JC WELDING

FUNCTIONAL SERVICING REPORT

1028 BRUCE ROAD 3

MUNICIPALITY OF BROCKTON

APRIL 2025

COBIDE Engineering Inc
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Hanover, ON N4N 1R4
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COBIDE
ENGINEERING INC

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1. INTRODUCTION

Cobide Engineering Inc. was retained by JC Welding to complete a Stormwater Management Report in support of a lot addition to expand the outside storage area and at some point in the future to expand the building.

A copy of the proposed Site Plan has been included in **Appendix A** as Drawing 13015-SP1.

1.1 LOCATION

The proposed development, herein referred to as the Site, is located on the northeast corner of the intersection of Highway 9 and Bruce Road 3, Municipality of Brockton, County of Bruce. The civic address of the Site is 1028 Bruce Road 3. A Site Location Map is included as **Figure 1**.

1.2 DEVELOPMENT PROPOSAL

The overall proposed property area is approximately 1.02 hectares (2.52 acres) in size. The owner is proposing to use the lot addition area for outdoor storage. In the future it is proposed to expand the building within the footprint of the existing lot. The site will continue to have access from Bruce Road 3.

The Site Plan showing the proposed development configuration has been included in **Appendix A** as Drawing 13015-SP1.

The Site is located on the west of Walkerton and is currently zoned Agriculture Commercial Industrial (ACI-4) within the Municipality of Brockton's zoning.

MAP SOURCE - MTO ROAD MAP

COBIDE ENGINEERING INC
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Client/Project
PROPOSED LOT ADDITION

MUNICIPALITY OF BROCKTON
COUNTY OF BRUCE
FUNCTIONAL SERVICING REPORT

Figure No.
1

Title
REGIONAL LOCATION MAP

ORIGINAL SHEET - 8 x 11
H:\Planning\13015- JC Welding Lot Addition\Drawings\Submissions\2024-08-29 First Submission\13015 - JC Welding Regional Map 2024-11-14.dwg Nov 14, 2024 - 3:35pm
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Figure 1 – Regional Location Map

2. STORMWATER MANAGEMENT AND SITE DRAINAGE

The stormwater management and site drainage for the proposed development must comply with the current standards of the Town, Conservation Authority and MECP Design Guidelines. The following provides a summary of the stormwater management and site drainage plan for the development.

The recommended stormwater strategy for the development requires the post development peak flows from the property to be less than or equal to the pre-development peak flow conditions.

2.1 EXISTING DRAINAGE CONDITIONS

The majority of the lands drain uncontrolled overland to the north. A small portion discharges overland to the to the south where grading doesn't allow runoff to be directed to the north around the building.

2.2 PROPOSED DRAINAGE CONDITIONS

The intent of the stormwater drainage plan for the lot addition is to maintain the catchment area exactly as they are in pre development conditions. Runoff that is discharging north will be captured in a new stormwater management pond to control runoff to pre development rates.

Since the lot addition for outdoor storage will increase the overall impervious area of the subject property, stormwater runoff will need to be over-controlled in order to reduce the peak flows to pre-development conditions or less. This will be achieved through the construction of a dry pond along the northern lot boundary. The pond will provide a controlled outlet into the existing roadside ditch. A single orifice will be utilized to control flows from the development.

2.3 STORMWATER MODELING

The stormwater modeling for the pre and post development scenarios was completed using PCSWMM for the 6-hour duration, SCS Type II Distribution, Mount Forest IDF parameters.

According to the Soils Survey of Bruce County, the local native soils are reported to be Harriston Loam which are classified as Hydrologic Soil Group BC.

The pre- and post development model parameters and SWM outputs are included in Appendix B.

2.3.1 PRE-DEVELOPMENT CONDITIONS

The modelling has been completed for the area discharging to the north only as there are no changes proposed to the south side of the site along Highway 9. A total catchment area of 0.84 ha was used to determine the pre-development peak flows for the design storm events at the northern property boundary.

The pre-development catchment area is included in Appendix A as drawing 13015-SWM1.

2.3.2 POST DEVELOPMENT CONDITIONS

The proposed development of the site will include the construction of and expanded outdoor storage area. Grading of the site will direct all post-development run-off from the site into the proposed SWM pond. The pond will be located on the north side of the site and will provide storage for all post-development flows and control the discharge rate of the site's stormwater into the existing roadside ditch.

Stormwater modelling was based on two catchment areas for post development conditions.

The total area of Catchment 201 is 0.70 ha and includes all areas that will drain to the SWM pond. The total area of Catchment 202 is 0.14 ha and includes the area that cannot be captured in the SWM pond due to grading.

The post-development catchment area is included as Appendix A as drawing 13015-SWM2.

2.3.3 SWM FACILITY CHARACTERISTICS

The stormwater management facility and outlet structure have been designed to control peak runoff rates as well as conform to MECP best practices.

In order to provide the required volumes and discharges, a dry SWM Pond will be implemented with the following characteristics.

Table 7.1 – SWM Facility Geometry

SWM FACILITY	DETAILED DESIGN
Side Slope	3:1
SWM Facility Bottom	306.50 m
Top Elevation	308.00 m
High Water Elevation	307.74 m

The outlet configuration for the SWM Facility will be as follows:

- There will be a 175mm diameter orifice on the outlet from the site to provide stormwater control for the development.
- An emergency overflow spillway located on the west side of the pond will allow stormwater to drain from the pond during storm events larger than the 100 year storm if the primary outlet becomes blocked.

2.4 SWM FACILITY PERFORMANCE

Below is a summary of the hydraulic performance of the SWM facility during the various storm events:

Table 7.2 – SWM Facility Performance

RETURN PERIOD	PEAK FLOW (l/s)	ELEVATION (m)	VOLUME (m^3)
2 Year	60	307.10	55
5 Year	68	307.30	99
25 Year	77	307.56	171
50 Year	79	307.65	203
100 Year	82	307.74	235

2.4.1 STORMWATER MODELLING RESULTS

The table below summarizes the existing pre-development peak flows as well as the post development peak flows:

Table 3 - Stormwater Peak Flow Summary

PEAK FLOW DISCHARGE SUMMARY		
RETURN PERIOD	DISCHARGE POINT #1 (L/S)	
	PRE	POST
2 Year	68	68
5 Year	105	81
25 Year	173	99
50 Year	204	106
100 Year	236	114

As seen in the above table, all storm event peak flows are less than the pre development peak flows with the exception of the 2 year storm event which is marginally higher in the post development scenario.

2.5 STORMWATER QUALITY

Stormwater quality control will be provided by an OGS unit to meet an enhanced level of water treatment. An FD GA-8 from Hydro International has been selected for this site.

3. GRADING, EROSION & SEDIMENT CONTROL

Erosion and sediment controls shall meet the requirements of the most recent version of the MECP *Stormwater Management Planning and Design Manual* at the time of construction.

3.1 CONSTRUCTION STAGE

Prior to the start of construction, appropriate sediment control facilities are to be in place. Following are details regarding erosion and sediment control that are to be implemented:

- Placement of light duty siltation fencing is required along the along the property boundary.
- Placement of temporary straw check dams within swales and any other locations where a concentrated flow of runoff may occur. All proposed drainage swales are to be seeded during construction;
- Mud mats will be placed at construction accesses to keep public roadways free from debris during the construction period.
- Re-vegetate all disturbed areas after underground and surface works have been constructed.

Prior to removal of sediment control facilities, ensure that sediment that may have accumulated has been removed.

Once the area has been stabilized, the silt fencing can be removed.

4. CONCLUSIONS

The above assessment demonstrates that the stormwater from the proposed lot addition can be adequately managed. It is therefore recommended that the proposed lot addition be approved by the Municipality of Brockton and County of Bruce.

If you have any questions regarding the above, please contact the undersigned at 519-506-5959.

Sincerely,

COBIDE Engineering Inc.

Travis Burnside, P.Eng.
Director

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Appendix A

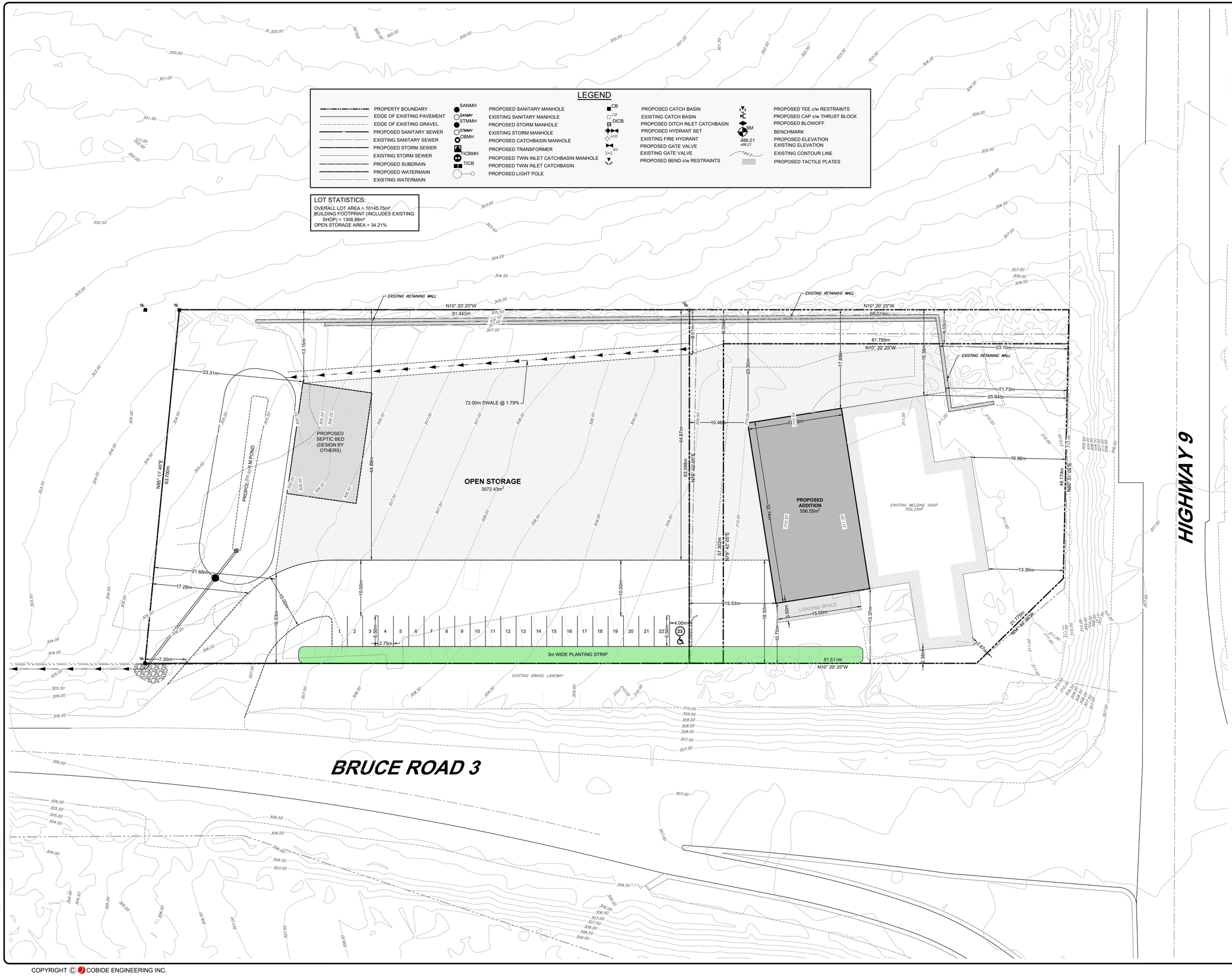
DRAWINGS

LEGEND

PROPERTY BOUNDARY	SANMH	PROPOSED SANITARY MANHOLE	CB	PROPOSED CATCH BASIN	PROPOSED TEE c/w RESTRAINTS
EDGE OF EXISTING PAVEMENT	SAMMH	EXISTING SANITARY MANHOLE	CB	EXISTING CATCH BASIN	PROPOSED CAP c/w THRUST BLOCK
EDGE OF EXISTING GRAVEL	STMMH	PROPOSED STORM MANHOLE	DICB	PROPOSED DITCH INLET CATCHBASIN	PROPOSED BLOWOFF
PROPOSED SANITARY SEWER	STMMH	EXISTING STORM MANHOLE	HYD	PROPOSED HYDRANT SET	BENCHMARK
EXISTING SANITARY SEWER	CBMH	PROPOSED CATCHBASIN MANHOLE	HYD	EXISTING FIRE HYDRANT	PROPOSED ELEVATION
PROPOSED STORM SEWER		PROPOSED TRANSFORMER	GV	PROPOSED GATE VALVE	486.21 EXISTING ELEVATION
EXISTING STORM SEWER	DICBMH	PROPOSED TWIN INLET CATCHBASIN MANHOLE	GV	EXISTING GATE VALVE	494.0 EXISTING CONTOUR LINE
PROPOSED SUBDRAIN	TICB	PROPOSED TWIN INLET CATCHBASIN		PROPOSED BEND c/w RESTRAINTS	PROPOSED TACTILE PLATES
PROPOSED WATERMAIN		PROPOSED LIGHT POLE			
EXISTING WATERMAIN					

LOT STATISTICS:

OVERALL LOT AREA = 10145.75m²
BUILDING FOOTPRINT (INCLUDES EXISTING SHOP) = 1306.88m²
OPEN STORAGE AREA = 34.21%



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

Notes

1. TOPOGRAPHICAL INFORMATION DERIVED FROM DRONE SURVEY BY COBIDE ENGINEERING INC., COMPLETED ON AUGUST 28, 2024.
2. ALL ORGANIC MATERIAL WITHIN 1.2m OF FINISHED PROFILE GRADE TO BE REMOVED FROM ALL AREAS UNDER THE TRAVELED PORTION OF THE DRIVEWAY, SIDEWALK AND PARKING LOT.
3. COVER OVER WATER SERVICES TO BE MINIMUM 1.8m AT ALL POINTS, AND SHALL BE CONSTRUCTED OF 50mmØ MUNICIPEX.
4. ALL WATERMAINS SHALL BE CONSTRUCTED OF PVC DR18, AWWA C900 OR C905.
5. TRACER WIRE - PROVIDE TYPE TWU No. 12/7 STRAND COPPER CABLE HAVING THERMOPLASTIC INSULATION RATED FOR UNDERGROUND USE AND SHALL HAVE A CONDUCTIVITY TEST COMPLETED FOLLOWING CONSTRUCTION.
6. WATERMAIN SHALL BE TESTED IN ACCORDANCE WITH OPSS 441, AWWA C651 AND MECP ' WATERMAIN DISINFECTION PROCEDURE'. ALL CHEMICALS AND MATERIALS USED SHALL CONFORM TO AWWA B300, AWWA B301, NSF/ANSI 60, NSF/ANSI 61.
7. WATERMAIN RESTRAINTS TO COMPLY WITH OPSS 441.07.23. REFER TO MUNICIPALITY OF BROCKTON - MUNICIPAL DEVELOPMENT AND SERVICING GUIDELINES SECTION 6.4.
8. SANITARY SEWER SHALL BE CONSTRUCTED OF PVC SDR35 (OR APPROVED ALTERNATIVE), AT A MINIMUM 2.5m DEPTH OF COVER CONFORMING TO OPSS 410. SEWERS SHALL BE TESTED IN ACCORDANCE WITH OPSS 410.
9. CONNECTIONS TO EXISTING SANITARY SERVICES SHALL BE MADE WITH PRE-MANUFACTURED APPROVED TEES.
10. MAINTAIN 2.50m HORIZONTAL AND 0.50m VERTICAL SEPARATIONS BETWEEN STORM/SANITARY SEWERS AND WATERMAIN.
11. ALL STORM CATCHBASINS TO HAVE A MINIMUM SUMP OF 600mm AND ALL CATCHBASIN MAINTENANCE HOLES TO HAVE A MINIMUM SUMP OF 300mm. ALL STORM MAINTENANCE HOLES SHALL BE BENCHED.
12. FIELD LOCATES OF ALL UNDERGROUND UTILITIES INCLUDING BUT NOT LIMITED TO; UNDERGROUND GAS, HYDRO, TELEPHONE, AND CABLE TELEVISION SHALL BE ARRANGED PRIOR TO CONSTRUCTION AND IS THEREFORE RESPONSIBILITY OF THE CONTRACTOR.
13. THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION PURPOSES UNTIL STAMPED 'ISSUED FOR CONSTRUCTION'.
14. ALL CONSTRUCTION SHALL BE COMPLETED IN ACCORDANCE WITH THE MUNICIPALITY OF BROCKTON'S MUNICIPAL DEVELOPMENT AND SERVICING GUIDELINES.
15. MUNICIPAL CONSENTS ARE REQUIRED FOR ALL OFFSITE UTILITIES THAT ARE NOT THE RESPONSIBILITY OF THE MUNICIPALITY.
16. EXTERIOR LIGHTING TO BE IN ACCORDANCE WITH MUNICIPAL BY-LAW 3.26.11 & 3.30.
17. STORM SEWERS UP TO AND INCLUDING 900mmØ ARE BOSS 2000. ALL STORM SEWERS 1050mmØ AND LARGER ARE BOSS 3000. STORM SEWER TO BE CLASS SDR35 SEWERS TO BE MANDREL TESTED AND VIDEOED FOLLOWING CONSTRUCTION.
18. ALL JOINTS OF SANITARY MANHOLES TO BE CAULKED WITH MIN. 15mm BEAD, INSTALLED ON THE TOP OF JOINT OF EACH SECTION PRIOR TO ABOVE SECTION BEING INSTALLED. CAULKING TO BE SIKAFLEX 1A OR APPROVED EQUIVALENT.
19. GEOTEXTILE FABRIC TO BE INSTALLED UNDER STORM GRATES UNTIL THE COMPLETION OF CONSTRUCTION.
20. RESTORE DISTURBED/GRADING AREAS WITH 150mm TOP SOIL, SEED AND MULCH.

SCALE 1:300

5 0 5 2.5 5 10 METRES
25 10 5 0 10 20 FEET

Benchmark Information

No.	DATE	DESCRIPTION	BY	APPD
1	APR 24/25	FIRST SUBMISSION	ID	TLB

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Title:
JC WELDING LOT ADDITION
COUNTY OF BRUCE
MUNICIPALITY OF BROCKTON

DEVELOPMENT SITE PLAN

Client:	JC WELDING		
Design:	TLB	Scale:	1:300
Drawn:	ID	Approved:	
Checked:	SJC		
Date:	APRIL 2025		Design Engineer
DRAWING No.	13015-C1		

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Notes

LEGEND

PROPERTY BOUNDARY	SANMH	PROPOSED SANITARY MANHOLE	CB	PROPOSED CATCH BASIN	PROPOSED TEE c/w RESTRAINTS
EDGE OF EXISTING PAVEMENT	SAMMH	EXISTING SANITARY MANHOLE	CB	EXISTING CATCH BASIN	PROPOSED CAP c/w THRUST BLOCK
EDGE OF EXISTING GRAVEL	STMMH	PROPOSED STORM MANHOLE	DICB	PROPOSED DITCH INLET CATCHBASIN	PROPOSED BLOWOFF
PROPOSED SANITARY SEWER	STMMH	EXISTING STORM MANHOLE	HYD	PROPOSED HYDRANT SET	BM BENCHMARK
EXISTING SANITARY SEWER	CBMH	PROPOSED CATCHBASIN MANHOLE	HYD	EXISTING FIRE HYDRANT	486.21 PROPOSED ELEVATION
PROPOSED STORM SEWER		PROPOSED TRANSFORMER	GV	PROPOSED GATE VALVE	486.21 EXISTING ELEVATION
EXISTING STORM SEWER	TICBMH	PROPOSED TWIN INLET CATCHBASIN MANHOLE	GV	EXISTING GATE VALVE	494.0 EXISTING CONTOUR LINE
PROPOSED SUBDRAIN	TICB	PROPOSED TWIN INLET CATCHBASIN		PROPOSED BEND c/w RESTRAINTS	PROPOSED TACTILE PLATES
PROPOSED WATERMAIN		PROPOSED LIGHT POLE			
EXISTING WATERMAIN					

EXISTING RETAINING WALL

N10° 20' 25"W 91.445m

EXISTING RETAINING WALL

N10° 20' 25"W 58.019m

1.795m N10° 20' 25"W

EXISTING RETAINING WALL

101
0.84ha

N85° 11' 40"E 68.700m

63.388m N79° 42' 05"E

57.302m N79° 42' 05"E

48.174m N80° 31' 05"E

EXISTING WELDING SHOP 750.33m²

21.775m N64° 48' 35"W

51.511m N10° 20' 25"W

EXISTING GRAVEL LANEWAY

BRUCE ROAD 3

HIGHWAY 9

SCALE 1:300

5 0 2.5 5 10 METRES

25 10 5 0 10 20 FEET

Benchmark Information

No.	DATE	DESCRIPTION	BY	APPD
1	APR 24/25	FIRST SUBMISSION	ID	TLB

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Title:

JC WELDING LOT ADDITION

COUNTY OF BRUCE
MUNICIPALITY OF BROCKTON

PRE-DEVELOPMENT SWM AREAS

Client:	JC WELDING		
Design:	TLB	Scale:	1:300
Drawn:	ID	Approved:	
Checked:	SJC		
Date:	APRIL 2025		Design Engineer
DRAWING No.	13015-SWM1		

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Notes

LEGEND

- PROPERTY BOUNDARY
- EDGE OF EXISTING PAVEMENT
- EDGE OF EXISTING GRAVEL
- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- PROPOSED SUBDRAIN
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- SANMH — PROPOSED SANITARY MANHOLE
- SANMH — EXISTING SANITARY MANHOLE
- STMMH — PROPOSED STORM MANHOLE
- STMMH — EXISTING STORM MANHOLE
- CBMH — PROPOSED CATCHBASIN MANHOLE
- TRANSFORMER — PROPOSED TRANSFORMER
- TICBMH — PROPOSED TWIN INLET CATCHBASIN MANHOLE
- TICB — PROPOSED TWIN INLET CATCHBASIN
- PROPOSED LIGHT POLE
- CB — PROPOSED CATCH BASIN
- CB — EXISTING CATCH BASIN
- DICB — PROPOSED DITCH INLET CATCHBASIN
- HYD — PROPOSED HYDRANT SET
- EXISTING FIRE HYDRANT
- PROPOSED GATE VALVE
- EXISTING GATE VALVE
- PROPOSED BEND c/w RESTRAINTS
- PROPOSED TEE c/w RESTRAINTS
- PROPOSED CAP c/w THRUST BLOCK
- PROPOSED BLOWOFF
- BM — BENCHMARK
- 486.21 / 486.21 — PROPOSED ELEVATION / EXISTING ELEVATION
- EXISTING CONTOUR LINE
- PROPOSED TACTILE PLATES

EXISTING RETAINING WALL

EXISTING RETAINING WALL

EXISTING RETAINING WALL

202
0.14ha

201
0.70ha

72.00m SWALE @ 1.79%

PROPOSED SWM POND

6.2m - 300mmØ HDPE STM @ 2.19%

FD GA-8
T/G = 307.88
SE 306.11
NW 306.11

DICB1
T/G = 306.55
NW 306.25
c/w 75mmØ ORIFICE

6.2m - 300mmØ HDPE STM @ 2.19%

INV: 305.66m

PROPOSED ADDITION
556.55m²

EXISTING WELDING SHOP
750.33m²

LOADING SPACE

EXISTING GRAVEL LANEWAY

BRUCE ROAD 3

HIGHWAY 9

SCALE 1:300

5 0 2.5 5 10 METRES
25 10 5 0 10 20 FEET

Benchmark Information

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Title:
JC WELDING LOT ADDITION
COUNTY OF BRUCE
MUNICIPALITY OF BROCKTON

POST-DEVELOPMENT SWM AREAS

Client:	JC WELDING		
Design:	TLB	Scale:	1:300
Drawn:	ID	Approved:	
Checked:	SJC		
Date:	APRIL 2025		Design Engineer

DRAWING No. 13015-SWM2

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Appendix B

SWM PARAMETERS AND OUTPUT

Table A.1 Parameter Summary Table

SWM Conditions									
Outlet Location	**Model Catchment ID**	**Description**	**Area (ha)**	**Drainage Channel (m)**	**Flow Length (m)**	**Gradient (%)**	**Total Imperv. Connected (%)**	**Manning's 'n' (Perv.)**	**CN (Perv.)**
	101	Pre Development Site	0.84	64	131	3.0	29.8	0.13	78.0
	201	Post Development - Majority of Site	0.70	64	109	3.0	92.9	0.30	72.0
	202	Uncontrolled Portion of Site	0.14	200	7	33.0	0.0	0.30	72.0

Table A.2 Site Soils: (as per Ontario Soil Survey Report No. 35 for Wellington County)

Soil Type
Harriston Loam

Hydologic Soil Group
BC

TABLE OF CURVE NUMBERS (CN's)									
Land Use	Hydrologic Soil Type								
	A	AB	B	BC	C	CD	D	Manning's 'n'	
Meadow	50	54	58	64.5	71	74.5	78	0.4	continuous grass
Woodlot	50	55.3	60.5	67	73.5	76.8	80	0.4	forests
Long Grass	55	60	65	72	79	81.5	84	0.3	natural, not maintained
Lawns	60	65.5	71	77	83	86	89	0.25	maintained
Pasture/Range	58	61.5	65	70.5	76	78.5	81	0.17	farm pasture
Crop	66	70	74	78	82	84	86	0.13	farm land
Fallow (bare)	77	82	86	89	91	93	94	0.05	idle farm land (bare)
Built-up	60	65.5	71	77	83	89	89	0.25	Lawns Existing
Streets, paved	98	98	98	98	98	98	98	0.01	

HYDROLOGIC SOIL TYPE (%)								
Catchment	Hydrologic Soil Type							
	A	AB	B	BC	C	CD	D	TOTAL
101	0	0	0	100	0	0	0	100
201	0	0	0	100	0	0	0	100
202	0	0	0	100	0	0	0	100

LAND USE (%)										
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture Range	Crop	Fallow (Bare)	Imperv. Not Connected (Rooftops)	Imperv. Connected	Total
101	0	0	0	0	0.0	70.2	0	0.0	29.8	100
201	0	0	7.1	0	0	0	0	0.0	92.9	100
202	0	0	100	0	0	0	0	0.0	0.0	100

CURVE NUMBER (CN)											
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture Range	Crop	Fallow (Bare)	Built-up	Imperv. Not Connected (Rooftops)	Weighted CN - Pervious	Manning's 'n'
101	65	67	72	77	70.5	78	89	77	90	78.0	0.13
201	65	67.0	72	77	71	78	89	77	90	72.0	0.30
202	65	67	72	77	70.5	78	89	77	90	72.0	0.30

Table A.3: Impervious Area Determination

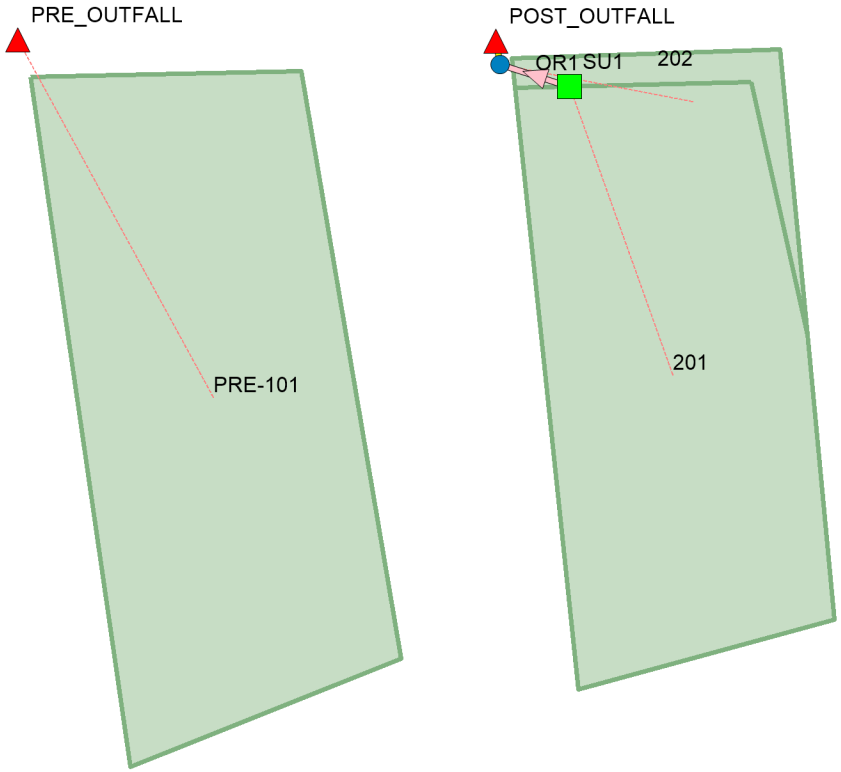
Existing Conditions

Area of Concern	Total Area (ha)	Impervious Area Connected		Impervious Area Not Connected (Rooftops)		Total (%)
		(ha)	(%)	(ha)	(%)	
101	0.84	0.25	29.8	0.00	0.0	29.8
201	0.70	0.65	92.9	0.00	0.0	92.9
202	0.14	0.00	0.0	0.00	0.0	0.0

Table A.3 - Impervious Area Determination

Catchment					Imperv. Area	Imperv %
101	0	m of	20	m wide ROW @ 45% imperv.	0.00 ha	0.0 %
	1	Impervious Area	2500	m^2 @ 100% imperv.	0.25 ha	29.8 %
	0	Roof Area	220	m^2 @ 100% imperv.	0.00 ha	0.0 %
					0.25 ha	
201	0	m of	10	m wide ROW @ 50% imperv.	0.00 ha	0.0 %
	1	Impervious Area	6500	m^2 @ 100% imperv.	0.65 ha	92.9 %
	0	Roof Area	220	m^2 @ 100% imperv.	0.00 ha	0.0 %
					0.65 ha	
202	0	m of	20	m wide ROW @ 45% imperv.	0.00 ha	0.0 %
	0	Impervious Area	1380	m^2 @ 100% imperv.	0.00 ha	0.0 %
	0	Roof Area	2025	m^2 @ 100% imperv.	0.00 ha	0.0 %
					0.00 ha	

JC WELDING - SWM MODEL SCHEMATIC



Legend

- Junctions
- Outfalls
- Storages
- Conduits
- Orifices
- Subcatchments

N

50 m

COBIDE
ENGINEERING INC

JC WELDING – SWM MODELLING – MODEL DETAILS

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           LPS
INFILTRATION         CURVE_NUMBER
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           10/1/2024
START_TIME           00:00:00
REPORT_START_DATE    10/1/2024
REPORT_START_TIME    00:00:00
END_DATE             10/2/2024
END_TIME             00:00:00
SWEEP_START          1/1
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         5
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              8

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
SCS_Type_II_25mm INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_25mm
SCS_Type_II_39.8mm_2yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_39.8mm_2yr
SCS_Type_II_55.1mm_5yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_55.1mm_5yr
SCS_Type_II_78.1mm_25yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_78.1mm_25yr
SCS_Type_II_87.6mm_50yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_87.6mm_50yr
SCS_Type_II_97.1mm_100yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_97.1mm_100yr

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
201              SCS_Type_II_97.1mm_100yr SU1      0.7      92.9     64       3        0
202              SCS_Type_II_97.1mm_100yr J1       0.14     0        200      33       0
PRE-101          SCS_Type_II_97.1mm_100yr PRE_OUTFALL 0.84  30.5     64       3        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
201              0.01       0.3        0.05       0.05       25         OUTLET
202              0.01       0.3        0.05       0.05       25         OUTLET
```

JC WELDING – SWM MODELLING – MODEL DETAILS

```
PRE-101          0.01       0.13       0.05       0.05       25         OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
201              72         12.7       7          0          0
202              72         12.7       7          0          0
PRE-101          78         12.7       7          0          0

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
J1               305.66     1          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
POST_OUTFALL     0          FREE                        NO
PRE_OUTFALL      0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape       Curve Name/Params            SurDepth Fevap    Psi
Ksat     IMD
;;-------------- -------- ---------- ---------- ----------- ---------------------------- -------- -------- -----
--- -------- --------
SU1              306.25   1.75       0          TABULAR     Pond                         0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow
MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ------
----
C1               J1               POST_OUTFALL     5.393      0.024      305.66     305        0          0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff     Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- ----------
OR1              SU1              J1               SIDE         306.25     0.65       NO       0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
C1               TRIANGULAR   1                6          0          0          1
OR1              CIRCULAR     0.175            0          0          0

[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
Pond             Storage    0          0.36
Pond                        0.3        0.36
Pond                        0.5        84
Pond                        0.75       155
Pond                        1          227
Pond                        1.25       305
Pond                        1.5        388
Pond                        1.75       480

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;SCS_Type_II_25mm design storm, total rainfall = 25 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_25mm

;SCS_Type_II_39.8mm design storm, total rainfall = 39.8 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_39.8mm_2yr
```

JC WELDING – SWM MODELLING – MODEL DETAILS

```
;SCS_Type_II_55.1mm design storm, total rainfall = 55.1 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_55.1mm_5yr

;SCS_Type_II_78.1mm design storm, total rainfall = 78.1 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_78.1mm_25yr

;SCS_Type_II_87.6mm design storm, total rainfall = 87.6 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_87.6mm_50yr

;SCS_Type_II_97.1mm design storm, total rainfall = 97.1 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_97.1mm_100yr

[REPORT]
;;Reporting Options
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS       484022.0693      4884053.916      484230.4907      4884244.194
UNITS            Meters
```

JC WELDING – SWM MODELLING – 2 YEAR DESIGN STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 3
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_25mm	SCS_Type_II_25mm	INTENSITY	6 min.
SCS_Type_II_39.8mm_2yr	SCS_Type_II_39.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_55.1mm_5yr	SCS_Type_II_55.1mm_5yr	INTENSITY	6 min.
SCS_Type_II_78.1mm_25yr	SCS_Type_II_78.1mm_25yr	INTENSITY	6 min.
SCS_Type_II_87.6mm_50yr	SCS_Type_II_87.6mm_50yr	INTENSITY	6 min.
SCS_Type_II_97.1mm_100yr	SCS_Type_II_97.1mm_100yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	0.70	64.00	92.90	3.0000	SCS_Type_II_39.8mm_2yr	SU1
202	0.14	200.00	0.00	33.0000	SCS_Type_II_39.8mm_2yr	J1
PRE-101	0.84	64.00	30.50	3.0000	SCS_Type_II_39.8mm_2yr	PRE_OUTFALL

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	305.66	1.00	0.0	
POST_OUTFALL	OUTFALL	0.00	306.00	0.0	
PRE_OUTFALL	OUTFALL	0.00	0.00	0.0	
SU1	STORAGE	306.25	1.75	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	POST_OUTFALL	CONDUIT	5.4	12.3308	0.0240
OR1	SU1	J1	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	1.00	3.00	0.47	6.00	1	26698.83

JC WELDING – SWM MODELLING – 2 YEAR DESIGN STORM EVENT

```
****************
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 ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 10/01/2024 00:00:00
Ending Date .............. 10/02/2024 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001524 m
```

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.067	39.800
Evaporation Loss	0.000	0.000
Infiltration Loss	0.020	12.178
Surface Runoff	0.046	27.646
Final Storage	0.000	0.062
Continuity Error (%)	-0.217	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.046	0.465
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.046	0.465
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

```
**************************
Time-Step Critical Elements
**************************
Link C1 (42.56%)

******************************
Highest Flow Instability Indexes
******************************
All links are stable.
```

JC WELDING – SWM MODELLING – 2 YEAR DESIGN STORM EVENT

```
  ********************************
  Most Frequent Nonconverging Nodes
  ********************************
  Convergence obtained at all time steps.


  ************************
  Routing Time Step Summary
  ************************
  Minimum Time Step           :     1.49 sec
  Average Time Step           :     3.95 sec
  Maximum Time Step           :     5.00 sec
  % of Time in Steady State   :     0.00
  Average Iterations per Step :     2.00
  % of Steps Not Converging   :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :    61.35 %
      3.155 -  1.991 sec      :    28.73 %
      1.991 -  1.256 sec      :     9.91 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


  ***************************
  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
  ---------------------------------------------------------------------------------------------------------------
----------------
  201                        39.80       0.00       0.00       2.01      37.09       0.81      37.90        0.27
136.65   0.952
  202                        39.80       0.00       0.00      28.37       0.00      11.40      11.40        0.02
8.67   0.286
  PRE-101                    39.80       0.00       0.00      17.95      12.17       9.64      21.81        0.18
67.47   0.548


  ******************
  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
  ------------------------------------------------------------------------------
  J1                   JUNCTION    0.02     0.11   305.77     0  03:06        0.11
  POST_OUTFALL         OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  PRE_OUTFALL          OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  SU1                  STORAGE     0.08     0.85   307.10     0  03:09        0.85


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

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

JC WELDING – SWM MODELLING – 2 YEAR DESIGN STORM EVENT

J1	JUNCTION	8.67	67.65	0	03:06	0.0161	0.282	0.001
POST_OUTFALL	OUTFALL	0.00	67.64	0	03:06	0	0.282	0.000
PRE_OUTFALL	OUTFALL	67.47	67.47	0	03:00	0.183	0.183	0.000
SU1	STORAGE	136.65	136.65	0	03:00	0.265	0.265	0.003

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SU1	0.002	0.7	0.0	0.0	0.055	15.9	0 03:09	60.49

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
POST_OUTFALL	49.13	14.21	67.64	0.282
PRE_OUTFALL	70.05	6.21	67.47	0.183
System	59.59	20.42	129.83	0.465

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	67.64	0 03:06	1.99	0.00	0.11
OR1	ORIFICE	60.49	0 03:09			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

JC WELDING – SWM MODELLING – 2 YEAR DESIGN STORM EVENT

```
--------------------------------------------------------------------------------
C1                     1.00    0.00  0.00  0.00  0.00  0.00  0.00  1.00  0.00  0.00


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

No conduits were surcharged.


Analysis begun on:  Wed Apr 23 21:39:50 2025
Analysis ended on:  Wed Apr 23 21:39:50 2025
Total elapsed time: < 1 sec
```

JC WELDING – SWM MODELLING – 5 YEAR DESIGN STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 3
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_25mm	SCS_Type_II_25mm	INTENSITY	6 min.
SCS_Type_II_39.8mm_2yr	SCS_Type_II_39.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_55.1mm_5yr	SCS_Type_II_55.1mm_5yr	INTENSITY	6 min.
SCS_Type_II_78.1mm_25yr	SCS_Type_II_78.1mm_25yr	INTENSITY	6 min.
SCS_Type_II_87.6mm_50yr	SCS_Type_II_87.6mm_50yr	INTENSITY	6 min.
SCS_Type_II_97.1mm_100yr	SCS_Type_II_97.1mm_100yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	0.70	64.00	92.90	3.0000	SCS_Type_II_55.1mm_5yr	SU1
202	0.14	200.00	0.00	33.0000	SCS_Type_II_55.1mm_5yr	J1
PRE-101	0.84	64.00	30.50	3.0000	SCS_Type_II_55.1mm_5yr	PRE_OUTFALL

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	305.66	1.00	0.0	
POST_OUTFALL	OUTFALL	0.00	306.00	0.0	
PRE_OUTFALL	OUTFALL	0.00	0.00	0.0	
SU1	STORAGE	306.25	1.75	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	POST_OUTFALL	CONDUIT	5.4	12.3308	0.0240
OR1	SU1	J1	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	1.00	3.00	0.47	6.00	1	26698.83

JC WELDING – SWM MODELLING – 5 YEAR DESIGN STORM EVENT

```
****************
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 ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 10/01/2024 00:00:00
Ending Date .............. 10/02/2024 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001524 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         0.093        55.100
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.025        14.952
Surface Runoff ...........         0.068        40.206
Final Storage ............         0.000         0.063
Continuity Error (%) .....        -0.218


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.068         0.676
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.068         0.676
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


***************************
Time-Step Critical Elements
***************************
Link C1 (45.00%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.
```

JC WELDING – SWM MODELLING – 5 YEAR DESIGN STORM EVENT

```
  ********************************
  Most Frequent Nonconverging Nodes
  ********************************
  Convergence obtained at all time steps.


  ************************
  Routing Time Step Summary
  ************************
  Minimum Time Step           :     1.43 sec
  Average Time Step           :     3.80 sec
  Maximum Time Step           :     5.00 sec
  % of Time in Steady State   :     0.00
  Average Iterations per Step :     2.00
  % of Steps Not Converging   :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :    58.08 %
      3.155 -  1.991 sec      :    28.64 %
      1.991 -  1.256 sec      :    13.27 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


  ***************************
  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
  ------------------------------------------------------------------------------------------------------------------
----------------
  201                       55.10       0.00       0.00       2.51      51.37       1.40      52.76        0.37
192.87   0.958
  202                       55.10       0.00       0.00      35.37       0.00      19.71      19.71        0.03
15.93   0.358
  PRE-101                   55.10       0.00       0.00      21.92      16.85      16.31      33.16        0.28
104.95   0.602


  ******************
  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
  ---------------------------------------------------------------------------
  J1                   JUNCTION    0.03     0.11   305.77     0  03:06        0.11
  POST_OUTFALL         OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  PRE_OUTFALL          OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  SU1                  STORAGE     0.12     1.05   307.30     0  03:09        1.05


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

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

JC WELDING – SWM MODELLING – 5 YEAR DESIGN STORM EVENT

J1	JUNCTION	15.93	80.64	0	03:06	0.0278	0.397	0.001
POST_OUTFALL	OUTFALL	0.00	80.63	0	03:06	0	0.397	0.000
PRE_OUTFALL	OUTFALL	104.95	104.95	0	03:00	0.279	0.279	0.000
SU1	STORAGE	192.87	192.87	0	03:00	0.37	0.37	0.004

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SU1	0.006	1.7	0.0	0.0	0.099	28.5	0 03:09	68.11

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
POST_OUTFALL	51.27	19.61	80.63	0.397
PRE_OUTFALL	71.88	9.67	104.95	0.279
System	61.57	29.27	181.05	0.676

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	80.63	0 03:06	2.08	0.00	0.11
OR1	ORIFICE	68.11	0 03:09			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

JC WELDING – SWM MODELLING – 5 YEAR DESIGN STORM EVENT

```
--------------------------------------------------------------------------------
C1                     1.00    0.00  0.00  0.00  0.00  0.00  0.00  1.00  0.00  0.00


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

No conduits were surcharged.


Analysis begun on:  Fri May  9 15:22:34 2025
Analysis ended on:  Fri May  9 15:22:34 2025
Total elapsed time: < 1 sec
```

JC WELDING – SWM MODELLING – 25 YEAR DESIGN STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 3
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_25mm	SCS_Type_II_25mm	INTENSITY	6 min.
SCS_Type_II_39.8mm_2yr	SCS_Type_II_39.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_55.1mm_5yr	SCS_Type_II_55.1mm_5yr	INTENSITY	6 min.
SCS_Type_II_78.1mm_25yr	SCS_Type_II_78.1mm_25yr	INTENSITY	6 min.
SCS_Type_II_87.6mm_50yr	SCS_Type_II_87.6mm_50yr	INTENSITY	6 min.
SCS_Type_II_97.1mm_100yr	SCS_Type_II_97.1mm_100yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	0.70	64.00	92.90	3.0000	SCS_Type_II_78.1mm_25yr	SU1
202	0.14	200.00	0.00	33.0000	SCS_Type_II_78.1mm_25yr	J1
PRE-101	0.84	64.00	30.50	3.0000	SCS_Type_II_78.1mm_25yr	PRE_OUTFALL

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	305.66	1.00	0.0	
POST_OUTFALL	OUTFALL	0.00	306.00	0.0	
PRE_OUTFALL	OUTFALL	0.00	0.00	0.0	
SU1	STORAGE	306.25	1.75	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	POST_OUTFALL	CONDUIT	5.4	12.3308	0.0240
OR1	SU1	J1	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	1.00	3.00	0.47	6.00	1	26698.83

JC WELDING – SWM MODELLING – 25 YEAR DESIGN STORM EVENT

```
****************
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 ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 10/01/2024 00:00:00
Ending Date .............. 10/02/2024 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001524 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         0.131        78.100
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.030        18.115
Surface Runoff ...........         0.101        60.091
Final Storage ............         0.000         0.063
Continuity Error (%) .....        -0.216


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.101         1.011
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.101         1.011
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


**************************
Time-Step Critical Elements
**************************
Link C1 (47.63%)


******************************
Highest Flow Instability Indexes
******************************
All links are stable.
```

JC WELDING – SWM MODELLING – 25 YEAR DESIGN STORM EVENT

```
  ********************************
  Most Frequent Nonconverging Nodes
  ********************************
  Convergence obtained at all time steps.


  ************************
  Routing Time Step Summary
  ************************
  Minimum Time Step           :     1.36 sec
  Average Time Step           :     3.64 sec
  Maximum Time Step           :     5.00 sec
  % of Time in Steady State   :     0.00
  Average Iterations per Step :     2.00
  % of Steps Not Converging   :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :    55.06 %
      3.155 -  1.991 sec      :    25.77 %
      1.991 -  1.256 sec      :    19.17 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


  ***************************
  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
  ------------------------------------------------------------------------------------------------------------------
----------------
  201                        78.10       0.00       0.00       3.10      72.81       2.45      75.26        0.53
278.36   0.964
  202                        78.10       0.00       0.00      43.62       0.00      34.49      34.49        0.05
29.06   0.442
  PRE-101                    78.10       0.00       0.00      26.38      23.87      27.84      51.71        0.43
172.54   0.662


  ******************
  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
  ------------------------------------------------------------------------------
  J1                   JUNCTION    0.04     0.12   305.78     0  03:06        0.12
  POST_OUTFALL         OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  PRE_OUTFALL          OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  SU1                  STORAGE     0.19     1.31   307.56     0  03:10        1.31


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

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

JC WELDING – SWM MODELLING – 25 YEAR DESIGN STORM EVENT

J1	JUNCTION	29.06	98.70	0	03:06	0.0486	0.576	0.001
POST_OUTFALL	OUTFALL	0.00	98.68	0	03:06	0	0.576	0.000
PRE_OUTFALL	OUTFALL	172.54	172.54	0	03:00	0.435	0.435	0.000
SU1	STORAGE	278.36	278.36	0	03:00	0.527	0.527	0.003

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SU1	0.014	4.1	0.0	0.0	0.171	49.3	0 03:10	76.56

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
POST_OUTFALL	53.59	27.60	98.68	0.576
PRE_OUTFALL	73.51	15.38	172.54	0.435
System	63.55	42.99	269.12	1.011

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	98.68	0 03:06	2.19	0.00	0.12
OR1	ORIFICE	76.56	0 03:10			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

JC WELDING – SWM MODELLING – 25 YEAR DESIGN STORM EVENT

```
--------------------------------------------------------------------------------
C1                     1.00    0.00  0.00  0.00  0.00  0.00  0.00  1.00  0.00  0.00


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

No conduits were surcharged.


Analysis begun on:  Fri May  9 15:26:17 2025
Analysis ended on:  Fri May  9 15:26:17 2025
Total elapsed time: < 1 sec
```

JC WELDING – SWM MODELLING – 50 YEAR DESIGN STORM EVENT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 3
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_25mm	SCS_Type_II_25mm	INTENSITY	6 min.
SCS_Type_II_39.8mm_2yr	SCS_Type_II_39.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_55.1mm_5yr	SCS_Type_II_55.1mm_5yr	INTENSITY	6 min.
SCS_Type_II_78.1mm_25yr	SCS_Type_II_78.1mm_25yr	INTENSITY	6 min.
SCS_Type_II_87.6mm_50yr	SCS_Type_II_87.6mm_50yr	INTENSITY	6 min.
SCS_Type_II_97.1mm_100yr	SCS_Type_II_97.1mm_100yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	0.70	64.00	92.90	3.0000	SCS_Type_II_87.6mm_50yr	SU1
202	0.14	200.00	0.00	33.0000	SCS_Type_II_87.6mm_50yr	J1
PRE-101	0.84	64.00	30.50	3.0000	SCS_Type_II_87.6mm_50yr	PRE_OUTFALL

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	305.66	1.00	0.0	
POST_OUTFALL	OUTFALL	0.00	306.00	0.0	
PRE_OUTFALL	OUTFALL	0.00	0.00	0.0	
SU1	STORAGE	306.25	1.75	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	POST_OUTFALL	CONDUIT	5.4	12.3308	0.0240
OR1	SU1	J1	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	1.00	3.00	0.47	6.00	1	26698.83

JC WELDING – SWM MODELLING – 50 YEAR DESIGN STORM EVENT

```
****************
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 ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 10/01/2024 00:00:00
Ending Date .............. 10/02/2024 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001524 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         0.147        87.600
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.032        19.141
Surface Runoff ...........         0.115        68.584
Final Storage ............         0.000         0.063
Continuity Error (%) .....        -0.215


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.115         1.153
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.115         1.153
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


***************************
Time-Step Critical Elements
***************************
Link C1 (48.50%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.
```

JC WELDING – SWM MODELLING – 50 YEAR DESIGN STORM EVENT

```
  ********************************
  Most Frequent Nonconverging Nodes
  ********************************
  Convergence obtained at all time steps.


  ************************
  Routing Time Step Summary
  ************************
  Minimum Time Step           :     1.34 sec
  Average Time Step           :     3.58 sec
  Maximum Time Step           :     5.00 sec
  % of Time in Steady State   :     0.00
  Average Iterations per Step :     2.00
  % of Steps Not Converging   :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :    54.09 %
      3.155 -  1.991 sec      :    24.17 %
      1.991 -  1.256 sec      :    21.74 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


  ***************************
  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
  ------------------------------------------------------------------------------------------------------------------
----------------
  201                        87.60       0.00       0.00       3.30      81.67       2.93      84.60        0.59
313.90   0.966
  202                        87.60       0.00       0.00      46.43       0.00      41.19      41.19        0.06
35.03   0.470
  PRE-101                    87.60       0.00       0.00      27.80      26.77      33.04      59.81        0.50
203.70   0.683


  ******************
  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
  ------------------------------------------------------------------------
  J1                   JUNCTION    0.04     0.13   305.79     0  03:06        0.13
  POST_OUTFALL         OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  PRE_OUTFALL          OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  SU1                  STORAGE     0.22     1.40   307.65     0  03:10        1.40


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

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

JC WELDING – SWM MODELLING – 50 YEAR DESIGN STORM EVENT

J1	JUNCTION	35.03	105.88	0	03:06	0.0581	0.65	0.001
POST_OUTFALL	OUTFALL	0.00	105.86	0	03:06	0	0.65	0.000
PRE_OUTFALL	OUTFALL	203.70	203.70	0	03:00	0.503	0.503	0.000
SU1	STORAGE	313.90	313.90	0	03:00	0.592	0.592	0.003

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SU1	0.019	5.3	0.0	0.0	0.203	58.3	0 03:10	79.41

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
POST_OUTFALL	54.36	30.86	105.86	0.650
PRE_OUTFALL	74.32	17.78	203.70	0.503
System	64.34	48.64	308.77	1.153

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	105.86	0 03:06	2.23	0.00	0.13
OR1	ORIFICE	79.41	0 03:10			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

JC WELDING – SWM MODELLING – 50 YEAR DESIGN STORM EVENT

```
--------------------------------------------------------------------------------
C1                     1.00    0.00  0.00  0.00  0.00  0.00  0.00  1.00  0.00  0.00


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

No conduits were surcharged.


Analysis begun on:  Fri May  9 16:18:36 2025
Analysis ended on:  Fri May  9 16:18:36 2025
Total elapsed time: < 1 sec
```

JC WELDING – SWM MODELLING – 100 YEAR DESIGN STORM EVENT

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 6
Number of subcatchments ... 3
Number of nodes ........... 4
Number of links ........... 2
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
SCS_Type_II_25mm     SCS_Type_II_25mm            INTENSITY    6 min.
SCS_Type_II_39.8mm_2yr SCS_Type_II_39.8mm_2yr      INTENSITY    6 min.
SCS_Type_II_55.1mm_5yr SCS_Type_II_55.1mm_5yr      INTENSITY    6 min.
SCS_Type_II_78.1mm_25yr SCS_Type_II_78.1mm_25yr     INTENSITY    6 min.
SCS_Type_II_87.6mm_50yr SCS_Type_II_87.6mm_50yr     INTENSITY    6 min.
SCS_Type_II_97.1mm_100yr SCS_Type_II_97.1mm_100yr    INTENSITY    6 min.


********************
Subcatchment Summary
********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
------------------------------------------------------------------------------------------------------------
201                         0.70     64.00     92.90    3.0000 SCS_Type_II_97.1mm_100yr SU1
202                         0.14    200.00      0.00   33.0000 SCS_Type_II_97.1mm_100yr J1
PRE-101                     0.84     64.00     30.50    3.0000 SCS_Type_II_97.1mm_100yr PRE_OUTFALL


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type              Elev.     Depth      Area    Inflow
----------------------------------------------------------------------------
J1                   JUNCTION         305.66      1.00       0.0
POST_OUTFALL         OUTFALL            0.00    306.00       0.0
PRE_OUTFALL          OUTFALL            0.00      0.00       0.0
SU1                  STORAGE          306.25      1.75       0.0


************
Link Summary
************
Name             From Node        To Node          Type            Length    %Slope Roughness
-------------------------------------------------------------------------------------------
C1               J1               POST_OUTFALL     CONDUIT            5.4   12.3308    0.0240
OR1              SU1              J1               ORIFICE


*********************
Cross Section Summary
*********************
                                    Full     Full     Hyd.     Max.   No. of     Full
Conduit          Shape             Depth     Area     Rad.    Width  Barrels     Flow
-----------------------------------------------------------------------------------
C1               TRIANGULAR         1.00     3.00     0.47     6.00        1 26698.83
```

JC WELDING – SWM MODELLING – 100 YEAR DESIGN STORM EVENT

```
****************
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 ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 10/01/2024 00:00:00
Ending Date .............. 10/02/2024 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001524 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         0.163        97.100
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.034        20.078
Surface Runoff ...........         0.130        77.167
Final Storage ............         0.000         0.063
Continuity Error (%) .....        -0.214


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.130         1.298
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.130         1.298
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.003


***************************
Time-Step Critical Elements
***************************
Link C1 (49.29%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.
```

JC WELDING – SWM MODELLING – 100 YEAR DESIGN STORM EVENT

```
  ********************************
  Most Frequent Nonconverging Nodes
  ********************************
  Convergence obtained at all time steps.


  ************************
  Routing Time Step Summary
  ************************
  Minimum Time Step           :     1.32 sec
  Average Time Step           :     3.53 sec
  Maximum Time Step           :     5.00 sec
  % of Time in Steady State   :     0.00
  Average Iterations per Step :     2.00
  % of Steps Not Converging   :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :    53.22 %
      3.155 -  1.991 sec      :    22.66 %
      1.991 -  1.256 sec      :    24.13 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


  ***************************
  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
  ---------------------------------------------------------------------------------------------------------------
----------------
  201                       97.10       0.00       0.00       3.48      90.53       3.42      93.95        0.66
349.54   0.968
  202                       97.10       0.00       0.00      48.97       0.00      48.16      48.16        0.07
41.25   0.496
  PRE-101                   97.10       0.00       0.00      29.10      29.67      38.35      68.02        0.57
236.42   0.700


  ******************
  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
  ------------------------------------------------------------------------------
  J1                   JUNCTION    0.04     0.13   305.79     0  03:00        0.13
  POST_OUTFALL         OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  PRE_OUTFALL          OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  SU1                  STORAGE     0.25     1.49   307.74     0  03:10        1.49


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

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

JC WELDING – SWM MODELLING – 100 YEAR DESIGN STORM EVENT

J1	JUNCTION	41.25	113.76	0	03:00	0.0679	0.726	0.000
POST_OUTFALL	OUTFALL	0.00	113.75	0	03:00	0	0.726	0.000
PRE_OUTFALL	OUTFALL	236.42	236.42	0	03:00	0.572	0.572	0.000
SU1	STORAGE	349.54	349.54	0	03:00	0.658	0.658	0.005

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SU1	0.024	6.8	0.0	0.0	0.235	67.5	0 03:10	81.99

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
POST_OUTFALL	55.06	34.09	113.75	0.726
PRE_OUTFALL	74.76	20.29	236.42	0.572
System	64.91	54.38	350.01	1.298

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	113.75	0 03:00	2.27	0.00	0.13
OR1	ORIFICE	81.99	0 03:10			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

JC WELDING – SWM MODELLING – 100 YEAR DESIGN STORM EVENT

```
--------------------------------------------------------------------------------
C1                     1.00    0.00  0.00  0.00  0.00  0.00  0.00  1.00  0.00  0.00


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

No conduits were surcharged.


Analysis begun on:  Fri May  9 16:26:52 2025
Analysis ended on:  Fri May  9 16:26:53 2025
Total elapsed time: 00:00:01
```

Hydro First Defense® - HC

Water Quality Flow Rate Worksheet

Rev. 9.6

Project Name:	**JC Welding**	*Report Date:*	**3-28-2025**
Street:		*City:*	**Walkerton**
Province:	**ON**	*Country:*	
Designer:	**TLB**	*email:*	

Paste

Treatment Parameters:

Structure ID:		
TSS Goal:	80	% Removal
TSS Particle Size:	Fine	
Water Quality Flow:	53	L/s
Peak Storm Flow:	96	L/s
Peak Storm Return:	100	yrs

RESULTS SUMMARY

Model	TSS
FD-3HC	60.0%
FD-4HC	70.4%
FD-5HC	75.7%
FD-6HC	78.9%
FD-8HC	**82.0%**

Performance Statement:

The Hydro International stormwater treatment system, model FD-8HC, achieves the water quality objective of 82.0% TSS using Fine particle size distribution, providing continuous treatment positive removal for the water quality flow of 53 L/s.

Model Specification:

Selected Model:	**FD-8HC**	
Diameter:	2400	mm
Design WQ Flow:	53.00	L/s
Peak Flow Capacity:	1416.00	L/s
Sediment Storage:	2.14	m^3
Oil Storeage:	4240.00	L

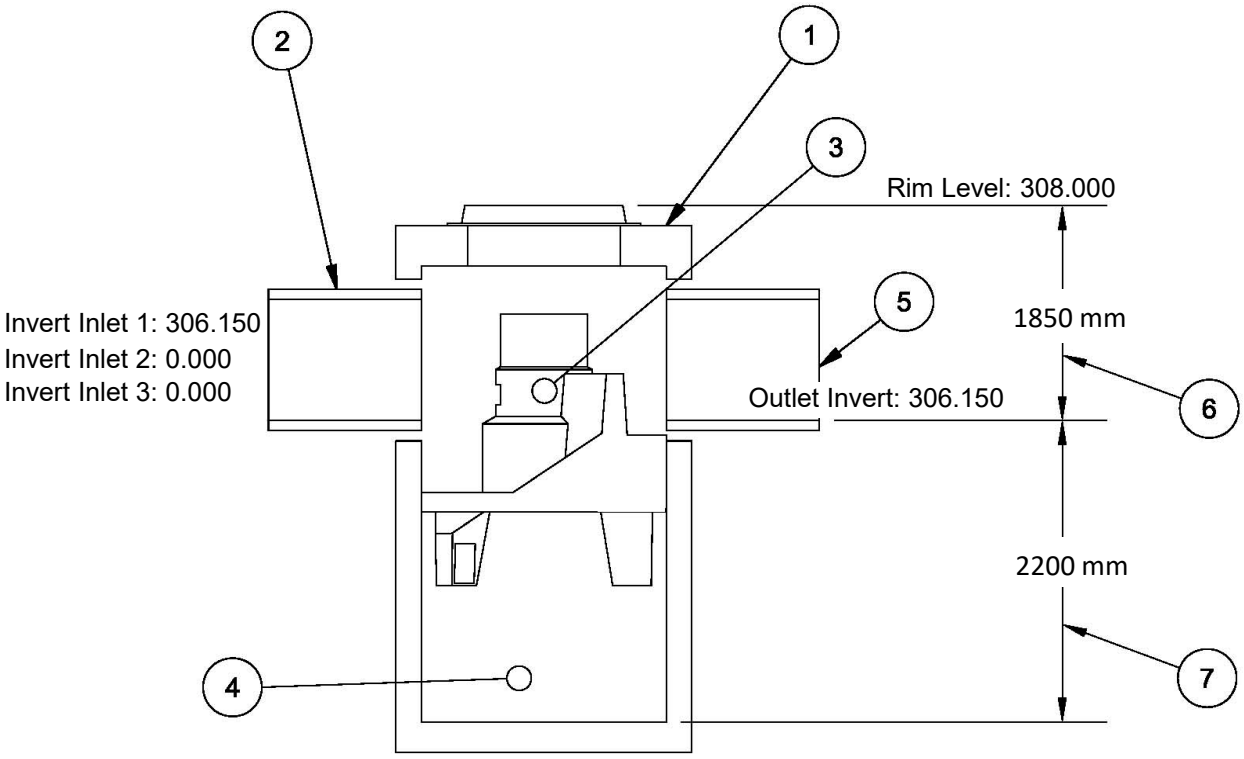
Installation Configuration:

Placement:	Online		
Outlet Pipe Size:	300	mm	*OK*
Inlet Pipe 1 Size:	300	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Inlet Pipe 3 Size:		mm	*OK*
Rim Level:	308.000	m	Calc Invs.
Outlet Pipe Invert:	306.150	m	*OK*
Invert Pipe 1:	306.150	m	*OK*
Invert Pipe 2:		m	*Inlet below outlet will reduce treatment capacity*
Invert Pipe 3:		m	*Inlet below outlet will reduce treatment capacity*

Designer Notes:

Hydro First Defense® - HC

FD-8HC



FD-8HC Specification

1	Vortex Chamber Diameter	2400	mm
2	Inlet Pipe Diameter	300	mm
3	Oil Storage Capacity	4240	L
4	Min. Provided Sediment Storage Capacity	2.14	m^3
5	Outlet Pipe Diameter	300	mm
6	Rim to Invert	1850	mm
7	Invert to Sump	2200	mm
	Total Depth	**4050**	**mm**

All drawing elevations are metres.

Designer Notes: