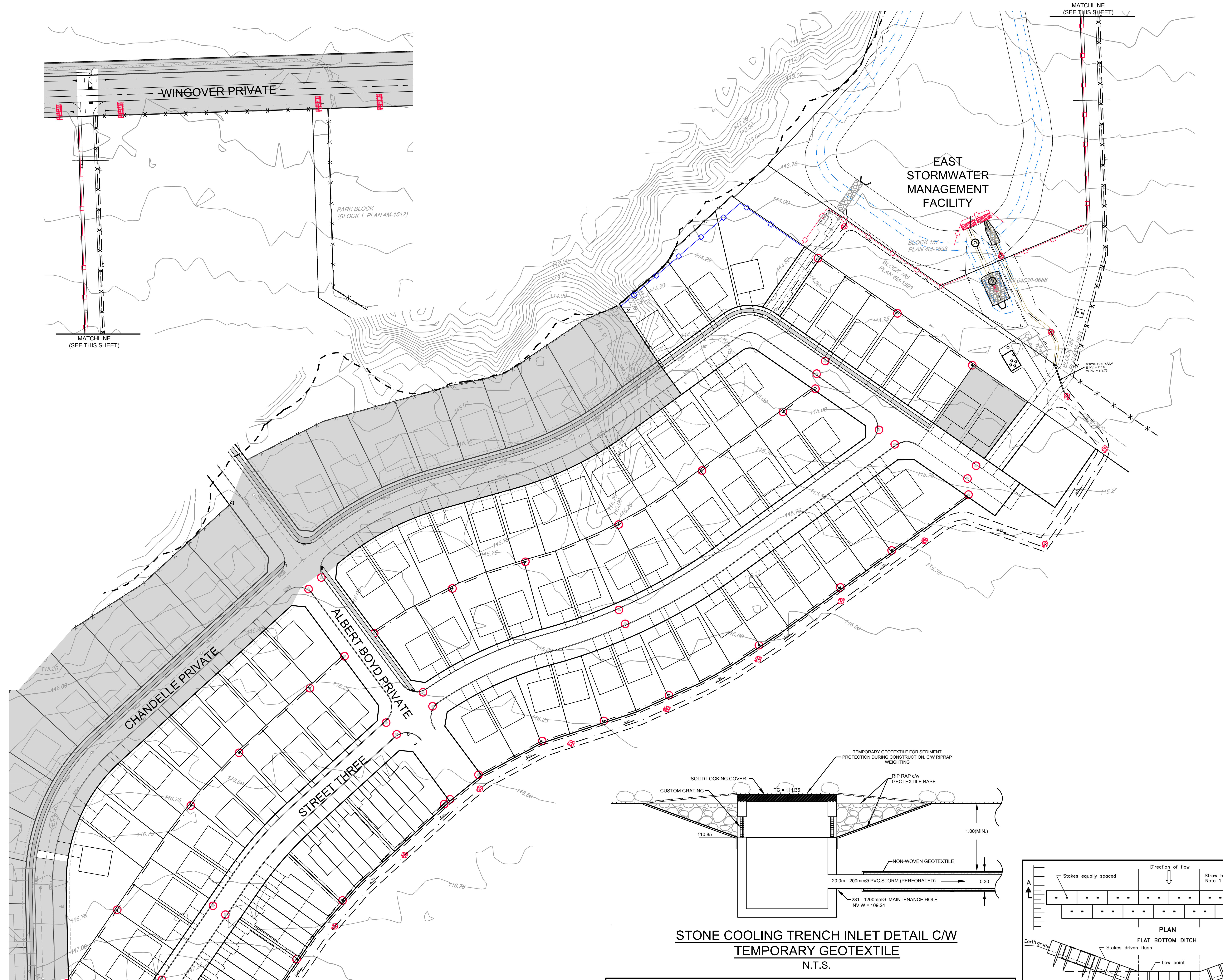
LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

DRAWING NAME
EAST STORMWATER
MANAGEMENT FACILITY DETAILS

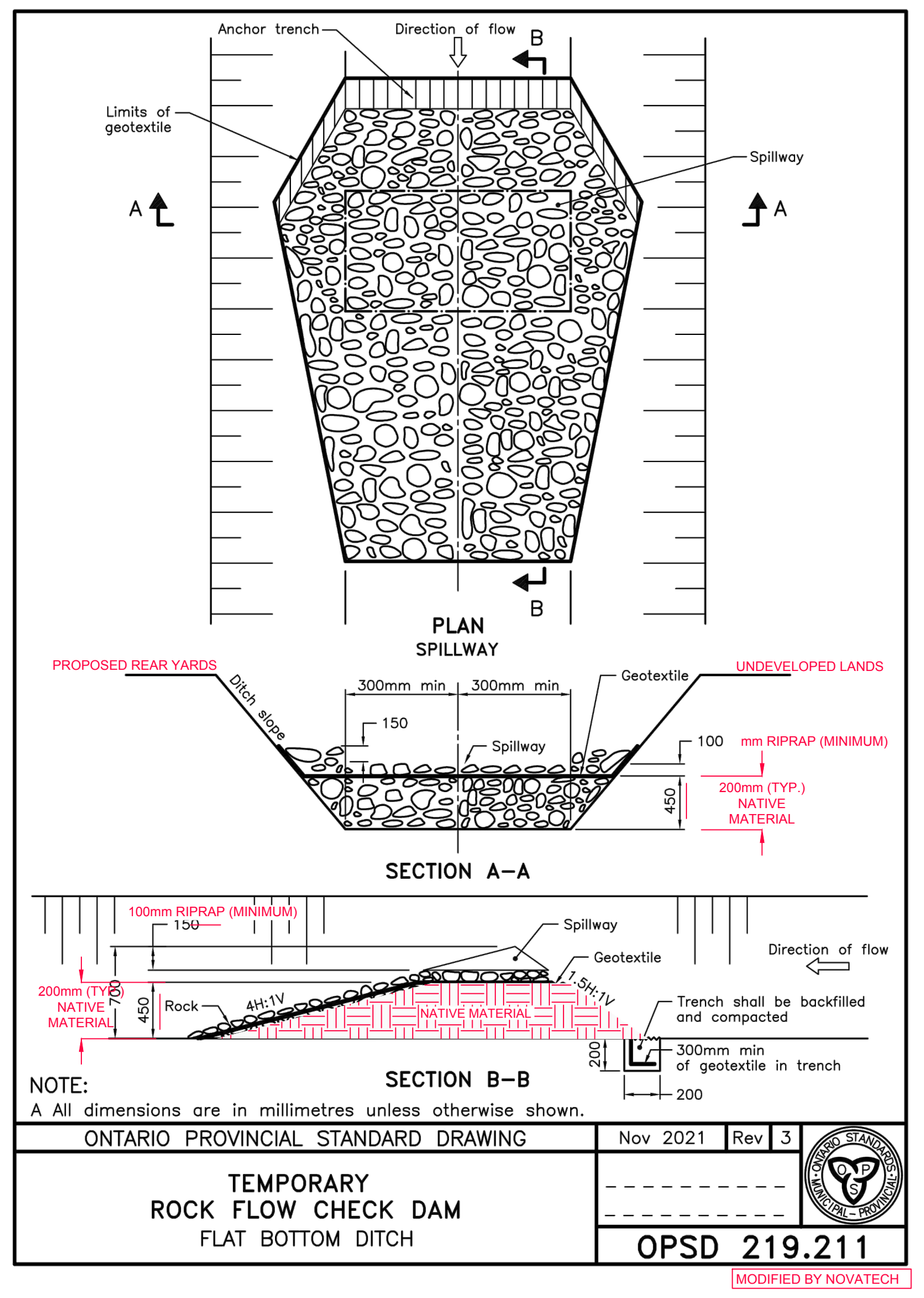
PROJECT No. 102085
REV REV # 4
DRAWING No. 102085-SWMF6

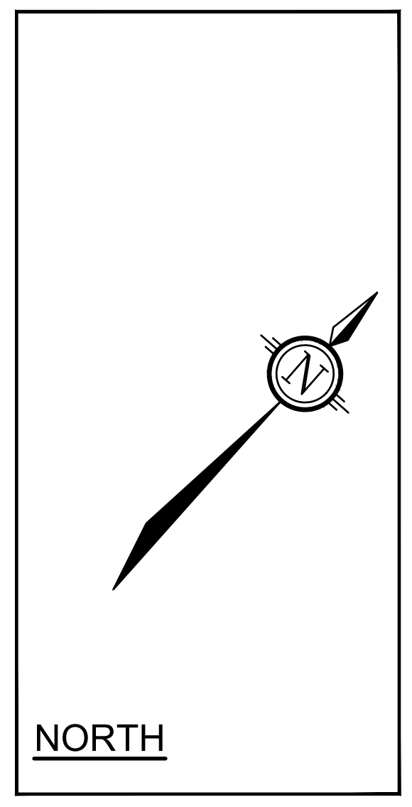
PLANB1.DWG - 1000mmx707mm

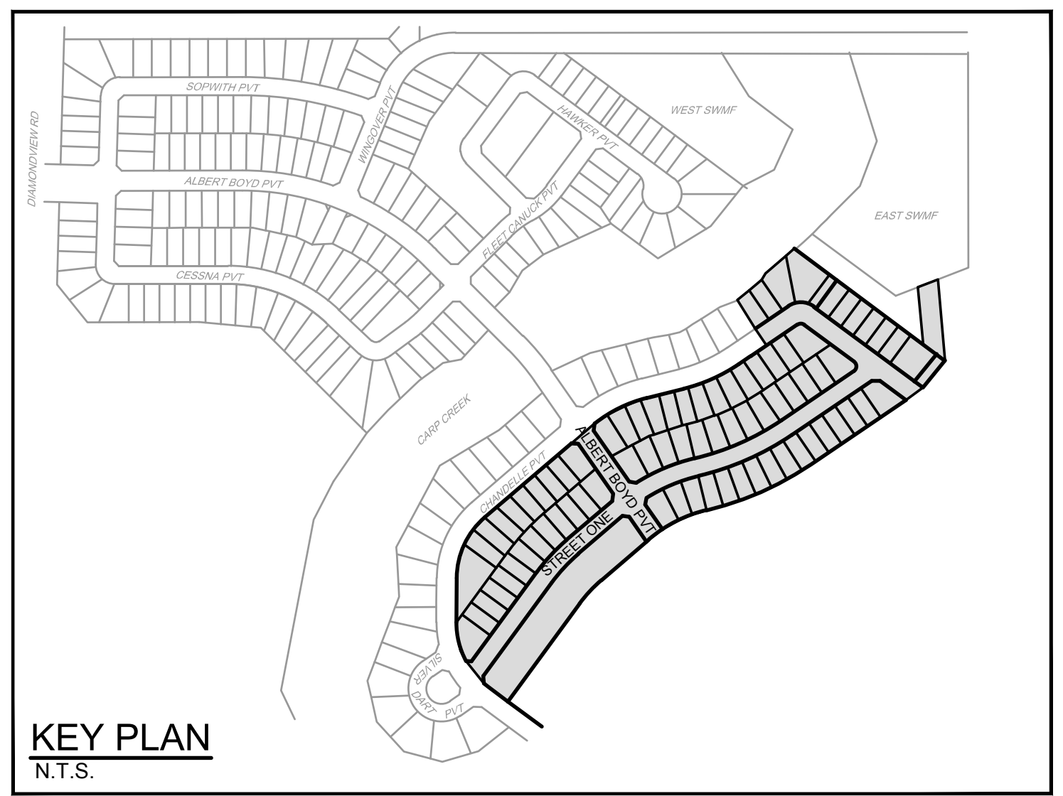


STONE COOLING TRENCH INLET DETAIL C/W TEMPORARY GEOTEXTILE

N.T.S.



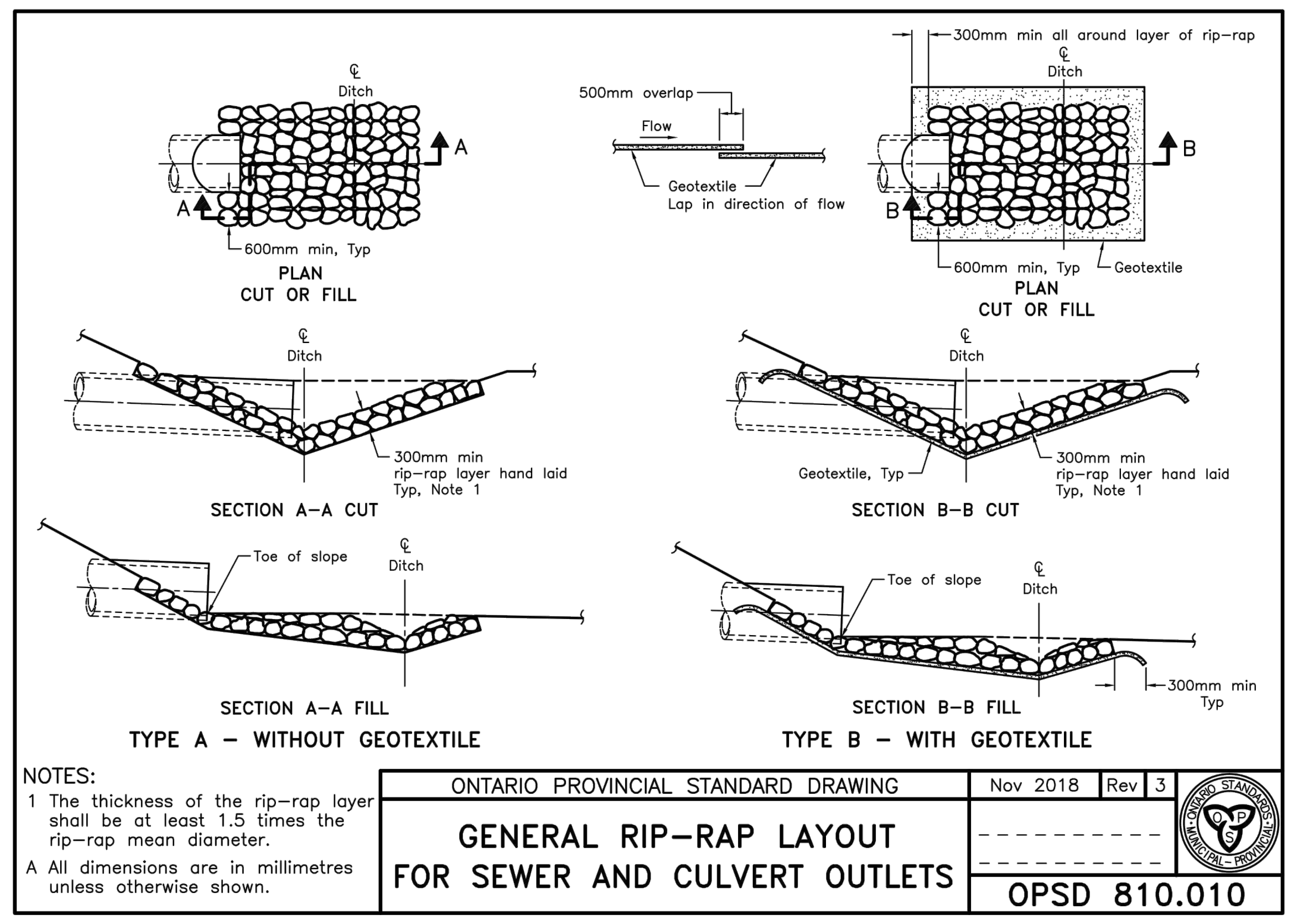




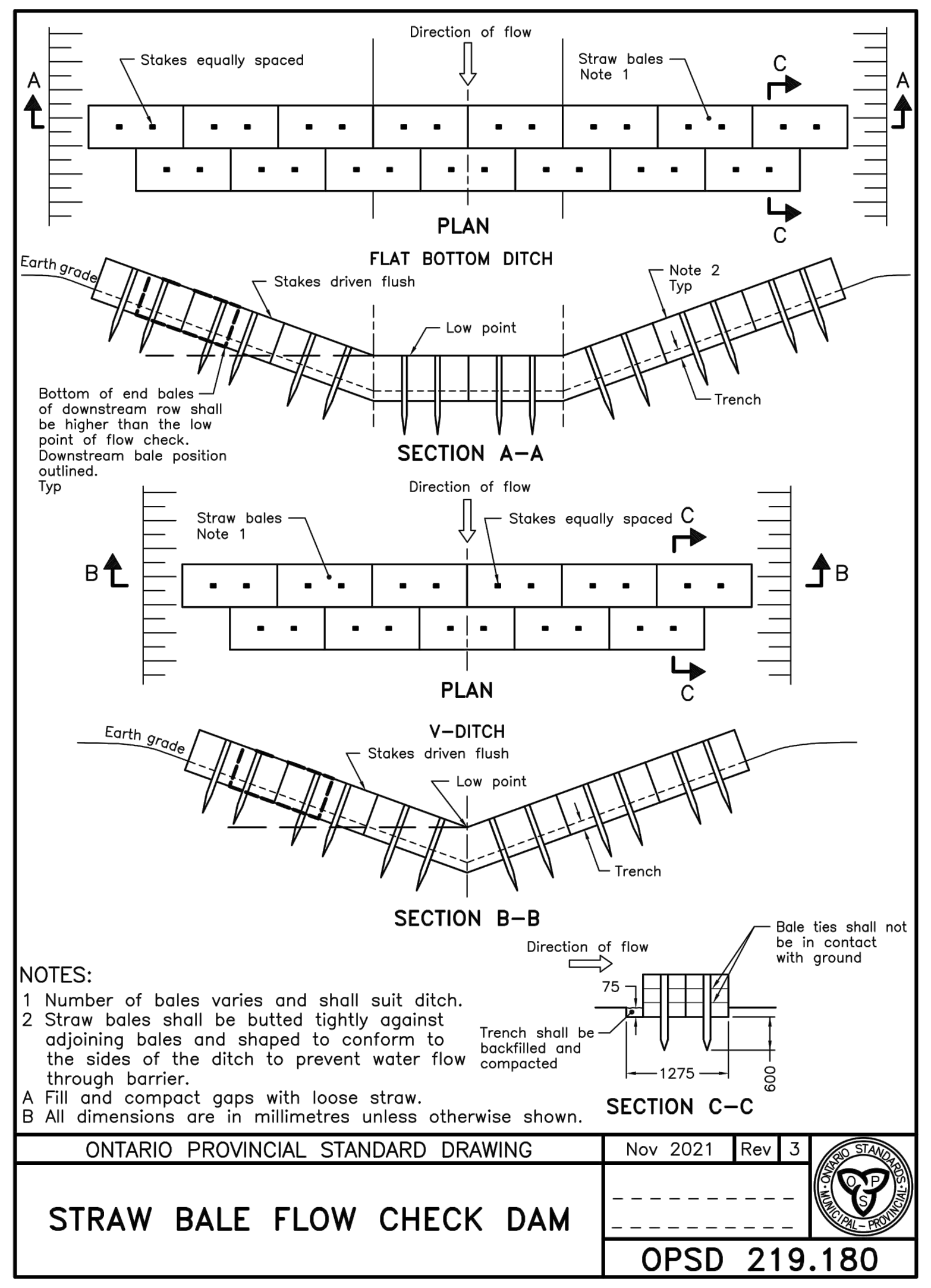
EROSION AND SEDIMENT CONTROL NOTES

1. THE CONTRACTOR AGREES TO PREPARE AND IMPLEMENT AN EROSION AND SEDIMENT CONTROL PLAN TO THE SATISFACTION OF THE CITY OF OTTAWA AND CONSERVATION AUTHORITY (MVCA), APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL.
2. THE EROSION AND SEDIMENT CONTROL PLANS ARE TO BE READ IN CONJUNCTION WITH THE ENVIRONMENTAL IMPACT STATEMENT AND TREE CONSERVATION REPORT PREPARED BY MUNCASTER ENVIRONMENTAL PLANNING INC. DATED NOVEMBER, 2021.
3. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
4. THE CONTRACTOR IS TO INSTALL FILTER BAGS UNDER ROADWAY AND REARYARD CATCHBASIN LIDS TO PREVENT SEDIMENTS FROM ENTERING STRUCTURES. FILTER BAGS MUST BE KEPT IN PLACE AND REGULARLY INSPECTED AND MAINTAINED UNTIL SOD OR VEGETATION HAS FULLY ESTABLISHED.
5. THE CONTRACTOR IS TO INSTALL AND MAINTAIN A LIGHT DUTY SILT FENCE BARRIER.
6. THE CONTRACTOR IS ADVISED THAT THE EXISTING VORTECHS UNIT WILL REMAIN IN SERVICE DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN FREE OF DEBRIS, MONITOR ON A REGULAR BASIS, AND CLEAN AS REQUIRED (AT LEAST ONCE A YEAR).
7. THE CONTRACTOR IS TO INSPECT ALL EROSION AND SEDIMENT CONTROL DAILY DURING ACTIVE CONSTRUCTION AND IMMEDIATELY AFTER EVERY RAINFALL EVENT, SIGNIFICANT SNOWMELT EVENT, AND ANY EXTREME WEATHER EVENT, AND REPAIR ANY DAMAGED OR NON FUNCTIONING MEASURES IMMEDIATELY.
8. THE CONTRACTOR SHALL ENSURE THAT RECORDS OF INSPECTION, INCLUDING AT A MINIMUM, THE INSPECTOR'S NAME, DATE OF INSPECTION, VISUAL OBSERVATIONS, AND ANY NECESSARY REMEDIAL MEASURES TO MAINTAIN INTERIM ESC MEASURES.
9. THE EROSION AND SEDIMENT CONTROL PLANS ARE TO BE CONSIDERED A 'LIVING DOCUMENT' WHICH MAY BE MODIFIED IN THE EVENT THE EROSION AND SEDIMENT CONTROL MEASURES ARE INSUFFICIENT.
7. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED IN GOOD WORKING ORDER UNTIL THE SITE HAS STABILIZED, AFTER WHICH ANY SUCH MEASURES THAT ARE NOT PERMANENT, AS PER THE APPROVED EROSION AND SEDIMENT CONTROL PLAN, SHALL BE REMOVED IN A MANNER THAT MINIMIZES DISTURBANCE TO THE SITE. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER
8. FOR MATERIAL STOCKPILING, MINIMIZE THE AMOUNT OF EXPOSED MATERIALS AT ANY GIVEN TIME: APPLY TEMPORARY SEEDING, TARPS, COMPACTION AND/OR SURFACE ROUGHENING AS REQUIRED TO STABILIZE STOCKPILED MATERIALS THAT WILL NOT BE USED WITHIN 14 DAYS.
9. ROADWAYS ARE TO BE SWEPT AS REQUIRED OR AS DIRECTED BY THE ENGINEER AND/OR THE REPRESENTATIVE OF THE CITY OF OTTAWA.

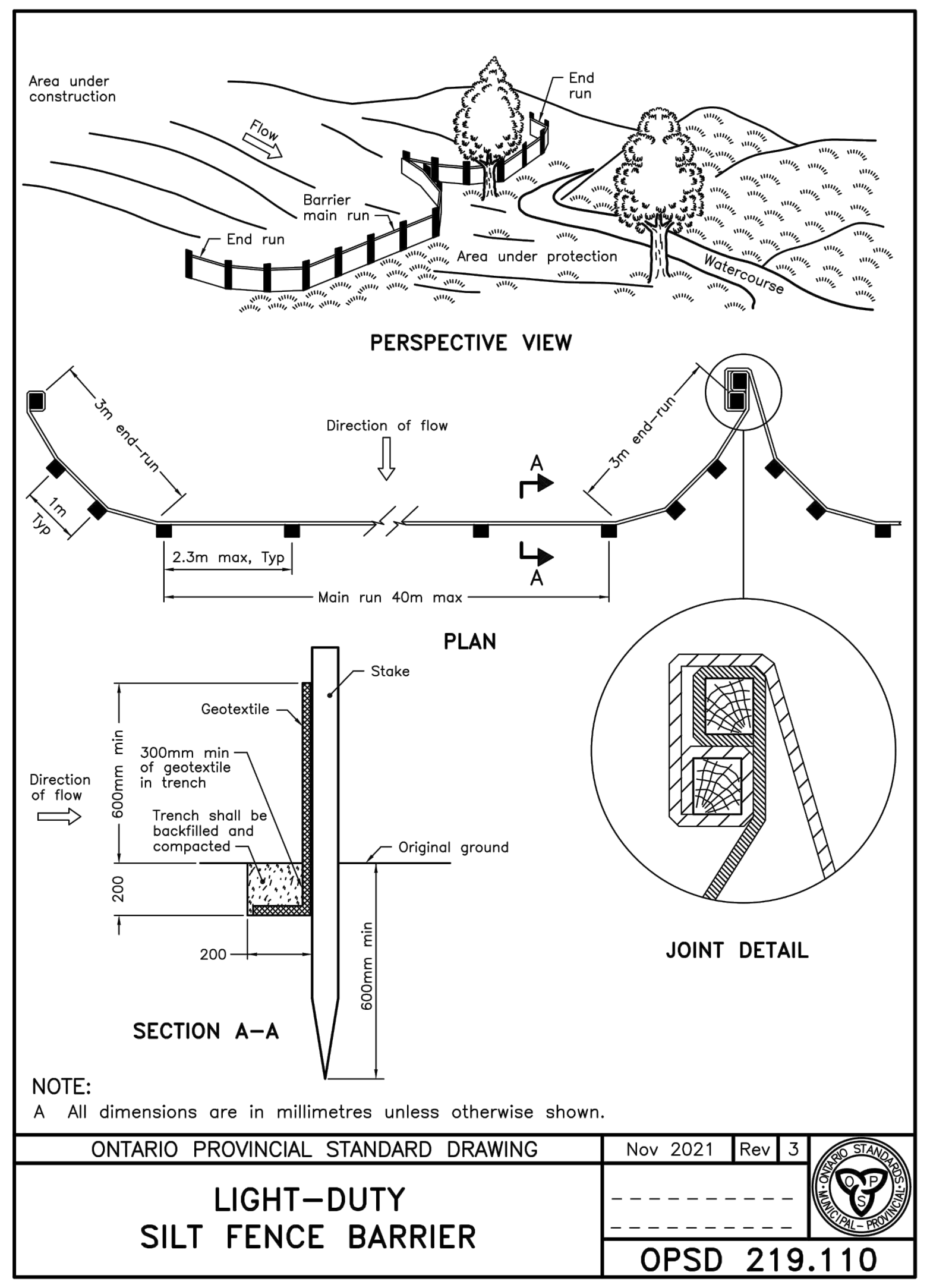
				During Construction		After Construction Prior to Final Acceptance		After Final Acceptance
	ESC Measure	Symbol	OPSD No.	Installation Responsibility	Inspection Responsibility	Inspection/Maintenance Responsibility	Removal Responsibility	Inspection/Maintenance Responsibility
Temporary Measures	Light-Duty Silt Fence	─□─□─	219.110	Developer's Contractor	Developer's Contractor	Developer	Developer	N/A
	Heavy-Duty Silt Fence	─□─□─	219.130	Developer's Contractor	Developer's Contractor	Developer	Developer	N/A
	Straw Bale Flow Check Dam	▨	219.180	Developer's Contractor	Developer's Contractor	Developer	Developer	N/A
	Filter Bags	○	Erosion and Sediment Control Notes	Developer's Contractor	Developer's Contractor	Developer	Developer	N/A
	Mud Mats	M M	N/A	Developer's Contractor	Developer's Contractor	Developer	Developer	N/A
	Geotextile Protection of Cooling Trench Inlet	○	N/A	Developer's Contractor	Developer's Contractor	Developer	Developer	N/A
Permament Measures	Rock Flow Check Dam	▨	219.211	Developer's Contractor	Developer's Contractor	Developer	N/A	Municipality
	Vortech Unit	⊡	N/A	Developer's Contractor	Developer's Contractor	Developer	N/A	Municipality
	Riprap	▨	810.010	Developer's Contractor	Developer's Contractor	Developer	N/A	Municipality
	Roof Leaders Directed to Grassed Areas	N/A	N/A	Builder	Builder	Homeowner	N/A	Homeowner
	Roadside Ditches, Swales (Grading and Vegetation)	N/A	N/A	Developer's Contractor	Developer's Contractor	Developer	N/A	Municipality



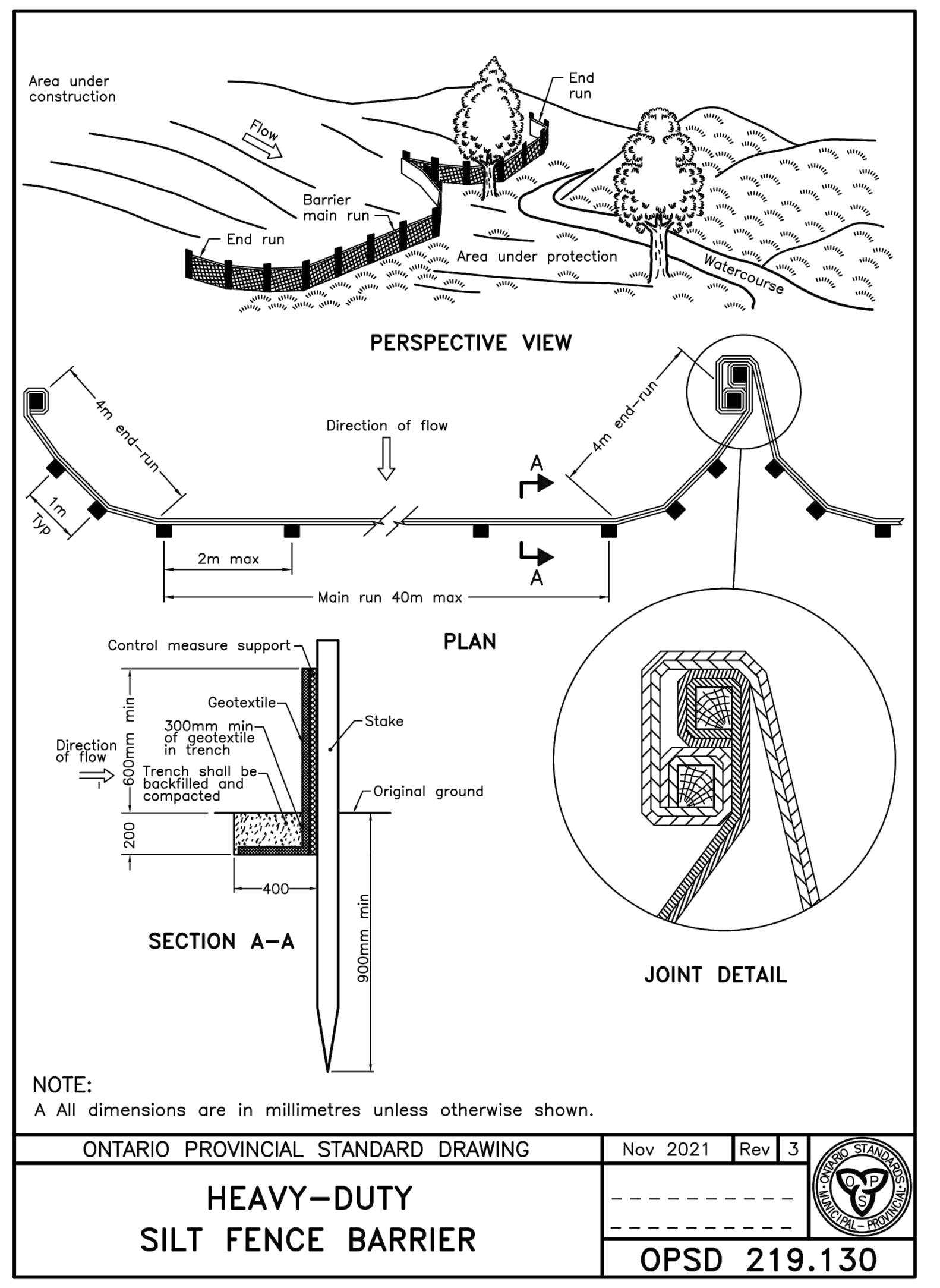
NOTES:
1 The thickness of the rip–rap layer shall be at least 1.5 times the rip–rap mean diameter.
A All dimensions are in millimetres unless otherwise shown.



NOTES:
1 Number of bales varies and shall suit ditch.
2 Straw bales shall be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A Fill and compact gaps with loose straw.
B All dimensions are in millimetres unless otherwise shown.



NOTE:
A All dimensions are in millimetres unless otherwise shown.



NOTE:
A All dimensions are in millimetres unless otherwise shown.

NOTE:
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No.	REVISION	DATE	BY
6.	ISSUED FOR REGISTRATION AND ECA	JUN 28/24	ARM
5.	REVISED POND INLET SWALE	MAY 14/24	ARM
4.	REVISED PER CITY COMMENTS	FEB 20/24	ARM
3.	ISSUED WITH ADDENDUM #2 (NO CHANGES)	JAN 5/24	ARM
2.	ISSUED FOR TENDER	DEC 7/23	ARM
1.	ISSUED FOR REVIEW	JUL 28/23	ARM

SCALE
1:1000

1:1000
0 10 20 30 40

DESIGN MNP
CHECKED ARM
DRAWN MNP
CHECKED ARM
APPROVED SMG

LICENSED PROFESSIONAL ENGINEER
A. A. RONGVE
100616298
June 28, 2024
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
A.R. MCAULEY
100141256
June 28, 2024
PROVINCE OF ONTARIO

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Suite 200, 240 Michael Cowpland Drive
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Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
WEST CAPITAL AIRPARK

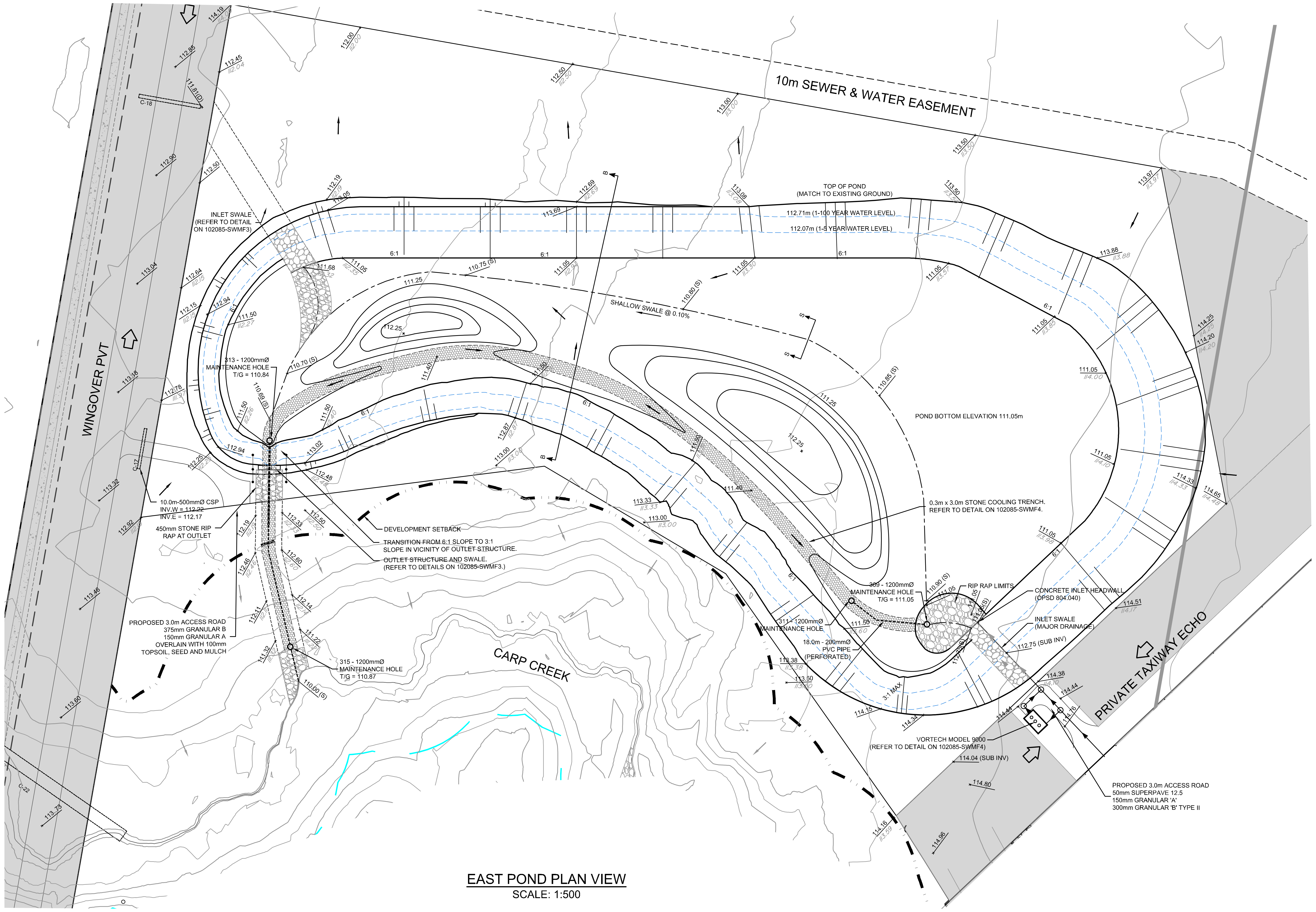
DRAWING NAME
EROSION & SEDIMENT CONTROL PLAN

PROJECT No. 102085
REV REV # 6
DRAWING No. 102085-ESC3

PLANB1.DWG - 1000mmx707mm

M:\2020\102085\CAD_PHASES2B&3\Civil\102085-2B3-ESC.dwg, ESC-SIZE B1, Jun 27, 2024 - 2:08pm, arongve

EXISTING PHASE 1B-1 DRAWINGS

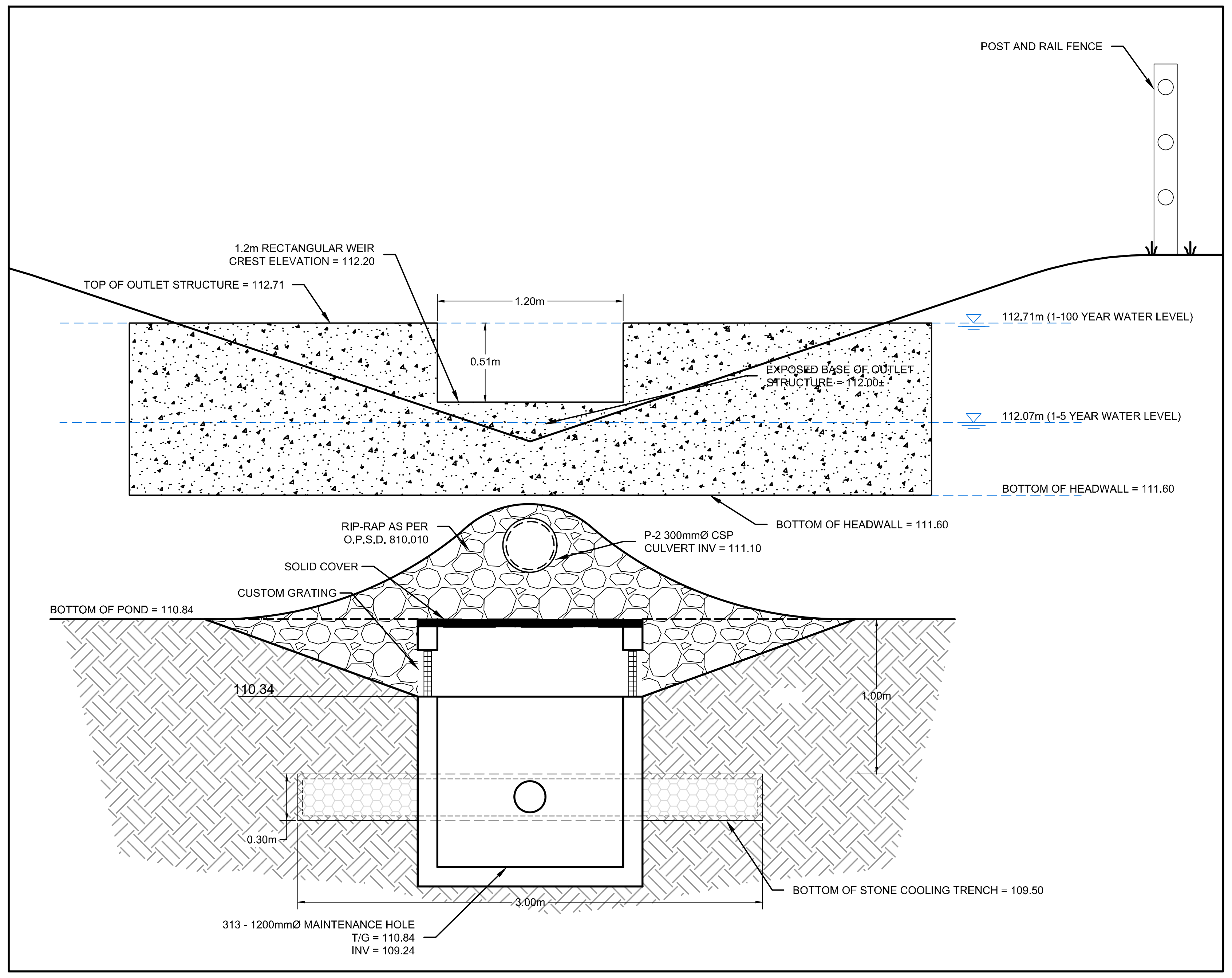


EAST POND PLAN VIEW

SCALE: 1:500

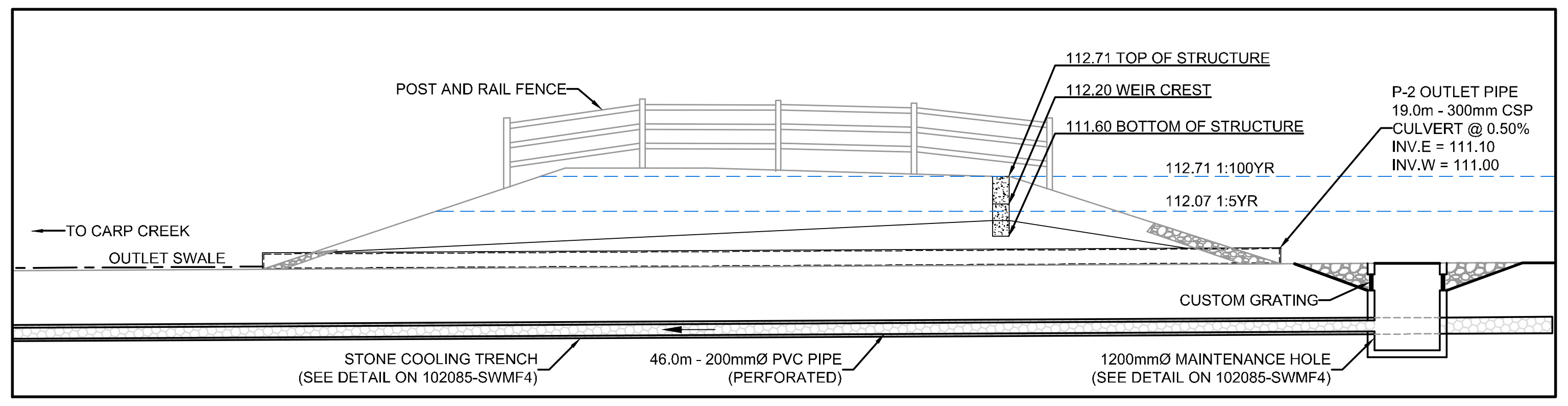
LEGEND

PROPOSED STORM MH & SEWER	PROPOSED RIP-RAP TREATMENT (OPSD 810.010)
C-1 CULVERT ID PROPOSED CSP CULVERT (REFER TO DRAWING 102085-NT)	113.88 PROPOSED ELEVATION 113.88 EXISTING ELEVATION
PROPOSED ROADSIDE DITCH	113.40(D) PROPOSED DITCH ELEVATION
SWALE @ 0.10% ℄ SWALE AND DIRECTION OF FLOW	111.05(S) PROPOSED SWALE ELEVATION
PROPOSED STONE COOLING TRENCH	PROPOSED DRAINAGE FLOW DIRECTION
DEVELOPMENT SETBACK	EXISTING DRAINAGE FLOW DIRECTION
6:1 PROPOSED 6:1 SIDESLOPING	MAJOR OVERLAND FLOW ROUTE
POST AND RAIL FENCE	
PROPOSED SUBDRAIN (100mmØ PERFORATED PIPE C/W SOCK)	



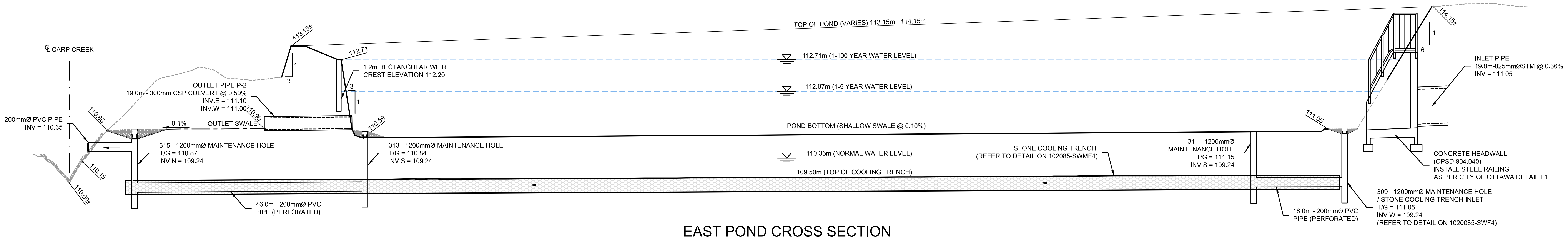
EAST POND OUTLET STRUCTURE DETAIL

SCALE: 1:25



EAST POND OUTLET STRUCTURE CROSS SECTION

SCALE: 1:100



EAST POND CROSS SECTION

SCALE: H - 1:500 (APPROXIMATELY)
SCALE: V - 1:50 (APPROXIMATELY)

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REFER TO DRAWING 102085-SWMF4 FOR SWMF DETAILS

REFER TO DRAWING 102085-L8 FOR POND LANDSCAPING

WEST CAPITAL Developments

No.	REVISION	DATE	BY
9.	REVISED PER CITY & CLEARFORD COMMENTS	SEPT 23/21	ARM
8.	REVISED PER PHASE 1B LIMITS	JUL 12/21	ARM
7.	ISSUED FOR TENDER	FEB 26/15	DJC
6.	ISSUED FOR PHASE 1 RESIDENTIAL REGISTRATION	OCT 15/14	DJC
5.	REVISED AS PER CITY / MVC COMMENTS	NOV 29/13	DJC
4.	REVISED AS PER CITY / MVC COMMENTS	SEPT 26/13	DJC
3.	REVISED AS PER CITY / MVC COMMENTS	MAY 28/13	DJC
2.	REVISED AS PER CITY COMMENTS	MAR 8/12	BBH
1.	ISSUED FOR REVIEW	NOV 21/11	MJP

SCALE
AS INDICATED

DESIGN MJP
CHECKED MJP
DRAWN JPB
CHECKED MJP
APPROVED SMG

FOR REVIEW ONLY

A.R. MCAULEY
100141256
Sept 23, 2021

S.M. GORDON

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CITY OF OTTAWA
WEST CAPITAL AIRPARK

EAST STORMWATER
MANAGEMENT FACILITY POND
LAYOUT AND CROSS SECTIONS

PROJECT No. 102085-01
REV REV # 9
DRAWING No. 102085-SWMF2

PLANB1.DWG - 1000mmx707mm