vallee

Consulting Engineers,
Architects & Planners

August 30, 2024

Norfolk County
Community Development - Planning Department
Robinson Administration Building
185 Robinson Street, Suite 200
Simcoe, ON N3Y 5L6

Attention: **Mohammad Alam, Supervisor of Development Planning**

Reference: **750 Old Highway 24 – Site Plan Application – Phase 1 Submission 2**
Verlinda Homes, Waterford, Norfolk County
Our Project 20-128

G. Douglas Vallee Limited is the agent acting on behalf of Verlinda Homes regarding a site plan application with Norfolk County. Please accept this package as our formal second site plan application for a commercial / retail development located at 750 Old Highway 24 in Waterford.

Please note, this site plan application only relates to the northern portion of the property which was recently severed as part of application BNPL2023254.

Included as part of this package are the following documents:

1. Engineering drawing set prepared by G. Douglas Vallee Limited, including the following:
    a. Servicing Plan
    b. Grading Plan
    c. Erosion And Sediment Control Plan
    d. Site Section Plan
    e. General Notes
    f. Sanitary Drainage Areas
    g. Storm Drainage Areas

2. Architectural site plan drawing set prepared by G. Douglas Vallee Limited (and others), including the following:
    a. Cover Sheet
    b. Site Plan Notes – Zoning
    c. General Site Plan Notes
    d. Site Plan Drawing
    e. Site Plan Details
    f. Canada Post Details
    g. Earth Bin Details
    h. OPSD Details
    i. Topographical Survey
    j. Restaurant Signage Details
    k. Site Plan Demolishment Details
    l. Building Elevations – prepared by others

3. Functional Servicing Report, prepared by G. Douglas Vallee Limited.

4. Stormwater Management Report, prepared by G. Douglas Vallee Limited.

5. Securities Estimate for work to be completed, prepared by G. Douglas Vallee Limited.

6. Species at Risk and Significant Wildlife Habitat Assessment, prepared by GeoProcess Research Associates.

7. Landscape drawing set, prepared by Adesso Design Inc.
    a. Landscape Plan.
    b. Details

8. Photometric (Lighting) drawing set, prepared by SEI Electrical Engineering.
    a. Electrical General Notes, Legends and Schedules
    b. Electrical Site Plan Photometric Calculations

We trust that the information in this letter will satisfy the requirements of a complete application. We look forward to continuously working with Norfolk County on this project, and should any questions arise, please feel free to contact me.

Yours truly,

John Iezzi, P.Eng.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners

H:\Projects\2020\20-128 Orchard Square\Agency\Submissions\2024.08.22 - Phase 1 - Site Plan - 2nd Submission\Phase 1 Submission 2 Cover Letter.docx

NOTES:

1. PROPOSED SEWERS TO ADHERE TO THE FOLLOWING OPSD:

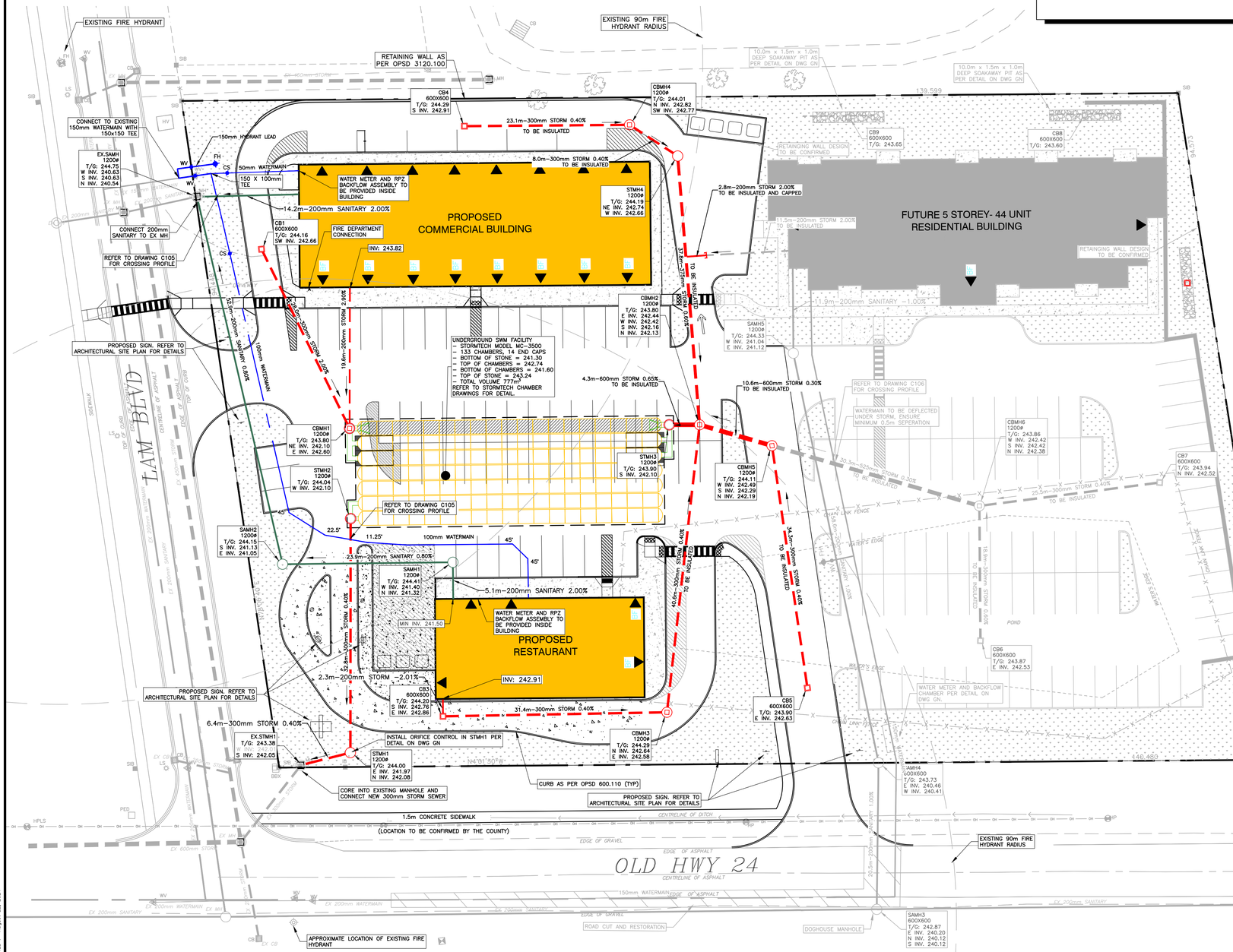
1200mm MAINTENANCE HOLE STRUCTURE	OPSD 701.010
1200mm CATCH BASIN MAINTENANCE HOLE GRATE	OPSD 400.010

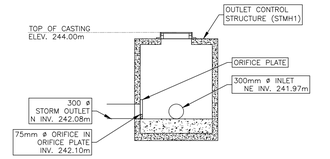
ALL COMPONENTS OF THE PROPOSED STORM SEWERS ARE TO ADHERE TO DIVISION 700 OF THE OPSD.

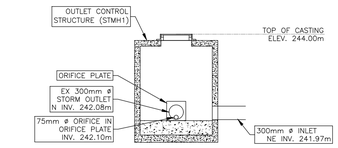
2. RESTORE EXISTING COUNTY INFRASTRUCTURE TO COUNTY STANDARDS:
   - REFER TO TRENCHING RESTORATION DETAIL ON DRAWING GN.
   - CONCRETE CURB TO MATCH EXISTING.
   - CONCRETE SIDEWALK TO MATCH EXISTING WIDTH.
   - CONSTRUCTION PER OPSS AND OPSD.
4. ALL WATERMAIN TO BE RESTRAINED AT ALL BENDS, TEES, REDUCERS, DEAD-ENDS, AND VALVES AS PER DETAILS ON DWG. GN.

LEGEND

- EX. STORM SEWER
- PROPOSED STORM SEWER
- EX. SANITARY SEWER
- PROPOSED SANITARY SEWER
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- EX. MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED TWIN INLET CATCHBASIN
- PROPOSED CATCHBASIN MANHOLE
- EX. CATCHBASIN
- PROPOSED WATERMAIN
- EX. WATERMAIN
- PROPOSED 3-WAY FIRE HYDRANT C/W STORZ CONNECTION
- EX. FIRE HYDRANT
- PROPOSED WATERVALVE
- EX. WATERVALVE
- EX. BURIED GAS LINE
- EX. BURIED BELL LINE
- EX. BURIED CABLE LINE
- EX. UNDERGROUND HYDRO LINE
- PROPERTY LINE







OUTLET CONTROL STRUCTURE DETAIL

DETAIL
N.T.S.

NOTES:

ORIFICE PLATE TO BE BOLTED TO MANHOLE FACE AND SEALED WITH NON-SHRINK GROUT. INVERT OF ORIFICE TO MATCH OUTLET PIPES.

ORIFICE CONTROL TO BE UNIFORM STEEL SECTION WITH NO OPEN SEAMS. MATERIAL TO BE MIN. 3mm THICK GALVANIZED STEEL OR ALUMINUM.

CONTROL FEATURE MUST BE INSTALLED AND INSPECTED BY THE ENGINEER PRIOR TO PAVING TO ENSURE STORMWATER RUNOFF FLOW CONTROLS ARE IN PLACE TO PROTECT DOWNSTREAM SYSTEM.

REV. No.	DATE	REVISION
0	MAR 8/24	ISSUED FOR SPA
1	APR 16/24	REVISED SPA SUBMISSION
2	AUG 22/24	SECOND SPA SUBMISSION

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

PLAN 37M-57, BLOCK 61, ROLL NUMBER 33605062868 IN THE TOWN OF WATERFORD IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: VERLINDA HOMES
TELEPHONE: 1-705-205-3235
ADDRESS: 99 MAPLE STREET, PORT CARLING ONTARIO, P0B 1J0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY ON LAM BOULEVARD.
ELEV. 245.91m

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

20-128-C101	SERVICING PLAN
20-128-C102	GRADING PLAN
20-128-C103	EXCESS CUT AND FILL PLAN
20-128-C104	EROSION AND SEDIMENT CONTROL PLAN
20-128-C105	SITE SECTION PLAN
20-128-C106	PLAN AND PROFILE PHASE 1 SERVICING
20-128-C107	PLAN AND PROFILE PHASE 2 SERVICING
20-128-GN	GENERAL NOTES AND DETAILS
20-128-SAN	SANITARY DRAINAGE AREAS PLAN
20-128-STM	STORM DRAINAGE AREAS PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

SCALE:
5 10 15
HORIZONTAL : 1:300

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Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

LICENSED PROFESSIONAL ENGINEER
20128
2024-08-27
J. T. IEZZI
100129485
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
SERVICING PLAN

Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 8/22/2024
Drawing Scale : 1:300	Drawing No. C101
Project No. 20-128	

DATE LAST PLOTTED : August 22, 2024

LEGEND

- 247.20 — PROPOSED SPOT ELEVATION
- EMERGENCY OVERLAND FLOW DIRECTION
- TOP OF SLOPE
- 246.2 — EXISTING GROUND CONTOUR
- ROPOSED GRADE BREAK
- PROPOSED SWALE

EROSION & SEDIMENT CONTROL NOTE:
ALL ROAD CATCH BASINS TO HAVE FILTER CLOTH COVER IN PLACE UNTIL BASE ASPHALT IS IN PLACE. STORMWATER INLET STRUCTURES (DITCH INLET CATCH BASINS, CATCH BASINS, CATCH BASIN MANHOLES ETC.) TO HAVE SILT PROTECTION. ALL EROSION CONTROL TO BE TO THE SATISFACTION OF ENGINEER AND L.P.R.C.A.

ROOF WATER DRAINAGE:
ROOF WATER DRAINAGE TO OUTLET TO SPLASH PADS AS PER DRAWING STM – STORM DRAINAGE AREAS.

MATCH ELEVATIONS:
MATCH ELEVATIONS AT THE PROPERTY LINE ARE BASED ON INTERPOLATED TOPOGRAPHIC DATA. CONTRACTOR TO CONFIRM MATCH ELEVATIONS AND REPORT AND DISCREPANCY TO THE ENGINEER PRIOR TO CONSTRUCTION.

NOTES:

1. PARKING AND AISLE PAVEMENT TO ADHERE TO PAVEMENT DESIGNS CONTAINED WITHIN THE GEOTECHNICAL REPORT AND NORFOLK COUNTY DESIGN CRITERIA:

   LIGHT DUTY FOR PARKING STALLS:

   40mm HL3
   50mm HL8
   150mm GRANULAR A
   300mm GRANULAR B

   HEAVY DUTY FOR DRIVE AISLES AND LANES:

   40mm HL3
   80mm HL8
   150mm GRANULAR A
   350mm GRANULAR B

2. GENERAL CONTRACTOR TO COORDINATE ALL WORK WITHIN THE SITE WITH THE COUNTY AND OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM LOCAL AUTHORITIES. EXECUTE ALL WORK AS PER NORFOLK COUNTY REQUIREMENTS.
3. GENERAL CONTRACTOR TO EXECUTE WORK TO CONSTRUCTION SITE ACCESS UNDER SUPERVISION OF THE ENGINEER. REFER TO ENTRANCE PERMIT REQUIREMENTS WHERE APPLICABLE. DRIVEWAY ENTRANCE TO BE MODIFIED OR INSTALLATION OF NEW ENTRANCE AS PER NORFOLK COUNTY REQUIREMENTS. PROVIDE NEW CONC. ENTRANCE CURBS TO MATCH EXISTING AS REQUIRED.
4. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, ALL BENCHMARKS, ELEVATIONS, DIMENSIONS AND GRADES MUST BE CHECKED BY THE CONTRACTOR AND ANY DISCREPANCIES REPORTED TO THE ENGINEER.
5. AT LEAST TWO DIFFERENT BENCHMARKS MUST BE REFERRED TO AT ALL TIMES.
6. COORDINATE WITH SITE GRADING PLAN FOR PROPOSED FINAL FINISH GRADE ELEVATIONS AND DRAINAGE SLOPES.
7. TRAFFIC CONTROL SHALL BE IMPLEMENTED BY THE CONTRACTOR IN ACCORDANCE WITH OTM TEMPORARY CONDITIONS BOOK 7. APPROVAL FOR THE TRAFFIC CONTROL WILL BE SOUGHT FROM THE MUNICIPALITY BY THE CONTRACTOR.

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ELEV.....245.91m

DRAWING LIST

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PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

SCALE:
5 10
HORIZONTAL : 1:300

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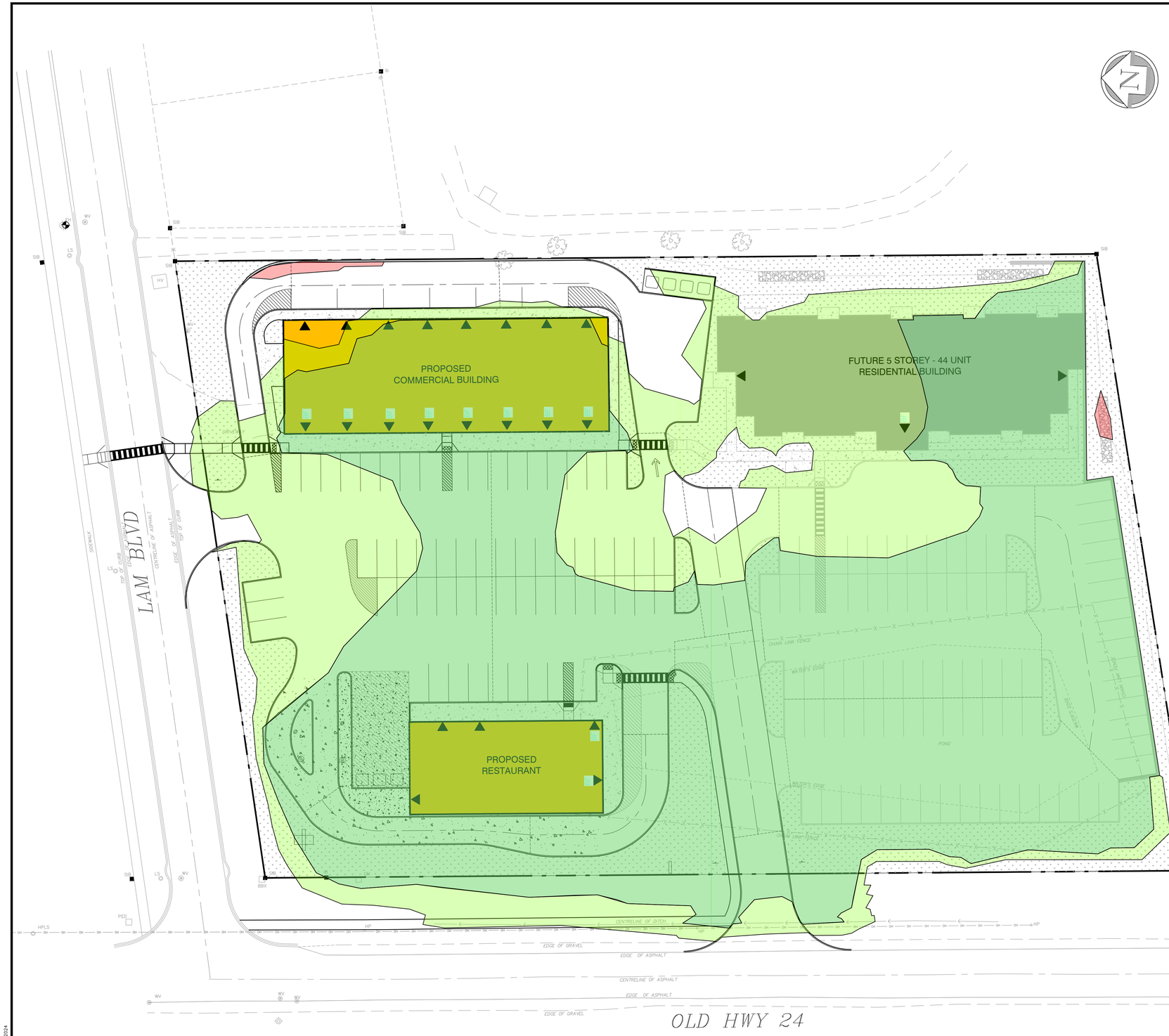
20128
2024-08-27
J. T. IEZZI
100139485
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
GRADING PLAN

Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 8/6/2024
Drawing Scale : 1:300	Drawing No. C102
Project No. 20-128	

DATE LAST PLOTTED : August 22, 2024



LEGEND

- 247.20 — PROPOSED SPOT ELEVATION
- 247.20 — PROPOSED CENTRELINE OF ROAD ELEVATION
- OVERLAND FLOW DIRECTION
- 246.2 — EXISTING GROUND CONTOUR
- FILL IN EXCESS OF 0.5m TO 1.0m
- FILL IN EXCESS OF 1.0m
- CUT IN EXCESS OF 0.5m

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ELEV.....245.91m

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SCALE:
5 10
HORIZONTAL : 1:300

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Stamp:
LICENSED PROFESSIONAL ENGINEER
20128
2024-08-27
J. T. IEZZI
100179485
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
EXCESS CUT AND FILL PLAN

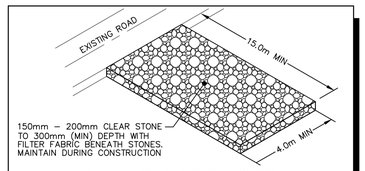
Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 7/25/2024
Drawing Scale : 1:300	Drawing No. C103
Project No. 20-128	

DATE LAST PLOTTED : August 22, 2024

EROSION CONTROL NOTES

1. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR DESIGN AND PROVISION OF ALL SEDIMENT CONTROL MEASURES AS MAY BE REQUIRED TO PROTECT THE WORK SITE OR THE ADJACENT LANDS, REGARDLESS OF THE SOURCE OR ORIGIN OF EROSION OR SEDIMENTS. IF THE ENGINEER IS NOT SATISFIED WITH THE EXTENT OF THE MEASURES TAKEN, THE ENGINEER MAY DIRECT THAT ADDITIONAL CONTROLS BE PUT IN PLACE.

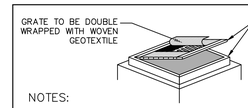
   THE ENGINEER'S REQUIREMENTS FOR SEDIMENT AND EROSION CONTROL SHALL BE CONSIDERED ABSOLUTE MINIMUMS. THE ULTIMATE RESPONSIBILITY TO ENSURE THAT THE MEASURES ARE ADEQUATE SHALL LIE SOLELY ON THE CONTRACTOR. ANY DAMAGE RESULTING FROM FAILURE OF THESE MEASURES SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.
2. PROTECT ALL EXPOSED SURFACES AND CONTROL ALL RUNOFF DURING CONSTRUCTION.
3. ALL EROSION CONTROL MEASURES TO BE IN PLACE UNTIL RESTORATION IS COMPLETE.
4. MAINTAIN EROSION CONTROL MEASURES DURING CONSTRUCTION.
5. ALL COLLECTED SEDIMENT TO BE DISPOSED OF AT AN APPROVED LOCATION.
6. MINIMIZE AREA DISTURBED DURING CONSTRUCTION.
7. ALL DEWATERING TO BE DISPOSED OF IN AN APPROVED SEDIMENTATION BASIN.
8. PROTECT ALL CATCH BASINS, MANHOLES AND PIPE ENDS FROM SEDIMENT INTRUSION WITH GEOTEXTILE AND MAINTAIN IN FREE FLOWING STATE (TERRAFIX 270R OR APPROVED EQUIVALENT). REFER TO DETAIL THIS PAGE.
9. KEEP ALL SUMPS CLEAN DURING CONSTRUCTION INCLUDING OIL GRIT SEPARATOR.
10. PREVENT WIND-BLOWN DUST.
11. CONTRACTOR TO PROVIDE MUD MAT AT ALL CONSTRUCTION ENTRANCES.



MUD MAT – CONSTRUCTION ACCESS
N.T.S.

LEGEND

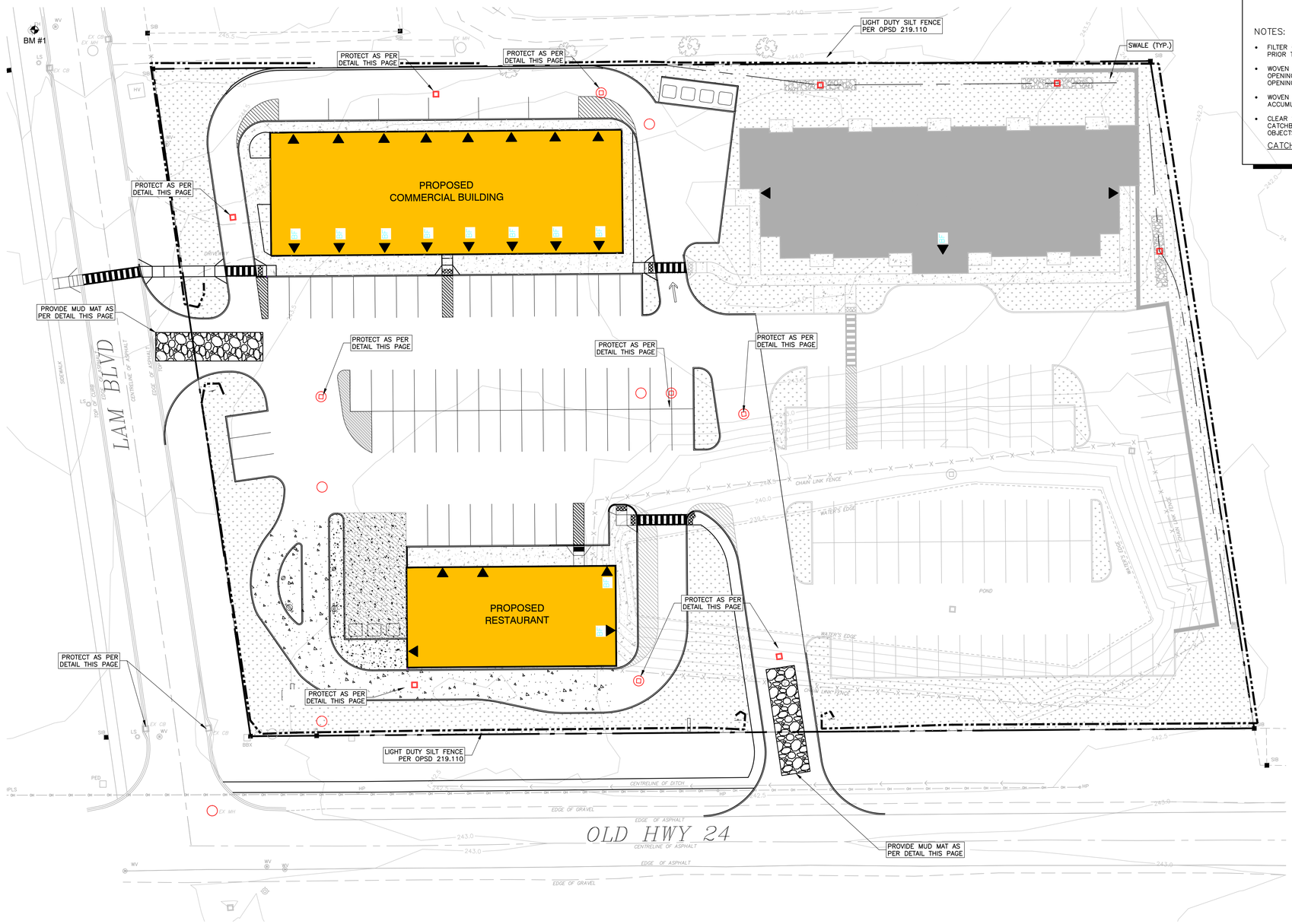
- EXISTING GROUND CONTOUR
- PROPOSED SWALE
- PROPOSED LIGHT DUTY SILT FENCE AS PER OPSD 219.110



NOTES:

- FILTER CLOTH WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.
- WOVEN GEOTEXTILE TO HAVE A MINIMUM EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm.
- WOVEN GEOTEXTILE TO BE REPLACED PERIODICALLY WHEN ACCUMULATED SEDIMENTS INTERFERES WITH DRAINAGE.
- CLEAR STONE TO BE PLACED ON TOP OF WRAPPED CATCHBASIN TO PROTECT GEOTEXTILE FROM LARGE OBJECTS.

CATCHBASIN SEDIMENT PROTECTION DETAIL
N.T.S.



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BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #28 LAM BOULEVARD.
ELEV.....245.91m

DRAWING LIST

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SCALE:
HORIZONTAL : 1:300 (5, 10, 15)

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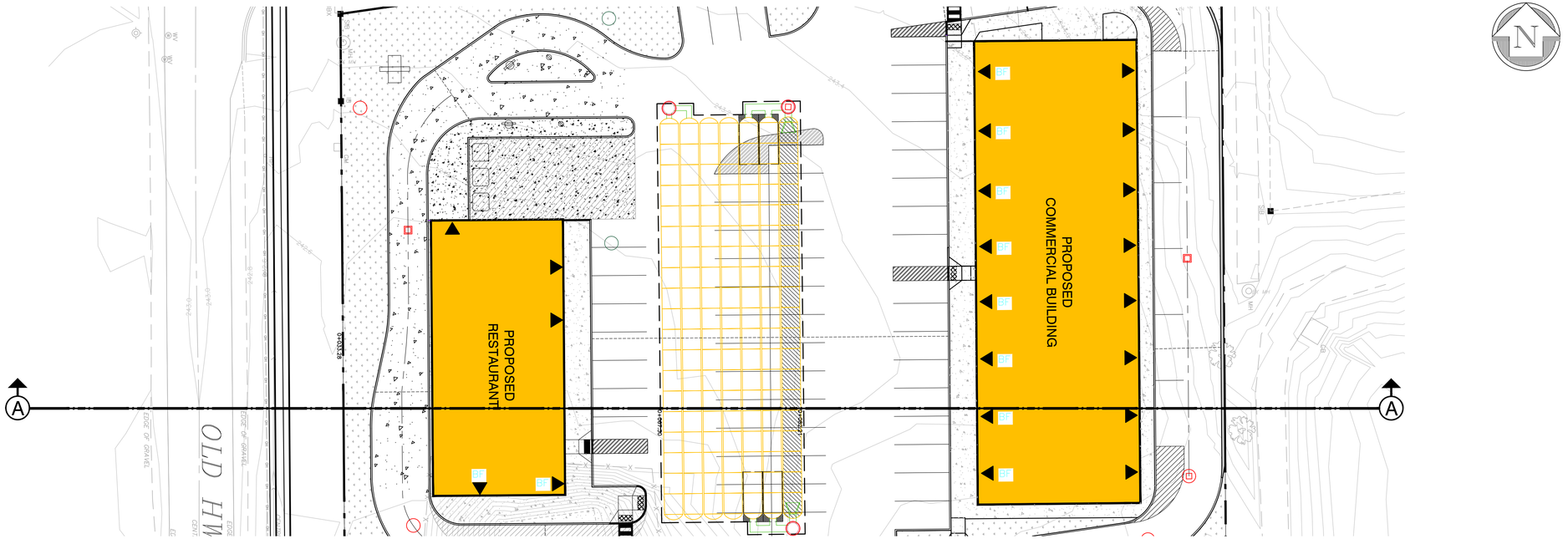
2024-08-27
J. T. IEZZI
100129485
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

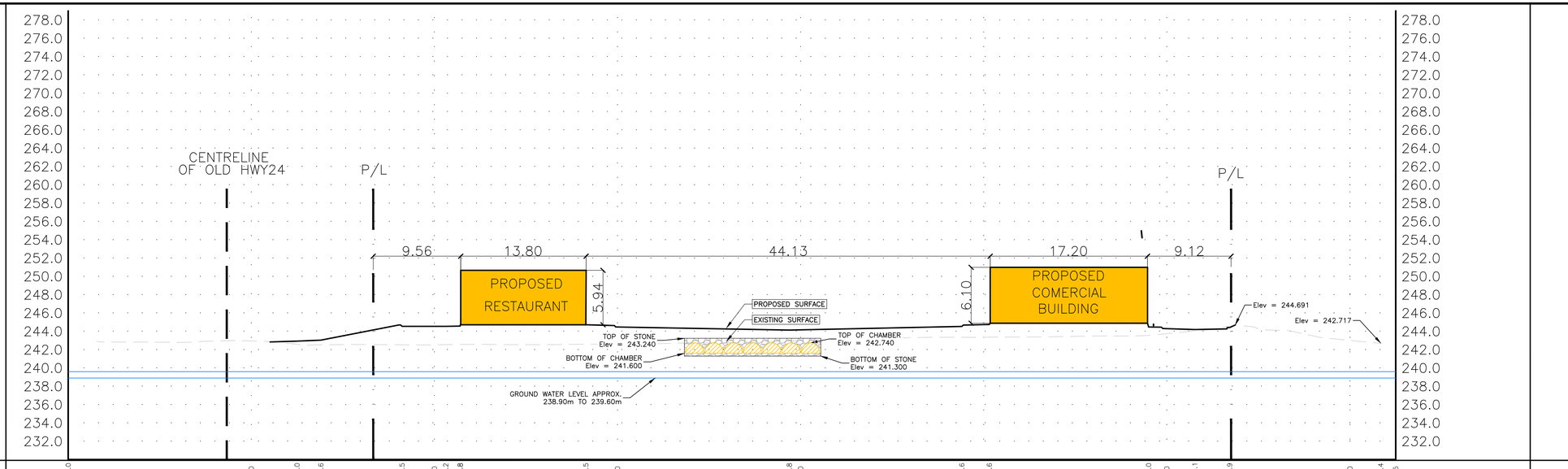
Drawing Title
EROSION AND SEDIMENT CONTROL PLAN

Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 7/25/2024
Drawing Scale : 1:300	Drawing No. C104
Project No. 20-128	

DATE LAST PLOTTED : August 22, 2024



SECTION A-A



CHAINAGE	0+000.0	0+020	0+025.0	0+027.6	0+036.5	0+040	0+041.2	0+042.8	0+056.5	0+060	0+078.8	0+080	0+097.6	0+100.6	0+118.0	0+120	0+123.1	0+126.9	0+140	0+143.4	0+145
FINAL CENTRE LINE ROAD ELEVATIONS			242.93	243.04	244.55	244.55	244.55	244.92	244.72	244.48	244.14	244.17	244.53	244.73 244.75	244.47	244.29	244.20	244.42			

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2	AUG 22/24	SECOND SPA SUBMISSION

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ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

PLAN 37M-57, BLOCK 61, ROLL NUMBER 33605062868 IN THE TOWN OF WATERFORD IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: VERLINDA HOMES
TELEPHONE: 1-705-205-3235
ADDRESS: 99 MAPLE STREET, PORT CARLING ONTARIO, P0B 1J0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #26 LAM BOULEVARD.
ELEV.....245.91m

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

20-128-C101	SERVICING PLAN
20-128-C102	GRADING PLAN
20-128-C103	EXCESS CUT AND FILL PLAN
20-128-C104	EROSION AND SEDIMENT CONTROL PLAN
20-128-C105	SITE SECTION PLAN
20-128-C106	PLAN AND PROFILE PHASE 1 SERVICING
20-128-C107	PLAN AND PROFILE PHASE 2 SERVICING
20-128-GN	GENERAL NOTES AND DETAILS
20-128-SAN	SANITARY DRAINAGE AREAS PLAN
20-128-STM	STORM DRAINAGE AREAS PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

SCALE:
HORIZONTAL : 1 : 250
VERTICAL : 1 : 250

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp
LICENSED PROFESSIONAL ENGINEER 20128 2024-08-27 J. T. JEZZI 100159485 PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

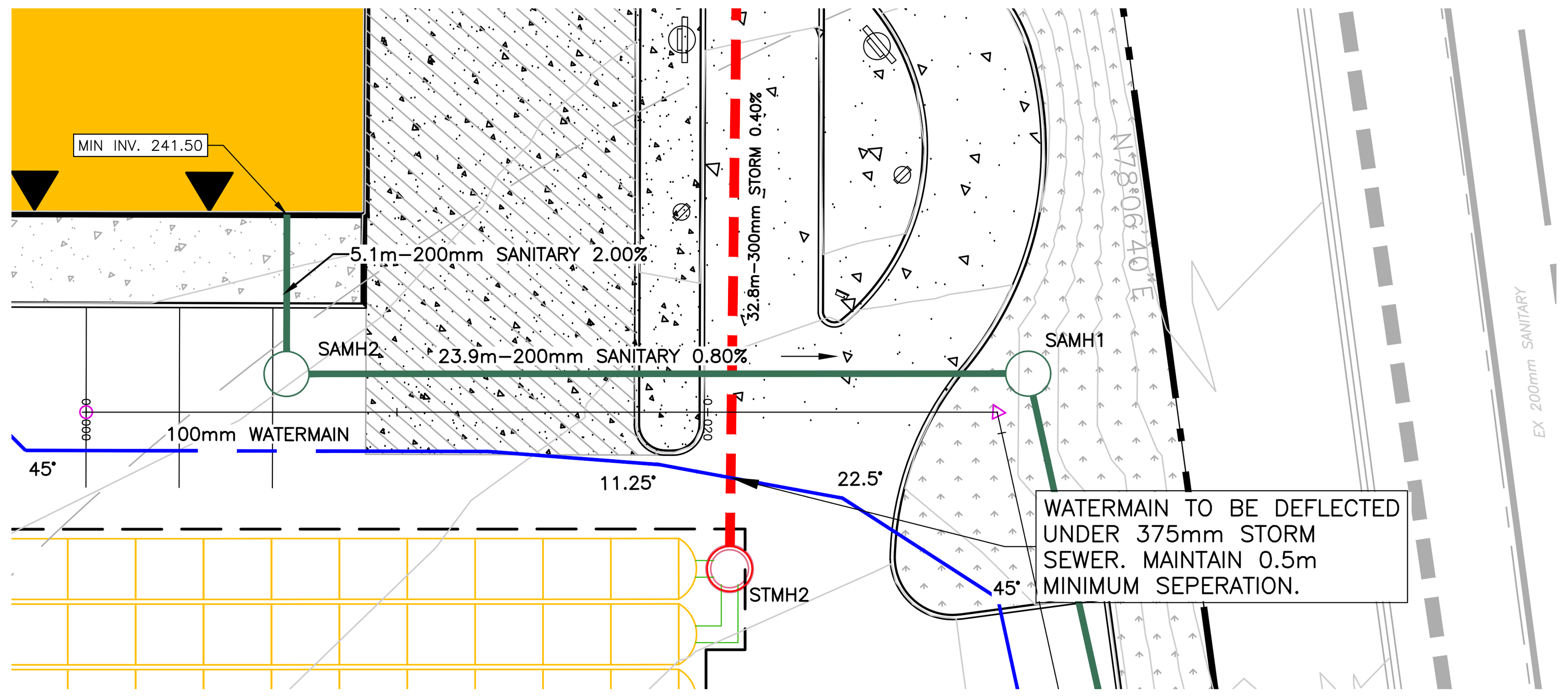
Drawing Title
SITE SECTION PLAN

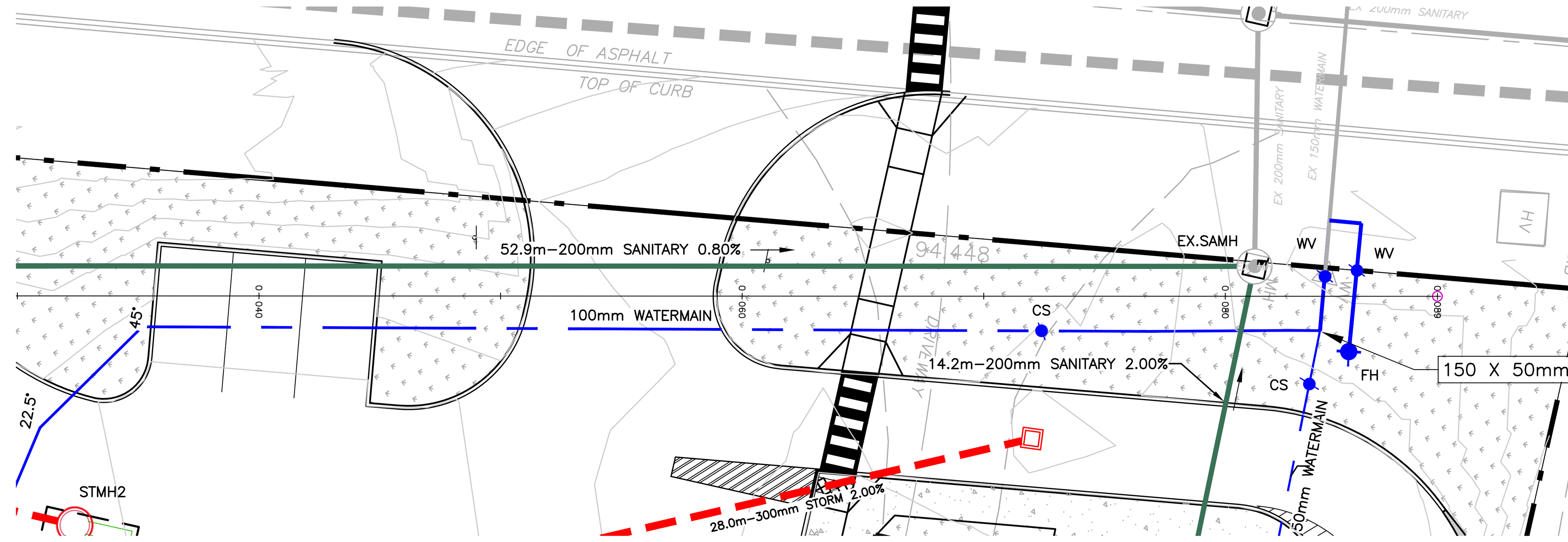
Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 7/24/2024
Drawing Scale : AS NOTED	Drawing No. C105
Project No. 20-128	

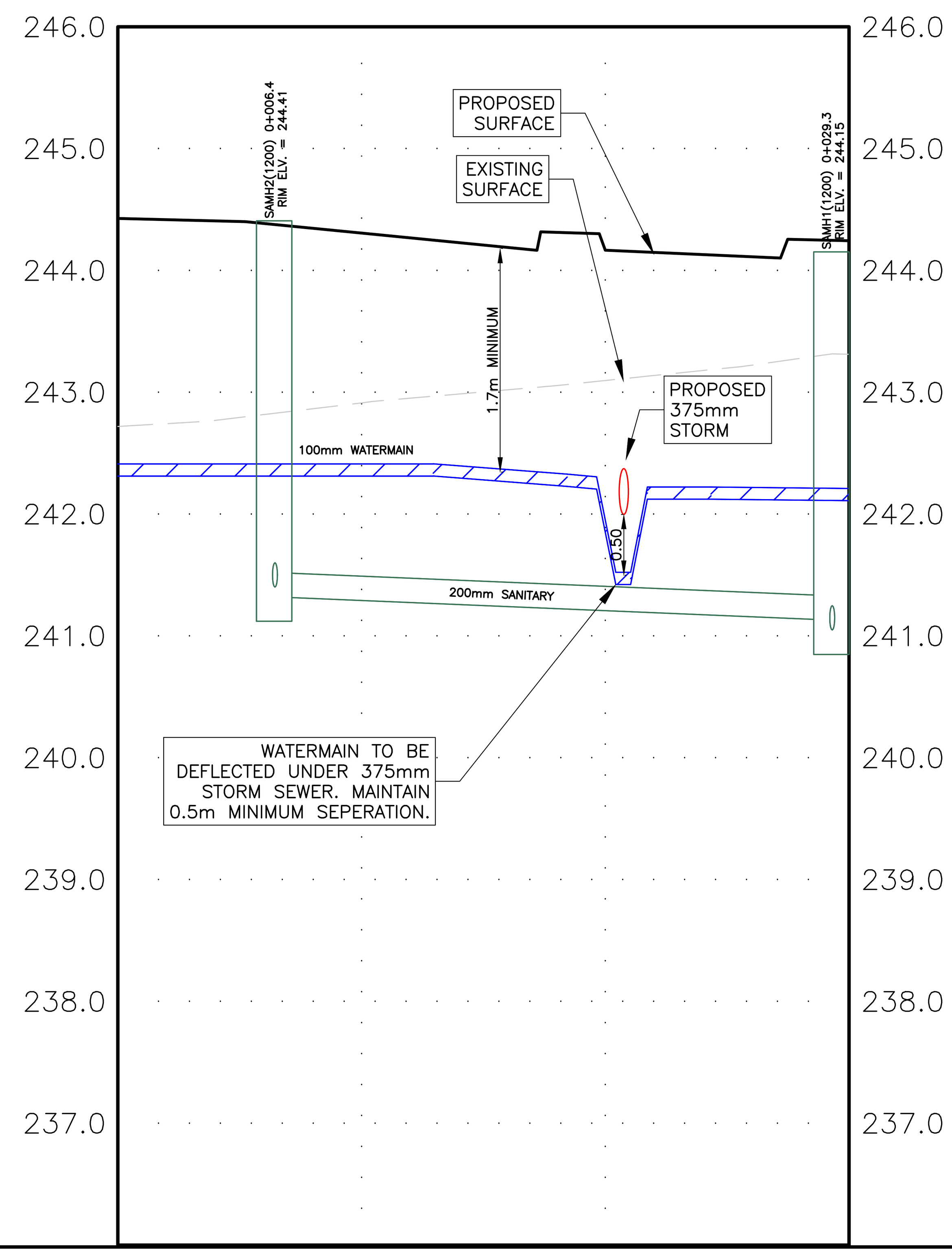
DATE LAST PLOTTED : August 22, 2024

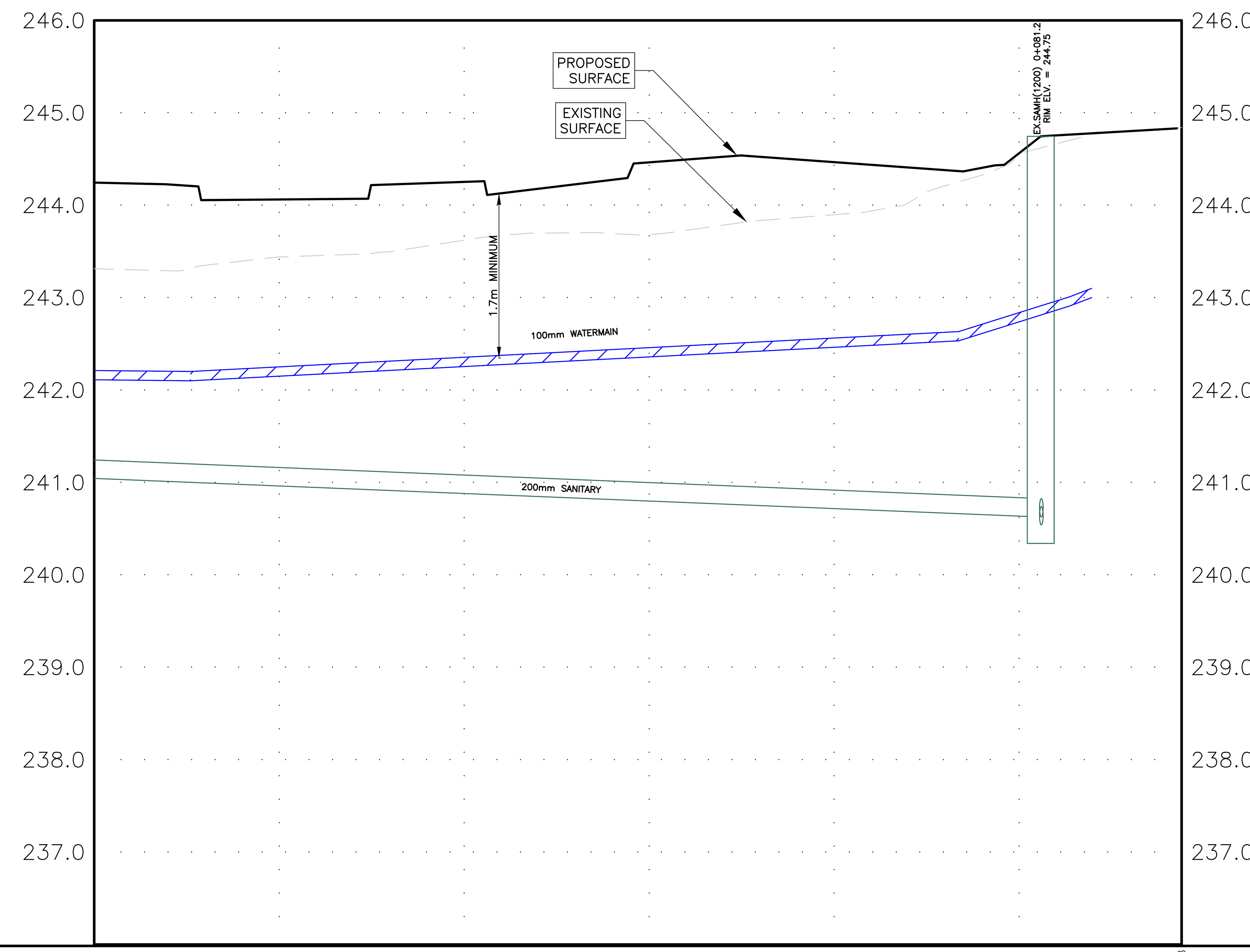
LEGEND

- EX. STORM SEWER
- PROPOSED STORM SEWER
- EX. SANITARY SEWER
- PROPOSED SANITARY SEWER
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- EX. MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED TWIN INLET CATCHBASIN
- PROPOSED CATCHBASIN MANHOLE
- EX. CATCHBASIN
- PROPOSED WATERMAIN
- EX. WATERMAIN
- PROPOSED 3-WAY FIRE HYDRANT C/W STORZ CONNECTION
- EX. FIRE HYDRANT
- PROPOSED WATERVALVE
- EX. WATERVALVE
- EX. BURIED GAS LINE
- EX. BURIED BELL LINE
- EX. BURIED CABLE LINE
- EX. UNDERGROUND HYDRO LINE
- PROPERTY LINE









CHAINAGE	0+000	0+010	0+020	0+030	0+030	0+040	0+050	0+060	0+070	0+080	0+088.8
PROPOSED ELEVATIONS	244.43	244.31	244.17	244.24	244.24	244.06	244.25	244.46	244.47	244.56	
STORM SEWER											
SANITARY SEWER	241.40W 241.32N — 23.9m OF 200mm PVC SDR 35 SANITARY WITH CLASS B BEDDING @ 0.80% — 241.13S 241.05E				52.9m OF 200mm PVC SDR 35 SANITARY WITH CLASS B BEDDING @ 0.80% — 240.63W 240.63S 240.54N						

DATE LAST PLOTTED : August 22, 2024

REV. No.	DATE	REVISION
0	MAR 8/24	ISSUED FOR SPA
1	APR 16/24	REVISED SPA SUBMISSION
2	AUG 22/24	SECOND SPA SUBMISSION

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ELEV.......245.91m

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PRELIMINARY
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SCALE:
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SIMCOE, ONTARIO N3Y 3W4
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Stamp: LICENSED PROFESSIONAL ENGINEER — 20128 — 2024-08-27 — J. T. IEZZI — 100189485 — PROVINCE OF ONTARIO

Project Title: ORCHARD SQUARE
WATERFORD - NORFOLK COUNTY

Drawing Title: PLAN AND PROFILE PHASE 1 SERVICES

Designed by : NBN/NLO	Drawn By : NBN
Checked by : JTI	Date Started : 4/16/24
Drawing Scale : AS SHOWN	Drawing No. C106
Project No. 20-128	

LEGEND

- EX. STORM SEWER
- PROPOSED STORM SEWER
- EX. SANITARY SEWER
- PROPOSED SANITARY SEWER
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- EX. MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED TWIN INLET CATCHBASIN
- PROPOSED CATCHBASIN MANHOLE
- EX. CATCHBASIN
- PROPOSED WATERMAIN
- EX. WATERMAIN
- PROPOSED 3-WAY FIRE HYDRANT C/W STORZ CONNECTION
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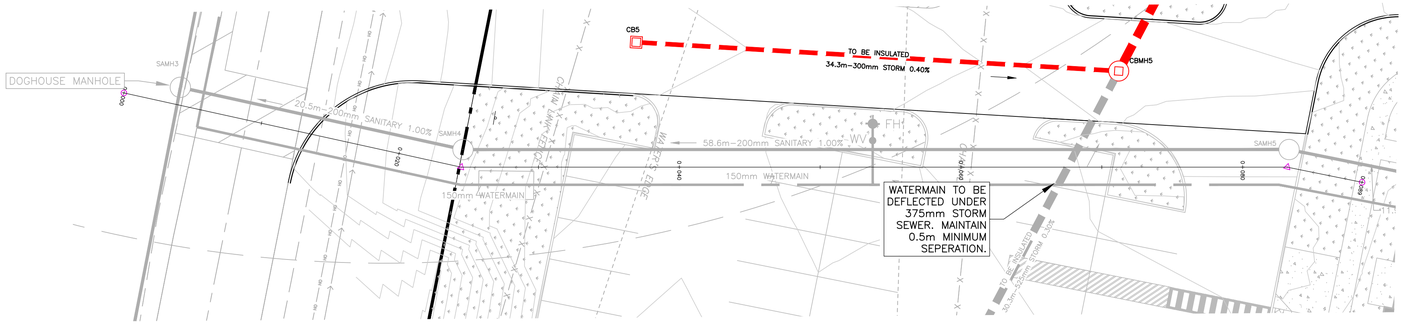

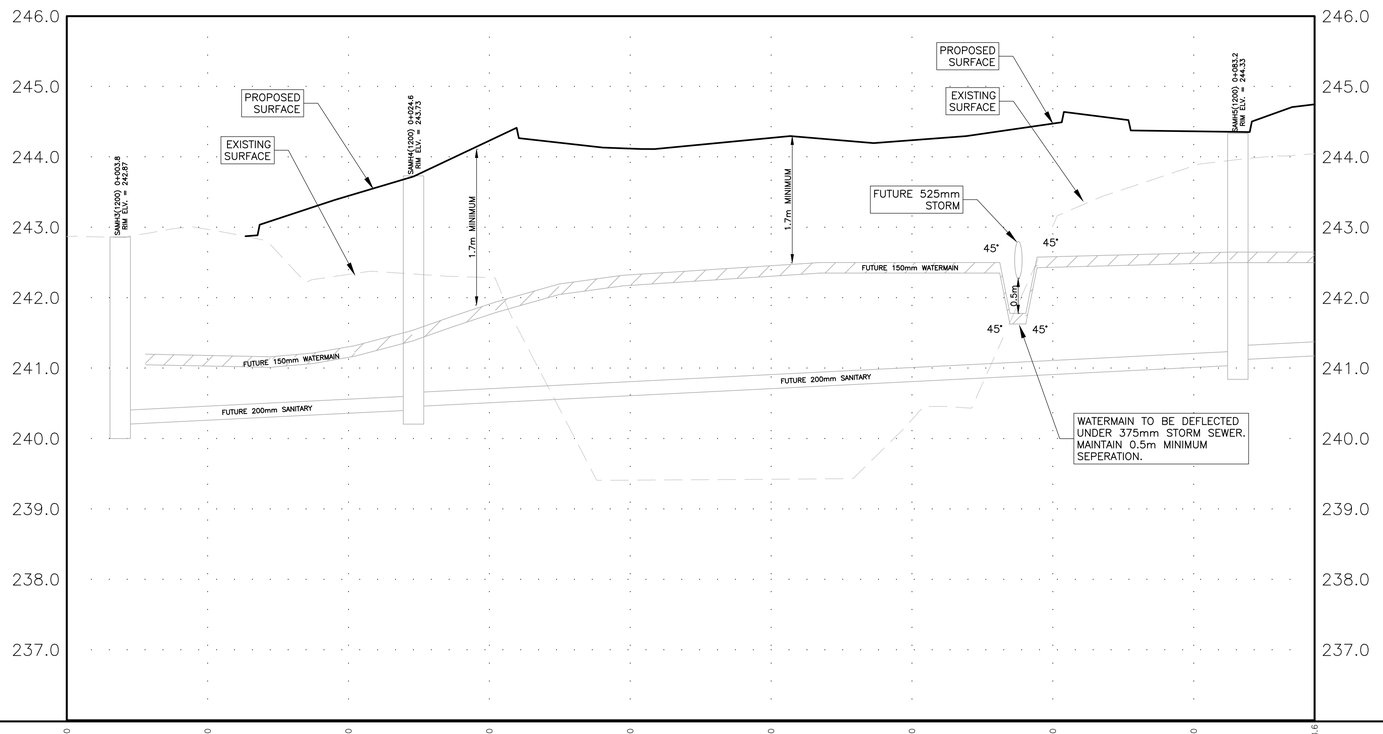

CHAINAGE	0+000	0+010	0+020	0+030	0+040	0+050	0+060	0+070	0+080	0+088.6
PROPOSED ELEVATIONS			243.45	244.23	244.12	244.27	244.24	244.47	244.36	244.75
STORM SEWER									11.9m OF 200mm PVC SANITARY WITH CLASS B BEDDING @ -1.00%	
SANITARY SEWER	240.20E	20.5m OF 200mm PVC SANITARY WITH CLASS B BEDDING @ 1.00%	240.44W 240.46E	58.6m OF 200mm PVC SDR 35 SANITARY WITH CLASS B BEDDING @ 1.00%					241.04W 241.12E	

DATE LAST PLOTTED : August 22, 2024

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BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #26 LAM BOULEVARD.
ELEV.....245.91m

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LICENSED PROFESSIONAL ENGINEER
20128
2024-08-27
J. T. IEZZI
100189485
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD - NORFOLK COUNTY

Drawing Title
PLAN AND PROFILE
PHASE 2 SERVICES

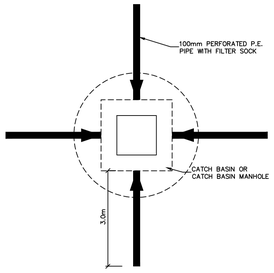
Designed by : NBN/NLO	Drawn By : NBN
Checked by : JTI	Date Started : 4/16/24
Drawing Scale : AS SHOWN	Drawing No. C107
Project No. 20-128	

GENERAL NOTES

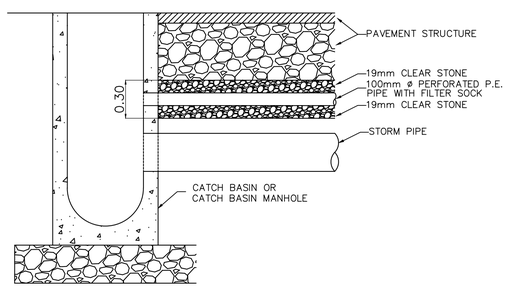
1. ALL PLANS TO BE REVIEWED IN CONJUCTION WITH THE ARCHITECTURAL DRAWING SET A100 – A112.
2. PRIOR TO CLOSING ANY STREET, THE CONTRACTOR SHALL OBTAIN CLEARANCE BY FILLING 1. OUT THE COUNTY'S NOTICE OF ROAD CLOSURE FORM AND NOTIFY SCHOOL BUS OPERATORS OF STREETS USED FOR DETOUR AND THE DURATION OF THE DETOUR. THE CONTRACTOR MUST SUPPLY AND MAINTAIN ADEQUATE LOCAL DETOUR SIGNS AND LIGHTS.
3. THE CONTRACTOR MUST MAINTAIN MAXIMUM ACCESS TO ALL PROPERTIES AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY MEASURES TO CONTROL SILT 2. ENTERING THE STORM DRAINAGE SYSTEM TO THE SPECIFICATIONS OUTLINED IN THE GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES PREPARED BY THE MINISTRY OF NATURAL RESOURCES. THESE MEASURES ARE TO BE INSTALLED PRIOR TO COMMENCING ANY CONSTRUCTION FOR THIS STREET AND ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION HAS BEEN COMPLETED TO THE SPECIFICATIONS OF THE ENGINEER. THE CONTRACTOR IS TO MEET ALL THE REQUIREMENTS OF THE OWNERS OF THE UTILITIES.
4. ON THIS PLAN, AND MUST MAKE SATISFACTORY ARRANGEMENTS WITH THE UTILITY COMPANIES FOR CROSSING THEIR INSTALLATIONS AND FOR PROVIDING ADEQUATE PROTECTION DURING CONSTRUCTION. PRIOR TO COMMENCING ANY CONSTRUCTION, ALL EXISTING UNDERGROUND UTILITIES SHALL BE.
5. LOCATED AND MARKED. ANY UTILITIES DAMAGED OR DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE OWNER AT THE CONTRACTORS EXPENSE. ALL ORGANIC, SUITABLE OR UNSUITABLE MATERIALS BENEATH THE ROAD ALLOWANCES MUST BE.
6. REMOVED AND THESE AREAS BACKFILLED WITH AN APPROVED FILL MATERIAL, ALL TO THE SATISFACTION OF THE ENGINEER.
7. PRIOR TO COMMENCING ANY CONSTRUCTION, ALL EXISTING SEWER OUTLET INFORMATION, BENCHMARKS, DIMENSIONS, ELEVATIONS AND GRADES MUST BE CHECKED AND VERIFIED AND ANY DISCREPANCIES REPORTED TO THE ENGINEER IMMEDIATELY.
8. ALL CATCH BASIN LEADS FOR SINGLE CATCH BASINS SHALL BE 250mm ø PVC SDR35 WITH CLASS 'B' BEDDING. ALL CATCH BASIN LEADS FOR TWIN INLET CATCH BASINS SHALL BE 300mm ø PVC SDR35 WITH CLASS 'B' BEDDING.
9. ALL PVC WATERMAIN SHALL HAVE TWU 10 COPPER TRACING WIRE LAID ALONG ENTIRE LENGTH. WATERMAIN SHALL HAVE 1.7m TO 1.9m COVER WITH CLASS 'B' BEDDING.
10. ALL 50mm WATER SERVICE TO BE BLUE904 SDR9 PEX AND ALL 150mm WATERMAIN TO BE PVC DR18 BLUE BRUTE WITH MANUFACTURED FITTINGS.
11. WATERMAIN FITTINGS SHALL BE MECHANICAL JOINT OR PUSH–ON JOINT INSTALLED WITH APPROVED MECHANICAL THRUST RESTRAINTS.
12. ALL MECHANICAL THRUST RESTRAINTS SHALL CONFORM TO CONTRACT DOCUMENT SPECIFICATIONS.
13. WHERE A WATERMAIN OR WATER SERVICE CROSSES ABOVE A STORM OR SANITARY SEWER, A MINIMUM VERTICAL CLEARANCE OF 0.50m SHALL BE PROVIDED. WHERE THE WATERMAIN OR WATER SERVICE IS UNABLE TO CROSS ABOVE THE SEWER, IT SHALL CROSS UNDERNEATH WHILE PROVIDING A MINIMUM SEPARATION OF 0.5m BETWEEN THE SEWER INVERT AND THE CROWN OF THE WATERMAIN OR WATER SERVICE. WHERE A STORM OR SANITARY SEWER CROSSES ANOTHER STORM OR SANITARY SEWER, A MINIMUM VERTICAL CLEARANCE BETWEEN PIPE BARRELS OF 0.50m SHALL BE PROVIDED.
14. PROPOSED SEWERS TO ADHERE TO THE FOLLOWING OPSD:
    - MAINTENANCE HOLE STRUCTURES OPSD 701.01X
    - BENCHING OPSD 701.021
    - SINGLE CATCH BASIN STRUCTURE 600mm X 600mm OPSD 705.010
    - 1200mm MAINTENANCE HOLE GRATE OPSD 401.010
    - 1200mm CATCH BASIN MAINTENANCE HOLE GRATE OPSD 400.020
    - SINGLE CATCH BASIN GRATE 600mm X 600mm OPSD 400.020
    - ALL COMPONENTS OF THE PROPOSED SEWERS ARE TO ADHERE TO DIVISION 700 OF THE OPSD.
15. ALL STORM SEWERS TO BE PVC DR35 WITH CLASS B BEDDING.
16. PROPOSED SANITARY TO BE PVC DR35 WITH CLASS 'B' BEDDING.
17. FIRE HYDRANTS TO BE AWWA C502 COMPLIANT, NON–DRAINING, OPEN LEFT.
18. MUNICIPALITY WATERMAIN PROCEDURES TO BE ADHERED TO FOR INSTALLATION OF WATERMAINS OR SERVICES
19. WATERMAINS AND WATER SERVICES SHALL MAINTAIN A MINIMUM COVER OF 1.7m.
20. PROVIDE 2.5m MINIMUM HORIZONTAL CLEARANCE BETWEEN THE PROPOSED WATERMAIN AND ANY STORM OR SANITARY SEWERS OR MAINTENANCE HOLES.

LEGEND

- EX. STORM SEWER
- PROPOSED STORM SEWER
- EX. SANITARY SEWER
- PROPOSED SANITARY SEWER
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- EX. MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED TWIN INLET CATCHBASIN
- PROPOSED CATCHBASIN MANHOLE
- EX. CATCHBASIN
- PROPOSED WATERMAIN
- EX. WATERMAIN
- PROPOSED 3–WAY FIRE HYDRANT C/W STORZ CONNECTION
- EX. FIRE HYDRANT
- PROPOSED WATERVALVE
- EX. WATERVALVE
- EX. BURIED GAS LINE (G)
- EX. BURIED BELL LINE (B)
- EX. BURIED CABLE LINE (CATV)
- EX. UNDERGROUND HYDRO LINE (UH)



SUBDRAIN PLAN DETAIL
N.T.S.



SUBDRAIN SECTION DETAIL
N.T.S.

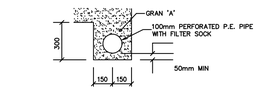
GENERAL SEDIMENT CONTROL MEASURES

1. PROTECT ALL EXPOSED SURFACES AND CONTROL ALL RUNOFF DURING CONSTRUCTION
2. ALL EROSION CONTROL MEASURES TO BE IN PLACE BEFORE STARTING CONSTRUCTION AND REMAIN IN PLACE UNTIL RESTORATION IS COMPLETE
3. MAINTAIN EROSION CONTROL MEASURES DURING CONSTRUCTION
4. ALL COLLECTED SEDIMENT TO BE DISPOSED OF AT AN APPROVED LOCATION
5. MINIMIZE AREA DISTURBED DURING CONSTRUCTION
6. ALL DEWATERING TO BE DISPOSED OF IN AN APPROVED SEDIMENTATION BASIN
7. PROTECT ALL CATCHBASINS, MANHOLES AND PIPE ENDS FROM SEDIMENT INTRUSION WITH GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUIVALENT)
8. KEEP ALL SUMPS CLEAN DURING CONSTRUCTION
9. PREVENT WIND–BLOWN DUST
10. STRAW BALES TO BE USED IN LOCALIZED AREAS AS SHOWN AND AND AS DIRECTED BY THE ENGINEER DURING CONSTRUCTION

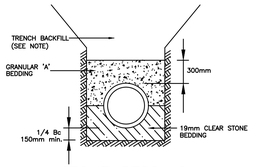
ROAD & BOULEVARD RESTORATION

ALL DISTURBED AREAS SHALL BE RESTORED AS FOLLOWS:

i. ALL ROAD CUTS SHALL BE RESTORED WITH
   - –40mm HL3 SURFACE ASPHALT (97% MARSHALL)
   - –50mm HL8 BASE ASPHALT (97% MARSHALL)
   - –150mm GRANULAR "A" BASE (100% SPMDD)
   - –300mm GRANULAR "B" TYPE 2 SUBBASE (100% SPMDD)
   - GRANULAR "B" TO BE EXTENDED 0.3m BEHIND EDGE OF THE PAVEMENT
   - –UNSHRINKABLE FILL (OPSS 1359) TO BE USED UP TO SUBGRADE LEVEL
ii. BOULEVARDS SHALL BE RESTORED WITH SOD OVER 100mm TOPSOIL (min) UNLESS OTHERWISE NOTED
iii. ASPHALT DRIVEWAYS SHALL BE RESTORED WITH 150mm OF GRANULAR "A" (100% SPMDD) WITH 50mm OF HL3A ASPHALT (97% MARSHALL)
iv. GRAVEL DRIVEWAYS SHALL BE RESTORED WITH 150mm OF GRANULAR "A" (100% SPMDD)
v. CONCRETE DRIVEWAYS SHALL BE RESTORED WITH 150mm OF GRANULAR "A" (100% SPMDD) WITH 150mm OF CONCRETE (OPSS MIX. 30MPa MINIMUM)

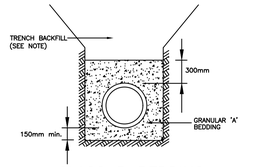


SUBDRAIN DETAIL



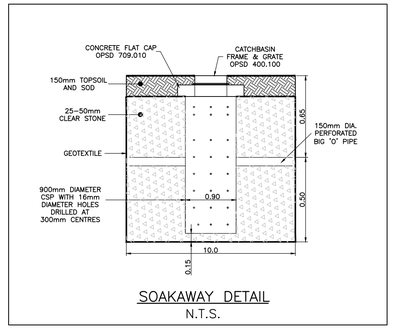
STONE BEDDING

NOTES:
1. 19mm CLEAR STONE STONE BEDDING SHALL BE USED IN PLACE OF THE STANDARD BEDDING WHERE HIGH HYDRAULIC GRADIENT CONDITIONS ARE ENCOUNTERED DURING CONSTRUCTION.

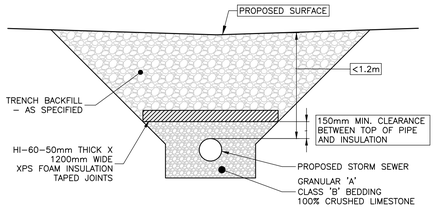


CLASS B BEDDING

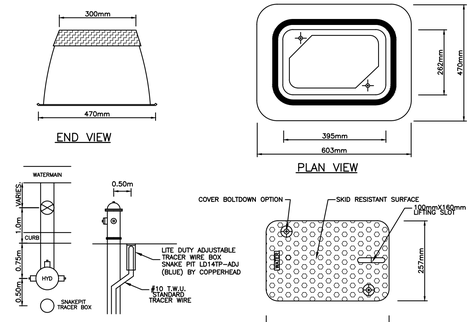
NOTES:
1. PIPE BEDDING AS SPECIFIED ON PLAN AND PROFILE DRAWINGS COMPACTED TO 95% SPMDD IN LAYERS NOT EXCEEDING 150mm, TO 300mm ABOVE TOP OF PIPE.
2. TRENCH BACKFILL FROM TOP OF PIPE BEDDING TO UNDERSIDE OF GRANULAR "B" SUBBASE SHALL CONSIST OF APPROVED NATIVE MATERIALS COMPACTED TO 95% SPMDD IN LAYERS NOT EXCEEDING 300mm.
3. PRIOR TO PLACING THE GRANULAR SUBBASE MATERIAL ALL TOPSOIL, SOFT OR OTHERWISE COMPRESSIBLE MATERIAL MUST BE REMOVED FROM THE SUBGRADE AREA AND THE SUBGRADE SHALL BE PROOF–ROLLED TO COMPACT ANY LOOSE SURFACE ZONES. ALL EXCAVATED AREAS MUST BE BACKFILLED WITH APPROVED ON–SITE NATIVE MATERIALS OR IMPORTED

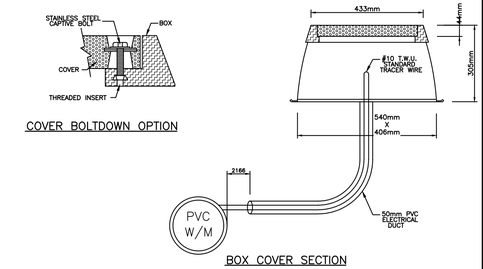


SOAKAWAY DETAIL
N.T.S.

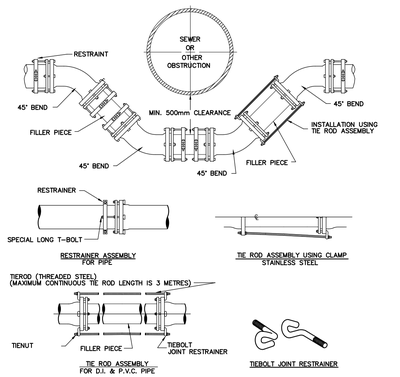


TYPICAL STORM INSULATION FOR STORM WITH <1.2m COVER
N.T.S.





TRACER WIRE HAND HOLE DETAIL
N.T.S.



WATERMAIN DEFLECTION DETAIL

WATERMAIN RESTRAINTS TABLE						
DIAMETER (mm)	MINIMUM LENGTH TO BE RESTRAINED ON EACH SIDE OF FITTINGS (m)					
	11–1/4°	22–1/2°	45°	90° BENDS AND TEES	REDUCER (IN DIRECTION OF LARGER PIPE)	DEAD END AND VALVES
150	2			9	N/A	12

NOTES;
1. ALL JOINTS WITHIN DISTANCES SHOWN SHALL BE RESTRAINED WITH A MEG–A–LUG JOINT RESTRAINT.
2. ALL TEES SHALL HAVE A MINIMUM OF 1.0m SOLID PIPE OUT EACH SIDE OF THE MAIN RUN OF THE TEE.
3. ALL DISTANCES TO BE CONFIRMED TO THE MANUFACTURERS STANDARDS FOR ALTERNATE RESTRAINTS TO MEGALUG.

REV. No.	DATE	REVISION
0	MAR 8/24	ISSUED FOR SPA
1	APR 16/24	REVISED SPA SUBMISSION
2	AUG 22/24	SECOND SPA SUBMISSION

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ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

PLAN 37M-57, BLOCK 61, ROLL NUMBER 33605062868 IN THE TOWN OF WATERFORD IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: VERLINDA HOMES
TELEPHONE: 1-705-205-3235
ADDRESS: 99 MAPLE STREET, PORT CARLING ONTARIO, P0B 1J0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #26 LAM BOULEVARD.
ELEV.....245.91m

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

20-128-C101	SERVICING PLAN
20-128-C102	GRADING PLAN
20-128-C103	EXCESS CUT AND FILL PLAN
20-128-C104	EROSION AND SEDIMENT CONTROL PLAN
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20-128-C106	PLAN AND PROFILE PHASE 1 SERVICING
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20-128-GN	GENERAL NOTES AND DETAILS
20-128-SAN	SANITARY DRAINAGE AREAS PLAN
20-128-STM	STORM DRAINAGE AREAS PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp: LICENSED PROFESSIONAL ENGINEER — 20128 — 2024-08-27 — J. T. IEZZI — 100139485 — PROVINCE OF ONTARIO

Project Title: ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title: GENERAL NOTES

Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 7/26/2024
Drawing Scale : AS NOTED	Drawing No. GN
Project No. 20-128	

DATE LAST PLOTTED : August 22, 2024

SANITARY SEWER DESIGN SHEET

Date: 7/25/2024
Project: 20-128 Orchard Sqaure
Town/County: Simcoe, Norfolk County

Pipe Material: PVC
N 0.013

Designed by: NLO
Checked by: JTI
Sheet: 1 of 1

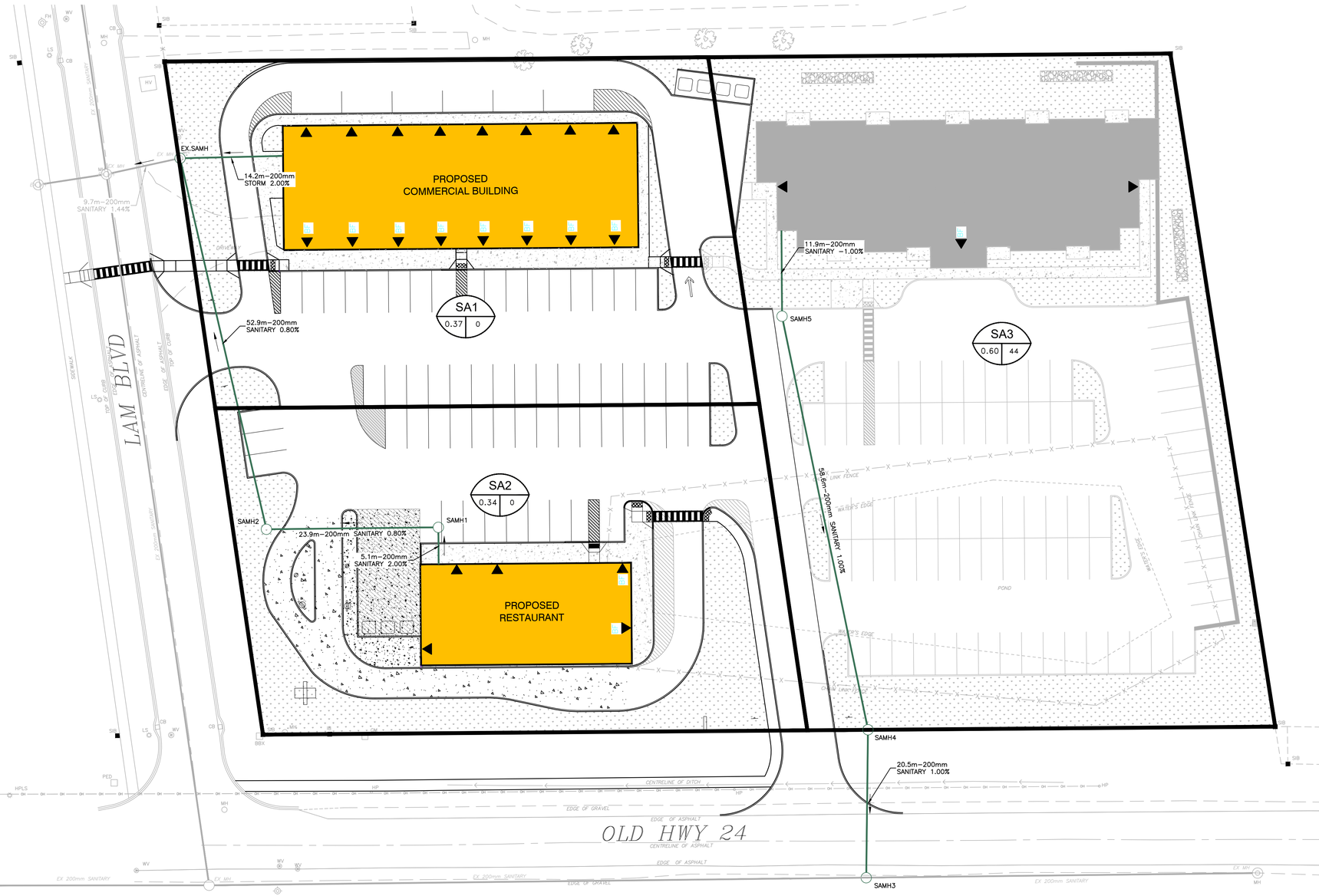
Location			Residential Area		Commercial Area		Total	Residential Services		Population			Flow			Sewer Design							
Area	From	To	Section	Cumul.	Section	Cumul.	Area	Section	Cumul.	Cumul.	KAV	M=Peak	Q(i)	Q(s)	Q(d)	Material	Size	Length	N	Slope	Cap	Q(d)/Cap	Full V
	MH	MH	Ha	Ha	Ha	Ha	Ha	Services	Services	Pop.	Factor	Factor	L/s	L/s	L/s		mm	m		%	L/s	%	m/s
SA1	COMMERICAL BUILDING	EX MH	0.00	0.00	0.37	0.37	0.370	0	0	33	0.800	3.478	0.10	0.60	0.71	PVC	200	14.2	0.013	2.00%	46.4	✓ 1.5%	1.48
SA2	RESTAURANT	SAMH1	0.00	0.00	0.34	0.34	0.340	0	0	31	0.800	3.483	0.10	0.56	0.65	PVC	200	5.1	0.013	2.00%	46.4	✓ 1.4%	1.48
-	SAMH1	SAMH2	0.00	0.00	0.00	0.34	0.340	0	0	31	0.800	3.483	0.10	0.56	0.65	PVC	200	23.9	0.013	0.80%	29.3	✓ 2.2%	0.93
-	SAMH2	EX MH	0.00	0.00	0.00	0.34	0.340	0	0	31	0.800	3.483	0.10	0.56	0.65	PVC	200	52.9	0.013	0.80%	29.3	✓ 2.2%	0.93
-	EX MH	EX MH	0.00	0.00	0.00	0.71	0.710	0	0	64	0.800	3.434	0.20	1.14	1.34	PVC	200	9.7	0.013	1.44%	39.4	✓ 3.4%	1.25
SA3	RESIDENTIAL BUILDING	SAMH5	0.60	0.60	0.00	0.00	0.600	44	44	121	1.000	4.220	0.17	2.66	2.83	PVC	200	11.9	0.013	1.00%	32.8	✓ 8.6%	1.04
-	SAMH5	SAMH4	0.00	0.60	0.00	0.00	0.600	0	44	121	1.000	4.220	0.17	2.66	2.83	PVC	200	58.6	0.013	1.00%	32.8	✓ 8.6%	1.04
-	SAMH4	SAMH3	0.00	0.60	0.00	0.00	0.600	0	44	121	1.000	4.220	0.17	2.66	2.83	PVC	200	20.5	0.013	1.00%	32.8	✓ 8.6%	1.04

Design Information:
Q(s) = Sewage Flow = P q M / 86.4
Q(i) = Infiltration Flow = I A
Q(d) = Peak Design Flow = Q(s) + Q(i)

Notes:
= Existring Pipes

P = Population in thousands
A = Tributary Area
Residential M = Peaking Factor = 1 + 14 / (4 + P^.5)
Commerical M = Peaking Factor = 0.8 (1 + 14 / (4 + P^.5)
Combined M = KAV (1 + 14 / (4 + P^.5)
KAV = (AR + (0.8*AC))/(AR+AC)

Residential q = Per Capita Flow=	450	L/cap/d
Commercial q = Per Capita Flow=	40000	L/ha/d
I = Peak Extraneous Flow =	0.28	L/s/ha
Residential Population Density =	2.75	persons /unit
Commercial Population Density =	90	persons /ha



LEGEND

SA1 — 0.99 | 4 — SANITARY DRAINAGE AREA NUMBER
AREA (ha) — NUMBER OF UNITS
SANITARY SEWER FLOW
SAMH5 — PROPOSED SANITARY SEWER
SANITARY DRAINAGE BOUNDARY

REV. No.	DATE	REVISION
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LEGAL DESCRIPTION

PLAN 37M-57, BLOCK 61, ROLL NUMBER 33605062868 IN THE TOWN OF WATERFORD IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: VILLAGES OF WATERFORD
TELEPHONE: 1-866-781-7653
ADDRESS: BOX 1152, 26 MAIN STREET, WATERFORD, N0E 1Y0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #28 LAM BOULEVARD.
ELEV.....245.91m

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PRELIMINARY
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SCALE:
HORIZONTAL : 1:300 (5, 10, 15)

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(519) 426-6270

Stamp
LICENSED PROFESSIONAL ENGINEER 20128 2024-08-27 J. T. IEZZI 100129485 PROVINCE OF ONTARIO

Project
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
SANITARY DRAINAGE AREAS

Designed by : NLO	Drawn By : NLO
Checked by : JTI	Date Started : 7/25/2024
Drawing Scale : 1:300	Drawing No. SAN
Project No. 20-128	

DATE LAST PLOTTED : August 22, 2024

Date: 7/25/2024
Project: 20-128 Orchard Square
Town/County: Waterford, Norfolk County

Return: 100-year
A 801.041
B 1.501
C 0.657
Multiplier 1.25

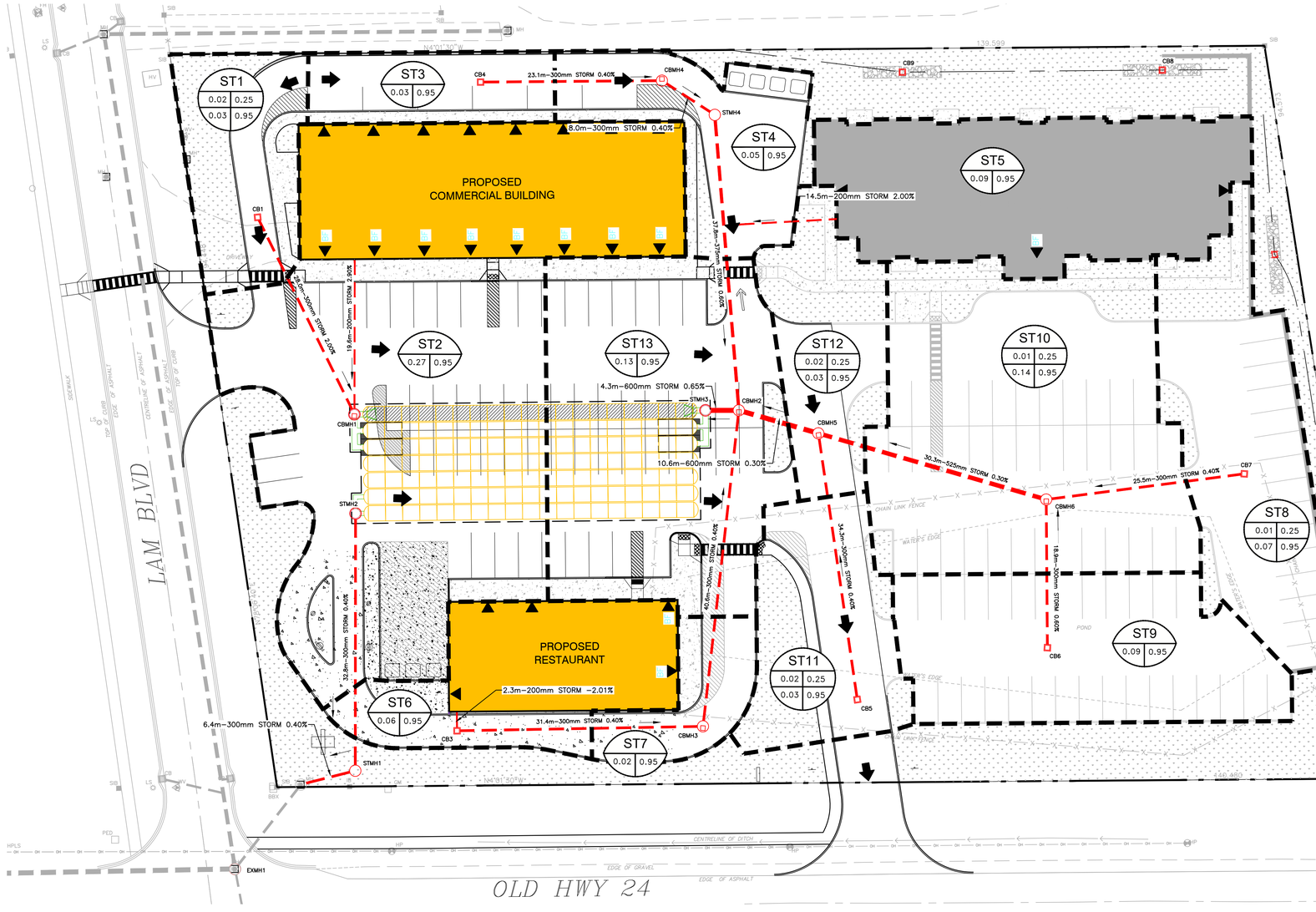
Pipe Material: PVC<=450, Concrete >450
n 0.013

Designed by: NBN/NLO
Checked by: JTI

Sheet: 1 of 1

Location			Area			Total	Individual	Cumulative	Time of	Rainfall	Flow	Sewer Design						
Area	From	To	Ha	Ha	Ha	Area	C*A	C*A	Concentration	mm/hr	2.78*I*A*C	Size	Slope	Capacity (Full)	Vel (Full)	Length	Time	Cap
			0.25	0.45	0.95	Ha			min		L/s	mm	%	L/s	m/s	m	min	%
ST1	CB1	CBMH1	0.02		0.03	0.05	0.03	0.03	5.00	234.17	27.3	300	2.00%	136.8	1.93	28.0	0.24	✓ 20%
ST3	CB4	CBMH4			0.030	0.03	0.03	0.03	5.00	234.17	23.2	300	0.40%	61.2	0.87	23.1	0.44	✓ 38%
ST4	CBMH4	STMH4			0.050	0.05	0.05	0.08	5.44	224.20	59.2	300	0.40%	61.2	0.87	8.0	0.15	✓ 97%
ST5	STMH4	CBMH2			0.09	0.09	0.09	0.17	5.60	220.99	126.9	375	0.60%	135.8	1.23	37.8	0.51	✓ 93%
ST6	CB3	CBMH3			0.06	0.06	0.06	0.06	5.00	234.17	46.4	300	0.40%	61.2	0.87	32.4	0.62	✓ 76%
ST7	CBMH3	CBMH2			0.02	0.02	0.02	0.02	5.62	220.48	14.6	300	0.40%	61.2	0.87	40.6	0.78	✓ 24%
ST8	CB7	CBMH6	0.01		0.07	0.08	0.07	0.07	5.00	234.17	54.6	300	0.40%	61.2	0.87	25.5	0.49	✓ 89%
ST9	CB6	CBMH6			0.09	0.09	0.09	0.09	5.00	234.17	69.6	300	0.60%	74.9	1.06	18.9	0.30	✓ 93%
ST10	CBMH6	CBMH5	0.01		0.14	0.15	0.14	0.29	5.49	223.23	223.5	525	0.30%	235.6	1.09	30.3	0.46	✓ 95%
ST11	CB5	CBMH5	0.02		0.03	0.05	0.03	0.03	5.00	234.17	27.3	300	0.40%	61.2	0.87	34.3	0.66	✓ 45%
ST12	CBMH5	CBMH2	0.017		0.03	0.05	0.03	0.35	5.96	214.00	262.8	600	0.30%	336.3	1.19	10.6	0.15	✓ 78%
ST13	CBMH2	STMH3			0.13	0.13	0.12	0.66	6.41	205.90	473.1	600	0.65%	495.0	1.75	4.3	0.04	✓ 96%
-	STMH2	STMH1									15.0	300	0.40%	61.2	0.87	32.8	0.63	✓ 25%
-	STMH1	EX MH1									15.0	300	0.40%	61.2	0.87	6.4	0.12	✓ 25%

LEGEND:
15 L/s = Allowable 100-year flow from from SWM Chamber Facility



LEGEND

- ST1 (0.99 | 0.45): STORM DRAINAGE AREA NUMBER; RUN–OFF COEFFICIENT; AREA (ha)
- OVERLAND FLOW (MAJOR)
- STORM SEWER FLOW (MINOR)
- STMH5: PROPOSED STORM MANHOLE
- PROPOSED INFILTRATION TRENCH
- PROPOSED SINGLE CATCH BASIN MH
- PROPOSED DOUBLE CATCH BASIN MH
- STORM DRAINAGE BOUNDARY

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ADDRESS: BOX 1152, 26 MAIN STREET, WATERFORD, N0E 1Y0

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ELEV. 245.91m

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SCALE:
HORIZONTAL : 1:300_XREF (5 10 15)

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(519) 426-6270

Stamp: LICENSED PROFESSIONAL ENGINEER 20128 2024-08-27 J. T. IEZZI 100189485 PROVINCE OF ONTARIO

Project Title: ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title: STORM DRAINAGE AREAS

Designed by : NLB	Drawn By : NLB
Checked by : JI	Date Started : 8/22/2024
Drawing Scale : 1:300_XREF	Drawing No. STM
Project No. 20-128	

DATE LAST PLOTTED : August 22, 2024

DRAWING LIST SPA

ARCHITECTURAL

A100	COVER SHEET SPA
A101	SITE PLAN NOTES - ZONING
A101A	SITE PLAN NOTES
A101B	SITE PLAN
A102	SITE PLAN DETAILS
A102A	SITE PLAN DETAILS
A102B	SITE PLAN DETAILS
A104	EARTHBIN
A104A	EARTHBIN
A105	OPSD DETAILS
A105A	OPSD DETAILS
A106	EXISTING SITE SURVEY
D100	SITE PLAN DEMO

ARCHITECTURAL PRESENTATION

P301	PRESENTATION ELEVATIONS
P302	PRESENTATION ELEVATIONS
P303	PRESENTATION ELEVATIONS

CIVIL

C101	SERVICING PLAN
C102	GRADING PLAN
C103	EROSION & SEDIMENT CONTROL PLAN
C104	SERVICES PLAN AND PROFILE
GN	GENERAL NOTES & DETAILS
SAN	SANITARY DRAINAGE AREAS PLAN
STM	STORM DRAINAGE AREAS PLAN

ELECTRICAL

EP001	ELECTRICAL GENERAL NOTES, LEGENDS AND SCHEDULES
EP100	ELECTRICAL SITE PLAN PHOTOMETRIC CALCULATIONS

LANDSCAPE

L-1	LANDSCAPE PLAN
L-2	DETAILS

ABBREVIATIONS & SHORT FORMS

GENERAL ABBREVIATIONS

A/F/F & AFF - ABOVE FINISHED FLOOR
AF - ABOVE FINISHED
ADJ. - ADJUSTABLE
ALT. - ALTERNATE
APP. - APPLICATION
ARCH. - ARCHITECTURAL
AODA - ACCESSIBILITY FOR ONTARIANS W/ DISABILITIES ACT
BD - BOARD
BF - BARRIER FREE
BFP - BACK FLOW PREVENTER
B/N/C & BNC - BULL NOSE CORNER
BOL - BOLLARD
BP - BEARING POCKET
BPP - BEARING PLATE POCKET
BR - BICYCLE RACK
CANT. - CANTILEVERED
CBS - CALL BUTTON STATION
CCJ - COMPARTMENT CONTROL JOINT
CHB - CHALK BOARD
CH.TBL. - CHANGE TABLE
CI - CONTINUOUS INSULATION
CJ - CONTROL JOINT
CM - CONTROL MODULE
CH - COAT HOOK
CMD - CARBON MONOXIDE DETECTOR
COMP. - COMPRESSIBLE / COMPRESSOR
CONT. - CONTINUOUS
CONN. - CONNECTION
CP - CONTROL PANEL
CU - CONDENSING UNIT
CV - CONTROL VALVE
CV - CENTRAL VAC
CVP - CENTRAL VAC PORT
C/W - COMPLETE WITH
DBL. - DOUBLE
DC - DROPPED CURB
DF - DRINKING FOUNTAIN
DW - DISH WASHER
DWG. - DRAWING
DIST. - DISTANCE
DISP. - DISPLAY CASE
DSR - DESIGNATED SUBSTANCE REPORT
EA - EACH
EGS - EMERGENCY CALL SWITCH
E.F. - EACH FACE
ELEV. - ELEVATION
ENG.D - ENGINEERED
ENG - ENGINEER
EPB - EMERGENCY PUSH BUTTON
EW - EYE WASH STATION
E.W. - EACH WAY
EX. - EXISTING
EXP. - EXPOSED
FB - FIRE BLOCK
FD - FLOOR DRAIN
FDTN. - FOUNDATION
FEC - FIRE EXTINGUISHER CABINET
FE - FIRE EXTINGUISHER
FDS - FOLD DOWN GRAB BAR
FLEX. - FLEXIBLE
FLR. - FLOOR
FLRING. - FLOORING
FR - REFRIDGERATOR
FRE - FREEZER
F/R/R & FRR - FIRE RESISTANCE RATING
FS - FIRE STOP
FSS - FOLD DOWN SHOWER SEAT
FTG.'S - FOOTINGS
F/V - FIELD VERIFY
FN - FOUNDATION WALL
GALV. - GALVANIZED
GAZ - GAZEBO
GB & GB# - GRAB BAR
GD - GARBAGE DISPOSAL
GEN. - GENERATOR
GL - GRID LINE
GM - GAS METER
HB - HOSE BIB
HD - HAND DRYER
H/D - HEAVY DUTY
HO - HOLD OPEN
HORIZ. - HORIZONTAL
HWH - HOT WATER HEATER
INSUL. - INSULATION
JCB - INTEGRAL COVE BASE
KP - KEY PAD
L - LOCK
M / MIRR - MIRROR
MANUF. - MANUFACTURED
MAX. - MAXIMUM
MECH. - MECHANICAL
MIN. - MINIMUM
M/O/L & MOL - MINISTRY OF LABOUR
M/O/T & MOT - MINISTRY OF TRANSPORTATION
MS - MOP SINK
MTD. - MOUNTED
MW - MICROWAVE
NADS - NORFOLK ACCESSIBILITY DESIGN GUIDELINES
N/I/C & NIC - NOT IN CONTRACT
NO. - NUMBER
NTS - NOT TO SCALE
OBC - ONTARIO BUILDING CODE
O/D - OUTSIDE DIAMETER
O/H - OVERHEAD
O/W - ONE WAY
PER.'S - PERIMETER / PERIMETERS PER.('S)
PB - POWER OPERATOR PUSH BUTTON
PDC - POWER DOOR CONTROL BUTTON
PDO - POWER DOOR OPERATOR
POS - PROTEGTION OF SOFFITS
PTD/D - PAPER TOWEL DISPENSER/DISPOSAL
P/I/P & PIP - POURED IN PLACE
PRE-FIN. - PRE-FINISHED
PROF. ENG. - PROFESSIONAL ENGINEER
P/T - PRESERVATIVE TREATED
RCH - RECESSED CABINET HEATER
REQ.D - REQUIRED
RCP - REFLECTED CEILING PLAN
REIN. - REINFORCED
REINF.'G - REINFORCING
REF. - REFERENCE
REF - REFRIDGERATOR
REL. - RELOCATED
RD - ROOF DRAIN
RM. - ROOM
R/O - ROUGH OPENING
R/WL - RAIN WATER LEADER
SA - SMOKE ALARM
SC - SAN CUT
SCD - TOILET SEAT COVER DISPENSER
SCH.'S - SCHEDULES
SD - SCUPPER DRAIN
SD - SOAP DISPENSER
SH - SOAP HOLDER
SHH - SHOWER HEAD & MIXING VALVE / WAND
SHF - SHELF
SND - SANITARY NAPKIN DISPOSAL
SNV - SANITARY NAPKIN VENDING DISPENSER
S/O/G & SOG - SLAB ON GRADE
SD - SOAP DISPENSER
SP - SUMP PUMP
SPEC.D - SPECIFIED
SPMDD - STD. PROCTOR MAX. DRY DENSITY
SR - SHOWER ROD
ST. - STOVE
STRUCT. - STRUCTURAL
TB - TACK BOARD
TBD - TO BE DETERMINED
TC - TEACHER'S CABINET/CLOSET
TH. - THERMOSTAT
THERM. - THERMAL
TM - TILTED MIRROR
TOB - TOWEL BAR
TPD - TOILET PAPER DISPENSER
TWF - THRU WALL FLASHING
TYP. - TYPICAL
ULC - UNDERWRITERS LABORATORIES OF CANADA
U/C - UNDER CUT
U/S - UNDER SIDE
U/N/O - UNO - UNLESS NOTED OTHERWISE
VAP. - VAPOUR
VAR. - VARIES
VERT. - VERTICAL
W/ - WITH
WB - WHITE BOARD/MARKER BOARD
WC - WATER COOLER
WM - WATER METER
WR - WASTE RECEPTACLE
WS - WATER SOFTENER
% - PERCENT
@ - AT
O/C - ON CENTER

MATERIAL ABBREVIATIONS

AB - ARCHITECTURAL BLOCK
ACT - ACOUSTIC CEILING TILE
ASPH. - ASPHALT
AWP - ACOUSTIC WALL PANEL
AT - ACOUSTIC TILE
AL - ALUMINUM
AN - ANODIZED
AN(C) - ANODIZED COLOURED
B - BRICK
B/B - BOARD & BATTEN
BFG - BACK PTD. GLASS
CAR - CARPET
CPT - CARPET TILE
CB - CONCRETE BLOCK
CEM - CEMENT BOARD
CET / CT - CERAMIC TILE
CONC - CONCRETE
C(H) - CONC. HARDENED & SEALED
C(S) - CONC. SEALED
C(P) - CONC. HARDENED, SEALED & POLISHED
EM - EXPANDED METAL
EP - EPOXY PAINT & PRIMER
ESF - EPOXY SEALED FLOORING
ET - EPOXY TERRAZZO
F - FIRELITE GLAZING
FG - FIBREGLASS
FT - FLOCKED TILE (CARPETING)
GB / GBD. / GYP.BD. - GYPSUM BOARD
GLB - GLASS BLOCK
GLBL - GLAZED BLOCK
GL - GLAZING / GLASS
GWG - GEORGIAN WIRE GLAZING
GM - GYM MAT
GMT - GLASS MOSAIC TILE
HM - HOLLOW METAL
HARDWD. - HARDWOOD
H/D/G - HDG - HOT DIPPED GALV.
IMP - INSULATED METAL PANELS
LGC - LEAD COATED COPPER
LINO - LINOLEUM
LSG - LAMINATED SAFETY GLAZING
LVT - LUXURY VINYL TILE
LVP - LUXURY VINYL PLANK
LXG - LEXAN GLAZING
MAR - MARMOLEUM
MAS - MASONITE
MS - METAL SIDING
MTL - METAL
MW - MOVEABLE WALL SYSTEM
NAT. - NATURAL
PB - PARTICLE BOARD
PC - PRECAST CONC.
P / PTD. - PAINTED
PF / PRE.FIN. - PREFINISHED
PL - PLASTER
PLAM - PLASTIC LAMINATE
PLYWD. - PLYWOOD
PMP - PREFORMED METAL PANEL
PSP - PIERCED STEEL PLANKING
PT - PORCELAIN TILE
PQF - PARQUET FLOORING
QT - QUARRY TILE
R - RUBBER
RB - RUBBER BASE
RSF - RESILIENT SHEET FLOORING
S - STONE
SAFF - SAFETY FLOORING
SC - SPECIAL COATING
SF - SPORTS FLOORING
SG - LAMINATED SAFETY GLASS
SGL - SPANDREL GLAZING
SHV - SHEET VINYL FLOORING
S.S. - SOLID SURFACE
ST - STUCCO
ST / STL. - STEEL
S/S - STAINLESS STEEL
S#V - STAINED & VARNISHED
SWC - SOLID WOOD CORE
T - TEMPERED GLAZING / GLASS
TDG - TEMPERED DOUBLE GLAZING / GLASS
TBB - TILE BACKER BOARD
TECTUM - TECTUM ACOUSTIC PANEL
TERR - TERRAZZO
T.S. - TOP SOIL
TURF - ARTIFICIAL TURF
U - POLYURETHANE
V - VINYL
VCGB - VINYL COATED GYPSUM BOARD
VCP - VENEER CORE PLYWOOD
VCT - VINYL COMPOSITE TILE
VPF - VINYL PLANK FLOORING
VR - VENTED RUBBER BASE
VQT - VINYL QUARTZ TILE
WD. - WOOD
WP - WATER PROOFING

RM. NAMES

AL. - AIR LOCK
CL. - CLOSET
CLASSRM. - CLASSROOM
COMM. - COMMUNICATION
CONF. - CONFERENCE
CORR. - CORRIDOR
ELEC. - ELECTRICAL
ELEV. - ELEVATOR
INST. - INSTRUCTOR
LAB - LABORATORY
LAUND. - LAUNDRY
PR. - POWDER ROOM
PRINC. - PRINCIPAL
REC. - RECEPTION
RECEIV. - RECEIVING
RM. - ROOM
SHWR. - SHOWER
STOR. - STORAGE
ST. - STATION
SURG. - SURGERY
VEST. - VESTIBULE
VP - VICE PRINCIPAL
WR. - WASHROOM

CONSULTANT LIST

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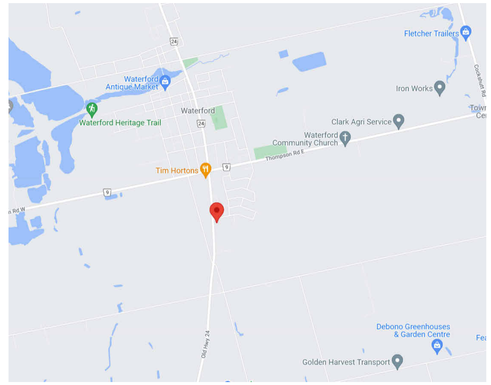
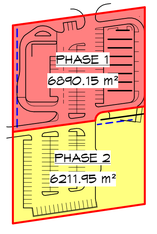
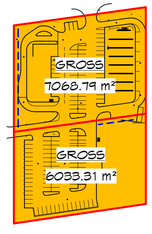


KEY MAP
SCALE 1 : 100

SITE MAP
SCALE 1 : 100



2 A100 SITE PHASING PLAN
SCALE 1 : 2000



1 A100 GROSS SITE
SCALE 1 : 2000

NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS
9	2024.07.16	SPA PHASE 2 SUB.#1
8	2024.07.10	SPA PHASE 2 SUB.#1 - OWNER REVIEW
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5	2024.03.07	PROGRESS
4	2024.03.05	PROGRESS
3	2024.02.29	PROGRESS
2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS

NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 3350502626B
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
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ORCHARD SQUARE

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STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
COVER SHEET SPA

CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE: As indicated	DRAWING NO.: A100
PROJECT NO.: 20-128	

DATE PLOTTED: 2024-08-27 3:51:37 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128- Orchard Square_Site.rvt

SITE STATISTIC & ZONING REQ.'S - PHASE 2

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062868 IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

ZONING:
IN ACCORDANCE TO ZONING BY-LAW 1-Z-2014 NORFOLK COUNTY - JULY-2020-CONSOLIDATION

PROVISION	LAND USE: EXISTING
5.5 5.5.1	URBAN RESIDENTIAL TYPE 5 ZONE (R5) (BLDG.#3) 10 PERMITTED USES In an R5 *Zone*, no land, *building* or *structure* shall be used except in accordance with the following uses: a) dwelling, apartment b) home occupation c) retirement home.
14.845 SPECIAL PROVISION	In lieu of the corresponding provisions in the R5 *Zone*, the following shall apply: a) minimum *front yard* – 60 metre; b) maximum number of *dwelling units* – forty four (44). In lieu of the corresponding provisions of Section 4.0, the following shall apply: a) minimum number of visitor *parking spaces* – eleven (11); b) *parking spaces* shall be *permitted* in the *front yard*.

PROVISION	SETBACKS (m - METERS):	REQUIRED (m)	PROVIDED (m)
5.5.2a)	MIN. LOT FRONTAGE:	30	64.4
5.5.2b)	MIN. FRONT YARD:	~~3~~ / 60	TBD >60
5.5.2c)	MIN. EXTERIOR SIDE YARD:	3	N/A
5.5.2d)	MIN. INTERIOR SIDE YARD	3	TBD >3
5.5.2e)	MIN. REAR YARD:	9	TBD >9
5.5.2f)	MAX. BLDG. HEIGHT	5 STOREYS	5 STOREYS
5.6.2g)	MAX. FLOOR AREA RATIO: i) 4 STOREY BLDG. ii) 5 STOREY BLDG.	0.72 0.79	N/A TBD <0.79
	"FLOOR AREA RATIO " shall mean the ratio of the *usable floor area* to the *lot*, determined by the calculation of: *floor area ratio = usable floor area / lot area*.		

COORD. W/ ZONING BY-LAW FOR ALL OTHER ZONING REQ.'S

SITE STATISTIC & ZONING REQ.'S - PHASE 1

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062868 IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

ZONING:
IN ACCORDANCE TO ZONING BY-LAW 1-Z-2014 NORFOLK COUNTY - JULY-2020-CONSOLIDATION

PROVISION	LAND USE: EXISTING
6.3 6.3.1	SERVICE COMMERCIAL ZONE (CS) (BLDG.#1 & 2) 10 PERMITTED USES *Permitted* Uses In a CS *Zone*, no land, *building* or *structure* shall be used except in accordance with the following uses: a) ambulance service b) *animal hospital*, provided the entire operation is carried on within an enclosed *building* c) any non-residential use *permitted* in the Neighbourhood Institutional *Zone* (IN), subject to the provisions of that *Zone* d) auction centre e) automobile gas station f) automobile service and repair station g) *automobile washing establishment* h) automotive parts shop i) bar or night club j) clinic or doctors' offices k) commercial greenhouse, tree and plant nursery l) community centre m) contractor shop n) contractor supply and service shop o) convenience store p) day care nursery q) *dry cleaning distribution station* r) dry cleaning establishment s) *dwelling, single detached* or *dwelling unit* in a non-residential *building* - maximum one (1) *[8-Z-2020]* t) equipment rental establishment u) farm implement sales and service establishment v) financial institution w) fire hall x) florist shop y) fruit and vegetable outlet z) funeral home aa) garden supply centre bb) home occupation cc) hotel dd) laundromat ee) *lumber yard and building supply establishment* ff) manufacturing and retail sale of monuments gg) merchandise service shop hh) miniature golf, golf driving range and baseball pitch ii) *outdoor storage* accessory to *permitted* uses jj) *parking lot* or *structure* kk) personal service shop ll) place of assembly mm) place of sports and recreation nn) *place of worship* oo) police station pp) private club qq) *restaurant* rr) *restaurant, fast-food* ss) *restaurant, take-out* tt) sheet metal, plumbing, heating, electrical or woodworking shop or any similar activity uu) swimming pool sales and service establishment vv) training and rehabilitation centre ww) *vehicle sales or rental establishment* xx) video store yy) wholesale outlets.
14.1043 SPECIAL PROVISION	to permit a retail use of 810m² of useable floor area within the service commercial (CS) zone.

PROVISION	SETBACKS (m - METERS):	REQUIRED (m)	PROVIDED (m)
6.3.2a)	MIN. LOT AREA: i) INTERIOR LOT ii) CORNER LOT	450m² 495m²	PROPOSED 7069m²
6.3.2b)	MIN. LOT FRONTAGE: i) INTERIOR LOT ii) CORNER LOT	15 16.5	PROPOSED 75.5
6.3.2c)	MIN. FRONT YARD:	3	9.4
6.3.2d)	MIN. EXTERIOR SIDE YARD:	3	12.6
6.3.2e)	MIN. INTERIOR SIDE YARD	3	11.1
6.3.2f)	MIN. REAR YARD:	9	9
6.3.2g)	MIN. USABLE FLOOR AREA: FOR A DWELLING UNIT IN A NON-RESIDENTIAL BLDG.	40m²	N/A
6.3.2h)	MAX. BLDG. HEIGHT	11	~9.14 RESTAURANT ~6.25 COMMERCIAL
6.3.2i)	MAX. LOT COVERAGE	35%	~17.8
6.3.2j)	MAX. USABLE FLOOR AREA: OF A FRUIT AND VEGETABLE OUTLET	200m²	N/A
6.3.2k)	OUTDOOR STORAGE	PROHIBITED IN A FRONT YARD & WITHIN 3m OF ANY LOT LINE ADJOINING A RESIDENTIAL ZONE	PROHIBITED IN A FRONT YARD & WITHIN 3m OF ANY LOT LINE ADJOINING A RESIDENTIAL ZONE
6.3.3	Outdoor Display of Goods Outdoor display of *vehicles* on paved areas shall be *permitted* in the *front yard* subject to Subsection 6.3.5. Outdoor display of other non-vehicular items shall be *permitted* within a *front yard* provided such display is located on a grassed or landscaped area without surrounding fences and subject to Subsection 6.3.5.		
6.3.4	Landscaped Strip All *buildings*, *parking lots* and *parking spaces* and display areas shall be *setback* 3 metres from the *front lot line*. This area shall be landscaped which may include patio pavers.		
6.3.5	*Zone* Provision for *Convenience Store* The *usable floor area* of a *convenience store* shall not exceed 280 square metres.		
6.3.6	*Zone* Provisions for *Dwellings* Notwithstanding the provisions in Subsection 6.3.2, all *single detached dwellings* shall conform to the Urban Residential Type 3 (R3) *Zone* provisions in Subsection 5.3. [8-Z-2020] [27-Z-2020]		

COORD. W/ ZONING BY-LAW FOR ALL OTHER ZONING REQ.'S

2.0 DEFINITIONS

2.170	"USABLE FLOOR AREA " shall mean the total area of all floors of a *building, outdoor patio or cafe*, or *dwelling unit* including: a) a hallway, aisle, stairway and corridor within a suite or unit; b) an internal wall and partition within a suite or unit; c) a storage room and storage area within a suite or unit; d) a *boatslip* in the case of a *boathouse*; e) a *habitable room* or area in the *basement* of a *dwelling*. But excluding: a) an area occupied by a common area in a multi-tenant *building* including but not limited to a public stairwell, public or shared corridor and lobby; b) a mechanical shaft; c) an entry vestibule not within a *dwelling unit*; d) a garage attached to a *building*; e) an unfinished *basement* in a *dwelling* used for storage or laundry. The *usable floor area* for a *dwelling* is measured from the outside face of exterior walls or to the centre-line of party or *common walls*. The *usable floor area* for all other *buildings* shall be measured from the inside face of exterior walls, interior *common walls* and firewalls.

2.81	"LANDSCAPE AREA " shall mean an area of land comprised of trees, shrubs, flowers, grass or other horticultural elements. Landscaping may include pervious paths, patios, walkways, or elements designed to enhance the visual amenity of a property but does not include open storage display areas, parking or loading areas, or areas covered by *driveways*. *[5-Z-2018]*

3.0 GENERAL PROVISIONS

3.8.	Exemptions from Height Provisions The height provisions of this By-Law shall not apply to the following uses: a) belfry, steeple, spire, clock or bell tower, dome, cupola, or flag pole; b) chimney or stack; c) radio, television or telecommunication antennae; d) aids to navigation; e) electrical transmission tower or pylon; f) water storage *structure*; g) barn, silo, drying elevator or tower, fire training tower, kiln, windmill, grain elevator; h) elevator enclosure or mechanical penthouse occupying not more than 10 percent of the area of the roof of a *building* on which it is located; i) machinery for the moving of industrial and extractive materials and housing frames and *structures* for such machinery; j) hospital.
3.10.	Exemptions from *Yard* Provisions Except as otherwise provided *herein*, every part of any *required yard* shall be open and unobstructed by any *building, structure,* fuel-storage tanks, heating or air conditioner units, and generators except: a) sills, belt courses, cornices, chimneys, bay windows, pilasters, hydro meters or gas meters may project into any *required yard* or *setback* area a distance of not more than 0.65 metres; b) eaves or gutters may project into any *required yard* or *setback* area a distance of not more than 0.65 metres; c) canopies or awnings may project into any *required rear yard*, *required front yard* or *required exterior side yard* area a distance of not more than 1.5 metres; d) *balconies* may project into any *required rear yard, required front yard* or *required exterior side yard* area a distance of not more than 1.5 metres provided they are no closer than 3 metres from an *interior lot line* and 6 metres from a *rear lot line*; e) barrier-free access ramps may project into any *required rear yard, required front yard* or *required exterior side yard* area a distance of 3 metres; f) steps may project into any *required rear yard, required front yard* or *required exterior side yard* area a distance or not more than 1.5 metres; and steps may project into any *required interior side yard* area a distance of 1 metre. g) Public utilities may project into any *required rear yard, required front yard, required interior side yard* area or *required exterior side yard* area. *[66-Z-2018]* h) Air conditioner units, provided the encroachment is no closer than 0.6 metres to the *side lot line*. [*27-Z-2020*]
3.11.	Frontage on a *Street* 3.11.1 No *building* or *structure* shall be *erected, altered* or enlarged on any land which does not have the minimum *required lot frontage* on an open, constructed and year-round, *improved street*. 3.11.2 For the purposes of this Subsection, a private condominium road servicing a condominium development shall be deemed to be an open, constructed and year-round *improved street*.

PARKING REQ.'D: RESIDENTIAL

PROVISION	NUMBER OF PARKING SPACES	REQUIRED	PROVIDED
4.9b)	APARTMENT DWELLING [8-Z-2017]: 1.5 SPACES / DWELLING UNIT 1.5 SPACES x 44 DWELLING UNITS = 66	66 SPACE(S)	66 SPACE(S)

PARKING REQ.'D RESIDENTIAL - VISITOR:

4.9f)	VISITOR PARKING: 1 SPACE / 3 DWELLING UNITS 1 SPACE x (44 / 3) = 15	15 SPACE(S)	15 SPACE(S)

PARKING REQ.'D TOTAL:

	TOTAL	81 SPACE(S)	81 SPACE(S)

PARKING REQ.'D - BARRIER FREE: (PART OF REQ.'D VISITOR PARKING)

4.3.3	BARRIER FREE PARKING REQ.'D: 1-25 (VISITOR) PARKING SPACES =		
	TYPE 'A' (3.4m WIDE) PLUS 1.5m AISLE TYPE 'B' (2.4m WIDE) PLUS 1.5m AISLE *Where an uneven number of accessible *parking spaces* are *required*, the extra type B space may be changed to a type A space.	1 SPACE(S) 0 SPACE(S)	2 SPACE(S) 2 SPACE(S)

PARKING REQ.'D: NON-RESIDENTIAL

4.9kk)	RESTUARANT, FAST FOOD WITH DRIVE THROUGH: 1 SPACE / 10m² 1 SPACE x (364 / 10m²) = 36.4	37 SPACE(S)	41 SPACE(S)
4.9uu)	OTHER NON-RESIDENTIAL USES: (COMMERCIAL) 1 SPACE / 35m² 1 SPACE x (811.5 / 35m²) = 23.2	24 SPACE(S)	25 SPACE(S)

PARKING REQ.'D TOTAL:

	TOTAL	61 SPACE(S)	66 SPACE(S)

PARKING REQ.'D - BARRIER FREE: (PART OF REQ.'D PARKING)

4.3.3	BARRIER FREE PARKING REQ.'D: 51-75 PARKING SPACES =		
	TYPE 'A' (3.4m WIDE) PLUS 1.5m AISLE TYPE 'B' (2.4m WIDE) PLUS 1.5m AISLE	1 SPACE(S) 2 SPACE(S)	2 SPACE(S) 2 SPACE(S)

4.0 OFF STREET PARKING

PARKING SPACE DIMENSIONS

4.1 4.1.3a) 4.1.3b)	PARKING SPACE DIMENSIONS WIDTH OF PARKING SPACE: FOR VEHICLES PARKED SIDE BY SIDE FOR VEHICLES PARKED WITH WALL OR FENCE ADJ. DEPTH OF PARKING SPACE: FOR 90 DEGREE PARKING FOR PARALLEL PARKING	3 MIN. 3.3 MIN. 5.8 MIN. 7 MIN.	3 3.3 5.8 7
4.1.4 4.1.4b)	PARKING AISLE REQ.'S TWO-WAY TRAFFIC	7.3 MIN.	7.3 MIN.

4.2 LOCATION OF PARKING ON A LOT

4.2.1	All *parking spaces* shall be wholly provided on the *lot* occupied by the *building, structure* or use for which the *parking spaces* are *required* except where a *lot* has both residential and non-residential *Zones* in which case any *parking spaces* for non-residential use shall not be *permitted* on any portion of the *lot Zoned* residential.
4.2.2	No parking area shall be located in any *sight triangle*.
4.2.4 14.845 SPECIAL PROVISION	4.2.4 Other Provisions a) For tri-plex dwellings, duplex dwellings, four-plex dwellings, street townhouses, stacked townhouses, and boarding or lodging houses, required parking spaces shall be prohibited within the required front yard or required exterior side yard; except where a dwelling unit has a private garage in which case the driveway leading to the private garage may be used as a parking space subject to the size requirements herein; b) for *group townhouses* and *apartment dwellings*, no *parking lot* shall be located closer than 3 metres from any *dwelling* on the *lot* or of any *interior lot line* abutting another residential *Zone*; ~~c) for *group townhouses* and *apartment dwellings*, no parking lot or *parking space* shall be located between a *dwelling* and the *street line*, except for individual or tandem *parking spaces* leading directly to each *townhouse dwelling unit*;~~ d) for commercial or industrial properties, no *parking lot* shall be located closer than 4.5 metres from any *interior lot line* abutting a residential *Zone*; e) for *accessory residential dwelling units*, notwithstanding the foregoing, one (1) *parking space* dedicated for the use of the *accessory residential dwelling unit*, may be *permitted* in the *front yard* provided a minimum of 50 percent of the *required front yard* shall be maintained as landscaped open space notwithstanding such dedicated *parking space*.
4.6	4.6 Parking for Multiple Uses When a *building, structure* or *lot* accommodates more than one (1) type of use, the *parking space* requirement for such *building, structure* or *lot* shall be the sum of the requirements for the separate uses thereof.

PARKING REQ.'D - LOADING SPACES

4.7	LOADING SPACES: 3m WIDTH x 10m DEPTH	N/A	1

PARKING NOT REQ.'D - PICK UP PULL FORWARD SPACES (DRIVE THRU)

	PICK UP PULL FORWARD SPACES:	N/A	2

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NO.	DATE	ISSUANCE

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IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152
WATERFORD, ON.,
NOE 1YO
TELEPHONE NO.: 1.705.205.3235

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ONTARIO ASSOCIATION OF ARCHITECTS
Melissa Stickl
MELISSA NICOLE STICKL
LICENCE 7887
Aug. 27, 2024

STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA,
N0E 1Y0

DRAWING TITLE:
SITE PLAN NOTES - ZONING

CHECKED BY: MS	DRAWN BY: JS
DRAWING SCALE: 1 : 100	DRAWING NO.: A101
PROJECT NO.: 20-128	

DATE PLOTTED 2024-08-27 3:51:37 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt

EASMENTS - FILE NUMBER: BNPL2023270

BLDG. HEIGHT - NORFOLK COUNTY:
shall mean the vertical distance between the average *finished grade* of the ground at the front wall of a *building* and:
a) in the case of a flat roof or a mansard roof, the highest point of the roof surface;
b) in the case of any other roof, the highest point of the ridge. *[8-Z-2017]*

DISCLAIMER:
ALL EXISTING SITE INFORMATION WAS PROVIDED BY JEWITT & DIXON LTD. ONTARIO LAND SURVEYORS IN THE FORM OF AN ELECTRONIC FILE PLAN FILE No. 21-3143-TOPO DATED 2021.10.18 CONSISTING OF THE LEGAL SURVEY PLAN & TOPOGRAPHY
(COORD. W/ A106 DWG.)

REFERENCE NOTE:
FOR OTHER SITE CONDITIONS, EXISTING TO REMAIN OR NEW TO BE PROVIDED, THIS DWG. IS TO BE READ IN CONJUNCTION W/ ALL OTHER DWG.'S LISTED ON A100 DWG. LIST

LIGHTING NOTE:
LIGHTING MUST BE DIRECTED ON SITE AND MUST NOT SPILL OVER TO / ONTO ADJACENT PROPERTIES OR STREETS. PROVIDE "HOUSE SHIELDS" WHERE NEEDED, TO COMPLETELY ELIMINATE SPILL / GLARE TO ADJACENT PROPERTIES, DARK SKY COMPLIANT
(COORD. W/ ELEC. PHOTOMETRIC SITE PLAN)

BEFORE STARTING WORK

- THE *AUTHORITY HAVING JURISDICTION* IS NORFOLK COUNTY
- THE CONTRACTOR SHALL NOTIFY THE *AUTHORITY HAVING JURISDICTION*, ARCHITECT & CONSULTANTS AT LEAST 48 HOURS PRIOR TO COMMENCING ANY CONST. OR DEMOLITION.
- THE POSITION OF THE POLE LINES, CONDUITS, WATER MAINS, SEWERS, & OTHER UTILITIES & STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DWG.'S. WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES & STRUCTURES IS NOT GUARANTEED & ARE TO BE VERFIED ON SITE.
- ALL POSITIONS OF THE EX. UNDERGROUND UTILITIES WITHIN THE LIMITS OF CONST. SHALL BE LOCATED, MARKED & PROTECTED BY THE CONTRACTOR. ANY UTILITIES DAMAGED OR DISTURBED DURING CONST. SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER, AT THE CONTRACTOR'S EXPENSE.
- PRIOR TO THE COMMENCEMENT OF CONST., ALL BENCHMARKS, ELEVATIONS, DIMENSIONS, & GRADES MUST BE CHECKED BY THE CONTRACTOR & ANY DISCREPANCIES REPORTED TO THE ENGINEER / ARCHITECT

BENCHMARKS
TWO DIFFERENT BENCHMARKS MUST BE REFERRED TO @ ALL TIMES; ELEVATIONS ARE REFERRED TO GEODETIC BENCHMARKS
BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #26 LAM BOULEVARD, HAVING AN ELEVATION = 245.91m (GEODETIC DATUM)

SITE PLAN NOTES

- ALL WORK INVOLVED IN THE CONST., RELOCATION, REPAIR OF MUNICIPAL SERVICES FOR THE PROJECT SHALL BE TO THE SATISFACTION OF THE *AUTHORITY HAVING JURISDICTION*
- FIRE ROUTE SIGNS & 3-WAY FIRE HYDRANTS SHALL BE ESTABLISHED TO THE SATISFACTION OF THE LOCAL FIRE DEPARTMENT & AT THE EXPENSE OF THE OWNER.
- ALL DRIVEWAYS FROM PROPERTY LINES FOR THE FIRST 7.5m SHALL BE WITHIN 5% MAX. GRADE, THEREAFTER, ALL DRIVEWAYS SHALL BE WITHIN 10% MAX. GRADES.
- OBC 3.2.5.6.(d) - ALL DRIVEWAYS FROM PROPERTY LINES SHALL HAVE A CHANGE OF GRADIENT NOT MORE THAN 1 IN 12.5 (8%) OVER A MINIMUM DISTANCE OF 15m
- THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE CONTRACTOR FROM THE REQ.'S TO OBTAIN THE VARIOUS PERMITS/APPROVALS AS MAY BE REQUIRED, SUCH AS, BUT NOT LIMITED TO:

- BUILDING PERMIT
- SANITARY / STORM & WATER PERMITS
- ROAD CUT PERMITS
- RELOCATION OF SERVICES
- APPROACH APPROVAL PERMITS
- ENCROACHMENT AGREEMENTS (IF REQ.'D)
- COMMITTEE OF ADJUSTMENT
- ROAD OCCUPANCY PERMIT
- SITE ALTERATION

- ABANDONED ACCESSES MUST BE REMOVED & THE CURB & BOULEVARD RESTORED W/ SOD AT THE OWNER'S EXPENSE TO THE SATISFACTION OF THE TRAFFIC ENGINEERING SECTION & PUBLIC WORKS DEPARTMENT.

GENERAL NOTES:

- FIRE ACCESS ROUTE TO BE POSTED & DESIGNATED UNDER MUNICIPAL BY-LAW (FIRE ACCESS ROUTE TO BE MIN. 6 m WIDE W/ A MIN. 12 m CENTER LINE TURNING RADIUS & MAX. 6% SLOPE)
- COORD. W/ MECH. & ELEC. SITE PLANS FOR ALL EX. & NEW LOCATIONS OF SERVICES & ENTRY OF SERVICES INTO THE BLDG. ENVELOPE. (ALL MECH. & ELEC. INFORMATION INDICATED ON ARCH. SITE DWG. A101 IS FOR GENERAL REFERENCE & COORD. ONLY)
- COORD. W/ SITE GRADING PLAN FOR PROPOSED FINAL FINISH GRADE ELEV.'S & DRAINAGE SLOPES
- COORD. W/ LANDSCAPE SITE PLAN FOR LOCATIONS OF SEEDING, SODDING, PLANTING & PAVING & OTHER HARD SURFACING. COORD. W/ ARCH. SITE PLAN
- TYP. DRIVEWAY & PARKING LOT CONC. CURBS AS INDICATED ON DRAWING. COORD. W/ OPSD DETAILS & SPEC'S. FOR TYPICAL CURB TYPES
- THE SUB-GRADE SOILS EXPOSED AFTER EXCAVATION SHALL BE INSPECTED & CERTIFIED BY A QUALIFIED REGISTERED PROFESSIONAL SOILS ENGINEER & A COPY OF THE REPORT SHALL BE FORWARDED TO THE *AUTHORITY HAVING JURISDICTION* BUILDING DIVISION. WHERE THE FOOTING WILL BE SITUATED ON FILL MATERIAL, THE FOOTINGS SHALL BE DESIGNED & APPROVED BY QUALIFIED REGISTERED PROFESSIONAL ENGINEER
- ALL FILL PLACED ON THE SITE SHALL BE COMPACTED TO A MIN.OF 98% STANDARD PROCTOR DENSITY. A SUFFICIENT NUMBER OF TESTS SHALL BE TAKEN AT VARIOUS LEVELS SATISFACTORY TO THE ENGINEER. TEST RESULTS SHALL BE SENT TO THE *AUTHORITY HAVING JURISDICTION* W/ A LETTER, SIGNED & STAMPED BY THE SOILS ENGINEER, STATING THAT A SUFFICIENT NUMBER OF TESTS HAVE BEEN TAKEN & THE MIN. COMPACTION HAS BEEN REACHED
- APPROVAL OF THIS DWG. IS FOR MATERIAL ACCEPTABILITY & COMPLIANCE W/ MUNICIPAL & PROVINCIAL SPEC.'S & STANDARDS ONLY. APPROVAL & INSPECTION BY THE MUNICIPALITY OF THE WORKS DOES NOT CERTIFY THE LINE & GRADE OF THE WORKS & IT IS THE OWNER'S RESPONSIBILITY TO HAVE THEIR ENGINEER CERTIFY THIS ACCORDINGLY
- SILTATION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO WORKS COMMENCING ON THE SITE & SHALL BE MAINTAINED FOR THE DURATION OF CONST., TO THE SATISFACTION OF THE *AUTHORITY HAVING JURISDICTION*
(COORD. W/ *OPSD 219.11, 219.130, 219.191*)
(SUBMIT SHOP DWG.'S FOR LOCATIONS & EXTENTS)
- PROVIDE CONST. GATES / FENCES / BOUNDARIES AS SHOWN / REQ.'D TO THE *AUTHORITY HAVING JURISDICTION* REQ.'S.
(SUBMIT SHOP DWG.'S FOR LOCATIONS & EXTENTS).
A 1.8m HIGH CHAIN LINK FENCE (ALTERNATE MODU-LOC OR SIMILAR CONSTRUCTION FENCING) C/W SUPPORTS AS REQ.'D, @ WORK BOUNDARIES TO BE ERECTED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF THE DEMOLITION PROCESS & SHALL REMAIN & BE MAINTAINED IN POSITION INDEFINITELY UNTIL COMPLETION OF NEW CONST. WORK
- PROVIDE HEAVY DUTY (H/D) ASPHALT @ ALL DRIVEWAYS AS NOTED PROVIDE MEDIUM DUTY (M/D) ASPHALT @ ALL PARKING SPACES AS NOTED. PROVIDE LIGHT DUTY (L/D) ASPHALT @ ALL PLAYGROUND & WALKWAY AREAS ONLY (UNO)
- CONTRACTOR IS RESPONSIBLE FOR PLANTINGS, SOD, WATERING & MAINTENANCE UNTIL SUBSTANTIAL PERFORMANCE IS ACHIEVED. THE WARRANTY PERIOD WILL COMMENCE UPON SUBSTANTIAL PERFORMANCE OF THIS WORK

GENERAL NOTES:

(A) GENERAL CONTRACTOR TO COORDINATE ALL WORK WITHIN THE BOULEVARD W/ THE *AUTHORITY HAVING JURISDICTION* & OBTAIN ALL NECESSARY PERMITS & APPROVALS FROM LOCAL AUTHORITIES. EXECUTE ALL WORK AS PER THE MUNICIPAL REQUIREMENTS.

(B) GENERAL CONTRACTOR TO EXECUTE WORK TO DRIVEWAY ENTRANCE UNDER SUPERVISION OF THE *AUTHORITY HAVING JURISDICTION* . REFER TO ENTRANCE PERMIT REQUIREMENTS WHERE EXIST. DRIVEWAY ENTRANCE TO BE MODIFIED OR INSTALLATION OF NEW ENTRANCE AS PER MUNICIPAL REQUIREMENTS. PROVIDE NEW CONC. ENTRANCE CURBS TO MATCH EXISTING WHERE INDICATED.

(L) PLANTING BEDS, TREE PLANTINGS, LANDSCAPE FEATURES & SODDED AREAS

(BR) BIKE RACK
1. Model No. EP 5980, Equiparc Tango Bike Rack, manufactured by Equiparc. (ADDESSO) – to review an get product data and complete
1. Capacity: Rated at 2 bikes single side each unit.
2. Materials: Aluminum
3. Mounting: Surface mounting, with anchor assembly for flush mount to concrete surface.
4. Finish: Painted - Meteor Gray Semi-gloss (FINISH TO MATCH COMMERCIAL BLDG. ALUM. COMP. PANEL CLADDING TYP. - TO BE CONFIRMED)
5. Location to be confirmed on site with Owner and Architect. Coordinate with Architectural Site Plan.

(BE) BENCH
1. Model Name – Backed Bench model EP 1630-IPE/WOA/JAT-A with backrest and armrests – Collection Plaza by Equiparc. (WD. FINISH TO MATCH COMMERCIAL BLDG. WD. GRAIN ALUM. CLADDING TYP. - TO BE CONFIRMED)
1. Length: 1505mm x 559 depth x 851 height
2. Mounting: Surface mounting, QAV drop in anchors with stainless steel theft proof bolts. Coordinate with manufacturer's installation instructions.
3. Colour: - BLK.
4. Location to be confirmed on site with Owner and Architect. Coordinate with Architectural Site Plan.

(SA) SLOPED SITE ACCESS
(COORD. W/ *OPSD-350.010)*

(CC) CONCRETE CURB
(COORD. W/ *OPSD-600.110)*

(SW) CONCRETE SIDEWALK
(COORD. W/ *OPSD-310.010, 310.020, 310.033, 310.039, 310.040 & CONC. CURBS)*

(DC) CONCRETE SIDEWALK DROP CURB
(COORD. W/ *OPSD-310.010, 310.020, 310.033, 310.039, 310.040 & CONC. CURBS)*

(GE) GARBAGE & RECYCLE ENCLOSURES
(COORD. W/ EARTHBIN A103A & 103B)

(MM) MUD MATT
PROVIDE MUD-MATT ENT. TO *AUTHORITY HAVING JURISDICTION* REQ.'S
(COORD. W/ 9/A102)

(EC) ELECTRIC VEHICLE CHARGING STATION
(CONDUIT TO BE INSTALLED FOR FUTURE CHARGING STATION)

(SP1) SIGN PYLON 1
(COORD. W/ 1&2/A102A)
(INSTALL CONDUIT FROM BLDG.#2)

(SP2) SIGN PYLON 2
(COORD. W/ 3&4/A102A)
(INSTALL CONDUIT FROM BLDG.#3)

(SP3) SIGN PYLON (ENTRANCE)
(COORD. W/ FOOD CONSULTANT FOR ACTUAL SIGN)
(INSTALL CONDUIT FROM BLDG.#1)

(SP4) SIGN PYLON (ENTRANCE)
(COORD. W/ FOOD CONSULTANT FOR ACTUAL SIGN)
(INSTALL CONDUIT FROM BLDG.#1)

(SP5) DIGITAL PRE-SELL BOARDS
(COORD. W/ FOOD CONSULTANT FOR ACTUAL SIGN)
(INSTALL CONDUIT FROM BLDG.#1)

(SP6) DIGITAL MENU BOARDS W/ COD & DETECTOR LOOP
(COORD. W/ FOOD CONSULTANT FOR ACTUAL SIGN)
(INSTALL CONDUIT FROM BLDG.#1)

(CP) CANADA POST
(COORD. W/ *A103)*

(RW) RETAINING WALL
(COORD. W/ *OPSD 3120.100, 3121.150, 3190.10*) 10

SIGN LEGEND

(A) STOP SIGN
(B) ONE WAY - DO NOT ENTER
(F) NO PARKING - FIRE ROUTE
(L) NO PARKING, BY PERMIT ONLY, BARRIER-FREE PARKING, VAN ACCESSIBLE- TYPE 'A'
(SUPPLIED & INSTALLED BY PATTISON SIGN GROUP FOR FOOD CONSULTANT)
(M) NO PARKING, BY PERMIT ONLY, BARRIER-FREE PARKING - TYPE 'B'
(SUPPLIED & INSTALLED BY PATTISON SIGN GROUP FOR FOOD CONSULTANT)
(O) VISITOR PARKING ONLY
(P) ELECTRIC VEHICLE PARKING
(Y) MOBILE ORDER (BY FOOD CONSULTANT)
(SUPPLIED & INSTALLED BY PATTISON SIGN GROUP)
(Z) PULL FORWARD SIGN (BY FOOD CONSULTANT)
(SUPPLIED & INSTALLED BY PATTISON SIGN GROUP)
(AA) THANK YOU / DO NOT ENTER SIGN (BY FOOD CONSULTANT)
(SUPPLIED & INSTALLED BY PATTISON SIGN GROUP)
(BB) ANY LANE ANY TIME (BY FOOD CONSULTANT)

NOTE:
CONFIRM LOCATIONS & CONTENT OF ALL SIGNAGE W/ THE OWNER & *AUTHORITY HAVING JURISDICTION* PRIOR TO FABRICATION & ERECTION. PROPOSED SITE SIGNAGE TO COMPLY W/ SIGNAGE BY-LAWS

NOTE:
ALL SIGNS TO BE CENTERED ON POSTS TYP.

NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS
9	2024.07.16	SPA PHASE 2 SUB.#1
8	2024.07.10	SPA PHASE 2 SUB.#1 - OWNER REVIEW
7	2024.03.11	SPA PHASE 1 SUB.#1
6	2024.03.08	SPA PHASE 1 SUB.#1 - REVIEW
5	2024.03.07	PROGRESS
4	2024.03.05	PROGRESS
3	2024.02.29	PROGRESS
2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062868
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152
WATERFORD, ON.,
NOE 1YO
TELEPHONE NO.: 1.705.205.3235

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TN

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ALL DWG.'S ARE TO BE READ IN COLOUR

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ORCHARD
SQUARE

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SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

STAMP ARCH.
ONTARIO ASSOCIATION OF ARCHITECTS
Melissa Stickl
MELISSA NICOLE STICKL
LICENCE 7887
Aug. 27, 2024

STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
SITE PLAN NOTES

CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE: 1 : 100	DRAWING NO.: A101A
PROJECT NO.: 20-128	

DATE PLOTTED: 2024-08-27 3:51:38 PM
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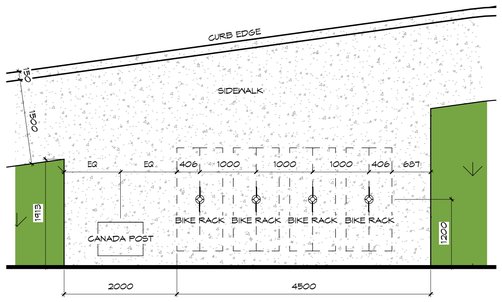
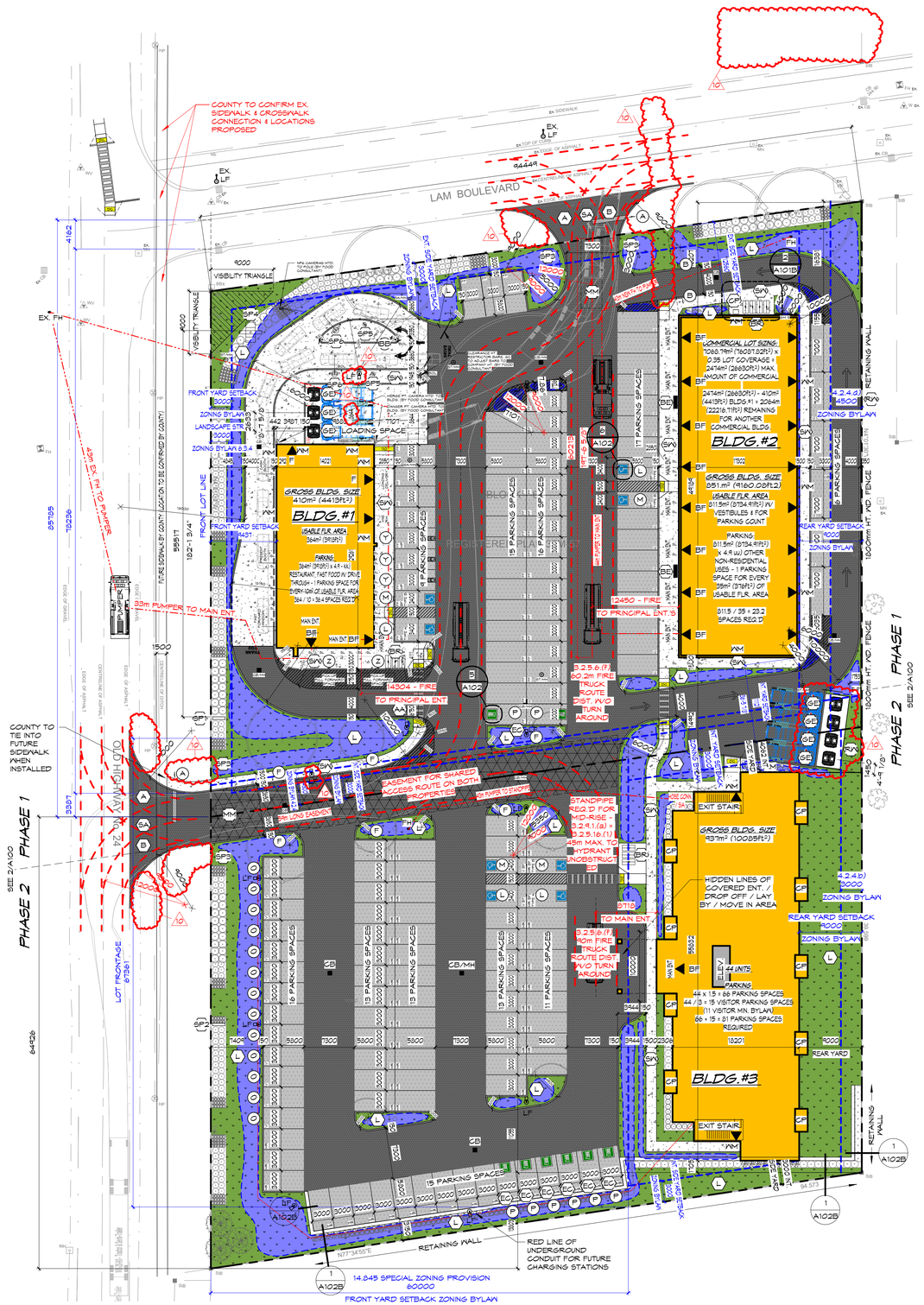


2 A101B SITE PLAN - CANADA POST & BICYCLE RACKS
SCALE 1 : 50



1 A101B SITE PLAN
SCALE 1 : 350

SITE PLAN LEGEND

- MAIN ENT. — MAIN / PRINCIPAL ENTRANCE / EXIT DOOR
- ENTRANCE / EXIT DOOR
- F — ENTRANCE / EXIT DOOR (FLUSH)
- BF — ENTRANCE / EXIT DOOR (BARRIER FREE OPERATOR)
- O/H — ENTRANCE / EXIT DOOR (OVERHEAD DOOR)
- DATUM / GRADE (RELATIVE TO A/F/F NEW BLDG.)
- PROPERTY BOUNDARY LINE(S)
- SETBACKS
- MD. FENCE (1800mm HT. PRIVACY)
- SNOW STORAGE (ALL ADDITIONAL SNOW TO BE TAKEN AWAY BY OWNER)
- FIRE ROUTE (6m WIDE / 12m CENTER RADIUS)
- CE — COVERED ENTRANCE
- CP — COVERED PATIO (ON GRADE)
- PAINTED GRAPHICS ON ASPHALT / CONC.: (COORD. W/ THE CITY / TOWN HAVING JURISDICTION, GUIDELINES)
- • ELECTRIC VEHICLE CHARGING SIGN ON ASPHALT / CONC. (WHITE & GREEN COLOUR)
- • ACCESSIBLE SIGN ON ASPHALT / CONC. (WHITE & BLUE COLOUR)
- • DIRECTIONAL SIGNS ON ASPHALT / CONC. (WHITE COLOUR)
- • CROSSWALK / CROSSING (WHITE COLOUR)
- DESCRIPTION
- • VEHICULAR STALL MARKINGS & DESCRIPTIONS (YELLOW COLOUR)
  V - VISITOR
  V BF - VISITOR BARRIER FREE
  BF - BARRIER FREE
  MR - MID-RISE
  MR BF - MID-RISE BARRIER FREE
  FF BF - FAST FOOD BARRIER FREE
  C BF - COMMERCIAL BARRIER FREE
  FF - FAST FOOD
  FF MP - FAST FOOD MOBILE PICK-UP PARKING
  C - COMMERCIAL PARKING
- • DIAGONAL MARKINGS (YELLOW COLOUR)
- • STOP SIGN VEHICULAR MARKINGS (WHITE COLOUR)
- DRIVE THRU THANK YOU — • DRIVE THRU - THANK YOU (WHITE COLOUR)
- BOL. — BOLLARD (REDUCED HT. BOLLARD W/ SURESIGN COVER @ FAST FOOD DRIVE THRU)
- SIGN (COORD. W/ SIGN LEGEND)
- DROP CURB (OPSD 6 NADS COMBINED MOST STRINGENT OF BOTH STD.'S)
- PERENNIAL DROUGHT RESISTANT GRASSES
- NEW CONIFEROUS TREE
- NEW DECIDUOUS TREE
- VISIBILITY TRIANGLES / SIGHT / DAYLIGHT TO BE MAINTAINED (REMAIN CLEAR) @ BOTH SIDES OF ALL LANEWAY / DRIVEWAYS & INTERSECTIONS. THE MAX. HEIGHT OF ANY OBJECT OR MATURE VEGETATION WITHIN THE VISIBILITY TRIANGLE IS NOT TO EXCEED REQ.D HEIGHT ABOVE THE CENTRELINE OF THE CORRESPONDING ADJACENT STREET
  NORFOLK COUNTY
  9m X 9m INTERSECTION / STREET LINES
  1m HEIGHT
  NO PARKING ALLOWED
- CB — CATCH BASIN
- EX. CB — EX. CATCH BASIN
- CB/MH — CATCH BASIN / MAN HOLE
- EX. CB/MH — EX. CATCH BASIN / MAN HOLE
- SA/MH — SANITARY MAN HOLE
- ST/MH — STORM MAN HOLE
- EX. SA/MH — EX. SANITARY MAN HOLE
- EX. ST/MH — EX. STORM MAN HOLE
- FH — FIRE HYDRANT
- EX. FH — EX. FIRE HYDRANT
- LF — LIGHT STD.
- EX. LF — EX. LIGHT STD.
- SL — SOFFIT LIGHT (CAN / POT LIGHT)
- EX. HV — EX. HYDRO VAULT/TRANSFORMER ON CONC. PAD
- WM — WALL MTD. LIGHT FIXTURE
- GM — GAS METERS
- TACTILE WARNING SURFACE INDICATORS (600mmWLENGTH - TILE) (FOR SITE CONDITIONS ONLY) (COORD. W/ OPSD 310.39) ON SITE & MUNICIPAL SIDEWALK LOCATIONS
- • KINESK ADVANTAGE CAST IRON CAST IN PLACE IN NEW SURFACES (UNCOATED NATURAL PATINA) (COLOUR TO BE VERIFIED BY ARCHITECT)

HATCH IDENTIFICATION LEGEND

- AREA OF LIGHT DUTY ASPHALT (COORD. W/ CIVIL DWG.'S & GEOTECH REPORT)
- AREA OF HEAVY DUTY ASPHALT (COORD. W/ CIVIL DWG.'S & GEOTECH REPORT)
- CONC. SIDEWALK / PAD / CROSSWALK / SIDEWALK / LANEWAY / STAIRS / ETC.
- REIN. CONC. ON 100mm RIGID INSUL. C/W IN SLAB HEATING & CUT LINES
- AREA OF NEW SOD ON 150mm TOPSOIL (COORD. W/ CONST. FOR EXTENTS)
- MUD MAT
- NEW BLDG. / ADDITION
- EASEMENT

GENERAL NOTES:
- SHOP DWG.'S ARE TO BE DIMENSIONED IN METRIC UNITS (IMPERIAL & METRIC BOTH SHOWN IS ACCEPTABLE)
- COORD. W/ EX. SURVEY DWG. FOR LINE WEIGHTS & TYPES AS REVIT IS NOT COMPATIBLE WITH AUTOCAD LINE WEIGHTS & TYPES
- ALL EX. ITEMS WILL BE LABELLED W/ 'EX' (OR GRAY SCALE ON EX. SURVEY DWG.) & ARE TO REMAIN U/N/O OR SHOWN & NOTED IN DEMO PLANS TYP.
- PATCH & REPAIR ALL EX. ITEMS WHERE DISTURBED / DAMAGED BY CONST. / DEMO; PROVIDE CLEAN TRANSITIONS TYP. (PROVIDE SOD @ ALL GRASSED AREAS)

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10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS
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6	2024.03.06	SPA PHASE 1 SUB.#1 - REVIEW
5	2024.03.01	PROGRESS
4	2024.03.05	PROGRESS
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ORCHARD SQUARE

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SIMCOE ONTARIO N3Y 3W4
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STAMP ARCH.: ONTARIO ASSOCIATION OF ARCHITECTS — MELISSA NICOLE STICKL — LICENCE 7887 — Aug 27, 2024
STAMP STRUCT.:

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
SITE PLAN

CHECKED BY: MS
DRAWN BY: JS
DRAWING SCALE: As indicated
DRAWING NO.: A101B
PROJECT NO.: 20-128

FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt
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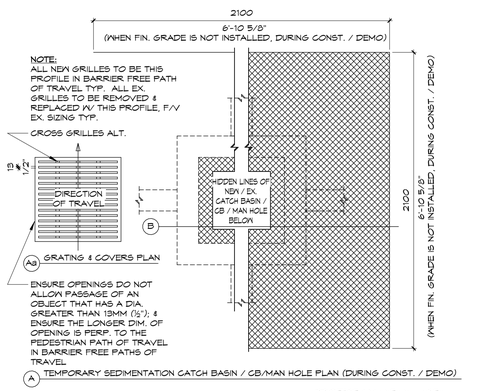
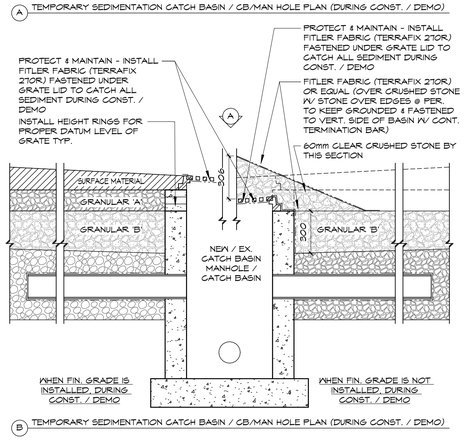
DATE PLOTTED: 2024-08-27 3:51:44 PM

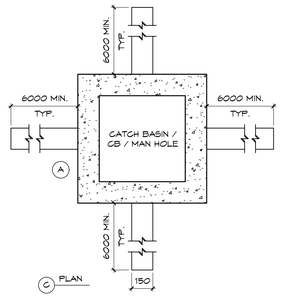


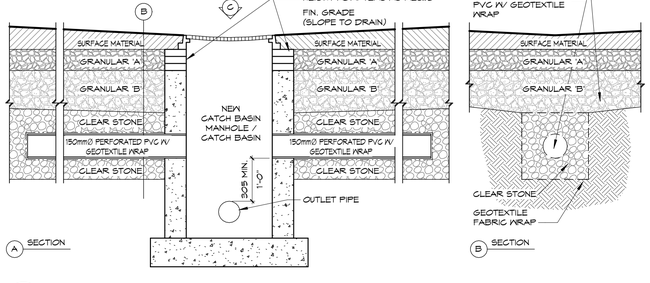
A TEMPORARY SEDIMENTATION CATCH BASIN / CB/MAN HOLE PLAN (DURING CONST. / DEMO)



B TEMPORARY SEDIMENTATION CATCH BASIN / CB/MAN HOLE PLAN (DURING CONST. / DEMO)

1 / A102 **CB COVER**
SCALE 1 : 20

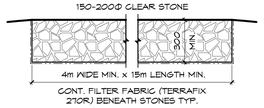




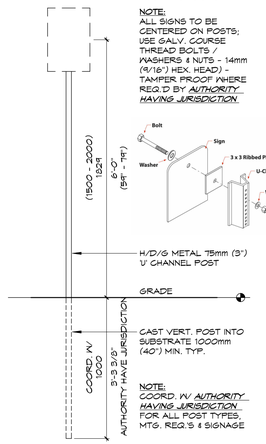
2 / A102 **CATCH BASIN**
SCALE 1 : 20

3 / A102 **SIGNS**
SCALE 1 : 50

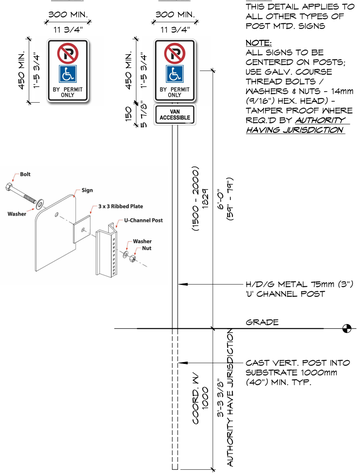
DESIGNATED ACCESS FOR ALL CONSTRUCTION TRAFFIC
INSTALL MUD MAT AS PER DETAIL BELOW, PRIOR TO ANY OTHER CONSTRUCTION. MAT TO BE MAINTAINED IN GOOD WORKING ORDER UNTIL GRADING WORKS ARE COMPLETED & GRANULAR "A" & "B" HAVE BEEN PLACED



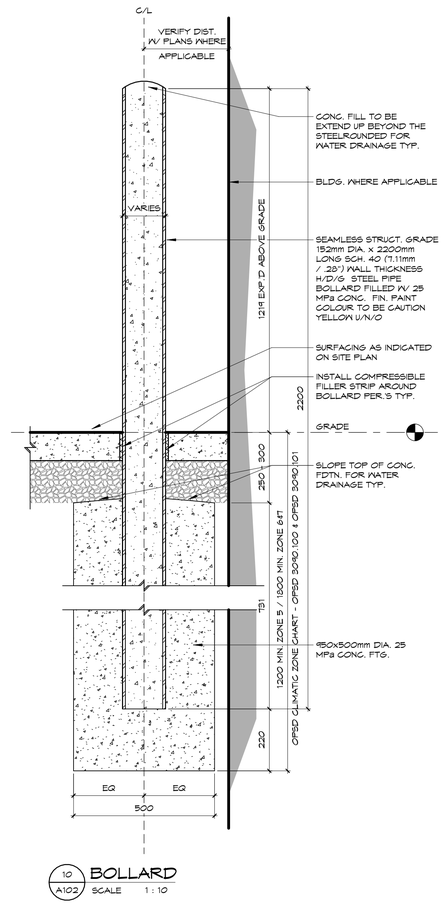
7 / A102 **MUD MAT**
SCALE 1 : 20



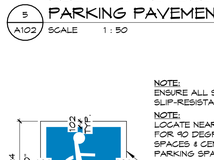
8 / A102 **VERT. SIGNAGE**
SCALE 1 : 20



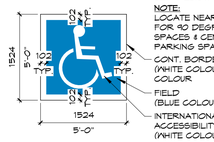
9 / A102 **ACCESSIBLE PARKING VERT. SIGNAGE - NORFOLK**
SCALE 1 : 20



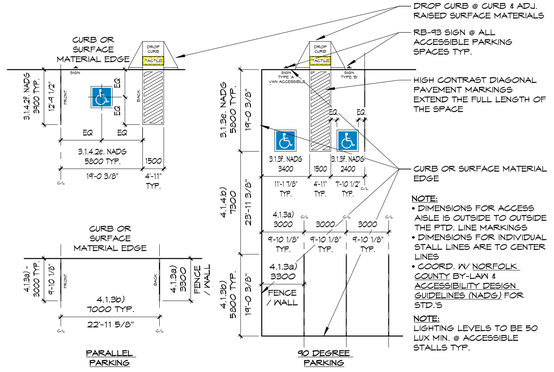
10 / A102 **BOLLARD**
SCALE 1 : 10



5 / A102 **ELECTRIC VEHICLE CHARGING PARKING PAVEMENT MARKING**
SCALE 1 : 50



6 / A102 **ACCESSIBLE PARKING PAVEMENT MARKING**
SCALE 1 : 50



4 / A102 **PARKING STALL GUIDELINES - NORFOLK COUNTY**
SCALE 1 : 200

NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS
9	2024.07.16	SPA PHASE 2 SUB.#1
8	2024.07.10	SPA PHASE 2 SUB.#1 - OWNER REVIEW
7	2024.03.11	SPA PHASE 1 SUB.#1
6	2024.03.05	SPA PHASE 1 SUB.#1 - REVIEW
5	2024.03.01	PROGRESS
4	2024.03.05	PROGRESS
3	2024.02.29	PROGRESS
2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS

NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062060
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

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ORCHARD SQUARE

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Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

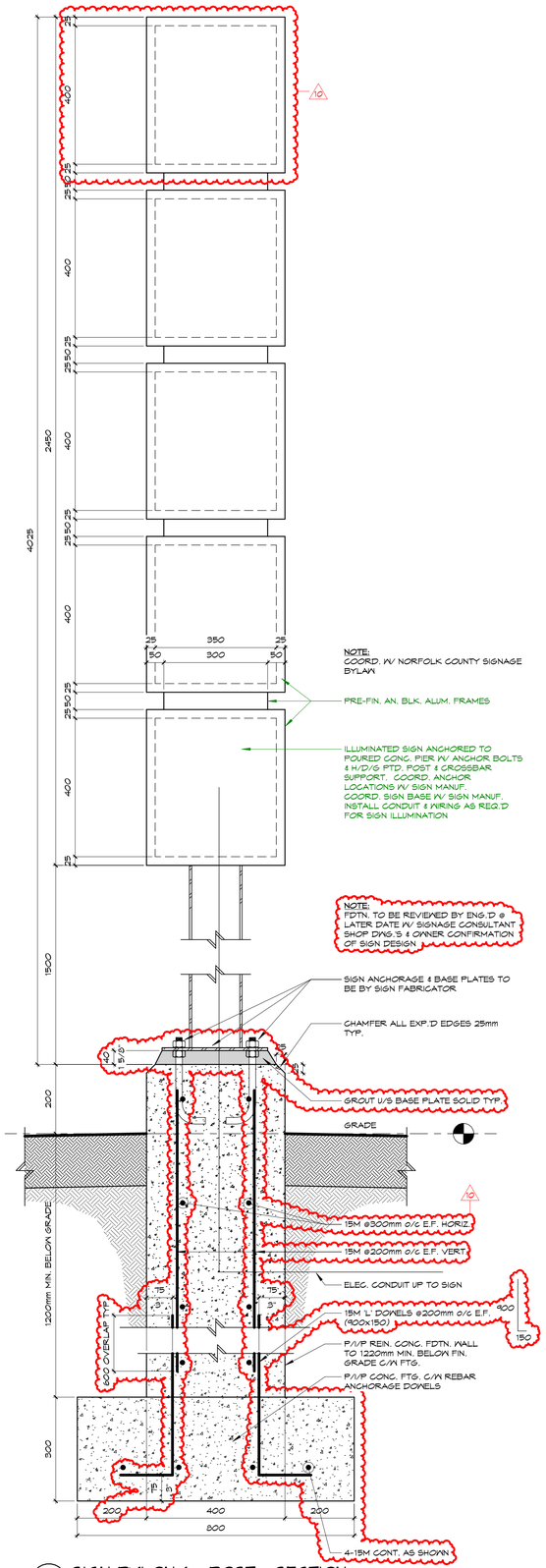
STAMP ARCH.: ONTARIO ASSOCIATION OF ARCHITECTS — MELISSA NICOLE STICKL — LICENCE 7987 — Aug 27, 2024
STAMP STRUCT.:

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

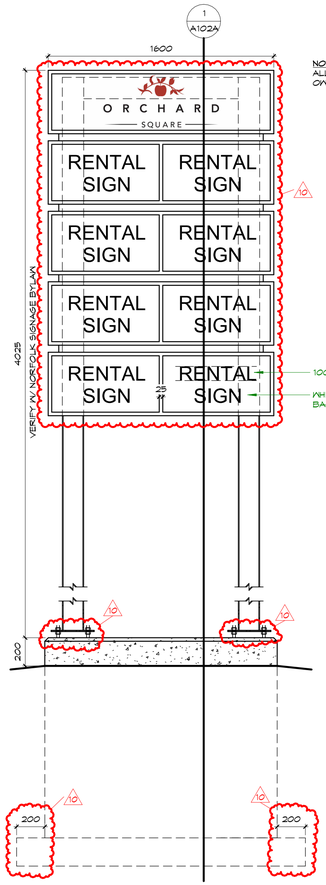
DRAWING TITLE:
SITE PLAN DETAILS

CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE: As indicated	DRAWING NO.: A102
PROJECT NO.: 20-128	

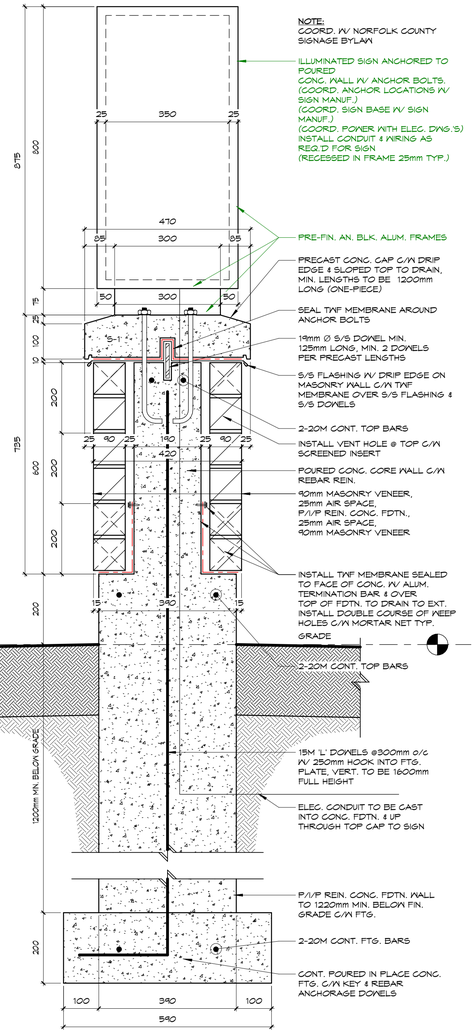
DATE PLOTTED: 2024-08-27 3:51:45 PM FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128- Orchard Square_Site.rvt PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE



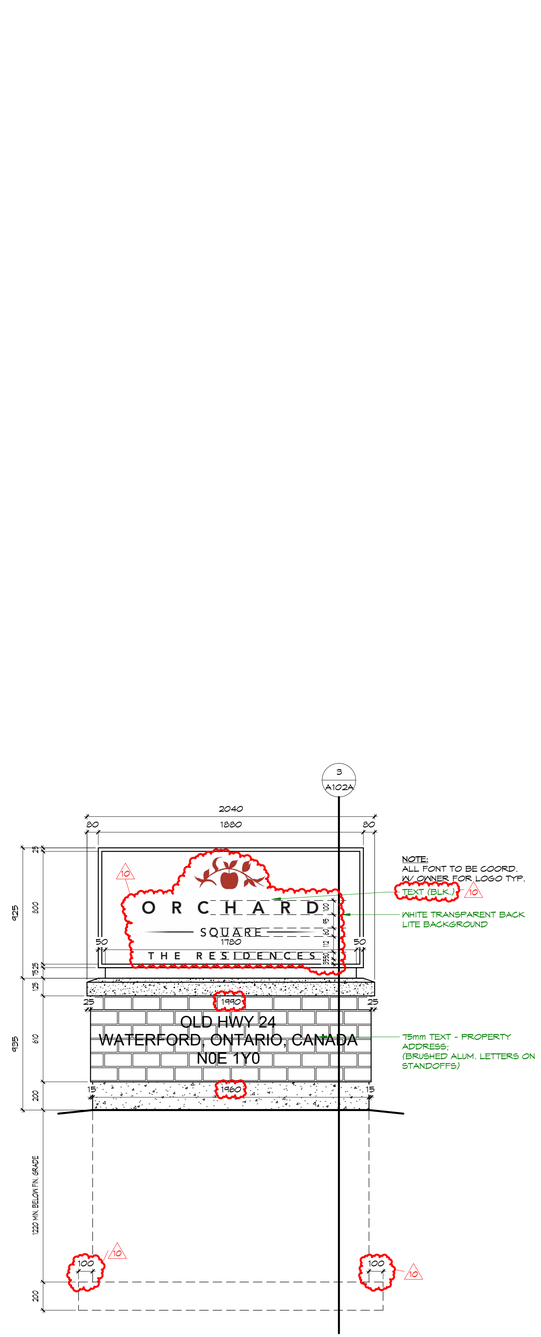
1 A102A — SIGN PYLON 1 - POST - SECTION
SCALE 1 : 8



2 A102A — SIGN PYLON 1 - POST - ELEV.
SCALE 1 : 20



3 A102A — SIGN PYLON 2 - GROUND - SECTION
SCALE 1 : 8



4 A102A — SIGN PYLON 2 - GROUND - ELEV.
SCALE 1 : 20

NO.	DATE	ISSUANCE
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9	2024.07.16	SPA PHASE 2 SUB.#1
8	2024.07.10	SPA PHASE 2 SUB.#1 - OWNER REVIEW
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6	2024.03.08	SPA PHASE 1 SUB.#1 - REVIEW
5	2024.03.07	PROGRESS
4	2024.03.05	PROGRESS
3	2024.02.29	PROGRESS
2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
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IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

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(519) 426-6270

STAMP ARCH.: ONTARIO ASSOCIATION OF ARCHITECTS — MELISSA NICOLE STICKL — LICENCE 7887 — Aug. 27, 2024
STAMP STRUCT.: LICENSED PROFESSIONAL ENGINEER — Aug. 27th, 2024 — B.D. BUCHWALD — 100200183 — PROVINCE OF ONTARIO

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
SITE PLAN DETAILS

CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE: As indicated	DRAWING NO.: A102A
PROJECT NO.: 20-128	

DATE PLOTTED: 2024-08-27 4:33:08 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128- Orchard Square_Site.rvt

NO.	DATE	ISSUANCE
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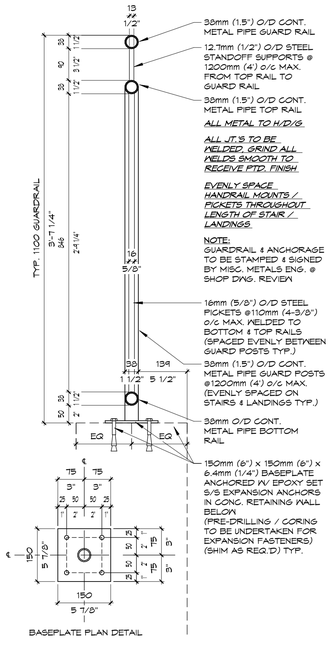
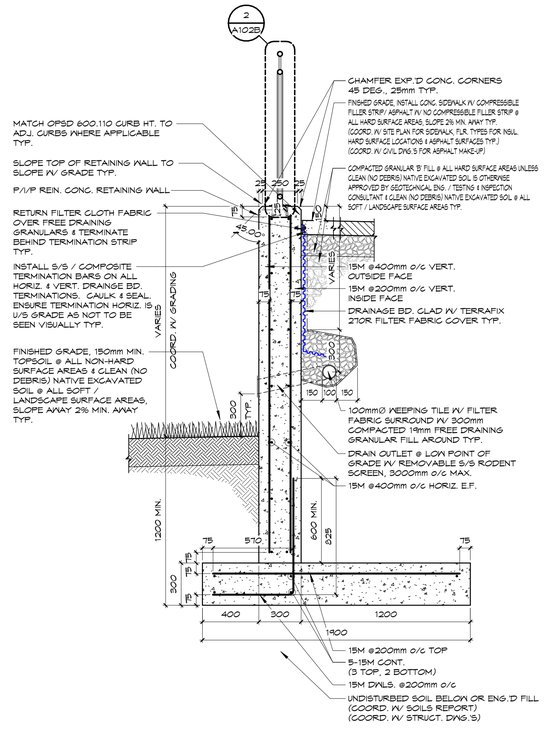
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235



2 / A102B — RETAINING WALL - GUARDRAIL
SCALE 1 : 5



1 / A102B — RETAINING WALL - VERT. - CONC.
SCALE 1 : 20

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STAMP ARCH: ONTARIO ASSOCIATION OF ARCHITECTS — MELISSA NICOLE STICKL — LICENCE 7887 — Aug. 27, 2024
STAMP STRUCT: LICENSED PROFESSIONAL ENGINEER — Aug. 27th, 2024 — B.D. BUCHWALD — 100200128 — PROVINCE OF ONTARIO

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
SITE PLAN DETAILS

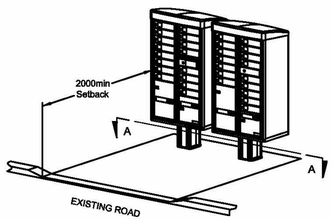
CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE: As indicated	DRAWING NO.: A102B
PROJECT NO.: 20-128	

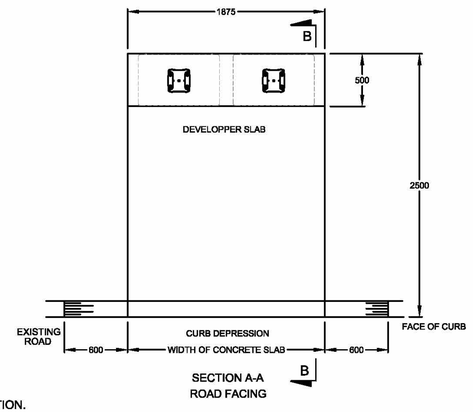
NOTES:

1. THIS DRAWING IS ONLY TO BE USED ON ROADS WITH POSTED LIMITS OF 60 KM/H OR LESS AND LOW TRAFFIC VOLUME (<750 ADT AS PER TRANSPORTATION ASSOCIATION OF CANADA'S GEOMETRIC DESIGN FOR CANADIAN ROADS- (CHAPTER 7- ROADSIDE DESIGN).
2. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE NATIONAL BUILDING CODE. ABIDE BY LOCAL MUNICIPAL BY-LAWS AND REGULATORY AGENCIES THAT MAY AFFECT THE WORK.
3. THE CONTRACTOR SHALL REVIEW THE SITE CONDITIONS AND ASSUME RESPONSIBILITY FOR EXISTING SERVICES (WATER; POWER; SEWAGE; GAS ETC.) THAT EXIST AT THE SITE.
4. CONCRETE SLAB TO HAVE A MINIMUM THICKNESS OF 150 mm.
5. CONCRETE SLAB SHALL BE PLACED ON 150 mm MINIMUM THICK BASE OF GRANULAR MATERIAL (OPSS GRANULAR 'A' OR EQUIVALENT) COMPACTED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.
6. GRANULAR BASE SHALL BE PLACED ON SOIL CAPABLE OF SAFELY SUSTAINING A BEARING PRESSURE OF NOT LESS THAN 30 kPa.
7. CONCRETE CONSTRUCTION SHALL CONFORM TO CSA A23.1.
8. CONCRETE TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH CSA A23.1 AND CSA 23.2.
9. CSA A23.1 CONCRETE EXPOSURE CLASSIFICATION TO BE C-1 WITH THE FOLLOWING PROPERTIES:
   - -MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS: 35 MPA
   - -MINIMUM WATER TO CEMENTING MATERIALS RATIO: 0.40
   - -MAXIMUM COARSE AGGREGATE SIZE: 20 mm
   - -MAXIMUM SLUMP: 90 mm
   - -AIR CONTENT: 5% TO 8%
10. SURFACE OF SLAB TO BE SLOPED 2% -0/+4% TO THE NEAREST PLUVIAL DRAIN.
11. TOP OF SLAB TO HAVE A TEXTURED BROOM FINISH TO CSA A23.1. EDGES OF SLAB TO HAVE A SMOOTH TOOLED FINISH.
12. SLAB REINFORCEMENT TO BE 152mm X 152mm, MW 25.8 X MW 25.8 WELDED WIRE FABRIC CONFORMING TO ASTM 1064M. REINFORCEMENT TO BE PLACED AT MID-DEPTH OF SLAB OR APPROVED EQUIVALENT.
13. APPLY PIGMENTED CURING COMPOUND TO SURFACE OR REBAR OF SLAB IN ACCORDANCE WITH ASTM C309 TYPE 2 (WHITE COLOUR), CLASS B (RESIN).
14. PROVIDE A MINIMUM SETBACK DISTANCE OF 2000 mm FROM ANY EDGE OF MAILBOX TO NEAREST EDGE OF TRAVELLED ROADWAY.
15. ALL SITE LOCATIONS REQUIRE CPC AND MUNICIPAL APPROVAL.
16. IF SITE CONDITIONS LIMIT PLACEMENT, CONTACT CPC FOR ASSISTANCE.
17. ADDITIONAL CURB CUTTING NOT REQUIRED WHEN ADDING MODULE TO SITE WHERE CURB DEPRESSION IS ALREADY EXISTING.

* EQUIPEMENT FLOORPRINT SHOWN FOR REFERENCE ONLY.

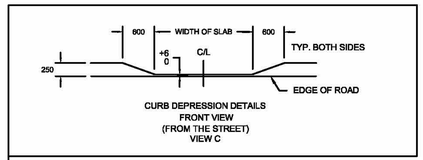
1 OR 2 MODULES



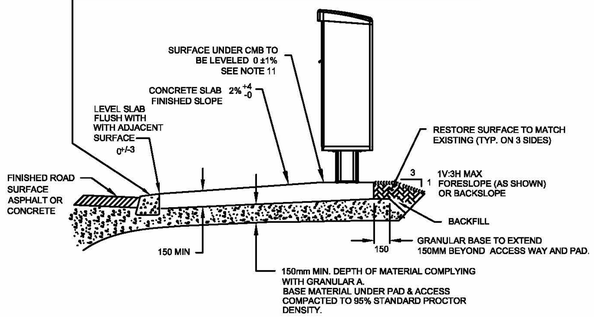


SECTION A-A
ROAD FACING

COMMUNITY MAILBOX SHOWN WITH PEDESTAL INSTALLATION.
PRECAST CONCRETE BALLASTED BASE COULD ALSO BE USED.

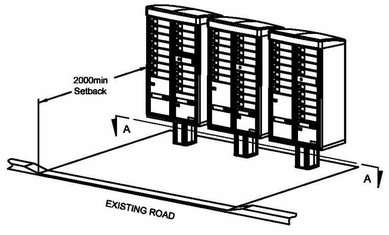


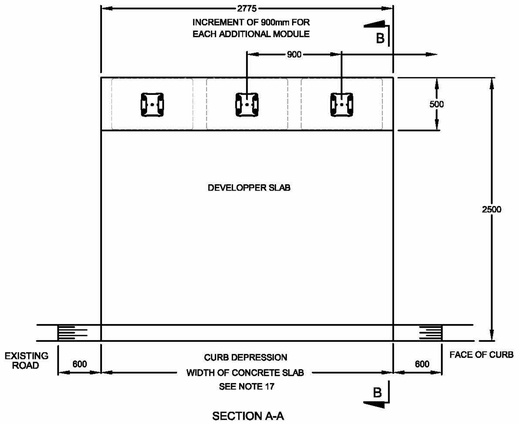
CURB DEPRESSION DETAILS
FRONT VIEW
(FROM THE STREET)
VIEW C



SECTION B-B

3 MODULES





SECTION A-A
ROAD FACING

TOLERANCES
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETERS.
SAUF SI SPÉCIFICATIONS CONTRAIRE DIMENSIONS SONT EN MILLIMÈTRES
DEC. X ±1 XX ±.3 XXX ±.15
ANGLES ± 1°
CONFORMS TO/ CONFORME À CSA B78.2

REV # / # RÉV	DATE	BY / PAR	CHKD / VÉR	EA / RG	DCC / CCD
	DESCRIPTION				

ENGINEERING SERVICES / SERVICES D'INGÉNERIE		DATE DD-MM-YYYY / JJ-MM-AAAA
CREATED BY / CRÉÉ PAR	M. ALLARD	29-03-2019
CHECKED BY / VÉRIFIÉ PAR	N. MOROZOVA	29-03-2019
ENGINEERING AUTH. RESP. DU GÉNIE	K. CHAMPOUX	29-03-2019

PROJECT / PROJET: E201-ENG-06

TITLE / TITRE: DEVELOPER PROVIDED CONCRETE PAD SPECIFICATIONS - ROAD FACING INSTALLATION

SCALE / ÉCHELLE: NTS | SHEET / FEUILLE 1 OF / DE 1 | REV: 00

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IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

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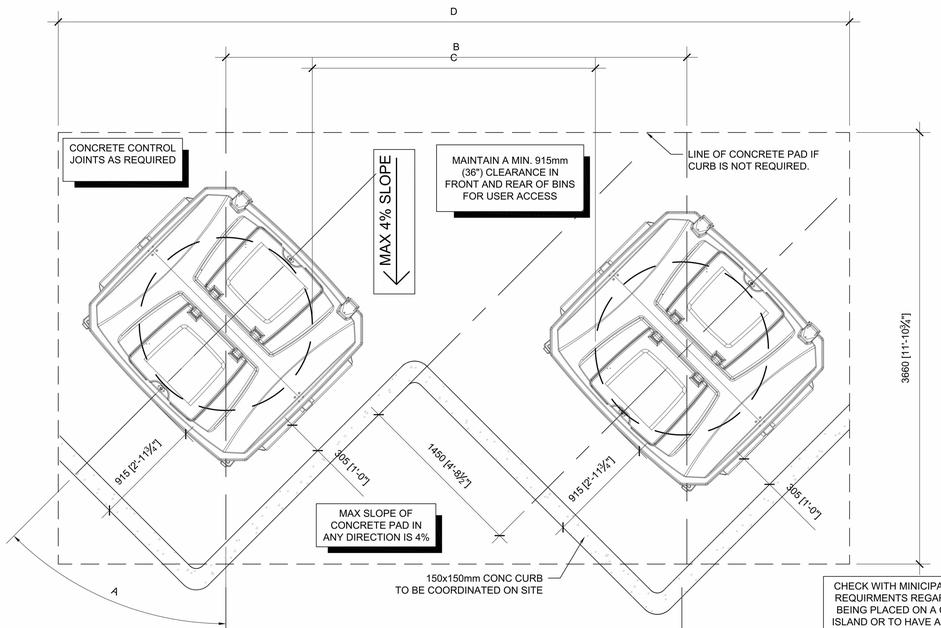
STAMP ARCH. | STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
CANADA POST

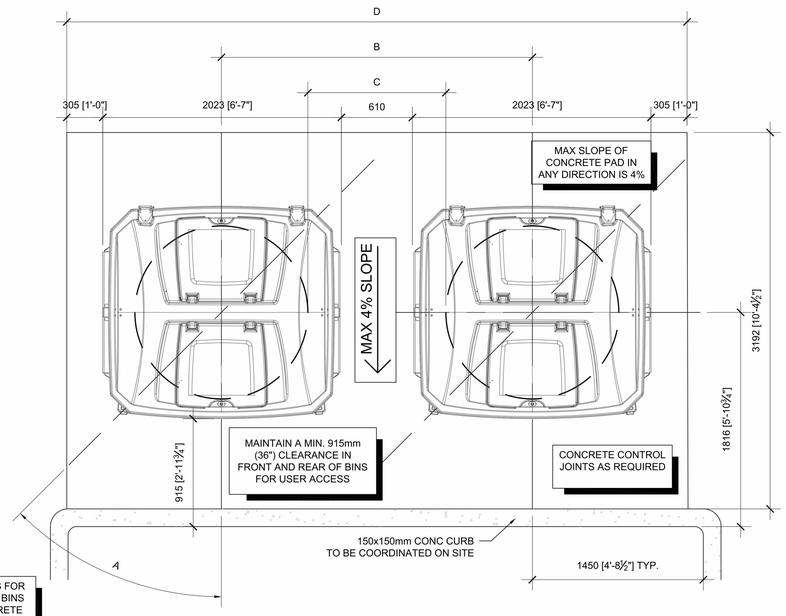
CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE:	DRAWING NO.:
PROJECT NO.: 20-128	A103

DATE PLOTTED: 2024-08-27 3:56:36 PM | PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE | FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt

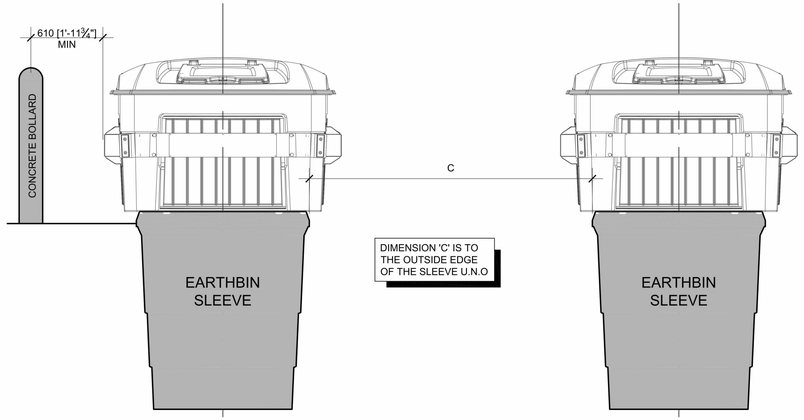


1 A1 ANGLED PLAN VIEW W/O BOLLARDS 1:20

CHECK WITH MINICIPALITIES FOR REQUIRMENTS REGARDING BINS BEING PLACED ON A CONCRETE ISLAND OR TO HAVE A CONCRETE CURB POUR AROUND THE PAD.



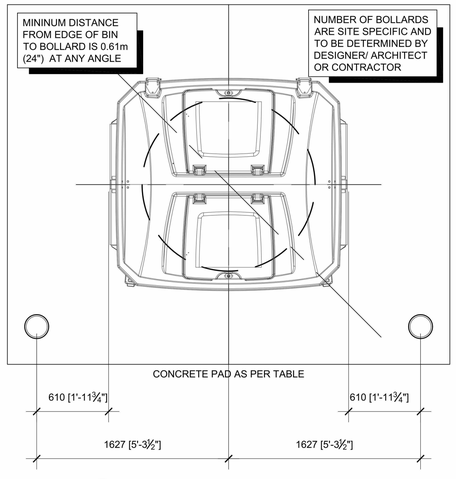
3 A1 TYPICAL PLAN VIEW W/O BOLLARDS 1:20



2 A1 ELEVATION VIEW OF BINS 1:20

MINIMUM DIMENSIONS BETWEEN BINS

A	B	C	D
0°	2640 [104"]	1170 [46"]	5485 [216"]
15°	2745 [108"]	1270 [50"]	5790 [228"]
30°	3050 [120"]	1575 [62"]	6170 [243"]
45°	3860 [152"]	2390 [94"]	6425 [253"]



4 A1 OPTIONAL BOLLARD PLACEMENT 1:20

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3	2024.02.29	PROGRESS
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1	2022.02.14	PROGRESS
NO.	DATE	ISSUANCE

EarthBin® TM

1. ISSUED FOR CLIENT REVIEW ON 2016 / 10 / 06
2. ISSUED FOR FINAL REVIEW ON 2017 / 05 / 05
3. ISSUED FOR PUBLIC RELEASE ON 2017 / 05 / 10

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062060
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

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APPLICANT: TOM O'HARA
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TELEPHONE NO.: 1.705.205.3235

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(519) 426-6270

STAMP ARCH.

STAMP STRUCT.

SCALE: AS NOTED
DESIGN BY: EARTHBIN PRODUCTS
DRAWN BY: STUDIO WOLF DESIGNS

INSTALLATION DRAWINGS

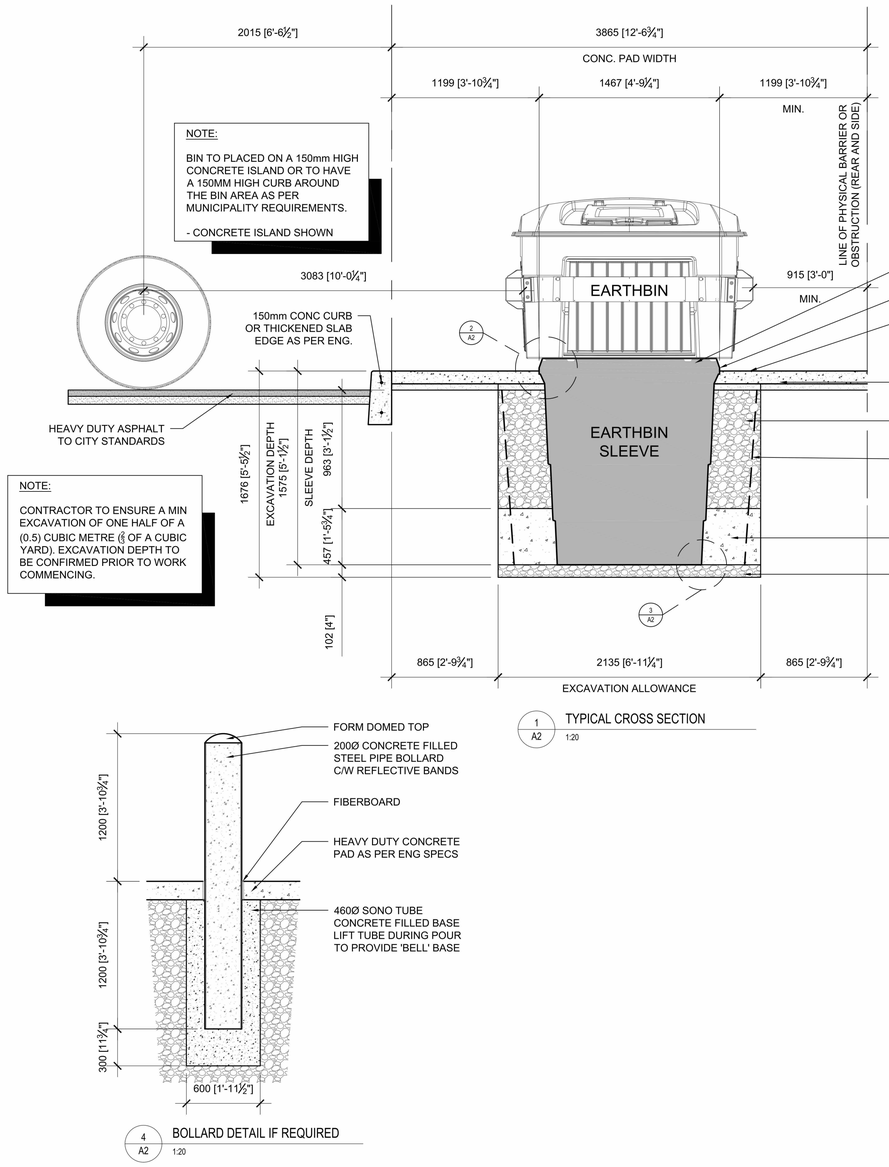
REVISION#9 | A1

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
EARTHBIN

CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE:	DRAWING NO.:
	A104
PROJECT NO.: 20-128	

DATE PLOTTED: 2024-08-27 3:56:44 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt



1 A2 TYPICAL CROSS SECTION
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4 A2 BOLLARD DETAIL IF REQUIRED
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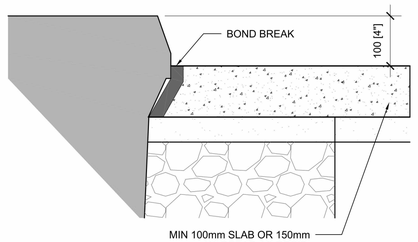

2 A2 SLEEVE DETAIL A
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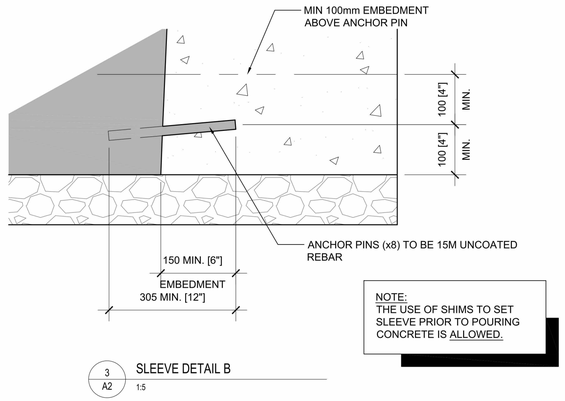


3 A2 SLEEVE DETAIL B
1:5

NO.	DATE	ISSUANCE
10	2024.05.27	SPA PHASE 1 SUB.#1 - COMMENTS
9	2024.07.16	SPA PHASE 2 SUB.#1
8	2024.07.10	SPA PHASE 2 SUB.#1 - OWNER REVIEW
7	2024.03.11	SPA PHASE 1 SUB.#1
6	2024.03.08	SPA PHASE 1 SUB.#1 - REVIEW
5	2024.03.07	PROGRESS
4	2024.03.05	PROGRESS
3	2024.02.29	PROGRESS
2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS
NO.	DATE	ISSUANCE

EarthBin®

1. ISSUED FOR CLIENT REVIEW ON 2016/10/06
2. ISSUED FOR FINAL REVIEW ON 2017/05/05
3. ISSUED FOR PUBLIC RELEASE ON 2017/05/10

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062060
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS
ALL DWG.'S ARE TO BE READ IN COLOUR
ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

ORCHARD SQUARE

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

SCALE: AS NOTED
DESIGN BY: EARTHBIN PRODUCTS
DRAWN BY: STUDIO WOLF DESIGNS

INSTALLATION DRAWINGS

REVISION#8 | A2

STAMP ARCH. | STAMP STRUCT.

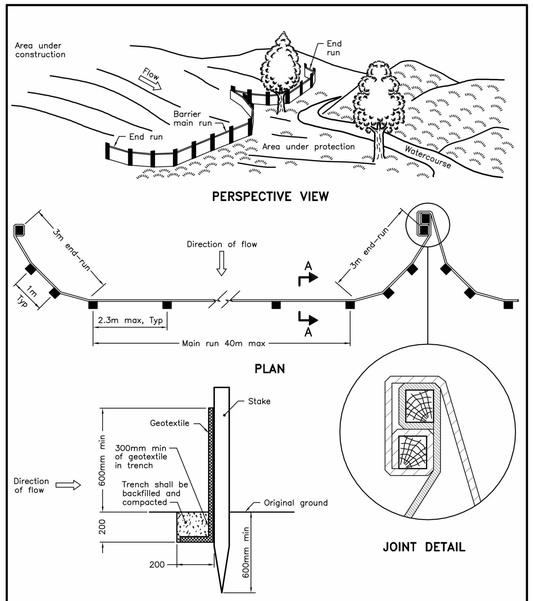
PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
EARTHBIN

CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE:	DRAWING NO.:
	A104A
PROJECT NO.: 20-128	

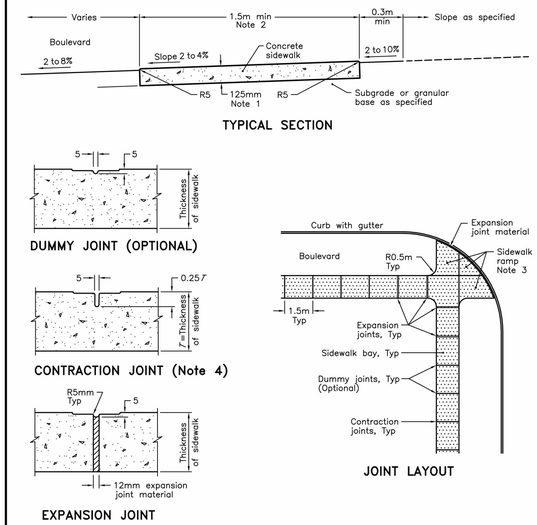
PLEASE NOTE THE SCALE OF THE INSERTED / ATTACHED DWG. HAS BEEN ALTERED / SCALED TO FIT THIS TITLEBLOCK / SHEET - DO NOT SCALE DWG.

DATE PLOTTED: 2024-08-27 3:56:54 PM | PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE | FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt



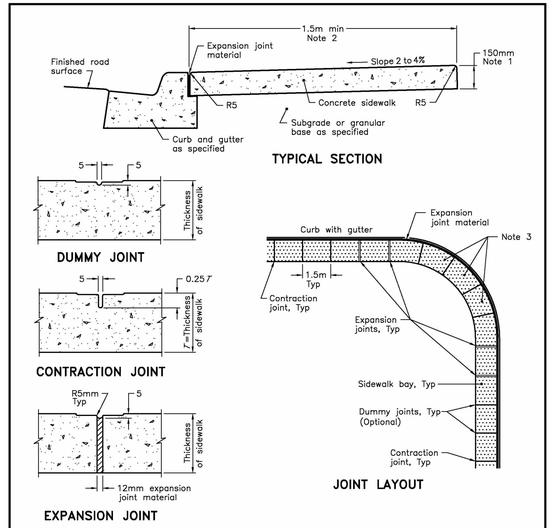
NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT–DUTY SILT FENCE BARRIER		OPSD 219.110



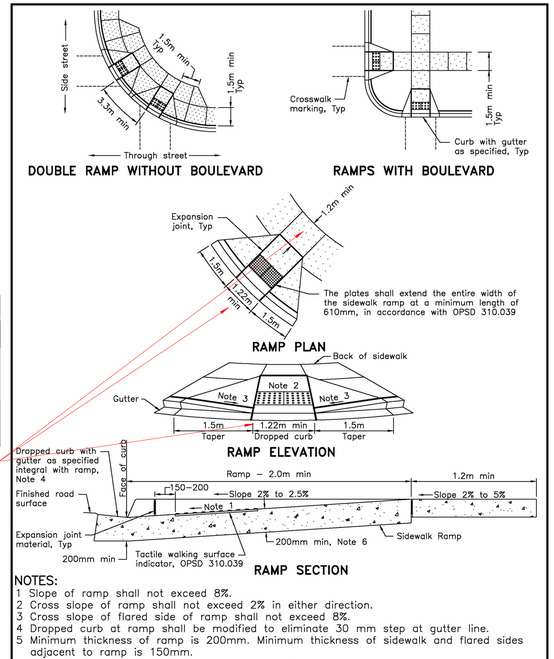
NOTES:
1 Sidewalk thickness at residential driveways and adjacent to curb shall be 150mm. At commercial and industrial driveways, the thickness shall be 200mm.
2 Sidewalk width shall be wider when specified.
3 This OPSD shall be read in conjunction with OPSD 310.030, 310.031, 310.033, and 310.039.
4 Contraction joint may be tooled or sawcut.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 3
CONCRETE SIDEWALK		OPSD 310.010



NOTES:
1 At commercial and industrial driveways, the thickness shall be 200mm.
2 Sidewalk width shall be wider when specified.
3 This OPSD shall be read in conjunction with OPSD 310.030, 310.031, 310.033, and 310.039.
A All dimensions are in millimetres unless otherwise shown.

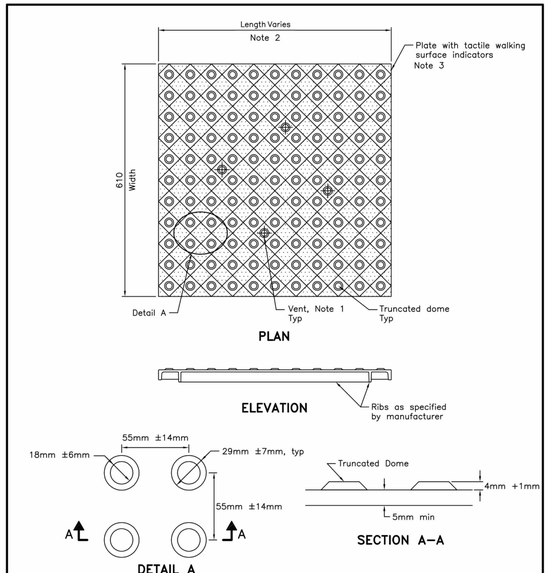
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 3
CONCRETE SIDEWALK ADJACENT TO CURB WITH GUTTER		OPSD 310.020



NORFOLK ACCESSIBILITY DESIGN GUIDELINES OVERRIDES / GOVERNS OVER OPSD FOR WIDTH OF DROPPED CURB & TOP LANDING TYP.

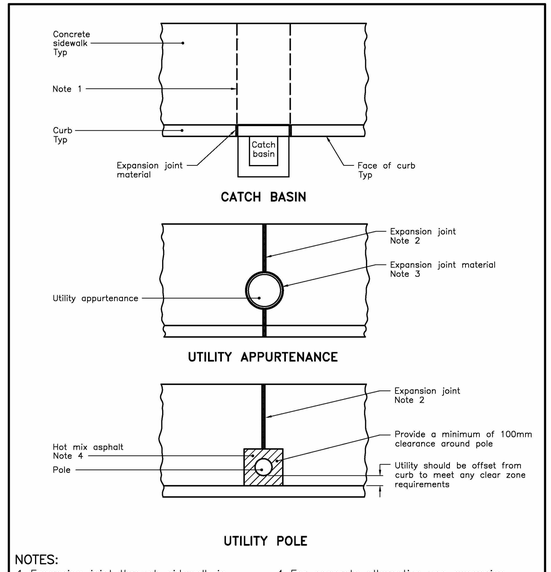
NOTES:
1 Slope of ramp shall not exceed 8%.
2 Cross slope of ramp shall not exceed 2% in either direction.
3 Cross slope of flared side of ramp shall not exceed 8%.
4 Dropped curb at ramp shall be modified to eliminate 30 mm step at gutter line.
5 Minimum thickness of ramp is 200mm. Minimum thickness of sidewalk and flared sides adjacent to ramp is 150mm.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 1
CONCRETE SIDEWALK RAMPS AT UNSIGNALIZED INTERSECTIONS		OPSD 310.033



NOTES:
1 Vents shall be as specified by the manufacturer.
2 Length of plate may be increased to suit the curb depression width.
3 Material of plate shall be as specified in Contract Documents.
A Adjacent cast iron plates shall be permanently connected using a locking mechanism and any hardware shall be hot dipped galvanized.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 1
CONCRETE SIDEWALK RAMPS TACTILE WALKING SURFACE INDICATORS COMPONENT		OPSD 310.039



NOTES:
1 Expansion joint through sidewalk is required when curb and gutter is poured integral with sidewalk.
2 Adjust joints to coincide with centre of utility, with minimum slab length of 1m.
3 Expansion joint material shall be placed around Utility appurtenance flush with concrete surface.
4 For concrete alternative use expansion joint material around boxout.
A For expansion joint detail, see OPSD 310.010.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 3
UTILITY ISOLATION IN CONCRETE SIDEWALKS		OPSD 310.040

NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS
9	2024.07.16	SPA PHASE 2 SUB.#1
8	2024.07.10	SPA PHASE 2 SUB.#1 - OWNER REVIEW
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4	2024.03.05	PROGRESS
3	2024.02.29	PROGRESS
2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 3360506206D
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

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ORCHARD SQUARE

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

STAMP ARCH.

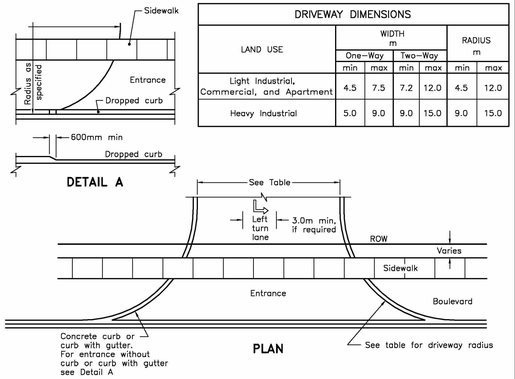
STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

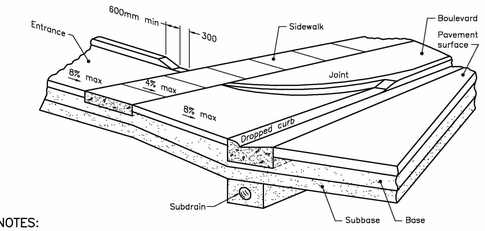
DRAWING TITLE:
OPSD DETAILS

CHECKED BY: MS
DRAWN BY: JS
DRAWING SCALE:
DRAWING NO.: A105
PROJECT NO.: 20-128

DATE PLOTTED: 2024-08-27 3:57:01 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt

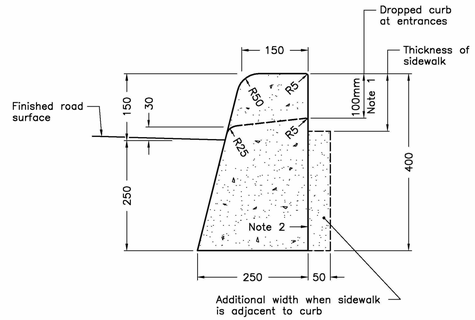


DRIVEWAY DIMENSIONS						
LAND USE	WIDTH m				RADIUS m	
	One-Way		Two-Way			
	min	max	min	max	min	max
Light Industrial, Commercial, and Apartment	4.5	7.5	7.2	12.0	4.5	12.0
Heavy Industrial	5.0	9.0	9.0	15.0	9.0	15.0



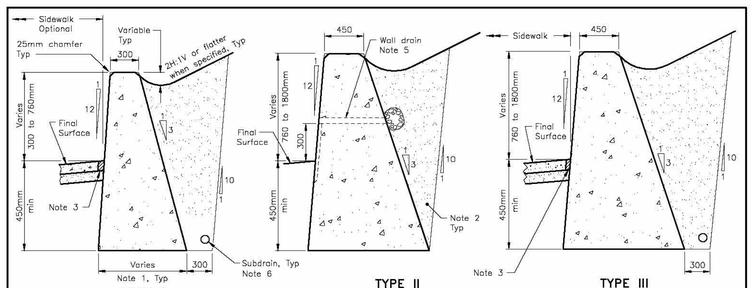
NOTES:
A All dimensions are in millimetres unless otherwise shown.

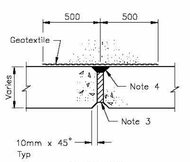
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2009	Rev 1
URBAN INDUSTRIAL, COMMERCIAL, AND APARTMENT ENTRANCES		OPSD 350.010



NOTES:
1 When sidewalk is continuously adjacent, the dropped curb at entrances shall be reduced to 75mm.
2 For slipforming procedure a 5% batter is acceptable.
A Treatment at entrances shall be according to OPSD 351.010.
B Outlet treatment shall be according to the OPSD 610 Series.
C The transition from one curb type to another shall be a minimum length of 3.0m, except in conjunction with guide rail where it shall be according to the OPSD 900 Series.
D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev 2
CONCRETE BARRIER CURB		OPSD 600.110

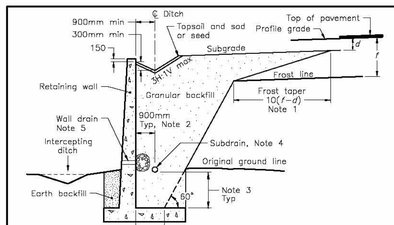


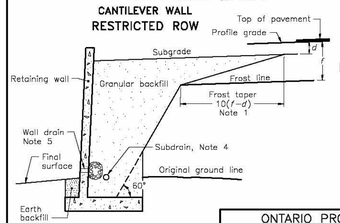


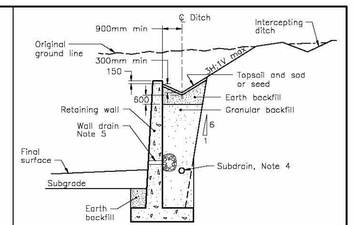
PLAN OF JOINT DETAIL IN CONCRETE TOE WALLS AT 3.0m SPACING

NOTES:
1 Walls shall be founded on undisturbed soil having a minimum bearing capacity at ultimate limit states of 200kPa for Type I and 300kPa for Type II and Type III.
2 Excavation for toe walls shall be backfilled with free draining granular material.
3 10mm preformed joint filler, Type A, non-extruding and resilient bituminous type as specified.
4 Cold applied rubber asphalt joint sealing compound.
5 Where specified, wall drains shall be installed as per OPSD 3190.100.
6 150mm dia perforated pipe subdrain wrapped in geotextile.
A Maximum height of slope above top of wall is 4m.
B Concrete for toe walls shall be 30MPa.
C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2010	Rev 2
WALLS RETAINING CONCRETE TOE WALL		OPSD 3120.100

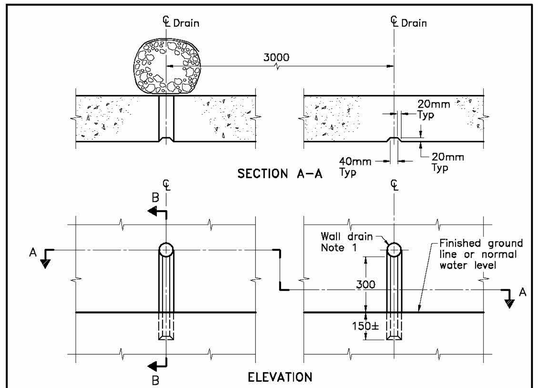






NOTES:
1 d = depth of combined base and subbase courses.
f = frost penetration depth as specified.
2 Dimensions perpendicular to back face of retaining wall.
3 Height to be consistent with positive drainage of subdrain as specified.
4 150mm dia perforated pipe subdrain wrapped with geotextile. Provision shall be made to carry pipe through counterfort wall.
5 Where specified, wall drains shall be installed as per OPSD 3190.100.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2010	Rev 1
WALLS RETAINING, BACKFILL MINIMUM GRANULAR REQUIREMENT		OPSD 3121.150



NOTES:
1 Bottom half of drain to be contoured to shape of vertical groove after removal of formwork.
2 Geotextile shall be non-woven, Class II, with an FOS of 125-250 µm.
A Minimum cover to reinforcing bars shall be measured from the base of the groove.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Apr 2011	Rev 2
WALLS RETAINING AND ABUTMENT WALL DRAIN		OPSD 3190.100

NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS
9	2024.07.16	SPA PHASE 2 SUB.#1
8	2024.07.10	SPA PHASE 2 SUB.#1 - OWNER REVIEW
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4	2024.03.05	PROGRESS
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2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062060
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM CHIARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

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ORCHARD SQUARE

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G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
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(519) 426-6270

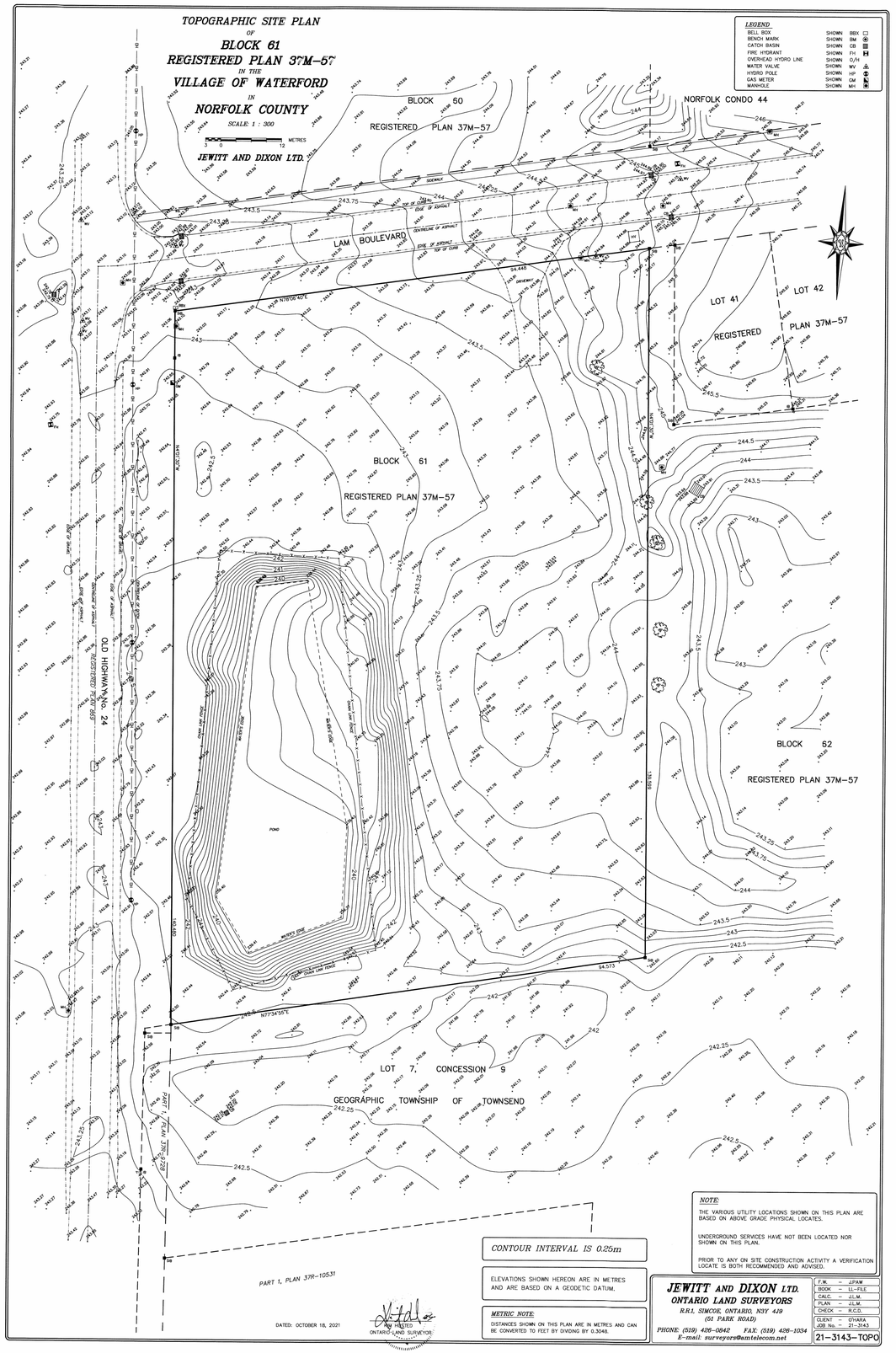
STAMP ARCH. | STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
OPSD DETAILS

CHECKED BY: MS | DRAWN BY: JS
DRAWING SCALE: | DRAWING NO.: A105A
PROJECT NO.: 20-128

DATE PLOTTED: 2024-08-27 3:57:07 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt



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ORCHARD SQUARE

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STAMP ARCH.

STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
EXISTING SITE SURVEY

CHECKED BY: MS
DRAWN BY: JS
DRAWING SCALE:
DRAWING NO.: A106
PROJECT NO.: 20-128

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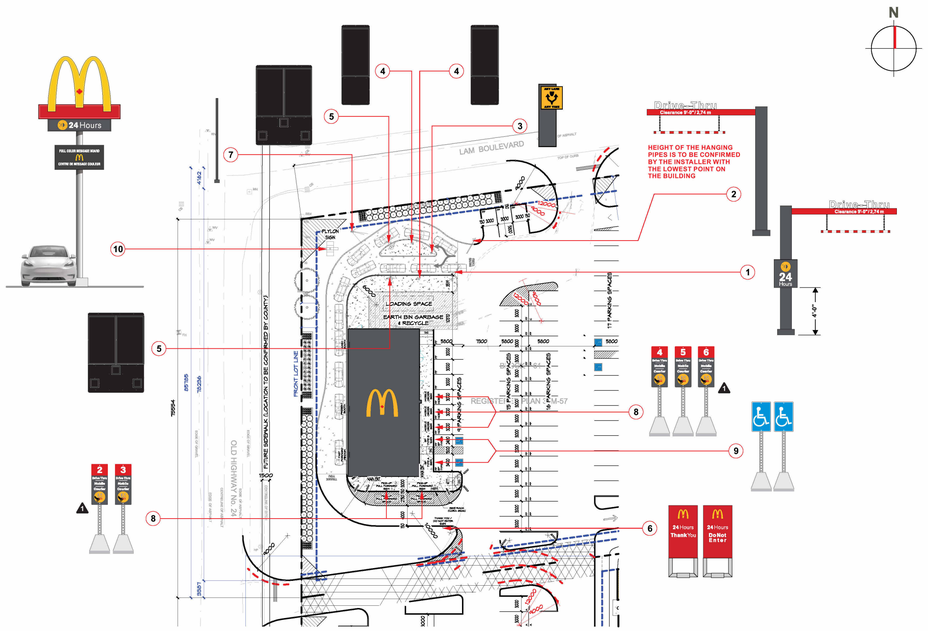
DATE PLOTTED: 2024-08-27 3:37:17 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt



CB7-87761A

SITE PLAN

Installation: ☐ Interior ☑ Exterior

Electrical Specifications:

Volts: T.B.D. Amps: T.B.D. Circ: T.B.D.

#	Description:
1	NON-ILLUMINATED VHD (RIGHT SIDE) W/ SWING ARM SEE MCD0OCS3XX0005 WITH ILLUMINATED 24H APPENDAGE SEE MCDO0SF4P30051 SIGN AREA: 4.67 FT²- 0.43 M² (APPENDAGE)
2	NON-ILLUMINATED VHD (LEFT SIDE) WITH SWING ARM SEE MCD0OCS3XX0006
3	NON-ILLUMINATED ANY LANE ANY TIME BOLLARD SIGN SEE MCD1E9AX014
4	DIGITAL PRE SELL BOARD SUPPLIED AND INSTALLED BY PSG SIGN AREA: 16.38 FT² - 1.52 M²
5	DIGITAL MENU BOARD WITH SPEAKER SUPPLIED AND INSTALLED BY PSG SIGN AREA: 33.22 FT² - 3.09 M²
6	ILLUMINATED DIRECTIONAL SIGNS SEE MCDO0DR4B30003 SIGN AREA: 7.32 FT² - 0.68 M²
7	NPR CAMERA POST SEE DRAWING MCDO0ST3XX0022 *LOCATION T.B.C.BY GC PRIOR TO POURING BASES/INSTALL*
8	CUSTOM PARKING SIGN WITH OMEGA POST AND CONCRETE BLOCK SEE PAGE 3 SIGN AREA: 2.5 FT² - 0.23 M²
9	S/F ACCESSIBLE PARKING SIGN MCDO0SFXAX0028 WITH OMEGA POST & CONCRETE BLOCK SIGN AREA: 2.14 FT² - 0.20 M²
10	ILLUMINATED HIGHWAY SIGN WITH DRB SEE PAGE 2 TOTAL SIGN AREA: 10.80 M²

HEIGHT OF THE HANGING PIPES IS TO BE CONFIRMED BY THE INSTALLER WITH THE LOWEST POINT ON THE BUILDING

#	Notes:
1	CLIENT TO CONFIRM IF RESTAURANT IS OPEN 24H - GRAPHIC IS SUBJECT TO CHANGE RESERVED PARKING AND MOP SIGN # ARE SUBJECT TO CHANGE

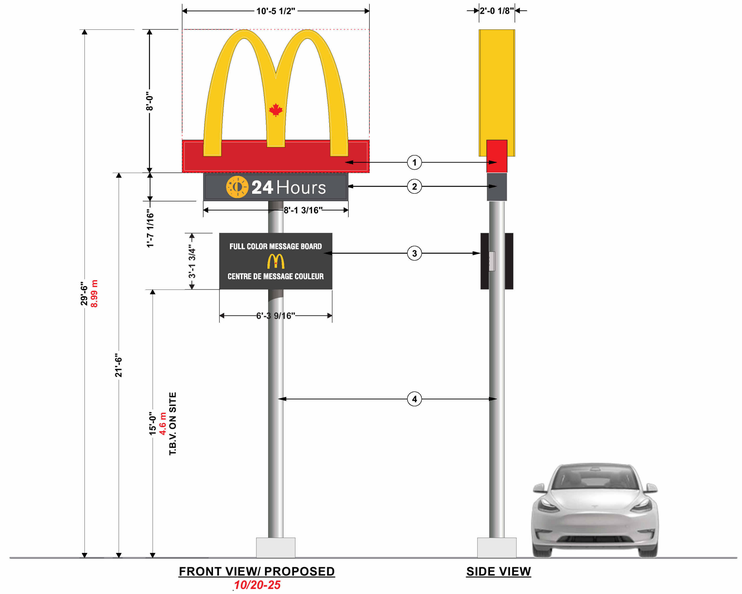
#	DIGITAL MENU BOARD CONNECTION
1	HARD WIRED
2	WIRELESS

#	DIGITAL MENU BOARD AUDIO
1	3M AUDIO
2	HME AUDIO

#	Revisions:
A	REVISED PARKING SIGNS - CV- 03.27.2024

Pattison Sign Group
Powering Your Brand
Toll Free:1-800-561-9798 • Fax:(877) 737-1734 • www.pattisonsign.com

Client:	MCDONALD'S STORE # 41344
Address:	WATERFORD, ON
Designer:	CLAUDIA VOGT
Checked by:	N/A — Date: 03.20.2024
Scale:	N.T.S. — Page: 1/3



TOTAL SIGN AREA: 10.80 M²

CB7-87761A

D/F ILLUMINATED PYLON SIGN (HIGHWAY SIGN)

Installation: ☐ Interior ☑ Exterior

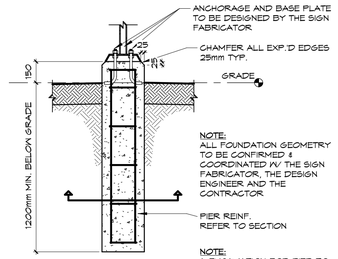
Electrical Specifications:

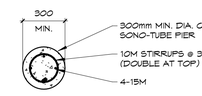
Volts: T.B.D. Amps: T.B.D. Circ: T.B.D.

#	Description:
1	NEXT GENERATION HIGHWAY SIGN HEAD SEE DRAWING MCDOODF3P0009 SIGNAREA: 83.66 FT² / 7.77 M²
2	ILLUMINATED 24H FEATURE SIGN BOX SIGNAREA: 12.86 FT² / 1.19 M²
3	3X6 MCDOODF4E30068 BRAVA SERIES SMD 6.67MM LED EXTERIOR DIGITAL DISPLAY, 1 PRIMARY AND 1 SECONDARY, MATRIX 144 X 288, CABINET SIZE 3' 1-3/4" H X 6' 3-9/16" W SIGN AREA: 19.81 FT² - 1.84 M²
*	MOUNTING BRACKETS
4	HSS POST

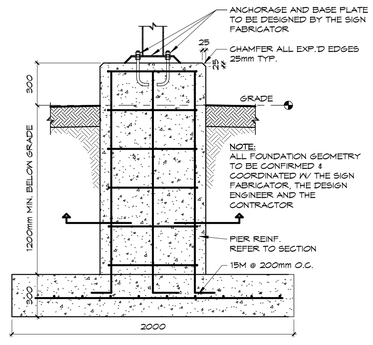
#	Notes:
1	HEIGHT AND SIGNAREA T.B.V.

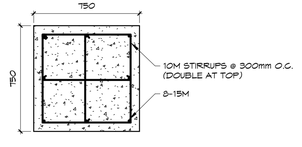
Client:	MCDONALD'S STORE # 41344
Address:	WATERFORD, ON
Designer:	CLAUDIA VOGT
Checked by:	N/A — Date: 03.20.2024
Scale:	N.T.S. — Page: 2/3





1 / A107 MISC. SONO-TUBE PIER
SCALE 1 : 20





2 / A107 SIGN PYLON MAIN MCDONALD'S SIGN
SCALE 1 : 20

NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS

NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062860
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM CHIARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS
ALL DWG.'S ARE TO BE READ IN COLOUR
ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

ORCHARD SQUARE

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

STAMP ARCH.

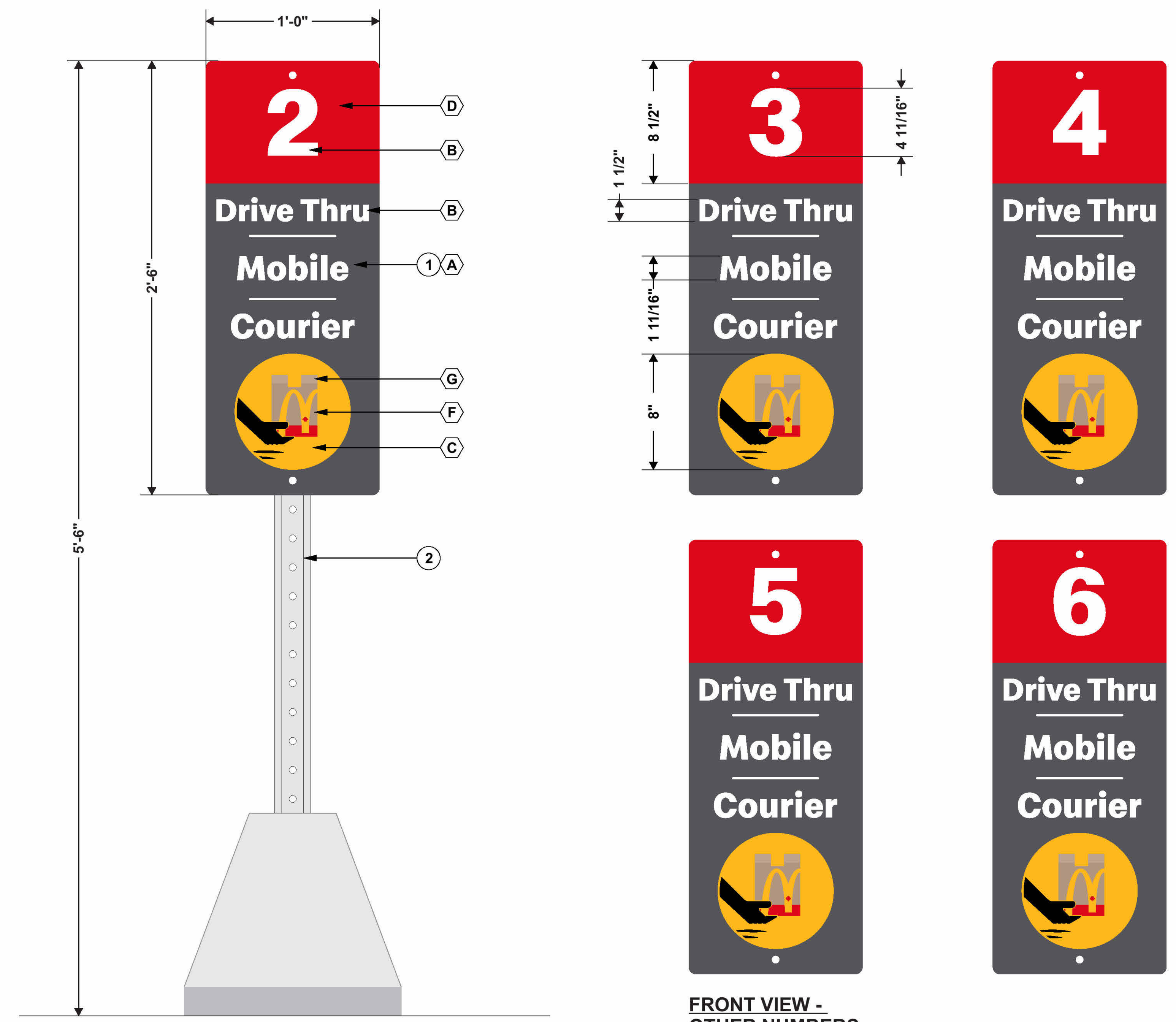
STAMP STRUCT.
LICENSED PROFESSIONAL ENGINEER
B.D. BUCHWALD
100209
PROVINCE OF ONTARIO
2024.08.27

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
FOOD SIGNAGE

CHECKED BY:	DRAWN BY:
MS	BM
DRAWING SCALE: 1 : 20	DRAWING NO.: A107
PROJECT NO.: 20-128	

DATE PLOTTED: 2024-08-27 4:32:39 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt



FRONT VIEW

FRONT VIEW - OTHER NUMBERS

CB7-87761A

MOBILE ORDER PARKING SIGN

Installation:	☐ Interior	☑ Exterior

Electrical Specifications:

Volts:	T.B.D.	Amps:	T.B.D.	Circ:	T.B.D.

#	Description:
1	PAINTED 1/8" TK. ALUMINUM PANEL (1/2"Ø RADIUS) WITH VINYL APPLICATION ON FIRST SURFACE (WITH HARDWARE)
2	OMEGA POST WITH CONCRETE BLOCK

#		Colors:
A		PAINTED COOL GREY 11C
B		WHITE REFLECTIVE VINYL 3M 3290
C		YELLOW VINYL 3M #3730-3762
D		RED VINYL 3M #3630-2609
E		BLACK VINYL
F		LIGHT BEIGE VINYL 1
G		LIGHT BEIGE VINYL 2

Custom Sign:
CUSTOM MESSAGE "DRIVE THRU"

#	Revisions:
1	ADDED PAGE - CV- 03.27.2024

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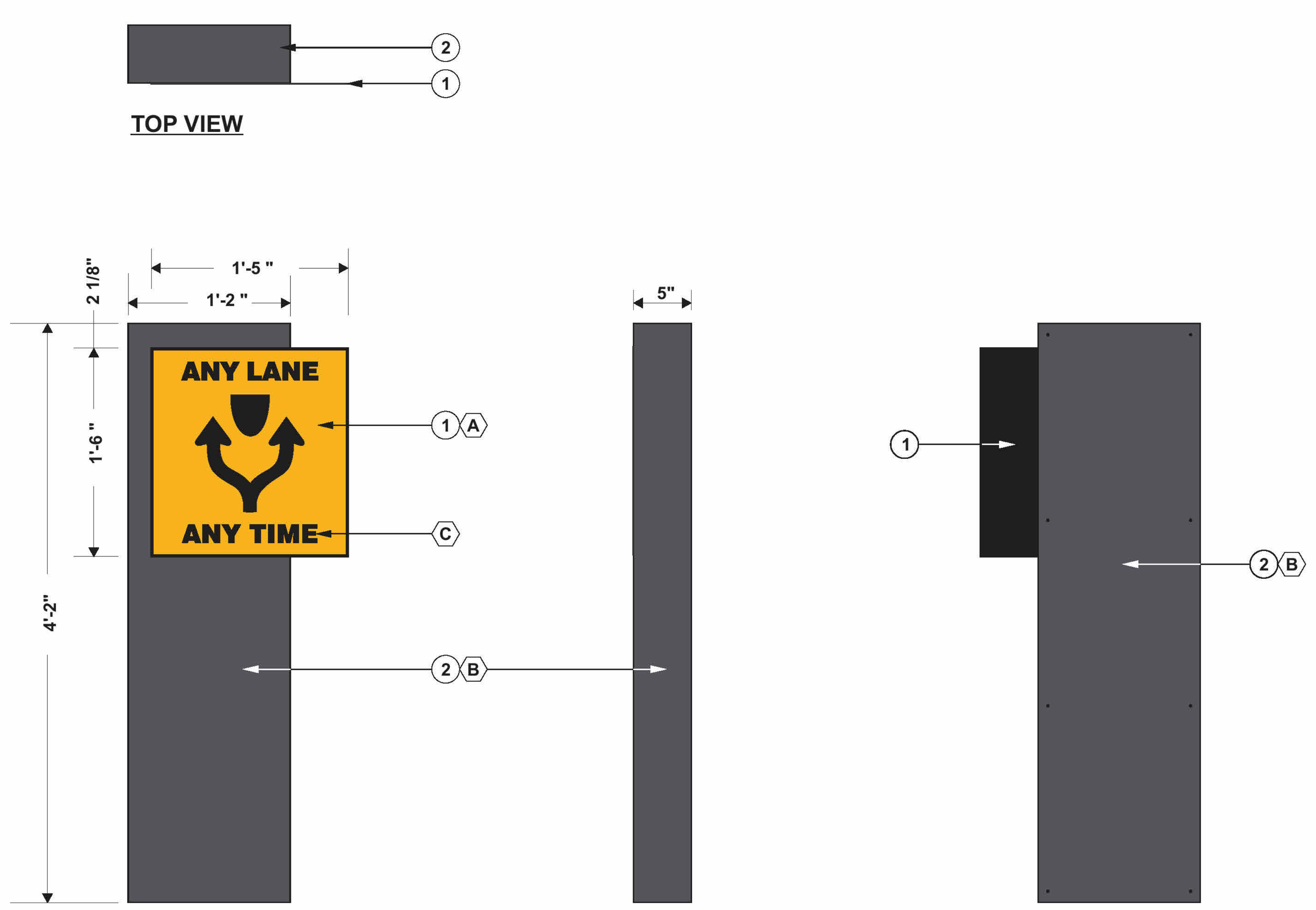
Client:	MCDONALD'S STORE # 41344		
Address:	WATERFORD, ON		
Designer:	CLAUDIA VOGT		
Checked by:	N/A	Date:	03.20.2024
Scale:	1 1/2" =1'-0"	Page:	3/3



TOP VIEW

FRONT VIEW

SIDE VIEW

BACK VIEW

MCD1E9AX014

S/F NON ILLUMINATED BOLLARD SIGN

Installation:	☐ Interior:	☑ Exterior:

Electrical specifications:

Volts:	N/A	Amp.:	N/A	Circ.:	N/A

#	Descriptions:
1	ALUMINUM PRE-PAINTED BLACK/WHITE PANEL WITH VINYL APPLIED ON 1ST SURFACE
2	FABRICATED ALUMINUM DECOR

#	Notes:
1	SEE TECHNICAL DRAWING FOR MORE DETAIL

#		Colors:
A		PAINTED TO MATCH YELLOW VINYL #3730-3762
B		PAINTED TO MATCH COOL GREY PMS 11C
C		BLACK VINYL #7725-22

#	Revision(s)	By:	Date:
1	REVISED TO MATCH STD.	LL	11.20.2023

Customer Approval:______________________ Date:____/____/____

PRODUCTION INFORMATION : LF 03.12.2024

FS\MCD1 (Mc Donald)\A2-New IMAGE 2010\Bollard Sign\MCD1E9AX014 non-Illuminée

This sign is intended to be installed in accordance with the requirements of Article 600 of the National Electrical code and Section 34 of the Canadian Electrical Code and/or other applicable local codes. This includes proper grounding and bonding of the sign.

Pattison Sign Group illuminated signs contain Fluorescent, Neon and/or HID Lamps. These lamps contain Mercury (Hg). Dispose of these lamps according to Local, Provincial, State, or Federal Laws.

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Descriptions:	Plate #:
ALUMINUM	MCD1E9AX014-1 &-2
ALUMINUM	MCD1E4D7008-3
XX	XX
XX	XX
XX	XX
XX	XX
XX	XX

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Client:	MCDONALD'S		
Site:	VARIOUS		
Draftsman:	ANNIE CARON	Date:	04.16.2015
Checked By:	JJ		
Page: 1/1	Scale:	1" = 1'-0"	

NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062868
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., NOE 1YO
TELEPHONE NO.: 1.705.205.3235

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ALL DWG.'S ARE TO BE READ IN COLOUR
ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

ORCHARD SQUARE

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

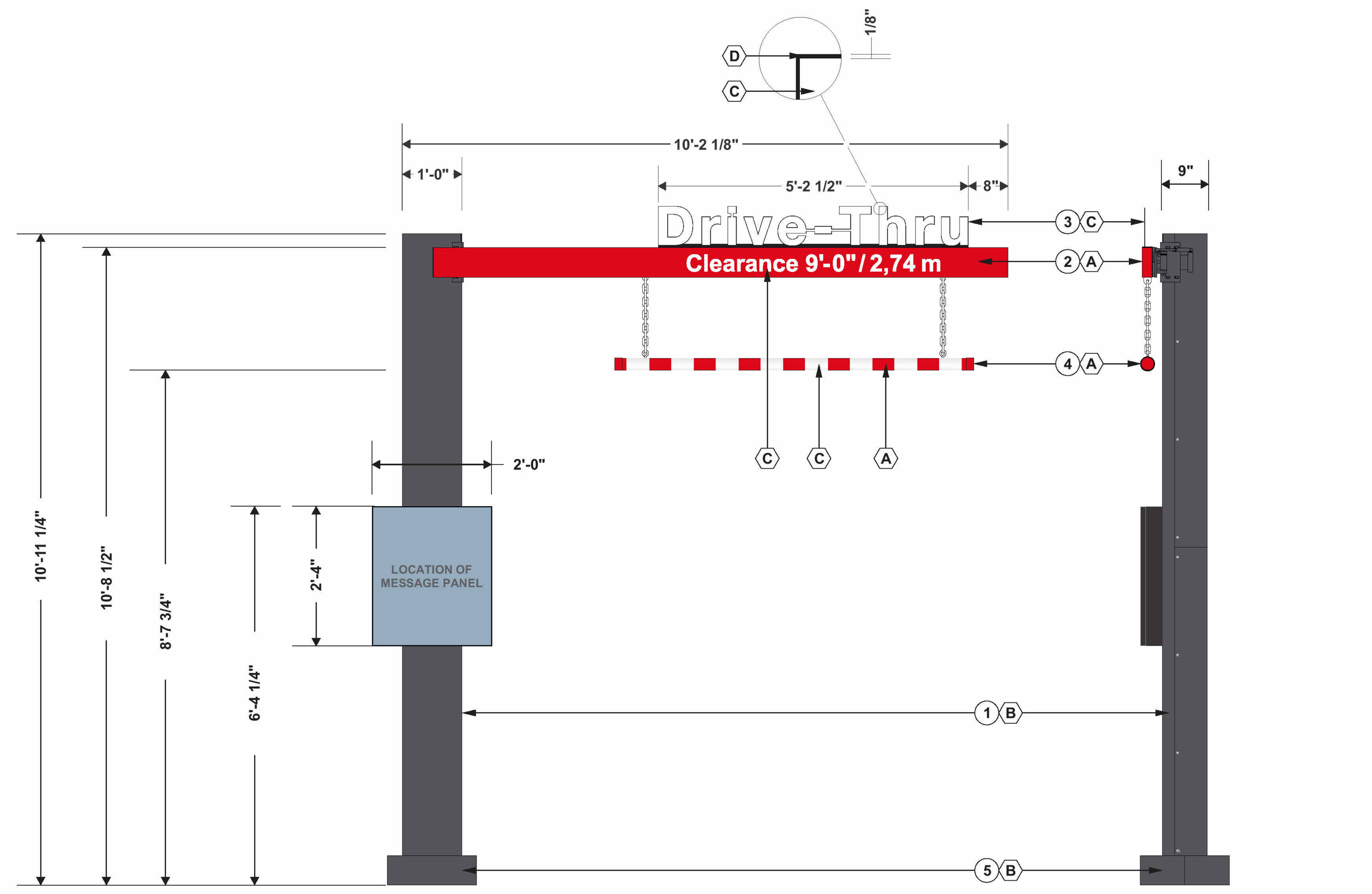
STAMP ARCH.

STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
FOOD SIGNAGE

CHECKED BY: MS
DRAWN BY: BM
DRAWING SCALE:
DRAWING NO.: A108 (10)
PROJECT NO.: 20-128



FRONT VIEW **SIDE VIEW**

MCDO0CS3XX0005

VHD / RIGHT SIDE / ENGLISH WITH HINGE

Installation:	Interior:	✓ Exterior:

Electrical specifications:

Volts:	N/A	Amp.:	N/A	Circ.:	N/A

#	Descriptions:
1	FABRICATED ALUMINUM DECOR
2	ALUMINUM TUBING WITH VINYL APPLIED ON FIRST SURFACE
3	0.125" TK. CUT OUT ALUMINUM LETTERS (WITH VINYL OUTLINE), BENT FOR MOUNTING TO ALUMINUM TUBING
4	2 3/8" Ø ALUMINUM PIPE WITH VINYL APPLICATION ON FIRST SURFACE AND 2 1/2"Ø END CAPS AND CHAINS
5	FABRICATED ALUMINUM BASE COVER

#	Notes:
1	SIGN MOUNTED TO 6" CURB (BY OTHER)
2	SEE TECHNICAL DRAWING MCDO0CS4XX0005S FOR MORE DETAIL

#	Colors:
A	PAINTED TO MATCH RED VINYL #3630-2609
B	PAINTED TO MATCH COOL GREY PMS 11C
C	WHITE OPAQUE VINYL 7725-20
D	PAINTED BLACK

#	Revision(s)	By:	Date:
1	REVISED TO MATCH STD.	LL	11.06.2023

Customer Approval:________________ Date:____/____/____

PRODUCTION INFORMATION : LF 02.20.2024

FS\MCDO0 (McDonald's)\Drive-Thru Signage\Clearance Sign\MCDO0CS3XX0005 (Single Lane Right Gateway New text RED (VHD N-ILL with hinge)

Descriptions:	Plate #:
ALUMINUM	MCDO0CS3XX0005-1
ALUMINUM	MCD1Q9XX013
ALUMINUM	MCD1L9AX006-1
ALUMINUM	MCD1V8XX029-2
XX	XX
XX	XX
XX	XX

This sign is intended to be installed in accordance with the requirements of Article 600 of the National Electrical code and Section 34 of the Canadian Electrical Code and/or other applicable local codes. This includes proper grounding and bonding of the sign.

Pattison Sign Group illuminated signs contain Fluorescent, Neon and/or HID Lamps. These lamps contain Mercury (Hg). Dispose of these lamps according to Local, Provincial, State, or Federal Laws.

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Pattison Sign Group

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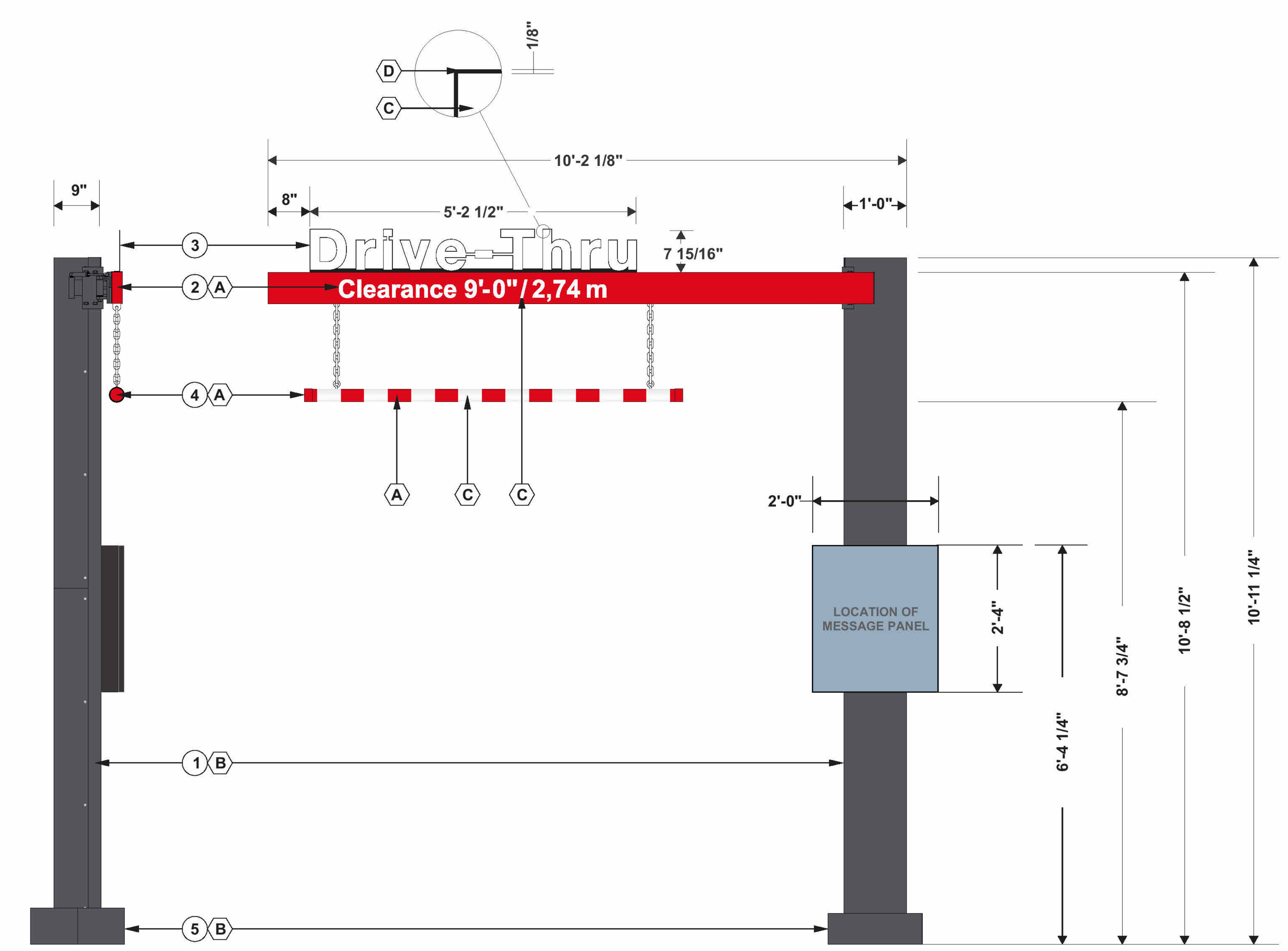
Client:	MCDONALD'S		
Site:	VARIOUS		
Draftsman:	ANNIE CARRIER	Date:	06.21.2017
Checked By:	JJ		
Page: 1/1	Scale:		1/2" = 1'-0"



SIDE VIEW **FRONT VIEW**

MCDO0CS3XX0006

VHD/ LEFT ARM/ ENGLISH WITH HINGE

Installation:	Interior:	✓ Exterior:

Electrical specifications:

Volts:	N/A	Amp.:	N/A	Circ.:	N/A

#	Descriptions:
1	FABRICATED ALUMINUM DECOR
2	ALUMINUM TUBING WITH VINYL APPLIED ON FIRST SURFACE
3	0.125" TK. CUT OUT ALUMINUM LETTERS (WITH VINYL OUTLINE), BENT FOR MOUNTING TO ALUMINUM TUBING
4	2 3/8" Ø ALUMINUM PIPE WITH VINYL APPLICATION ON FIRST SURFACE AND 2 1/2"Ø END CAPS AND CHAINS
5	FABRICATED ALUMINUM BASE COVER

#	Notes:
1	SIGN MOUNTED TO 6" CURB (BY OTHER)
2	SEE TECHNICAL DRAWING MCDO0CS4XX0009S FOR MORE DETAIL

#	Colors:
A	PAINTED TO MATCH RED VINYL #3630-2609
B	PAINTED TO MATCH COOL GREY PMS 11C
C	WHITE OPAQUE VINYL 7725-20
D	PAINTED BLACK

#	Revision(s)	By:	Date:
1	REVISED TO MATCH STD.	LL	11.15.2023

Customer Approval:________________ Date:____/____/____

PRODUCTION INFORMATION : LF 03.12.2024

FS\MCDO0 (McDonald's)\Drive-Thru Signage\VHD\MCDO0CS3XX0006 (Left Arm english with hinge)

Descriptions:	Plate #:
ALUMINUM	MCDO0CS3XX0006-1
ALUMINUM	MCD1Q9XX013
ALUMINUM	MCD1L9AX006-1
ALUMINUM	MCD1V8XX029-2
XX	XX
XX	XX
XX	XX

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Client:	MCDONALD'S		
Site:	VARIOUS		
Draftsman:	ANNIE CARRIER	Date:	06.21.2017
Checked By:	JJ		
Page: 1/1	Scale:		1/2" = 1'-0"

NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062868
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

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ORCHARD SQUARE

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G. DOUGLAS VALLEE LIMITED
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SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

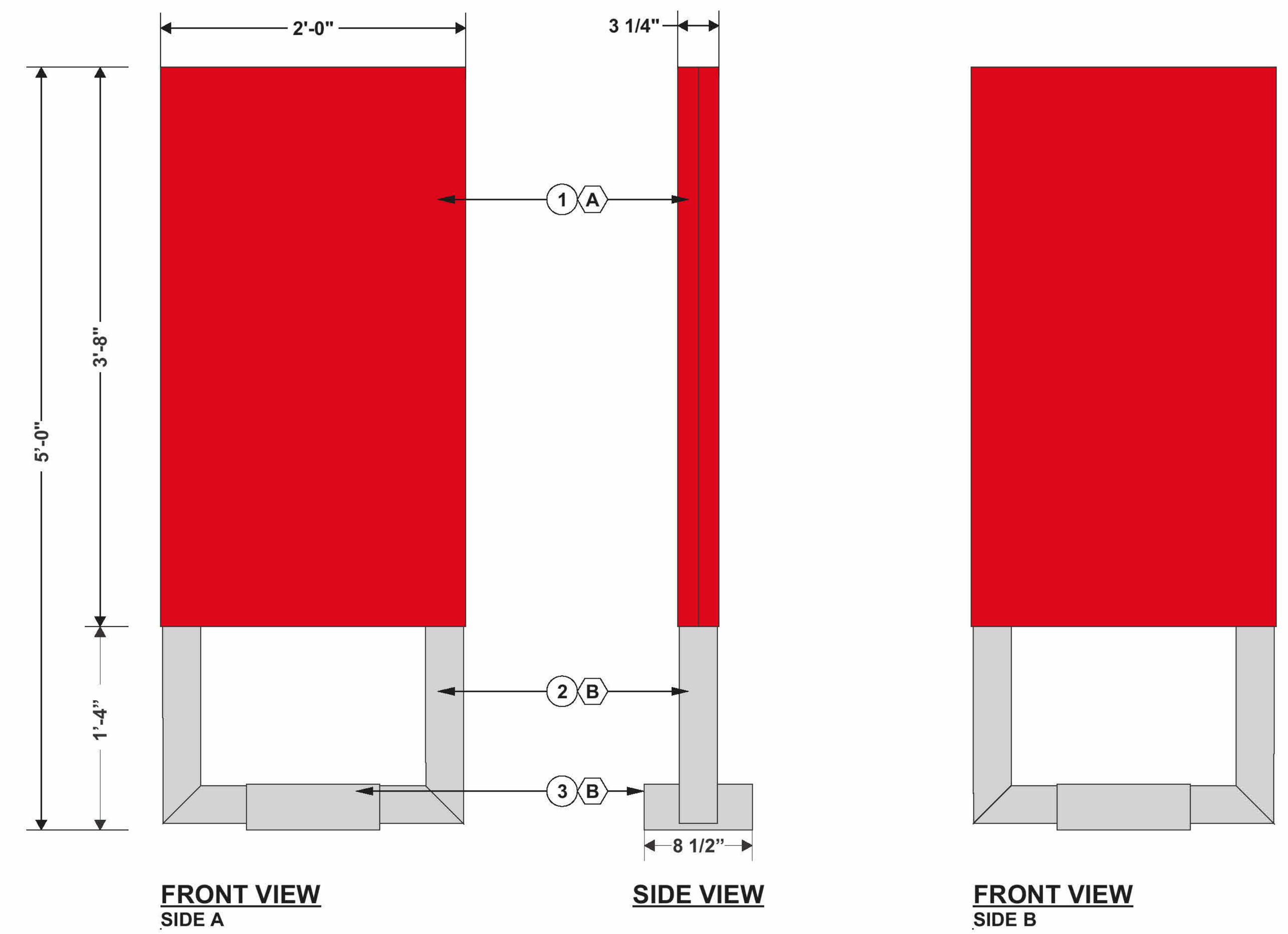
STAMP ARCH. STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
FOOD SIGNAGE

CHECKED BY:	DRAWN BY:
MS	BM
DRAWING SCALE:	DRAWING NO.:
PROJECT NO.: 20-128	A109

DATE PLOTTED: 2024-08-27 4:03:54 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt



MCDO0DR4B30003

D/F ILLUMINATED DIRECTIONAL SIGN

Installation:		Interior:	✓	Exterior:

Electrical specifications:

Volts:	120	Amp.:	0.3	Circ.:	1

#	Descriptions:
1	ROUTED 1/8" TK. ALUMINUM FACE BACKED WITH 0.118" TK. SABIC POLYCARBONATE (SEE GRAPHIC OPTION)
2	ALUMINUM TUBING
3	ALUMINUM BASE COVER

#	Notes:
1	SEE TECHNICAL DRAWING FOR MORE DETAIL

#		Colors:
A		PAINTED TO MATCH RED VINYL #3630-2609
B		PAINTED TO MATCH SILVER COIL AT 70% GLOSS

#	Revision(s)	By:	Date:
1	ADD GRAPHICS OPTION PAGE 3 TO 7	AC	09.22.2016
2	REVISED POWER SUPPLY	LL	12.22.2022
3	REVISED TO MATCH STD.	LL	11.07.2023
4	REMOVED "DO NOT USE" FACES AND CREATE PDF "MCDO0DR4B30003-FACES"	CC	03.25.2024

Customer Approval:______________________________ Date:____/____/____

PRODUCTION INFORMATION : LF 01.09.2024

FS\MCDO0 (McDonald's)\Directionnel\MCDO0DR4B30003 3'-8" X 2'-0"

Descriptions:	Plate #:
ALUMINUM	MCD1E9B7020-1 &-2
ALUMINUM	MCDO0DR4B30003-1
XX	XX
XX	XX
XX	XX
XX	XX
XX	XX

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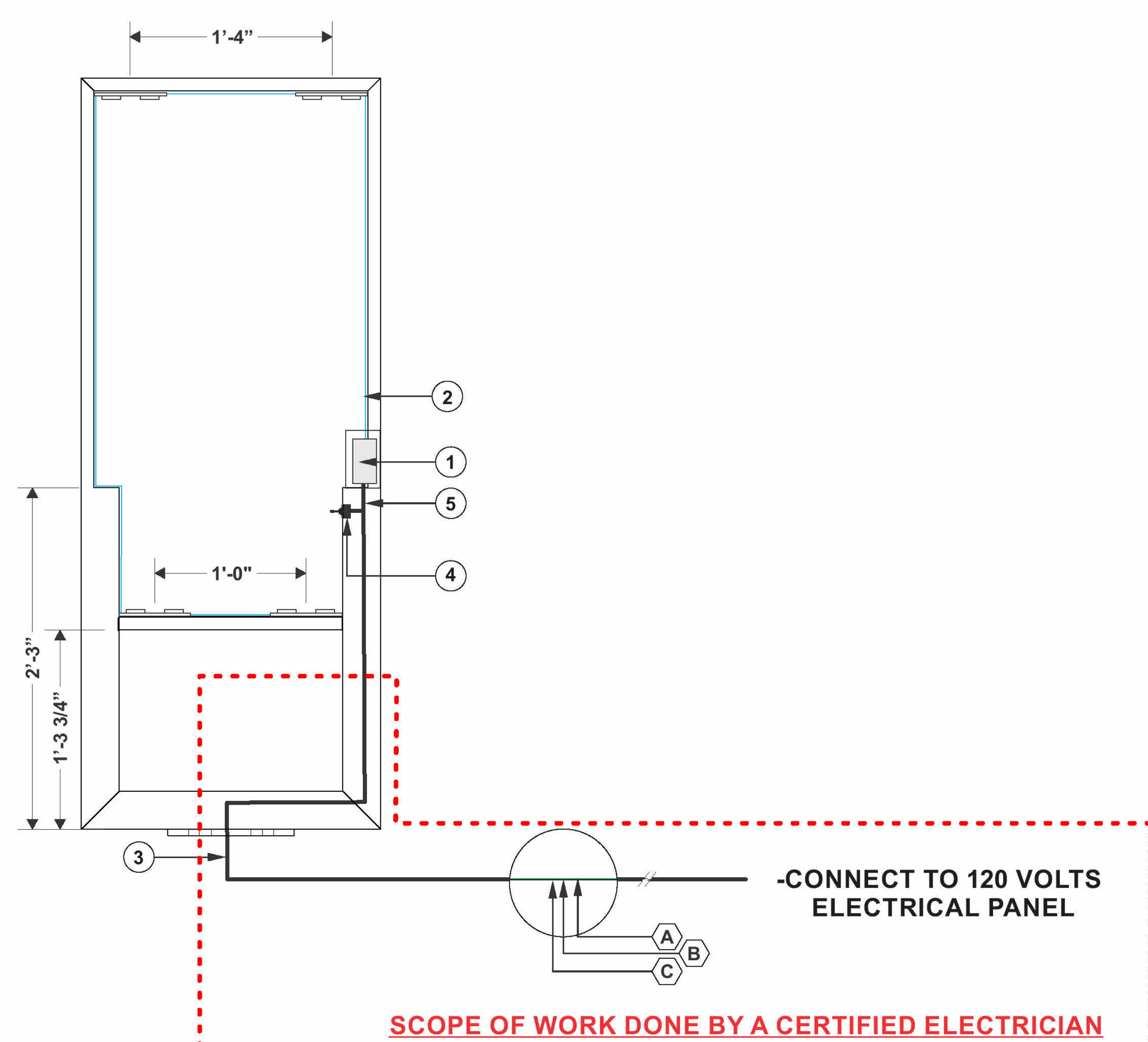
Pattison Sign Group

Tel: (506) 735-5506 | Fax: (877) 737-1734 | Toll Free: 1-800-561-9798

Client:	MCDONALD'S		
Site:	VARIOUS		
Draftsman:	ANNIE CARRIER	Date:	08.31.2016
Checked By:	JJ		
Page: 1/2	Scale:		1" = 1'-0"

LED MODULE INFO: TYPE:	QTY:	POWER SUPPLY INFO: TYPE:	QTY:	MAXIMUM LOAD PER POWER SUPPLY
GEBI50-2 GE (LEMO0182)	4	GEPS24-25U-NA (0.3 AMPS) (LEPS0066)	1	9 LED MODULES



⚠ WARNING!

RISK OF ELECTRIC SHOCK: Turn power OFF before inspection, installation or removal.

RISK OF FIRE: Use only approved wire for input/output connections.

MCDO0DR4B30003

LED & ELECTRICAL LAYOUT

Installation:		Interior:	✓	Exterior:

Electrical specifications:

Volts:	120	Amp.:	0.3	Circ.:	1

#	Descriptions:
1	CLASS 2 POWER SUPPLY
2	LOW VOLTAGE CLASS 2 POWER WIRES
3	120 VOLTS PRIMARY IN CONDUIT (BY OTHER)
4	WEATHERPROOF TOGGLE SWITCH
5	INSTALLATION INPUT 120 VOLTS

#	Notes:
1	CONDUCTOR OPERATING AT DIFFERENT POTENTIALS THEN CLASS 2 IN AN ENCLOSURE SHALL BE SEPARATED OR SEGREGATED FROM THE CLASS 2 CONDUCTORS
2	ELECTRICAL HOOK UP SUPPLIED BY OTHER
3	MAXIMUM DISTANCE BETWEEN LED LETTERS & POWER SUPPLY: 18FT. FOR 18 WIRE GAUGE 29FT. FOR 16 WIRE GAUGE

#		Colors:
A		GREEN ELECTRICAL WIRE
B		BLACK ELECTRICAL WIRE
C		WHITE ELECTRICAL WIRE

This sign is intended to be installed in accordance with the requirements of Article 600 of the National Electrical code and Section 34 of the Canadian Electrical Code and/or other applicable local codes. This includes proper grounding and bonding of the sign.

Pattison Sign Group illuminated signs contain Fluorescent, Neon and/or HID Lamps. These lamps contain Mercury (Hg). Dispose of these lamps according to Local, Provincial, State, or Federal Laws.

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www.pattisonsign.com

Pattison Sign Group

Tel: (506) 735-5506 | Fax: (877) 737-1734 | Toll Free: 1-800-561-9798

Client:	MCDONALD'S		
Site:	VARIOUS		
Draftsman:	ANNIE CARRIER	Date:	08.31.2016
Checked By:	JJ		
Page: 2/2	Scale:		1" = 1'-0"

NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062868
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DWG.'S ARE TO BE READ IN COLOUR

ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

ORCHARD SQUARE

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

STAMP ARCH. | STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
FOOD SIGNAGE

CHECKED BY:	DRAWN BY:
MS	BM
DRAWING SCALE:	DRAWING NO.:
PROJECT NO.: 20-128	A110

DATE PLOTTED 2024-08-27 4:03:59 PM
PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE
FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt

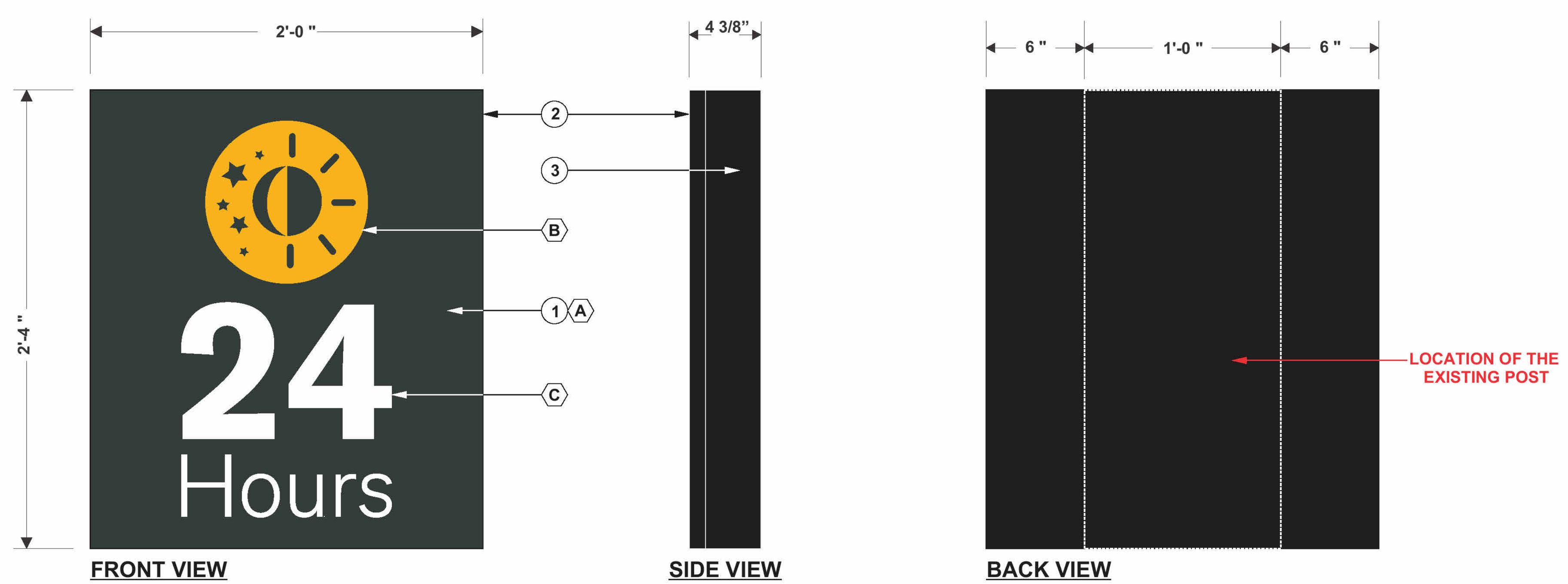
NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS

MCDO0SF4P30051

S/F ILLUMINATED SIGN

Installation:	☐ Interior:		☑ Exterior:		
Electrical specifications:					
Volts:	120	Amp.:	0.65	Circ.:	1

#	Descriptions:
1	1/8" TK. CLEAR ACRYLIC WITH VINYL APPLIED ON SECOND SURFACE
2	1" BLACK TRIM CAP
3	FABRICATED SIGN BOX WITH 0.051" TK. ALUMINUM PRE-PAINTED BLACK/WHITE



#	Notes:
1	2 WATER HOLES TO BE DRILLED ON BOTTOM OF SIGN
2	BACK OF SIGN IS VISIBLE AND NEEDS TO BE CLEAN FINISH

#		Colors:
A		GREY VINYL #7725-41
B		YELLOW VINYL #3630-3762
C		WHITE DIFFUSER VINYL #3630-20

Customer Approval: Date: ___/___/___

PRODUCTION INFORMATION : XX	Descriptions:	Plate #:
XX	XX	XX
	XX	XX
	XX	XX
	XX	XX
	XX	XX
	XX	XX
	XX	XX

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Pattison Sign Group

Tel: (506) 735-5506 | Fax: (877) 737-1734 | Toll Free: 1-800-561-9798

Client:	MCDONALD'S		
Site:	VARIOUS		
Draftsman:	NAZANIN ABEDIN	Date:	02.02.2024
Checked By:	CC		
Page: 1/2	Scale:		1 1/2" = 1'-0"

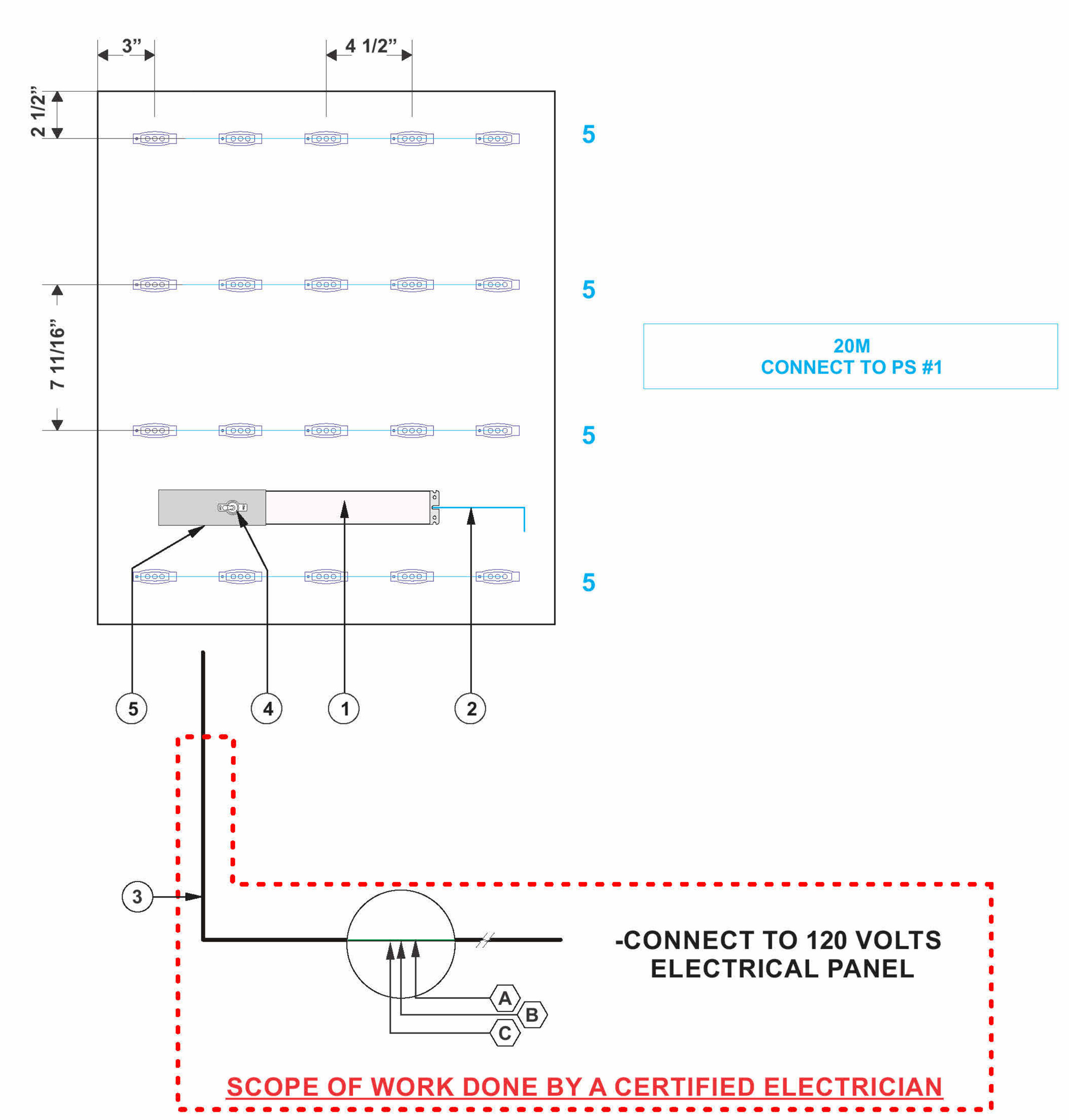
MCDO0SF4P30051

LED & ELECTRICAL LAYOUT

Installation:	☐ Interior:		☑ Exterior:		
Electrical specifications:					
Volts:	120	Amp.:	0.65	Circ.:	1

#	Descriptions:
1	CLASS 2 POWER SUPPLY
2	LOW VOLTAGE CLASS 2 POWER WIRES
3	120 VOLTS PRIMARY IN CONDUIT (BY OTHER)
4	DISCONNECT TOGGLE SWITCH
5	INSTALLATION INPUT 120 VOLTS

LED MODULE INFO: TYPE:	QTY:	POWER SUPPLY INFO: TYPE:	QTY:	MAXIMUM LOAD PER POWER SUPPLY
GEMM71-W1 GE (LEMO0058)	20	GEPS12-60U-NA (0.65 AMPS) (LEPS0023)	1	170 LED MODULES



#	Notes:
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2	ELECTRICAL HOOK UP SUPPLIED BY OTHER
3	MAXIMUM DISTANCE BETWEEN LED LETTERS & POWER SUPPLY: 18FT. FOR 18 WIRE GAUGE 29FT. FOR 16 WIRE GAUGE

#		Colors:
A		GREEN ELECTRICAL WIRE
B		BLACK ELECTRICAL WIRE
C		WHITE ELECTRICAL WIRE

⚠ WARNING!

RISK OF ELECTRIC SHOCK: Turn power OFF before inspection, installation or removal.

RISK OF FIRE: Use only approved wire for input/output connections.

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Client:	MCDONALD'S		
Site:	VARIOUS		
Draftsman:	NAZANIN ABEDIN	Date:	02.02.2024
Checked By:	CC		
Page: 2/2	Scale:		1 1/2" = 1'-0"

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062868
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

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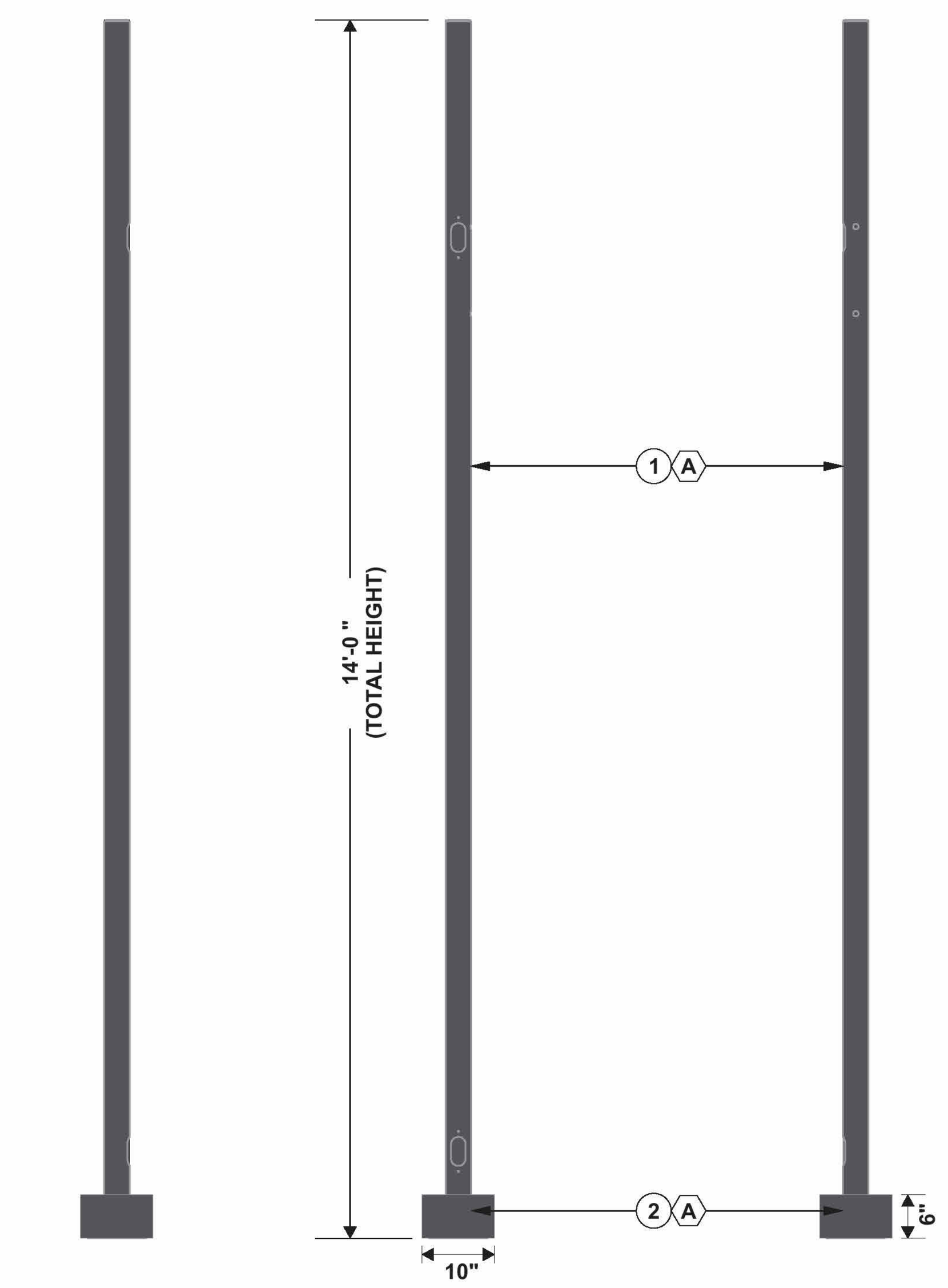
STAMP ARCH. STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
FOOD SIGNAGE

CHECKED BY:	DRAWN BY:
MS	BM
DRAWING SCALE:	DRAWING NO.:
PROJECT NO.: 20-128	A111

DATE PLOTTED: 2024-08-27 4:04:06 PM   PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE   FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt



SIDE VIEW | FRONT VIEW | SIDE VIEW

MCDO0ST3XX0022

STEEL CAMERA POST WITH BASE COVER

Installation: ☐ Interior: ☑ Exterior:

Electrical specifications:

Volts:	N/A	Amp.:	N/A	Circ.:	N/A

#	Descriptions:
1	STEEL POST
2	ALUMINUM BASE COVER

#	Notes:
1	SEE TECHNICAL DRAWING FOR MORE DETAIL

#		Colors:
A		PAINTED TO MATCH COOL GREY PMS 11C

#	Revision(s)	By:	Date:
1	REVISED TO MATCH STD.	LL	11.15.2023

Customer Approval:______________________ Date:____/____/____

PRODUCTION INFORMATION : XX

XX

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Descriptions:	Plate #:
XX	XX
XX	XX
XX	XX
XX	XX
XX	XX
XX	XX
XX	XX

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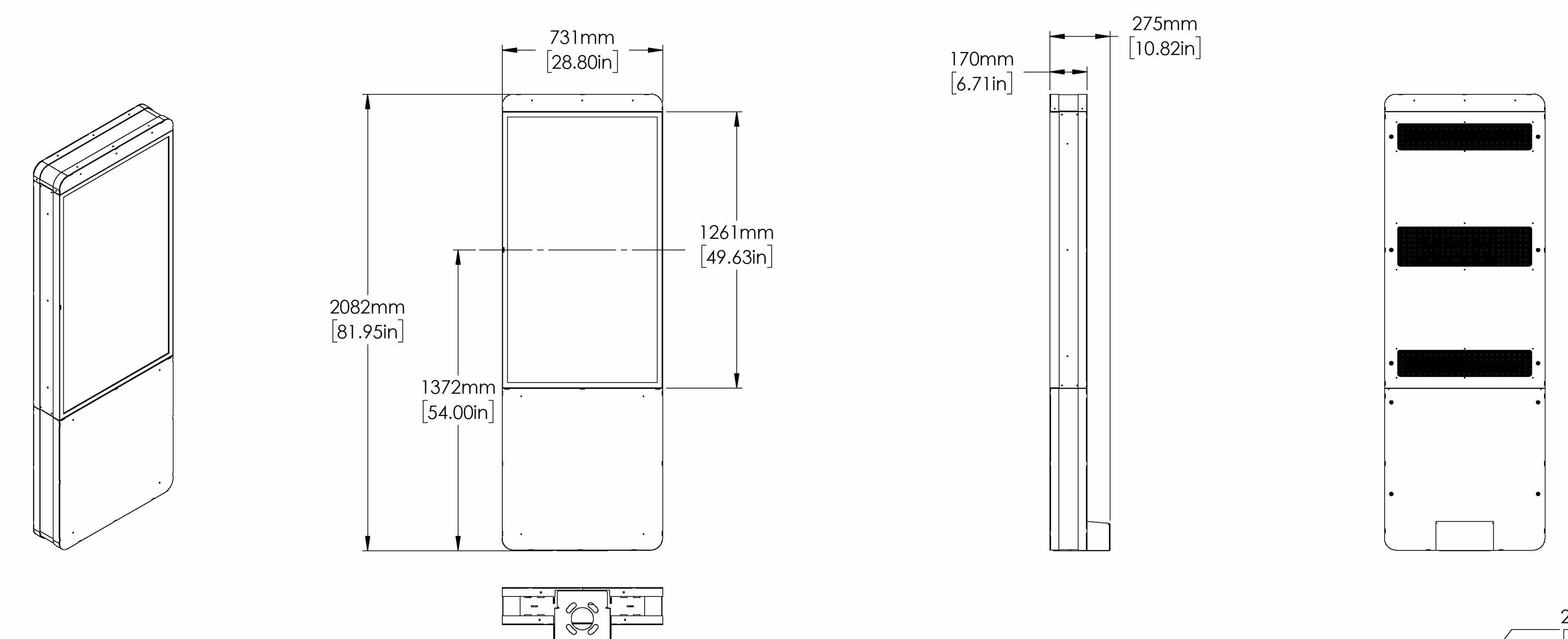
Tel: (506) 735-5506 | Fax: (877) 737-1734 | Toll Free: 1-800-561-9798

Client:	MCDONALD'S		
Site:	VARIOUS		
Draftsman:	LOUISE LANDRY	Date:	11.15.2023
Checked By:	CC		
Page: 1/1	Scale:		1"=1'-0"



NOTES

1. STRUCTURAL DESIGN SCOPE INCLUDES METAL FRAME, FOUNDATION CONNECTION PLATE, AND ENCLOSURE ONLY - ANCHORAGE IS RESPONSIBILITY OF OTHERS.
2. FRAME HAS BEEN DESIGNED FOR THE FOLLOWING PARAMETERS IN ACCORDANCE WITH FIGURE I-24 IN THE STRUCTURAL COMMENTARY:

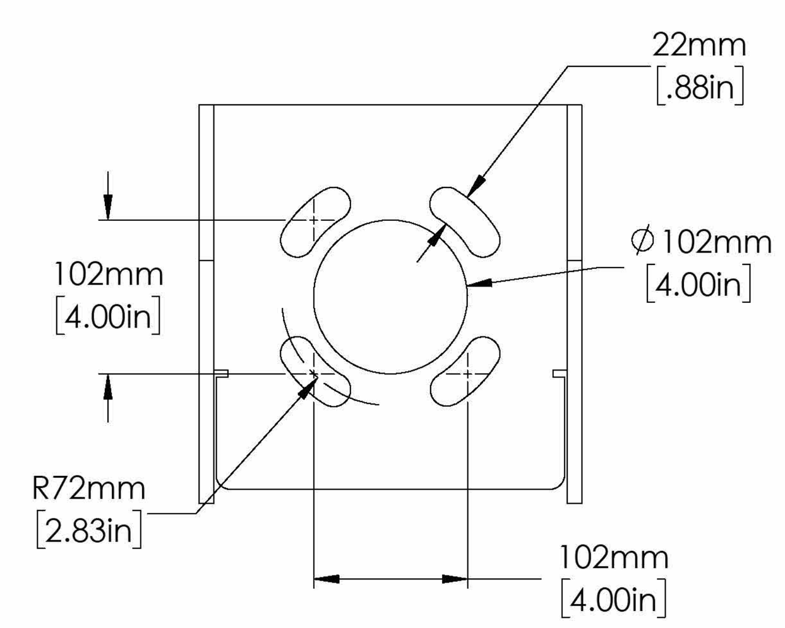
   Cf = 1.1
   Cn = 1.0
   Cg = 2.0
   Ce = 0.9
3. MENU BOARD STRUCTURE HAS BEEN QUALIFIED FOR INSTALLATION IN ALL ONTARIO LOCATIONS WITH Q(1/50) LESS THAN 0.7kPA AS INDICATED IN THE CLIMATIC DATA IN OBC 2012.

MATERIAL SPECIFICATIONS

1. INTERNAL FRAME MATERIALS: STEEL, POWDER COATED PANTONE PMS 425 (MATTE GREY)
2. EXTERNAL COVERS: ALUMINUM, POWDER COATED RAL9005 (MATTE BLACK)
3. EXTERNAL PERIMETER TRIM: ALUMINUM, POWDER COATED PANTONE PMS 425 (MATTE GREY)
4. DIGITAL DISPLAY EQUIPMENT: SAMSUNG OUTDOOR DISPLAY MODEL OHF/OHV

POWER & DATA REQUIREMENTS

1. POWER SUPPLY: 120V SINGLE PHRASE 60 HZ 20A
2. DATA FEED: CAT6 SHIELDED CABLES WITH RJ45 TERMINATION



FOUNDATION CONNECTION PLATE DETAIL A
SCALE 1:5

THIRD ANGLE PROJECTION	UNLESS OTHERWISE SPECIFIED: TOLERANCES APPLY AS SHOWN BELOW	CUSTOMER: MELITRON	PART DESCRIPTION: OUTDOOR DIGITAL MENU BOARD, 55 SINGLE DISPLAY
PROPRIETARY AND CONFIDENTIAL The information contained in this drawing is the sole property of Melitron Corporation. Any reproduction in part or as a whole without the written permission of Melitron Corporation is prohibited.	DECIMAL PLACES / INCHES / METRIC: .XXX ±.005 ±0.1; .XX ±.010 ±0.25; .X ±.020 ±0.5	UNIT OF MEASURE: INCHES ☐ MILLIMETRES ☒	DWG No. MC-710155-01-P Rev. 00
	ANGULAR DIMENSIONS: XX° ±1.0°; XX.X° ±0.5°	NEXT ASSEMBLY / MATERIAL: SEE COMPONENT DRAWINGS / FINISH: NO FINISH AT THIS LEVEL	SIZE B SCALE NTS SHEET 1 OF 3

MELITRON Metal Products for Technology
404 Silvercreek Parkway North
Guelph, ON, Canada N1H 1E8
www.melitron.com

NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS

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IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., NOE 1YO
TELEPHONE NO.: 1.705.205.3235

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ORCHARD SQUARE

vallee
Consulting Engineers, Architects & Planners

G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

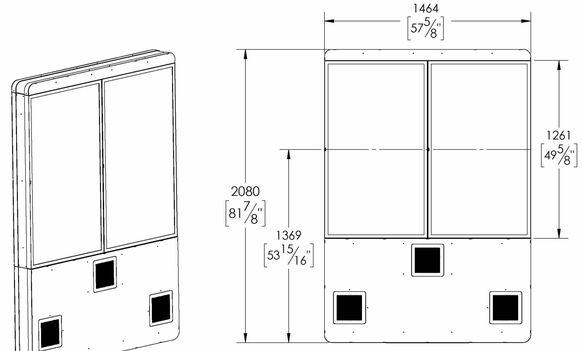
STAMP ARCH. | STAMP STRUCT.

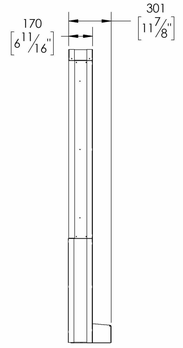
PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

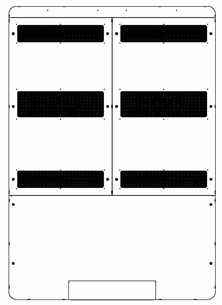
DRAWING TITLE:
FOOD SIGNAGE

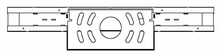
CHECKED BY: MS	DRAWN BY: BM
DRAWING SCALE:	DRAWING NO.: A112
PROJECT NO.: 20-128	

DATE PLOTTED 2024-08-27 4:04:14 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt









NOTES

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POWER & DATA REQUIREMENTS

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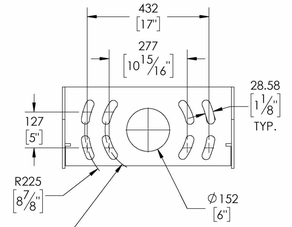
2. DATA FEED: 2X CAT6 SHIELDED CABLES WITH RJ45 TERMINATION



FOUNDATION CONNECTION PLATE DETAIL A
SCALE 1:5

THIRD ANGLE PROJECTION	UNLESS OTHERWISE SPECIFIED: TOLERANCES APPLY AS SHOWN BELOW	CUSTOMER: MELITRON	PART DESCRIPTION: OUTDOOR DIGITAL MENU BOARD, 55 DUAL DISPLAY
PROPRIETARY AND CONFIDENTIAL The information contained in this drawing is the property of Melitron Corporation. Any reproduction in part or as a whole without the written permission of Melitron Corporation is prohibited.	DECIMAL PLACES: INCHES / METRIC XXX ±.005 / ±0.1 XX ±.010 / ±0.3 X ±.020 / ±0.5 ANGULAR DIMENSIONS: ±1.0° XX.X° ±0.5°	NEXT ASSEMBLY UNIT OF MEASURE: INCHES ☐ MILLIMETRES ☒ MATERIAL: SEE COMPONENT DRAWING FINISH: NO FINISH AT THIS LEVEL	Metal Products for Technology 404 Silvercreek Parkway North Guelph, ON, Canada N1H 1E8 www.melitron.com
			DWG No.: MC-710255-03-P Rev.: 00 SIZE: B SCALE: NTS SHEET 1 OF 3

NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS

NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062060
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

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STAMP ARCH.

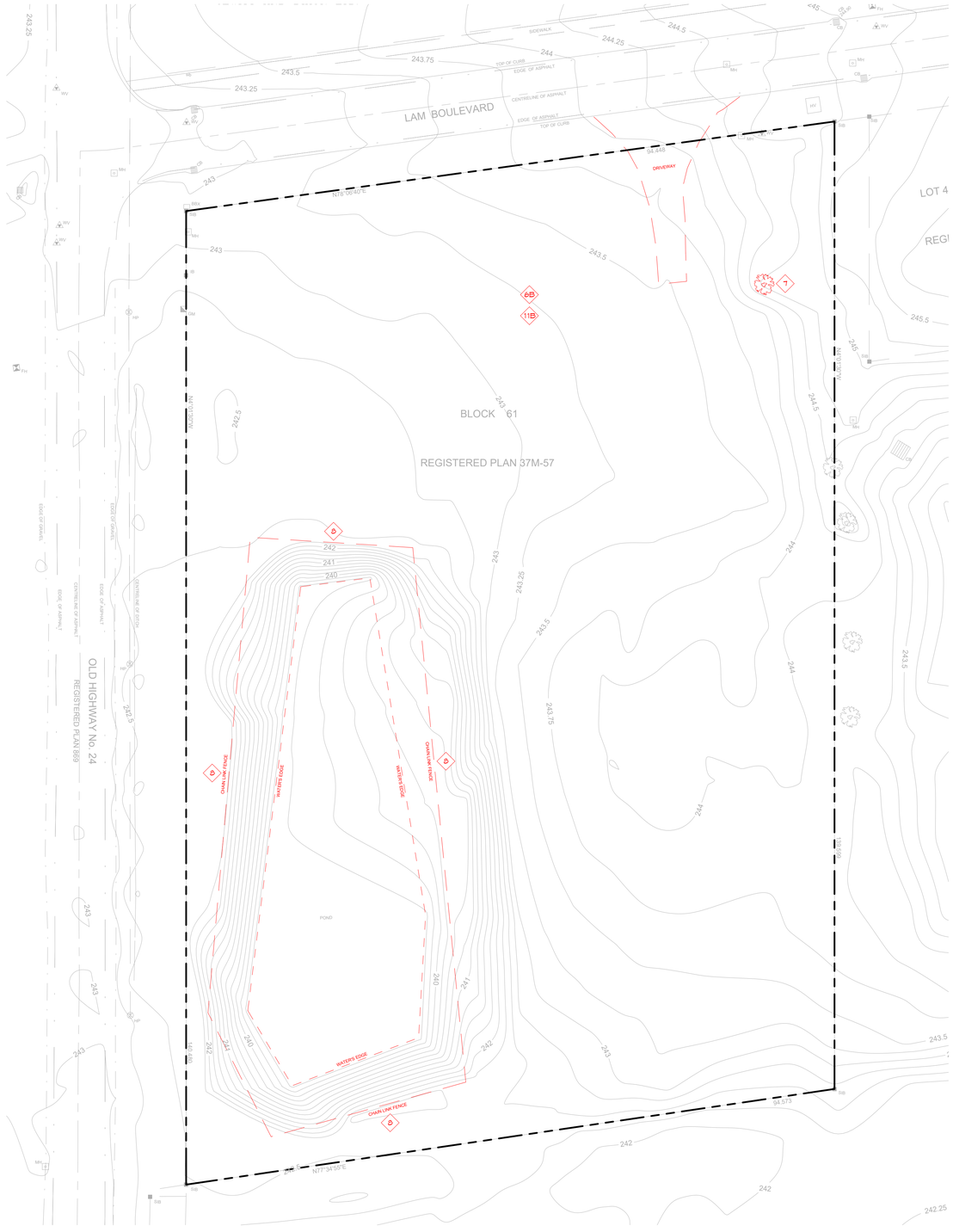
STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
FOOD SIGNAGE

CHECKED BY: MS
DRAWN BY: BM
DRAWING SCALE:
DRAWING NO.: A113
PROJECT NO.: 20-128

DATE PLOTTED: 2024-08-27 4:04:21 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt



1 / D100 SITE PLAN DEMOLITION
SCALE 1 : 350

SITE SPECIFIC

GENERAL NOTES:

VERIFY CONDITIONS:

• CONTRACTOR TO VERIFY ALL CONDITIONS ON SITE TO DETERMINE COMPLETE SCOPE OF WORK
(COORD. W/ EX. SITE SURVEY & ALL OTHER DWG.'S)

• CONTRACTOR TO VERIFY EXISTENCE & OBTAIN LOCATES FOR ALL EX. UNDERGROUND & O/H SERVICES ON BOTH EXT. & INT. OF PROPERTY / BOUNDARY / SCOPE OF WORK LINES PRIOR TO COMMENCEMENT OF WORK / ANY DIGGING / EXCAVATION
(COORD. W/ SITE SERVICE & EX. SITE SURVEY DWG.'S)

ACCESS / CONST. FENCE / SECURE SITE:

• CONTRACTOR TO SECURE THE WORK SITE DURING DEMO & CONST. & HOARD OFF THE WORK AREA TO PREVENT ACCESS FOR ANYONE NOT ENGAGED IN THE WORK OF THIS DEMOLITION / CONST. SCOPE

• PROVIDE CONST. GATES / FENCES / BOUNDARIES AS SHOWN / REQ.'D TO THE AUTHORITY HAVING JURISDICTION REQ.'S.
(SUBMIT SHOP DWG.'S FOR LOCATIONS & EXTENTS).
A 1.8m HIGH CHAIN LINK FENCE (ALTERNATE MODU-LOC OR SIMILAR CONSTRUCTION FENCING) C/W SUPPORTS AS REQ.'D, @ WORK BOUNDARIES TO BE ERECTED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF THE DEMOLITION PROCESS & SHALL REMAIN & BE MAINTAINED IN POSITION INDEFINITELY UNTIL COMPLETION OF NEW CONST. WORK.

• MAINTAIN SAFE EMPLOYEE / SAFE PUBLIC ACCESS TO THE BLDG. DURING OPERATING HOURS & MAINTAIN FULL EMERGENCY ACCESS & EXITING @ ALL TIMES TO & FROM THE BLDG. THROUGH OUT CONST. & DEMO. PROVIDE PROTECTION TO ALL PERSONEL FROM FALLING DEBRIS & CONST. TRAFFIC; POST SIGNAGE & CONSTRUCT HOARDING / PROTECTED PEDESTRIAN WALKWAYS AS REQ.'D.

SILTATION / MUD MATT:

• SILTATION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO WORKS COMMENCING ON THE SITE FOR DEMOLITION / CONST. SCOPE AND SHALL BE MAINTAINED IN POSITION UNTIL COMPLETION OF DEMO WORK / UNTIL COMPLETION OF NEW CONST. WORK, TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION BY THE DEMO CONTRACTOR
(COORD. W/ OPSD 219.11, 219.130)

• PROVIDE SILTATION GEOTECH FABRIC CONTROL ON EX. CATCH BASINS, MAN HOLES, ETC. ON ADJ. COUNTY ROADWAYS TYP.

• PROVIDE MUD-MATT ENT. TO CITY/TOWN HAVING JURISDICTION REQ.'S
(COORD. W/ 9/A102)

PROTECTION:

• DO NOT DISTURB ANY ITEMS BEYOND THIS BOUNDARY OR ONTO MUNICIPAL PROPERTY OR THAT ARE NOT INDICATED (REPAIR & MAKE GOOD WHERE REQ.'D, PROVIDE CLEAN TRANSITIONS TYP.)

• PROTECT ALL SIGNIFICANT AREAS / ELEMENTS DURING DEMOLITION TYP.

• CONTRACTOR TO PROTECT ALL EXPOSED PORTIONS OF THE EX. BLDG. TO REMAIN. MAKE GOOD ALL DISTURBED SURFACES & ADJACENT SYSTEMS / REPLACE & REPAIR ANY DAMAGE CAUSED BY INSUFFICIENT PROTECTION OF SURFACES / MATERIALS THAT ARE TO REMAIN, PROVIDE CLEAN TRANSITIONS TYP.

REMOVAL / DISPOSAL:

• CONTRACTOR TO INCLUDE REMOVAL AND TERMINATION OF ANY EX. SERVICES CONNECTED TO THE EXISTING BUILDING / LOCATED IN SCOPE OF WORK TO BE DEMOLISHED / OR RELOCATED INCLUDING ANY NECESSARY PERMITS OR UTILITY FEES.

• CONTRACTOR IS RESPONSIBLE FOR REMOVAL & DISPOSAL OF ALL MATERIALS THAT ARE DEMOLISHED & THAT ARE NOT INDICATED FOR RE-USE / RECLAIMING / SALVAGING OR AS OTHERWISE INDICATED BY THE OWNER. ALL COSTS ARE PART OF BASE BID SUBMISSION IN ACCORDANCE W/ BEST CONSTRUCTION PRACTICE, OBC, MUNICIPAL & PROVINCIAL LEGISLATURE REGARDING DEMOLITION & DISPOSAL METHODS (RECYCLE ALL MATERIALS WHERE ABLE).

RUBBLE:

• NO RUBBLE OF ANY NATURE TO BE LEFT IN PLACE OR BE USED AS BACKFILL. THIS INCLUDES ALL REBAR, STEEL, SCRAP METAL, WOOD & OTHER DEBOTAGE MATERIALS RESULTING FROM ABATEMENT AND DEMOLITION PROCESSES.

• ALL DISTURBED AREAS & HOLES CREATED BY EXCAVATION DURING DEMOLITION TO BE BACKFILLED TO FINISHED GRADE W/ GRANULAR 'B' & COMPACTED TO 100% STANDARD PROCTOR (@ HARD SURFACE AREAS, SOFT AREAS USE EXCAVATED / NATIVE DIRT MATERIALS). ALL BACK SLOPES TO BLEND INTO EX. TO A MAX. SLOPE OF 1:2 TO PREVENT PONDING. INSTALL 150mm MIN. TOPSOIL AT ALL VEGETATION AREAS, ANY AREAS OF BARE TOPSOIL TO BE GRADED LEVEL & COVERED W/ SOD

MAKE GOOD:

• MAKE GOOD ALL EXISTING SURFACES / SUBSTRATES / OPENINGS TO RECEIVE NEW FINISHES. INFILL AFTER DEMOLITION IS COMPLETE, ENSURE VOIDS ARE CLEAN & FREE FROM OBSTRUCTIONS SO NEW WORK IS NOT ADVERSELY AFFECTED.

SALVAGING:

• ALL SALVAGED / REUSED MATERIALS ARE TO BE REMOVED W/ GREAT CARE, KEPT IN DRY PLACE, PLACED ON SKIDS, COVERED & PROTECTED FROM DAMAGE FOR FUTURE USE & IMPLEMENTATION. TAG / NOTE WHERE MATERIALS ARE ORIG. FROM IN THE BLDG. ALL PLANTINGS TO BE PLANTED IN LARGE POTS & WATERED THROUGHOUT DURATIONS OF PROJECT. LOCATION TO BE DETERMINED ON SITE W/ OWNER TYP.

DISCLAIMER:
ALL EXISTING SITE INFORMATION WAS PROVIDED BY JEWITT & DIXON LTD, ONTARIO LAND SURVEYORS IN THE FORM OF AN ELECTRONIC FILE PLAN FILE No. 21-3145-TOPO DATED 2021.10.18 CONSISTING OF THE LEGAL SURVEY PLAN & TOPOGRAPHY
(COORD. W/ A106 DWG.)

SPECIFIC SITE DEMO. NOTES:

SURFACES:

68 REMOVE EX. TOPSOIL @ NEW LANDNAY / BLDG. / CONST. LOCATIONS WHERE APPLICABLE - STOCK PILE WHERE AVAILABLE ON SITE W/ LOCATION AS COORD.'D W/ CIVIL & DIRECTED BY OWNER - EXTENTS TO BE VERIFIED BY CONTRACTOR

GENERAL NOTE:
CUT & REMOVE EX. SURFACES & SUB-BASES AS REQ.'D TO REMOVE ANY EX. WORK OR INSTALL ANY NEW WORK FOR ANY TRADE - COORD. DEMO WORK FOR NEW CONST. AS REQ.'D IN THE SURFACES TO FINISH THE WORK.
INSTALL NEW SURFACES TO MATCH EX. MATERIALS, PROVIDE CLEAN TRANSITIONS, MAKE GOOD WHERE DAMAGED / DISTURBED TYP.

LANDSCAPE:

7 REMOVE ALL EX. SITE LANDSCAPE ELEMENTS INCLUDING BUT NOT LIMITED TO TREES / SHRUBS / BUSHES / ROOTS / VEGETATION / PLANTING BOXES / GARDENS / RAISED GARDEN BEDS / URNS / ROCKS / VEGETATION IN CONFLICT W/ NEW PROPOSED LAYOUTS / DEMOLITION AREA / AS NOTED
(NOTE: REMOVE ONLY THAT PORTION OF TREE ROOT SYSTEMS WHICH ARE FOUND WITHIN THE PROPERTY LIMITS - DO NOT UNDERCUT PERIMETER FENCING / HOARDING)

FENCING:

5 REMOVE FENCING & GATES W/ ASSOCIATED FTG.'S OR PIER SYSTEMS. SALVAGE WHAT IS GOOD; BOTH FULL HEIGHT AND HALF HEIGHT. RE-INSTALL AS TEMPORARY DEMOLITION PER. FENCE OR RE-INSTALL FOR PERMANENT NEW PER. FENCE IF REQ.'D.

UTILITIES:

118 COORD. W/ CIVIL FOR ANY ASSOCIATED DEMO / REMOVAL / CAPPING / TERMINATIONS / ETC. & CONST. TYP.

GENERAL NOTE:
COORD. W/ CIVIL FOR ANY ASSOCIATED DEMO / REMOVAL / CAPPING / TERMINATIONS / ETC. & CONST. TYP.

NO.	DATE	ISSUANCE
10	2024.08.27	SPA PHASE 1 SUB.#1 - COMMENTS
9	2024.07.16	SPA PHASE 2 SUB.#1
8	2024.07.10	SPA PHASE 2 SUB.#1 - OWNER REVIEW
7	2024.03.11	SPA PHASE 1 SUB.#1
6	2024.03.08	SPA PHASE 1 SUB.#1 - REVIEW
5	2024.03.07	PROGRESS
4	2024.03.05	PROGRESS
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 3360506206B
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS
ALL DWG.'S ARE TO BE READ IN COLOUR
ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

ORCHARD SQUARE

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

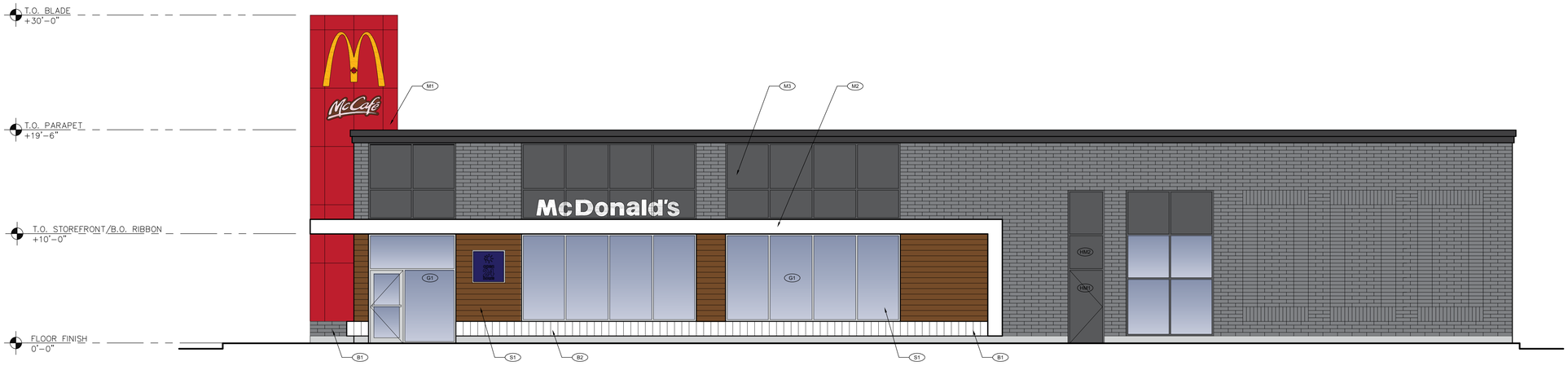
STAMP ARCH.: ONTARIO ASSOCIATION OF ARCHITECTS, MELISSA NICOLE STICKL, LICENCE 7887, Aug 21, 2024
STAMP STRUCT.:

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
SITE PLAN DEMO

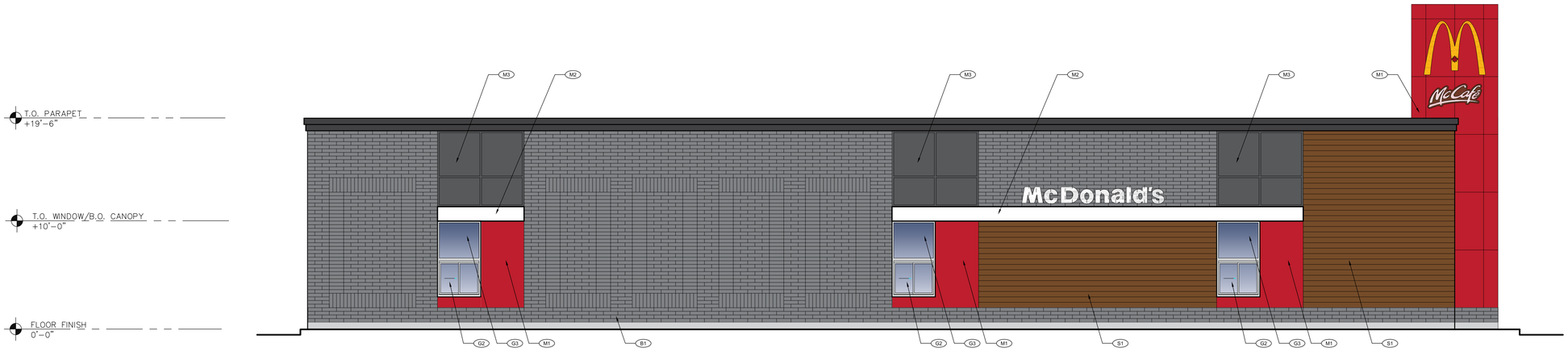
CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE: As indicated	DRAWING NO.: D100
PROJECT NO.: 20-128	

DATE PLOTTED: 2024-08-27 3:52:04 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt



1 / A4.0 EAST ELEVATION (+/- 80 SEATS)
3/16" = 1'-0"

MATERIAL SCHEDULE		
#	DESCRIPTION	COLOUR
M1	MITSUBISHI 4mm ALPOLIC METAL CLADDING	RON RED
M2	MITSUBISHI 4mm ALPOLIC METAL CLADDING	BONE WHITE
M3	ACM METAL PANEL	CHARCOAL GREY
B1	RICHVALE YORK CAMBRIDGE SERIES CONCRETE BLOCK	ONYX
B2	RICHVALE YORK CAMBRIDGE SERIES CONCRETE BLOCK	ARCTIC WHITE
S1	LONGBOARD TONGUE & GROOVE PLANK	LIGHT WALNUT
G1	STOREFRONT GLAZING SYSTEM	CLEAR ANODIZED
G2	QUIK-SERV DRIVE THRU WINDOW	CLEAR ANODIZED
G3	SPANDREL PANEL	SOLAR GREY
HM1	HOLLOW METAL DOORS	CHARCOAL GREY
HM2	HOLLOW METAL PANEL	CHARCOAL GREY



2 / A4.0 WEST ELEVATION (+/- 80 SEATS)
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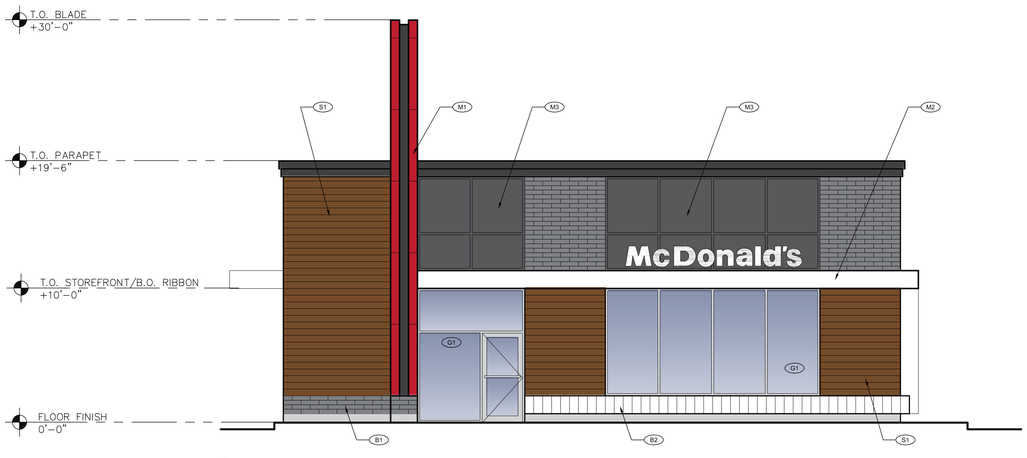

3 / A4.0 SOUTH ELEVATION (+/- 80 SEATS)
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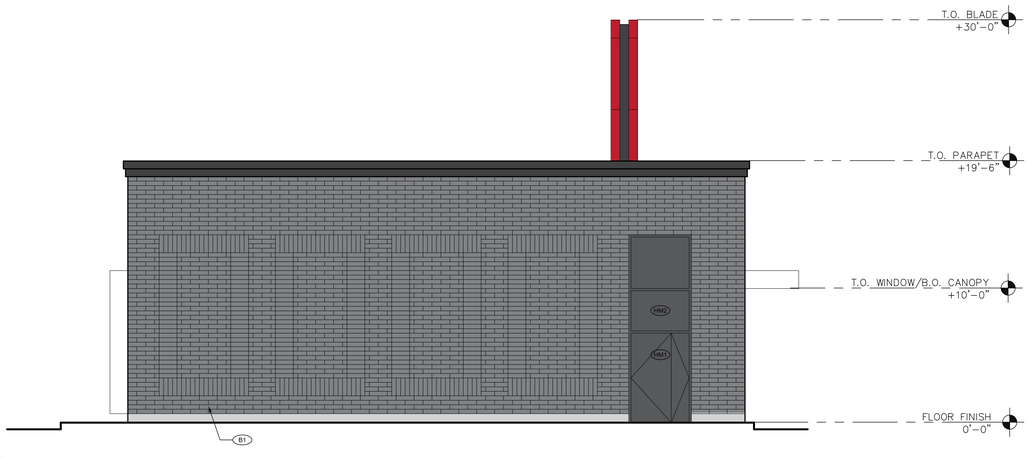


4 / A4.0 NORTH ELEVATION (+/- 80 SEATS)
3/16" = 1'-0"

BY	DESCRIPTION	DATE	REV

McDonald's®

McDONALD'S RESTAURANTS OF CANADA LIMITED,
1 McDONALD'S PLACE, TORONTO, ON. M3C 3L4

DRAWING TITLE: EXTERIOR ELEVATIONS

STORE NAME: McDONALD's WATERFORD

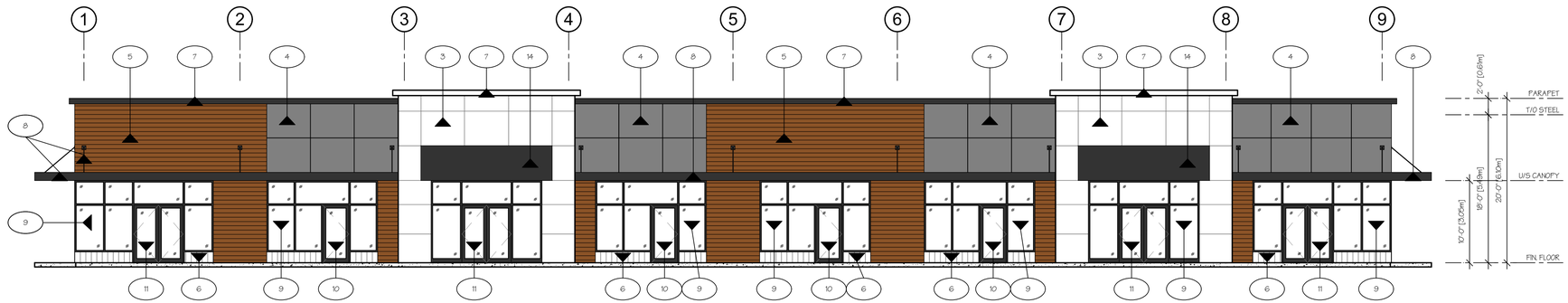
STORE NUMBER: 41344

PHASE: #

OLD HWY 24 & LAM BLVD
WATERFORD, ON

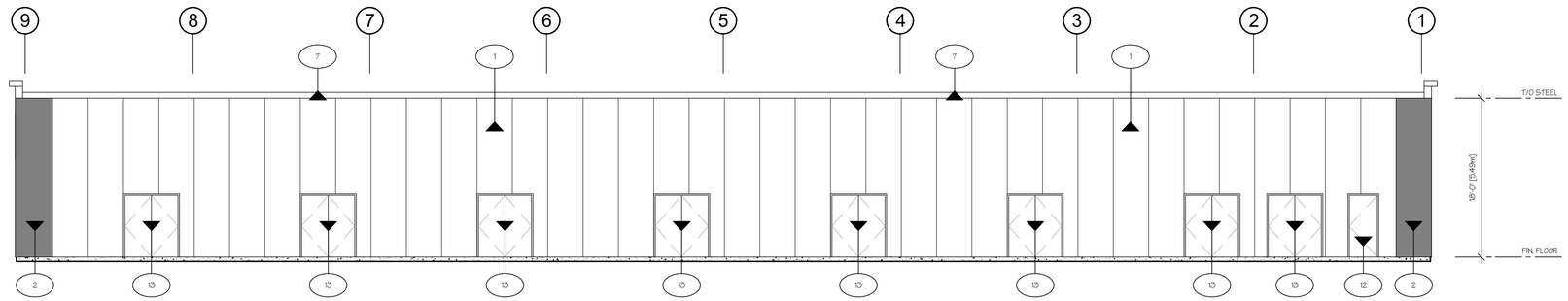
A4.0

PLOT SCALE: 1"=1" MCDA-BOR



1 A2.01 FRONT ELEVATION

SCALE: 1/8" = 1'-0"



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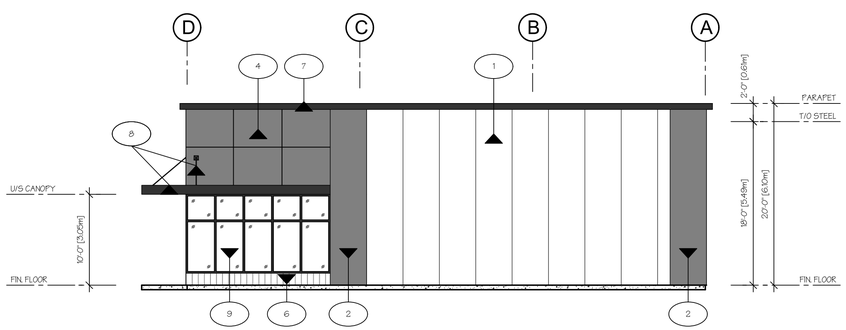
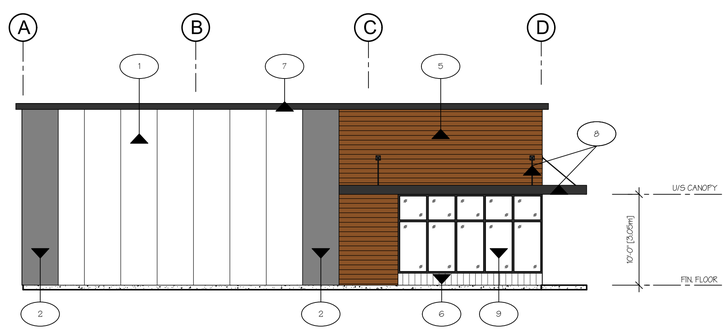
SCALE: 1/8" = 1'-0"



3 A2.01 SIDE ELEVATION

SCALE: 1/8" = 1'-0"



4 A2.01 SIDE ELEVATION

SCALE: 1/8" = 1'-0"

1 INSULATED METAL PANEL BY METL SPAN OR EQUIVALENT - CF LIGHT MESA IN WHITE

2 INSULATED METAL PANEL BY METL SPAN OR EQUIVALENT - CF LIGHT MESA IN GREY

3 ALUMINUM COMPOSITE PANEL IN WHITE

4 ALUMINUM COMPOSITE PANEL IN GREY

5 LONGBOARD TONGUE AND GROOVE PLANK IN LIGHT CHESTNUT

6 DECORATIVE CONCRETE BLOCK PAINTED WHITE

7 PRE-PAINTED METAL CAP FLASHING IN CORRESPONDING COLOUR AS SHOWN

8 SUSPENDED CANOPY w/ ROD IRON HANGERS OR SIMILAR IN BLACK

9 CLEAR ANODIZED ALUMINUM CURTAIN WALL w/ BLACK CAPPING

10 3'-2" x 7'-0" CLEAR ANODIZED ALUMINUM MAN DOOR PAINTED BLACK

11 6'-0" x 7'-0" CLEAR ANODIZED ALUMINUM DOUBLE MAN DOOR PAINTED BLACK

12 3'-2" x 7'-0" H.M. MAN DOOR

13 6'-0" x 7'-0" H.M. DOUBLE MAN DOOR

14 DECORATIVE CANOPY IN BLACK

GENERAL NOTES:

NO.	REVISION	BY	DATE
2	REVISED FACADE	CS	01.24.2024
1	PROPOSAL	CS	11.01.2023

ABCOTT CONSTRUCTION LTD.

GENERAL CONTRACTORS AND DESIGN BUILDERS

124 Garden Avenue,
Brantford, Ontario N3S 7W4
Tel (519) 756-4350 Fax (519) 756-8721
www.abcott.com

CLIENT
WATERFORD RETAIL PLAZA
LAM BOULEVARD, WATERFORD, ONTARIO

PROJECT
PROPOSED PRE-ENG BUILDING

DWG. TITLE
ELEVATIONS

DATE:	JOB NO.	DRAWING NO.
NOV. 1, 2023	23-189	A2.01
SCALE: AS NOTED	DRAWN BY: CS	

vallee

Consulting Engineers,
Architects & Planners

August 22, 2024

Verlinda Homes
26 Main Street South PO Box 1152
Waterford, ON
N0E 1Y0

Attention: **Mr. Tom O'Hara**

Reference: **Functional Servicing Report**
Orchard Square Development
Waterford, Norfolk County
Our Project # 20-128

Introduction

This functional servicing report has been prepared on behalf of Verlinda Homes, in support of the site plan application for the proposed Orchard Square Development located at municipal address 750 Old Highway 24, on the southeast corner of Old Hwy 24 and Lam Boulevard in Waterford - Norfolk County. The proposed development site has been severed into two properties, and will be constructed in two phases, with Phase 1 including a four-unit commercial building, and a fast-food restaurant and Phase 2 includes a 5-storey, 44-unit residential mid-rise building. This report presents the functional servicing for the proposed development, including sanitary, storm and domestic and fire water servicing.

The 1.31 ha development site is vacant land which features open grassed area and an irrigation pond. The sites are bound by Lam Boulevard to the north, old Highway 24 to the west, an existing subdivision and stormwater management pond to the east and agricultural land to the south. Refer to Figure 1 below.

Figure 1 – Site Location

Land Use and Design Assumptions

The development site currently features an open landscaped area and a pond and is zoned as Hamlet Residential Type 5 – R5(H) and Hamlet Service Commercial – CS(H). The proposed development will consist of the following construction:

Phase 1:

- 1 – 4-unit commercial building
- 1 – fast food restaurant
- Parking lot
- Storm, sanitary and watermain infrastructure to support the proposed construction, including a stormwater management facility
- Curbs, sidewalks and other miscellaneous items to support the proposed construction

Phase 2:

- 1 – 5-storey residential mid-rise building with 44 dwelling units
- Parking lot
- Storm, sanitary and watermain infrastructure to support the proposed construction
- Curbs, sidewalks and other miscellaneous items to support the proposed construction

The following table outlines the mix of land use and calculates the anticipated population based on a residential dwelling density of 2.75 people per unit (ppu) and a commercial density of 90 people per hectare as utilized in the 2019 Norfolk County Design Criteria.

Table 1
Subject Lands – Estimate of Population

Phase	Land Use	Area	Number of Units	Density	Population
Phase 1	Commercial Area	0.71 ha	-	0.71 ha @ 90 pph	64 people
Phase 2	44 Apartment Units	0.60 ha	44	44 units @ 2.75 ppu	121 people
				Total	185 people

Sanitary Servicing

Norfolk County record drawings from Vallee Project No. 10-034 – Yin Subdivision Phase 5 indicate a 200mm diameter PVC sanitary sewer along Lam Boulevard, and a 200mm diameter AC sanitary sewer along Old Highway 24. As part of this project, a sanitary manhole was installed at the northeast corner of the subject site for future development. Sanitary flows from Phase 1 of the proposed development will be conveyed to this existing sanitary manhole and ultimately the Lam Boulevard sanitary sewer; and sanitary flows from Phase 2 of the proposed development will be conveyed to the existing sanitary sewer along Old Highway 24 via 2 via two separate internal sanitary sewer networks. Refer to drawing 20-128 C100 – Servicing Plan.

Sanitary design flows for the proposed development were calculated using the 2019 Norfolk County Design Criteria. Table 2 presents the flow information associated with each of the proposed development zones. In summary, the proposed development is anticipated to generate an additional sanitary flow of approximately 1.33 L/s to the existing sanitary sewer on Lam Boulevard after the construction of Phase 1, and an additional sanitary flow of approximately 2.83 L/s to the existing sanitary sewer on Old Highway 24 after the construction of Phase 2. Ultimately, an additional sanitary flow of approximately 4.15 L/s is anticipated at the intersection of Lam Boulevard and Old Highway 24. Refer to detailed calculations in Appendix A.

Table 2
Sanitary Design Flows

	Phase 1 Commercial	Phase 2 Residential
Development Area (ha)	0.71 ha	0.60 ha
Population	64	121
Per Capita Flow	40000 L/ha/day	450 L/person/day
Peak Extraneous Flow	0.28 L/sec/ha	
Infiltration Flow	0.20 L/s	0.17 L/s
Sewage Flow	0.33 L/s	0.63 L/s
Peaking Factor	3.43	4.22
Peak Design Flow	1.33 L/s	2.83 L/s
Total Peak Design Flow	4.15 L/s	

As part of the Yin Subdivision Phase 5 Project (Vallee Project No. 10-034), a sanitary drainage area plan and design sheet were created for the sanitary sewer system which discharges to the sanitary main along Lam Boulevard and Old Hwy 24, as shown in Appendix A. The subject site was included in the drainage area plan, and a total estimated sanitary flow of 3.16 L/s was calculated. As calculated above, the total sanitary flow of 4.15 L/s from the proposed development is only a minor increase from the estimated flow from the Yin Subdivision Phase 5 Project. Therefore, the existing sanitary sewers along Lam Boulevard and Old Highway 24 are anticipated to have adequate capacity to support the proposed development.

In July 2023, a request was made to Norfolk County to have the previous development layout and anticipated sanitary flow reviewed by the County's external sanitary modeling consultant. At this time, no sanitary modeling report has been received. In the Comments received from County staff on the first submission of this report, it was indicated that "The RVA report noted that there are existing downstream capacity issues – however the unit sewage rate (450 Lpcd) and the modelling software (InfoSewer) may generate overly conservative results. The proposed development is only contributing marginally to the overall downstream sewer capacity – increased risk to surcharging of the existing downstream sewer system from the proposed development is minimal.". On the strength of this comment, we understand that the County has no sanitary capacity concerns with this development proceeding.

Water Servicing

As-constructed drawings and the Norfolk County ISMP indicate an existing 200mm diameter watermain along Lam Boulevard and at the intersection of Lam Boulevard and Old Highway 24. As part of the Yin Subdivision Phase 5 Project (Vallee Project No. 10-034), a 150mm diameter water service was installed at the northeast corner of the subject site, which will be used to service Phase 1 of the proposed development. As there is currently no watermain along the western frontage of Phase 2, a 150mm diameter watermain extension from the intersection of Lam Boulevard and Old Highway 24 will be installed the watermain along Old Highway 24 to service Phase 2. Refer to drawing 20-128 C100 – Servicing Plan.

Norfolk County's design criteria stipulates the following requirements for system pressures, and the system shall be designed to meet the greater of either of the following requirements;

- Fire flow conditions– not less than 140 kPa
- Normal operating conditions – not less than 280 kPa

Domestic Water Demand

Table 3 presents the domestic water flow information for the proposed development:

Table 3
Domestic Water Demands

	Phase 1 Commercial	Phase 2 Residential
Population	64	121
Average Daily Demand	450 L/person/day	
Maximum Day Demand Factor	2.25	
Maximum Day Demand	0.75 L/s	1.42 L/s
Peak Hourly Demand Factor	2	4
Peak Hourly Demand	0.67 L/s	2.52 L/s

In summary, the proposed development is anticipated to have a total maximum daily demand of 2.08 L/s and a maximum hourly demand of 3.19 L/s. Refer to Appendix B for detailed calculations.

Fire Water Service

According to the County GIS online mapping, there are two existing fire hydrants located in proximity to the proposed development. One is on the west side of Old Hwy 24, at the intersection of Old Hwy 24 and Lam Boulevard, and the second is located on the north side of Lam Boulevard, at the northeast corner of the subject property. It is proposed that one new hydrant will be installed at the northeast corner on the site during the construction of Phase 1, and one will be installed at the center of the development during the construction of Phase 2.

Typically, available fire flow during the maximum day demand is the critical criterion when evaluating a watermain distribution system's ability to service a residential subdivision. The estimated fire flow requirement for the development has been determined using the Fire Underwriters Survey – 2020 (FUS). Using the FUS recommendations, the minimum required fire flow was determined to be 67 L/s for Phase 1 and 100 L/s for Phase 2. The proposed commercial building in Phase 1 will feature an automatic sprinkler system and will be non-combustible construction. The proposed fast-food restaurant in Phase 1 will have no sprinkler system and will be ordinary construction. It is assumed that the mid-rise residential building in Phase 2 will feature fully automatic sprinkler systems and will be non-combustible construction. Supporting calculations are detailed in Appendix B.

Information obtained from Norfolk County ISMP indicates that the estimated available fire flow in the existing watermain on Lam Boulevard and at the intersection of Lam Boulevard and Old Highway 24 ranges from 83 L/s to 159 L/s, as displayed in Appendix B. In addition, Norfolk County has indicated that the fire flow during the maximum day demand is preliminarily estimated to be 129 L/s. Therefore, the available municipal watermain is anticipated to provide sufficient flow to service both Phase 1 and Phase 2 of the development.

In July 2023, a request was made to Norfolk County to have the previous development layout and anticipated water demands reviewed by the County's external water modeling consultant. At this time, no water modeling report has been received. In the Comments received from County staff on the first submission of this report, it was indicated that " Modelling completed by R. V. Anderson Associates Limited notes that available fire flow in the area of the proposed development maxes out at 91L/s under Maximum Day Demands – this is sufficient to support the proposed development of a restaurant and commercial". On the weight of that response, we assume the county has no further concerns with water available for Phase 1 of the proposed development.

It should be noted that the FUS method is generally conservative. Norfolk County is currently revising their fire flow criteria to a hybrid approach between the FUS and OBC methods. As such, the required flow will be re-evaluated when the updated approach is confirmed.

Stormwater Management

Under pre-development conditions, the subject property is vacant land which features an open grassed area and an irrigation pond. Stormwater runoff from the subject property drains uncontrolled, overland in a southwesterly direction towards Old Highway 24. As part of the Yin's Subdivision - Phase 5 Project (Vallee Project No. 10-034), a peak flow allowance of 0.015 m^3/s was allocated for the subject site as part of the storm sewer design along Old Highway 24.

The overall stormwater management (SWM) strategy is to utilize site grading and an internal storm sewer system to convey flows from the 2-year through the 100-year storm events from Phase 1 and Phase 2 to a shared underground stormwater management chamber facility located in Phase 1 of the development. Ultimately, runoff from the SWM facility will be released to the existing storm sewer on Old Highway 24. Given the subject site has been severed into two properties, storm easements will be made across the two properties to allow both properties to share the proposed stormwater detention system. The proposed SWM system will have two primary functions:

1. Reduce and/or control all post-development peak flow rates from the site to levels that do not exceed the 0.015 m^3/s flow allowance, for all storm events up to and including the 100-year storm event.
2. Treat stormwater to a Normal Protection Level as defined in the Ministry of the Environment's *Stormwater Management Practices Planning and Design Manual* (March 2003).

Complete details of the SWM design are provided in the Orchard Square Development Stormwater Management Report dated August 21, 2024.

Conclusions and Recommendations

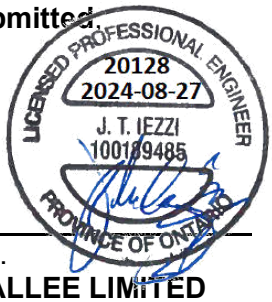
The functional servicing design for the proposed development can be summarized as follows:

- A peak sanitary design flow of approximately 4.15 L/s is anticipated from Phase 1 and Phase 2 of the proposed development.
- Sanitary modeling from Norfolk County's consultant has been requested to determine if existing County infrastructure provides adequate capacity to accommodate the estimated sanitary design flow. No modeling has been received at this time. Based on the county's first submission comments, it is concluded that there are no sanitary capacity concerns with the proposed development.
- The domestic maximum day demand and peak hourly demand for Phase 1 and 2 of the proposed development were found to be 2.08 L/s and 3.19 L/s, respectively.
- Using the FUS criteria, the required fire flow demand for Phase 1 and Phase 2 of the proposed development were found to be 67 L/s and 100 L/s, respectively.
- Water modeling from Norfolk County's consultant has been requested to determine the water servicing capacity and constraints on the existing water system to ensure adequate system flows and pressure for the aforementioned domestic and fire demands. No modeling has been received at this time. Based on the county's first submission comments, it is concluded that there are no concerns related to fire flows for Phase 1 of the proposed development.
- The fire flow capacity will be re-evaluated when the revised fire flow requirements are confirmed by Norfolk County.
- Overland flow and internal storm sewers will convey stormwater to the proposed underground SWM facility, which will ultimately be released to the existing storm sewer on Old Highway 24.
- Under all storm events, peak flows associated with the post-development site are controlled to less than or equal to the allowable flow rate of 0.015 m^3/s under all storm events.
- Stormwater will be treated to a normal level of water quality protection.

It is recommended that this report be provided to Norfolk County and the Long Point Region Conservation Authority in support of the site plan application proposed development.

We trust that this information is complete and sufficient for submission. Should you have any questions or require further information please do not hesitate to contact us.

Respectfully submitted,



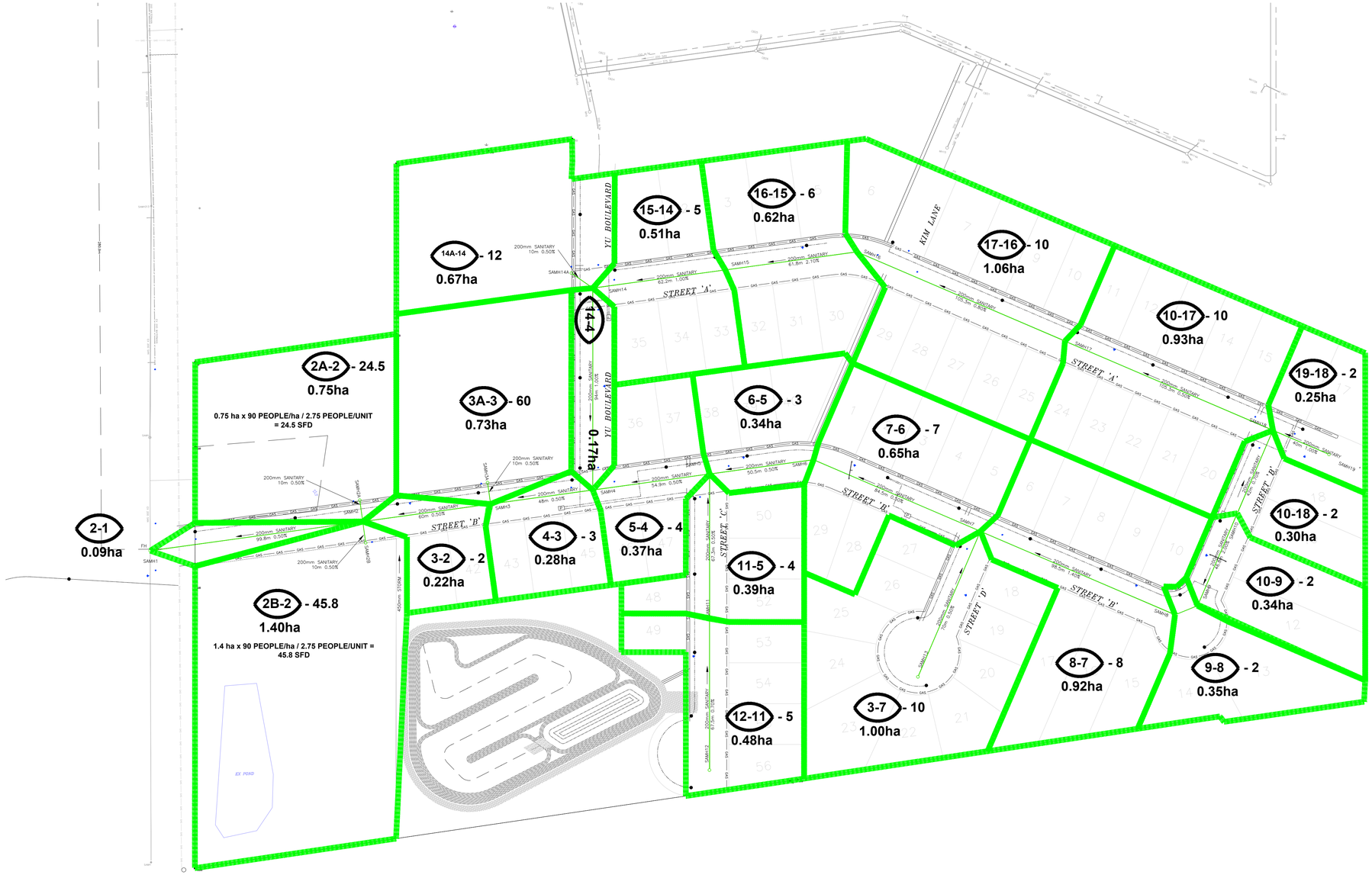
John Iezzi, P.Eng.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners

Appendix A
– DWG 10-034 SA1 – Sanitary Sewer Drainage Areas
– 10-034 Sanitary Design Sheet
– 20-128 Sanitary Flow Calculations

Appendix B
– 20-128 Domestic Water Demand Calculations
– 20-128 FUS Fire Flow Calculations
– 20-128 Fire Flow Calculation Distances
– Norfolk County ISMP Available Fire Flow

APPENDIX A

DWG 10-034 SA1 – Sanitary Sewer Drainage Areas
10-034 Sanitary Design Sheet
20-128 Sanitary Flow Calculations



REV. No.	DATE	REVISION
0		

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title
YIN PHASE 5
WATERFORD - NORFOLK COUNTY

Drawing Title
SANITARY SEWER DRAINAGE AREAS

Designed by : DJB	Drawn By : TJC
Checked by : TGS	Date Started : SEPTEMBER 2010
Drawing Scale : 1:1000	Drawing No. SA1
Project No. 10-034	

DATE LAST PLOTTED :

SANITARY SEWER DESIGN SHEET

Pipe Material: PVC
N: 0.013

Project: Yin's Subdivision Phase 6

Job No.: 14123

Date: 1-Feb-15
Designed by: TGS
Checked by: JDV
Sheet of: 1 of 1

Location				Area						Flow			Sewer Design						
Area	Street	From MH	To MH	Section Ha	Cumul. Ha	Section Units	Cumul Units	Total Pop.	M=Peak Factor	Q(i) L/s	Q(s) L/s	Q(d) L/s	Material	Size mm	Length m	N	Slope %	Cap L/s	Full V m/s
10-18	Lam Blvd	10	18	0.3	0.30	2	2	6	4.4363	0.084	0.1271	0.211	PVC	200	42	0.013	0.70%	27.4	0.87
19-18	Tan Ave	19	18	0.25	0.55	2	4	11	4.4106	0.154	0.2527	0.407	PVC	200	40	0.013	1.00%	32.8	1.04
18-17	Tan Ave	18	17	0.93	1.48	10	14	39	4.3363	0.4144	0.8695	1.284	PVC	200	105.3	0.013	0.50%	23.2	0.74
17-16	Tan Ave	17	16	1.06	2.54	10	24	66	4.2888	0.7112	1.4743	2.185	PVC	200	105.3	0.013	0.80%	29.3	0.93
16-15	Tan Ave	16	15	0.62	3.16	6	30	83	4.2655	0.8848	1.8328	2.718	PVC	200	61.8	0.013	2.10%	47.5	1.51
15-14	Tan Ave	15	14	0.51	3.67	5	35	96	4.2481	1.0276	2.1296	3.157	PVC	200	62.2	0.013	1.00%	32.8	1.04
14A-14	Block 1 - TWNHSE	14A	14	0.67	0.67	12	12	33	4.348	0.1876	0.7473	0.935	PVC	200	10	0.013	0.50%	23.2	0.74
14-4	Yu Blvd	14	4	0.17	4.51	0	47	129	4.2114	1.2628	2.835	4.098	PVC	200	94	0.013	1.00%	32.8	1.04
10-9	Lam Blvd	10	9	0.34	0.34	2	2	6	4.4363	0.0952	0.1271	0.222	PVC	200	46.8	0.013	2.00%	46.4	1.48
9-8	Lam Blvd	9	8	0.35	0.69	2	4	11	4.4106	0.1932	0.2527	0.446	PVC	200	11.3	0.013	1.70%	42.8	1.36
8-7	Lam Blvd	8	7	0.92	1.61	8	12	33	4.348	0.4508	0.7473	1.198	PVC	200	98.5	0.013	1.40%	38.8	1.24
13-7	Tai Shan Place	13	7	1.00	1.00	10	10	28	4.3607	0.28	0.6246	0.905	PVC	200	70	0.013	0.50%	23.2	0.74
7-6	Lam Blvd	7	6	0.65	3.26	7	29	80	4.2692	0.9128	1.7733	2.686	PVC	200	84.5	0.013	0.50%	23.2	0.74
6-5	Lam Blvd	6	5	0.34	3.60	3	32	88	4.2584	1.008	1.9517	2.96	PVC	200	50.5	0.013	0.50%	23.2	0.74
12-11	Jong St	12	11	0.48	0.48	5	5	14	4.4003	0.1344	0.3151	0.45	PVC	200	67.5	0.013	0.70%	27.4	0.87
11-5	Jong St	11	5	0.39	0.87	4	9	25	4.3676	0.2436	0.563	0.807	PVC	200	67.3	0.013	0.50%	23.2	0.74
5-4	Lam Blvd	5	4	0.37	4.84	4	45	124	4.2171	1.3552	2.718	4.073	PVC	200	54.9	0.013	0.50%	23.2	0.74
4-3	Lam Blvd	4	3	0.28	9.63	3	95	261	4.1034	2.6964	5.5835	8.28	PVC	200	48	0.013	0.50%	23.2	0.74
3A-3	Block 2 Aptmnts.	3A	3	0.73	0.73	60	60	165	4.1773	0.2044	3.5899	3.794	PVC	200	10	0.013	0.50%	23.2	0.74
3-2	Lam Blvd	3	2	0.22	10.58	2	157	432	4.0062	2.9624	9.0087	11.97	PVC	200	60	0.013	0.50%	23.2	0.74
2A-2	Block 3 Commercial	2A	2	0.75	0.75	25	25	67	4.2867	0.21	1.5043	1.714	PVC	200	10	0.013	0.50%	23.2	0.74
2B-2	Block 2 Aptmnts.	2B	2	1.4	1.40	46	46	126	4.2148	0.392	2.7648	3.157	PVC	200	10	0.013	0.50%	23.2	0.74
2-1	Lam Blvd	2	1	0.09	12.07	0	227	625	3.9224	3.3796	12.77	16.15	PVC	200	99.8	0.013	0.50%	23.2	0.74

Design Information:

Q(s) = Sewage Flow = P q M / 86.4
Q(i) = Infiltration Flow = I A
Q(d) = Peak Design Flow = Q(s) + Q(i)

P = Population in thousands
M = Peaking Factor = 1 + 14 / (4 + P^.5)
A = Tributary Area

q = Per Capita Flow= 450 L/cap d
I = Peak Extraneous Flow = 0.28 L/s/ha
Population Density 2.75 persons /unit

Existing Sewer

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Subject:	Orchard Square Phase		
Date:	2/28/2024	By:	NLO
Project #:	20-128	Page:	1
Description:	Phase 1 - Commercial		

Norfolk County Design Criteria Section 9.2 - Sanitary Sewage Flow

9.2.01 Tributary Population

Commercial:

Commercial Development:	90	persons/ha
Site Area:	0.71	ha
Number of Persons:	64	persons

9.2.02 Sewage Flow

Per Capita Flow:	40	m^3/hectare/day
Average Sewage Flow:	0.329	L/s

9.2.03 Peak Sanitary Flow Factor

Commerical Peaking Factor Formula:

M = 0.8(1+(14/(4+(Pe^0.5))))

P =	0.0639
M =	3.434

9.2.04 Infiltration Allowance

Infiltration Allowance:	0.28	L/s/ha
Infiltration Allowance:	0.199	L/s

9.2.05 Design Flow

Design Flow:

Design Flow = (Average Sewage Flow * Peak Sanitary Flow Factor) + Infil. Allowance

Design Flow =	1.33	L/s

Norfolk County Design Criteria Section 9.2 - Sanitary Sewage Flow

9.2.01 Tributary Population

Residential:

Residential Development:	2.75	persons/unit
Units:	44	Units
Number of Persons:	121	persons
Site Area:	0.60	ha

9.2.02 Sewage Flow

Per Capita Flow:	0.45	m^3/person/day
Average Sewage Flow:	0.630	L/s

9.2.03 Peak Sanitary Flow Factor

Residential Peaking Factor Formula:

M = 1+(14/(4+(Pe^0.5)))

P =	0.121
M =	4.220

9.2.04 Infiltration Allowance

Infiltration Allowance:	0.28	L/s/ha
Infiltration Allowance:	0.168	L/s

9.2.05 Design Flow

Design Flow:

Design Flow = (Average Sewage Flow * Peak Sanitary Flow Factor) + Infil. Allowance

Design Flow =	2.83	L/s

Summary of Design Flows

Phase 1: 1.33 L/s

Phase 2: 2.83 L/s

Total Design Flow:	**4.15 L/s**

APPENDIX B

20-128 Domestic Water Demand Calculations
20-128 FUS Fire Flow Calculations
20-128 Fire Flow Calculation Distances
Norfolk County ISMP Available Fire Flow

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Subject:	Orchard Square		
Date:	2/28/2024	By:	NLO
Project #:	20-128	Page:	1
Description:	Phase 1		

Maximum Daily Demand

Area	0.71	ha
Zoning of Land	Commercial	
Equiv. Population Density	90	ppl/ha
Equiv. Population	64	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Daily Demand Peaking Factor	2.25	
Maximum Daily Demand	64.80	m^3/day
	0.75	l/s

Maximum Hourly Demand

Area	0.71	ha
Zoning of Land	Commercial	
Equiv. Population Density	90	ppl/ha
Equiv. Population	64	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Hourly Demand Peaking Factor	2	
Maximum Hourly Demand	2.40	m^3/hour
	0.67	l/s

Maximum Daily Demand

Total Number of Units	44	units
Zoning of Land	Residential	
Equiv. Population Density	2.75	ppl/unit
Equiv. Population	121	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Daily Demand Peaking Factor	2.25	
Maximum Daily Demand	122.51	m^3/day
	1.42	l/s

Maximum Hourly Demand

Total Number of Units	44	units
Zoning of Land	Residential	
Equiv. Population Density	2.75	ppl/ha
Equiv. Population	121	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Hourly Demand Peaking Factor	4	
Maximum Hourly Demand	9.08	m^3/hour
	2.52	l/s

Summary of Maximum Daily Demand

Phase 1:	0.67	L/s
Phase 2:	1.42	L/s
Total Maximum Daily Demand:	**2.08**	**L/s**

Summary of Maximum Hourly Demand

Phase 1:	0.67	L/s
Phase 2:	2.52	L/s
Total Maximum Hourly Demand:	**3.19**	**L/s**

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Subject:	Orchard Sqaure		
Date:	7/25/2024	By:	NLO
Project #:	20-128	Page:	1

PHASE 1 COMMERCIAL BUILDING

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 0.8 Construction coefficient for non-combustible construction

A= 849 Floor Area m^2 = Main Floor Area

F_1= 5128 L/min

F_1= 5000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Mercentile Occupancy - Limited Combustible Contents

Reduction: 15%

Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 4250 L/min

3) Sprinkler System

Sprinkler System:

Applicable
- Assumes the building is protected by a complete automatic sprinkler system, conforming to NFPA 13 and other standards
- Assumes water supply is standard for both the system and fire department hose lines

Reduction: 40%

$F_3=F_2*Reduction$ (L/min)

F_3= 1700 L/min

4) Seperation

Direction	Distance (m)	Surcharge
North	> 30m	0%
East	16.6	15%
West	> 30m	0%
South	16.5	15%
	Total:	30%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

F4=(TOTAL)*F2 (L/min)

F_4= 1275 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 3825 L/min

= 4000 L/min (Round to the nearest 1,000 l/min)

= **66.7 L/s**

Notes: *1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

PHASE 1 FAST FOOD RESTAURANT

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 1.0 Construction coefficient for ordinary construction
(Steel frame exterior with wood infills and metal interior)

A= 410 Floor Area m^2 = Main Floor Area

F_1= 4455 L/min

F_1= 4000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Mercentile Occupancy - Limited to Combustable Contents
Reduction: 0%
Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 4000 L/min

3) Sprinkler System

Sprinkler System: No sprinkler system provided.
Reduction: 0%

$F_3=F_2*Reduction$ (L/min)

F_3= 0 L/min

4) Seperation

Direction	Distance (m)	Surcharge
South	> 30m	0%
East	> 30m	0%
West	> 30m	0%
North	> 30m	0%
	Total:	0%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

F4=(TOTAL)*F2 (L/min)

F_4= 0 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 4000 L/min
= 4000 L/min (Round to the nearest 1,000 l/min)
= **66.7 L/s**

Notes: *1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

PHASE 2 - 5-STOREY MID-RISE RESIDENTIAL BUILDING

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 0.8 Non Combustible Construction

Af= 945 m^2 = main floor area

945 m^2 = second floor area

A= 3308 Fire Area m^2 = two adjoining floor areas plus 50% of all floors immediately above them

F_1= 10122 L/min

F_1= 10000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Residential Occupancy

Reduction: 15%

Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 8500 L/min

3) Sprinkler System

Sprinkler System:

Applicable
- Assumes the building is protected by a complete automatic sprinkler system, conforming to NFPA 13 and other standards
- Assumes water supply is standard for both the system and fire department hose lines

Reduction: 40%

$F_3=F_2*Reduction$ (L/min)

F_3= 3400 L/min

4) Seperation

Direction	Distance (m)	Surcharge
North	16.5	15%
East	> 30m	0%
West	> 30m	0%
South	> 30m	0%
	Total:	15%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

F4=(TOTAL)*F2 (L/min)

F_4= 1275 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 6375 L/min

= 6000 L/min (Round to the nearest 1,000 l/min)

= **100.0 L/s**

Notes: *1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

Water Supply for Public Fire Protection - Fire Underwriters Survey 2020
Tables & Figures

Method for Determining Required Fire Flows

Fire Underwriters Survey defines **Required Fire Flow** as the amount and rate of water application required in firefighting to confine and control the fires possible in a building or group of buildings which comprise essentially the same fire area by virtue of immediate exposure. This may include as much as a city block.

To determine the estimated amount of water required to confine and control a fire in a building or group of buildings, Fire Underwriters Survey uses the following base formula:

$$RFF = 220C\sqrt{A}$$

Where:

RFF = the Required Fire Flow in litres per minutes (LPM)
C = the Construction Coefficient is related to the type of construction of the building
A = the Total Effective Floor Area (effective building area) in square metres of the building

Construction Coefficient (C)

Note that the construction typology used by the insurance industry and public fire protection differs from the terms of reference in the National Building Code of Canada (NBC).

The following Construction Types and Coefficients are used in the required fire flow formula:

C = 1.5 for **Type V** Wood Frame Construction
= 0.8 for **Type IV-A** Mass Timber Construction
= 0.9 for **Type IV-B** Mass Timber Construction
= 1.0 for **Type IV-C** Mass Timber Construction
= 1.5 for **Type IV-D** Mass Timber Construction
= 1.0 for **Type III** Ordinary Construction
= 0.8 for **Type II** Noncombustible Construction
= 0.6 for **Type I** Fire Resistive Construction

Occupancy and Contents Adjustment Factor

The required fire flow may be reduced by as much as -25% for occupancies having contents with a very low fire hazard or may be increased by up to 25% for occupancies having contents with a high fire hazard. The Occupancy and Contents Adjustment Factor should not be made at greater than 25% or less than -25%.

- *Noncombustible Contents* *-25%*
  - Includes merchandise or materials, including stock, or equipment, which in permissible quantities does not in themselves constitute an active fuel for the spread of fire.
  - May include limited or controlled amounts of combustible material, not exceeding 5% of the Total Effective Area of the occupancy. Combustible components of construction (ex. interior walls, finishes, etc.) should be included in the limit on combustible materials.
- *Limited Combustible Contents* *-15%*
  - Includes merchandise or materials, including furniture, stock, or equipment, of low combustibility, with limited concentrations of combustible materials.
- Combustible Contents 0% no adjustment
  - Includes merchandise or materials, including furniture, stock, or equipment, of moderate combustibility.
- *Free Burning Contents* *+15%*
  - Includes merchandise or materials, including furniture, stock, or equipment, which burn freely, constituting an active fuel.
- *Rapid Burning Contents* *+25%*
  - Includes merchandise or materials, including furniture, stock, or equipment, which either
    - Burn with great intensity
    - spontaneously ignite and are difficult to extinguish
    - give off flammable or explosive vapors at ordinary temperatures
    - as a result of an industrial processing, produce large quantities of dust or other finely divided debris subject to flash fire or explosion

Table 3 Recommended Occupancy/Contents Charges by Major Occupancy Examples[1]

Group	Division	Description of Major Occupancies	Occupancy and Contents	Adjustment Factor
A	1	***Assembly** occupancies* intended for the production and viewing of the performing arts	Combustible	0%
A	2	***Assembly** occupancies* not elsewhere classified in Group A	Limited to Combustible	-15% to 0%
A	3	***Assembly** occupancies* of the arena type	Limited to Combustible	-15% to 0%
A	4	***Assembly** occupancies* in which occupants are gathered in the open air	Limited to Combustible	-15% to 0%
B	1	**Detention** occupancies	Noncombustible to Limited	-25% to -15%
B	2	**Care** and treatment occupancies	Noncombustible to Limited	-25% to -15%
B	3	**Care** occupancies	Limited	-15%
C	---	**Residential** occupancies	Limited	-15%
D	---	**Business** and personal services occupancies		
D	---	• *Police stations without detention quarters*	Non-combustible	-20%
D	---	• *Banks, Barber and hairdressing shops, Beauty parlours, Dental offices, Laundries (self-service), Medical offices, Offices, Radio stations*	Limited	-15%
D	---	• *Dry cleaning establishments (self-service, not using flammable or explosive solvents or cleaners), Small tool and appliance rental and service establishments*	Combustible	0%
E	---	**Mercantile** occupancies		
E	---	• *Exhibition halls*	Limited	-15%
E	---	• *Supermarkets*	Limited	-15%
E	---	• *Shops/Stores*	Limited to Combustible	-15% to 0%
E	---	• *Markets*	Combustible	0
E	---	• *Department stores*	Free Burning	15%
F	1	**High hazard industrial** occupancies	Rapid Burning	+25%
F	2	**Medium hazard industrial** occupancies		
F	2	• *Television studios not admitting a viewing audience*	Limited	-15%
F	2	• *Cold storage plants*	Combustible	0%
F	2	• *Electrical substations*	Combustible	0%
F	2	• *Helicopter landing areas on roofs*	Limited	-15%

[1] *The values presented in this table are intended as a guideline and the occupancy/contents adjustment should be based on the actual severity of conditions within the risk structure.*

Total Effective Area (A)

To determine a required fire flow for an individual building, the Total Effective Area that would be affected during the design fire must be determined. The Total Effective Area is the largest Floor Area (in square metres) plus the following percentages of the total area of the other floors:

1) For a building classified with a Construction Coefficient from 1.0 to 1.5:
   a) 100% of all Floor Areas are considered in determining the Total Effective Area to be used in the formula.
2) For a building classified with a Construction Coefficient below 1.0:
   a) if any vertical openings in the building (ex. interconnected floor spaces, atria, elevators, escalators, etc.) are unprotected, consider the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight; or
   b) if all vertical openings and exterior vertical communications are properly protected in accordance with the National Building Code, consider only the single largest Floor Area plus 25% of each of the two immediately adjoining floors.

Automatic Sprinkler Protection

The required fire flow may be reduced by up to 50 percent for complete Automatic Sprinkler Protection depending upon adequacy of the system. Where only part of a building is protected by Automatic Sprinkler Protection, credit should be interpolated by determining the percentage of the Total Floor Area being protected by the automatic sprinkler system.

To be able to apply the full 50 percent reduction, the following areas should be reviewed to determine the appropriate level of credit for having Automatic Sprinkler Protection as per the table below:

Table 4 Sprinkler Credits

Automatic Sprinkler System Design	Credit	
	With complete building coverage	With partial building coverage of X%
Automatic sprinkler protection designed and installed in accordance with NFPA 13	30%	30% × Percentage of Total Floor Area Serviced by Sprinkler System
Water supply is standard for both the system and Fire Department hose lines	10%	10% × Percentage of Total Floor Area Serviced by Sprinkler System
Fully supervised system	10%	10% × Percentage of Total Floor Area Serviced by Sprinkler System

Exposure Adjustment Charge

A percentage of water for the exposures should be added to the required fire flow for the subject building to provide adequate flow rates for hose streams used to reduce the spreading of fire from the subject building to exposed risks (ex. structures, stored materials, forest, etc.). The required fire flow of a subject building may be increased depending on the severity of exposed risks to the subject building and the distance between the exposed risks and the subject building. This charge considers the usage of water supplies to prevent exposed risks from igniting or being damaged during a major fire incident in the subject building.

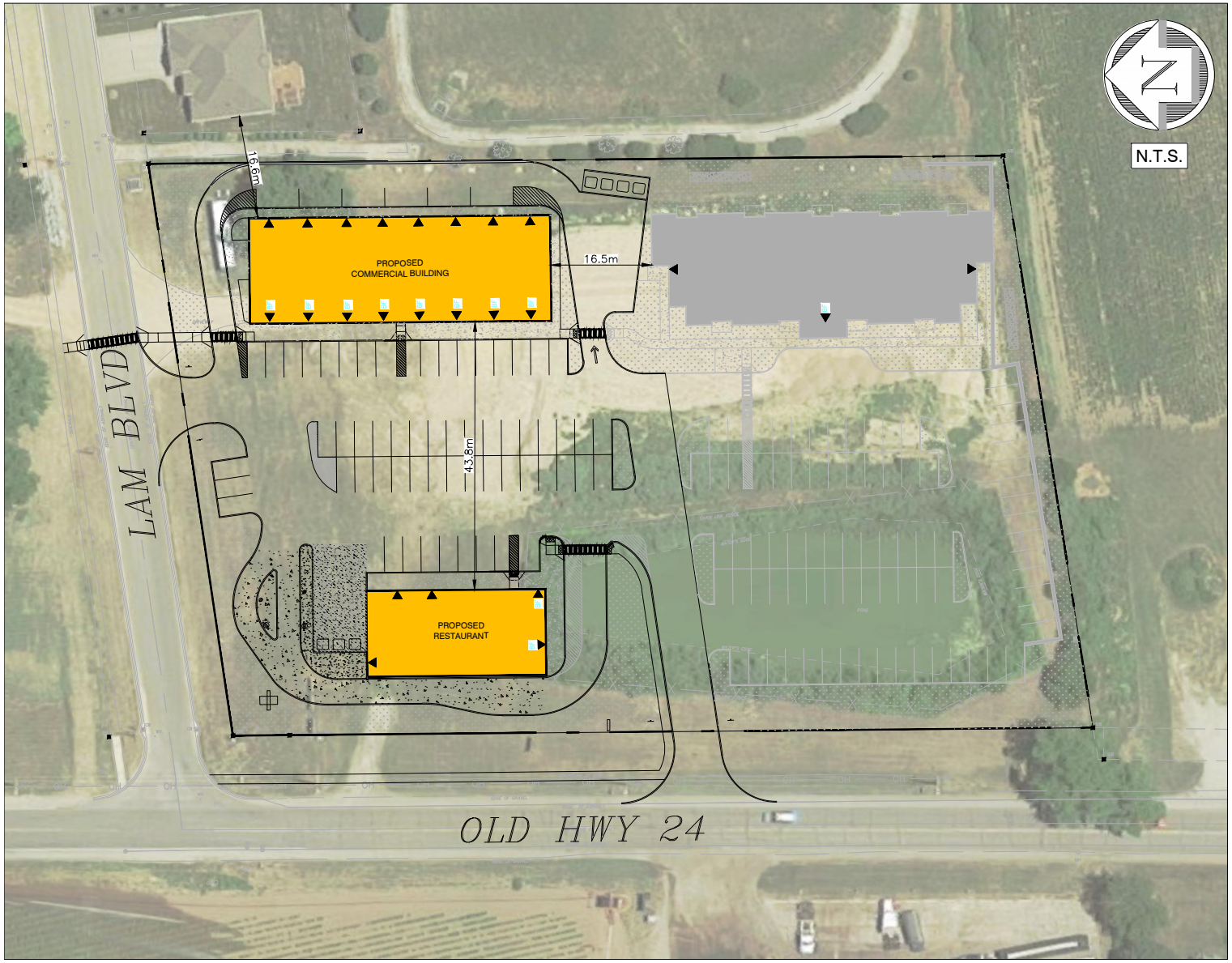
The maximum Exposure Adjustment Charge to be applied to a subject building is 75% when summing the percentages for all sides of the building. Table 5 outlines the maximum Exposure Adjustment Charge to apply for any one side of the subject building based on the following separation distances between the subject building and the exposed risk (aka. exposure):

Table 5 Exposure Charges

Separation Distance	Maximum Exposure Adjustment Charge
0 m to 3 m	25%
3.1 m to 10 m	20%
10.1 m to 20 m	15%
20.1 m to 30 m	10%
Greater than 30	0%

Table 6 Exposure Adjustment Charges for Subject Building considering Construction type of Exposed Building Face

Distance (m) to the Exposure	Length-height factor of exposing building face	Type V	Type III-IV[2]	Type III-IV[3]	Type I-II[2]	Type I-II[3]
0 to 3	0-20	20%	15%	5%	10%	0%
	21-40	21%	16%	6%	11%	1%
	41-60	22%	17%	7%	12%	2%
	61-80	23%	18%	8%	13%	3%
	81-100	24%	19%	9%	14%	4%
	Over 100	25%	20%	10%	15%	5%
3.1 to 10	0-20	15%	10%	3%	6%	0%
	21-40	16%	11%	4%	7%	0%
	41-60	17%	12%	5%	8%	1%
	61-80	18%	13%	6%	9%	2%
	81-100	19%	14%	7%	10%	3%
	Over 100	20%	15%	8%	11%	4%
10.1 to 20	0-20	10%	5%	0%	3%	0%
	21-40	11%	6%	1%	4%	0%
	41-60	12%	7%	2%	5%	0%
	61-80	13%	8%	3%	6%	1%
	81-100	14%	9%	4%	7%	2%
	Over 100	15%	10%	5%	8%	3%
20.1 to 30	0-20	0%	0%	0%	0%	0%
	21-40	2%	1%	0%	0%	0%
	41-60	4%	2%	0%	1%	0%
	61-80	6%	3%	1%	2%	0%
	81-100	8%	4%	2%	3%	0%
	Over 100	10%	5%	3%	4%	0%
Over 30 m	all sizes	0%	0%	0%	0%	0%


N
N.T.S.
PROPOSED
COMMERCIAL BUILDING
PROPOSED
RESTAURANT
16.6m
16.5m
43.8m
LAM BLVD
OLD HWY 24

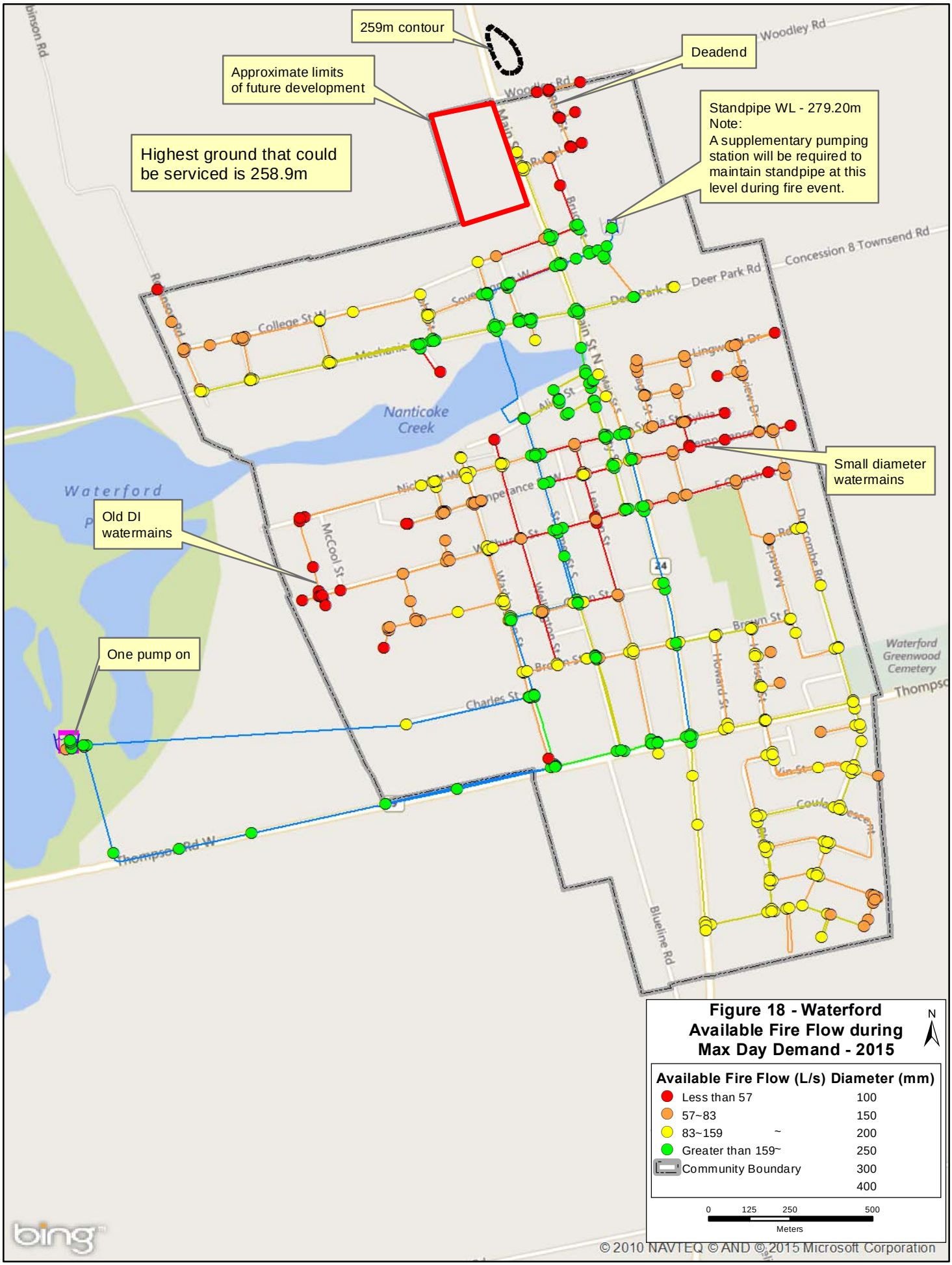


Figure 18 - Waterford Available Fire Flow during Max Day Demand - 2015

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Consulting Engineers,
Architects & Planners

August 21, 2024

Verlinda Homes
26 Main Street South PO Box 1152
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N0E 1Y0

Attention: **Mr. Tom O'Hara**

Reference: **Stormwater Management Report**
Orchard Square Development
Waterford, Norfolk County
Our Project # 20-128

Introduction

This Stormwater Management (SWM) Report has been prepared on behalf of Verlinda Homes, in support of the site plan application for the proposed Orchard Square Development located at municipal address 750 Old Highway 24, on the southeast corner of Old Hwy 24 and Lam Boulevard in Waterford - Norfolk County. The proposed development site has been severed into two properties, and will be constructed in two phases, with Phase 1 including a four-unit commercial building, and a fast-food restaurant and Phase 2 includes a 5-storey, 44-unit residential mid-rise building. The following SWM strategy is a comprehensive plan for both parcels. It is the intention to submit this report to Norfolk County for review and approval of the proposed site plan.

The 1.31 ha development site is vacant land which features open grassed area and an irrigation pond. The sites are bound by Lam Boulevard to the north, old Highway 24 to the west, an existing subdivision and stormwater management pond to the east and agricultural land to the south. Refer to Figure 1 below.

Figure 1 - Site Location

Stormwater Management Design Criteria

Under pre-development conditions, the subject property is vacant land which features open grassed area and an irrigation pond. Stormwater runoff from the subject property drains uncontrolled, overland in a southwesterly direction towards Old Hwy 24.

As part of the Yin's Subdivision - Phase 5 Project (Vallee Project No. 10-034), a peak flow allowance of 0.015 m^3/s was allocated for the subject site as part of the storm sewer design along Old Highway 24. Refer to the 10-034 Yin's Subdivision - Phase 5 Stormwater Management Report in Appendix F for details.

Consequently, the design criteria for the proposed development are as follows:

- Quantity Control: Reduce or control the total post-development peak flow rates from the site to levels that do not exceed the 0.015 m^3/s flow allowance, for all storm events up to and including the 100-year storm event.
- Quality Control: Stormwater is to be treated to a Normal Protection Level as defined in the MOECC Ministry of Environment and Climate Change Design Manual - March 2003.

A Visual Otthymo computer model has been used to simulate the drainage areas under post-development conditions. The simulations were conducted using the 4-hour Chicago Distribution design storm of the 2-year, 5-year, 10-year, 25-year, 50-year and 100-year storm events. The Norfolk County rainfall IDF curve data has been used for the storm analysis using the parameters in Table 1 below.

Table 1
Norfolk County Rainfall IDF Parameters

Event	A	B	C
2-year	529.711	4.501	0.745
5-year	583.017	3.007	0.703
10-year	670.324	3.007	0.698
25-year	721.533	2.253	0.679
50-year	766.038	1.898	0.668
100-year	801.041	1.501	0.657

Post Development Condition

The overall stormwater management quantity control strategy is to reduce the total post-development peak flow rates from the site to less than or equal to the allowable release rate of 0.015 m^3/s. To meet this objective, runoff from the proposed development will be detained in an underground storage facility, and released at a rate such that the peak flow allowance is not exceeded. Infiltration beneath the chamber facility will be utilized to decrease the required storage volume and promote groundwater infiltration. Minor and major storm events (2-year to 100-year storm) will be conveyed to the proposed SWM storage facility through a storm sewer network. Runoff released from the storage facility will be directed to the existing municipal 600mm diameter storm sewer along Old Highway 24. In addition, soakaway pits will be utilized to capture and infiltrate runoff from a small portion of the development on the east side of the property that can't be conveyed to the SWM facility.

The post-development drainage areas are shown in Drawing SWM – Stormwater Management Drainage Areas in Appendix A, and can generally be described as follows:

- Area A1: Approximately 1.11 ha of the development site. This area encompasses the majority of the development site. Flows from this area are conveyed to the underground SWM chamber facility via the proposed storm sewer network.
- Area A2: Approximately 0.05 ha of the development site. This area encompasses a portion of the site on the east side of the proposed Phase 2 mid-rise residential building. Runoff from this area will be completely infiltrated by two proposed infiltration trenches.
- Area A3: Approximately 0.12 ha of the development site. This area encompasses the frontage along Old Highway 24 and a portion of the frontage along Lam Boulevard. Flows from this area will flow uncontrolled, overland towards Lam Boulevard and Old Highway 24 as they do under pre-development conditions.
- Area A4: Approximately 0.03 ha of the development site. This area encompasses a portion of the site on the south side of the proposed Phase 2 mid-rise residential building. Runoff from this area will be completely infiltrated by a proposed infiltration trench.

Table 2 summarizes the site soil parameters and the post-development catchment input parameters for the Visual OTTHYMO computer model with complete details included in Appendix B and E. The model uses a modified SCS procedure to estimate losses that occur naturally during a rainfall event such as evaporation and infiltration.

Table 2
Visual Otthymo Model Input – Post-Development

Parameter	A1	A2	A3	A4
Area	1.11 ha	0.05 ha	0.12 ha	0.03 ha
Soil Type		Sandy Textures over Gravelly Sand & Loamy Sand		
Hydrologic Soil Group		A		
SCS Curve Number		Pasture & Other Improved Land - 58		
Initial Abstraction		15.6 mm ($IA/S_{0.05}$ = 0.05, with $S_{0.05}$ = 1.33 * $S_{0.20}$^1.15 in inches and $S_{0.20}$ = 1000/CN-10 in inches)		
Longest Flow Path	N/A	5m	5m	5m
Average Slope	N/A	4%	20%	4%
Runoff Coefficient	N/A	0.25	0.30	0.25
Time to Peak	N/A	0.04 hr	0.02 hr	0.04 hr
Impervious Percentage	93%	N/A	N/A	N/A
Directly Connected Impervious Percentage	93%	N/A	N/A	N/A

Infiltration Trenches

Three infiltration trenches/soakaway pits will be installed behind the mid-rise residential building in Phase 2 to capture and infiltrate runoff that cannot be conveyed to the underground SWM chamber facility. Infiltration basins provide not only water quantity benefits such as a reduced runoff volume, but also provide water quality benefits by promoting natural groundwater recharge. The depth of an infiltration basin is governed by the native soil infiltration rate, the porosity of the aggregate material used in the stone reservoir and the targeted time period to achieve complete drainage between storm events.

As presented in the Geotechnical Investigation completed by Soil -Mat Engineers & Consultants Limited (refer to Appendix C), the recommended native soil infiltration rate was determined to be 30 mm/hr. Applying a safety factor of 2.5, the design infiltration rate was taken as 12mm/hr. Therefore, the maximum allowable stone depth was determined to be 2.88m based on the design infiltration rate of 12 mm/hr, a void ratio of 0.4 and a drainage time of 96 hours, as defined in the Norfolk County Design Criteria (2012). Corresponding calculations are detailed in Appendix B. Using Visual OTTHYMO, the infiltration trenches in catchment area A2 and A4 were sized to infiltrate 100% of the runoff captured under all storm events up to and including the 100-year event. Table 3 outlines the storage capacity and drawdown time during the 100-year storm event for each proposed infiltration trench.

Table 3
Infiltration Trench Sizing & Drawdown

Soakaway Pit	Length (m)	Width (m)	Depth (m)	Storage Volume (m^3)	Drawdown Time (hr)
Soakaway #1	10.0	1.5	1.0	6.0	13.3
Soakaway #2	10.0	1.5	1.0	6.0	13.3
Soakaway #3	10.0	1.5	1.0	6.0	16.6

Stormwater Management Chamber Facility

An underground chamber system is proposed to provide stormwater storage, control post-development peak flow rates, and promote further infiltration. To determine the storage volume required in the proposed system, the relationship between the storage volume and the discharge is defined by a rating curve. This rating curve is determined by calculating the expected discharge from the facility based on the water level in the system and the proposed outlet control configuration.

Generally, orifices or weirs can control discharge from SWM facilities. Each of these control methods can be used by the singular control or they can be used in combination depending on the discharge characteristics desired. For this facility both a single orifice is proposed with the following equation used to estimate discharge:

Sharp-Crested Circular Orifice

$$Q = C * A * \sqrt{2 * g * h}$$

where: Q = Discharge in cms
C = constant, 0.63
A = orifice area in m^2
g = gravitational constant, 9.81 m/s^2
h = height above orifice, m

The proposed underground chamber system utilizes 133 StormTech MC-3500 chambers, with 14 end caps, a 500mm stone reservoir above the chambers and a 300mm stone reservoir below, resulting in a total storage volume of 777 m^3. Drawings and specifications for the proposed StormTech chamber facility are located in Appendix D. To control the release rate from the proposed facility, a single 75mm orifice at an elevation of 242.10m, will be installed in the outlet control structure. The complete discharge-to-storage rating curve is appended to this report as part of Appendix B.

Table 4 summarizes the total peak post-development runoff rates from the entire subject site found using Visual OTTHYMO and compares them to the allowable release rate for each storm event up to and including the 100-year storm event. The utilized storage volumes in the StormTech chamber facility and corresponding ponding elevations and drawdown times for each storm event are also presented in Table 4.

Table 4
Post-Development Flow Rates, Storage Volumes, Ponding Elevations & Drawdown

Event	Allowable Release Rate (cm/s)	Post-Development (cm/s)	Net Change (cm/s)	Utilized Storage Volume (cm)	Ponding Elevation (m)	Drawdown Time (hr)
2-year	0.015	0.000	-0.015	324	242.01	39.5
5-year		0.005	-0.010	443	242.24	49.7
10-year		0.007	-0.008	514	242.39	52.2
25-year		0.009	-0.006	611	242.63	54.8
50-year		0.011	-0.004	688	242.90	56.6
100-year		0.013	-0.002	764	243.18	58.1

As presented above, the total peak post-development flow rates from the entire site have been attenuated to less than or equal to the allowable release rate of 0.015 m^3/s, for all storm events up to and including the 100-year storm event. In addition, the drawdown time for each storm event is less than the maximum drawdown time of 96 hours specified in the Norfolk County Design Criteria. All corresponding calculations completed during the development of the Visual OTTHYMO model can be found in Appendix B and the results from the Visual OTTHYMO analysis are detailed in Appendix E.

Water Balance

As requested by Norfolk County, G. Douglas Vallee Ltd. has completed a water balance investigation for the pre-development and post-development site. A water balance is used to describe the hydrological cycle, and provides an accounting of water across the system's boundaries over a specified time period. Any differences between inflows and outflows of the system must attempt to be balanced using storage systems.

A continuous Visual OTTHYMO simulation was used to model the pre-development and post-development water balance for the subject site over a six-year period. Historical climate data for Simcoe, Ontario for the years 1981-1986 was obtained from the Government of Canada. This data includes daily precipitation (rainfall and/or snowfall) and daily minimum and maximum temperatures. In addition, Table 5 presents the average monthly evapotranspiration for Buffalo, New York, utilized in the OTTHYMO model.

Table 5 Average Monthly Evapotranspiration	
Month	**(mm)**
January	6.1
February	10.2
March	25.1
April	48.8
May	82.8
June	95.0
July	102.9
August	87.1
September	56.6
October	30.0
November	11.9
December	6.1

Table 6 presents the total average annual volume of precipitation (rainfall and/or snowfall), evapotranspiration, infiltration and runoff from the pre-development and post-development catchment areas found using Visual OTTHYMO. Note that the post-development infiltration value listed in Table 6 does not include the infiltration achieved by the proposed infiltration basins and underground stormwater chamber facility.

Table 6 Average Annual Water Balance Volumes (without LID)			
Hydrologic Cycle Component	**Pre-Development (m^3)**	**Post-Development (m^3)**	**Δ Volume (%)**
Precipitation	13179	13380	2%
Evapotranspiration	5554	1776	-68%
Infiltration	7218	1634	-77%
Runoff	2424	10430	330%

As previously mentioned, the proposed infiltration basins, and underground stormwater chamber facility within the development site are utilized to reduce the required storage volume, but are also used to increase the volume of post-development infiltration. Table 7 summarizes the average annual volume of infiltration under pre-development conditions, the total post-development site infiltration with the infiltration systems and total difference in infiltration from pre- to post-development.

Table 10 Pre to Post-Development Infiltration Volumes	
Pre-Development Site Infiltration	7218 m^3
Total Post-Development Site Infiltration (with LID)	11660 m^3
Δ Infiltration Volume (Pre to Post)	62%

As described above, with the addition of the proposed infiltration basins and underground stormwater chamber facility, there is a 62% increase in infiltration from the pre-development to post-development condition.

Quality Control

Chamber Facility Quality Control

The selection of the level of water quality treatment is based on the proposed outlet for a SWM facility. For this site, the proposed outlet is the Old Highway 24 storm sewer, therefore a normal level of protection has been selected. The Ministry of the Environment Stormwater Management Planning and Design Manual defines a normal level of protection as the removal of 70% of the total suspended solids (TSS).

Quality control will be provided by the StormTech Isolator PLUS Row, which is a row of standard StormTech chambers surrounded by filter fabric. The isolator row creates a detention basin that allows water to egress through the surrounding filter fabric while sediment is trapped within. In addition, a flared end ramp is attached to the inlet pipe inside of the chamber end cap to provide a smooth transition from pipe invert to fabric bottom. It is configured to improve chamber function performance over time by distributing sediment and debris that would otherwise collect at the inlet.

Each MC-3500 isolator row chamber has an ETV-verified treated flow rate of 11.19 L/s corresponding to greater than 81% TSS removal. The proposed chamber facility features 19 isolator row chambers, which allows for a total treated inlet flow rate of approximately 213 L/s. Using Visual OTTHYMO, the maximum flow rate entering the chambers during the 25mm storm event (quality control event) was determined to be 143 L/s. Consequently, it can be concluded that the proposed chamber facility provides more than sufficient capacity to provide a normal level of water quality protection, corresponding to 70% TSS removal. The StormTech Isolator Row Sizing Chart can be found in Appendix B.

Inspection and maintenance are fundamental to the long-term performance of any stormwater quality treatment device. StormTech recommends that the chamber system be inspected annually at a minimum, and every six months for the first year of operation to determine the sediment accumulation rate. In subsequent years inspections can be based on observations or local requirements. The unit should be inspected immediately after an oil, fuel or chemical spill, and a licensed waste management company should remove oil and sediment for proper disposal.

Minimum Orifice Size

A minimum orifice of 75mm is recommended as per the MOE guidelines. For this facility, a 75m orifice is proposed.

Erosion and Sediment Control

During construction, the contractor is required to protect the worksite and all adjacent lands from sediment and erosion regardless of the source, to the satisfaction of all applicable parties. The measures installed by the contractor are to remain in place until such time as there is no further threat of damage and all vegetation is established. Measures that are to be put into place as an absolute minimum include silt fences, mud mats, and filter cloths over catch basins onsite.

Conclusions and Recommendations

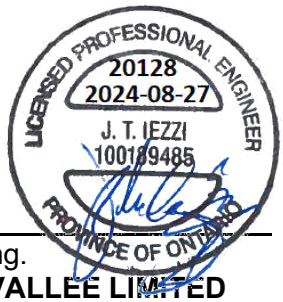
Based on the review presented by this Stormwater Management Report, the comprehensive stormwater management design for the proposed development can be summarized as follows:

- Storm sewers will convey stormwater from the subject site to the proposed underground SWM chamber facility located in Phase 1 of the development.
- Runoff released from the SWM facility will be conveyed to the existing municipal 600mm diameter storm sewer along Old Highway 24.
- Three infiltration trenches in Phase 2 and infiltration beneath the chamber facility are used to reduce the required stormwater storage volume and promote groundwater infiltration.
- The underground storage chamber facility uses 133 StormTech MC-3500 chambers and has a total storage volume of 777 m^3.
- The required storage volume in the chamber facility ranges between 324 m^3 to 764 m^3 for the 2-year and 100-year storm events, respectively.
- Discharge from the chamber facility is controlled by a 75mm orifice at an elevation of 242.10m.
- The proposed stormwater management facility has sufficient volume to detain runoff such that discharge from the total post-development site is controlled to less than or equal to the allowable release rate of 0.015 m^3/s for all storm events up to and including the 100-year storm event.
- During events greater than the 100-year storm, runoff from the site will surcharge the SWM facility, and flow overland towards Old Highway 24 as it does under pre-development conditions.
- The proposed StormTech Isolator PLUS Row shall be utilized to achieve a normal level of water quality protection, corresponding to 70% TSS removal.

It is recommended that this report be provided to Norfolk County in support of the application for site plan approval of the proposed development.

We trust that this information is complete and sufficient for submission. Should you have any questions or require further information please do not hesitate to contact us.

Respectfully submitted,



John Iezzi, P.Eng.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners

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Appendix A
– 20-128 DWG SWM – Stormwater Management Drainage Areas

Appendix B
– Soil Parameter Calculations
– Post-Development Parameters
– Rating Curve
– Post-Development Flows & Storage
– Quality Control
– Soakaway Sizing
– Water Balance

Appendix C
– Soil Parameters
– Geotechnical Investigation Orchard Square
(Soil-Mat Engineers & Consultants Limited, December 20, 2021)

Appendix D
– ADS StormTech Chamber Drawings & Specifications

Appendix E
– Visual OTTHYMO Summary Outputs

Appendix F
– 10-034 Yin's Subdivision - Phase 5 Stormwater Management Report
(G. Douglas Vallee Engineering Limited, December 10, 2010)

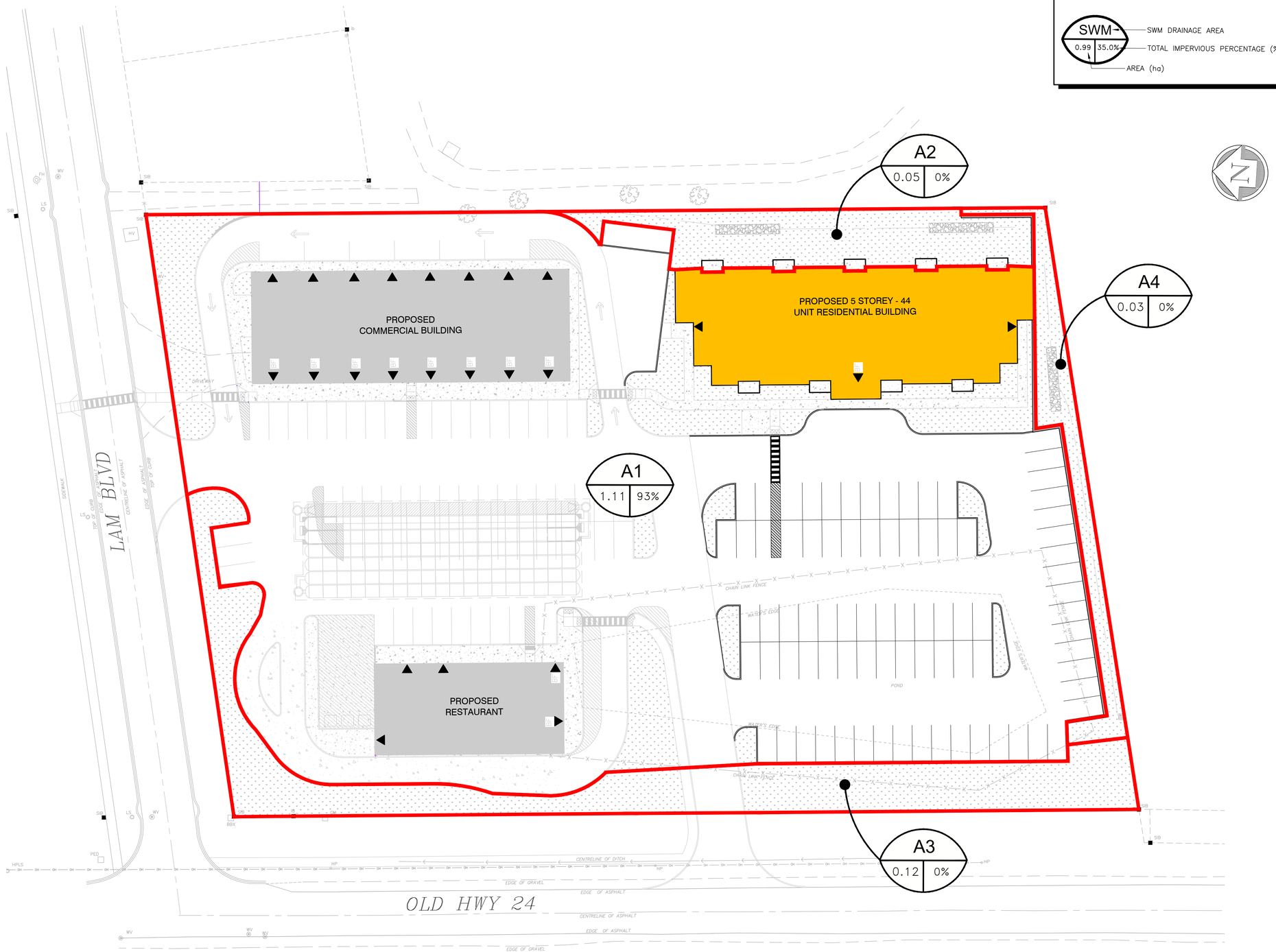
APPENDIX A

20-128 DWG SWM – Stormwater Management Drainage Areas

REV. No.	DATE	REVISION

LEGEND

- OVERLAND FLOW (MAJOR)
- CATCHMENT BOUNDARY
- SWM — SWM DRAINAGE AREA
- 0.99 | 35.0% — TOTAL IMPERVIOUS PERCENTAGE (%)
- AREA (ha)



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5 10 15
HORIZONTAL : 1:300

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G. DOUGLAS VALLEE LIMITED
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Stamp

PRELIMINARY
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Project Title
ORCHARD SQUARE
PHASE 2
WATERFORD, NORFOLK COUNTY

Drawing Title
STORMWATER MANAGEMENT DRAINAGE AREAS

Designed by : NLB	Drawn By : NLB
Checked by : JI	Date Started : 7/9/2024
Drawing Scale : 1:300	Drawing No. SWM
Project No. 20-128	

DATE LAST PLOTTED : July 10, 2024

APPENDIX B

Soil Parameter Calculations
Post-Development Parameters
Rating Curve
Post-Development Flows & Storage
Quality Control
Soakaway Sizing

vallee
Consulting Engineers, Architects & Planners

Subject:	Soil Parameters		
Date:	Aug-24	By:	NLO
Project #:	20-128	Page	1

SOIL PARAMETERS

Soil Type	Sandy textures over gravelly sand & loamy sand	
Soil Group	A	
CN	58	Pasture & Other Improved Land
Initial Abstraction	16.5	mm

INFILTRATION PARAMETERS

Infiltration Rate (i)	30	mm/hr
Safety Factor	2.5	
Design Infiltration Rate	12	mm/hr
Design Infiltration Rate	0.012	m/hr
Void Ratio (Vr)	0.4	
Drainage Time (ts)	96	hr
Max allowable stone depth (drmax)	2.88	m

**Soil-Mat Engineers & Consultants Ltd. Geotechnical Investigation dated December 20th 2021*

BMP Sizing

The depth of the soakaway or infiltration trench is dependent on the native soil infiltration rate, porosity (void space ratio) of the gravel storage layer media (i.e, aggregate material used in the stone reservoir) and the targeted time period to achieve complete drainage between storm events. The maximum allowable depth of the stone reservoir for designs without an underdrain can be calculated using the following equation:

$$d_{r\,max} = i * t_s / V_r$$

Where:

- $d_{r\,max}$ = Maximum stone reservoir depth (mm)
- i = Infiltration rate for native soils (mm/hr)
- V_r = Void space ratio for aggregate used (typically 0.4 for 50 mm clear stone)
- t_s = Time to drain (design for 48 hour time to drain is recommended)

PRE-DEVELOPMENT AREA PARAMETERS:

Drainage Area	Total Area (ha)	Runoff Coeff.	Drainage Length (m)	Slope (%)	Time of Concentration (min)	Time to Peak (0.6*tc) (hr)
PRE	1.31	0.25	70.00	0.0	84.30	0.84

POST-DEVELOPMENT AREA PARAMETERS:

Area Description	Area (ha)
Grass	0.28
Buildings	0.22
Roads/Parking/Sidewalks	0.81
Total Site	1.31

Airport Formula

$Tc = 3.26 * (1.1 - C) * L^{0.5} / Sw^{0.33}$

Tc = Time of Concentration (minutes)
C = Runoff Coefficient (dimensionless)
L = Watershed Length (metres)
Sw = Watershed Slope % (m/m)

Drainage Area	Control?	Total Area (ha)	Impervious Area (ha)	TIMP (%)	Dir. Conn. Imperv. Area (ha)	XIMP (%)
A1	SWM Chambers	1.11	1.03	93%	1.03	93%

Drainage Area	Control?	Total Area (ha)	Runoff Coeff.	Drainage Length (m)	Slope (%)	Time of Concentration (min)	Time to Peak (0.6*tc) (hr)
A2	Infiltration Basin	0.05	0.25	5.00	4.0	3.92	0.04
A3	Uncontrolled	0.12	0.30	5.00	20.0	2.17	0.02
A4	Infiltration Basin	0.03	0.25	5.00	4.0	3.92	0.04

CHAMBERS PARAMETERS

Model	MC-3500	
Number of Chambers	133	
Number of End Caps	14	
Depth of Stone Above Chamber	500	mm
Depth of Stone Below Chambers	300	mm
Base of Stone Elev.	241.30	m
Base of Chamber Elev.	241.60	m
Height of Chambers	1143	mm
Top of Chamber Elv.	242.74	m
Top of Stone Elev.	243.24	m
Min. Cover (For Vehicles)	0.54	m
Min Surface Elev.	243.78	m
System Footprint	679.72	m2

ORIFICE PARAMETERS

Diameter	0.075	m
Area	0.0044	m2
Inv. Elev.	242.10	m
CL Elev.	242.14	m
Depth	0.80	m

$$Q = CA\sqrt{2gh}$$

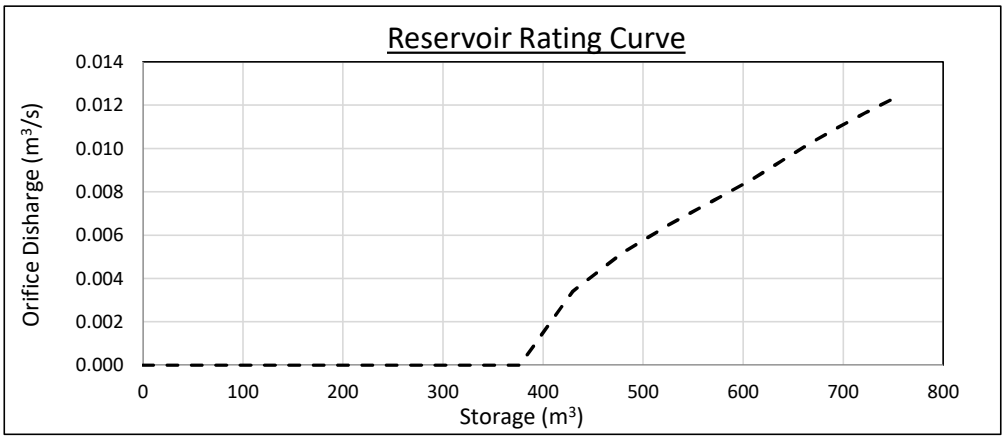
C = 0.63

**300mm Gran B, 150mm Gran A, 50mm base, 40mm surface*

STAGE-STORAGE-DISCHARGE

Description	Elevation (m)	Stage (mm)	Stage (m)	Volume (m3)	Height Above Invert (m)	Q (m3/s) Orifice 1
Base of Stone Storage	241.30	0	0.00	0	0.00	0.0000
	241.40	102	0.10	28	0.00	0.0000
	241.50	203	0.20	55	0.00	0.0000
Base of Chambers	241.61	305	0.31	91	0.00	0.0000
	241.71	406	0.41	150	0.00	0.0000
	241.81	508	0.51	209	0.00	0.0000
	241.91	610	0.61	266	0.00	0.0000
	242.01	711	0.71	322	0.00	0.0000
Orifice 1	242.11	813	0.81	377	0.00	0.0000
	242.21	914	0.91	430	0.08	0.0034
	242.32	1016	1.02	480	0.18	0.0052
	242.42	1118	1.12	528	0.28	0.0065
	242.52	1219	1.22	571	0.38	0.0076
	242.62	1321	1.32	609	0.48	0.0086
Top of Chambers	242.72	1422	1.42	639	0.58	0.0094
	242.82	1524	1.52	666	0.69	0.0102
	242.93	1626	1.63	694	0.79	0.0109
	243.03	1727	1.73	722	0.89	0.0116
	243.13	1829	1.83	749	0.99	0.0123
Top of Stone Storage	243.23	1930	1.93	777	1.09	0.0129

**Storage volumes obtained from OTTHYMO*



PRE TO POST FLOWS

Return Period	Q (m3/s)			Check
	Allowable	Total Post	Net	
2	0.015	0.000	-0.015	✓
5		0.005	-0.010	✓
10		0.007	-0.008	✓
25		0.009	-0.006	✓
50		0.011	-0.004	✓
100		0.013	-0.002	✓

STAGE-STORAGE-DISCHARGE

Description	Elevation (m)	Depth (m)	Volume (m^3)	Q (m3/s)
Base of Stone Storage	241.30	0.00	0	0.000
	241.40	0.10	28	0.000
	241.50	0.20	55	0.000
Base of Chambers	241.61	0.31	91	0.000
	241.71	0.41	150	0.000
	241.81	0.51	209	0.000
	241.91	0.61	266	0.000
	242.01	0.71	322	0.000
Orifice 1	242.11	0.81	377	0.000
	242.21	0.91	430	0.003
	242.32	1.02	480	0.005
	242.42	1.12	528	0.007
	242.52	1.22	571	0.008
	242.62	1.32	609	0.009
Top of Chambers	242.72	1.42	639	0.009
	242.82	1.52	666	0.010
	242.93	1.63	694	0.011
	243.03	1.73	722	0.012
	243.13	1.83	749	0.012
Top of Stone Storage	243.23	1.93	777	0.013

**Storage volumes obtained from OTTHYMO*

APPROXIMATE STORAGE & PONDING DEPTHS

Return Period	Storage (m)	Ponding Depth (m)	Elev. (m)	Drawdown Time (hr)
2	324	0.71	242.01	39.5
5	443	0.94	242.24	49.7
10	514	1.09	242.39	52.2
25	611	1.33	242.63	54.8
50	688	1.60	242.90	56.6
100	764	1.88	243.18	58.1

**Storage volumes obtained from OTTHYMO*

Water Quality Control Provided by Stormtech Isolator Row

Inflow to Chambers During 25mm Quality Storm Event	0.143	m^3/s
	143	L/s
Chamber Type	MC-3500	
Treated Flowrate / Isolator Row Chamber	11.19	L/s
Required Number of Isolator Row Chambers	13	
Provided Number of Isolator Row Chambers	19	
Provided Treated Flowrate	213	L/s ✓

StormTech
Detention • Retention • Water Quality
An ADS company

StormTech Isolator Row Sizing Chart

StormTech Isolator Row - Water Quality Flowrate for >81% TSS Removal							
	SC-160	SC-310	SC-740	DC-780	MC-3500	MC-4500	MC-7200
Chamber Bottom Area (m²)	1.06	1.64	2.58	2.58	3.99	2.80	4.65
Treated Flowrate / Chamber (L/s)	2.97	4.62	7.25	7.25	11.19	7.84	12.74

Notes:

- Results per ETV verified results, independently verifed by VerifiGlobal: https://www.verifiglobal.com/media/knubjbej/verifiglobal-verification-statement-for-stormtech-isolator-row-plus-final-2020-10-27-for-posting.pdf
- ETV verified treated flowrate = 4.13 GPM/ft² (2.80 L/s/m²)
- Above rates based on 81.2% removal of ETV/NJDEP particle size distribution.

Soakaway Sizing for Area 2

Contributing Area	0.05	ha
Runoff from VO (100-YR)	11.683	mm
Volume Required	**5.84**	**m^3**

Soakaway Pit #1

Void Ratio	0.4	m
Soakaway Depth	1	m
Soakaway Width	1.5	m
Soakaway Length	10	m
Volume	6	m^3

Soakaway Pit #2

Void Ratio	0.4	m
Soakaway Depth	1	m
Soakaway Width	1.5	m
Soakaway Length	10	m
Volume	6	m^3

Total Provided Volume	**12**	**m^3**	✓
Drawdown Time	**13.3**	**hr**	< 96 hr OK.

Soakaway Sizing for Area 4

Contributing Area	0.03	ha
Runoff from VO (100-YR)	11.683	mm
Volume Required	**3.50**	**m^3**

Soakaway Pit #1

Void Ratio	0.4	m
Soakaway Depth	1	m
Soakaway Width	1.5	m
Soakaway Length	10	m
Volume	6	m^3

Total Provided Volume	**6**	**m^3**	✓
Drawdown Time	**16.6**	**hr**	< 96 hr OK.

Average Annual Pre-Development Water Balance Volumes

	Area (ha.)	Vol. (mm)	Vol. (m3)
Precipatation	1.31	1006	13179
Evapotranspiration		424	5554
Infiltration		551	7218
Runoff		185	2424

Average Annual Post-Development Water Balance Volumes (Without LID Features)

	A1			A2		
	Area (ha.)	Vol. (mm)	Vol. (m3)	Area (ha.)	Vol. (mm)	Vol. (m3)
Precipatation	1.11	1006	11167	0.05	1006	503
Evapotranspiration		76	844		424	212
Infiltration		38	422		551	276
Runoff		903	10023		185	93

	A3			A4		
	Area (ha.)	Vol. (mm)	Vol. (m3)	Area (ha.)	Vol. (mm)	Vol. (m3)
Precipatation	0.12	1006	1207	0.03	1006	503
Evapotranspiration		424	509		424	212
Infiltration		551	661		551	276
Runoff		185	222		185	93

Average Annual Pre to Post-Development Water Balance Volumes (Without LID Features)

	PRE Vol. (m3)	POST Vol. (m3)	Δ Vol. (m3)	Δ Vol. (%)
Precipatation	13179	13380	201	2%
Evapotranspiration	5554	1776	-3778	-68%
Infiltration	7218	1634	-5584	-77%
Runoff	2424	10430	8007	330%

Average Annual LID Infiltration Volumes

Infiltration Area	LID Inflow (m3)	LID Infiltration (m3)	LID Overflow (m3)
A1 Chambers	10018	9881	137
A2 Infiltration Trench	93	91	2
A4 Infiltration Trench	56	54	2
Total	10167	10026	141

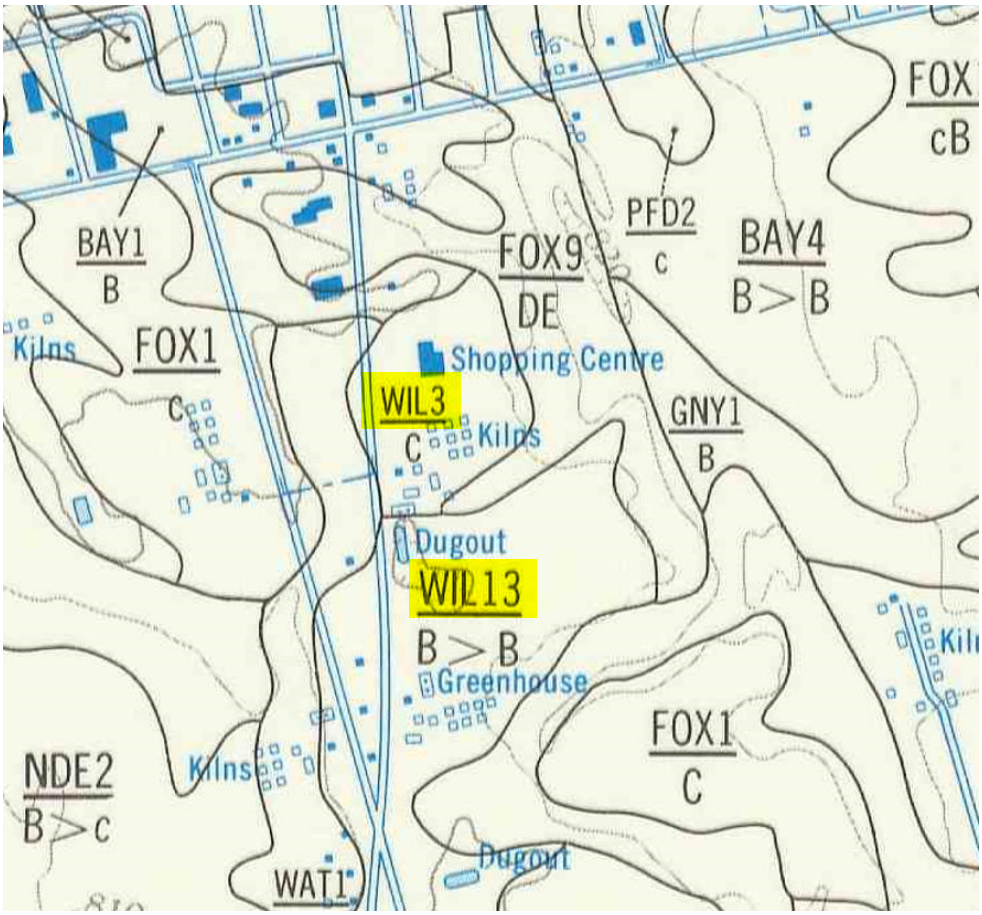
Average Annual Post Development Infiltration with LID Features

Pre-Development Site Infiltraiton	7218 m^3
Total Post-Development Site Infiltration	11660 m^3
Δ Infiltration (Pre to Post)	4442 m^3
Δ Infiltration (%)	62%

APPENDIX C

Soil Parameters
Geotechnical Investigation Orchard Square
(Soil-Mat Engineers & Consultants Limited, December 20, 2021)

20-128 Soil Parameters



WIL - Wilsonville						
WIL 1	WIL	None	Mainly gravelly sandy till		Rapid to well	
WIL 3	WIL.C	None	15-40 cm sandy textures over gravelly sandy till		Rapid to well	
WIL 5	WIL	WIL.C	see WIL 1	see WIL 3	Rapid to well	Rapid to well
WIL 9	WIL.L	WIL	15-40 cm loamy textures over gravelly sandy till	see WIL 1	Rapid to well	Rapid to well
WIL 10	WIL.L	BRT	see WIL 9	see BRT 1	Rapid to well	Well
WIL 11	WIL.C	WIL	see WIL 3	see WIL 1	Rapid to well	Rapid to well
WIL 12	WIL.C	STD	see WIL 3	see STD 1	Rapid to well	Rapid to well
WIL 13	WIL.C	NDE	see WIL 3	see NDE 1	Rapid to well	Imperfect

NDE - Normandale					
NDE 1	NDE	None	Mainly loamy fine sand and fine sandy loam	Imperfect	

CHART C2-2 - HYDROLOGIC SOIL GROUPS FOR GENERAL SOIL TYPES

Sands, sandy loams, and gravels	
- overlying sand, gravel or limestone bedrock, very well drained	A
- ditto, imperfectly drained	AB
- Shallow, overlying precambrian bedrock or clay subsoil	B
Coarse loams	
- overlying sand, gravel or limestone, well drained	AB
- shallow, overlying precambrian bedrock or clay subsoil	B
Medium textured loams	
- shallow, overlying limestone bedrock	B
- overlying medium textured subsoil	BC
Silt loams, some loams	
- with good internal drainage	BC
- with slow internal drainage and good external drainage	C
Clays, clay loams, silty clay loams	
- with good internal drainage	C
- with imperfect or poor external drainage	C
- with slow internal drainage and good external drainage	D

Note: Soils are classified on the basis of bare soil having maximum swelling at the end of a long storm whose rainfall exceeds infiltration into soil. Classifications shown are subject to modification as experience dictates.

Classifications are based on S.C.S. definitions (9) modified to suit Ontario conditions.

CHART C2-8 - SOIL/LAND USE CURVE NUMBERS

Land Use	Hydrologic Soil Group						
	A	AB	B	BC	C	CD	D
Fallow (special cases only)	77	82	86	89	91	93	94
Crop and other improved land	66*	70	74	78	82	84	86
Pasture & other unimproved land	58*	62*	65	71	76	79	81
Woodlots and forest	50*	54*	58	65	71	74	77
Impervious areas (paved)		98					
Bare rock draining directly to stream		98					
Bare rock draining indirectly to stream		70					
Water surfaces		100	(use in special cases only)				

Notes

1. Figures are based on average antecedent moisture condition (AMC II) except those marked *, which are initially wet (AMC III) or an intermediate condition. For definition of AMC's see Chart C2-10.
2. Table is not applicable to frozen soils or to periods in which snowmelt contributes to runoff.
3. For detailed values in urban areas see Table 2.2 of ref. 14.
4. Source: SCS Handbook of Hydrology, Chapter 9 (9), with modifications.

CHART C2-9 - PERCENT IMPERVIOUSNESS OF URBAN AREAS

Urban Land Use	% Imperviousness
Business - Commercial	40 - 90
Industrial - Light	45 - 65
Industrial - Heavy	50 - 70
Residential - Low density	20 - 30
Residential - Medium density	25 - 35
Residential - High density	30 - 40

Source: SCS Handbook of Hydrology, Chapter 15 (9)

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PROJECT NO.: SM 302104-G December 20, 2021

2525228 ONTARIO LTD.
c/o Thomas O'Hara
Box 1152, 26 Main Street South
Waterford, Ontario
N0E1Y0

Attention: Thomas O'Hara

GEOTECHNICAL INVESTIGATION
ORCHARD SQUARE
OLD HIGHWAY 24 AND LAM BOULEVARD
WATERFORD, ONTARIO

Dear Mr. O'Hara

Further to your authorisation, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has completed the fieldwork, and report preparation in connection with the above noted project. The scope of work was completed in general accordance with our proposal P302104, dated August 17, 2021. Our comments and recommendations based on our findings at the six [6] borehole locations are presented in the following paragraphs.

1. INTRODUCTION

We understand that the project will involve the construction of a residential development located at the southeast corner of Old Highway 24 and Lam Boulevard in Waterford, Ontario. The development will consist of townhouses including the installation of underground municipal services, along asphalt paved roadways. It is understood that the stormwater management is likely to involve the use of an underground storage chamber system. The purpose of this geotechnical investigation work was to assess the subsurface soil and groundwater conditions, and to provide our comments and recommendations with respect to the design and construction of the proposed development, from a geotechnical point of view.

This report is based on the above summarised project description, and on the assumption that the design and construction will be performed in accordance with applicable codes and standards. Any significant deviations from the proposed project design may void the recommendations given in this report. If significant changes are made to the proposed design, this office must be consulted to review the new design with respect to the results of this investigation.

2. PROCEDURE

A total of six [6] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using continuous flight power auger equipment on November 3, 2021 under the direction of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD., to termination at depths of between approximately 3.7 and 6.7 metres below the existing ground surface.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of ASTM test specification D1586, Standard Penetration Resistance Testing. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from the borings. Selected samples were also subjected to laboratory grain size analyses.

Groundwater observations were made during the drilling operations. Upon completion of drilling, groundwater monitoring wells were installed at two [2] of the borehole locations. The monitoring wells consisted of 50-millimetre diameter PVC pipe, screened in the lower 1.5 metres. The monitoring wells were encased in well filter sand up to approximately 0.3 metres above the screened portion, then fitted with protective steel 'stick up' casings. The remaining boreholes were backfilled in general accordance with Ontario Regulation 903, and the ground surface was reinstated even with the existing grade.

Additionally, a total of three [3] selected samples of the subsurface soils recovered from the boreholes were submitted to AGAT Laboratories, an independent Canadian accredited analytical laboratory for background environmental testing. These samples were submitted for a standard panel of metal parameters, pH, and petroleum hydrocarbons [PHCs]. The purpose of this testing was to assess the background environmental characteristics of the subsurface soils for comparison to the relevant Standards under Ontario Regulation 406/19 [as amended] and provide preliminary comment regarding off-site disposal of surplus soil from the project. The results of this background analytical testing have been appended to the end of this report.

The boreholes were located in the field by representatives of SOIL-MAT ENGINEERS, based on accessibility over the site and clearance of underground utilities. The ground surface elevation at the borehole locations has been referenced to a site-specific temporary benchmark, described as the manhole cover at the southeast corner of the intersection of Old Highway 24 and Lam Boulevard, at the northwest corner of the

property, as illustrated in the attached Drawing No. 1, Borehole Location Plan. This benchmark has been assigned an elevation of 100.0 metres for convenience.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Borehole Nos. 1 to 6, inclusive, following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed at the exact depths of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject site is located at the southeast corner of the intersection of Old Highway 24 and Lam Boulevard in Waterford, Ontario, and is currently occupied by a pond, a dirt driveway and parking area. The site is bound to the west by Old Highway 24, to the north Lam Boulevard, to the south by a single family dwelling and an agricultural field, and to the east by a walking trail and a residential development. The site is relatively flat, roughly level with Old Highway 24, with an overall topographic relief of approximately 1 metre based on the borehole elevations.

The subsurface conditions encountered at the borehole locations are summarised as follows:

Topsoil

A surficial veneer of topsoil approximately 250 to 350 millimetres in thickness was encountered at all borehole locations. It is noted that the depth of topsoil may vary across the site and from the depths encountered at the borehole locations, and a conservative approach should be taken in estimating topsoil quantities across the site. It is also noted that the term ‘topsoil’ has been used from a geotechnical point of view, and does not necessarily reflect its nutrient content or ability to support plant life.

Sand Fill

Sand fill was encountered beneath the topsoil at Borehole Nos. 1, 2, and 3. The sand fill soils were brown in colour with organic staining in the upper levels, contained trace clay, trace to some silt with occasional cobbles, and were generally in a loose condition. The sand fill was proven to depths of approximately 1.8 in Borehole No. 3, and to

approximately 4.1 metres in Borehole Nos. 1 and 2, however greater depths of fill material may be present across the site.

Sand

Native sand was encountered beneath the topsoil and/or the fill deposits at all borehole locations. The native fine grained soils were brown in colour, contained trace to some silt, clay and gravel. The soils were generally in a compact condition, and 'wet' between approximately 3.5 to 4.5 metres. The native sand was proven to terminations at depths between 3.7 to 6.7 metres below the existing ground surface at all borehole locations.

It is noted that due to the granular nature of the fill and native soils encountered, the transition from sand fill to native sand is somewhat indistinct. As such, some material identified as fill may in fact be loose or disturbed native soils. Conversely, some material identified as native soils may in fact be well compact fill.

Grain Size Analyses

Grain size analyses were conducted on four [4] selected samples of the native soils recovered from the boreholes. The results of this grain size testing can be found appended to the end of this report, and are summarized as follows:

Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH1 SS4	2.3 m	8	11	81	0	10^{-5}	30 to 40
BH1 SS6	4.6 m	3	11	80	6	10^{-4}	50 to 75
BH5 SS5	3.0 m	2	6	70	22	10^{-3}	100 to 150
BH7 SS3	1.5 m	3	9	88	0	10^{-3}	50 to 75

The results of the lab testing indicate the soils to consist predominately of sand, with trace clay, and trace to some silt and gravel. These soils are relatively permeable, with hydraulic conductivities on the order of 10^{-3} to 10^{-5} cm/sec. According to the Unified Soil Classification System (USCS), the soils are classified as S.M. – sand silt mixtures to S.P. – poorly graded sands or S.W. – well graded sands, gravelly sands little or no fines, or S.W. – well graded sands. These results of consistent with our observations of the soils during drilling and visual assessment of the recovered samples. These soils would generally be considered suitable for low impact development (LID) stormwater management systems. As in-situ infiltration rates vary with compaction, silt, and clay content, it is recommended that a conservative approach be taken for preliminary design of such LID stormwater management systems such as infiltration galleries/trenches,

considering a design of 30 mm/hr across the site. If the use of greater infiltration rates would be beneficial to the project, in-situ testing may be conducted at specific locations and depths of proposed galleries/trenches.

A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soils to consist of coarse-textured glaciolacustrine deposits of sand, gravel, with minor silt and clay. These conditions are consistent with our observations during drilling and experience in the area, encountering predominately fine grained granular soils with trace silt and clay.

Groundwater Observations

Borehole Nos. 1, 2, 3, 4, and 5 were noted to be open and 'wet' at a depths between 3.5 to 4.6 metres, while Borehole No. 6 was open and 'dry' upon completion of drilling. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes. As noted above, Borehole Nos. 1, and 2 were fitted with monitoring wells to allow for future measurements of the groundwater level. Measurements of the water level at the monitoring well locations were taken at two separate occasions, summarised as follows:

Borehole No.	Ground Surface Elevation (m)	November 25, 2021		December 2, 2021	
		Groundwater Depth (m)	Groundwater Elevation (m)	Groundwater Depth (m)	Groundwater Elevation (m)
BH1/MW1	100.02	3.40	96.62	3.40	96.62
BH2/MW2	100.85	4.09	96.76	4.09	96.76

It is noted that the elevations noted above are based on reference to a temporary benchmark with an assumed elevation of 100.00 metres. These elevations may be corrected once the geodetic elevation of the benchmark has been established.

Based on the measurements at the monitoring well locations, the groundwater level is estimated at depths of 3.5 to 4 metres, at an elevation of roughly 96.5 to 97.0 metres below the ground surface, and would be expected to fluctuate seasonally. Based on the time of year of the groundwater measurements, this may be more indicative of a seasonal 'high'.

4. EXCAVATIONS

Excavations for the installation of foundations and underground services are anticipated to extend to depths of up to approximately 2 to 4 metres below the existing grade. Excavations through the fill materials and native sand would be expected to remain stable at inclinations of up to 45 degrees to the horizontal. Where wet sand seams are encountered, during periods of extended precipitation, or where excavations extend below the static groundwater level, the sides of excavations should be expected to 'slough in' to as flat as 3 horizontal to 1 vertical, or flatter. Where excavations extend below the ground water level or during the 'wet' times of the year, greater dewatering efforts should be anticipated, as well as increased excavation instability, and the contractor should expect to work in the 'wet'. Nevertheless, all excavations must comply with the current Occupational Health and Safety Act and Regulations for Construction Projects. The native sand soils encountered would be considered a Type 3 soil, as outlined in the Ontario Health and Safety Act III – Excavation. Excavation slopes steeper than those required in the Safety Act must be supported and a senior geotechnical engineer from this office should monitor the work.

As noted above the groundwater level is estimated at depths of approximately 3.5 to 4 metres, generally below the anticipated depths of construction, however some deeper excavations may extend near to below this level. Nevertheless, above the groundwater level, some infiltration of water from more permeable seams and surface runoff into the open excavations should be anticipated, however should be readily controlled using typical construction dewatering techniques for excavations above the groundwater level. Where excavations extend below the static groundwater level, increased excavation instability and groundwater infiltration should be expected. Significant infiltration of water should be expected for excavations extending below depths of about 4 metres, and as noted above, the contractor should be prepared to work in the 'wet'. It may be prudent to advance a series of test excavations in any areas of proposed deep excavations to assess first hand how groundwater levels may affect excavations operations. Surface water should be directed away from the excavations.

The base of the excavations in the native fine grained granular soils encountered in the boreholes should generally remain firm and stable above the groundwater level. Where excavations extend near to below the static groundwater level, during the 'wet' times of the year, or where left exposed to elements for extended periods of time, stabilisation of excavation bases may be required. Such stabilisation efforts may include sub-excavation of unsuitable materials, additional bedding, or 'punching' in coarse granular material or 'rip rap'. Stabilised where required, standard pipe bedding material as specified by the Ontario Provincial Standard Specification [OPSS] or Norfolk County should be satisfactory. The bedding should be well compacted to provide sufficient

support to the pipes and components (i.e. valve chambers, manholes etc.), and to minimize settlements of the roadway above the service trenches. Special attention should be paid to compaction under the pipe haunches.

We recommend that the invert elevations of any storm sewer pipes for rear yard catch basins be located above the proposed underside of footing elevations of adjacent residential structures, or that the trench excavations should be filled with 5 MPa 'lean mix' concrete product to the proposed underside of footing level where the excavations extend below an imaginary 10 horizontal to 7 vertical line extending outwards and down from a point 0.3 metres beyond the proposed townhouse foundations.

Any utility poles, light poles, etc. located within 3 metres of the top of an excavation slope should be braced to ensure their stability. Likewise, temporary support might be required for other existing above and below ground structures, including existing underground services, roadways, etc. depending on their proximity to the trench excavations.

5. BACKFILL CONSIDERATIONS

The excavated material will consist predominately of the fill and native sand soils encountered in the boreholes as described above. These soils are generally considered suitable for use as engineered fill, trench backfill, etc., provided that they are free of organics, construction debris, or other deleterious material, and that its moisture content can be controlled to within 3 per cent of its standard Proctor optimum moisture content.

It is noted that while moderately free draining, the on-site sandy soils encountered should not considered to be free draining and should not be used where this characteristic is necessary without additional assessment and testing. It is also noted that these fine grained soils will present difficulties in achieving effective compaction where access with compaction equipment is restricted. The on-site soils encountered are generally considered to be near to slightly 'dry' of their standard Proctor optimum moisture content. Some moisture conditioning may be required depending upon the weather conditions at the time of construction. It is noted that these soils will become nearly impossible to compact when wet of its optimum moisture content. Any material that becomes wet to saturated should be spread out to allow to dry, or removed and discarded, or utilised in non-settlement sensitive areas.

We note that where backfill material is placed near or slightly above its optimum moisture content, the potential for long term settlements due to the ingress of groundwater and collapse of the fill structure is reduced. Correspondingly, the shear

strength of the 'wet' backfill material is also lowered, thereby reducing its ability to support construction traffic and therefore impacting roadway construction. If the soil is well dry of its optimum value, it will appear to be very strong when compacted, but will tend to settle with time as the moisture content in the fill increases to equilibrium condition. The fine grained soils encountered may require high compaction energy to achieve acceptable densities if the moisture content is not close to its standard Proctor optimum value. It is therefore very important that the moisture content of the backfill soils be within 3 per cent of its standard Proctor optimum moisture content during placement and compaction to minimise long term subsidence [settlement] of the fill mass. Any imported fill required in service trenches or to raise the subgrade elevation should have its moisture content within 3 per cent of its optimum moisture content and meet the necessary environmental guidelines.

A representative of SOIL-MAT should be present on-site during the backfilling and compaction operations to confirm the uniform compaction of the backfill material to project specification requirements. Close supervision is prudent in areas that are not readily accessible to compaction equipment, for instance near the end of compaction 'runs'. In the event that site grading activities result in the placement of engineered fill below founding level, all structural fill should be compacted to 100 per cent of its standard Proctor maximum dry density [SPMDD]. Backfill within service trenches, areas to be paved, etc., should be placed in loose lifts not exceeding 300 millimetres in thickness and compacted to a minimum of 98 per cent of its SPMDD. The appropriate compaction equipment should be employed based on soil type, i.e. pad-toe for cohesive soils and smooth drum/vibratory plate for granular soils. A method should be developed to assess compaction efficiency employing the on-site compaction equipment and backfill materials during construction.

It is understood that the existing pond at the southwest corner of the property will be filled as part of site development. Care will be required to ensure that all saturated, organic, or otherwise unsuitable soils are removed from the base of the pond and the based assessed by a representative of SOIL-MAT ENGINEERS prior to placement of engineered fill. Depending on the depth of the pond, the contractor may encounter difficulties completely removing all of the water from the pond. If feasible, draining of the pond and placement of engineered fill in this area should be conducted during the dry summer months. The pond should be filled with a quality engineered fill compacted in accordance with the requirements noted above with monitoring and testing by a representative of SOIL-MAT ENGINEERS on a full time basis. It is understood it is proposed to make used of a crushed concrete product as engineered fill to fill the pond. This material should be crushed down into a well graded granular material and assessed by our office prior to its acceptance and use as engineered fill.

6. MANHOLES, CATCH BASINS AND THRUST BLOCKS

Properly prepared bearing surfaces for manholes, valve chambers, etc. in the native competent soils or engineered fill, stabilised where required, will be practically non-yielding under the anticipated loads. Proper preparation of the founding soils will tend to accentuate the protrusion of these structures above the pavement surface if compaction of the fill around these structures is not adequate, causing settlement of the surrounding paved surfaces. Conversely, the pavement surfaces may rise above the valve chambers and around manholes under frost action. To alleviate the potential for these types of differential movements, free-draining, non-frost susceptible material should be employed as backfill around the structures located within the paved roadway limits, and compacted to 100 per cent of its standard Proctor maximum dry density.

The thrust blocks in the native soils or quality engineered fill may be conservatively sized as recommended by the applicable Ontario Provincial Standard Specification conservatively using a horizontal allowable bearing pressure of up to 150 kPa [~3,000 psf]. Any backfill required behind the blocks should be a well-graded granular product and should be compacted to 100 per cent of its standard Proctor maximum dry density.

7. PAVEMENT STRUCTURE DESIGN CONSIDERATIONS

All areas to be paved must be cleared of all organic and otherwise unsuitable materials, and the exposed subgrade proof rolled with 3 to 4 passes of a loaded tandem-axle truck in the presence of a representative of SOIL-MAT ENGINEERS & CONSULTANTS LTD., immediately prior to the placement of the sub-base material. Any areas of distress revealed by this or other means should be subexcavated and replaced with suitable backfill material. Where the subgrade condition is poorer it may be necessary to implement more aggressive stabilisation methods, such as the use of coarse aggregate [50-millimetre clear stone, ‘rip rap’, etc.] ‘punched’ into the soft areas.

Good drainage provisions will optimise the long-term performance of the pavement structure. The subgrade must be properly crowned and shaped to promote drainage to the subdrain system. Subdrains should be installed to intercept excess subsurface water and to prevent softening of the subgrade material. Surface water should not be allowed to pond adjacent to the outer limits of the paved areas.

The most severe loading conditions on the subgrade typically occur during the course of construction, therefore precautionary measures may have to be taken to ensure that the subgrade is not unduly disturbed by construction traffic. SOIL-MAT should be given the

opportunity to review the final pavement structure design and subdrain scheme prior to construction to ensure that they are consistent with the recommendations of this report.

If construction is conducted under adverse weather conditions, additional subgrade preparation may be required. During wet weather conditions, such as during the fall and spring months, it should be anticipated that additional subgrade preparation will be required, such as additional depth of Ontario Provincial Standard Specification [OPSS] Granular 'B', Type II (crushed bedrock) sub-base material. It is also important that the sub-base and base granular layers of the pavement structure be placed as soon as possible after exposure, preparation and approval of the subgrade level.

The proposed roadways through the residential subdivision would be required to adequately support cars, trucks and intermittent delivery and garbage trucks. Where roadways are to be assumed by Norfolk County, they should conform to Norfolk County's pavement design requirements, understood to consist of 300 millimetres of OPSS Granular 'B', Type II (crushed bedrock) sub-base course, 150 millimetres of OPSS Granular 'A' base course, 50 millimetres of HL8 binder course asphaltic concrete, and 40 millimetres of HL3 surface course asphaltic concrete for local roads. This is considered a suitable pavement structure for the proposed development, provided the subgrade is good and firm prior to the placement of granular sub-base layers. If the subgrade is soft, remedial measures as discussed above may have to be implemented and/or the sub-base thickness may have to be increased. It is noted that a pit run sand and gravel Granular B Type I may be considered based on local availability. This would be considered an acceptable, cost effective alternative to a fully crushed Granular B Type II (crushed bedrock), however if utilised, the depth of Granular B Type I should be increased to a minimum of 400 millimetres. The granular sub-base and base courses and asphaltic concrete layers should be compacted to OPSS or Norfolk County requirements. A program of in-place density testing must be carried out to monitor that compaction requirements are being met. We note that this pavement structure is not to be considered as a construction roadway design.

To minimise segregation of the finished asphalt mat, the asphalt temperature must be maintained uniform throughout the mat during placement and compaction. All too often, significant temperature gradients exist in the delivered and placed asphalt with the cooler portions of the mat resisting compaction and presenting a honeycomb surface. As the spreader moves forward, a responsible member of the paving crew should monitor the pavement surface, to ensure a smooth uniform surface. The contractor can mitigate the surface segregation by 'back-casting' or scattering shovels of the full mix material over the segregated areas and raking out the coarse particles during compaction operations. Of course, the above assumes that the asphalt mix is sufficiently hot to allow the 'back-casting' to be performed.

Asphalt paving of driveways should be consistent with the general recommendations provided above. Proper preparation of the subgrade soils is essential to good long-term performance of the pavement. Likewise, sufficient depth and compaction of granular base materials and adequate drainage will be important in achieving good long-term performance, i.e. preventing/limiting premature cracking, subgrade failure, rutting, etc. It is understood that the Norfolk County standards indicate residential driveways to consist of a minimum of 150 millimetres of OPSS Granular 'A' base course, compacted to 100 percent standard Proctor maximum dry density, followed by a minimum of 50 millimetres of HL3 or HL3F asphaltic concrete, compacted to a minimum of 92 per cent of their Marshall maximum relative density [MRD].

8. HOUSE AND TOWNHOUSE CONSTRUCTION

The native soils encountered at the borehole locations are considered capable of supporting the loads associated with typical residential dwelling and townhouse structures on conventional spread footings, below any fill, organic, or otherwise unsuitable materials. This typically considers a nominal design bearing pressure of 75 kPa [~1,500 psf], however bearing pressures of up to 150 kPa [~3,000 psf] SLS and 225 kPa [~4,500 psf] ULS may be considered in the competent native soils, however it is not anticipated that such higher bearing values are required for the proposed development. The founding surfaces must be hand cleaned of any loose or disturbed material, along with any ponded water, immediately prior to placement of foundation concrete. Depending on the condition of the soil present at the founding level at the time of construction, depth of fill materials encountered, etc., some sub-excavation of unsuitable soils may be required.

In the event that site grading works or the remediation of existing unsuitable fill deposits require the placement of engineered fill below the founding elevations of the proposed structures, the general recommendations presented in the Backfill Considerations above should be strictly adhered to, with compaction to 100 per cent of its SPMDD, verified by monitoring and testing by a representative of SOIL-MAT ENGINEERS present on a full time basis. If there is a short fall in the volume of fill required, then the source of imported fill should be reviewed for gradation, Proctor value, compatibility with existing fill, environmental characteristics and be approved by this office prior to use. On a preliminary basis the design bearing capacity for footings within the engineered fill should be limited to 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] ULS, pending confirmation based on monitoring and testing of the engineered fill works.

The support conditions afforded by the native soils and/or engineered fill are generally not uniform across the building footprint, nor are the loads on the various foundation elements. As such it is recommended that consideration be given to the provision of nominal reinforcement in the footings and foundation walls to account for variable support and loading conditions. The use of nominal reinforcement is considered good construction practice as it will act to reduce the potential for cracking in the foundation walls due to minor settlements, heaving, shrinkage, etc. and will assist in resisting the pressures generated against the foundation walls by the backfill. Such nominal reinforcement is an economical approach to the reduction and prevention of costly foundation repairs after completion and later in the life of the buildings. This reinforcement would typically consist of two continuous 15M steel bars placed in the footings [directly below the foundation wall], and similarly two steel bars placed approximately 300 millimeters from the top of the foundation walls at a minimum, depending on ground conditions exposed during construction. These reinforcement bars would be bent to reinforce all corners and under basement windows, and be provided with sufficient overlap at staggered splice locations. At 'steps' in the foundations and at window locations, the reinforcing steel should transition diagonally, rather than at 90 degrees, to maintain the continuous tensile capacity of the reinforcement. Where footings are founded on, or partially on, engineered fill the above provision for nominal reinforcement would be required.

All basement foundation walls should be suitably damp proofed, including the provision of a 'dimple board' type drainage product, and provided with a perimeter drainage tile system outlet to a gravity sewer connection or positive sump pit a minimum of 150 millimetres below the basement floor slab. The clear stone material surrounding the weeping tile should be encased with a geotextile material to prevent the migration of fines from the foundation wall backfill into the clear stone product. In the event that sump pit systems are required we would recommend that the sump pump system should be constructed with an 'oversized' reservoir and a 'back-flow' prevention valve so that the sump pump will not cycle repeatedly within short time periods.

All footings exposed to the environment must be provided with a minimum of 1.2 meters of earth or equivalent insulation to protect against frost penetration. This frost protection would also be required if construction were undertaken during the winter months. All footings must be proportioned to satisfy the requirements of the Ontario Provincial Building Code.

It is imperative that a soils engineer be retained from this office to provide geotechnical engineering services during the excavation and foundation construction phases of the project. This is to observe compliance with the design concepts and recommendations

outlined in this report, and to allow changes to be made in the event that subsurface conditions differ from the conditions identified at the borehole locations.

9. ENVIRONMENTAL CONSIDERATIONS

As noted above, selected samples of the subsurface soils recovered from the boreholes were submitted to AGAT Laboratories, an independent Canadian accredited analytical laboratory for background analytical testing. Three [3] selected samples of the samples recovered from the boreholes [identified as BH1 SS3, BH3 SS1, and BH4 SS3] were submitted for background analytical testing consisting of a standard panel of metal and inorganics, and petroleum hydrocarbons [PHCs]. The purpose of this testing was to provide preliminary comments with respect to the off-site disposal of surplus soil during construction. The results of this testing are presented in the attached AGAT Certificates of Analysis [21T825888]. The results of this analytical testing has been appended to the end of this report.

The laboratory test results received in our office were compared to the applicable standard from the Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*, as follows:

- **Table 1**: Full Depth Background Site Condition Standards.
- **Table 2.1**: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition for a Residential/ Parkland/ Institutional property use, [RPI], as well as for an Industrial/ Commercial/ Community [ICC] property use.
- **Table 3.1**: Full Depth Excess Soil Quality Standards in a Non-Potable Ground Water Condition for a Residential/ Parkland/ Institutional property use, [RPI], as well as for an Industrial/ Commercial/ Community [ICC] property use.

Based on SOIL-MAT ENGINEERS' field observations and the analytical test results from AGAT, SOIL-MAT ENGINEERS has the following comments to offer:

1. The sampled material was found to meet the Table 1 [RPI/ICC] Standards for all parameters tested.
2. The submitted samples were found to meet the Table 2.1 and 3.1 [RPI] Standards for the tested parameters.
3. The submitted samples were found to meet the Table 2.1 and 3.1 [ICC] Standards for the tested parameters.

4. The samples secured for analytical testing are believed to be representative of the soil conditions at the borehole locations only. If any significant changes are noted, i.e., odours, staining etc., SOIL-MAT should be contacted to reassess the environmental characteristics of the soil.

Given the above test results the following disposal options are applicable under Regulation 406/19, as amended:

- As the tested material has been shown to meet the Table 1 [RPI/ICC] Standards, surplus material may reasonably be accepted at an off-site Table 1 property, including a property subject to a Record of Site Condition or MECP Certificate of Authorisation, subject to approval of the receiving property owner or designated Qualified Person [QP].
- As the test results for the submitted sample was found to meet the Table 2.1 and 3.1 [RPI] Standards, surplus materials may reasonably be accepted at an off site RPI property in a potable or non-potable groundwater conditions, subject to approval of the receiving property owner/QP;
- As the sampled material was found to meet the Table 2.1 and 3.1 [ICC] Standards, surplus material may reasonably be accepted at an off-site ICC property in a potable or non-potable groundwater condition, subject to approval of the receiving property owner/QP.
- Depending on the volume of surplus soil to be handled, as well as the environmental requirements of the receiving site, additional testing may be required.
- Excavated soil may be reused on site.

10. SOIL IMPORT/EXPORT CONSIDERATIONS

It is anticipated that the proposed development will require import of some volume of soil as part of grading activities, filling the existing pond with engineered fill, etc. Ontario Regulation has recently come into effect, which governs the management of excess soils during construction. Where soil import is required, the import operations would require strict monitoring and control via the implementation of a Fill Management Plan, including pre-screening of potential source sites.

In the event that site development requires export of some volume of surplus soil from the site as part of grading activities, foundation construction etc. the management of excess soils requires the developer to conduct an assessment of the subject site, along with rigorous sampling and analysis based, based on volume of surplus soil generated, to support acceptance at an off-site location. Such testing can be conducted once development details have been finalised, based on volume of surplus soils to be generated, as well as the results of the Assessment of Past Uses, or a Phase One ESA, if available. Regardless of import or export volumes, SOIL-MAT ENGINEERS may be retained to provide such services, to ensure the operations are conducted in accordance with Ontario Regulation 406/19.

11. GENERAL COMMENTS

The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SOIL-MAT ENGINEERS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Evan Chambers, B.Eng., EIT.

Kyle Richardson, P. Eng.
Project Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Log of Borehole Nos. 1 to 6, inclusive
Drawing No. 2, Recommended Design Requirements for Basement Construction
AGAT Certificate of Analyses [21T825888]

Distribution: 2525228 Ontario Ltd [1, plus pdf]

LEGEND

BH# Borehole Location

TBM Temporary Benchmark
Top of manhole cover.
Assigned Elevation of 100.00 metres

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 302104-G.

2. Proposed Borehole locations are approximate and Subject to change.

SOIL-MAT
ENGINEERS & CONSULTANTS LTD.

Proposed Townhouse Development
Old Highway 24 & Lam Boulevard
Waterford, Ontario

Proposed Borehole Location Plan

Project No. SM 302104-G

Date: November 2021

Drawn: NS

SM 302104-G Borehole Location Plan

Drawing No. 1

Log of Borehole No. 01

Project No: SM 302104-G
Project: Proposed Townhouse Development
Location: Old Hwy 24 and Lam Blvd, Waterford
Client: 2525228 Ontario Ltd.

Project Manager: Ian Shaw, P.Eng
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4752173
E: 558186

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	100.02	Ground Surface								
0 / 0	99.70	**Topsoil** Approximately 300 millimetres of topsoil.								
1 / 0 – 4 / 1		**Sand Fill** Brown, some organic staining in the upper levels, trace silt, trace clay, very loose to loose.		SS	1	3,3,4,5	7			
				SS	2	2,1,1,2	2			
6 / 2				SS	3	2,2,4,3	6			
9 / 3				SS	4	2,1,1,1	2			
11 / 3				SS	5	1,1,1,1	2			
13 / 4	95.90	**Sand** Brown, wet below this depth, trace gravel, trace silt, trace clay, very loose to compact.								
16 / 5				SS	6	6,11,11,12	22			
20 / 6				SS	7	4,5,6,9	11			
22 / 7	93.30	End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on November 3, 2021 to termination at a depth of 6.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 4.6 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

November 25: 3.40 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: November 3, 2021
Hole Size: 200 Millimetres
Drilling Contractor: Elements Geo

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T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Temporary Benchmark
Field Logged by: NS
Checked by: IS
Sheet: 1 of 1

Log of Borehole No. 02

Project No: SM 302104-G
Project: Proposed Townhouse Development
Location: Old Hwy 24 and Lam Blvd, Waterford
Client: 2525228 Ontario Ltd.

Project Manager: Ian Shaw, P.Eng
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4752096
E: 558262

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
	100.85	Ground Surface								
0 / 0	100.50	**Topsoil** Approximately 300 millimetres of topsoil.								
		Sand Fill Brown, some organic staining in the upper levels, trace silt, trace clay, trace cobbles, very loose.		SS	1	3,1,1,1	2			
1 / 0				SS	2	50/1"	100			
2 / 1				SS	3	3,3,2,2	5			
3 / 1				SS	4	1,1,1,1	2			
4 / 1				SS	5	1,1,1,1	2			
13 / 4	96.70	**Sand** Brown, wet below this depth, trace silt, trace clay, trace gravel, loose to compact.								
16 / 5				SS	6	9,10,12,11	22			
20 / 6										
21 / 6				SS	7	4,11,14,14	25			
22 / 7	94.10	End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on November 3, 2021 to termination at a depth of 6.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 3.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

November 25: 4.09 metres below ground surface.
December 2: 4.09 metres below ground

Drill Method: Hollow Stem Augers
Drill Date: November 3, 2021
Hole Size: 200 Millimetres
Drilling Contractor: Elements Geo

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Log of Borehole No. 03

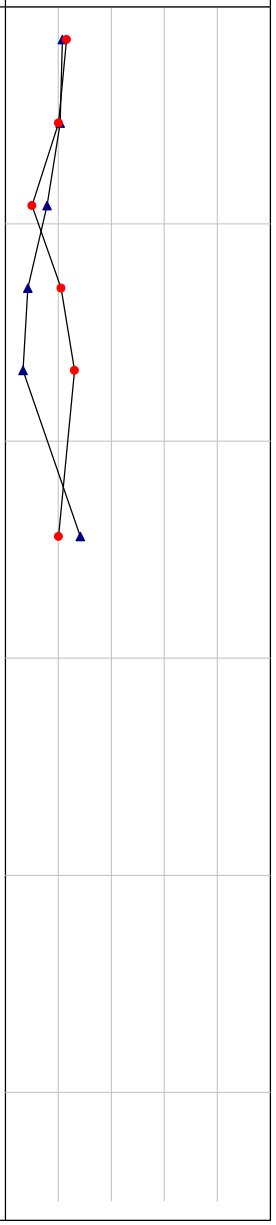
Project No: SM 302104-G
Project: Proposed Townhouse Development
Location: Old Hwy 24 and Lam Blvd, Waterford
Client: 2525228 Ontario Ltd.

Project Manager: Ian Shaw, P.Eng
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4752116
E: 558247

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
ft 0 / m 0	100.85		Ground Surface								
0 / 0	100.55		**Topsoil** Approximately 300 millimetres of topsoil.		SS	1	4,11,12,12	23			
3 / 1			**Sand** Brown, some organic staining in upper levels, trace silt, clay and gravel, compact.		SS	2	8,10,10,8	20			
6 / 2					SS	3	5,5,5,8	10			
9 / 3					SS	4	5,9,12,14	21			
11 / 3					SS	5	8,12,14,13	26			
16 / 5	95.60		End of Borehole		SS	6	10,10,10,10	20			

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on November 3, 2021 to termination at a depth of 5.2 metres.

2. Borehole was recorded as open and 'wet' at a depth of 3.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Hollow Stem Augers
Drill Date: November 3, 2021
Hole Size: 200 Millimetres
Drilling Contractor: Elements Geo

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Log of Borehole No. 04

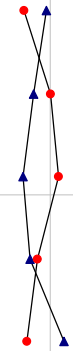
Project No: SM 302104-G
Project: Proposed Townhouse Development
Location: Old Hwy 24 and Lam Blvd, Waterford
Client: 2525228 Ontario Ltd.

Project Manager: Ian Shaw, P.Eng
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4752147
E: 558210

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
ft / m	100.14		Ground Surface								
0 / 0	99.90		**Topsoil** Approximately 200 millimetres of topsoil.								
1 / 0			**Silty Sand/Sand** Brown, reworked in the upper levels, trace silt, trace clay, wet in the lower levels, loose to compact.		SS	1	4,5,5,4	10			
3 / 1					SS	2	7,8,12,13	20			
6 / 2					SS	3	10,10,13,14	23			
9 / 3					SS	4	7,7,8,7	15			
11 / 3	96.50				SS	5	5,5,6,7	11			
12 / 4			End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on November 3, 2021 to termination at a depth of 3.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 3.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: November 3, 2021
Hole Size: 150 Millimetres
Drilling Contractor: Elements Geo

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Log of Borehole No. 05

Project No: SM 302104-G
Project: Proposed Townhouse Development
Location: Old Hwy 24 and Lam Blvd, Waterford
Client: 2525228 Ontario Ltd.

Project Manager: Ian Shaw, P.Eng
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4752147
E: 558210

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	99.64		Ground Surface								
0 / 0	99.40		**Topsoil** Approximately 200 millimetres of topsoil.								
1 / 0			**Sand** Brown, reworked in the upper levels, trace silt, trace clay, wet in the lower levels, compact.		SS	1	3,5,6,6	11			
3 / 1					SS	2	6,8,9,13	17			
6 / 2					SS	3	9,14,14,16	28			
9 / 3					SS	4	5,5,6,8	11			
11 / 3					SS	5	6,12,17,13	29			
12 / 4	96.00		End of Borehole								

NOTES:

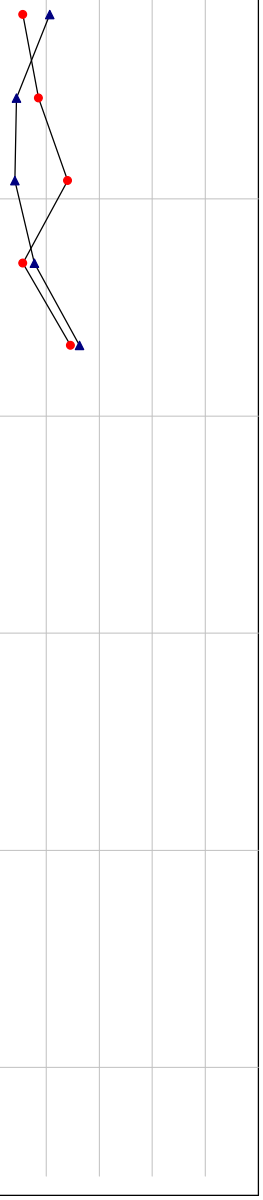
1. Borehole was advanced using solid stem auger equipment on November 3, 2021 to termination at a depth of 3.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 3.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Moisture Content w%: 10 20 30 40

Standard Penetration Test blows/300mm: 20 40 60 80



Drill Method: Solid Stem Augers
Drill Date: November 3, 2021
Hole Size: 150 Millimetres
Drilling Contractor: Elements Geo

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Log of Borehole No. 06

Project No: SM 302104-G
Project: Proposed Townhouse Development
Location: Old Hwy 24 and Lam Blvd, Waterford
Client: 2525228 Ontario Ltd.

Project Manager: Ian Shaw, P.Eng
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4752161
E: 558193

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	99.69	Ground Surface								
0 / 0		**Topsoil** Approximately 200 millimetres of topsoil.								
3 / 1		**Sand** Brown, reworked in the upper levels, trace silt, trace clay, compact.		SS	1	5,5,7,6	12			
5 / 1				SS	2	10,10,14,16	24			
7 / 2				SS	3	11,12,13,14	25			
9 / 3				SS	4	7,8,8,9	16			
11 / 3				SS	5	2,5,9,12	14			
12 / 4	96.00	End of Borehole								

NOTES:

1. Borehole was advanced using solid stem auger equipment on November 3, 2021 to termination at a depth of 3.7 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

Drill Method: Solid Stem Augers
Drill Date: November 3, 2021
Hole Size: 150 Millimetres
Drilling Contractor: Elements Geo

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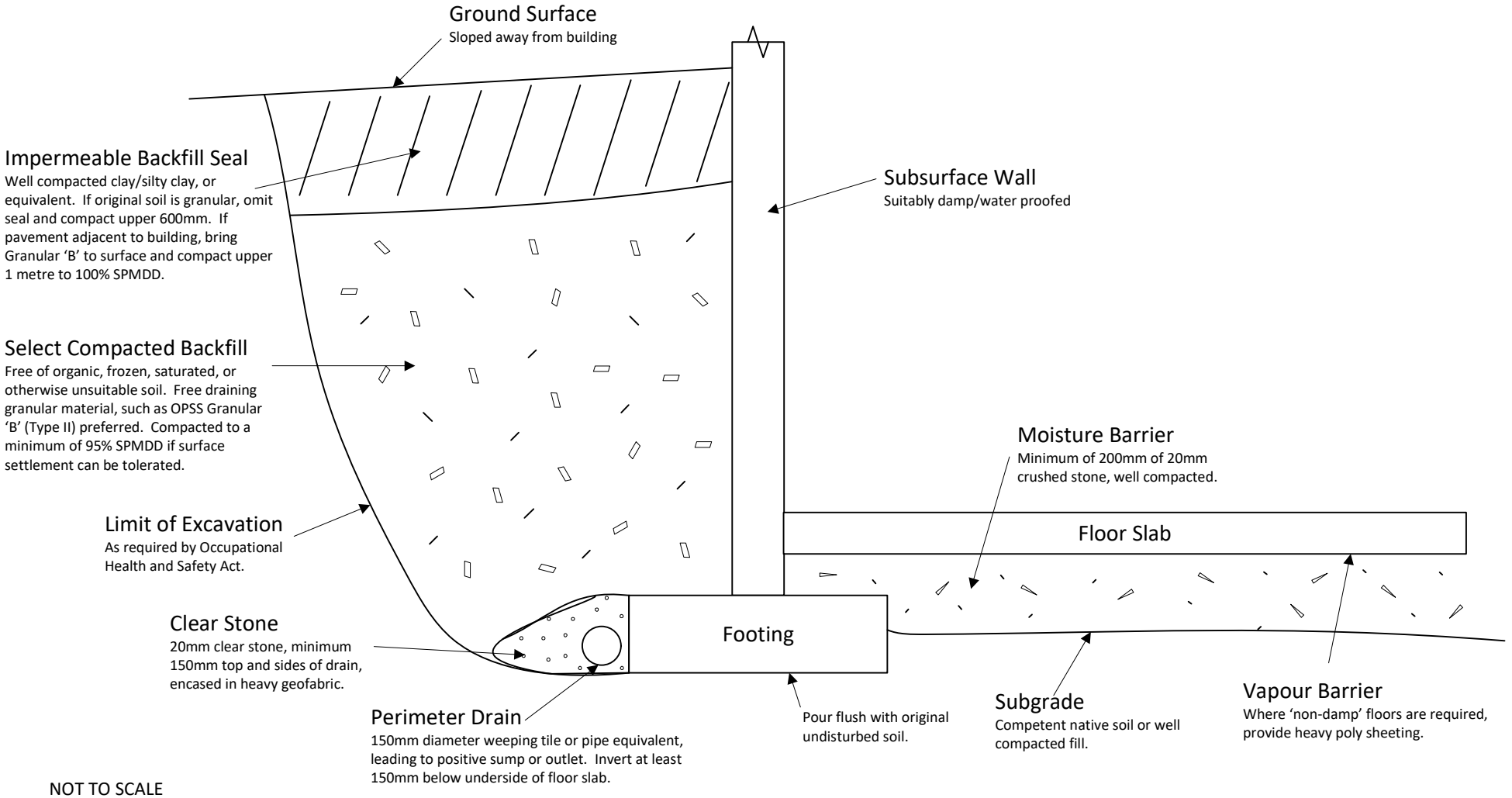

NOT TO SCALE

Soil-Mat

Soil-Mat Engineers & Consultants Ltd.

Project No.:	SM 302104-G
Date:	December 2021

Typical Design Requirements
Drainage and Backfill for Basement Walls

Drawing No. 2

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT
130 LANCING DRIVE
HAMILTON, ON L8W3A1
(905) 318-7440

ATTENTION TO: Malcolm Craig

PROJECT: 302104

AGAT WORK ORDER: 21T825888

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Nov 10, 2021

PAGES (INCLUDING COVER): 10

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21T825888

PROJECT: 302104

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

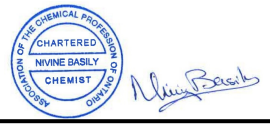
O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-11-04

DATE REPORTED: 2021-11-10

		SAMPLE DESCRIPTION:		BH1SS3	BH3SS1	BH4SS3
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2021-11-03	2021-11-03	2021-11-03
Parameter	Unit	G / S	RDL	3170855	3170859	3170861
Antimony	µg/g	1.3	0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	2	3	2
Barium	µg/g	220	2.0	21.4	29.0	13.2
Beryllium	µg/g	2.5	0.4	<0.4	<0.4	<0.4
Boron	µg/g	36	5	<5	<5	<5
Boron (Hot Water Soluble)	µg/g	NA	0.10	<0.10	0.22	<0.10
Cadmium	µg/g	1.2	0.5	<0.5	<0.5	<0.5
Chromium	µg/g	70	5	12	10	<5
Cobalt	µg/g	21	0.5	3.2	3.3	1.6
Copper	µg/g	92	1.0	6.0	10.7	5.9
Lead	µg/g	120	1	5	10	3
Molybdenum	µg/g	2	0.5	<0.5	<0.5	<0.5
Nickel	µg/g	82	1	7	8	4
Selenium	µg/g	1.5	0.8	<0.8	<0.8	<0.8
Silver	µg/g	0.5	0.5	<0.5	<0.5	<0.5
Thallium	µg/g	1	0.5	<0.5	<0.5	<0.5
Uranium	µg/g	2.5	0.50	<0.50	<0.50	<0.50
Vanadium	µg/g	86	0.4	32.1	17.3	7.0
Zinc	µg/g	290	5	25	43	18
Chromium, Hexavalent	µg/g	0.66	0.2	<0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	0.57	0.005	0.062	0.147	0.068
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	2.4	N/A	0.123	0.166	0.088
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.20	7.60	7.86

Certified By:



AGAT Laboratories

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AGAT WORK ORDER: 21T825888

PROJECT: 302104

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

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SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-11-04 **DATE REPORTED: 2021-11-10**

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3170855-3170861 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 21T825888

PROJECT: 302104

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2021-11-04

DATE REPORTED: 2021-11-10

		SAMPLE DESCRIPTION:		BH1SS3	BH3SS1	BH4SS3
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2021-11-03	2021-11-03	2021-11-03
Parameter	**Unit**	**G / S**	**RDL**	**3170855**	**3170859**	**3170861**
Benzene	µg/g	0.02	0.02	<0.02	<0.02	<0.02
Toluene	µg/g	0.2	0.05	<0.05	<0.05	<0.05
Ethylbenzene	µg/g	0.05	0.05	<0.05	<0.05	<0.05
m & p-Xylene	µg/g		0.05	<0.05	<0.05	<0.05
o-Xylene	µg/g		0.05	<0.05	<0.05	<0.05
Xylenes (Total)	µg/g	0.05	0.05	<0.05	<0.05	<0.05
F1 (C6 - C10)	µg/g	25	5	<5	<5	<5
F1 (C6 to C10) minus BTEX	µg/g	25	5	<5	<5	<5
F2 (C10 to C16)	µg/g	10	10	<10	<10	<10
F3 (C16 to C34)	µg/g	240	50	<50	<50	<50
F4 (C34 to C50)	µg/g	120	50	<50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g	120	50	NA	NA	NA
Moisture Content	%		0.1	17.2	9.6	4.1
Surrogate	**Unit**	**Acceptable Limits**				
Toluene-d8	% Recovery	60-140		90	88	105
Terphenyl	%	60-140		70	94	69

Certified By: NPopowich

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 21T825888

PROJECT: 302104

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2021-11-04 **DATE REPORTED: 2021-11-10**

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3170855-3170861 Results are based on sample dry weight.
The C6-C10 fraction is calculated using Toluene response factor.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX contribution.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.
Quality Control Data is available upon request.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: 

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Quality Assurance

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T825888

PROJECT: 302104

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Nov 10, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	3166927		<0.8	<0.8	NA	< 0.8	104%	70%	130%	110%	80%	120%	111%	70%	130%
Arsenic	3166927		<1	1	NA	< 1	100%	70%	130%	108%	80%	120%	109%	70%	130%
Barium	3166927		7.1	7.2	NA	< 2.0	105%	70%	130%	105%	80%	120%	111%	70%	130%
Beryllium	3166927		<0.4	<0.4	NA	< 0.4	101%	70%	130%	112%	80%	120%	111%	70%	130%
Boron	3166927		<5	<5	NA	< 5	93%	70%	130%	98%	80%	120%	87%	70%	130%
Boron (Hot Water Soluble)	3173737		0.19	0.18	NA	< 0.10	93%	60%	140%	108%	70%	130%	96%	60%	140%
Cadmium	3166927		<0.5	<0.5	NA	< 0.5	124%	70%	130%	107%	80%	120%	110%	70%	130%
Chromium	3166927		<5	<5	NA	< 5	104%	70%	130%	96%	80%	120%	93%	70%	130%
Cobalt	3166927		1.0	1.1	NA	< 0.5	106%	70%	130%	96%	80%	120%	94%	70%	130%
Copper	3166927		1.9	1.8	NA	< 1.0	99%	70%	130%	97%	80%	120%	94%	70%	130%
Lead	3166927		2	2	NA	< 1	95%	70%	130%	89%	80%	120%	90%	70%	130%
Molybdenum	3166927		<0.5	<0.5	NA	< 0.5	100%	70%	130%	101%	80%	120%	105%	70%	130%
Nickel	3166927		2	2	NA	< 1	103%	70%	130%	106%	80%	120%	103%	70%	130%
Selenium	3166927		<0.8	<0.8	NA	< 0.8	96%	70%	130%	96%	80%	120%	101%	70%	130%
Silver	3166927		<0.5	<0.5	NA	< 0.5	109%	70%	130%	109%	80%	120%	112%	70%	130%
Thallium	3166927		<0.5	<0.5	NA	< 0.5	93%	70%	130%	110%	80%	120%	110%	70%	130%
Uranium	3166927		0.59	0.70	NA	< 0.50	97%	70%	130%	110%	80%	120%	109%	70%	130%
Vanadium	3166927		4.7	4.9	3.8%	< 0.4	110%	70%	130%	90%	80%	120%	92%	70%	130%
Zinc	3166927		9	8	NA	< 5	108%	70%	130%	111%	80%	120%	108%	70%	130%
Chromium, Hexavalent	3168179		<0.2	<0.2	NA	< 0.2	92%	70%	130%	87%	80%	120%	73%	70%	130%
Cyanide, Free	3175392		<0.040	<0.040	NA	< 0.040	98%	70%	130%	110%	80%	120%	101%	70%	130%
Mercury	3166927		<0.10	<0.10	NA	< 0.10	125%	70%	130%	116%	80%	120%	118%	70%	130%
Electrical Conductivity (2:1)	3173737		0.137	0.136	0.8%	< 0.005	108%	80%	120%						
Sodium Adsorption Ratio (2:1) (Calc.)	3173961		10.1	10.8	6.1%	NA									
pH, 2:1 CaCl2 Extraction	3170861	3170861	7.86	7.84	0.3%	NA	101%	80%	120%						

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By:

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Quality Assurance

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T825888

PROJECT: 302104

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Nov 10, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PHCs F1 - F4 (Soil)															
Benzene	3170969		< 0.02	< 0.02	NA	< 0.02	95%	60%	140%	82%	60%	140%	98%	60%	140%
Toluene	3170969		< 0.05	< 0.05	NA	< 0.05	80%	60%	140%	95%	60%	140%	96%	60%	140%
Ethylbenzene	3170969		< 0.05	< 0.05	NA	< 0.05	99%	60%	140%	89%	60%	140%	82%	60%	140%
m & p-Xylene	3170969		< 0.05	< 0.05	NA	< 0.05	90%	60%	140%	96%	60%	140%	99%	60%	140%
o-Xylene	3170969		< 0.05	< 0.05	NA	< 0.05	91%	60%	140%	83%	60%	140%	93%	60%	140%
F1 (C6 - C10)	3170969		< 5	< 5	NA	< 5	100%	60%	140%	103%	60%	140%	80%	60%	140%
F2 (C10 to C16)	3170861	3170861	< 10	< 10	NA	< 10	117%	60%	140%	114%	60%	140%	113%	60%	140%
F3 (C16 to C34)	3170861	3170861	< 50	< 50	NA	< 50	133%	60%	140%	79%	60%	140%	71%	60%	140%
F4 (C34 to C50)	3170861	3170861	< 50	< 50	NA	< 50	106%	60%	140%	121%	60%	140%	62%	60%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: N Popnikolof

AGAT Laboratories

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Method Summary

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T825888

PROJECT: 302104

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

AGAT Laboratories

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Method Summary

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T825888

PROJECT: 302104

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Toluene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Ethylbenzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
m & p-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
o-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Xylenes (Total)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
F1 (C6 - C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	P&T GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID

AGAT Laboratories

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Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: Soil-Mat
Contact:
Address:
Phone: Fax:
Reports to be sent to:
1. Email: Malcolm Craig
2. Email: Ian Shaw

Project Information:

Project: 302104
Site Location: Waterford, Ont
Sampled By: NS
AGAT ID #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☒ No ☐
Company:
Contact:
Address:
Email:

Regulatory Requirements:

(Please check all applicable boxes)

- ☒ Regulation 153/04 — Table 1 (Indicate One) — ☐ Ind/Com ☐ Res/Park ☐ Agriculture — Soil Texture (Check One): ☐ Coarse ☐ Fine
- ☐ Excess Soils R406 — Table (Indicate One)
- ☐ Regulation 558
- ☐ CCME
- ☐ Sewer Use ☐ Sanitary ☐ Storm — Region
- ☐ Prov. Water Quality Objectives (PWQO)
- ☐ Other — Indicate One

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Laboratory Use Only

Work Order #: 21T825888

Cooler Quantity:
Arrival Temperatures: 8 | 6.2 | 7.5
6.9 | 7.3 | 6.8
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
Notes: ICE PAK

Turnaround Time (TAT) Required:

Regular TAT (Most Analysis) ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	BTEX, F1-F4 PHCs — Analyze F4G if required ☐ Yes ☐ No	PAHs	Total PCBs ☐ Aroclor	VOC	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Excess Soils SPLP Rainwater Leach — SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	Excess Soils Characterization Package: pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	Potentially Hazardous or High Concentration (Y/N)
BH1SS3	Nov 3	AM/PM	3	S			X		X								
BH3SS1	1	AM/PM	1	1			X		X								
BH4SS3		AM/PM					X		X								
		AM/PM															
		AM/PM															
		AM/PM															
		AM/PM															
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		AM/PM															
		AM/PM															
		AM/PM															

Samples Relinquished By (Print Name and Sign):	Date: Nov 4 2021	Time: 1:43pm	Samples Received By (Print Name and Sign):	Date: 11/4/21 Time: 1:45
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Page ____ of ____

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APPENDIX D

ADS StormTech Chamber Drawings & Specifications

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
VISIT OUR APP

2024.02.27 20-128 ORCHARD SQUARE

WATERFORD, ON, CANADA

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 75 mm (3").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm)..
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
11. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

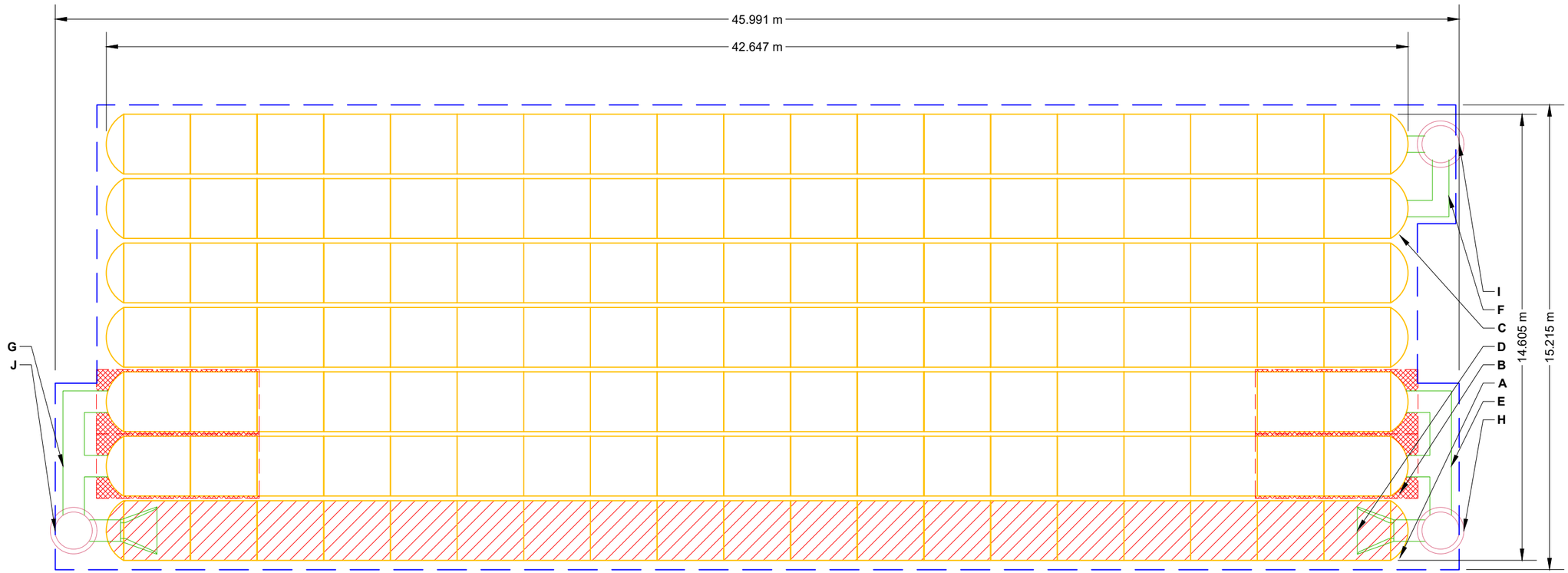
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		PROPOSED ELEVATIONS:	
133	STORMTECH MC-3500 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	245.181
14	STORMTECH MC-3500 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	243.353
500	STONE ABOVE (mm)	TOP OF STONE:	243.243
300	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	243.200
40	STONE VOID	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	243.200
783.8	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	243.200
		TOP OF MC-3500 CHAMBER:	242.743
		600 mm x 600 mm TOP MANIFOLD INVERT:	241.968
		600 mm x 600 mm TOP MANIFOLD INVERT:	241.968
679.7	SYSTEM AREA (m^2)	600 mm ISOLATOR ROW PLUS INVERT:	241.652
124.9	SYSTEM PERIMETER (m)	600 mm ISOLATOR ROW PLUS INVERT:	241.652
		450 mm x 450 mm BOTTOM MANIFOLD INVERT:	241.645
		450 mm BOTTOM CONNECTION INVERT:	241.645
		BOTTOM OF MC-3500 CHAMBER:	241.600
		BOTTOM OF STONE:	241.300

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	600 mm BOTTOM CORED END CAP, PART#: MC3500IEPP24BC / TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	52 mm	
PREFABRICATED END CAP	B	600 mm TOP CORED END CAP, PART#: MC3500IEPP24TC / TYP OF ALL 600 mm TOP CONNECTIONS	368 mm	
PREFABRICATED END CAP	C	450 mm BOTTOM CORED END CAP, PART#: MC3500IEPP18BC / TYP OF ALL 450 mm BOTTOM CONNECTIONS	45 mm	
FLAMP	D	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: MCFLAMP (TYP 2 PLACES)		
MANIFOLD	E	600 mm x 600 mm TOP MANIFOLD, ADS N-12	368 mm	
MANIFOLD	F	450 mm x 450 mm BOTTOM MANIFOLD, ADS N-12	45 mm	
MANIFOLD	G	600 mm x 600 mm TOP MANIFOLD, ADS N-12	368 mm	
CONCRETE STRUCTURE	H	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		481 L/s IN
CONCRETE STRUCTURE	I	OCS (DESIGN BY ENGINEER / PROVIDED BY OTHERS)		227 L/s OUT
CONCRETE STRUCTURE	J	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		481 L/s IN



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 5.334 m OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

2024.02.27 20-128 ORCHARD SQUARE
WATERFORD, ON, CANADA

DRAWN: NB | CHECKED: N/A
DATE: | PROJECT #:

DATE	DRW	CHK	DESCRIPTION

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

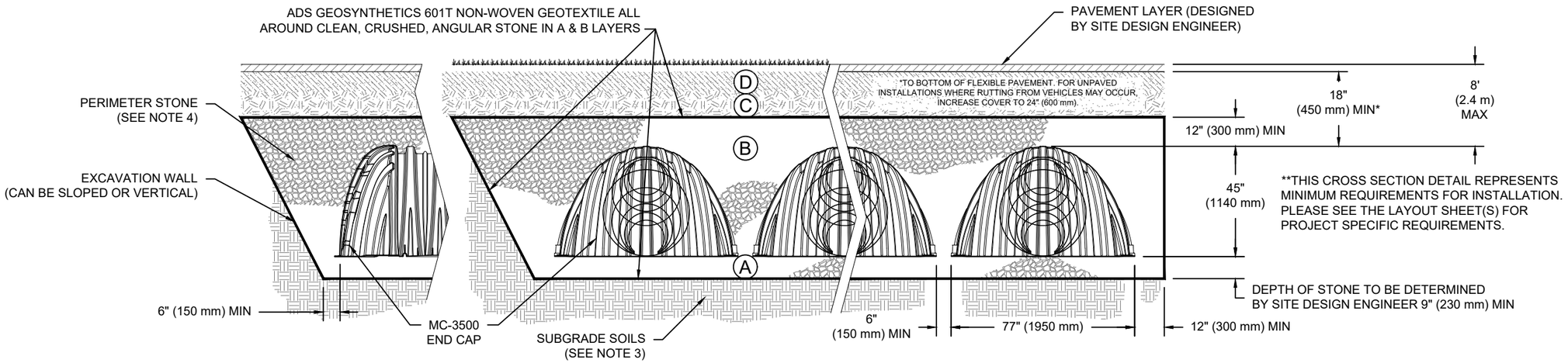
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 150

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

2024.02.27 20-128 ORCHARD SQUARE
WATERFORD, ON, CANADA
DRAWN: NB
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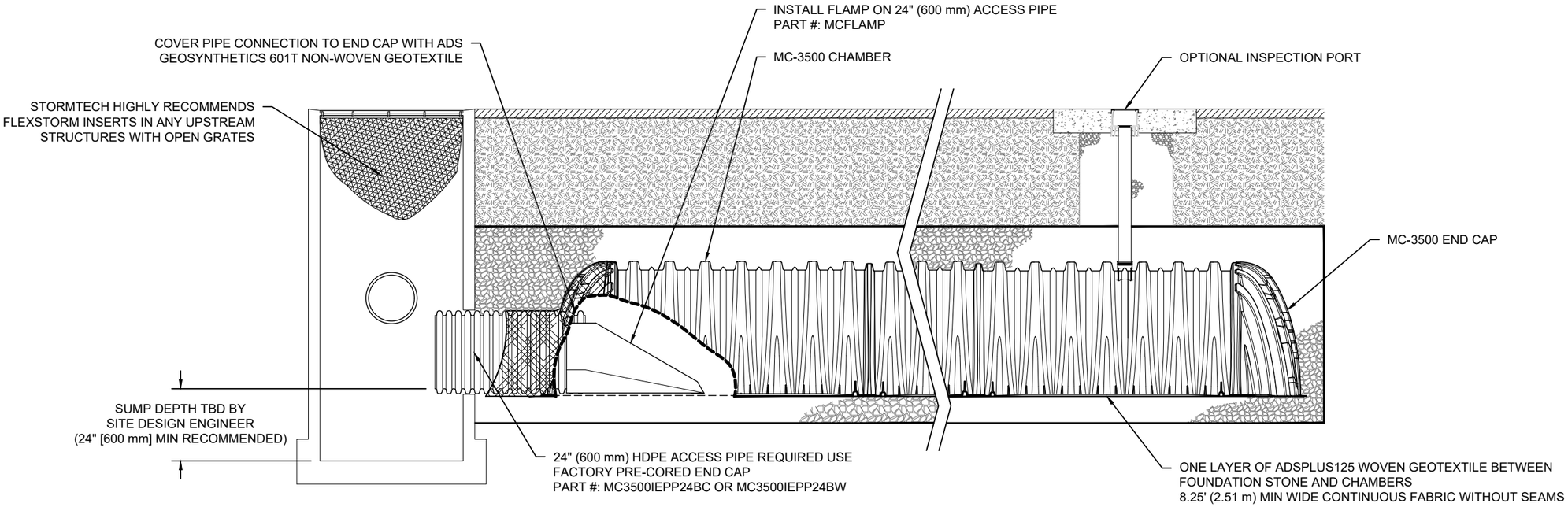
StormTech® Chamber System
888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473



MC-3500 ISOLATOR ROW PLUS DETAIL
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INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

2024.02.27 20-128 ORCHARD SQUARE
WATERFORD, ON, CANADA

DATE: | DRAWN: NB
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4640 TRUEMAN BLVD
HILLIARD, OH 43026
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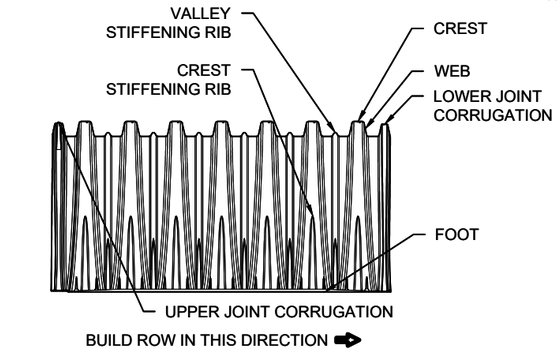
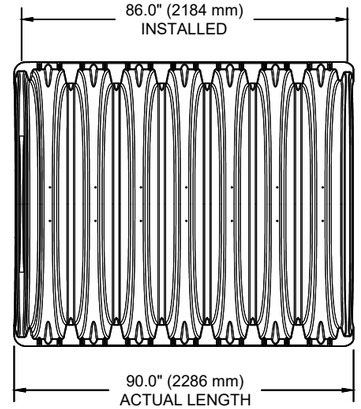
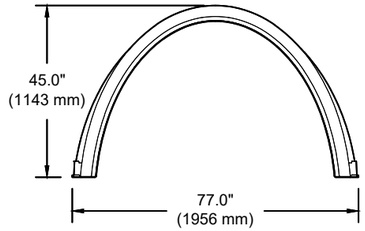
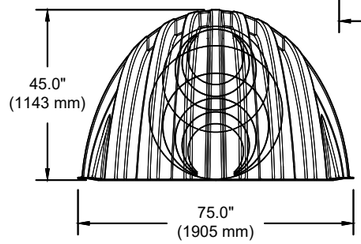
MC-3500 TECHNICAL SPECIFICATION

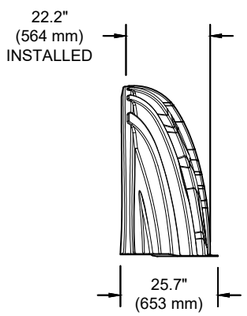
NTS











NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	175.0 CUBIC FEET	(4.96 m³)
WEIGHT	134 lbs.	(60.8 kg)

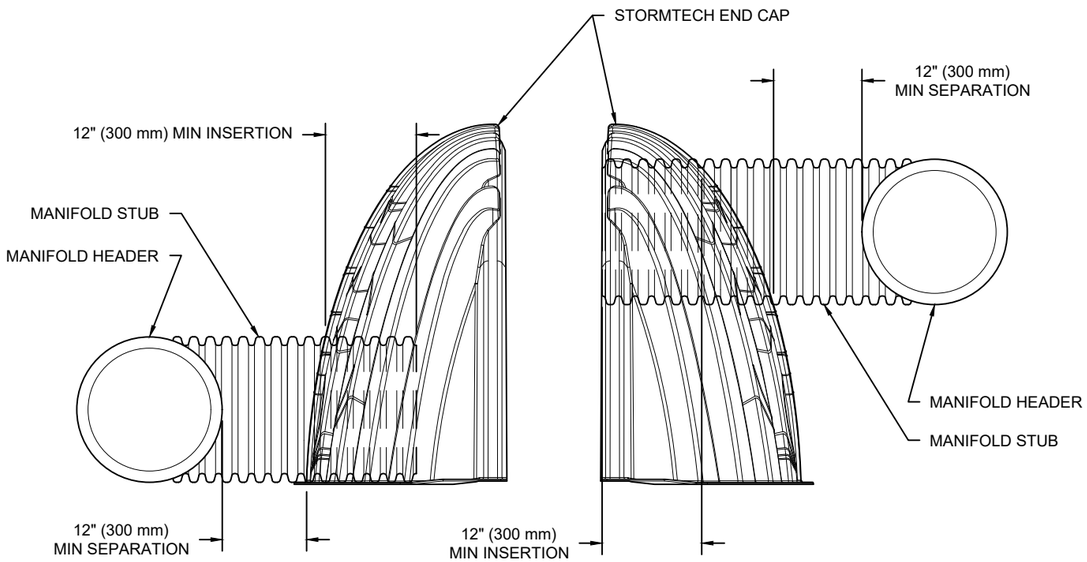
NOMINAL END CAP SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	75.0" X 45.0" X 22.2"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET	(1.28 m³)
WEIGHT	49 lbs.	(22.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION, 6" SPACING BETWEEN CHAMBERS, 6" (152 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY

MC-SERIES END CAP INSERTION DETAIL

NTS

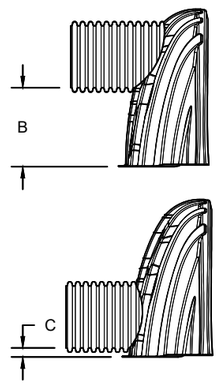


NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18TW			
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP18BW			
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24TW			
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP24BW			
MC3500IEPP30BC	30" (750 mm)	---	2.75" (70 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

2024.02.27 20-128 ORCHARD SQUARE
WATERFORD, ON, CANADA

DATE: | DRAWN: NB | CHECKED: N/A
PROJECT #:

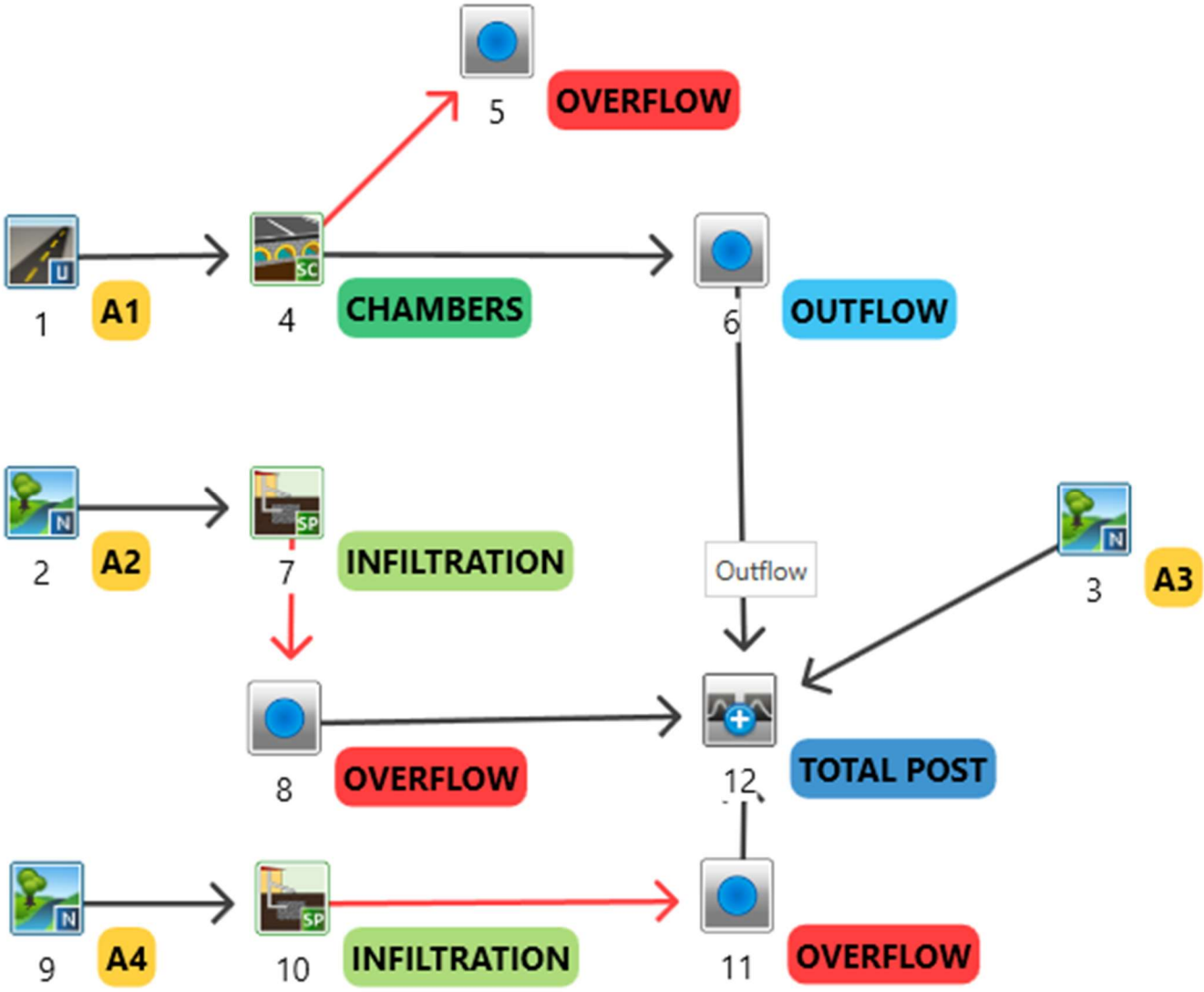
DESCRIPTION	CHK	DRW	DATE

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

APPENDIX E

Visual OTTHYMO Summary Outputs

20-128 ORCHARD SQUARE
POST-DEVELEPMENT OTTHYMO MODEL



2-YEAR STORM

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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  Output  filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-
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  Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-
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DATE: 07/09/2024                          TIME: 03:34:10

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 01_2-Year Norfolk             **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 529.711
| Ptotal= 35.21 mm |                          B=   4.501
--------------------                          C=   0.745
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.68 |  1.00   17.69 |  2.00    5.90 |  3.00    3.14
                0.17    3.04 |  1.17   72.24 |  2.17    5.09 |  3.17    2.94
                0.33    3.53 |  1.33   22.78 |  2.33    4.50 |  3.33    2.76
                0.50    4.26 |  1.50   12.62 |  2.50    4.04 |  3.50    2.60
                0.67    5.49 |  1.67    8.98 |  2.67    3.68 |  3.67    2.47
                0.83    8.02 |  1.83    7.08 |  2.83    3.39 |  3.83    2.35

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   1.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  93.00   Dir. Conn.(%)=  93.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.03         0.08
     Dep. Storage     (mm)=       1.00        16.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      86.02        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.68 | 1.083   17.69 | 2.083    5.90 |  3.08    3.14
               0.167    2.68 | 1.167   17.69 | 2.167    5.90 |  3.17    3.14
               0.250    3.04 | 1.250   72.24 | 2.250    5.09 |  3.25    2.94
               0.333    3.04 | 1.333   72.24 | 2.333    5.09 |  3.33    2.94
               0.417    3.53 | 1.417   22.78 | 2.417    4.50 |  3.42    2.76
               0.500    3.53 | 1.500   22.78 | 2.500    4.50 |  3.50    2.76
               0.583    4.26 | 1.583   12.62 | 2.583    4.04 |  3.58    2.60
               0.667    4.26 | 1.667   12.62 | 2.667    4.04 |  3.67    2.60
               0.750    5.49 | 1.750    8.98 | 2.750    3.68 |  3.75    2.47
               0.833    5.49 | 1.833    8.98 | 2.833    3.68 |  3.83    2.47
               0.917    8.02 | 1.917    7.08 | 2.917    3.39 |  3.92    2.35
               1.000    8.02 | 2.000    7.08 | 3.000    3.39 |  4.00    2.35

     Max.Eff.Inten.(mm/hr)=      72.24         1.16
               over (min)        5.00        10.00
     Storage Coeff.  (min)=      2.66 (ii)    5.51 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.29         0.16
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.20         0.00          0.204 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.58           1.33
     RUNOFF VOLUME    (mm)=     34.21         1.73          31.94
     TOTAL RAINFALL   (mm)=     35.21        35.21          35.21
     RUNOFF COEFFICIENT   =      0.97         0.05           0.91

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.

       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
------------------
| CHAMBER(  0004)|  OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: ON
|IN= 2--> OUT= 3 |  CHAMBER:
| DT=  5.0 min   |  MAX STO VOL (cu.m.)=  776.77  Bottom Area(m2)   =  679.72
------------------
                        DEPTH       STORAGE          |   DEPTH      STORAGE
                        (mm)        (cu.m.)          |   (mm)       (cu.m.)
                          0.00          0.00         |    991.00       467.67
                         25.00          6.90         |   1016.00       480.03
                         51.00         13.81         |   1041.00       492.21
                         76.00         20.71         |   1067.00       504.21
                        102.00         27.62         |   1092.00       515.99
                        127.00         34.52         |   1118.00       527.56
                        152.00         41.43         |   1143.00       538.89
                        178.00         48.33         |   1168.00       549.97
                        203.00         55.23         |   1194.00       560.77
                        229.00         62.14         |   1219.00       571.26
                        254.00         69.04         |   1245.00       581.41
                        279.00         75.95         |   1270.00       591.17
                        305.00         90.92         |   1295.00       600.42
                        330.00        105.81         |   1321.00       608.89
                        356.00        120.66         |   1346.00       616.72
                        381.00        135.46         |   1372.00       624.30
                        406.00        150.21         |   1397.00       631.65
                        432.00        164.91         |   1422.00       638.68
                        457.00        179.55         |   1448.00       645.59
                        483.00        194.14         |   1473.00       652.49
                        508.00        208.66         |   1499.00       659.39
                        533.00        223.12         |   1524.00       666.30
                        559.00        237.51         |   1549.00       673.20
                        584.00        251.83         |   1575.00       680.11
                        610.00        266.08         |   1600.00       687.01
                        635.00        280.25         |   1626.00       693.92
                        660.00        294.33         |   1651.00       700.82
                        686.00        308.33         |   1676.00       707.72
                        711.00        322.24         |   1702.00       714.63
                        737.00        336.05         |   1727.00       721.53
                        762.00        349.77         |   1753.00       728.44
                        787.00        363.37         |   1778.00       735.34
                        813.00        376.87         |   1803.00       742.25
                        838.00        390.24         |   1829.00       749.15
                        864.00        403.50         |   1854.00       756.05
                        889.00        416.62         |   1880.00       762.96
                        914.00        429.61         |   1905.00       769.86
                        940.00        442.45         |   1930.00       776.77
                        965.00        455.14         |      0.00         0.00

                       DEPTH       DISCHARGE        |   DEPTH      DISCHARGE
                         (m)         (cms)          |     (m)        (cms)
                       0.000         0.000          |   0.580        0.009
                       0.080         0.003          |   0.690        0.010
                       0.180         0.005          |   0.790        0.011
                       0.280         0.007          |   0.890        0.012
                       0.380         0.008          |   0.990        0.012
                       0.480         0.009          |   1.090        0.013

                     NATIVE SOIL LAYER:
                     Infiltration (m/hr) = 0.0120

                          AREA         QPEAK            TPEAK          R.V.
                          (ha)         (cms)            (hrs)          (mm)
              INFLOW:ID= 2     1.11         0.204            1.33         31.94
             OUTFLOW:ID= 1     0.00         0.000            0.00          0.00
            OVERFLOW:ID= 3     0.00         0.000            0.00          0.00

                     Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
                     Time to reach Max storage              (Hr)=        4.00
                     Volume of water for drawdown in LID (cu.m.)=      322.55
                     Volume of maximum water storage     (cu.m.)=      324.20
                     Calculated Drawdown Time               (Hr)=       39.50

  --------------------------
  | Junction Command(0005) |
  --------------------------

                               AREA     QPEAK   TPEAK     R.V.
                               (ha)     (cms)   (hrs)     (mm)
  INFLOW : ID= 3(  0004)     0.00      0.00    0.00      0.00
  OUTFLOW: ID= 2(  0005)     0.00      0.00    0.00      0.00

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   0.05   Curve Number    (CN)= 58.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  16.50   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.04

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.68 | 1.083   17.69 | 2.083    5.90 |  3.08    3.14
               0.167    2.68 | 1.167   17.69 | 2.167    5.90 |  3.17    3.14
               0.250    3.04 | 1.250   72.24 | 2.250    5.09 |  3.25    2.94
               0.333    3.04 | 1.333   72.24 | 2.333    5.09 |  3.33    2.94
               0.417    3.53 | 1.417   22.78 | 2.417    4.50 |  3.42    2.76
               0.500    3.53 | 1.500   22.78 | 2.500    4.50 |  3.50    2.76
               0.583    4.26 | 1.583   12.62 | 2.583    4.04 |  3.58    2.60
               0.667    4.26 | 1.667   12.62 | 2.667    4.04 |  3.67    2.60
               0.750    5.49 | 1.750    8.98 | 2.750    3.68 |  3.75    2.47
               0.833    5.49 | 1.833    8.98 | 2.833    3.68 |  3.83    2.47
               0.917    8.02 | 1.917    7.08 | 2.917    3.39 |  3.92    2.35
               1.000    8.02 | 2.000    7.08 | 3.000    3.39 |  4.00    2.35

     Unit Hyd Qpeak  (cms)=   0.048
```

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 1.030
TOTAL RAINFALL (mm)= 35.210
RUNOFF COEFFICIENT = 0.029

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0007)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:
Length (m)= 20.00 Height (m)= 1.00
Porosity = 0.40 Initial Water Level (m)= 0.00
Width (m)= 1.50 Min. Drawdown (hr)= 24.00
Max. Drawdown (hr)= 33.33 Available Storage (cu.m.)= 12.00

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.05	0.001	4.08	1.80
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.17
Volume of water for drawdown in LID (cu.m.)= 0.29
Volume of maximum water storage (cu.m.)= 0.32
Calculated Drawdown Time (Hr)= 0.75

| Junction Command(0008) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0007)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0008)	0.00	0.00	0.00	0.00

| CALIB |
| NASHYD (0003)| Area (ha)= 0.11 Curve Number (CN)= 58.0
|ID= 1 DT= 5.0 min | Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.02

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.68	1.083	17.69	2.083	5.90	3.08	3.14
0.167	2.68	1.167	17.69	2.167	5.90	3.17	3.14
0.250	3.04	1.250	72.24	2.250	5.09	3.25	2.94
0.333	3.04	1.333	72.24	2.333	5.09	3.33	2.94
0.417	3.53	1.417	22.78	2.417	4.50	3.42	2.76
0.500	3.53	1.500	22.78	2.500	4.50	3.50	2.76
0.583	4.26	1.583	12.62	2.583	4.04	3.58	2.60
0.667	4.26	1.667	12.62	2.667	4.04	3.67	2.60
0.750	5.49	1.750	8.98	2.750	3.68	3.75	2.47
0.833	5.49	1.833	8.98	2.833	3.68	3.83	2.47
0.917	8.02	1.917	7.08	2.917	3.39	3.92	2.35
1.000	8.02	2.000	7.08	3.000	3.39	4.00	2.35

Unit Hyd Qpeak (cms)= 0.210

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 0.100
TOTAL RAINFALL (mm)= 35.210
RUNOFF COEFFICIENT = 0.003

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| Junction Command(0006) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 1(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0006)	0.00	0.00	0.00	0.00

| CALIB |
| NASHYD (0009)| Area (ha)= 0.03 Curve Number (CN)= 58.0
|ID= 1 DT= 5.0 min | Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.04

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.68	1.083	17.69	2.083	5.90	3.08	3.14
0.167	2.68	1.167	17.69	2.167	5.90	3.17	3.14
0.250	3.04	1.250	72.24	2.250	5.09	3.25	2.94
0.333	3.04	1.333	72.24	2.333	5.09	3.33	2.94
0.417	3.53	1.417	22.78	2.417	4.50	3.42	2.76
0.500	3.53	1.500	22.78	2.500	4.50	3.50	2.76
0.583	4.26	1.583	12.62	2.583	4.04	3.58	2.60
0.667	4.26	1.667	12.62	2.667	4.04	3.67	2.60
0.750	5.49	1.750	8.98	2.750	3.68	3.75	2.47
0.833	5.49	1.833	8.98	2.833	3.68	3.83	2.47
0.917	8.02	1.917	7.08	2.917	3.39	3.92	2.35
1.000	8.02	2.000	7.08	3.000	3.39	4.00	2.35

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 1.030
TOTAL RAINFALL (mm)= 35.210
RUNOFF COEFFICIENT = 0.029

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0010)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:
Length (m)= 10.00 Height (m)= 1.00
Porosity = 0.40 Initial Water Level (m)= 0.00
Width (m)= 1.50 Min. Drawdown (hr)= 24.00
Max. Drawdown (hr)= 33.33 Available Storage (cu.m.)= 6.00

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.03	0.001	4.08	2.31
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.17
Volume of water for drawdown in LID (cu.m.)= 0.34
Volume of maximum water storage (cu.m.)= 0.35
Calculated Drawdown Time (Hr)= 1.83

| Junction Command(0011) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0010)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0011)	0.00	0.00	0.00	0.00

| ADD HYD (0012)|
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0011 <ID= 1> IS DRY.
*** W A R N I N G : HYDROGRAPH 0012 = HYDROGRAPH 0003
ID1= 1 (0011): 0.00 0.000 0.00 0.00
+ ID2= 2 (0003): 0.11 0.000 1.50 0.10
ID = 3 (0012): 0.11 0.000 1.50 0.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD (0012)|
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0006 <ID= 2> IS DRY.
*** W A R N I N G : HYDROGRAPH 0001 = HYDROGRAPH 0003
ID1= 3 (0012): 0.11 0.000 1.50 0.10
+ ID2= 2 (0006): 0.00 0.000 0.00 0.00
ID = 1 (0012): 0.11 0.000 1.50 0.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD (0012)|
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0008 <ID= 2> IS DRY.
*** W A R N I N G : HYDROGRAPH 0003 = HYDROGRAPH 0001
ID1= 1 (0012): 0.11 0.000 1.50 0.10
+ ID2= 2 (0008): 0.00 0.000 0.00 0.00
ID = 3 (0012): 0.11 0.000 1.50 0.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

5-YEAR STORM

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-
9c0f-9f2fb80764f6\5bb580c0-366b-4902-9154-f6d484d1b822\scen
  Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-
9c0f-9f2fb80764f6\5bb580c0-366b-4902-9154-f6d484d1b822\scen


DATE: 07/09/2024                          TIME: 03:34:10

USER:


COMMENTS: _____________________________________________________

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  ***********************************************
  ** SIMULATION : 02_5-Year Norfolk            **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 583.017
| Ptotal= 49.03 mm |                          B=   3.007
--------------------                          C=   0.703
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    4.20 |  1.00   23.22 |  2.00    8.64 |  3.00    4.87
                0.17    4.72 |  1.17   96.03 |  2.17    7.56 |  3.17    4.58
                0.33    5.42 |  1.33   29.33 |  2.33    6.76 |  3.33    4.32
                0.50    6.44 |  1.50   17.13 |  2.50    6.13 |  3.50    4.10
                0.67    8.09 |  1.67   12.62 |  2.67    5.63 |  3.67    3.90
                0.83   11.39 |  1.83   10.19 |  2.83    5.22 |  3.83    3.72

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---------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   1.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  93.00   Dir. Conn.(%)=  93.00
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.03         0.08
     Dep. Storage     (mm)=       1.00        16.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      86.02        40.00
     Mannings n           =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
               0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
               0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
               0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
               0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
               0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
               0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
               0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
               0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
               0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
               0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
               1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72

    Max.Eff.Inten.(mm/hr)=      96.03         4.65
                over (min)        5.00         5.00
    Storage Coeff.  (min)=       2.37 (ii)    4.92 (ii)
    Unit Hyd. Tpeak (min)=       5.00         5.00
    Unit Hyd. peak  (cms)=       0.30         0.22
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.27         0.00        0.273 (iii)
    TIME TO PEAK    (hrs)=       1.33         1.33         1.33
    RUNOFF VOLUME    (mm)=      48.03         4.89        45.01
    TOTAL RAINFALL   (mm)=      49.03        49.03        49.03
    RUNOFF COEFFICIENT   =       0.98         0.10         0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  58.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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------------------
| CHAMBER(  0004)|  OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: ON
|IN= 2--> OUT= 3 |  CHAMBER:
| DT=  5.0 min   |  MAX STO VOL (cu.m.)=  776.77  Bottom Area(m2)   =  679.72
------------------

                      DEPTH       STORAGE          |   DEPTH      STORAGE
                      (mm)        (cu.m.)          |   (mm)       (cu.m.)
                       0.00           0.00         |    991.00       467.67
                      25.00           6.90         |   1016.00       480.03
                      51.00          13.81         |   1041.00       492.21
                      76.00          20.71         |   1067.00       504.21
                     102.00          27.62         |   1092.00       515.99
                     127.00          34.52         |   1118.00       527.56
                     152.00          41.43         |   1143.00       538.89
                     178.00          48.33         |   1168.00       549.97
                     203.00          55.23         |   1194.00       560.77
                     229.00          62.14         |   1219.00       571.26
                     254.00          69.04         |   1245.00       581.41
                     279.00          75.95         |   1270.00       591.17
                     305.00          90.92         |   1295.00       600.42
                     330.00         105.81         |   1321.00       608.89
                     356.00         120.66         |   1346.00       616.72
                     381.00         135.46         |   1372.00       624.30
                     406.00         150.21         |   1397.00       631.65
                     432.00         164.91         |   1422.00       638.68
                     457.00         179.55         |   1448.00       645.59
                     483.00         194.14         |   1473.00       652.49
                     508.00         208.66         |   1499.00       659.39
                     533.00         223.12         |   1524.00       666.30
                     559.00         237.51         |   1549.00       673.20
                     584.00         251.83         |   1575.00       680.11
                     610.00         266.08         |   1600.00       687.01
                     635.00         280.25         |   1626.00       693.92
                     660.00         294.33         |   1651.00       700.82
                     686.00         308.33         |   1676.00       707.72
                     711.00         322.24         |   1702.00       714.63
                     737.00         336.05         |   1727.00       721.53
                     762.00         349.77         |   1753.00       728.44
                     787.00         363.37         |   1778.00       735.34
                     813.00         376.87         |   1803.00       742.25
                     838.00         390.24         |   1829.00       749.15
                     864.00         403.50         |   1854.00       756.05
                     889.00         416.62         |   1880.00       762.96
                     914.00         429.61         |   1905.00       769.86
                     940.00         442.45         |   1930.00       776.77
                     965.00         455.14         |      0.00         0.00

                    DEPTH       DISCHARGE        |   DEPTH      DISCHARGE
                     (m)          (cms)          |    (m)         (cms)
                   0.000          0.000          |   0.580         0.009
                   0.080          0.003          |   0.690         0.010
                   0.180          0.005          |   0.790         0.011
                   0.280          0.007          |   0.890         0.012
                   0.380          0.008          |   0.990         0.012
                   0.480          0.009          |   1.090         0.013

                  NATIVE SOIL LAYER:
                  Infiltration (m/hr) = 0.0120

                      AREA          QPEAK           TPEAK          R.V.
                      (ha)          (cms)           (hrs)          (mm)
    INFLOW:ID= 2     1.11          0.273            1.33         45.01
   OUTFLOW:ID= 1     1.11          0.005            4.00          5.49
  OVERFLOW:ID= 3     0.00          0.000            0.00          0.00

          Volume Reduction Rate[(RVin-RVout)/RVin](%)=      87.80
          Time to reach Max storage              (Hr)=       4.00
          Volume of water for drawdown in LID (cu.m.)=     437.81
          Volume of maximum water storage     (cu.m.)=     443.37
          Calculated Drawdown Time               (Hr)=      49.67

  --------------------------
  | Junction Command(0005) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)   (hrs)     (mm)
  INFLOW : ID= 3(  0004)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0005)    0.00     0.00    0.00     0.00

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   0.05   Curve Number   (CN)= 58.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  16.50   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.04

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
               0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
               0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
               0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
               0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
               0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
               0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
               0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
               0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
               0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
               0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
               1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72

    Unit Hyd Qpeak  (cms)=   0.048

    PEAK FLOW       (cms)=   0.000 (i)
    TIME TO PEAK    (hrs)=   1.333
```

```
     RUNOFF VOLUME     (mm)=   2.915
     TOTAL RAINFALL    (mm)=  49.033
     RUNOFF COEFFICIENT   =   0.059

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
------------------
|SOAKAWAY(  0007)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  5.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=  20.00   Height                (m)=   1.00
                    Porosity           =   0.40   Initial Water Level   (m)=   0.00
                    Width           (m)=   1.50   Min. Drawdown        (hr)=  24.00
                    Max. Drawdown  (hr)=  33.33   Available Storage  (cu.m.)=  12.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0120

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
      INFLOW:ID= 2     0.05         0.001             4.08         3.85
    OVERFLOW:ID= 3     0.00         0.000             0.00         0.00

              Volume Reduction Rate[(RVin-RVout)/RVin](%):
                       If RVout= (Overflow           )=      100.00
              Time to reach Max storage             (Hr)=       4.17
              Volume of water for drawdown in LID (cu.m.)=       0.84
              Volume of maximum water storage     (cu.m.)=       0.87
              Calculated Drawdown Time              (Hr)=       2.33

  --------------------------
  | Junction Command(0008) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0007)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0008)    0.00     0.00    0.00     0.00

  -------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area     (ha)=   0.11   Curve Number    (CN)= 58.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=  16.50   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.02

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
   0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
   0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
   0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
   0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
   0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
   0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
   0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
   0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
   0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
   0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
   1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72

     Unit Hyd Qpeak  (cms)=   0.210

     PEAK FLOW       (cms)=   0.000 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=   0.340
     TOTAL RAINFALL   (mm)=  49.033
     RUNOFF COEFFICIENT   =   0.007

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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  --------------------------
  | Junction Command(0006) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 1(  0004)    1.11     0.00    4.00     5.49
  OUTFLOW: ID= 2(  0006)    1.11     0.00    4.00     5.49

  -------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0009)|   Area     (ha)=   0.03   Curve Number    (CN)= 58.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=  16.50   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.04

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
   0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
   0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
   0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
   0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
   0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
   0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
   0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
   0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
   0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
   0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
   1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72

     Unit Hyd Qpeak  (cms)=   0.029

     PEAK FLOW       (cms)=   0.000 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=   2.915
     TOTAL RAINFALL   (mm)=  49.033
     RUNOFF COEFFICIENT   =   0.059

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
------------------
|SOAKAWAY(  0010)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  5.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=  10.00   Height                (m)=   1.00
                    Porosity           =   0.40   Initial Water Level   (m)=   0.00
                    Width           (m)=   1.50   Min. Drawdown        (hr)=  24.00
                    Max. Drawdown  (hr)=  33.33   Available Storage  (cu.m.)=   6.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0120

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
      INFLOW:ID= 2     0.03         0.001             4.08         4.48
    OVERFLOW:ID= 3     0.00         0.000             0.00         0.00

              Volume Reduction Rate[(RVin-RVout)/RVin](%):
                       If RVout= (Overflow           )=      100.00
              Time to reach Max storage             (Hr)=       4.17
              Volume of water for drawdown in LID (cu.m.)=       0.80
              Volume of maximum water storage     (cu.m.)=       0.82
              Calculated Drawdown Time              (Hr)=       4.42

  --------------------------
  | Junction Command(0011) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0010)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0011)    0.00     0.00    0.00     0.00

  -------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)     (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0011 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0012 = HYDROGRAPH 0003
       ID1= 1 (  0011):     0.00   0.000     0.00     0.00
     + ID2= 2 (  0003):     0.11   0.000     1.33     0.34
       ==================================================
       ID = 3 (  0012):     0.11   0.000     1.33     0.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0012)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 3 (  0012):     0.11   0.000     1.33     0.34
     + ID2= 2 (  0006):     1.11   0.005     4.00     5.49
       ==================================================
       ID = 1 (  0012):     1.22   0.005     4.00     5.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)     (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0008 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
       ID1= 1 (  0012):     1.22   0.005     4.00     5.03
     + ID2= 2 (  0008):     0.00   0.000     0.00     0.00
       ==================================================
       ID = 3 (  0012):     1.22   0.005     4.00     5.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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10-YEAR STORM

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
        V  V    I       SS  U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```


***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\db54ba52-4f2c-4a5e-84ad-8c988622173a\scen
Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\db54ba52-4f2c-4a5e-84ad-8c988622173a\scen

DATE: 07/09/2024 TIME: 03:34:10

USER:

COMMENTS: _____

** SIMULATION : 03_10-Year Norfolk **

| CHICAGO STORM | Ptotal= 57.94 mm |

IDF curve parameters: A= 670.324
B= 3.007
C= 0.698
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	5.04	1.00	27.43	2.00	10.30	3.00	5.84
0.17	5.66	1.17	111.84	2.17	9.03	3.17	5.49
0.33	6.49	1.33	34.58	2.33	8.07	3.33	5.18
0.50	7.70	1.50	20.31	2.50	7.33	3.50	4.92
0.67	9.66	1.67	15.00	2.67	6.74	3.67	4.68
0.83	13.55	1.83	12.13	2.83	6.25	3.83	4.47

| CALIB | STANDHYD (0001) | ID= 1 DT= 5.0 min |

Area (ha)= 1.11
Total Imp(%)= 93.00 Dir. Conn.(%)= 93.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.03	0.08
Dep. Storage	(mm)=	1.00	16.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	86.02	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.04	1.083	27.43	2.083	10.30	3.08	5.84
0.167	5.04	1.167	27.43	2.167	10.30	3.17	5.84
0.250	5.66	1.250	111.84	2.250	9.03	3.25	5.49
0.333	5.66	1.333	111.84	2.333	9.03	3.33	5.49
0.417	6.49	1.417	34.58	2.417	8.07	3.42	5.18
0.500	6.49	1.500	34.58	2.500	8.07	3.50	5.18
0.583	7.70	1.583	20.31	2.583	7.33	3.58	4.92
0.667	7.70	1.667	20.31	2.667	7.33	3.67	4.92
0.750	9.66	1.750	15.00	2.750	6.74	3.75	4.68
0.833	9.66	1.833	15.00	2.833	6.74	3.83	4.68
0.917	13.55	1.917	12.13	2.917	6.25	3.92	4.47
1.000	13.55	2.000	12.13	3.000	6.25	4.00	4.47

				TOTALS
Max.Eff.Inten.(mm/hr)=		111.84	8.30	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.23 (ii)	4.63 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.30	0.22	
PEAK FLOW	(cms)=	0.32	0.00	0.320 (iii)
TIME TO PEAK	(hrs)=	1.33	1.33	1.33
RUNOFF VOLUME	(mm)=	56.94	7.62	53.49
TOTAL RAINFALL	(mm)=	57.94	57.94	57.94
RUNOFF COEFFICIENT	=	0.98	0.13	0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CHAMBER(0004) | IN= 2--> OUT= 3 | DT= 5.0 min |

OUTFLOW: ON, UNDERDRAIN: OFF, INFIL: ON
CHAMBER:
MAX STO VOL (cu.m.)= 776.77 Bottom Area(m2) = 679.72

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	991.00	467.67
25.00	6.90	1016.00	480.03
51.00	13.81	1041.00	492.21
76.00	20.71	1067.00	504.21
102.00	27.62	1092.00	515.99
127.00	34.52	1118.00	527.56
152.00	41.43	1143.00	538.89
178.00	48.33	1168.00	549.97
203.00	55.23	1194.00	560.77
229.00	62.14	1219.00	571.26
254.00	69.04	1245.00	581.41
279.00	75.95	1270.00	591.17
305.00	90.92	1295.00	600.42
330.00	105.81	1321.00	608.89
356.00	120.66	1346.00	616.72
381.00	135.46	1372.00	624.30
406.00	150.21	1397.00	631.65
432.00	164.91	1422.00	638.68
457.00	179.55	1448.00	645.59
483.00	194.14	1473.00	652.49
508.00	208.66	1499.00	659.39
533.00	223.12	1524.00	666.30
559.00	237.51	1549.00	673.20
584.00	251.83	1575.00	680.11
610.00	266.08	1600.00	687.01
635.00	280.25	1626.00	693.92
660.00	294.33	1651.00	700.82
686.00	308.33	1676.00	707.72
711.00	322.24	1702.00	714.63
737.00	336.05	1727.00	721.53
762.00	349.77	1753.00	728.44
787.00	363.37	1778.00	735.34
813.00	376.87	1803.00	742.25
838.00	390.24	1829.00	749.15
864.00	403.50	1854.00	756.05
889.00	416.62	1880.00	762.96
914.00	429.61	1905.00	769.86
940.00	442.45	1930.00	776.77
965.00	455.14	0.00	0.00

DEPTH (m)	DISCHARGE (cms)	DEPTH (m)	DISCHARGE (cms)
0.000	0.000	0.580	0.009
0.080	0.003	0.690	0.010
0.180	0.005	0.790	0.011
0.280	0.007	0.890	0.012
0.380	0.008	0.990	0.012
0.480	0.009	1.090	0.013

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	1.11	0.320	1.33	53.49
OUTFLOW:ID= 1	1.11	0.007	4.00	12.13
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)= 77.32
Time to reach Max storage (Hr)= 4.00
Volume of water for drawdown in LID (cu.m.)= 506.86
Volume of maximum water storage (cu.m.)= 514.27
Calculated Drawdown Time (Hr)= 52.17

| Junction Command(0005) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0005)	0.00	0.00	0.00	0.00

| CALIB | NASHYD (0002) | ID= 1 DT= 5.0 min |

Area (ha)= 0.05 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.04

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.04	1.083	27.43	2.083	10.30	3.08	5.84
0.167	5.04	1.167	27.43	2.167	10.30	3.17	5.84
0.250	5.66	1.250	111.84	2.250	9.03	3.25	5.49
0.333	5.66	1.333	111.84	2.333	9.03	3.33	5.49
0.417	6.49	1.417	34.58	2.417	8.07	3.42	5.18
0.500	6.49	1.500	34.58	2.500	8.07	3.50	5.18
0.583	7.70	1.583	20.31	2.583	7.33	3.58	4.92
0.667	7.70	1.667	20.31	2.667	7.33	3.67	4.92
0.750	9.66	1.750	15.00	2.750	6.74	3.75	4.68
0.833	9.66	1.833	15.00	2.833	6.74	3.83	4.68
0.917	13.55	1.917	12.13	2.917	6.25	3.92	4.47
1.000	13.55	2.000	12.13	3.000	6.25	4.00	4.47

Unit Hyd Qpeak (cms)= 0.048

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 4.544
TOTAL RAINFALL (mm)= 57.945

RUNOFF COEFFICIENT = 0.078

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0007)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length	(m)= 20.00	Height	(m)= 1.00		
Porosity	= 0.40	Initial Water Level	(m)= 0.00		
Width	(m)= 1.50	Min. Drawdown	(hr)= 24.00		
Max. Drawdown	(hr)= 33.33	Available Storage	(cu.m.)= 12.00		

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.05	0.001	4.08	5.54
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.17
Volume of water for drawdown in LID (cu.m.)= 1.66
Volume of maximum water storage (cu.m.)= 1.69
Calculated Drawdown Time (Hr)= 4.58

| Junction Command(0008) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0007)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0008)	0.00	0.00	0.00	0.00

CALIB
NASHYD (0003)|ID= 1 DT= 5.0 min

Area (ha)= 0.11 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.02

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.04	1.083	27.43	2.083	10.30	3.08	5.84
0.167	5.04	1.167	27.43	2.167	10.30	3.17	5.84
0.250	5.66	1.250	111.84	2.250	9.03	3.25	5.49
0.333	5.66	1.333	111.84	2.333	9.03	3.33	5.49
0.417	6.49	1.417	34.58	2.417	8.07	3.42	5.18
0.500	6.49	1.500	34.58	2.500	8.07	3.50	5.18
0.583	7.70	1.583	20.31	2.583	7.33	3.58	4.92
0.667	7.70	1.667	20.31	2.667	7.33	3.67	4.92
0.750	9.66	1.750	15.00	2.750	6.74	3.75	4.68
0.833	9.66	1.833	15.00	2.833	6.74	3.83	4.68
0.917	13.55	1.917	12.13	2.917	6.25	3.92	4.47
1.000	13.55	2.000	12.13	3.000	6.25	4.00	4.47

Unit Hyd Qpeak (cms)= 0.210

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 0.531
TOTAL RAINFALL (mm)= 57.945
RUNOFF COEFFICIENT = 0.009

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| Junction Command(0006) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 1(0004)	1.11	0.01	4.00	12.13
OUTFLOW: ID= 2(0006)	1.11	0.01	4.00	12.13

CALIB
NASHYD (0009)|ID= 1 DT= 5.0 min

Area (ha)= 0.03 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.04

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.04	1.083	27.43	2.083	10.30	3.08	5.84
0.167	5.04	1.167	27.43	2.167	10.30	3.17	5.84
0.250	5.66	1.250	111.84	2.250	9.03	3.25	5.49
0.333	5.66	1.333	111.84	2.333	9.03	3.33	5.49
0.417	6.49	1.417	34.58	2.417	8.07	3.42	5.18
0.500	6.49	1.500	34.58	2.500	8.07	3.50	5.18
0.583	7.70	1.583	20.31	2.583	7.33	3.58	4.92
0.667	7.70	1.667	20.31	2.667	7.33	3.67	4.92
0.750	9.66	1.750	15.00	2.750	6.74	3.75	4.68
0.833	9.66	1.833	15.00	2.833	6.74	3.83	4.68
0.917	13.55	1.917	12.13	2.917	6.25	3.92	4.47
1.000	13.55	2.000	12.13	3.000	6.25	4.00	4.47

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 4.543
TOTAL RAINFALL (mm)= 57.945
RUNOFF COEFFICIENT = 0.078

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0010)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length	(m)= 10.00	Height	(m)= 1.00		
Porosity	= 0.40	Initial Water Level	(m)= 0.00		
Width	(m)= 1.50	Min. Drawdown	(hr)= 24.00		
Max. Drawdown	(hr)= 33.33	Available Storage	(cu.m.)= 6.00		

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.03	0.001	4.08	6.20
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.17
Volume of water for drawdown in LID (cu.m.)= 1.31
Volume of maximum water storage (cu.m.)= 1.32
***** After simulation, water volume is not zero.

| Junction Command(0011) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0010)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0011)	0.00	0.00	0.00	0.00

ADD HYD (0012)|	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				

*** W A R N I N G : HYDROGRAPH 0011 <ID= 1> IS DRY.
*** W A R N I N G : HYDROGRAPH 0012 = HYDROGRAPH 0003

ID1= 1 (0011):	0.00	0.000	0.00	0.00
+ ID2= 2 (0003):	0.11	0.000	1.33	0.53
ID = 3 (0012):	0.11	0.000	1.33	0.53

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0012)|	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1				

ID1= 3 (0012):	0.11	0.000	1.33	0.53
+ ID2= 2 (0006):	1.11	0.007	4.00	12.13
ID = 1 (0012):	1.22	0.007	4.00	11.09

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0012)|	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				

*** W A R N I N G : HYDROGRAPH 0008 <ID= 2> IS DRY.
*** W A R N I N G : HYDROGRAPH 0003 = HYDROGRAPH 0001

ID1= 1 (0012):	1.22	0.007	4.00	11.09
+ ID2= 2 (0008):	0.00	0.000	0.00	0.00
ID = 3 (0012):	1.22	0.007	4.00	11.09

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

25-YEAR STORM

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
        V  V    I       SS  U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```


***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\b41c6750-4b25-4b97-b39b-5ff0b49c2399\scen
Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\b41c6750-4b25-4b97-b39b-5ff0b49c2399\scen

DATE: 07/09/2024 TIME: 03:34:10

USER:

COMMENTS: _____

** SIMULATION : 04_25-Year Norfolk **

CHICAGO STORM
Ptotal= 69.38 mm

IDF curve parameters: A= 721.533
B= 2.253
C= 0.679
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	6.34	1.00	31.84	2.00	12.58	3.00	7.30
0.17	7.08	1.17	131.63	2.17	11.08	3.17	6.87
0.33	8.07	1.33	39.74	2.33	9.96	3.33	6.50
0.50	9.51	1.50	23.97	2.50	9.08	3.50	6.18
0.67	11.82	1.67	17.98	2.67	8.38	3.67	5.90
0.83	16.33	1.83	14.70	2.83	7.79	3.83	5.64

CALIB
STANDHYD (0001)
ID= 1 DT= 5.0 min

Area (ha)= 1.11
Total Imp(%)= 93.00 Dir. Conn.(%)= 93.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.03	0.08
Dep. Storage	(mm)=	1.00	16.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	86.02	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.34	1.083	31.84	2.083	12.58	3.08	7.30
0.167	6.34	1.167	31.84	2.167	12.58	3.17	7.30
0.250	7.08	1.250	131.63	2.250	11.08	3.25	6.87
0.333	7.08	1.333	131.63	2.333	11.08	3.33	6.87
0.417	8.07	1.417	39.74	2.417	9.96	3.42	6.50
0.500	8.07	1.500	39.74	2.500	9.96	3.50	6.50
0.583	9.51	1.583	23.97	2.583	9.08	3.58	6.18
0.667	9.51	1.667	23.97	2.667	9.08	3.67	6.18
0.750	11.82	1.750	17.98	2.750	8.38	3.75	5.90
0.833	11.82	1.833	17.98	2.833	8.38	3.83	5.90
0.917	16.33	1.917	14.70	2.917	7.79	3.92	5.64
1.000	16.33	2.000	14.70	3.000	7.79	4.00	5.64

				TOTALS
Max.Eff.Inten.(mm/hr)=		131.63	13.63	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.09 (ii)	4.34 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.31	0.23	
PEAK FLOW	(cms)=	0.38	0.00	0.378 (iii)
TIME TO PEAK	(hrs)=	1.33	1.33	1.33
RUNOFF VOLUME	(mm)=	68.38	11.81	64.42
TOTAL RAINFALL	(mm)=	69.38	69.38	69.38
RUNOFF COEFFICIENT	=	0.99	0.17	0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CHAMBER(0004)
IN= 2--> OUT= 3
DT= 5.0 min

OUTFLOW: ON, UNDERDRAIN: OFF, INFIL: ON
CHAMBER:
MAX STO VOL (cu.m.)= 776.77 Bottom Area(m2) = 679.72

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	991.00	467.67
25.00	6.90	1016.00	480.03
51.00	13.81	1041.00	492.21
76.00	20.71	1067.00	504.21
102.00	27.62	1092.00	515.99
127.00	34.52	1118.00	527.56
152.00	41.43	1143.00	538.89
178.00	48.33	1168.00	549.97
203.00	55.23	1194.00	560.77
229.00	62.14	1219.00	571.26
254.00	69.04	1245.00	581.41
279.00	75.95	1270.00	591.17
305.00	90.92	1295.00	600.42
330.00	105.81	1321.00	608.89
356.00	120.66	1346.00	616.72
381.00	135.46	1372.00	624.30
406.00	150.21	1397.00	631.65
432.00	164.91	1422.00	638.68
457.00	179.55	1448.00	645.59
483.00	194.14	1473.00	652.49
508.00	208.66	1499.00	659.39
533.00	223.12	1524.00	666.30
559.00	237.51	1549.00	673.20
584.00	251.83	1575.00	680.11
610.00	266.08	1600.00	687.01
635.00	280.25	1626.00	693.92
660.00	294.33	1651.00	700.82
686.00	308.33	1676.00	707.72
711.00	322.24	1702.00	714.63
737.00	336.05	1727.00	721.53
762.00	349.77	1753.00	728.44
787.00	363.37	1778.00	735.34
813.00	376.87	1803.00	742.25
838.00	390.24	1829.00	749.15
864.00	403.50	1854.00	756.05
889.00	416.62	1880.00	762.96
914.00	429.61	1905.00	769.86
940.00	442.45	1930.00	776.77
965.00	455.14	0.00	0.00

DEPTH (m)	DISCHARGE (cms)	DEPTH (m)	DISCHARGE (cms)
0.000	0.000	0.580	0.009
0.080	0.003	0.690	0.010
0.180	0.005	0.790	0.011
0.280	0.007	0.890	0.012
0.380	0.008	0.990	0.012
0.480	0.009	1.090	0.013

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	1.11	0.378	1.33	64.42
OUTFLOW:ID= 1	1.11	0.009	4.00	21.04
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)= 67.34
Time to reach Max storage (Hr)= 4.00
Volume of water for drawdown in LID (cu.m.)= 601.69
Volume of maximum water storage (cu.m.)= 611.19
Calculated Drawdown Time (Hr)= 54.83

Junction Command(0005)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0005)	0.00	0.00	0.00	0.00

CALIB
NASHYD (0002)
ID= 1 DT= 5.0 min

Area (ha)= 0.05 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.04

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.34	1.083	31.84	2.083	12.58	3.08	7.30
0.167	6.34	1.167	31.84	2.167	12.58	3.17	7.30
0.250	7.08	1.250	131.63	2.250	11.08	3.25	6.87
0.333	7.08	1.333	131.63	2.333	11.08	3.33	6.87
0.417	8.07	1.417	39.74	2.417	9.96	3.42	6.50
0.500	8.07	1.500	39.74	2.500	9.96	3.50	6.50
0.583	9.51	1.583	23.97	2.583	9.08	3.58	6.18
0.667	9.51	1.667	23.97	2.667	9.08	3.67	6.18
0.750	11.82	1.750	17.98	2.750	8.38	3.75	5.90
0.833	11.82	1.833	17.98	2.833	8.38	3.83	5.90
0.917	16.33	1.917	14.70	2.917	7.79	3.92	5.64
1.000	16.33	2.000	14.70	3.000	7.79	4.00	5.64

Unit Hyd Qpeak (cms)= 0.048

PEAK FLOW (cms)= 0.002 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 7.046
TOTAL RAINFALL (mm)= 69.379

RUNOFF COEFFICIENT = 0.102

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0007)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length	(m)= 20.00	Height	(m)= 1.00		
Porosity	= 0.40	Initial Water Level	(m)= 0.00		
Width	(m)= 1.50	Min. Drawdown	(hr)= 24.00		
Max. Drawdown	(hr)= 33.33	Available Storage	(cu.m.)= 12.00		

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.05	0.002	1.33	7.16
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.00
Volume of water for drawdown in LID (cu.m.)= 2.47
Volume of maximum water storage (cu.m.)= 2.50
Calculated Drawdown Time (Hr)= 6.83

Junction Command(0008)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0007)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0008)	0.00	0.00	0.00	0.00

CALIB					
NASHYD (0003)	Area	(ha)= 0.11	Curve Number	(CN)= 58.0	
ID= 1 DT= 5.0 min	Ia	(mm)= 16.50	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= 0.02				

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.34	1.083	31.84	2.083	12.58	3.08	7.30
0.167	6.34	1.167	31.84	2.167	12.58	3.17	7.30
0.250	7.08	1.250	131.63	2.250	11.08	3.25	6.87
0.333	7.08	1.333	131.63	2.333	11.08	3.33	6.87
0.417	8.07	1.417	39.74	2.417	9.96	3.42	6.50
0.500	8.07	1.500	39.74	2.500	9.96	3.50	6.50
0.583	9.51	1.583	23.97	2.583	9.08	3.58	6.18
0.667	9.51	1.667	23.97	2.667	9.08	3.67	6.18
0.750	11.82	1.750	17.98	2.750	8.38	3.75	5.90
0.833	11.82	1.833	17.98	2.833	8.38	3.83	5.90
0.917	16.33	1.917	14.70	2.917	7.79	3.92	5.64
1.000	16.33	2.000	14.70	3.000	7.79	4.00	5.64

Unit Hyd Qpeak (cms)= 0.210

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 0.822
TOTAL RAINFALL (mm)= 69.379
RUNOFF COEFFICIENT = 0.012

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

Junction Command(0006)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 1(0004)	1.11	0.01	4.00	21.04
OUTFLOW: ID= 2(0006)	1.11	0.01	4.00	21.04

CALIB					
NASHYD (0009)	Area	(ha)= 0.03	Curve Number	(CN)= 58.0	
ID= 1 DT= 5.0 min	Ia	(mm)= 16.50	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= 0.04				

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.34	1.083	31.84	2.083	12.58	3.08	7.30
0.167	6.34	1.167	31.84	2.167	12.58	3.17	7.30
0.250	7.08	1.250	131.63	2.250	11.08	3.25	6.87
0.333	7.08	1.333	131.63	2.333	11.08	3.33	6.87
0.417	8.07	1.417	39.74	2.417	9.96	3.42	6.50
0.500	8.07	1.500	39.74	2.500	9.96	3.50	6.50
0.583	9.51	1.583	23.97	2.583	9.08	3.58	6.18
0.667	9.51	1.667	23.97	2.667	9.08	3.67	6.18
0.750	11.82	1.750	17.98	2.750	8.38	3.75	5.90
0.833	11.82	1.833	17.98	2.833	8.38	3.83	5.90
0.917	16.33	1.917	14.70	2.917	7.79	3.92	5.64
1.000	16.33	2.000	14.70	3.000	7.79	4.00	5.64

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 7.039
TOTAL RAINFALL (mm)= 69.379
RUNOFF COEFFICIENT = 0.101

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0010)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length	(m)= 10.00	Height	(m)= 1.00		
Porosity	= 0.40	Initial Water Level	(m)= 0.00		
Width	(m)= 1.50	Min. Drawdown	(hr)= 24.00		
Max. Drawdown	(hr)= 33.33	Available Storage	(cu.m.)= 6.00		

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.03	0.001	1.33	7.23
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.17
Volume of water for drawdown in LID (cu.m.)= 1.62
Volume of maximum water storage (cu.m.)= 1.63
Calculated Drawdown Time (Hr)= 8.92

Junction Command(0011)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0010)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0011)	0.00	0.00	0.00	0.00

ADD HYD (0012)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0011):	0.00	0.000	0.00	0.00
	+ ID2= 2 (0003):	0.11	0.000	1.33	0.82
	ID = 3 (0012):	0.11	0.000	1.33	0.82

*** W A R N I N G : HYDROGRAPH 0011 <ID= 1> IS DRY.
*** W A R N I N G : HYDROGRAPH 0012 = HYDROGRAPH 0003

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0012)					
3 + 2 = 1		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 3 (0012):	0.11	0.000	1.33	0.82
	+ ID2= 2 (0006):	1.11	0.009	4.00	21.04
	ID = 1 (0012):	1.22	0.009	4.00	19.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0012)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0012):	1.22	0.009	4.00	19.22
	+ ID2= 2 (0008):	0.00	0.000	0.00	0.00
	ID = 3 (0012):	1.22	0.009	4.00	19.22

*** W A R N I N G : HYDROGRAPH 0008 <ID= 2> IS DRY.
*** W A R N I N G : HYDROGRAPH 0003 = HYDROGRAPH 0001

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

50-YEAR STORM

```
 V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
 V    V   I    SS     U   U   A A   L
  V  V    I     SS    U   U  AAAAA  L
  V  V    I       SS  U   U  A   A  L
   VV     I    SSSSS  UUUUU  A   A  LLLLL

  OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
 O   O    T      T    H   H   Y Y   MM MM  O   O
 O   O    T      T    H   H    Y    M   M  O   O
  OOO     T      T    H   H    Y    M   M   OOO
```


***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\c4a8c3a6-c310-4267-a4ca-eb9a4d7c5de2\scen
Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\c4a8c3a6-c310-4267-a4ca-eb9a4d7c5de2\scen

DATE: 07/09/2024 TIME: 03:34:10

USER:

COMMENTS: _____

** SIMULATION : 05_50-Year Norfolk **

| CHICAGO STORM | Ptotal= 78.32 mm |

IDF curve parameters: A= 766.038
B= 1.898
C= 0.668
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	7.35	1.00	35.40	2.00	14.38	3.00	8.44
0.17	8.19	1.17	146.50	2.17	12.71	3.17	7.96
0.33	9.32	1.33	43.93	2.33	11.45	3.33	7.55
0.50	10.95	1.50	26.91	2.50	10.46	3.50	7.18
0.67	13.53	1.67	20.36	2.67	9.66	3.67	6.85
0.83	18.53	1.83	16.73	2.83	9.00	3.83	6.56

| CALIB | STANDHYD (0001) | ID= 1 DT= 5.0 min |

Area (ha)= 1.11
Total Imp(%)= 93.00 Dir. Conn.(%)= 93.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.03	0.08
Dep. Storage	(mm)=	1.00	16.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	86.02	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	7.35	1.083	35.40	2.083	14.38	3.08	8.44
0.167	7.35	1.167	35.40	2.167	14.38	3.17	8.44
0.250	8.19	1.250	146.50	2.250	12.71	3.25	7.96
0.333	8.19	1.333	146.50	2.333	12.71	3.33	7.96
0.417	9.32	1.417	43.93	2.417	11.45	3.42	7.55
0.500	9.32	1.500	43.93	2.500	11.45	3.50	7.55
0.583	10.95	1.583	26.91	2.583	10.46	3.58	7.18
0.667	10.95	1.667	26.91	2.667	10.46	3.67	7.18
0.750	13.53	1.750	20.36	2.750	9.66	3.75	6.85
0.833	13.53	1.833	20.36	2.833	9.66	3.83	6.85
0.917	18.53	1.917	16.73	2.917	9.00	3.92	6.56
1.000	18.53	2.000	16.73	3.000	9.00	4.00	6.56

				TOTALS
Max.Eff.Inten.(mm/hr)=		146.50	18.29	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.00 (ii)	4.16 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.31	0.24	
PEAK FLOW	(cms)=	0.42	0.00	0.422 (iii)
TIME TO PEAK	(hrs)=	1.33	1.33	1.33
RUNOFF VOLUME	(mm)=	77.32	15.55	72.99
TOTAL RAINFALL	(mm)=	78.32	78.32	78.32
RUNOFF COEFFICIENT	=	0.99	0.20	0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CHAMBER(0004) | IN= 2--> OUT= 3 | DT= 5.0 min |

OUTFLOW: ON, UNDERDRAIN: OFF, INFIL: ON
CHAMBER:
MAX STO VOL (cu.m.)= 776.77 Bottom Area(m2) = 679.72

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	991.00	467.67
25.00	6.90	1016.00	480.03
51.00	13.81	1041.00	492.21
76.00	20.71	1067.00	504.21
102.00	27.62	1092.00	515.99
127.00	34.52	1118.00	527.56
152.00	41.43	1143.00	538.89
178.00	48.33	1168.00	549.97
203.00	55.23	1194.00	560.77
229.00	62.14	1219.00	571.26
254.00	69.04	1245.00	581.41
279.00	75.95	1270.00	591.17
305.00	90.92	1295.00	600.42
330.00	105.81	1321.00	608.89
356.00	120.66	1346.00	616.72
381.00	135.46	1372.00	624.30
406.00	150.21	1397.00	631.65
432.00	164.91	1422.00	638.68
457.00	179.55	1448.00	645.59
483.00	194.14	1473.00	652.49
508.00	208.66	1499.00	659.39
533.00	223.12	1524.00	666.30
559.00	237.51	1549.00	673.20
584.00	251.83	1575.00	680.11
610.00	266.08	1600.00	687.01
635.00	280.25	1626.00	693.92
660.00	294.33	1651.00	700.82
686.00	308.33	1676.00	707.72
711.00	322.24	1702.00	714.63
737.00	336.05	1727.00	721.53
762.00	349.77	1753.00	728.44
787.00	363.37	1778.00	735.34
813.00	376.87	1803.00	742.25
838.00	390.24	1829.00	749.15
864.00	403.50	1854.00	756.05
889.00	416.62	1880.00	762.96
914.00	429.61	1905.00	769.86
940.00	442.45	1930.00	776.77
965.00	455.14	0.00	0.00

DEPTH (m)	DISCHARGE (cms)	DEPTH (m)	DISCHARGE (cms)
0.000	0.000	0.580	0.009
0.080	0.003	0.690	0.010
0.180	0.005	0.790	0.011
0.280	0.007	0.890	0.012
0.380	0.008	0.990	0.012
0.480	0.009	1.090	0.013

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	1.11	0.422	1.33	72.99
OUTFLOW:ID= 1	1.11	0.011	4.00	28.33
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)= 61.19
Time to reach Max storage (Hr)= 4.00
Volume of water for drawdown in LID (cu.m.)= 676.69
Volume of maximum water storage (cu.m.)= 687.95
Calculated Drawdown Time (Hr)= 56.58

| Junction Command(0005) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0005)	0.00	0.00	0.00	0.00

| CALIB | NASHYD (0002) | ID= 1 DT= 5.0 min |

Area (ha)= 0.05 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.04

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	7.35	1.083	35.40	2.083	14.38	3.08	8.44
0.167	7.35	1.167	35.40	2.167	14.38	3.17	8.44
0.250	8.19	1.250	146.50	2.250	12.71	3.25	7.96
0.333	8.19	1.333	146.50	2.333	12.71	3.33	7.96
0.417	9.32	1.417	43.93	2.417	11.45	3.42	7.55
0.500	9.32	1.500	43.93	2.500	11.45	3.50	7.55
0.583	10.95	1.583	26.91	2.583	10.46	3.58	7.18
0.667	10.95	1.667	26.91	2.667	10.46	3.67	7.18
0.750	13.53	1.750	20.36	2.750	9.66	3.75	6.85
0.833	13.53	1.833	20.36	2.833	9.66	3.83	6.85
0.917	18.53	1.917	16.73	2.917	9.00	3.92	6.56
1.000	18.53	2.000	16.73	3.000	9.00	4.00	6.56

Unit Hyd Qpeak (cms)= 0.048

PEAK FLOW (cms)= 0.002 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 9.280
TOTAL RAINFALL (mm)= 78.320

RUNOFF COEFFICIENT = 0.118

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0007)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length	(m)= 20.00	Height	(m)= 1.00		
Porosity	= 0.40	Initial Water Level	(m)= 0.00		
Width	(m)= 1.50	Min. Drawdown	(hr)= 24.00		
Max. Drawdown	(hr)= 33.33	Available Storage	(cu.m.)= 12.00		

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.05	0.002	1.33	9.39
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.00
Volume of water for drawdown in LID (cu.m.)= 3.58
Volume of maximum water storage (cu.m.)= 3.62
Calculated Drawdown Time (Hr)= 9.92

| Junction Command(0008) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0007)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0008)	0.00	0.00	0.00	0.00

CALIB					
NASHYD (0003)	Area	(ha)= 0.11	Curve Number	(CN)= 58.0	
ID= 1 DT= 5.0 min	Ia	(mm)= 16.50	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= 0.02				

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	7.35	1.083	35.40	2.083	14.38	3.08	8.44
0.167	7.35	1.167	35.40	2.167	14.38	3.17	8.44
0.250	8.19	1.250	146.50	2.250	12.71	3.25	7.96
0.333	8.19	1.333	146.50	2.333	12.71	3.33	7.96
0.417	9.32	1.417	43.93	2.417	11.45	3.42	7.55
0.500	9.32	1.500	43.93	2.500	11.45	3.50	7.55
0.583	10.95	1.583	26.91	2.583	10.46	3.58	7.18
0.667	10.95	1.667	26.91	2.667	10.46	3.67	7.18
0.750	13.53	1.750	20.36	2.750	9.66	3.75	6.85
0.833	13.53	1.833	20.36	2.833	9.66	3.83	6.85
0.917	18.53	1.917	16.73	2.917	9.00	3.92	6.56
1.000	18.53	2.000	16.73	3.000	9.00	4.00	6.56

Unit Hyd Qpeak (cms)= 0.210

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 1.083
TOTAL RAINFALL (mm)= 78.320
RUNOFF COEFFICIENT = 0.014

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| Junction Command(0006) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 1(0004)	1.11	0.01	4.00	28.33
OUTFLOW: ID= 2(0006)	1.11	0.01	4.00	28.33

CALIB					
NASHYD (0009)	Area	(ha)= 0.03	Curve Number	(CN)= 58.0	
ID= 1 DT= 5.0 min	Ia	(mm)= 16.50	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= 0.04				

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	7.35	1.083	35.40	2.083	14.38	3.08	8.44
0.167	7.35	1.167	35.40	2.167	14.38	3.17	8.44
0.250	8.19	1.250	146.50	2.250	12.71	3.25	7.96
0.333	8.19	1.333	146.50	2.333	12.71	3.33	7.96
0.417	9.32	1.417	43.93	2.417	11.45	3.42	7.55
0.500	9.32	1.500	43.93	2.500	11.45	3.50	7.55
0.583	10.95	1.583	26.91	2.583	10.46	3.58	7.18
0.667	10.95	1.667	26.91	2.667	10.46	3.67	7.18
0.750	13.53	1.750	20.36	2.750	9.66	3.75	6.85
0.833	13.53	1.833	20.36	2.833	9.66	3.83	6.85
0.917	18.53	1.917	16.73	2.917	9.00	3.92	6.56
1.000	18.53	2.000	16.73	3.000	9.00	4.00	6.56

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 9.271
TOTAL RAINFALL (mm)= 78.320
RUNOFF COEFFICIENT = 0.118

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0010)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length	(m)= 10.00	Height	(m)= 1.00		
Porosity	= 0.40	Initial Water Level	(m)= 0.00		
Width	(m)= 1.50	Min. Drawdown	(hr)= 24.00		
Max. Drawdown	(hr)= 33.33	Available Storage	(cu.m.)= 6.00		

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.03	0.001	1.33	9.47
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.17
Volume of water for drawdown in LID (cu.m.)= 2.29
Volume of maximum water storage (cu.m.)= 2.30
Calculated Drawdown Time (Hr)= 12.67

| Junction Command(0011) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0010)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0011)	0.00	0.00	0.00	0.00

ADD HYD (0012)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	0.00	0.000	0.00	0.00
+ ID2= 2 (0003):	0.11	0.001	1.33	1.08
ID = 3 (0012):	0.11	0.001	1.33	1.08

*** W A R N I N G : HYDROGRAPH 0011 <ID= 1> IS DRY.
*** W A R N I N G : HYDROGRAPH 0012 = HYDROGRAPH 0003

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0012)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0012):	0.11	0.001	1.33	1.08
+ ID2= 2 (0006):	1.11	0.011	4.00	28.33
ID = 1 (0012):	1.22	0.011	4.00	25.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0012)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0012):	1.22	0.011	4.00	25.87
+ ID2= 2 (0008):	0.00	0.000	0.00	0.00
ID = 3 (0012):	1.22	0.011	4.00	25.87

*** W A R N I N G : HYDROGRAPH 0008 <ID= 2> IS DRY.
*** W A R N I N G : HYDROGRAPH 0003 = HYDROGRAPH 0001

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

100-YEAR STORM

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```


***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\4d080023-452c-4ab5-b196-efec8b939418\scen
Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\4d080023-452c-4ab5-b196-efec8b939418\scen

DATE: 07/09/2024 TIME: 03:34:10

USER:

COMMENTS: _____

** SIMULATION : 06_100-Year Norfolk **

CHICAGO STORM
Ptotal= 87.09 mm

IDF curve parameters: A= 801.041
B= 1.501
C= 0.657
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	8.40	1.00	38.70	2.00	16.17	3.00	9.61
0.17	9.34	1.17	160.97	2.17	14.33	3.17	9.08
0.33	10.59	1.33	47.72	2.33	12.95	3.33	8.61
0.50	12.39	1.50	29.71	2.50	11.86	3.50	8.20
0.67	15.24	1.67	22.67	2.67	10.97	3.67	7.84
0.83	20.69	1.83	18.74	2.83	10.24	3.83	7.51

CALIB
STANDHYD (0001)
ID= 1 DT= 5.0 min

Area (ha)= 1.11
Total Imp(%)= 93.00 Dir. Conn.(%)= 93.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.03	0.08
Dep. Storage	(mm)=	1.00	16.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	86.02	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	8.40	1.083	38.70	2.083	16.17	3.08	9.61
0.167	8.40	1.167	38.70	2.167	16.17	3.17	9.61
0.250	9.34	1.250	160.97	2.250	14.33	3.25	9.08
0.333	9.34	1.333	160.97	2.333	14.33	3.33	9.08
0.417	10.59	1.417	47.72	2.417	12.95	3.42	8.61
0.500	10.59	1.500	47.72	2.500	12.95	3.50	8.61
0.583	12.39	1.583	29.71	2.583	11.86	3.58	8.20
0.667	12.39	1.667	29.71	2.667	11.86	3.67	8.20
0.750	15.24	1.750	22.67	2.750	10.97	3.75	7.84
0.833	15.24	1.833	22.67	2.833	10.97	3.83	7.84
0.917	20.69	1.917	18.74	2.917	10.24	3.92	7.51
1.000	20.69	2.000	18.74	3.000	10.24	4.00	7.51

				TOTALS
Max.Eff.Inten.(mm/hr)=		160.97	24.31	
over (min)		5.00	5.00	
Storage Coeff. (min)=		1.93 (ii)	4.00 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.31	0.24	
PEAK FLOW	(cms)=	0.46	0.01	0.465 (iii)
TIME TO PEAK	(hrs)=	1.33	1.33	1.33
RUNOFF VOLUME	(mm)=	86.09	19.58	81.43
TOTAL RAINFALL	(mm)=	87.09	87.09	87.09
RUNOFF COEFFICIENT	=	0.99	0.22	0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CHAMBER(0004)
IN= 2--> OUT= 3
DT= 5.0 min

OUTFLOW: ON, UNDERDRAIN: OFF, INFIL: ON
CHAMBER:
MAX STO VOL (cu.m.)= 776.77 Bottom Area(m2) = 679.72

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	991.00	467.67
25.00	6.90	1016.00	480.03
51.00	13.81	1041.00	492.21
76.00	20.71	1067.00	504.21
102.00	27.62	1092.00	515.99
127.00	34.52	1118.00	527.56
152.00	41.43	1143.00	538.89
178.00	48.33	1168.00	549.97
203.00	55.23	1194.00	560.77
229.00	62.14	1219.00	571.26
254.00	69.04	1245.00	581.41
279.00	75.95	1270.00	591.17
305.00	90.92	1295.00	600.42
330.00	105.81	1321.00	608.89
356.00	120.66	1346.00	616.72
381.00	135.46	1372.00	624.30
406.00	150.21	1397.00	631.65
432.00	164.91	1422.00	638.68
457.00	179.55	1448.00	645.59
483.00	194.14	1473.00	652.49
508.00	208.66	1499.00	659.39
533.00	223.12	1524.00	666.30
559.00	237.51	1549.00	673.20
584.00	251.83	1575.00	680.11
610.00	266.08	1600.00	687.01
635.00	280.25	1626.00	693.92
660.00	294.33	1651.00	700.82
686.00	308.33	1676.00	707.72
711.00	322.24	1702.00	714.63
737.00	336.05	1727.00	721.53
762.00	349.77	1753.00	728.44
787.00	363.37	1778.00	735.34
813.00	376.87	1803.00	742.25
838.00	390.24	1829.00	749.15
864.00	403.50	1854.00	756.05
889.00	416.62	1880.00	762.96
914.00	429.61	1905.00	769.86
940.00	442.45	1930.00	776.77
965.00	455.14	0.00	0.00

DEPTH (m)	DISCHARGE (cms)	DEPTH (m)	DISCHARGE (cms)
0.000	0.000	0.580	0.009
0.080	0.003	0.690	0.010
0.180	0.005	0.790	0.011
0.280	0.007	0.890	0.012
0.380	0.008	0.990	0.012
0.480	0.009	1.090	0.013

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	1.11	0.465	1.33	81.43
OUTFLOW:ID= 1	1.11	0.013	4.00	35.67
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)= 56.19
Time to reach Max storage (Hr)= 4.00
Volume of water for drawdown in LID (cu.m.)= 751.35
Volume of maximum water storage (cu.m.)= 764.27
Calculated Drawdown Time (Hr)= 58.08

Junction Command(0005)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0005)	0.00	0.00	0.00	0.00

CALIB
NASHYD (0002)
ID= 1 DT= 5.0 min

Area (ha)= 0.05 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.04

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	8.40	1.083	38.70	2.083	16.17	3.08	9.61
0.167	8.40	1.167	38.70	2.167	16.17	3.17	9.61
0.250	9.34	1.250	160.97	2.250	14.33	3.25	9.08
0.333	9.34	1.333	160.97	2.333	14.33	3.33	9.08
0.417	10.59	1.417	47.72	2.417	12.95	3.42	8.61
0.500	10.59	1.500	47.72	2.500	12.95	3.50	8.61
0.583	12.39	1.583	29.71	2.583	11.86	3.58	8.20
0.667	12.39	1.667	29.71	2.667	11.86	3.67	8.20
0.750	15.24	1.750	22.67	2.750	10.97	3.75	7.84
0.833	15.24	1.833	22.67	2.833	10.97	3.83	7.84
0.917	20.69	1.917	18.74	2.917	10.24	3.92	7.51
1.000	20.69	2.000	18.74	3.000	10.24	4.00	7.51

Unit Hyd Qpeak (cms)= 0.048

PEAK FLOW (cms)= 0.003 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 11.683
TOTAL RAINFALL (mm)= 87.089

RUNOFF COEFFICIENT = 0.134

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0007)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length	(m)= 20.00	Height	(m)= 1.00		
Porosity	= 0.40	Initial Water Level	(m)= 0.00		
Width	(m)= 1.50	Min. Drawdown	(hr)= 24.00		
Max. Drawdown	(hr)= 33.33	Available Storage	(cu.m.)= 12.00		

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.05	0.003	1.33	11.79
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.17
Volume of water for drawdown in LID (cu.m.)= 4.78
Volume of maximum water storage (cu.m.)= 4.81
Calculated Drawdown Time (Hr)= 13.25

Junction Command(0008)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0007)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0008)	0.00	0.00	0.00	0.00

CALIB					
NASHYD (0003)	Area	(ha)= 0.11	Curve Number	(CN)= 58.0	
ID= 1 DT= 5.0 min	Ia	(mm)= 16.50	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= 0.02				

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	8.40	1.083	38.70	2.083	16.17	3.08	9.61
0.167	8.40	1.167	38.70	2.167	16.17	3.17	9.61
0.250	9.34	1.250	160.97	2.250	14.33	3.25	9.08
0.333	9.34	1.333	160.97	2.333	14.33	3.33	9.08
0.417	10.59	1.417	47.72	2.417	12.95	3.42	8.61
0.500	10.59	1.500	47.72	2.500	12.95	3.50	8.61
0.583	12.39	1.583	29.71	2.583	11.86	3.58	8.20
0.667	12.39	1.667	29.71	2.667	11.86	3.67	8.20
0.750	15.24	1.750	22.67	2.750	10.97	3.75	7.84
0.833	15.24	1.833	22.67	2.833	10.97	3.83	7.84
0.917	20.69	1.917	18.74	2.917	10.24	3.92	7.51
1.000	20.69	2.000	18.74	3.000	10.24	4.00	7.51

Unit Hyd Qpeak (cms)= 0.210

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 1.363
TOTAL RAINFALL (mm)= 87.089
RUNOFF COEFFICIENT = 0.016

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

Junction Command(0006)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 1(0004)	1.11	0.01	4.00	35.67
OUTFLOW: ID= 2(0006)	1.11	0.01	4.00	35.67

CALIB					
NASHYD (0009)	Area	(ha)= 0.03	Curve Number	(CN)= 58.0	
ID= 1 DT= 5.0 min	Ia	(mm)= 16.50	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= 0.04				

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	8.40	1.083	38.70	2.083	16.17	3.08	9.61
0.167	8.40	1.167	38.70	2.167	16.17	3.17	9.61
0.250	9.34	1.250	160.97	2.250	14.33	3.25	9.08
0.333	9.34	1.333	160.97	2.333	14.33	3.33	9.08
0.417	10.59	1.417	47.72	2.417	12.95	3.42	8.61
0.500	10.59	1.500	47.72	2.500	12.95	3.50	8.61
0.583	12.39	1.583	29.71	2.583	11.86	3.58	8.20
0.667	12.39	1.667	29.71	2.667	11.86	3.67	8.20
0.750	15.24	1.750	22.67	2.750	10.97	3.75	7.84
0.833	15.24	1.833	22.67	2.833	10.97	3.83	7.84
0.917	20.69	1.917	18.74	2.917	10.24	3.92	7.51
1.000	20.69	2.000	18.74	3.000	10.24	4.00	7.51

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.002 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 11.683
TOTAL RAINFALL (mm)= 87.089
RUNOFF COEFFICIENT = 0.134

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0010)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length	(m)= 10.00	Height	(m)= 1.00		
Porosity	= 0.40	Initial Water Level	(m)= 0.00		
Width	(m)= 1.50	Min. Drawdown	(hr)= 24.00		
Max. Drawdown	(hr)= 33.33	Available Storage	(cu.m.)= 6.00		

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.03	0.002	1.33	11.87
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.17
Volume of water for drawdown in LID (cu.m.)= 3.00
Volume of maximum water storage (cu.m.)= 3.01
Calculated Drawdown Time (Hr)= 16.58

Junction Command(0011)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0010)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0011)	0.00	0.00	0.00	0.00

ADD HYD (0012)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0011 <ID= 1> IS DRY.				
*** W A R N I N G : HYDROGRAPH 0012 = HYDROGRAPH 0003				
ID1= 1 (0011):	0.00	0.000	0.00	0.00
+ ID2= 2 (0003):	0.11	0.001	1.33	1.36
ID = 3 (0012):	0.11	0.001	1.33	1.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0012)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0012):	0.11	0.001	1.33	1.36
+ ID2= 2 (0006):	1.11	0.013	4.00	35.67
ID = 1 (0012):	1.22	0.013	4.00	32.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0012)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0008 <ID= 2> IS DRY.				
*** W A R N I N G : HYDROGRAPH 0003 = HYDROGRAPH 0001				
ID1= 1 (0012):	1.22	0.013	4.00	32.58
+ ID2= 2 (0008):	0.00	0.000	0.00	0.00
ID = 3 (0012):	1.22	0.013	4.00	32.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

25mm QUALITY STORM

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```


***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\35781785-a6fb-4e32-95b2-6436175a98e2\scen
Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\35781785-a6fb-4e32-95b2-6436175a98e2\scen

DATE: 07/09/2024 TIME: 03:34:10

USER:

COMMENTS: _____

****
** SIMULATION : 25 mm, 4 hr Norfolk **
****

READ STORM | Filename: C:\Users\Natalie\AppData\Local\Temp\211c29c2-c05c-4a63-afb7-6d129355c529\c2700bce
Ptotal= 25.00 mm | Comments: 25 mm, 4 hr Norfolk

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.17	12.56	2.33	3.61	3.50	1.96
0.17	1.90	1.33	51.29	2.50	3.19	3.67	1.85
0.33	2.16	1.50	16.17	2.67	2.87	3.83	1.75
0.50	2.51	1.67	8.96	2.83	2.61	4.00	1.67
0.67	3.03	1.83	6.38	3.00	2.41		
0.83	3.90	2.00	5.03	3.17	2.23		
1.00	5.69	2.17	4.19	3.33	2.09		

CALIB | STANDHYD (0001) | ID= 1 DT= 5.0 min | Area (ha)= 1.11 | Total Imp(%)= 93.00 | Dir. Conn.(%)= 93.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.03	0.08
Dep. Storage	(mm)=	1.00	16.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	86.02	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.167	5.69	2.250	4.19	3.33	2.23
0.167	0.00	1.250	12.56	2.333	4.19	3.42	2.09
0.250	1.90	1.333	12.56	2.417	3.61	3.50	2.09
0.333	1.90	1.417	51.29	2.500	3.61	3.58	1.96
0.417	2.16	1.500	51.29	2.583	3.19	3.67	1.96
0.500	2.16	1.583	16.17	2.667	3.19	3.75	1.85
0.583	2.51	1.667	16.17	2.750	2.87	3.83	1.85
0.667	2.51	1.750	8.96	2.833	2.87	3.92	1.75
0.750	3.03	1.833	8.96	2.917	2.61	4.00	1.75
0.833	3.03	1.917	6.38	3.000	2.61	4.08	1.67
0.917	3.89	2.000	6.38	3.083	2.41	4.17	1.67
1.000	3.90	2.083	5.03	3.167	2.41		
1.083	5.69	2.167	5.03	3.250	2.23		

Max.Eff.Inten.	(mm/hr)=	51.29	0.17	
over	(min)	5.00	10.00	
Storage Coeff.	(min)=	3.05 (ii)	6.32 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	10.00	
Unit Hyd. peak	(cms)=	0.27	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.14	0.00	0.143 (iii)
TIME TO PEAK	(hrs)=	1.50	2.58	1.50
RUNOFF VOLUME	(mm)=	24.00	0.38	22.34
TOTAL RAINFALL	(mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT	=	0.96	0.02	0.89

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CHAMBER(0004) | IN= 2--> OUT= 3 | DT= 5.0 min | OUTFLOW: ON, UNDERDRAIN: OFF, INFIL: ON
CHAMBER:
MAX STO VOL (cu.m.)= 776.77 Bottom Area(m2) = 679.72

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	991.00	467.67
25.00	6.90	1016.00	480.03
51.00	13.81	1041.00	492.21
76.00	20.71	1067.00	504.21
102.00	27.62	1092.00	515.99
127.00	34.52	1118.00	527.56
152.00	41.43	1143.00	538.89
178.00	48.33	1168.00	549.97
203.00	55.23	1194.00	560.77
229.00	62.14	1219.00	571.26
254.00	69.04	1245.00	581.41
279.00	75.95	1270.00	591.17
305.00	90.92	1295.00	600.42
330.00	105.81	1321.00	608.89
356.00	120.66	1346.00	616.72
381.00	135.46	1372.00	624.30
406.00	150.21	1397.00	631.65
432.00	164.91	1422.00	638.68
457.00	179.55	1448.00	645.59
483.00	194.14	1473.00	652.49
508.00	208.66	1499.00	659.39
533.00	223.12	1524.00	666.30
559.00	237.51	1549.00	673.20
584.00	251.83	1575.00	680.11
610.00	266.08	1600.00	687.01
635.00	280.25	1626.00	693.92
660.00	294.33	1651.00	700.82
686.00	308.33	1676.00	707.72
711.00	322.24	1702.00	714.63
737.00	336.05	1727.00	721.53
762.00	349.77	1753.00	728.44
787.00	363.37	1778.00	735.34
813.00	376.87	1803.00	742.25
838.00	390.24	1829.00	749.15
864.00	403.50	1854.00	756.05
889.00	416.62	1880.00	762.96
914.00	429.61	1905.00	769.86
940.00	442.45	1930.00	776.77
965.00	455.14	0.00	0.00

DEPTH (m)	DISCHARGE (cms)	DEPTH (m)	DISCHARGE (cms)
0.000	0.000	0.580	0.009
0.080	0.003	0.690	0.010
0.180	0.005	0.790	0.011
0.280	0.007	0.890	0.012
0.380	0.008	0.990	0.012
0.480	0.009	1.090	0.013

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	1.11	0.143	1.50	22.34
OUTFLOW:ID= 1	0.00	0.000	0.00	0.00
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)=		100.00
Time to reach Max storage	(Hr)=	4.17
Volume of water for drawdown in LID	(cu.m.)=	216.77
Volume of maximum water storage	(cu.m.)=	218.46
Calculated Drawdown Time	(Hr)=	26.58

Junction Command(0005)

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0004)		0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0005)		0.00	0.00	0.00	0.00

****

CALIB | NASHYD (0002) | ID= 1 DT= 5.0 min | Area (ha)= 0.05 | Ia (mm)= 16.50 | U.H. Tp(hrs)= 0.04 | Curve Number (CN)= 58.0 | # of Linear Res.(N)= 3.00

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.167	5.69	2.250	4.19	3.33	2.23
0.167	0.00	1.250	12.56	2.333	4.19	3.42	2.09
0.250	1.90	1.333	12.56	2.417	3.61	3.50	2.09
0.333	1.90	1.417	51.29	2.500	3.61	3.58	1.96
0.417	2.16	1.500	51.29	2.583	3.19	3.67	1.96
0.500	2.16	1.583	16.17	2.667	3.19	3.75	1.85
0.583	2.51	1.667	16.17	2.750	2.87	3.83	1.85
0.667	2.51	1.750	8.96	2.833	2.87	3.92	1.75
0.750	3.03	1.833	8.96	2.917	2.61	4.00	1.75
0.833	3.03	1.917	6.38	3.000	2.61	4.08	1.67
0.917	3.89	2.000	6.38	3.083	2.41	4.17	1.67
1.000	3.90	2.083	5.03	3.167	2.41		
1.083	5.69	2.167	5.03	3.250	2.23		

Unit Hyd Qpeak	(cms)=	0.048
PEAK FLOW	(cms)=	0.000 (i)
TIME TO PEAK	(hrs)=	2.333
RUNOFF VOLUME	(mm)=	0.223
TOTAL RAINFALL	(mm)=	24.999

RUNOFF COEFFICIENT = 0.009

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0007)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length	(m)=	20.00	Height	(m)=	1.00
Porosity	=	0.40	Initial Water Level	(m)=	0.00
Width	(m)=	1.50	Min. Drawdown	(hr)=	24.00
Max. Drawdown	(hr)=	33.33	Available Storage	(cu.m.)=	12.00

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.05	0.001	4.25	0.91
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):

If RVout= (Overflow	)=	100.00
Time to reach Max storage	(Hr)=	4.33
Volume of water for drawdown in LID	(cu.m.)=	0.25
Volume of maximum water storage	(cu.m.)=	0.28
Calculated Drawdown Time	(Hr)=	0.67

Junction Command(0008)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0007)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0008)	0.00	0.00	0.00	0.00

CALIB	
NASHYD (0003)	Area (ha)= 0.11 Curve Number (CN)= 58.0
ID= 1 DT= 5.0 min	Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.02

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.167	5.69	2.250	4.19	3.33	2.23
0.167	0.00	1.250	12.56	2.333	4.19	3.42	2.09
0.250	1.90	1.333	12.56	2.417	3.61	3.50	2.09
0.333	1.90	1.417	51.29	2.500	3.61	3.58	1.96
0.417	2.16	1.500	51.29	2.583	3.19	3.67	1.96
0.500	2.16	1.583	16.17	2.667	3.19	3.75	1.85
0.583	2.51	1.667	16.17	2.750	2.87	3.83	1.85
0.667	2.51	1.750	8.96	2.833	2.87	3.92	1.75
0.750	3.03	1.833	8.96	2.917	2.61	4.00	1.75
0.833	3.03	1.917	6.38	3.000	2.61	4.08	1.67
0.917	3.89	2.000	6.38	3.083	2.41	4.17	1.67
1.000	3.90	2.083	5.03	3.167	2.41		
1.083	5.69	2.167	5.03	3.250	2.23		

Unit Hyd Qpeak (cms)= 0.210

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 0.000
RUNOFF VOLUME (mm)= 0.000
TOTAL RAINFALL (mm)= 24.999
RUNOFF COEFFICIENT = 0.000

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

Junction Command(0006)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 1(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0006)	0.00	0.00	0.00	0.00

CALIB	
NASHYD (0009)	Area (ha)= 0.03 Curve Number (CN)= 58.0
ID= 1 DT= 5.0 min	Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.04

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.167	5.69	2.250	4.19	3.33	2.23
0.167	0.00	1.250	12.56	2.333	4.19	3.42	2.09
0.250	1.90	1.333	12.56	2.417	3.61	3.50	2.09
0.333	1.90	1.417	51.29	2.500	3.61	3.58	1.96
0.417	2.16	1.500	51.29	2.583	3.19	3.67	1.96
0.500	2.16	1.583	16.17	2.667	3.19	3.75	1.85
0.583	2.51	1.667	16.17	2.750	2.87	3.83	1.85
0.667	2.51	1.750	8.96	2.833	2.87	3.92	1.75
0.750	3.03	1.833	8.96	2.917	2.61	4.00	1.75
0.833	3.03	1.917	6.38	3.000	2.61	4.08	1.67
0.917	3.89	2.000	6.38	3.083	2.41	4.17	1.67
1.000	3.90	2.083	5.03	3.167	2.41		
1.083	5.69	2.167	5.03	3.250	2.23		

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 0.000
RUNOFF VOLUME (mm)= 0.000
TOTAL RAINFALL (mm)= 24.999
RUNOFF COEFFICIENT = 0.000

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

|SOAKAWAY(0010)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length	(m)=	10.00	Height	(m)=	1.00
Porosity	=	0.40	Initial Water Level	(m)=	0.00
Width	(m)=	1.50	Min. Drawdown	(hr)=	24.00
Max. Drawdown	(hr)=	33.33	Available Storage	(cu.m.)=	6.00

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.03	0.014	0.08	16.64
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):

If RVout= (Overflow	)=	100.00
Time to reach Max storage	(Hr)=	0.17
Volume of water for drawdown in LID	(cu.m.)=	4.20
Volume of maximum water storage	(cu.m.)=	4.51
Calculated Drawdown Time	(Hr)=	23.25

Junction Command(0011)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0010)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0011)	0.00	0.00	0.00	0.00

ADD HYD (0012)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0011 <ID= 1> IS DRY.				
*** W A R N I N G : HYDROGRAPH 0012 = HYDROGRAPH 0003				
ID1= 1 (0011):	0.00	0.000	0.00	0.00
+ ID2= 2 (0003):	0.11	0.000	0.00	0.00
ID = 3 (0012):	0.11	0.000	0.00	0.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0012)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0006 <ID= 2> IS DRY.				
*** W A R N I N G : HYDROGRAPH 0001 = HYDROGRAPH 0003				
ID1= 3 (0012):	0.11	0.000	0.00	0.00
+ ID2= 2 (0006):	0.00	0.000	0.00	0.00
ID = 1 (0012):	0.11	0.000	0.00	0.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0012)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0008 <ID= 2> IS DRY.				
*** W A R N I N G : HYDROGRAPH 0003 = HYDROGRAPH 0001				
ID1= 1 (0012):	0.11	0.000	0.00	0.00
+ ID2= 2 (0008):	0.00	0.000	0.00	0.00
ID = 3 (0012):	0.11	0.000	0.00	0.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

==========

APPENDIX F

10-034 Yin's Subdivision - Phase 5 Stormwater Management Report
(G. Douglas Vallee Engineering Limited, December 10, 2010)

vallee

Consulting Engineers, Architects & Planners

December 10, 2010

Tony Yin
204 McMichael Rd
RR#4
Waterford, ON N0E 1Y0

Attention: **Mr. Tony Yin**

Dear Sir:

Reference: **Storm Water Management Report**
Yin's Subdivision – Phase 5
Waterford – Norfolk County
Our File 10034

1.0 Introduction

This storm water report has been completed to summarize the storm water management design for Phase 5 of the Yin's Subdivision in Waterford, Norfolk County, Ontario. It is the intention to submit this report to the Norfolk County and the Long Point Region Conservation Authority for review and approval.

Yin's Subdivision Phase 5 is a single family residential development located at the southern end of Waterford along Main Street (Old Highway 24). The site is bordered by agricultural lands to the south and west; single-family residences to the north and Main Street to the west. Figure 1 shows the overall development. This report will outline the SWM plan for the overall development.

The SWMHYMO computer model has been used to simulate the sub watershed under pre and post development conditions. The simulations were conducted using the 4-hour Chicago Distribution design storm of the 2-year, 5-year, 10-year, 25-year, 50-year and 100-year storm events.

The receiver for the discharge from the development is the Waterford South Municipal Drain. This municipal drain is a storm sewer system and also includes a dry pond facility at the down stream end of the system. Therefore, a basic level of protection is proposed with respect to water quality enhancement.

2.0 Pre-Development

Typically, it is requirement for development sites to reduce or control the post development runoff from the site to levels that do not exceed pre-development conditions. This is achieved by directing the majority of runoff to a retention area or areas. The release from these areas is controlled by means of orifice plates and/or weirs.

However, in this case the outlet for the proposed SWM facility will be the Waterford South Municipal Drain, which is a storm sewer system. Therefore, the Drain has a finite design capacity and the capacity attributable to the portion of the site within the drainage area of the municipal drain will be the limiting factor for the total discharge from the site, post development. Figure 2 shows the overall development site along with the portion of the site that is within the Waterford South Municipal Drain. Design information for the storm sewer along Main Street is unavailable from Norfolk County. However, this office completed the design of the Waterford South Municipal Drain and it is known the 2-year design storm was used.

The total site area is approximately 14.0 ha and the portion within the Waterford South Municipal drain is approximately 6.0 ha.

The SWMHYMO computer model was used to simulate pre-development conditions the portion of the site within the municipal drain's drainage area. The model uses a modified SCS procedure to estimate losses that occur naturally during a rainfall event such as evaporation and infiltration. For the areas with rural runoff characteristics, Table 1 summarizes the background information and input parameters for the computer model with complete notes included with this report as Appendix A.

Table 1
SWMHYMO Model Input – Pre Development

Parameters	Value
Area (ha)	6.0 ha
Soil Type	Fox – sand and loamy sand Granby – sand and loamy sand Wilsonville – sandy textures over gravelly sand
Hydrologic Soil Group	A
SCS Curve Number	58
Longest Flow Path (m)	429m
Average Slope (%)	1.63%
Runoff Coeff	0.2
Time to Peak (hrs)	0.52

The estimated peak pre-development storm water runoff generated from portion of the site within the Waterford South Municipal Drain is 0.064 cms.

3.0 Post-Development

Due the topography of the existing site, specifically the low elevation of Main Street relative to the elevation of the proposed SWM facility, Blocks 3 and 4 as well as small portion of Street B will not be able to drain to the SWM facility. These areas will connect directly to the proposed outlet sewer along Main Street. Therefore to achieve the required reduction in post development discharge to the identified criteria for the site, these two blocks will have a limiting post development discharge of 0.015 cms each. Both Blocks 3 and 4 will be subject to a site plan approval process with Norfolk County and as part of any submissions for these sites a SWM plan will need to be included demonstrating that the limiting discharge is achieved for these sites.

As was indicated previously the total development site is approximately 14 ha. Therefore the contributing area to the proposed SWM facility can be estimated by reducing the total area by the areas of Blocks 3 and 4 as will as the portion of Street A (approximately 2.18 ha). This results in a contributing area to the SWM facility of 11.82 ha.

Post development, impervious land areas will be introduced to each of these areas to differing degrees. For the areas within the development the following assumptions have been made with respect to impervious surfaces introduced post development.

- Assumed roof and driveway area per town single family unit $230m^2$
- Municipal Road (includes sidewalk one side) $11m^2/m$
  (Road area considered directly connected to storm sewers)

The impervious land area introduced on the town house block and the apartment block has been assumed to be 75% of the total area of these blocks. Of this impervious area, 50% has been attributed to the parking/drive areas and therefore is considered directly connected.

For the commercial blocks, the impervious land area has assumed to 90% of total block areas with 50% of this impervious area corresponding to the parking/drive areas of the sites.

Table 2 summarizes the anticipated impervious land areas for the development.

Table 2
Post Development Impervious Areas

Area	Total Area (ha)	Impervious Area (ha)	Directly Connected (ha)
SFD	9.3	3.47	1.52
Block 1 – TWNHSE	0.57	0.43	0.21
Block 2 – Apartments	0.69	0.52	0.26
Block 3 - Commercial	0.8	0.72	0.36
Block 4 – Commercial	1.4	1.26	0.63
Block 5 – SWM	1.26	1.13	0.57
TOTAL	14.02	3.55	7.53

Discharge to Storage Relationship
To determine the required level of storage for a storm water detention pond, the post-development conditions were modeled, again using the SWMHYMO computer model. In order for the computer model to determine the storage volume required the relationship between the storage volume of the pond and the discharge must be defined and is referred to as the pond-rating curve. This rating curve is determined by calculating volume of the proposed pond facility up to a proposed contour elevation and then calculating the expected discharge from the facility based on the water level at this contour elevation and the proposed outlet control configuration.

Generally orifices or weirs can control discharge from SWM facilities. Each of these control methods can be used by the singular control or they can be used in combination depending on the discharge characteristics desired. For this facility only an orifice and weir will be used to control with the following equations used to estimate discharge

1. Orifice
   - $Q = C * A * \sqrt{2 * g * h}$

   where: Q = Discharge in cms
   C = constant, 0.63
   A = orifice area in m^2
   g = gravitational constant, 9.81 m/s^2
   h = height above orifice, m

For this facility a 125mm orifice will be used as the outlet control beginning at elevation 243.25. The complete rating curve is appended to this report as Appendix B.

Post Development Model
The post development model developed for this report as included as Appendix C. Table 3 summarizes the post development conditions for the storm events analyzed.

Table 3
Post Development Discharge

Event	Post Development to WSMD (cms)	Allowable Discharge to WSMD (cms)
2-Year	0.047	0.064
5-Year	0.050	
10-Year	0.053	
25-Year	0.055	
50-Year	0.057	
100-Year	0.060	

For all storm events the peak post development discharge to the WSMD has been controlled to less than the estimated peak pre development runoff from the contributing area to the WSMD.

4.0 Proposed SWM Facility

The Ministry of the Environment's document titled **Stormwater Management Practices Planning and Design Manual** (March 2003) was used in conjunction with requirements of the Norfolk County to determine the design for the storm water ponds for Yin's Subdivision. The following summarizes the design guidelines presented by the manual along with the corresponding value for the proposed facility. The complete calculations are provided as Appendix D.

a) Storage Sizing: Table 3.2 of the MOE design manual provides levels of storage volume required dependent on the percent impervious land area to provide basic protection. For a dry pond facility based on 54% impervious area of the contributing area to the facility, the required volume of storage is $147 m^3/ha$ of contributing area. For the contributing area of 11.82 ha this results in a required storage of 1,738 m^3 and compares to the 1,768 m^3 provided during the quality storm (2-year event).

b) Detention Time: During the quality storm the design manual indicates a 24 hr detention time as a minimum requirement for dry pond facilities with 48 hr preferred. For the proposed facility the runoff stored during the quality storm (2-year event) is estimated to be between 26 and 35 hours.

c) Minimum Orifice Size: A minimum orifice of 75mm is recommended for wet pond facilities and compares to the 125mm provided by this facility.

d) Active Storage Depth: The MOE guideline recommends a maximum active storage depth of 2.0m. The active storage depth ranges between 0.3m and 0.9m depending on the storm event.

e) Side Slopes: Average side slopes are recommended to be at 4(h):1(v) or flatter. The exposed side slopes of the proposed facility are proposed to be 5(h):1(v).

f) Forebay Settling Length: The design manual outlines the calculation of the required length for the forebay to allow a certain size of particle to settle. The calculation is based on the peak flow rate from the pond during the quality storm, the length to width ratio of the forebay and settling velocity of the particle size (0.0003 m/s). The resulting length is 11m and compares to the 50m provided depending on the pond inlet.

g) Forebay Dispersion Length: The design manual also outlines a calculation to determine the length of forebay required to slow a discharge. This calculation is based on the inlet flow rate during the quality storm (2-year), the depth of the permanent pool in the forebay and the desired velocity in the forebay (0.5 m/s). This results in a target forebay length of 8m and compares to the 38m provided.

h) Sediment Accumulation: Based on the anticipated sediment loading rates outlined by Table 6.3 of the MOE guidelines, the estimated sediment accumulation can be determined based on the impervious land area within the catchment area along with the target removal efficiency of the proposed facility. For the estimated 54% impervious land of the contributing area, sediment accumulation is estimated to be approximately 130m^3 over a 10-year period. This compares to the forebay volume of 444m^3.

5.0 Outlet Capacity

The proposed outlet for the SWM facility outlined by this report is the Waterford South Municipal Drain. The main branch of this drain was constructed along Thompson Road in Waterford and was designed based on the 2-year storm event. Following construction of this drain, the former Regional Municipality of Haldimand Norfolk constructed a storm sewer south along Main Street. The purpose of this storm sewer was to provide an outlet to lands identified within the drainage area of the WSMD. It is unclear as to the genesis of this extension, however it appears that drainage report was not completed to bring this extension under the umbrella of the WSMD.

As was noted previously by this report, the design information for the storm sewer extension along Main Street is unavailable. Therefore to determine if the Main Street storm sewer provides sufficient capacity, design calculations were completed based on the contributing drainage area and at the 2-year storm event, the design event for the WSMD. These calculations, which are appended to this report, indicate that the existing system has insufficient capacity to service the existing drainage area.

Furthermore, a review of the existing system profile has indicated that the system would have insufficient depth to service the proposed development site.

Therefore, it is proposed to reconstruct this system beginning at the intersection of Thompson Road and proceeding southerly along Main Street with a new storm system of sufficient depth and capacity to service the existing drainage area and the development site. As the design of the WSMD is based on the 2-year event, the design of this new system is based on the 2-year event as well as the controlled discharges from the development site up to the 100-year event. The complete calculations for this system are appended to this report.

6.0 Emergency Overflow

As part of the outlet structure for the proposed SWM facility, a 1.8m square precast concrete catch basin structure has been placed with its top corresponding to the anticipated water level of the proposed SWM facility during the 100-year storm event (244.09 +/-). In the event that a storm event in excess of the 100-year storm occurs or the primary outlet is blocked, discharge from the facility will begin to occur over the top of this structure prior to overflowing the top of bank surrounding the SWM facility.

7.0 Proposed SWM Facility Summary

The following summarizes the proposed SWM Facility, shown drawings SWM1, for the Phase 5 of the Yin's Subdivision in Waterford.

- A dry pond facility with a permanent pool elevation in the sediment forebay of 243.25, pond bottom of elevation in the sediment forebay of 242.00 and top of slope 244.25.
- Permanent pool depth of 1.25m in the sediment forebay with a volume of 896m^3
- Total storage volume provided for the 100-year storm event is 5,0690m^3.
- Discharge from the proposed facility controlled by a 125mm diameter orifice at elevation 234.25.
- Outlet from the proposed facility to be provided by an extension of the WSMD along Main Street to the site. The design of this system to based on the 2-year event for the contributing area along Main Street and the controlled discharge from the development site as follows:
    - SWM Facility - 0.03 cms
    - Block 3 Commercial - 0.015 cms
    - Block 4 Commercial - 0.015 cms
- Emergency overflow flow provided by catch basin structure with top of casting elevation placed at the approximate 100-year storage level (244.09 +/-).

8.0 Erosion and Sediment Control

During construction, the contractor is required to protect the work site and all adjacent lands from sediment and erosion regardless of the source to the satisfaction of all applicable parties. The measures installed by the contractor are to remain in place until such time as there is no further threat of damage.

9.0 The Drainage Act

During the draft plan approval stage of this development, County staff recognized that the development site was within the drainage area of the WSMD. Therefore, the following draft plan condition was stipulated:

> " 5. The applicant covenants and agrees to pay all costs related to the Corporation of Norfolk County hiring and engineer on behalf of the applicant as per Section 4(1) of the Drainage Act for the purpose of constructing an extension to the existing municipal drain or to construct an entirely new municipal drainage system to service the severed property(s)."

To begin this process a formal request needs to provided by the applicant to Norfolk County.

11.0 Conclusions and Recommendations

It is concluded that:

1. Post development flows from the development site have been controlled to less then the current discharge of the portion of the site within the drainage area of the WSMD.
2. The proposed storm water pond has sufficient capacity and meets the design guidelines outlined by the MOE's document titled **Stormwater Management Practices Planning and Design Manual** (March 2003) for basic protection and requirements Norfolk County.
3. The existing storm sewer along Main Street has insufficient capacity during the 2-year event for the current contributing area to this system.

It is recommended that:

1. This report is provided to the Norfolk County and the Long Point Region Conservation Authority as part of the engineering approval package for the development.
2. Pending approval by the municipality and receipt of the required Ministry of the Environment approvals, the Facility and associated appurtenances be constructed as outlined by this report.
3. The applicant formally request of Norfolk County the appointment of an engineer under the Drainage Act to address the extension of the WSMD to the development site.

We trust that this is the information for submission. Should you have any questions or require further information please do not hesitate to call. Thank you.

Yours truly,

T. Gregory Smith, P.Eng.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners

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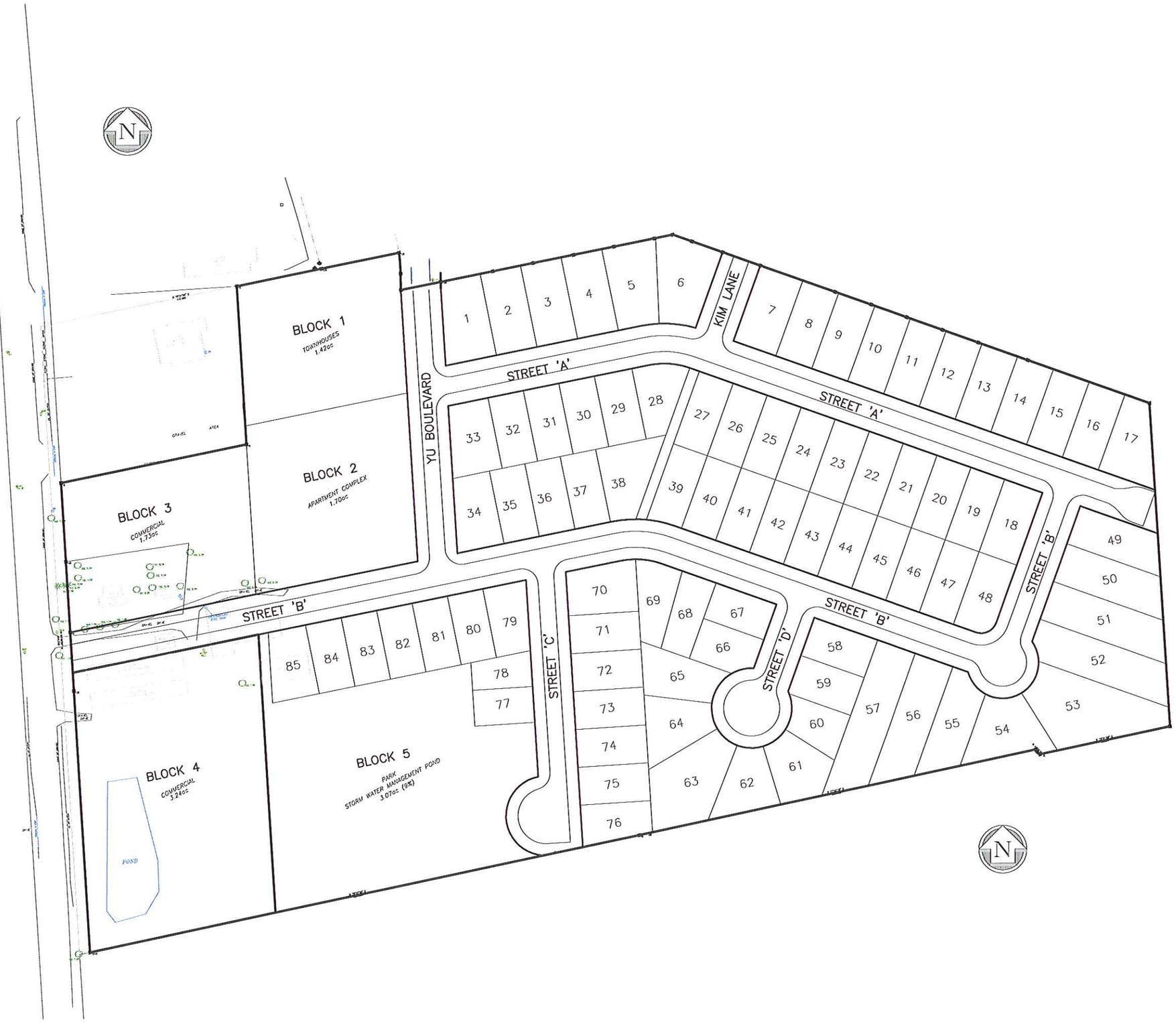
List of Figures

List of Appendices

List of Drawings



DATE	REVISION

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Stamp

vallee

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(519) 426-6270

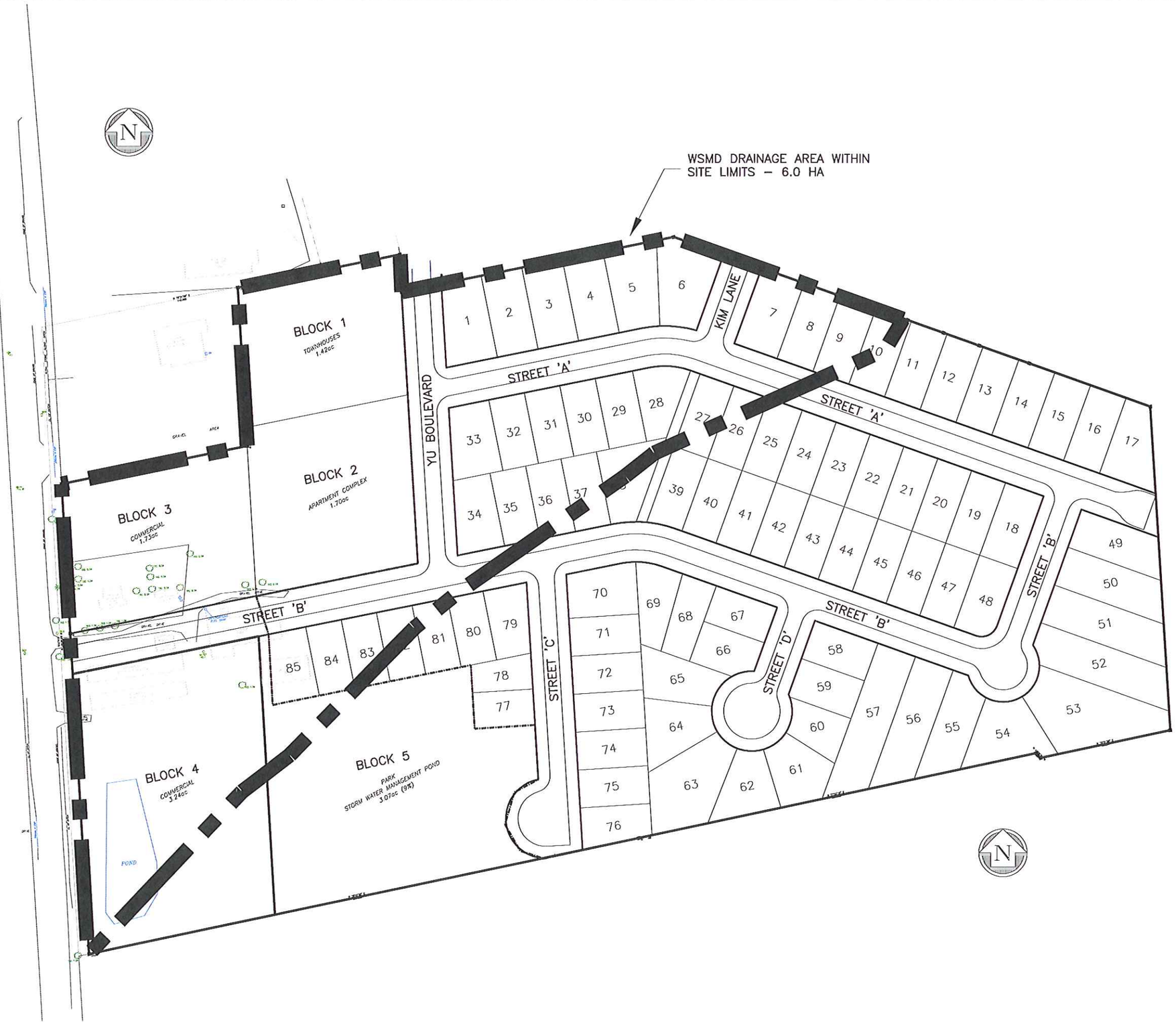
Project Title

YIN'S SUDIVISION
PHASE 5

Drawing Title

FIGURE 1
DEVELOPMENT LAYOUT

Designed by :	Drawn By :	Checked By :
TGS	TGS	
Scale : 1:2000	Date : DEC 2010	Drawing No. F1
Project No. 10034		



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SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Project Title

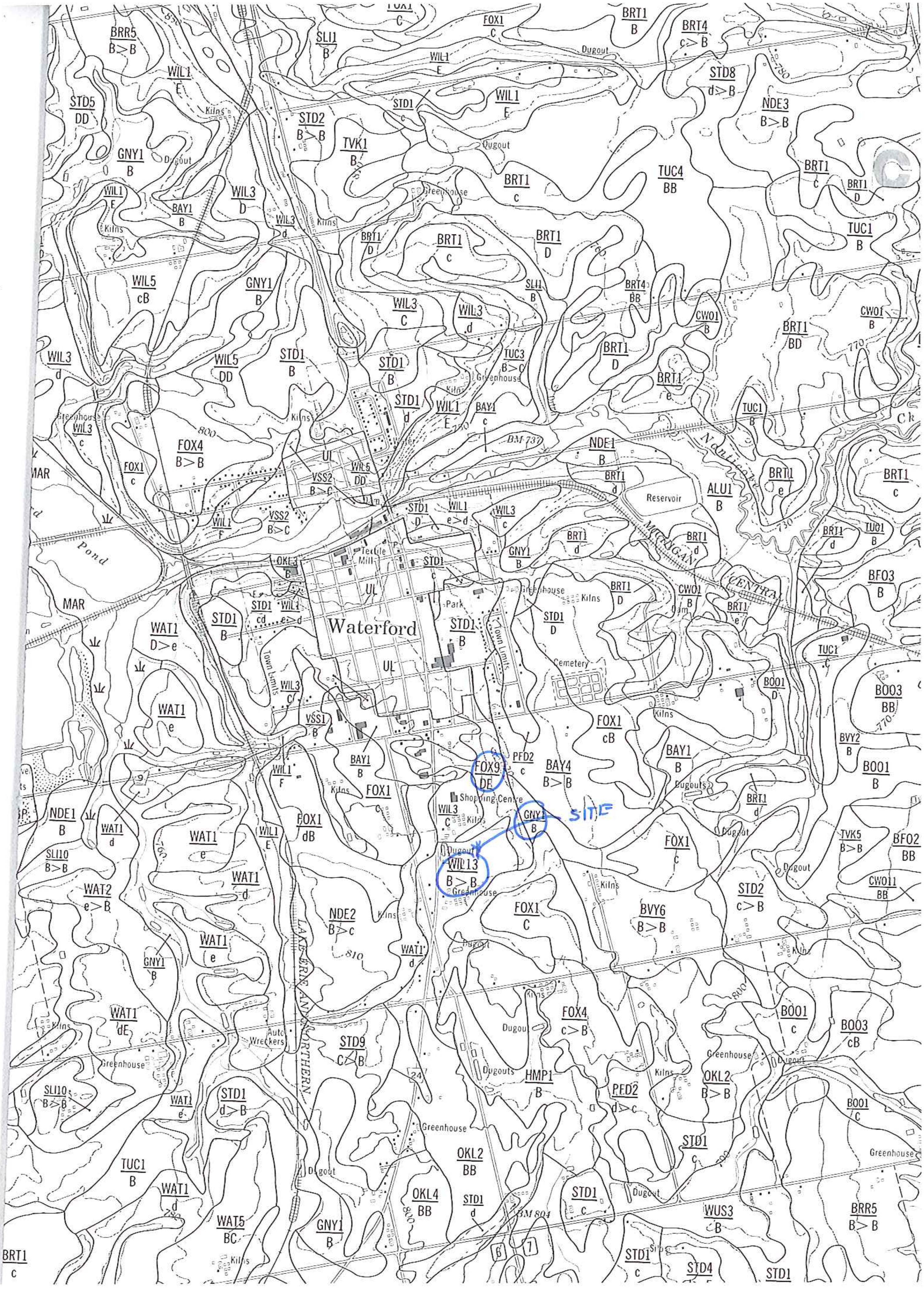
YIN'S SUDIVISION
PHASE 5

Drawing Title

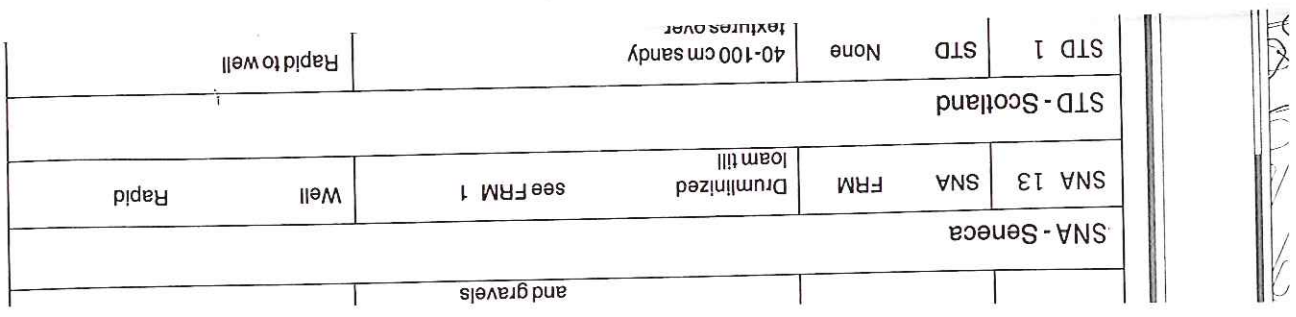
FIGURE 2
WSMD DRAINAGE AREA

Designed by :	Drawn By :	Checked By :
TGS	TGS	
Scale : 1:2000	Date : DEC 2010	Drawing No. F2
Project No. 10034		

Appendix A: Pre-Development Model


Waterford
SITE
FOX9
DE
GNY1
B
WIL13
B>B
Shopping Centre
Town Limits
Cemetery
Park
Textile Mill
Reservoir
Pond
MAR
UL
BM 737
BM 804
Greenhouse
Kilns
Dugout
Auto Wreckers
LAKE ERIE AND NORTHERN
MICHIGAN CENTRAL
Nanticoke Ck
BRR5
B>B
WIL1
E
STD5
DD
STD2
B>B
TVK1
B
SLI1
B
FOX1
C
BRT1
B
BRT4
c>B
STD8
d>B
NDE3
B>B
TUC4
BB
BRT1
c
WIL3
D
BAY1
B
WIL5
cB
GNY1
B
WIL3
C
STD1
B
WIL5
DD
TUC3
B>C
FOX4
B>B
VSS2
B>C
NDE1
B
ALU1
B
STD1
B
WAT1
D>e
BAY4
B>B
PFD2
c
BAY1
B
FOX1
cB
FOX1
dB
NDE2
B>c
FOX1
C
BVY6
B>B
STD2
c>B
FOX4
c>B
STD9
C>B
HMP1
B
PFD2
d>c
OKL2
B>B
OKL2
BB
OKL4
BB
TUC1
B
WAT5
BC
WUS3
B
BRR5
B>B
STD4
BO01
D
BO03
BB
BF03
B
BF02
BB
TVK5
B>B
CW011
BB
SLI10
B>B
WAT2
e>B
WAT1
dE

CWO 20	CWO.C	BRR	15-40 cm sandy textures over lacustrine silt loam	see BRR 1	Poor	Imperfect
CWO 22	CWO.P	HMP	15-40 cm organic materials over lacustrine silt loam	see HMP 1	Poor	Very poor
FOX - Fox						
FOX 1	FOX	None	Mainly lacustrine sand and loamy sand		Rapid to well	
FOX 3	FOX	GNY	see FOX 1	see GNY 1	Rapid to well	Poor
FOX 4	FOX	BAY	see FOX 1	see BAY 1	Rapid to well	Imperfect
FOX 8	FOX	BRR	see FOX 1	see BRR 1	Rapid to well	Imperfect
FOX 9	FOX	STD	see FOX 1	see STD 1	Rapid to well	Well
FOX 10	FOX	OKL	see FOX 1	see OKL 1	Rapid to well	Imperfect
FOX 13	FOX	CWO	see FOX 1	see CWO 1	Rapid to well	Poor
FRM - Farmington						
FRM 1	FRM	None	Less than 20 cm variable textures over bedrock		Rapid	
GNY - Granby						
GNY 1	GNY	None	Mainly lacustrine sand and loamy sand		Poor	
GNY 3	GNY.P	None	15-40 cm organic materials over lacustrine sand and loamy sand		Very poor	
GNY 4	GNY	BAY	see GNY 1	see BAY 1	Poor	Imperfect
GNY 6	GNY	FOX	see GNY 1	see FOX 1	Poor	Rapid to well
GNY 7	GNY	CWO	see GNY 1	see CWO 1	Poor	Poor
GNY 11	GNY	GNY.P	see GNY 1	see GNY 3	Poor	Very poor
GNY 15	GNY	OKL	see GNY 1	see OKL 1	Poor	Imperfect
GNY 17	GNY	BRR	see GNY 1	see BRR 1	Poor	Imperfect
GNY 18	GNY.P	TLD.C	see GNY 3	see TLD 2	Very poor	Poor



RAINAGE MPONENTS No. 2
Rapid
Variable
Rapid
Rapid to well
Rapid
Rapid to well

ll

l drainages. This informa-

mate proportions, and the

ents in the map unit. The onent refers to the No. 2 ient has been mapped in

the slope symbols appear s, a "greater than" symbol hat occupies at least 80%

ls B, c, C, d, D, e, E, f, F,

tand that many soil bound- several hectares, of uniden- cs to a depth of about 100

MAP UNIT SYMBOL	MAP UNIT COMPONENTS No. 1	MAP UNIT COMPONENTS No. 2	PARENT MATERIAL COMPONENTS No. 1	PARENT MATERIAL COMPONENTS No. 2	DRAINAGE COMPONENTS No. 1	DRAINAGE COMPONENTS No. 2
WIL - Wilsonville						
WIL 1	WIL	None	Mainly gravelly sandy till		Rapid to well	
WIL 3	WIL.C	None	15-40 cm sandy textures over gravelly sandy till		Rapid to well	
WIL 5	WIL	WIL.C	see WIL 1	see WIL 3	Rapid to well	Rapid to well
WIL 9	WIL.L	WIL	15-40 cm loamy textures over gravelly sandy till	see WIL 1	Rapid to well	Rapid to well
WIL 10	WIL.L	BRT	see WIL 9	see BRT 1	Rapid to well	Well
WIL 11	WIL.C	WIL	see WIL 3	see WIL 1	Rapid to well	Rapid to well
WIL 12	WIL.C	STD	see WIL 3	see STD 1	Rapid to well	Rapid to well
WIL 13	WIL.C	NDE	see WIL 3	see NDE 1	Rapid to well	Imperfect
WIL 14	WIL.C	OKL	see WIL 3	see OKL 1	Rapid to well	Imperfect
WSH - Walsher						
WSH 1	WSH	None	40-100 cm sandy textures over lacustrine silt loam		Well	
WUS - Wauseon						
WUS 1	WUS	None	40-100 cm sandy textures over lacustrine silty clay		Poor	
WUS 3	WUS.P	None	15-40 cm organic materials over lacustrine silty clay		Very poor	
WUS 4	WUS	BRR	see WUS 1	see BRR 1	Poor	Imperfect
WUS 6	WUS	TLD.C	see WUS 1	see TLD 2	Poor	Poor
WUS 9	WUS	SLI	see WUS 1	see SLI 1	Poor	Poor
WUS 10	WUS	TUC.C	see WUS 1	15-40 cm sandy textures over lacustrine silt loam	Poor	Imperfect

TVK - Ta
TVK 1
TVK 2
TVK 3
TVK 4
TVK 5
TVK 7
TVK 9
VSS - Va
VSS 1
VSS 2
WAT - V
WAT 1
WAT 2
WAT 3
WAT 4
WAT 5
WAT 8
WAT 1

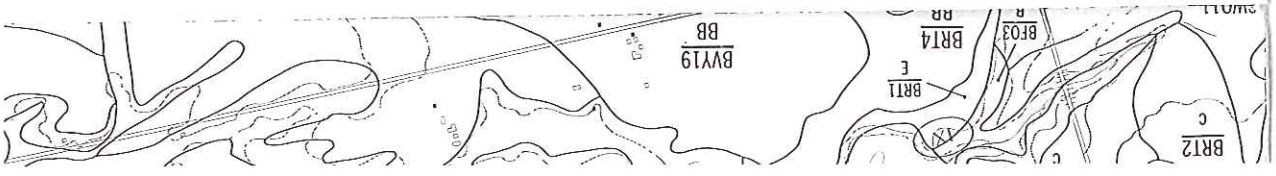


CHART C2-6 -continued

Soil Series	Soil Type	Hyd. Soil Grp.	Soil Series	Soil Type	Hyd. Soil Grp.	Soil Series	Soil Type	Hyd. Soil Grp.
Crombie	s l	B	Englehart	s l	B	Harriston	l	BC
"	si l	BC	Evanturel	si l	BC	"	si l	BC
Dack	c	D	"	si c l	C	Harrow	s	A
Dalton	s	AB	Falardeau	si l	BC	"	s l	AB
Darlington	s	B	"	si c l	C	"	l	B
"	l	C	Farmington	s l	A	Havelock	s /g	A
Dawson	s l	A	"	l	B	Hawkesvi.	l	B
"	l	B	"	c l	C	Haysville	s l	AB
Deloro	l	B	Ferndale	si l	BC	Heidelburg	f. s l	B
Devlin	si c /}	C	"	c l	C	Hendrie	s /g	AB
	c l }		Flamboro	s	B	Henwood	s /g	A
Dinorwic	c	BC	Floradale	l	B	Hespeler	s l	B
Dobie	c /l	BC	Fonthill	g	A	Hillier	c	C
Doe	s l	B	Font	g s l	A	Hillsburgh	s l	A
"	si l	BC	Forbes	c	D	Himsworth	si l	BC
Donald	l	B	Fox	s	A	Hinchinbr.	s l	B
Donnybrook	s g	A	"	s l	AB	"	l	BC
"	s l	AB	Foxboro	s	A	"	si l	BC
Dorion	c /l	C	Franktown	l	B	Honeywood	s l	AB
Dorking	si c l	BC	Freeport	s l	B	"	si l	BC
Dumfries	s l	A	Galesburg	s l	A	Howland	s l	B
"	l	AB	"	l	AB	"	l	BC
Dummer	s l	A	Gameland	s /g	AB	Huron	s l	B
"	l	B	Gananoque	c	C	"	l	BC
Dundonald	s l	AB	Gerow	c l	C	"	si l	BC
Dunedin	c	D	Gilford	s l	B	"	c l	CorD
Dymond	s l	AB	"	l	B	Innisville	s l	B
"	l	B	Gordon	si c	C	Jeddo	l	BC
Eagle Lake	s /g	AB	Granby	s	B	"	c l	C
Eamer	l	BC	"	s l	B	Kagawong	si l	BC
Earlton	si l	B	Grand	l	B	Kars	s /g	A
"	c l	C	Grenville	s l	A	Kemble	si l	BC
Eastport	s	A	"	l	BC	"	si c l	C
Edenvale	s	AB	Grimsby	s l	A	"	c l	D
Eganville	l	B	Guelph	s l	A	Kenabeek	s	B
Elderslie	si l	BC	"	l	BC	"	s l	B
"	si c l	C	"	si l	BC	Killean	l/s l	AB
"	c l	C	Guerin	s l	AB	King	si l	BC
Eldorado	s l	A	"	l	B	"	c l	C
"	l	B	Gwillimb.	g	AB	Kirkland	s l	A
Elk Pit	s g	A	Haileybury	si c l	C	Kossuth	s l	B
Ellwood	c l	C	"	si c	C	L'Achigan	s	AB
Elmbrook	si l	BC	"	c	CD	Lambton	l	BC
"	c l	C	Haldimand	si l	BC	"	si l	BC
"	c	C	"	si c l	C	Lanark	c	C
Elmira	l	B	"	c	CorD	Lansdowne	c /si l	C
Elmsley	s l	B	Hanbury	si c l	C	Leech	si c l	C
Embro	s l	BC	"	si c	C	"	c l	D
"	s l	C	"	c	D	Leitrim	g	B
Emily	l	B	Harkaway	l	B	Leith	si l	BC
Emo	c & p	C	"	si l	BC	Lily	l/s l	B

CHART C2-6

CHART C2-6 - continued

Soil Series	Soil Type	Hyd. Soil Grp.	Soil Series	Soil Type	Hyd. Soil Grp.	Soil Series Late	Soil Type Addit.	Hyd. Soil Grp.
Smithville	l	BC	Uplands	s	A	Percy	f s l	B
"	si c l	C	"	s l	A	Brisbane	l	B
"	si l	BC	Upsala	f s	AB	Donnybrook	l	B
Snedden	si c l	C	Vars	l	B			
Solmesville	c l	C	Vasey	s l	AB			
South Bay	c l	D	"	l	B			
"	c	D	Vergennes	si l	BC			
Spohn	s /g / c	BC	"	l	BC			
			"	c	C			
Springvale	s l	A	Vincent	si l	BC			
Stafford	l	B	"	si c l	C			
Stockdale	si l/f		"	c l	D			
	s	B	Vineland	s l	AB			
St, Clem.	s l	A	Wabi	s l	A			
"	si c l	C	"	l	B			
St. Jacobs	l	B	Wabigoon	c	C			
St. Peter	s /g	A	Waterloo	s	A			
St. Rosalie	c	C	"	s l	A			
St. Samuel	s	B	Watrin	s	B			
"	s l	B	Waupoos	c l	D			
St. Thomas	s	A	"	c	D			
Sullivan	s	A	Wauseon	s l	B			
"	s l	A	Wayside	s	AB			
Sutton Bay	s	B	Welland	c	C			
"	s l	B	Wellesley	s l	AB			
Tansley	c	D	"	si c l	C			
Tavistock	s l	AB	Wemyss	s l	AB			
"	si l	BC	Wendigo	s	A			
Tecumseth	s	AB	"	s l+r	AB			
Teeswater	si l	B	Wendover	c l	D			
Tennyson	s l	A	Westmeath	s	A			
Thames	c l	D	Whitby	l	BC			
Thorah	s	B	White Lake	s /g	A			
Thornloe	c	C	Whitfield	si l	B			
Thwaites	si l	BC	Wiarton	l	B			
Tioga	s	A	"	si l	BC			
"	s l	A	Wilmot	s l	B			
Toledo	si l	BC	"	si c l	C			
"	si c l	C	Winona	s l	AB			
"	c l	C	Woburn	s l	A			
"	c	C	"	l	B*			
Trafalgar	c	D	Wolford	c l	D			
Trent	s	AB	Wolsey	si c	C			
Tuscola	s l	AB	Wooler	si l/f				
"	si l	BC		s	AB			
Tweed	s l	A	Woolwich	l	BC			
Undiffer'd	s l +r	AB or B (dep. on depth)	Worthing.	s /g /c	BC			
			Wyevale	s /g	A			

WILSONVILLE NOT LISTED - SANDY => GROUP A.

*Rev. 79 06 01

CHART C2-8 - SOIL/LAND USE CURVE NUMBERS

Land Use	Hydrologic Soil Group						
	A	AB	B	BC	C	CD	D
Fallow (special cases only)	77	82	86	89	91	93	94
Crop and other improved land	66*	70	74	78	82	84	86
Pasture & other unimproved land	58*	62*	65	71	76	79	81
Woodlots and forest	50*	54*	58	65	71	74	77
Impervious areas (paved)		98					
Bare rock draining directly to stream		98					
Bare rock draining indirectly to stream		70					
Water surfaces		100	(use in special cases only)				

Notes

1. Figures are based on average antecedent moisture condition (AMC II) except those marked *, which are initially wet (AMC III) or an intermediate condition. For definition of AMC's see Chart C2-10.
2. Table is not applicable to frozen soils or to periods in which snowmelt contributes to runoff.
3. For detailed values in urban areas see Table 2.2 of ref. 14.
4. Source: SCS Handbook of Hydrology, Chapter 9 (9), with modifications.

CHART C2-9 - PERCENT IMPERVIOUSNESS OF URBAN AREAS

Urban Land Use	% Imperviousness
Business - Commercial	40 - 90
Industrial - Light	45 - 65
Industrial - Heavy	50 - 70
Residential - Low density	20 - 30
Residential - Medium density	25 - 35
Residential - High density	30 - 40

Source: SCS Handbook of Hydrology, Chapter 15 (9)

vallee
Consulting Engineers, Architects & Planners

Subject: Yin Phase 5
Date: Nov 2/10 By: TGS
Project #: 10034 Page

High Density - predevelopment and current state

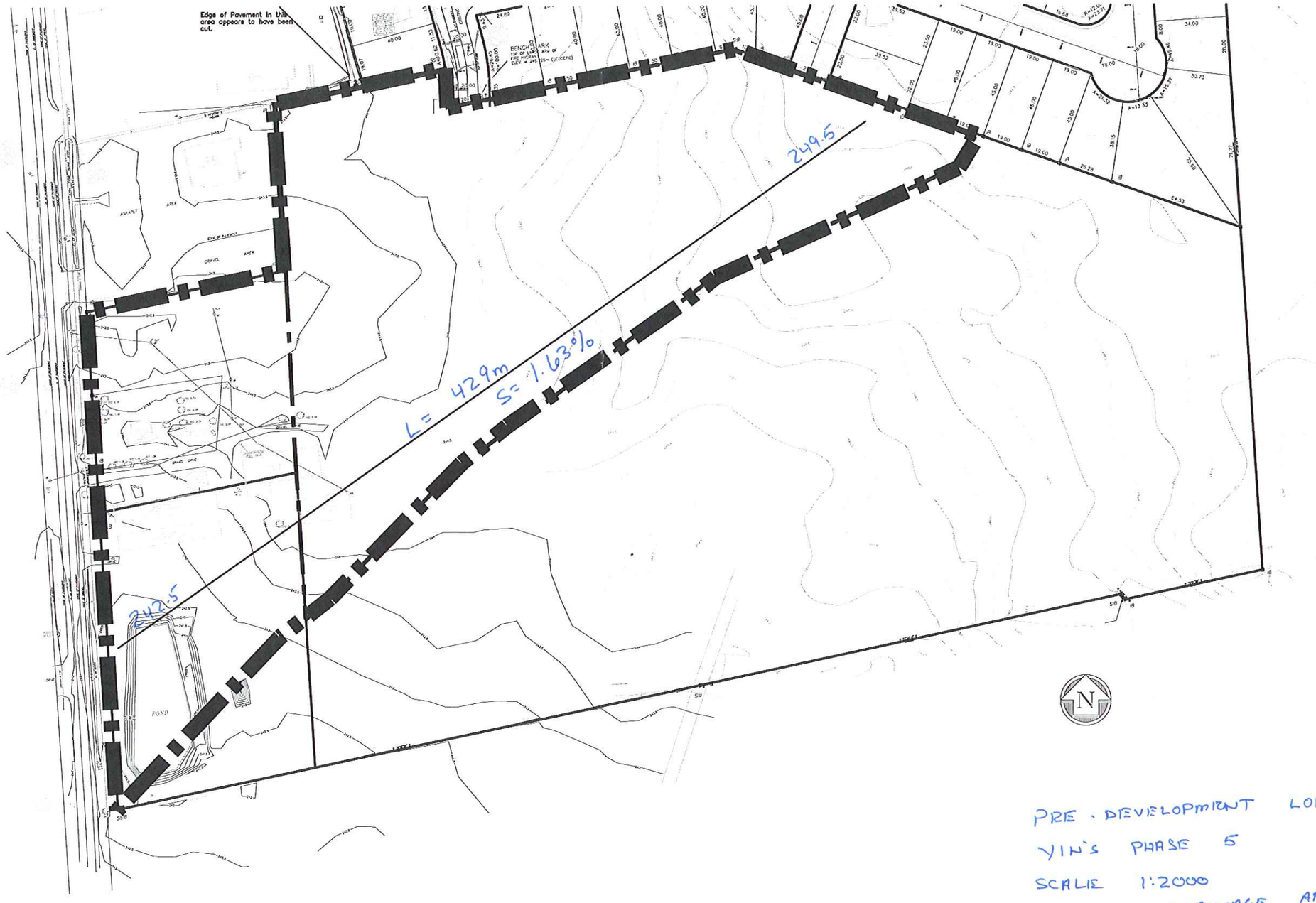
tc calc for upstream drainage area

tc = 3.26*(1.1-C)*L^(0.5)/S^0.333 (airport formula)

L as above	429 m
S as above but as percent	1.63 %
C, rational Runoff Coefficient (Pre dev)	0.2

tc = 52 min 0.86 hrs

tp = 0.6 *tc tp = 0.52 hrs



PRE - DEVELOPMENT LONGIEST FLOWPATH

YIN'S PHASE 5

SCALE 1:2000

PRE-DEV DRAINAGE AREA TO WATERFORD SOUTH MUNICIPAL DRAIN.

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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   000        999    999  ==========
 S      W W W  MM MM  H   H   Y Y   MM MM  0   0      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  0   0  ##  9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  0   0       9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   000            9      9 ==========
                                                      9   9  9   9 # 3568969
      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: G. Douglas Vallee Limited                        +++++++
 +++++++                Simcoe                 SERIAL#:3568969          +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


 ********************   D E T A I L E D   O U T P U T   ********************
 ********************************************************************************
 *       DATE: 2010-11-22     TIME: 14:14:54     RUN COUNTER: 001100       *
 ********************************************************************************
 * Input   filename: H:\SWMHYM~1\10034Y~1\PREDEV.DAT                            *
 * Output  filename: H:\SWMHYM~1\10034Y~1\PREDEV.out                            *
 * Summary filename: H:\SWMHYM~1\10034Y~1\PREDEV.sum                            *
 * User comments:                                                               *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 ********************************************************************************

--------------------------------------------------------------------------------
001:0001----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [YINS PHASE 5]    Project Number: [101034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
*#  License #   :  3568969
*#*****************************************************************************
--------------------
| START            |  Project dir.: H:\SWMHYM~1\10034Y~1\
--------------------  Rainfall dir.: H:\SWMHYM~1\10034Y~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
          #  1=CH2.STM
--------------------------------------------------------------------------------
001:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: H:\SWMHYM~1\10034Y~1\CH2.STM
| Ptotal=  39.39 mm|    Comments: 2 YEAR CHICAGO 4 HOUR DESIGN STORM DISTR
--------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .17   3.250 |   1.17   8.940 |   2.17   8.150 |   3.17   4.390
             .33   3.560 |   1.33  16.920 |   2.33   7.010 |   3.33   4.110
             .50   3.960 |   1.50  78.820 |   2.50   6.200 |   3.50   3.890
             .67   4.520 |   1.67  21.890 |   2.67   5.590 |   3.67   3.680
             .83   5.310 |   1.83  13.000 |   2.83   5.110 |   3.83   3.510
            1.00   6.550 |   2.00   9.880 |   3.00   4.720 |   4.00   3.350

--------------------------------------------------------------------------------
001:0003----------------------------------------------------------------------
********************************************************************************
*
*
*  PRE DEVELOPMENT MODEL - ENTIRE SITE
*
*
********************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=   14.00   Curve Number   (CN)=58.00
| 01:PREDEV DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .670

     Unit Hyd Qpeak  (cms)=     .798

     PEAK FLOW       (cms)=     .111 (i)
     TIME TO PEAK    (hrs)=    2.400
     RUNOFF VOLUME    (mm)=    6.471
     TOTAL RAINFALL   (mm)=   39.385
     RUNOFF COEFFICIENT   =     .164

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0004----------------------------------------------------------------------
********************************************************************************
*
*
*  PORTION OF SITE THAT DRAINS TO WSMD AND WILL DRAIN TO POND
*
*
********************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=    4.12   Curve Number   (CN)=58.00
| 02:WSMD   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .520

     Unit Hyd Qpeak  (cms)=     .303

     PEAK FLOW       (cms)=     .038 (i)
     TIME TO PEAK    (hrs)=    2.167
     RUNOFF VOLUME    (mm)=    6.471
     TOTAL RAINFALL   (mm)=   39.385
     RUNOFF COEFFICIENT   =     .164

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0005----------------------------------------------------------------------
********************************************************************************
*
*
* PRE DEVELOPMENT TO WSMD
*
*
********************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.02   Curve Number   (CN)=62.00
| 03:WSMD   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .520

     Unit Hyd Qpeak  (cms)=     .442

     PEAK FLOW       (cms)=     .064 (i)
     TIME TO PEAK    (hrs)=    2.167
     RUNOFF VOLUME    (mm)=    7.415
     TOTAL RAINFALL   (mm)=   39.385
     RUNOFF COEFFICIENT   =     .188

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0006----------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2010-11-22     at 14:14:54
================================================================================
```

Appendix B: Pond Rating Curves

vallee
Consulting Engineers, Architects & Planners

Subject: Yins Phase 5
Date: Dec-10 By: TGS
Project #: 10034 Page

Orifgice Elevation 243.25 m
Orifice Dia 0.125 m
Orifice Area 0.012272 m2

Discharge Coeff 0.63

	Forebay m2	Main m2	Total m2	Incr Vol m3	Cum Vol m3	H above Orifice m	Orifice Q cms	Storage ha*m	Incr Time to Drain hr	Cum. Time to Drain hr
243.25	717	4485	5202	0	0	0	0	0	0	
243.35	778	4626	5404	530	530	0.0375	0.006632	0.05303		
243.45	841	4769	5610	551	1081	0.1375	0.012698	0.1081	15.8	15.8
243.55	906	4913	5819	571	1652	0.2375	0.016689	0.165245	10.8	26.6
243.65		6042	6042	593	2245	0.3375	0.019895	0.22455	9.0	35.6
243.75		6196	6196	612	2857	0.4375	0.022651	0.28574	8.0	43.6
243.85		6351	6351	627	3485	0.5375	0.025107	0.348475	7.3	50.9
243.95		6508	6508	643	4128	0.6375	0.027343	0.41277	6.8	57.7
244.05		6667	6667	659	4786	0.7375	0.029409	0.478645	6.4	64.2
244.15		6827	6827	675	5461	0.8375	0.03134	0.546115	6.2	70.4
244.25		6989	6989	691	6152	0.9375	0.033158	0.615195	6.0	76.3

244.15 0.5461
244.05 0.4786

244.09 0.5069 Elevation at 100-year storage

Appendix C: Post Development Model

vallee
Consulting Engineers, Architects & Planners

Subject: YIN PHASE 5
Date: NOV 2/10 By: TGS
Project #: 10034 Page

IMPERVIOUS AREA ASSUMPTIONS:

AVERAGE DWELLING ROOF AREA:	185	m2	
AVERAGE DWELLING DRIVEWAY AREA:	45	m2	
TOTAL IMPERVIOUS AREA PER DWELLING:	230	m2	0.023 ha
ROADWAY AND ONE SIDE SIDEWALK AREA PER METRE LENGTH OF ROAD:	11	m2	0.0011 ha

Area No.	Total Area (ha)	No. of Dwell	Dwellling Imp Area (ha)	Street Lenth (m)	Street Imp Area (ha)	Dir Conn Ratio	Total Imp Area (ha)	Imp Area Ratio
SFD	9.3	85	1.96	1380	1.52	0.16	3.47	0.37
BLOCK 1 TOWN HOUSES	0.57				0.21	0.38	0.43	0.75
BLOCK 2 APARTMENTS	0.69				0.26	0.38	0.52	0.75
BLOCK 3 COMMERCIAL	0.8				0.36	0.45	0.72	0.90
BLOCK 4 COMMERCIAL	1.4				0.63	0.45	1.26	0.90
BLOCK 5 SWM	1.26				0.57	0.45	1.13	0.90
	14.02				3.5475	0.25	7.532	0.54

1) IMPERVIOUS AREAS FOR BLOCKS 1 THOUGH 5 HAVE BEEN ASSUMED BASED ON RUNOFF COEFFICIENTS FOR APPLICABLE LAND USE PER NORFOLK COUNTY'S CURRENT DESIGN CRITERIA.
2) FOR DIRECTLY CONNECTED AREAS (IE DRIVES AND PARKING) OF BLOCKS 1 THROUGH 5, 50% OF THE TOTAL IMPERVIOUS AREA HAS BEEN ASSUMED.
3) TOTAL AREA DOES NOT EQUAL TOTAL SITE AREA AS APPROXIMATELY 0.2 HA OF STREET B WILL NOT FLOW TO SWM FACILITY.

TOTAL STREET LENGTH

580
150
80
370
50
150
1380m

1:2000

```
===========================================================================
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 # 3568969
     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: G. Douglas Vallee Limited                   +++++++
+++++++             Simcoe                   SERIAL#:3568969      +++++++
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

*******************   D E T A I L E D   O U T P U T   *******************
**************************************************************************
*      DATE: 2010-11-22      TIME: 14:15:43      RUN COUNTER: 001101     *
**************************************************************************
* Input   filename: H:\SWMHYM~1\10034Y~1\PSTDEV.DAT                      *
* Output  filename: H:\SWMHYM~1\10034Y~1\PSTDEV.out                      *
* Summary filename: H:\SWMHYM~1\10034Y~1\PSTDEV.sum                      *
* User comments:                                                         *
* 1:_____________________________________________________________________*
* 2:_____________________________________________________________________*
* 3:_____________________________________________________________________*
**************************************************************************

--------------------------------------------------------------------------
001:0001------------------------------------------------------------------
*#************************************************************************
*#  Project Name: [YINS PHASE 5]    Project Number: [10034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
*#  License #   :  3568969
*#************************************************************************
-------------------
| START            |  Project  dir.: H:\SWMHYM~1\10034Y~1\
-------------------   Rainfall dir.: H:\SWMHYM~1\10034Y~1\
    TZERO =    .00 hrs on        0
    METOUT=    2 (output = METRIC)
    NRUN  =  001
    NSTORM=    1
           #  1=CH2.STM
--------------------------------------------------------------------------
001:0002------------------------------------------------------------------
-------------------
| READ STORM       |    Filename: H:\SWMHYM~1\10034Y~1\CH2.STM
| Ptotal=  39.39 mm|    Comments: 2 YEAR CHICAGO 4 HOUR DESIGN STORM DISTR
-------------------
              TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME    RAIN
               hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs   mm/hr
               .17    3.250 |   1.17    8.940 |   2.17    8.150 |   3.17   4.390
               .33    3.560 |   1.33   16.920 |   2.33    7.010 |   3.33   4.110
               .50    3.960 |   1.50   78.820 |   2.50    6.200 |   3.50   3.890
               .67    4.520 |   1.67   21.890 |   2.67    5.590 |   3.67   3.680
               .83    5.310 |   1.83   13.000 |   2.83    5.110 |   3.83   3.510
              1.00    6.550 |   2.00    9.880 |   3.00    4.720 |   4.00   3.350

--------------------------------------------------------------------------
001:0003------------------------------------------------------------------
**************************************************************************
*
*
* SFD
*
*
**************************************************************************
---------------------
| DESIGN STANDHYD    |   Area    (ha)=    9.30
| 01:SFD    DT= 1.00 |   Total Imp(%)=   37.00   Dir. Conn.(%)=   16.00
---------------------
                            IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=      3.44          5.86
     Dep. Storage      (mm)=       .80          1.50
     Average Slope      (%)=      1.00          1.00
     Length             (m)=    249.00         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=      78.82         11.25
                over (min)        5.00         26.00
     Storage Coeff.  (min)=       4.86 (ii)    25.68 (ii)
     Unit Hyd. Tpeak (min)=       5.00         26.00
     Unit Hyd. peak  (cms)=        .23           .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .27           .11          .301 (iii)
     TIME TO PEAK    (hrs)=       1.52          1.92         1.517
     RUNOFF VOLUME    (mm)=      38.58          8.31        13.152
     TOTAL RAINFALL   (mm)=      39.38         39.38        39.385
     RUNOFF COEFFICIENT   =        .98           .21          .334

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =   58.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
001:0004------------------------------------------------------------------
```

```
**************************************************************************
*
*
* BLOCK 1 TOWNHOUSES
*
*
**************************************************************************
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .57
| 02:BLK1   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
---------------------
                            IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       .43           .14
     Dep. Storage      (mm)=       .80          1.50
     Average Slope      (%)=      1.00          1.00
     Length             (m)=     61.64         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=      78.82         48.36
                over (min)        2.00         14.00
     Storage Coeff.  (min)=       2.10 (ii)    13.72 (ii)
     Unit Hyd. Tpeak (min)=       2.00         14.00
     Unit Hyd. peak  (cms)=        .54           .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .05           .01          .052 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.70         1.500
     RUNOFF VOLUME    (mm)=      38.58         13.32        22.918
     TOTAL RAINFALL   (mm)=      39.38         39.38        39.385
     RUNOFF COEFFICIENT   =        .98           .34          .582

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =   58.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
001:0005------------------------------------------------------------------
**************************************************************************
*
*
* BLOCK 2 APARTMENTS
*
*
**************************************************************************
---------------------
| DESIGN STANDHYD    |   Area    (ha)=     .69
| 03:BLK2   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
---------------------
                            IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       .52           .17
     Dep. Storage      (mm)=       .80          1.50
     Average Slope      (%)=      1.00          1.00
     Length             (m)=     67.82         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=      78.82         48.36
                over (min)        2.00         14.00
     Storage Coeff.  (min)=       2.23 (ii)    13.85 (ii)
     Unit Hyd. Tpeak (min)=       2.00         14.00
     Unit Hyd. peak  (cms)=        .52           .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .06           .01          .063 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.70         1.500
     RUNOFF VOLUME    (mm)=      38.58         13.32        22.918
     TOTAL RAINFALL   (mm)=      39.38         39.38        39.385
     RUNOFF COEFFICIENT   =        .98           .34          .582

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =   58.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
001:0006------------------------------------------------------------------
**************************************************************************
*
*
* BLOCK 5 SWM
*
*
**************************************************************************
---------------------
| DESIGN STANDHYD    |   Area    (ha)=    1.26
| 06:BLK5   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
---------------------
                            IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=      1.13           .13
     Dep. Storage      (mm)=       .80          1.50
     Average Slope      (%)=      1.00          1.00
     Length             (m)=     91.65         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=      78.82          6.11
                over (min)        3.00         29.00
     Storage Coeff.  (min)=       2.67 (ii)    29.24 (ii)
     Unit Hyd. Tpeak (min)=       3.00         29.00
     Unit Hyd. peak  (cms)=        .40           .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .24           .00          .241 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.97         1.500
     RUNOFF VOLUME    (mm)=      38.58          6.47        35.374
     TOTAL RAINFALL   (mm)=      39.38         39.38        39.385
     RUNOFF COEFFICIENT   =        .98           .16          .898

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =   58.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
001:0007------------------------------------------------------------------
**************************************************************************
*
*
* DETERMINE INFLOW TO POND
*
*
```

```
**********************************************************************
---------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
-------------------- ID1 01:SFD     (ha)     (cms)    (hrs)    (mm)     (cms)
                  ID1 01:SFD       9.30     .301     1.52    13.15     .000
                 +ID2 02:BLK1      .57      .052     1.50    22.92     .000
                 +ID3 03:BLK2      .69      .063     1.50    22.92     .000
                 +ID4 06:BLK5     1.26      .241     1.50    35.37     .000
                  ==========================================================
                  SUM 07:PSTDEV   11.82      .651     1.50    16.56     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0008----------------------------------------------------------------------
**********************************************************************
*
*
* ROUTE THROUGH POND
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>07:(PSTDEV)    |
| OUT<08:(PNDOUT)    |    =========  OUTFLOW STORAGE TABLE  =========
--------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .025  .3535E+00
                            .007  .5520E-01    |     .027  .4178E+00
                            .013  .1118E+00    |     .029  .4837E+00
                            .017  .1700E+00    |     .031  .5512E+00
                            .020  .2296E+00    |     .033  .6203E+00
                            .023  .2908E+00    |     .000  .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (PSTDEV)       11.82      .651     1.500     16.562
     OUTFLOW<08: (PNDOUT)       11.82      .017     4.533     16.561
    OVERFLOW<09: (PNDOVR)         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=       .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.623
                  TIME SHIFT OF PEAK FLOW          (min)=   182.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1768E+00

------------------------------------------------------------------------------
001:0009----------------------------------------------------------------------
**********************************************************************
*
*
* BLOCK 3 COMMERCIAL
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .80
| 04:BLK3    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      .72          .08
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    73.03        40.00
     Mannings n            =    .013         .250

     Max.eff.Inten.(mm/hr)=    78.82       230.54
               over (min)      2.00         9.00
     Storage Coeff.  (min)=    2.33 (ii)    8.55 (ii)
     Unit Hyd. Tpeak (min)=    2.00         9.00
     Unit Hyd. peak  (cms)=     .51          .13
                                                    *TOTALS*
     PEAK FLOW       (cms)=     .08          .03        .102 (iii)
     TIME TO PEAK    (hrs)=    1.50         1.60       1.500
     RUNOFF VOLUME    (mm)=   38.58        21.08      28.960
     TOTAL RAINFALL   (mm)=   39.38        39.38      39.385
     RUNOFF COEFFICIENT    =    .98          .54        .735

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0010----------------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STORAGE ON BLOCK 3 TO RELEASE AT CONTROLLED RATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>04:(BLK3  )    |
| OUT<01:(B3CTRL)    |    =========  OUTFLOW STORAGE TABLE  =========
--------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .015  .1000E+01
                            .015  .1000E-03    |     .000  .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (BLK3  )         .80      .102     1.500      28.960
     OUTFLOW<01: (B3CTRL)         .80      .015     1.233      28.960
    OVERFLOW<02: (3OVR  )         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=       .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   14.763
                  TIME SHIFT OF PEAK FLOW          (min)=  -16.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.9246E-02

------------------------------------------------------------------------------
001:0011----------------------------------------------------------------------
**********************************************************************
*
*
* BLOCK 4 COMMERCIAL
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=    1.40
| 05:BLK4    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.26          .14
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    96.61        40.00
     Mannings n            =    .013         .250

     Max.eff.Inten.(mm/hr)=    78.82       230.54
               over (min)      3.00         9.00
     Storage Coeff.  (min)=    2.75 (ii)    8.97 (ii)
     Unit Hyd. Tpeak (min)=    3.00         9.00
     Unit Hyd. peak  (cms)=     .40          .13
                                                    *TOTALS*
     PEAK FLOW       (cms)=     .13          .06        .174 (iii)
     TIME TO PEAK    (hrs)=    1.50         1.60       1.500
     RUNOFF VOLUME    (mm)=   38.58        21.08      28.960
     TOTAL RAINFALL   (mm)=   39.38        39.38      39.385
     RUNOFF COEFFICIENT    =    .98          .54        .735

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0012----------------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STORAGE ON 4 TO RELEASE AT CONTROLLED RATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>05:(BLK4  )    |
| OUT<03:(B4CTRL)    |    =========  OUTFLOW STORAGE TABLE  =========
--------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .015  .1000E+01
                            .015  .1000E-03    |     .000  .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >05: (BLK4  )        1.40      .174     1.500      28.960
     OUTFLOW<03: (B4CTRL)        1.40      .015     1.067      28.960
    OVERFLOW<04: (4OVR  )         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=       .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    8.616
                  TIME SHIFT OF PEAK FLOW          (min)=   -26.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.2211E-01

------------------------------------------------------------------------------
001:0013----------------------------------------------------------------------
**********************************************************************
*
*
* TOTAL POST DEVELOPMENT FROM SITE
*
*
**********************************************************************
--------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
-------------------- ID1 08:PNDOUT (ha)     (cms)    (hrs)    (mm)     (cms)
                  ID1 08:PNDOUT    11.82     .017     4.53    16.56     .000
                 +ID2 09:PNDOVR      .00     .000      .00      .00     .000 **DRY**
                 +ID3 01:B3CTRL      .80     .015     1.23    28.96     .000
                 +ID4 02:3OVR        .00     .000      .00      .00     .000 **DRY**
                 +ID5 03:B4CTRL     1.40     .015     1.07    28.96     .000
                 +ID6 04:4OVR        .00     .000      .00      .00     .000 **DRY**
                  ==========================================================
                  SUM 05:PSTDEV    14.02     .047     4.53    18.51     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0014----------------------------------------------------------------------
  ** END OF RUN :   1

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




--------------------
| START            |  Project dir.: H:\SWMHYM~1\10034Y~1\
--------------------  Rainfall dir.: H:\SWMHYM~1\10034Y~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 002
    NSTORM=   1
            #  1=CH5.STM
------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
*#**********************************************************************
*#  Project Name: [YINS PHASE 5]    Project Number: [10034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
```

```
*#  License #   :  3568969
*#*************************************************************************
-------------------------------------------------------------------------------
002:0002---------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: H:\SWMHYM-1\10034Y-1\CH5.STM
| Ptotal=  48.48 mm|    Comments: 5 YEAR CHICAGO 4 HOUR DESIGN DISTRIBUTIO
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .17   3.529 |   1.17  10.190 |   2.17   9.150 |   3.17   4.550
               .33   3.658 |   1.33  21.620 |   2.33   7.700 |   3.33   4.220
               .50   4.040 |   1.50 112.370 |   2.50   6.680 |   3.50   3.960
               .67   4.670 |   1.67  27.760 |   2.67   5.940 |   3.67   3.730
               .83   5.610 |   1.83  15.750 |   2.83   5.390 |   3.83   3.530
              1.00   7.110 |   2.00  11.430 |   3.00   4.930 |   4.00   3.350

-------------------------------------------------------------------------------
002:0003---------------------------------------------------------------------
*************************************************************************
*
*
* SFD
*
*
*************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=    9.30
| 01:SFD    DT= 1.00 |   Total Imp(%)=   37.00   Dir. Conn.(%)=   16.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      3.44          5.86
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=    249.00         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    112.37         22.33
               over (min)         4.00         20.00
     Storage Coeff.  (min)=      4.22 (ii)    20.04 (ii)
     Unit Hyd. Tpeak (min)=      4.00         20.00
     Unit Hyd. peak  (cms)=       .27           .06
                                              *TOTALS*
     PEAK FLOW       (cms)=       .41           .21          .475 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.50         1.517
     RUNOFF VOLUME    (mm)=     47.68         12.10        17.793
     TOTAL RAINFALL   (mm)=     48.48         48.48        48.478
     RUNOFF COEFFICIENT    =      .98           .25          .367

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0004---------------------------------------------------------------------
*************************************************************************
*
*
* BLOCK 1 TOWNHOUSES
*
*
*************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .57
| 02:BLK1   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       .43           .14
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=     61.64         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    112.37         93.55
               over (min)         2.00         11.00
     Storage Coeff.  (min)=      1.82 (ii)    10.75 (ii)
     Unit Hyd. Tpeak (min)=      2.00         11.00
     Unit Hyd. peak  (cms)=       .59           .10
                                              *TOTALS*
     PEAK FLOW       (cms)=       .07           .02          .080 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.63         1.500
     RUNOFF VOLUME    (mm)=     47.68         18.78        29.761
     TOTAL RAINFALL   (mm)=     48.48         48.48        48.478
     RUNOFF COEFFICIENT    =      .98           .39          .614

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0005---------------------------------------------------------------------
*************************************************************************
*
*
* BLOCK 2 APARTMENTS
*
*
*************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .69
| 03:BLK2   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       .52           .17
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=     67.82         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    112.37         93.55
               over (min)         2.00         11.00
     Storage Coeff.  (min)=      1.93 (ii)    10.86 (ii)
     Unit Hyd. Tpeak (min)=      2.00         11.00
     Unit Hyd. peak  (cms)=       .57           .10
                                              *TOTALS*
     PEAK FLOW       (cms)=       .08           .03          .097 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.63         1.500
     RUNOFF VOLUME    (mm)=     47.68         18.78        29.761
     TOTAL RAINFALL   (mm)=     48.48         48.48        48.478
     RUNOFF COEFFICIENT    =      .98           .39          .614

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0006---------------------------------------------------------------------
*************************************************************************
*
*
* BLOCK 5 SWM
*
*
*************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=    1.26
| 06:BLK5   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      1.13           .13
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=     91.65         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    112.37         11.89
               over (min)         2.00         23.00
     Storage Coeff.  (min)=      2.31 (ii)    22.68 (ii)
     Unit Hyd. Tpeak (min)=      2.00         23.00
     Unit Hyd. peak  (cms)=       .51           .05
                                              *TOTALS*
     PEAK FLOW       (cms)=       .35           .00          .350 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.85         1.500
     RUNOFF VOLUME    (mm)=     47.68          9.56        43.866
     TOTAL RAINFALL   (mm)=     48.48         48.48        48.478
     RUNOFF COEFFICIENT    =      .98           .20          .905

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0007---------------------------------------------------------------------
*************************************************************************
*
*
* DETERMINE INFLOW TO POND
*
*
*************************************************************************
--------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA      QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)      (cms)    (hrs)    (mm)    (cms)
                  ID1 01:SFD       9.30      .475     1.52    17.79    .000
                 +ID2 02:BLK1      .57       .080     1.50    29.76    .000
                 +ID3 03:BLK2      .69       .097     1.50    29.76    .000
                 +ID4 06:BLK5      1.26      .350     1.50    43.87    .000
                  ==========================================================
                  SUM 07:PSTDEV    11.82     .995     1.50    21.85    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0008---------------------------------------------------------------------
*************************************************************************
*
*
* ROUTE THROUGH POND
*
*
*************************************************************************
--------------------
| ROUTE RESERVOIR  |    Requested routing time step =  1.0 min.
|  IN>07: (PSTDEV) |
| OUT<08: (PNDOUT) |    =========  OUTFLOW STORAGE TABLE  =========
--------------------    OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                          (cms)     (ha.m.)   |    (cms)     (ha.m.)
                           .000  .0000E+00     |     .025  .3535E+00
                           .007  .5520E-01     |     .027  .4178E+00
                           .013  .1118E+00     |     .029  .4837E+00
                           .017  .1700E+00     |     .031  .5512E+00
                           .020  .2296E+00     |     .033  .6203E+00
                           .023  .2908E+00     |     .000  .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (PSTDEV)       11.82      .995     1.500      21.848
     OUTFLOW<08: (PNDOUT)       11.82      .020     4.400      21.847
    OVERFLOW<09: (PNDOVR)        .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=       .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=     2.034
                  TIME SHIFT OF PEAK FLOW          (min)=    174.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.2367E+00

-------------------------------------------------------------------------------
002:0009---------------------------------------------------------------------
*************************************************************************
*
*
* BLOCK 3 COMMERCIAL
*
*
*************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .80
| 04:BLK3   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
```

```
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .72           .08
     Dep. Storage      (mm)=        .80          1.50
     Average Slope      (%)=       1.00          1.00
     Length             (m)=      73.03         40.00
     Mannings n            =       .013          .250

     Max.eff.Inten.(mm/hr)=     112.37        389.75
               over (min)          2.00          7.00
     Storage Coeff.  (min)=       2.02 (ii)     7.06 (ii)
     Unit Hyd. Tpeak (min)=       2.00          7.00
     Unit Hyd. peak  (cms)=        .56           .16
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .11           .06       .160 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.57       1.500
     RUNOFF VOLUME    (mm)=      47.68         28.46      37.108
     TOTAL RAINFALL   (mm)=      48.48         48.48      48.478
     RUNOFF COEFFICIENT   =        .98           .59        .765

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

002:0010----------------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STORAGE ON BLOCK 3 TO RELEASE AT CONTROLLED RATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(BLK3  )   |
| OUT<01:(B3CTRL)   |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .015  .1000E+01
                            .015  .1000E-03    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (BLK3  )        .80      .160     1.500     37.108
     OUTFLOW<01: (B3CTRL)        .80      .015     1.200     37.108
    OVERFLOW<02: (3OVR  )        .00      .000      .000      .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    9.363
                  TIME SHIFT OF PEAK FLOW          (min)=   -18.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.1520E-01

002:0011----------------------------------------------------------------------
**********************************************************************
*
*
* BLOCK 4 COMMERCIAL
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD   |    Area     (ha)=    1.40
| 05:BLK4   DT= 1.00 |    Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.26           .14
     Dep. Storage      (mm)=        .80          1.50
     Average Slope      (%)=       1.00          1.00
     Length             (m)=      96.61         40.00
     Mannings n            =       .013          .250

     Max.eff.Inten.(mm/hr)=     112.37        389.75
               over (min)          2.00          7.00
     Storage Coeff.  (min)=       2.39 (ii)     7.43 (ii)
     Unit Hyd. Tpeak (min)=       2.00          7.00
     Unit Hyd. peak  (cms)=        .50           .16
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .19           .10       .277 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.57       1.500
     RUNOFF VOLUME    (mm)=      47.68         28.46      37.108
     TOTAL RAINFALL   (mm)=      48.48         48.48      48.478
     RUNOFF COEFFICIENT   =        .98           .59        .765

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

002:0012----------------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STOPAGE ON 4 TO RELEASE AT CONTROLLED PATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>05:(BLK4  )   |
| OUT<03:(B4CTRL)   |    =========  OUTFLOW STOPAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .015  .1000E+01
                            .015  .1000E-03    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >05: (BLK4  )       1.40      .277     1.500     37.108
     OUTFLOW<03: (B4CTRL)       1.40      .015     1.017     37.108
    OVERFLOW<04: (4OVR  )        .00      .000      .000      .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    5.425
                  TIME SHIFT OF PEAK FLOW          (min)=   -29.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.3323E-01

002:0013----------------------------------------------------------------------
**********************************************************************
*
*
* TOTAL POST DEVELOPMENT FROM SITE
*
*
**********************************************************************
---------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.    DWF
---------------------             (ha)     (cms)    (hrs)   (mm)    (cms)
                    ID1 08:ENDOUT  11.82     .020    4.40  21.85    .000
                   +ID2 09:ENDOVR    .00     .000     .00    .00    .000 **DRY**
                   +ID3 01:B3CTRL    .80     .015    1.20  37.11    .000
                   +ID4 02:3OVR      .00     .000     .00    .00    .000 **DRY**
                   +ID5 03:B4CTRL   1.40     .015    1.02  37.11    .000
                   +ID6 04:4OVR      .00     .000     .00    .00    .000 **DRY**
                    ==========================================================
                    SUM 05:PSTDEV  14.02     .050    4.40  24.24    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

002:0014----------------------------------------------------------------------
002:0002----------------------------------------------------------------------
  ** END OF RUN :   2

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




---------------------
| START             |  Project  dir.: H:\SWMHYM-1\10034Y-1\
---------------------  Rainfall dir.: H:\SWMHYM-1\10034Y-1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 003
    NSTORM=   1
           #  1=CH10.STM
-------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
*#**********************************************************************
*#  Project Name: [YINS PHASE 5]    Project Number: [10034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
*#  License #   :  3568969
*#**********************************************************************
-------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
---------------------
| READ STORM        |    Filename: H:\SWMHYM-1\10034Y-1\CH10.STM
| Ptotal=  56.08 mm |    Comments: 10 YEAR CHICAGO 4 HOURS DESIGN DISTRIBUT
---------------------
          TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
          hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
          .17   3.580 |  1.17  11.510 |  2.17  10.310 |  3.17   5.050
          .33   3.990 |  1.33  25.320 |  2.33   8.660 |  3.33   4.700
          .50   4.500 |  1.50 133.600 |  2.50   7.520 |  3.50   4.394
          .67   5.210 |  1.67  32.000 |  2.67   6.650 |  3.67   4.140
          .83   6.270 |  1.83  19.730 |  2.83   5.380 |  3.83   3.910
         1.00   8.000 |  2.00  12.954 |  3.00   5.490 |  4.00   3.632

-------------------------------------------------------------------------------
003:0003----------------------------------------------------------------------
**********************************************************************
*
*
* SFD
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD   |    Area     (ha)=    9.30
| 01:SFD    DT= 1.00 |    Total Imp(%)=   37.00   Dir. Conn.(%)=   16.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       3.44          5.86
     Dep. Storage      (mm)=        .80          1.50
     Average Slope      (%)=       1.00          1.00
     Length             (m)=     249.00         40.00
     Mannings n            =       .013          .250

     Max.eff.Inten.(mm/hr)=     133.60         31.29
               over (min)          4.00         18.00
     Storage Coeff.  (min)=       3.93 (ii)    17.76 (ii)
     Unit Hyd. Tpeak (min)=       4.00         18.00
     Unit Hyd. peak  (cms)=        .29           .06
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .50           .31       .601 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.77      1.517
     RUNOFF VOLUME    (mm)=      55.28         15.66     21.998
     TOTAL RAINFALL   (mm)=      56.08         56.08     56.083
     RUNOFF COEFFICIENT   =        .99           .28       .392

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0004----------------------------------------------------------------------
**********************************************************************
*
*
* BLOCK 1 TOWNHOUSES
```

```
*
*
*******************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .57
| 02:BLK1   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
---------------------

                        IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      .43          .14
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    61.64        40.00
     Mannings n            =    .013         .250

     Max.eff.Inten.(mm/hr)=   133.60       136.37
               over (min)        2.00         9.00
     Storage Coeff.  (min)=     1.70 (ii)    9.38 (ii)
     Unit Hyd. Tpeak (min)=     2.00         9.00
     Unit Hyd. peak  (cms)=      .62          .12
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .08          .03       .102 (iii)
     TIME TO PEAK    (hrs)=     1.50         1.60      1.500
     RUNOFF VOLUME    (mm)=    55.28        23.74     35.727
     TOTAL RAINFALL   (mm)=    56.08        56.08     56.083
     RUNOFF COEFFICIENT    =    .99          .42       .637

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0005-------------------------------------------------------------------------
*******************************************************************************
*
*
* BLOCK 2 APARTMENTS
*
*
*******************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .69
| 03:BLK2   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
---------------------

                        IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      .52          .17
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    67.82        40.00
     Mannings n            =    .013         .250

     Max.eff.Inten.(mm/hr)=   133.60       131.26
               over (min)        2.00        10.00
     Storage Coeff.  (min)=     1.80 (ii)    9.60 (ii)
     Unit Hyd. Tpeak (min)=     2.00        10.00
     Unit Hyd. peak  (cms)=      .60          .12
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .10          .04       .121 (iii)
     TIME TO PEAK    (hrs)=     1.50         1.62      1.500
     RUNOFF VOLUME    (mm)=    55.28        23.74     35.727
     TOTAL RAINFALL   (mm)=    56.08        56.08     56.083
     RUNOFF COEFFICIENT    =    .99          .42       .637

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0006-------------------------------------------------------------------------
*******************************************************************************
*
*
* BLOCK 5 SWM
*
*
*******************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=    1.26
| 06:BLK5   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
---------------------

                        IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=     1.13          .13
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    91.65        40.00
     Mannings n            =    .013         .250

     Max.eff.Inten.(mm/hr)=   133.60        17.53
               over (min)        2.00        20.00
     Storage Coeff.  (min)=     2.16 (ii)   19.59 (ii)
     Unit Hyd. Tpeak (min)=     2.00        20.00
     Unit Hyd. peak  (cms)=      .53          .06
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .42          .00       .417 (iii)
     TIME TO PEAK    (hrs)=     1.50         1.80      1.500
     RUNOFF VOLUME    (mm)=    55.28        12.49     51.004
     TOTAL RAINFALL   (mm)=    56.08        56.08     56.083
     RUNOFF COEFFICIENT    =    .99          .22       .909

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0007-------------------------------------------------------------------------
*******************************************************************************
*
*
* DETERMINE INFLOW TO POND
*
*
*******************************************************************************
--------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA      QPEAK     TPEAK     R.V.     DWF
--------------------                (ha)      (cms)     (hrs)     (mm)     (cms)
                    ID1 01:SFD      9.30      .601     1.52     22.00     .000
                   +ID2 02:BLK1      .57      .102     1.50     35.73     .000
                   +ID3 03:BLK2      .69      .121     1.50     35.73     .000
                   +ID4 06:BLK5     1.26      .417     1.50     51.00     .000
                    ==========================================================
                    SUM 07:PSTDEV  11.82     1.231     1.50     26.55     .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
003:0008-------------------------------------------------------------------------
*******************************************************************************
*
*
* ROUTE THPOUGH POND
*
*
*******************************************************************************
--------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>07:(PSTDEV)    |
| OUT<08:(PNDOUT)    |    =========  OUTLFOW STORAGE TABLE  =========
--------------------      OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
                            (cms)      (ha.m.)   |    (cms)      (ha.m.)
                             .000  .0000E+00      |     .025  .3535E+00
                             .007  .5520E-01      |     .027  .4178E+00
                             .013  .1118E+00      |     .029  .4837E+00
                             .017  .1700E+00      |     .031  .5512E+00
                             .020  .2296E+00      |     .033  .6203E+00
                             .023  .2908E+00      |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (PSTDEV)      11.82     1.231     1.500     26.553
     OUTFLOW<08: (PNDOUT)      11.82      .023     4.367     26.552
   OVERFLOW<09: (PNDOVR)         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =       0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=     .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=     .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.841
                  TIME SHIFT OF PEAK FLOW          (min)=   172.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.2900E+00

-------------------------------------------------------------------------------
003:0009-------------------------------------------------------------------------
*******************************************************************************
*
*
* BLOCK 3 COMMERCIAL
*
*
*******************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .80
| 04:BLK3   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------

                        IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      .72          .08
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    73.03        40.00
     Mannings n            =    .013         .250

     Max.eff.Inten.(mm/hr)=   133.60       504.85
               over (min)        2.00         6.00
     Storage Coeff.  (min)=     1.88 (ii)    6.43 (ii)
     Unit Hyd. Tpeak (min)=     2.00         6.00
     Unit Hyd. peak  (cms)=      .58          .18
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .13          .08       .202 (iii)
     TIME TO PEAK    (hrs)=     1.50         1.55      1.500
     RUNOFF VOLUME    (mm)=    55.28        34.90     44.072
     TOTAL RAINFALL   (mm)=    56.08        56.08     56.083
     RUNOFF COEFFICIENT    =    .99          .62       .786

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0010-------------------------------------------------------------------------
*******************************************************************************
*
*
* SIMULATE STORAGE ON BLOCK 3 TO RELEASE AT CONTROLLED RATE
*
*
*******************************************************************************
--------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>04:(BLK3  )    |
| OUT<01:(B3CTRL)    |    =========  OUTLFOW STORAGE TABLE  =========
--------------------      OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
                            (cms)      (ha.m.)   |    (cms)      (ha.m.)
                             .000  .0000E+00      |     .015  .1000E+01
                             .015  .1000E-03      |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (BLK3  )       .80      .202     1.500     44.072
     OUTFLOW<01: (B3CTRL)       .80      .015     1.183     44.072
   OVERFLOW<02: (3OVR  )        .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =       0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=     .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=     .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.411
                  TIME SHIFT OF PEAK FLOW          (min)=  -19.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.1986E-01

-------------------------------------------------------------------------------
003:0011-------------------------------------------------------------------------
*******************************************************************************
```

```
*
*
* BLOCK 4 COMMERCIAL
*
*
**************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     1.40
| 05:BLK4   DT= 1.00 |   Total Imp(%)=    90.00   Dir. Conn.(%)=    45.00
---------------------
                               IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       1.26          .14
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       1.00         1.00
     Length             (m)=      96.61        40.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      133.60       494.86
               over (min)          2.00         7.00
     Storage Coeff.  (min)=        2.23 (ii)    6.81 (ii)
     Unit Hyd. Tpeak (min)=        2.00         7.00
     Unit Hyd. peak  (cms)=         .52          .16
                                                           *TOTALS*
     PEAK FLOW        (cms)=        .23          .13         .342 (iii)
     TIME TO PEAK     (hrs)=       1.50         1.57        1.500
     RUNOFF VOLUME     (mm)=      55.28        34.90       44.072
     TOTAL RAINFALL    (mm)=      56.08        56.08       56.083
     RUNOFF COEFFICIENT   =         .99          .62         .786

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  58.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
003:0012------------------------------------------------------------------
**************************************************************************
*
*
* SIMULATE STORAGE ON 4 TO RELEASE AT CONTROLLED RATE
*
*
**************************************************************************
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>05:(BLK4  )    |
| OUT<03:(B4CTRL)    |    =========  OUTLFOW STORAGE TABLE  =========
---------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .000  .0000E+00     |    .015  .1000E+01
                           .015  .1000E-03     |    .000  .0000E+00

     ROUTING RESULTS               AREA      QPEAK     TPEAK      R.V.
     --------------------          (ha)      (cms)     (hrs)      (mm)
     INFLOW >05: (BLK4  )          1.40       .342     1.500    44.072
     OUTFLOW<03: (B4CTRL)          1.40       .015      .917    44.072
    OVERFLOW<04: (4OVR  )           .00       .000      .000      .000

                TOTAL NUMBER OF SIMULATED OVERFLOWS  =           0
                CUMULATIVE TIME OF OVERFLOWS  (hours)=         .00
                PERCENTAGE OF TIME OVERFLOWING    (%)=         .00


                PEAK   FLOW   REDUCTION [Qout/Qin](%)=      4.387
                TIME SHIFT OF PEAK FLOW          (min)=     -35.00
                MAXIMUM  STORAGE   USED         (ha.m.)=.4236E-01

--------------------------------------------------------------------------
003:0013------------------------------------------------------------------
**************************************************************************
*
*
* TOTAL POST DEVELOPMENT FROM SITE
*
*
**************************************************************************
---------------------
| ADD HYD (PSTDEV) | ID: NHYD      AREA     QPEAK    TPEAK    R.V.     DWF
---------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
              ID1 08:PNDOUT         11.82      .023     4.37   26.55    .000
             +ID2 09:PNDOVR           .00      .000      .00     .00    .000 **DRY**
             +ID3 01:B3CTRL           .80      .015     1.18   44.07    .000
             +ID4 02:3OVR             .00      .000      .00     .00    .000 **DRY**
             +ID5 03:B4CTRL          1.40      .015      .92   44.07    .000
             +ID6 04:4OVR             .00      .000      .00     .00    .000 **DRY**
             ==================================================
              SUM 05:PSTDEV         14.02      .053     4.37   29.30    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
003:0014------------------------------------------------------------------
--------------------------------------------------------------------------
003:0002------------------------------------------------------------------
--------------------------------------------------------------------------
003:0002------------------------------------------------------------------
  ** END OF RUN :   3

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





---------------------
| START              | Project  dir.: H:\SWMHYM~1\10034Y~1\
---------------------  Rainfall dir.: H:\SWMHYM~1\10034Y~1\
   TZERO =   .00 hrs on        0
   METOUT=   2 (output = METRIC)
   NRUN  = 004
   NSTORM=   1
          #  1=CH25.STM
--------------------------------------------------------------------------
004:0002------------------------------------------------------------------
*#************************************************************************
*#  Project Name: [YINS PHASE 5]    Project Number: [10034]
*#  Date         : 02-11-2010
*#  Modeller     : [TGS]
*#  Company      : G. Douglas Vallee Limited
```

```
*#  License #    :  3568969
*#************************************************************************
--------------------------------------------------------------------------
004:0002------------------------------------------------------------------
---------------------
| READ STORM       |     Filename: H:\SWMHYM~1\10034Y~1\CH25.STM
| Ptotal=  66.02 mm|     Comments: 25 YEAR CHICAGO 4 HOUR DESIGN DISTRIBUTI
---------------------
             TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME    RAIN
              hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs   mm/hr
              .17    4.500 |   1.17   13.670 |   2.17   12.320 |   3.17   6.270
              .33    4.980 |   1.33   27.690 |   2.33   10.440 |   3.33   5.000
              .50    5.613 |   1.50  158.850 |   2.50    9.144 |   3.50   5.840
              .67    6.450 |   1.67   35.080 |   2.67    8.150 |   3.67   5.180
              .83    7.700 |   1.83   20.600 |   2.83    7.390 |   3.83   4.900
             1.00    9.700 |   2.00   15.240 |   3.00    6.780 |   4.00   4.650

--------------------------------------------------------------------------
004:0003------------------------------------------------------------------
**************************************************************************
*
*
* SFD
*
*
**************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     9.30
| 01:SFD    DT= 1.00 |   Total Imp(%)=    37.00   Dir. Conn.(%)=    16.00
---------------------
                               IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       3.44         5.86
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       1.00         1.00
     Length             (m)=     249.00        40.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      158.85        44.51
               over (min)          4.00        16.00
     Storage Coeff.  (min)=        3.67 (ii)   15.68 (ii)
     Unit Hyd. Tpeak (min)=        4.00        16.00
     Unit Hyd. peak  (cms)=         .30          .07
                                                           *TOTALS*
     PEAK FLOW        (cms)=        .60          .44         .775 (iii)
     TIME TO PEAK     (hrs)=       1.50         1.73        1.517
     RUNOFF VOLUME     (mm)=      65.22        20.76       27.877
     TOTAL RAINFALL    (mm)=      66.02        66.02       66.023
     RUNOFF COEFFICIENT   =         .99          .31         .422

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  58.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
004:0004------------------------------------------------------------------
**************************************************************************
*
*
* BLOCK 1 TOWNHOUSES
*
*
**************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=      .57
| 02:BLK1   DT= 1.00 |   Total Imp(%)=    75.00   Dir. Conn.(%)=    38.00
---------------------
                               IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=        .43          .14
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       1.00         1.00
     Length             (m)=      61.64        40.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      158.85       186.82
               over (min)          2.00         8.00
     Storage Coeff.  (min)=        1.59 (ii)    8.36 (ii)
     Unit Hyd. Tpeak (min)=        2.00         8.00
     Unit Hyd. peak  (cms)=         .64          .14
                                                           *TOTALS*
     PEAK FLOW        (cms)=        .10          .05         .130 (iii)
     TIME TO PEAK     (hrs)=       1.50         1.58        1.500
     RUNOFF VOLUME     (mm)=      65.22        30.66       43.793
     TOTAL RAINFALL    (mm)=      66.02        66.02       66.023
     RUNOFF COEFFICIENT   =         .99          .46         .663

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  58.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
004:0005------------------------------------------------------------------
**************************************************************************
*
*
* BLOCK 2 APARTMENTS
*
*
**************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=      .69
| 03:BLK2   DT= 1.00 |   Total Imp(%)=    75.00   Dir. Conn.(%)=    38.00
---------------------
                               IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=        .52          .17
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       1.00         1.00
     Length             (m)=      67.82        40.00
     Mannings n           =        .013         .250

     Max.eff.Inten.(mm/hr)=      158.85       186.82
               over (min)          2.00         8.00
     Storage Coeff.  (min)=        1.68 (ii)    8.45 (ii)
     Unit Hyd. Tpeak (min)=        2.00         8.00
     Unit Hyd. peak  (cms)=         .62          .14
                                                           *TOTALS*
     PEAK FLOW        (cms)=        .12          .05         .157 (iii)
```

TIME TO PEAK	(hrs)=	1.50	1.58	1.500
RUNOFF VOLUME	(mm)=	65.22	30.66	43.793
TOTAL RAINFALL	(mm)=	66.02	66.02	66.023
RUNOFF COEFFICIENT	=	.99	.46	.663

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

004:0006

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* BLOCK 5 SWM

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| DESIGN STANDHYD | Area (ha)= 1.26
| 06:BLK5 DT= 1.00 | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.13	.13
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	91.65	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		158.85	25.55
over (min)		2.00	17.00
Storage Coeff. (min)=		2.01 (ii)	17.01 (ii)
Unit Hyd. Tpeak (min)=		2.00	17.00
Unit Hyd. peak (cms)=		.56	.07

			TOTALS
PEAK FLOW	(cms)=	.50	.01 .498 (iii)
TIME TO PEAK	(hrs)=	1.50	1.75 1.500
RUNOFF VOLUME	(mm)=	65.22	16.76 60.376
TOTAL RAINFALL	(mm)=	66.02	66.02 66.023
RUNOFF COEFFICIENT	=	.99	.25 .914

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

004:0007

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* DETERMINE INFLOW TO POND

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ADD HYD (PSTDEV)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
ID1	01:SFD	9.30	.775	1.52	27.88	.000
+ID2	02:BLK1	.57	.130	1.50	43.79	.000
+ID3	03:BLK2	.69	.157	1.50	43.79	.000
+ID4	06:BLK5	1.26	.498	1.50	60.38	.000
SUM	07:PSTDEV	11.82	1.542	1.50	33.04	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

004:0008

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* ROUTE THROUGH POND

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| ROUTE RESERVOIR | IN>07:(PSTDEV) | OUT<08:(PNDOUT) |

Requested routing time step = 1.0 min.

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
.000	.0000E+00	.025	.3535E+00
.007	.5520E-01	.027	.4178E+00
.013	.1118E+00	.029	.4837E+00
.017	.1700E+00	.031	.5512E+00
.020	.2296E+00	.033	.6203E+00
.023	.2908E+00	.000	.0000E+00

ROUTING RESULTS		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >07:	(PSTDEV)	11.82	1.542	1.500	33.038
OUTFLOW<08:	(PNDOUT)	11.82	.025	4.383	33.036
OVERFLOW<09:	(PNDOVR)	.00	.000	.000	.000

TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
CUMULATIVE TIME OF OVERFLOWS (hours)= .00
PERCENTAGE OF TIME OVERFLOWING (%)= .00

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.651
TIME SHIFT OF PEAK FLOW (min)= 173.00
MAXIMUM STORAGE USED (ha.m.)=.3637E+00

004:0009

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* BLOCK 3 COMMERCIAL

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| DESIGN STANDHYD | Area (ha)= .80
| 04:BLK3 DT= 1.00 | Total Imp(%)= 90.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.72	.08
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	73.03	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		158.85	639.53
over (min)		2.00	6.00
Storage Coeff. (min)=		1.76 (ii)	5.89 (ii)
Unit Hyd. Tpeak (min)=		2.00	6.00
Unit Hyd. peak (cms)=		.61	.19

			TOTALS
PEAK FLOW	(cms)=	.16	.10 .251 (iii)
TIME TO PEAK	(hrs)=	1.50	1.53 1.500
RUNOFF VOLUME	(mm)=	65.22	43.58 53.321
TOTAL RAINFALL	(mm)=	66.02	66.02 66.023
RUNOFF COEFFICIENT	=	.99	.66 .808

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

004:0010

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* SIMULATE STORAGE ON BLOCK 3 TO RELEASE AT CONTROLLED RATE

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| ROUTE RESERVOIR | IN>04:(BLK3) | OUT<01:(B3CTRL) |

Requested routing time step = 1.0 min.

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
.000	.0000E+00	.015	.1000E+01
.015	.1000E-03	.000	.0000E+00

ROUTING RESULTS		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >04:	(BLK3)	.80	.251	1.500	53.321
OUTFLOW<01:	(B3CTRL)	.80	.015	1.067	53.321
OVERFLOW<02:	(3OVR)	.00	.000	.000	.000

TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
CUMULATIVE TIME OF OVERFLOWS (hours)= .00
PERCENTAGE OF TIME OVERFLOWING (%)= .00

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.978
TIME SHIFT OF PEAK FLOW (min)= -26.00
MAXIMUM STORAGE USED (ha.m.)=.2536E-01

004:0011

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* BLOCK 4 COMMERCIAL

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| DESIGN STANDHYD | Area (ha)= 1.40
| 05:BLK4 DT= 1.00 | Total Imp(%)= 90.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.26	.14
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	96.61	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		158.85	639.53
over (min)		2.00	6.00
Storage Coeff. (min)=		2.08 (ii)	6.22 (ii)
Unit Hyd. Tpeak (min)=		2.00	6.00
Unit Hyd. peak (cms)=		.54	.18

			TOTALS
PEAK FLOW	(cms)=	.28	.17 .434 (iii)
TIME TO PEAK	(hrs)=	1.50	1.55 1.500
RUNOFF VOLUME	(mm)=	65.22	43.58 53.321
TOTAL RAINFALL	(mm)=	66.02	66.02 66.023
RUNOFF COEFFICIENT	=	.99	.66 .808

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

004:0012

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* SIMULATE STORAGE ON 4 TO RELEASE AT CONTROLLED RATE

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| ROUTE RESERVOIR | IN>05:(BLK4) | OUT<03:(B4CTRL) |

Requested routing time step = 1.0 min.

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
.000	.0000E+00	.015	.1000E+01
.015	.1000E-03	.000	.0000E+00

ROUTING RESULTS		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >05:	(BLK4)	1.40	.434	1.500	53.321
OUTFLOW<03:	(B4CTRL)	1.40	.015	.750	53.321
OVERFLOW<04:	(4OVR)	.00	.000	.000	.000

```
                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    3.459
                    TIME SHIFT OF PEAK FLOW          (min)=   -45.00
                    MAXIMUM  STORAGE  USED        (ha.m.)=.5446E-01
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004:0013

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*
* TOTAL POST DEVELOPMENT FROM SITE
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*
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```

ADD HYD (PSTDEV)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)	
	ID1 08:ENDOUT	11.82	.025	4.38	33.04	.000	
	+ID2 09:ENDOVR	.00	.000	.00	.00	.000	**DRY**
	+ID3 01:B3CTRL	.80	.015	1.07	53.32	.000	
	+ID4 02:3OVR	.00	.000	.00	.00	.000	**DRY**
	+ID5 03:B4CTRL	1.40	.015	.75	53.32	.000	
	+ID6 04:4OVR	.00	.000	.00	.00	.000	**DRY**
	SUM 05:PSTDEV	14.02	.055	4.38	36.22	.000	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

004:0014

004:0002

004:0002

004:0002

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  ** END OF RUN :   4

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| START              |  Project  dir.: H:\SWMHYM~1\10034Y~1\
|--------------------|  Rainfall dir.: H:\SWMHYM~1\10034Y~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
          #  1=CH50.STM
```

005:0002

```
*#*****************************************************************************
*#  Project Name: [YINS PHASE 5]     Project Number: [10034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
*#  License #   :  3568969
*#*****************************************************************************
```

005:0002

```
| READ STORM       |    Filename: H:\SWMHYM~1\10034Y~1\CH50.STM
| Ptotal=  72.96 mm|    Comments: 50 YEAR CHICAGO 4 HOUR DESIGN DISTRIBUTI
```

TIME hrs	PAIN mm/hr	TIME hrs	PAIN mm/hr	TIME hrs	PAIN mm/hr	TIME hrs	PAIN mm/hr
.17	3.990	1.17	14.270	2.17	12.620	3.17	5.790
.33	4.450	1.33	33.900	2.33	10.390	3.33	5.330
.50	5.080	1.50	186.560	2.50	8.890	3.50	4.980
.67	5.970	1.67	44.810	2.67	7.800	3.67	4.650
.83	7.290	1.83	23.440	2.83	6.960	3.83	4.370
1.00	9.530	2.00	16.260	3.00	6.300	4.00	4.140

005:0003

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*
*
* SFD
*
*
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```
| DESIGN STANDHYD    |   Area     (ha)=    9.30
| 01:SFD    DT= 1.00 |   Total Imp(%)=   37.00   Dir. Conn.(%)=   16.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.44	5.86
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	249.00	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		186.56	61.99
over (min)		3.00	14.00
Storage Coeff. (min)=		3.44 (ii)	13.96 (ii)
Unit Hyd. Tpeak (min)=		3.00	14.00
Unit Hyd. peak (cms)=		.34	.08
			TOTALS
PEAK FLOW	(cms)=	.72	.62 .987 (iii)
TIME TO PEAK	(hrs)=	1.50	1.70 1.517
RUNOFF VOLUME	(mm)=	72.16	24.60 32.209
TOTAL RAINFALL	(mm)=	72.96	72.96 72.962
RUNOFF COEFFICIENT	=	.99	.34 .441

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

005:0004

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*****************************************************************************
*
*
* BLOCK 1 TOWNHOUSES
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```
| DESIGN STANDHYD    |   Area     (ha)=     .57
| 02:BLK1   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.43	.14
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	61.64	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		186.56	234.31
over (min)		1.00	8.00
Storage Coeff. (min)=		1.49 (ii)	7.67 (ii)
Unit Hyd. Tpeak (min)=		1.00	8.00
Unit Hyd. peak (cms)=		.83	.15
			TOTALS
PEAK FLOW	(cms)=	.11	.06 .157 (iii)
TIME TO PEAK	(hrs)=	1.50	1.58 1.500
RUNOFF VOLUME	(mm)=	72.16	35.73 49.575
TOTAL RAINFALL	(mm)=	72.96	72.96 72.962
RUNOFF COEFFICIENT	=	.99	.49 .679

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

005:0005

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*****************************************************************************
*
*
* BLOCK 2 APARTMENTS
*
*
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```
| DESIGN STANDHYD    |   Area     (ha)=     .69
| 03:BLK2   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	.17
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	67.82	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		186.56	234.31
over (min)		2.00	8.00
Storage Coeff. (min)=		1.58 (ii)	7.76 (ii)
Unit Hyd. Tpeak (min)=		2.00	8.00
Unit Hyd. peak (cms)=		.65	.14
			TOTALS
PEAK FLOW	(cms)=	.14	.07 .190 (iii)
TIME TO PEAK	(hrs)=	1.50	1.58 1.500
RUNOFF VOLUME	(mm)=	72.16	35.73 49.575
TOTAL RAINFALL	(mm)=	72.96	72.96 72.962
RUNOFF COEFFICIENT	=	.99	.49 .679

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

005:0006

```
*****************************************************************************
*
*
* BLOCK 5 SWM
*
*
*****************************************************************************
```

```
| DESIGN STANDHYD    |   Area     (ha)=    1.26
| 06:BLK5   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.13	.13
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	91.65	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		186.56	35.64
over (min)		2.00	15.00
Storage Coeff. (min)=		1.89 (ii)	15.02 (ii)
Unit Hyd. Tpeak (min)=		2.00	15.00
Unit Hyd. peak (cms)=		.58	.08
			TOTALS
PEAK FLOW	(cms)=	.58	.01 .587 (iii)
TIME TO PEAK	(hrs)=	1.50	1.72 1.500
RUNOFF VOLUME	(mm)=	72.16	20.00 66.945
TOTAL RAINFALL	(mm)=	72.96	72.96 72.962
RUNOFF COEFFICIENT	=	.99	.27 .918

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

005:0007

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*****************************************************************************
*
*
* DETERMINE INFLOW TO POND
*
*
```

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*************************************************************************
--------------------
| ADD HYD (PSTDEV) | ID: NHYD       AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                   ID1 01:SFD       9.30      .987    1.52   32.21   .000
                  +ID2 02:BLK1       .57      .157    1.50   49.58   .000
                  +ID3 03:BLK2       .69      .190    1.50   49.58   .000
                  +ID4 06:BLK5      1.26      .587    1.50   66.95   .000
                  ====================================================
                   SUM 07:PSTDEV   11.82     1.905    1.50   37.76   .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
005:0008-------------------------------------------------------------------
*************************************************************************
*
*
* ROUTE THROUGH POND
*
*
*************************************************************************
--------------------
| ROUTE RESERVOIR   |      Requested routing time step =  1.0 min.
|  IN>07:(PSTDEV)   |
| OUT<08:(PNDOUT)   |      =========  OUTLFOW STORAGE TABLE  =========
--------------------        OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)     (ha.m.)   |   (cms)     (ha.m.)
                              .000  .0000E+00    |     .025  .3535E+00
                              .007  .5520E-01    |     .027  .4178E+00
                              .013  .1118E+00    |     .029  .4837E+00
                              .017  .1700E+00    |     .031  .5512E+00
                              .020  .2296E+00    |     .033  .6203E+00
                              .023  .2908E+00    |     .000  .0000E+00

     ROUTING RESULTS               AREA     QPEAK     TPEAK       R.V.
     --------------------          (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (PSTDEV)         11.82     1.905     1.500     37.763
     OUTFLOW<08: (PNDOUT)         11.82      .027     4.300     37.761
   OVERFLOW<09: (PNDOVR)            .00      .000      .000       .000

                TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
                CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
                PERCENTAGE OF TIME OVERFLOWING    (%)=        .00


                PEAK   FLOW   REDUCTION [Qout/Qin](%)=     1.434
                TIME SHIFT OF PEAK FLOW         (min)=    168.00
                MAXIMUM  STORAGE   USED       (ha.m.)=.4182E+00

---------------------------------------------------------------------------
005:0009-------------------------------------------------------------------
*************************************************************************
*
*
* BLOCK 3 COMMERCIAL
*
*
*************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=      .80
| 04:BLK3   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=     .72          .08
     Dep. Storage     (mm)=     .80         1.50
     Average Slope     (%)=    1.00         1.00
     Length            (m)=   73.03        40.00
     Mannings n           =    .013         .250

     Max.eff.Inten.(mm/hr)=  186.56       792.82
               over (min)      2.00         5.00
     Storage Coeff.  (min)=    1.65 (ii)    5.44 (ii)
     Unit Hyd. Tpeak (min)=    2.00         5.00
     Unit Hyd. peak  (cms)=     .63          .21
                                                       *TOTALS*
     PEAK FLOW       (cms)=     .19          .13        .310 (iii)
     TIME TO PEAK    (hrs)=    1.50         1.53       1.500
     RUNOFF VOLUME    (mm)=   72.16        49.78      59.854
     TOTAL RAINFALL   (mm)=   72.96        72.96      72.962
     RUNOFF COEFFICIENT   =     .99          .68        .820

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  58.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
005:0010-------------------------------------------------------------------
*************************************************************************
*
*
* SIMULATE STORAGE ON BLOCK 3 TO RELEASE AT CONTROLLED RATE
*
*
*************************************************************************
--------------------
| ROUTE RESERVOIR   |      Requested routing time step =  1.0 min.
|  IN>04:(BLK3  )   |
| OUT<01:(B3CTRL)   |      =========  OUTLFOW STORAGE TABLE  =========
--------------------        OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)     (ha.m.)   |   (cms)     (ha.m.)
                              .000  .0000E+00    |     .015  .1000E+01
                              .015  .1000E-03    |     .000  .0000E+00

     ROUTING RESULTS               AREA     QPEAK     TPEAK       R.V.
     --------------------          (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (BLK3  )           .80      .310     1.500     59.854
     OUTFLOW<01: (B3CTRL)           .80      .015     1.067     59.854
   OVERFLOW<02: (3OVR  )            .00      .000      .000       .000

                TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
                CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
                PERCENTAGE OF TIME OVERFLOWING    (%)=        .00


                PEAK   FLOW   REDUCTION [Qout/Qin](%)=     4.840
                TIME SHIFT OF PEAK FLOW         (min)=    -26.00
                MAXIMUM  STORAGE   USED       (ha.m.)=.3117E-01
```

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---------------------------------------------------------------------------
005:0011-------------------------------------------------------------------
*************************************************************************
*
*
* BLOCK 4 COMMERCIAL
*
*
*************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     1.40
| 05:BLK4   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=    1.26          .14
     Dep. Storage     (mm)=     .80         1.50
     Average Slope     (%)=    1.00         1.00
     Length            (m)=   96.61        40.00
     Mannings n           =    .013         .250

     Max.eff.Inten.(mm/hr)=  186.56       780.67
               over (min)      2.00         6.00
     Storage Coeff.  (min)=    1.95 (ii)    5.77 (ii)
     Unit Hyd. Tpeak (min)=    2.00         6.00
     Unit Hyd. peak  (cms)=     .57          .19
                                                       *TOTALS*
     PEAK FLOW       (cms)=     .32          .22        .525 (iii)
     TIME TO PEAK    (hrs)=    1.50         1.53       1.500
     RUNOFF VOLUME    (mm)=   72.16        49.78      59.854
     TOTAL RAINFALL   (mm)=   72.96        72.96      72.962
     RUNOFF COEFFICIENT   =     .99          .68        .820

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  58.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
005:0012-------------------------------------------------------------------
*************************************************************************
*
*
* SIMULATE STORAGE ON 4 TO RELEASE AT CONTROLLED RATE
*
*
*************************************************************************
--------------------
| ROUTE RESERVOIR   |      Requested routing time step =  1.0 min.
|  IN>05:(BLK4  )   |
| OUT<03:(B4CTRL)   |      =========  OUTLFOW STORAGE TABLE  =========
--------------------        OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)     (ha.m.)   |   (cms)     (ha.m.)
                              .000  .0000E+00    |     .015  .1000E+01
                              .015  .1000E-03    |     .000  .0000E+00

     ROUTING RESULTS               AREA     QPEAK     TPEAK       R.V.
     --------------------          (ha)     (cms)     (hrs)       (mm)
     INFLOW >05: (BLK4  )          1.40      .525     1.500     59.854
     OUTFLOW<03: (B4CTRL)          1.40      .015      .833     59.854
   OVERFLOW<04: (4OVR  )            .00      .000      .000       .000

                TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
                CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
                PERCENTAGE OF TIME OVERFLOWING    (%)=        .00


                PEAK   FLOW   REDUCTION [Qout/Qin](%)=     2.859
                TIME SHIFT OF PEAK FLOW         (min)=    -40.00
                MAXIMUM  STORAGE   USED       (ha.m.)=.6394E-01

---------------------------------------------------------------------------
005:0013-------------------------------------------------------------------
*************************************************************************
*
*
* TOTAL POST DEVELOPMENT FROM SITE
*
*
*************************************************************************
--------------------
| ADD HYD (PSTDEV) | ID: NHYD       AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                   ID1 08:PNDOUT   11.82      .027    4.30   37.76   .000
                  +ID2 09:PNDOVR     .00      .000     .00     .00   .000 **DRY**
                  +ID3 01:B3CTRL     .80      .015    1.07   59.85   .000
                  +ID4 02:3OVR       .00      .000     .00     .00   .000 **DRY**
                  +ID5 03:B4CTRL    1.40      .015     .83   59.85   .000
                  +ID6 04:4OVR       .00      .000     .00     .00   .000 **DRY**
                  ====================================================
                   SUM 05:PSTDEV   14.02      .057    4.30   41.23   .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
005:0014-------------------------------------------------------------------
---------------------------------------------------------------------------
005:0002-------------------------------------------------------------------
---------------------------------------------------------------------------
005:0002-------------------------------------------------------------------
---------------------------------------------------------------------------
005:0002-------------------------------------------------------------------
---------------------------------------------------------------------------
005:0002-------------------------------------------------------------------
 ** END OF RUN :   5

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




--------------------
| START            |  Project  dir.: H:\SWMHYM~1\10034Y~1\
--------------------  Rainfall dir.: H:\SWMHYM~1\10034Y~1\
   TZERO =   .00 hrs on        0
   METOUT=   2 (output = METRIC)
   NRUN  = 006
   NSTORM=   1
```

```
          #  1=CH100.STM
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [YINS PHASE 5]     Project Number: [10034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
*#  License #   :  3568969
*#*****************************************************************************
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: H:\SWMHYM-1\10034Y-1\CH100.STM
| Ptotal=  83.90 mm|    Comments: 100 YEAR CHICAGO 4 HOUR DESIGN STORM DIS
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .17   4.500 |   1.17  16.860 |   2.17  14.830 |   3.17   6.600
               .33   5.050 |   1.33  41.070 |   2.33  12.120 |   3.33   6.100
               .50   5.820 |   1.50 205.920 |   2.50  10.310 |   3.50   5.660
               .67   6.830 |   1.67  54.560 |   2.67   9.020 |   3.67   5.280
               .83   8.410 |   1.83  29.170 |   2.83   8.030 |   3.83   4.980
              1.00  11.070 |   2.00  19.280 |   3.00   7.240 |   4.00   4.700

--------------------------------------------------------------------------------
006:0003----------------------------------------------------------------------
*****************************************************************************
*
*
* SFD
*
*
*****************************************************************************
----------------------
| DESIGN STANDHYD    |   Area     (ha)=    9.30
| 01:SFD    DT= 1.00 |   Total Imp(%)=   37.00   Dir. Conn.(%)=   16.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.44          5.86
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=    249.00         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    205.92         79.53
               over (min)        3.00         13.00
     Storage Coeff.  (min)=      3.31 (ii)    12.83 (ii)
     Unit Hyd. Tpeak (min)=      3.00         13.00
     Unit Hyd. peak  (cms)=       .35           .09
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .80           .80      1.192 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.68      1.517
     RUNOFF VOLUME    (mm)=     83.10         31.04     39.372
     TOTAL RAINFALL   (mm)=     83.90         83.90     83.902
     RUNOFF COEFFICIENT    =      .99           .37       .469

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
006:0004----------------------------------------------------------------------
*****************************************************************************
*
*
* BLOCK 1 TOWNHOUSES
*
*
*****************************************************************************
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .57
| 02:BLK1   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .43           .14
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=     61.64         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    205.92        286.05
               over (min)        1.00          7.00
     Storage Coeff.  (min)=      1.43 (ii)     7.14 (ii)
     Unit Hyd. Tpeak (min)=      1.00          7.00
     Unit Hyd. peak  (cms)=       .85           .16
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .12           .07       .185 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.57      1.500
     RUNOFF VOLUME    (mm)=     83.10         44.06     58.898
     TOTAL RAINFALL   (mm)=     83.90         83.90     83.902
     RUNOFF COEFFICIENT    =      .99           .53       .702

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
006:0005----------------------------------------------------------------------
*****************************************************************************
*
*
* BLOCK 2 APARTMENTS
*
*
*****************************************************************************
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .69
| 03:BLK2   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .52           .17
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=     67.82         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    205.92        286.05
               over (min)        2.00          7.00
     Storage Coeff.  (min)=      1.52 (ii)     7.22 (ii)
     Unit Hyd. Tpeak (min)=      2.00          7.00
     Unit Hyd. peak  (cms)=       .66           .16
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .15           .09       .224 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.57      1.500
     RUNOFF VOLUME    (mm)=     83.10         44.06     58.898
     TOTAL RAINFALL   (mm)=     83.90         83.90     83.902
     RUNOFF COEFFICIENT    =      .99           .53       .702

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
006:0006----------------------------------------------------------------------
*****************************************************************************
*
*
* BLOCK 5 SWM
*
*
*****************************************************************************
----------------------
| DESIGN STANDHYD    |   Area     (ha)=    1.26
| 06:BLK5   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.13           .13
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=     91.65         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    205.92         46.00
               over (min)        2.00         14.00
     Storage Coeff.  (min)=      1.82 (ii)    13.67 (ii)
     Unit Hyd. Tpeak (min)=      2.00         14.00
     Unit Hyd. peak  (cms)=       .59           .08
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .65           .01       .650 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.70      1.500
     RUNOFF VOLUME    (mm)=     83.10         25.49     77.341
     TOTAL RAINFALL   (mm)=     83.90         83.90     83.902
     RUNOFF COEFFICIENT    =      .99           .30       .922

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
006:0007----------------------------------------------------------------------
*****************************************************************************
*
*
* DETERMINE INFLOW TO POND
*
*
*****************************************************************************
--------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 01:SFD       9.30     1.192     1.52   39.37    .000
                 +ID2 02:BLK1      .57      .185      1.50   58.90    .000
                 +ID3 03:BLK2      .69      .224      1.50   58.90    .000
                 +ID4 06:BLK5     1.26      .650      1.50   77.34    .000
                  ==========================================================
                  SUM 07:PSTDEV   11.82     2.221     1.50   45.50    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
006:0008----------------------------------------------------------------------
*****************************************************************************
*
*
* ROUTE THROUGH POND
*
*
*****************************************************************************
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>07:(PSTDEV)    |
| OUT<08:(PNDOUT)    |    ========  OUTFLOW STORAGE TABLE  ==========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)  |    (cms)    (ha.m.)
                             .000  .0000E+00    |     .025  .3535E+00
                             .007  .5520E-01    |     .027  .4178E+00
                             .013  .1118E+00    |     .029  .4837E+00
                             .017  .1700E+00    |     .031  .5512E+00
                             .020  .2296E+00    |     .033  .6203E+00
                             .023  .2908E+00    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (PSTDEV)      11.82     2.221     1.500     45.501
     OUTFLOW<08: (PNDOUT)      11.82      .030     4.300     45.500
    OVERFLOW<09: (PNDOVR)       .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.353
                  TIME SHIFT OF PEAK FLOW          (min)=   168.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=.5069E+00

--------------------------------------------------------------------------------
006:0009----------------------------------------------------------------------
*****************************************************************************
*
*
```

```
* BLOCK 3 COMMERCIAL
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD     |   Area     (ha)=     .80
| 04:BLK3   DT= 1.00  |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       .72          .08
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      1.00         1.00
     Length            (m)=     73.03        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    205.92       907.51
               over (min)        2.00         5.00
     Storage Coeff.  (min)=      1.58 (ii)    5.18 (ii)
     Unit Hyd. Tpeak (min)=      2.00         5.00
     Unit Hyd. peak  (cms)=       .64          .22
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .21          .15        .353 (iii)
     TIME TO PEAK    (hrs)=      1.50         1.53       1.500
     RUNOFF VOLUME    (mm)=     83.10        59.74      70.253
     TOTAL RAINFALL   (mm)=     83.90        83.90      83.902
     RUNOFF COEFFICIENT   =       .99          .71        .837

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------
006:0010---------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STORAGE ON BLOCK 3 TO RELEASE AT CONTROLLED RATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR     |    Requested routing time step =  1.0 min.
|  IN>04:(BLK3  )     |
| OUT<01:(B3CTRL)     |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)    |    (cms)    (ha.m.)
                           .000   .0000E+00     |     .015   .1000E+01
                           .015   .1000E-03     |     .000   .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (BLK3  )         .80      .353     1.500     70.253
     OUTFLOW<01: (B3CTRL)         .80      .015     1.033     70.253
    OVERFLOW<02: (3OVR  )         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.253
                  TIME SHIFT OF PEAK FLOW          (min)=   -28.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.3841E-01

------------------------------------------------------------------------
006:0011---------------------------------------------------------------
**********************************************************************
*
*
* BLOCK 4 COMMERCIAL
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD     |   Area     (ha)=    1.40
| 05:BLK4   DT= 1.00  |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      1.26          .14
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      1.00         1.00
     Length            (m)=     96.61        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    205.92       907.51
               over (min)        2.00         5.00
     Storage Coeff.  (min)=      1.87 (ii)    5.47 (ii)
     Unit Hyd. Tpeak (min)=      2.00         5.00
     Unit Hyd. peak  (cms)=       .58          .21
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .36          .27        .610 (iii)
     TIME TO PEAK    (hrs)=      1.50         1.53       1.500
     RUNOFF VOLUME    (mm)=     83.10        59.74      70.253
     TOTAL RAINFALL   (mm)=     83.90        83.90      83.902
     RUNOFF COEFFICIENT   =       .99          .71        .837

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------
006:0012---------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STORAGE ON 4 TO RELEASE AT CONTROLLED RATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR     |    Requested routing time step =  1.0 min.
|  IN>05:(BLK4  )     |
| OUT<03:(B4CTRL)     |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)    |    (cms)    (ha.m.)
                           .000   .0000E+00     |     .015   .1000E+01
                           .015   .1000E-03     |     .000   .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >05: (BLK4  )        1.40      .610     1.500     70.253
     OUTFLOW<03: (B4CTRL)        1.40      .015      .717     70.253
    OVERFLOW<04: (4OVR  )         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.457
                  TIME SHIFT OF PEAK FLOW          (min)=   -47.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.7812E-01

------------------------------------------------------------------------
006:0013---------------------------------------------------------------
**********************************************************************
*
*
* TOTAL POST DEVELOPMENT FROM SITE
*
*
**********************************************************************
---------------------
| ADD HYD (PSTDEV)  | ID: NHYD     AREA     QPEAK    TPEAK    R.V.    DWF
---------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                    ID1 08:ENDOUT   11.82      .030    4.30   45.50    .000
                  +ID2 09:ENDOVR      .00      .000     .00     .00    .000 **DRY**
                  +ID3 01:B3CTRL      .80      .015    1.03   70.25    .000
                  +ID4 02:3OVR        .00      .000     .00     .00    .000 **DRY**
                  +ID5 03:B4CTRL     1.40      .015     .72   70.25    .000
                  +ID6 04:4OVR        .00      .000     .00     .00    .000 **DRY**
                   ================================================
                   SUM 05:PSTDEV    14.02      .060    4.30   49.38    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
006:0014---------------------------------------------------------------
------------------------------------------------------------------------
006:0002---------------------------------------------------------------
------------------------------------------------------------------------
006:0002---------------------------------------------------------------
------------------------------------------------------------------------
006:0002---------------------------------------------------------------
------------------------------------------------------------------------
006:0002---------------------------------------------------------------
------------------------------------------------------------------------
006:0002---------------------------------------------------------------
      FINISH
------------------------------------------------------------------------
**********************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2010-11-22     at 14:15:45
======================================================================
```

Appendix D: Miscellaneous Pond Design Calculations

vallee
Consulting Engineers, Architects & Planners

Subject: Yin's Phase 5
Date: Nov 4/10 By: TGS
Project #: 10034 Page

Water Quality Sizing

35% Impervious	90
55% Impervious	150
54% Impervious	147
Contributing Area	11.82
Volume Req.	1738

1) Forebay Design: Settling

Equation 4.5 Dist= sqrt(r*Qp/Vs)

Dist = forebay length
r = length to width of forebay
Qp = peak flow rate from pond during quality storm
Vs= target settling velocity, recommended at 0.0003 m/s

Given	r=	2	Target 2:1
	Qp =	0.017	
	Vs=	0.0003	
	Dist=	11	

2) Forebary Design: Dispersion Length

Equation 4.6 Dist = 8*Q/(d*Vf)

Dist = forebay length
Q= inlet flow rate for quality storm
d= depth of perm pool
Vf = desired velocity in forebay (<0.5m/s)

Given	Q=	0.651	SYMHYMO results to pond for 2-year event
	d=	1.25	
	Vf=	0.5	
	dist=	8	

3) Forebay Design: Bottom Width

Equation 4.7 Width=Dist/8

Given Dist= 11

width= 1.375

4) Forebay Design: Cleanout Frequency

Table 6.3 of SWM Planning and Design Manual

35% Impervious	0.6	m3/ha, annual sediment loading
55% Impervious	1.9	m3/ha, annual sediment loading

Reference Calculation of Impervious areas spreadsheet for this development==> 39% impervious
Therefore extrapolate

54%	1.835	m3/ha

Total site area, including external contributing area 11.82 ha

Sediment Accummulation	21.6897	m3/year
Target Removal eff. For basic protection	60%	
Anticipate Accumulation	13.01382	m3/year
Clean Frequency	10	year
Total Anticipated Accumulation	130.1382	m3

Contour	Area	Incr V	Volume
242	73	0	
242.45	187	59	59
242.65	380	57	115
243.25	717	329	444

Appendix E: Main Street Storm Sewer Design Calculations (Existing and Proposed)

vallee
Consulting Engineers, Architects & Planners

Subject: Yins Phase 5 Main Street Ex Storm
Date: Dec-10 By: TGS
Project #: 10034 Page

Existing storm services drainage area from Thompson Road to Area 4-3.

	Area	Runoff C	C*A
1-ex	1.26	0.45	0.567
2-1	1.71	0.45	0.7695
3-2	1.81	0.9	1.629
4-3	2.09	0.9	1.881
			4.8465

WSMD Designed for 2-year storm

Norfolk County Design criteria for 2-year storm, I = A/(t+B)^C

A	529.711
B	4.501
C	0.745

Assume and inlet time of 10 min to account for initial estimate of 5.0min per design criteria for commercial areas and some transit time in system

I	72.243	mm/hr
Q	973	L/s

Existing storm sewer along Main Street is all 525mm at 0.4%

Dia	0.525	m
n	0.013	
Hyd R	0.13125	m
Slope	0.4%	
C/S A	0.21647537	m2
Q	272	L/s

Therefore insufficient capacity to service drainage area for the 2-year event.

REV. No.	DATE	REVISION
0	DEC 8/10	SUBMIT TO COUNTY FOR REVIEW

(10) STORM MANHOLE AND NUMBER

10-10A
0.69 0.75
AREA NUMBER
RUNOFF COEFF.
AREA (Ha)

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title
YIN PHASE 5
NORFOLK COUNTY - WATERFORD

Drawing Title
STORM DRAINAGE AREAS

Designed by : DJB	Drawn By : TJC
Checked by : TGS	Date Started : SEPTEMBER 2010
Drawing Scale : 1:100	Drawing No. ST1
Project No. 10-034	

DATE LAST PLOTTED :

STORM SEWER DESIGN SHEET

Storm 2-year Simcoe
A= 529.71 B= 4.501 C= 0.745
Pipe Material PVC<=450, Concrete >450
n 0.013

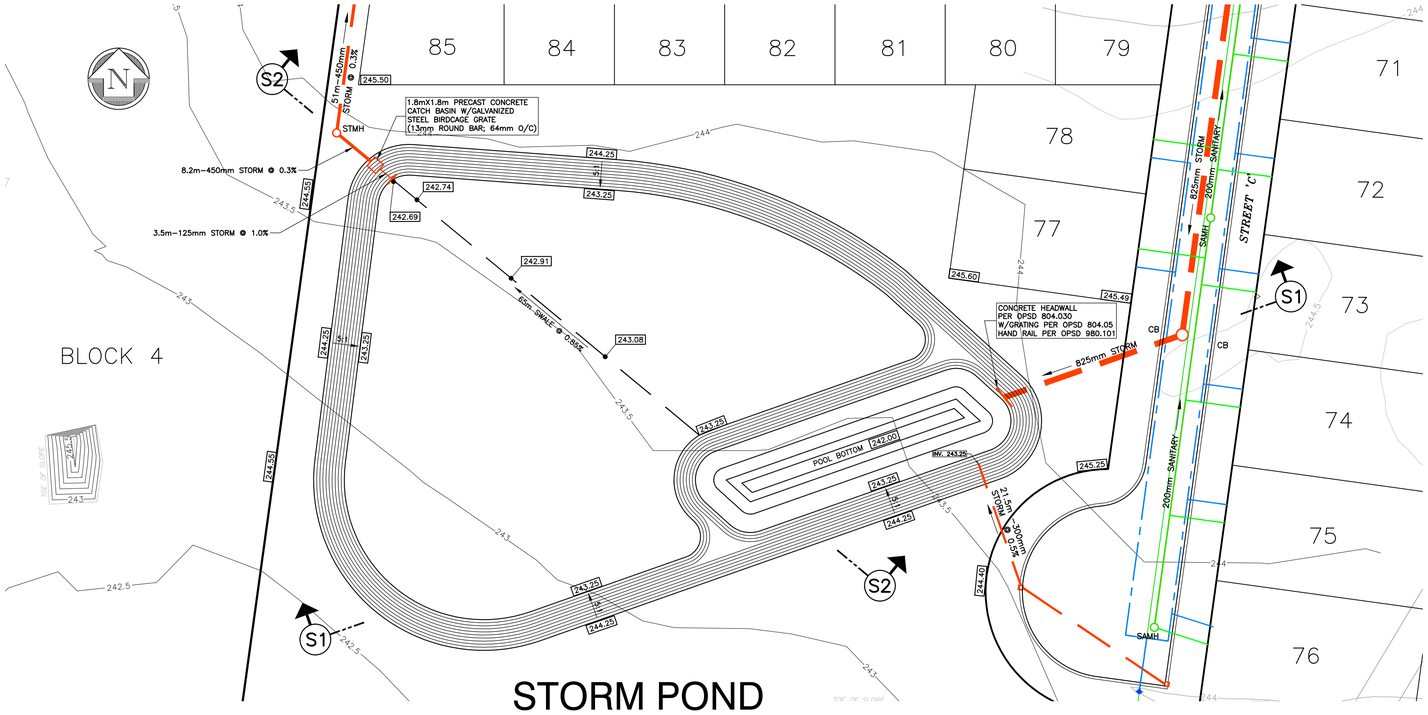
Project 10034 Yin's Phase 5 - Main Street Storm
Town/County Waterford - Norfolk County

Date Nov 24/10
Designed by TGS
Checked by JDV
Sheet of : 1 of

Location			Area			Cumlative	Time	Rainfall	Flow	Sewer Design					
Area	From	To			TOTAL	R*A	of		2.78*I*A*R	Size	Slope	Cap	Vel	Length	Time
			Ha	Ha	Ha		Concentration	mm/hr							
			0.45	0.9			min		L/s	mm	%	L/s	m/s	m	min
Pond	Pond	7	0		0.00	0	0.00	N/A	30.0	450	0.30%	156.2	0.982	59.2	1
7-6	7	6	0.37		0.17	0.17	15.00	57.94	56.8	450	0.40%	180.3	1.134	104.5	1.54
6-5	6	5	0		0.00	0.17	16.54	54.75	85.3	600	0.20%	274.6	0.971	114	1.96
5-4	5	4		1.34	1.21	1.37	18.49	51.24	255.5	600	0.20%	274.6	0.971	119	2.04
4-3	4	3		2.09	1.88	3.25	20.53	48.10	495.0	750	0.25%	556.6	1.26	119.4	1.58
3-2	3	2		1.81	1.63	4.88	22.11	45.95	683.7	825	0.25%	717.7	1.343	84	1.04
2-1	2	1	1.71		0.77	5.65	23.16	44.66	761.7	825	0.30%	786.2	1.471	29.9	0.34
1-EX	1	EX	1.26		0.57	6.22	23.50	44.25	825.1	825	0.35%	849.2	1.589	107	1.12

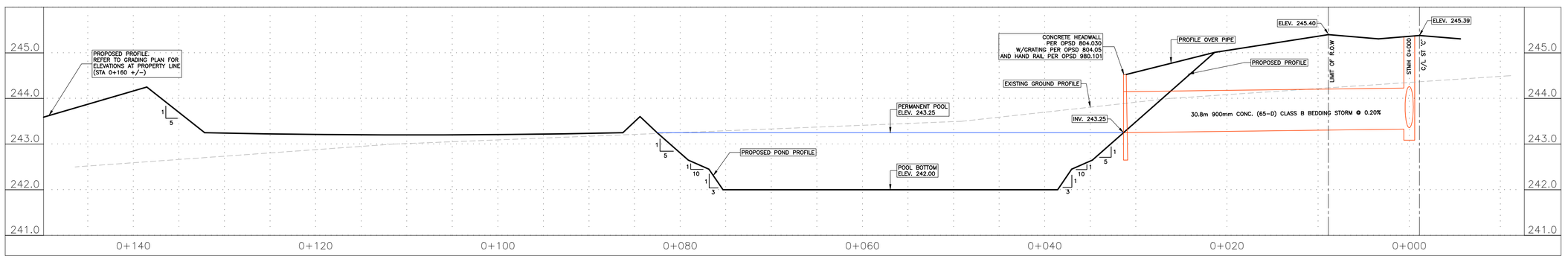
Note:

Peak Discharge from Pond (100-yr storm)	0.03	Applied at Area POND
Peak Dischare from Block 3	0.015	Applied at Area 6-5
Peak Discharge from Block 4	0.015	Applied at Area 6-6



STORM POND

SCALE 1:500



SECTION S1-S1

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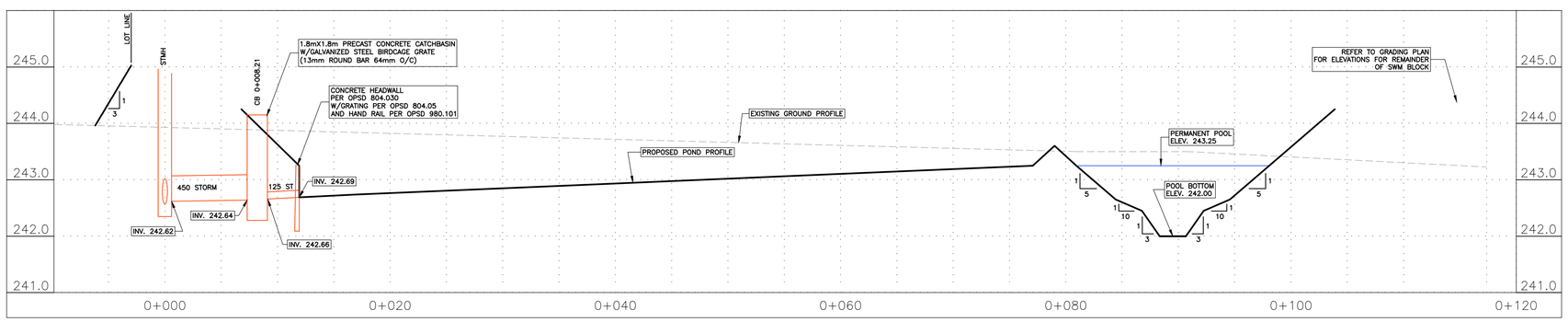
VERTICAL=1:50



SECTION S2-S2

SCALE HORIZONTAL=1:250
VERTICAL=1:50

REV. No.	DATE	REVISION
0	DEC 8/10	SUBMIT TO COUNTY FOR REVIEW

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Stamp

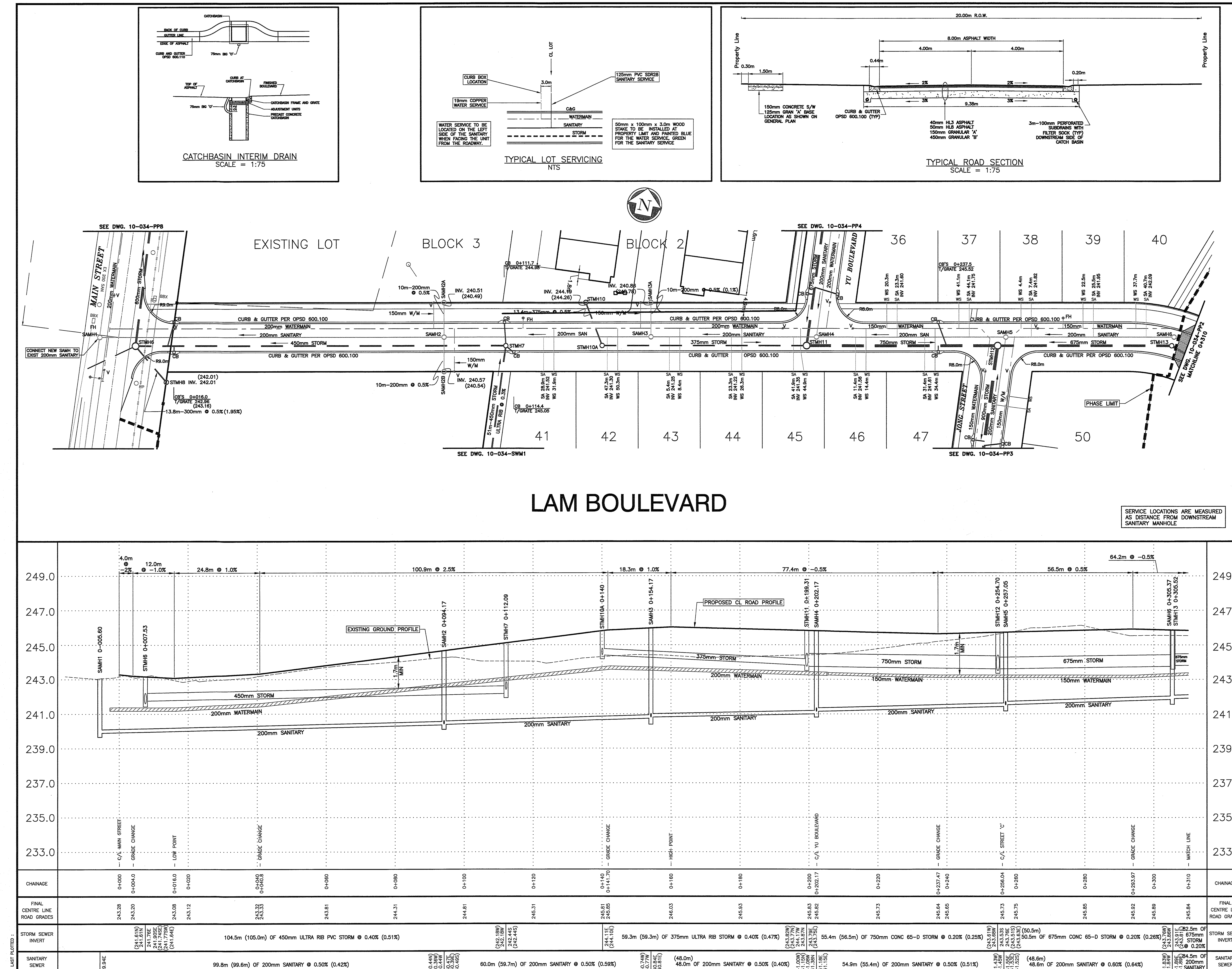
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title
YIN PHASE 5
NORFOLK COUNTY - WATERFORD

Drawing Title
PLAN AND SECTION DETAILS

Designed by : GRB	Drawn By : TJC
Checked by : TGS	Date Started : NOVEMBER 2010
Drawing Scale : AS NOTED	Drawing No. SWM1
Project No. 10-034	

DATE LAST PLOTTED :



REV. No.	DATE	REVISION
0	DEC 8/10	SUBMIT TO COUNTY FOR REVIEW
1	JAN 28/11	REVISE PER COUNTY COMMENTS
2	MAR 15/11	REVISE PER COUNTY COMMENTS
3	NOV/11	AS-CONSTRUCTED
4	JAN 14/16	REVISED AS RECORDED

LEGEND

(226.43N) READING IN BRACKETS DENOTES AS RECORDED ELEVATION AND/OR SLOPE OR DISTANCE.

SCALE:
HORIZONTAL : 1 : 500
VERTICAL : 1 : 100

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Stamp

LICENSED PROFESSIONAL ENGINEER
T. G. SMITH
FEB 24/16
10034
PROVINCE OF ONTARIO

Project Title

YIN PHASE 5

NORFOLK COUNTY - WATERFORD

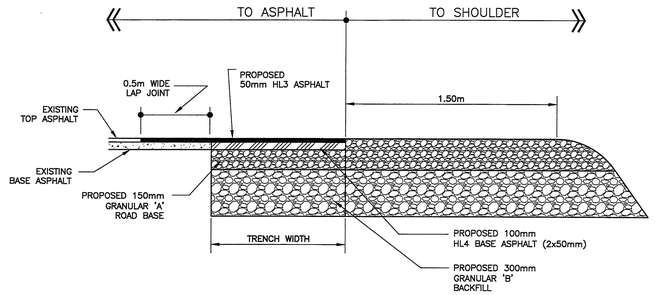
Drawing Title

PLAN AND PROFILE
LAM BOULEVARD 0+000 TO 0+320

Designed by : GRB	Drawn By : TJC
Checked by : TGS	Date Started : SEPTEMBER 2010
Drawing Scale : AS NOTED	Drawing No. PP1-AC
Project No. 10-034	

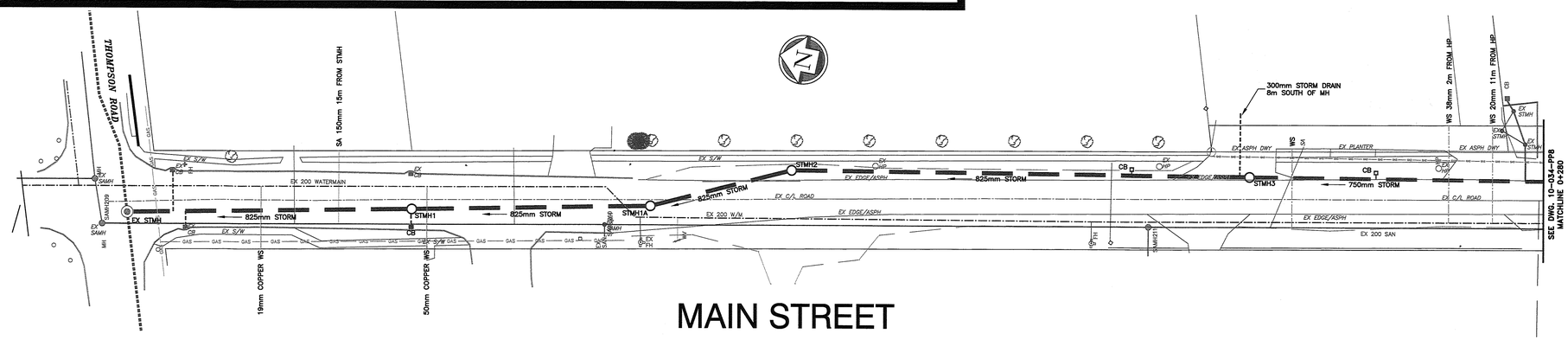
ROADWAY RESTORATION NOTES:

1. CONTRACTOR TO OBTAIN ALL NECESSARY ROAD CUT PERMITS PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO MAINTAIN A MINIMUM OF ONE LANE OF TRAFFIC AT ALL TIMES. IF TEMPORARY ROAD CLOSURES ARE NECESSARY, THEN CONTRACTOR SHALL MAKE ALL NECESSARY ARRANGEMENTS WITH NORFOLK COUNTY.
3. CONTRACTOR SHALL LOCATE AND PROTECT ALL UTILITIES.
4. ALL CUTS TO EXISTING ASPHALT AND CONCRETE SHALL BE CLEAN SAW CUTS ONLY.
5. BACKFILL FOR ALL SERVICE TRENCHES WITHIN ROADWAY SHALL BE AS PER DETAIL THIS SHEET
6. BACKFILL FOR ALL SERVICE TRENCHES FROM EDGE OF ASPHALT TO BACK OF SIDEWALK SHALL BE GRANULAR 'B' MATERIAL
7. BACKFILL FOR ALL SERVICE TRENCHES FROM BACK OF SIDEWALK TO STREET LINE SHALL BE SELECT NATIVE MATERIAL
8. ALL BEDDING AND BACKFILL SHALL BE COMPACTED TO MIN 98% SPD.
9. ROADWAY RESTORATION SHALL BE AS PER DETAIL, THIS SHEET.
10. CURBS AND SUBDRAINS SHALL BE RESTORED TO MATCH EXISTING CONDITIONS TO THE SATISFACTION OF NORFOLK COUNTY.
11. BOULEVARDS, SHALL BE RESTORED WITH No.1 NURSERY SOD ON MINIMUM 100MM TOPSOIL TO THE SATISFACTION OF NORFOLK COUNTY.
12. ROADSIDE DITCHES AND CULVERTS TO BE RESTORED TO PREVIOUS CONDITION.
13. CONCRETE SIDEWALK TO BE RESTORED WITH 150mm GRANULAR 'A' COMPACTED BASE AND 125mm 125mm 32 MPA CONCRETE (150mm IN DRIVEWAYS)

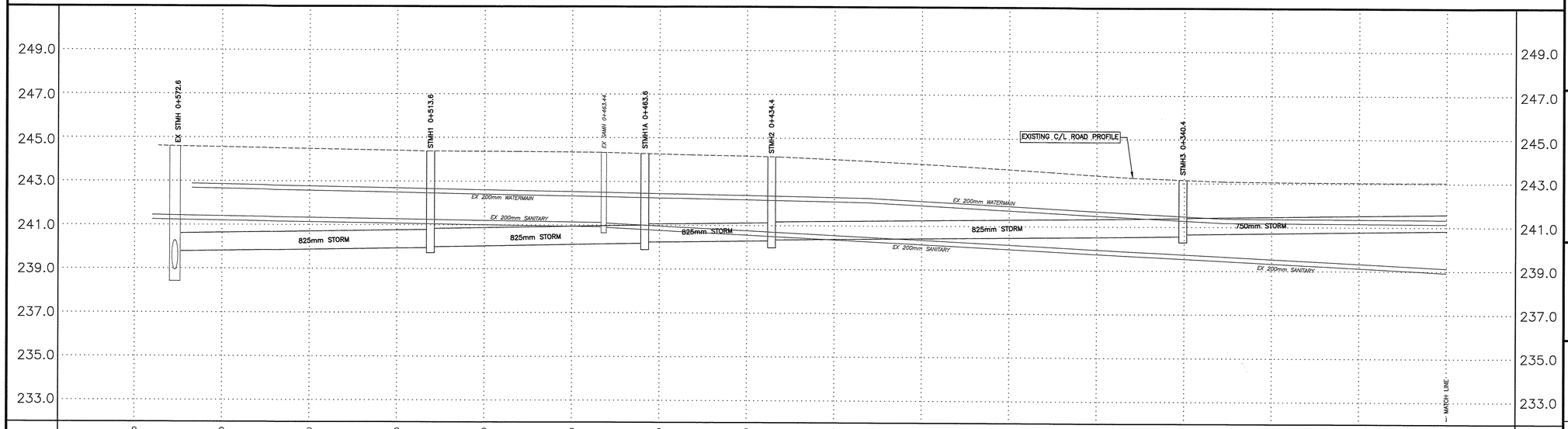


LAP JOINT/TRENCH RESTORATION DETAIL

SCALE 1 : 20



MAIN STREET



	0+580	0+560	0+540	0+520	0+500	0+480	0+460	0+440	0+420	0+400	0+380	0+360	0+340	0+320	0+300	0+280
CHAINAGE																
FINAL CENTRE LINE ROAD GRADES																
STORM SEWER INVERT	239.78S (239.76S)	58.3m (59.0m) OF 825mm CONC. STORM @ 0.35% (0.34%)	239.98N (239.96N)	240.01S (239.99S)	49.0m (50.0m) OF 825mm CONC. STORM @ 0.35% (0.36%)		(240.17N) 240.19N	(240.19S) (240.22S)	29.9m (29.2m) OF 825mm CONC. STORM @ 0.30% (0.27%)	(240.23N) 240.25N	240.37S (240.35S)	84.0m (94.0m) OF 825mm CONC. STORM @ 0.25% (0.20%)	(240.54N) 240.58N	240.67S (240.63S)	119.4m (102.6m) OF 750mm CONC. STORM @ 0.25% (0.25%)	
SANITARY SEWER																

DATE LAST PLOTTED :

REV. No.	DATE	REVISION
0	DEC 8/10	SUBMIT TO COUNTY FOR REVIEW
1	JAN 28/11	REVISE PER COUNTY COMMENTS
2	MAR 15/11	REVISE PER COUNTY COMMENTS
3	NOV 03/11	AS CONSTRUCTED
4	JAN 14/16	REVISED AS RECORDED

LEGEND

(226.43N) READING IN BRACKETS DENOTES AS RECORDED ELEVATION AND/OR SLOPE OR DISTANCE.

SCALE:

HORIZONTAL : 1 : 500 (5, 15, 25)

VERTICAL : 1 : 100 (1, 2, 3, 4, 5)

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SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

LICENSED PROFESSIONAL ENGINEER T. G. SMITH FEB 22/16 10034 PROVINCE OF ONTARIO

Project Title

YIN PHASE 5

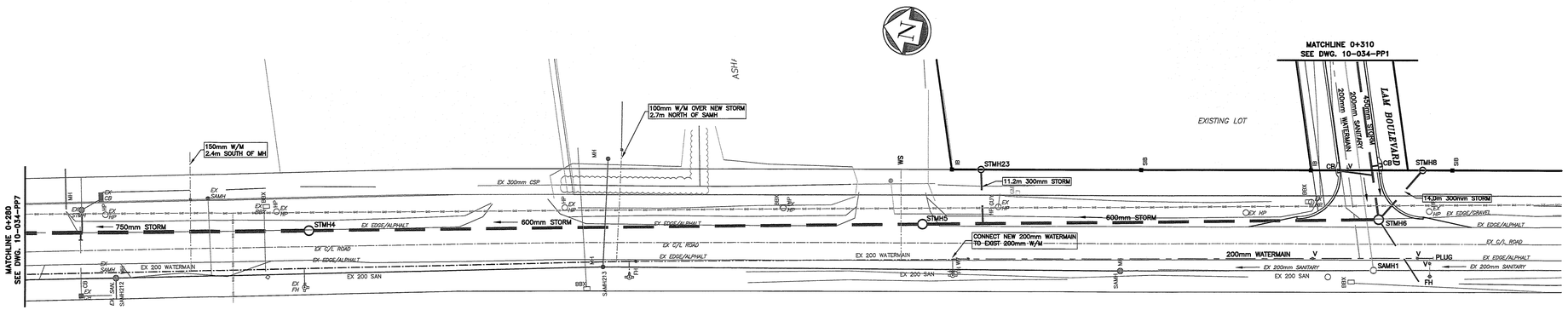
NORFOLK COUNTY - WATERFORD

Drawing Title

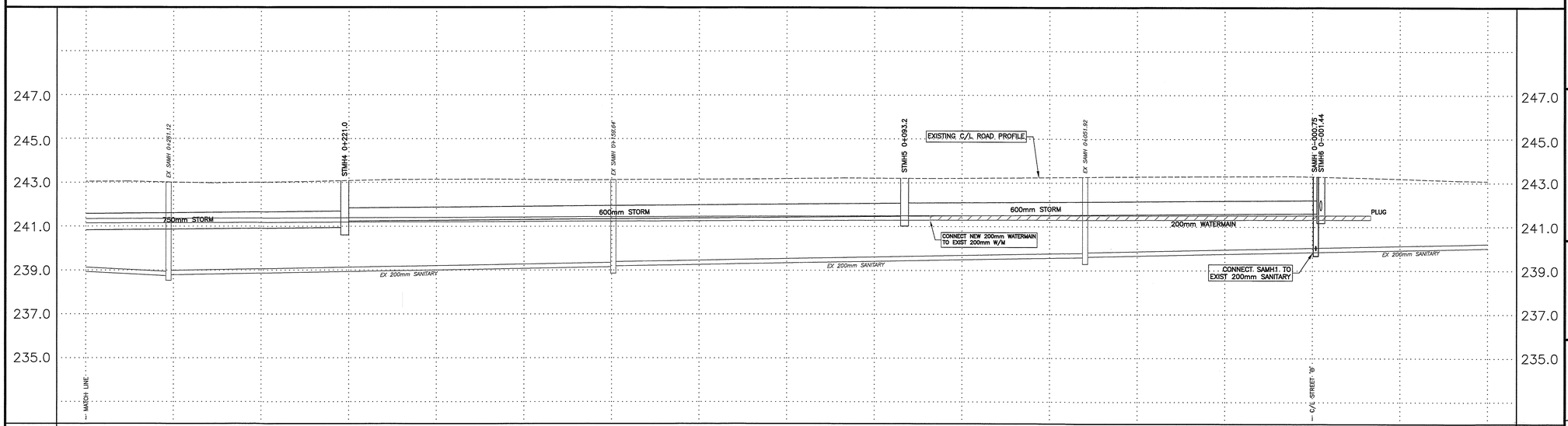
PLAN AND PROFILE
MAIN STREET 0+240 TO 0+500

Designed by : DJB	Drawn By : TJC
Checked by : TGS	Date Started : SEPTEMBER 2010
Drawing Scale : AS NOTED	Drawing No. PP7-AC
Project No. 10-034	

REV. No.	DATE	REVISION
0	DEC 8/10	SUBMIT TO COUNTY FOR REVIEW
1	JAN 28/11	REVISE PER COUNTY COMMENTS
2	MAR 15/11	REVISE PER COUNTY COMMENTS
3	NOV 03/11	AS CONSTRUCTED
4	JAN 14/16	REVISED AS RECORDED



MAIN STREET



DATE LAST PLOTTED :

LEGEND

(226.43N) READING IN BRACKETS DENOTES AS RECORDED ELEVATION AND/OR SLOPE OR DISTANCE.

SCALE:

HORIZONTAL : 1 : 500 (5, 15, 25)

VERTICAL : 1 : 100 (1, 2, 3, 4, 5)

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(519) 426-6270

Stamp

LICENSED PROFESSIONAL ENGINEER
T. G. SMITH
FEB. 22/16
10034
PROVINCE OF ONTARIO

Project Title

YIN PHASE 5

NORFOLK COUNTY - WATERFORD

Drawing Title

PLAN AND PROFILE
MAIN STREET 0+000 TO 0+240

Designed by : DJB	Drawn By : TJC
Checked by : TGS	Date Started : SEPTEMBER 2010
Drawing Scale : AS NOTED	Drawing No. PP8-AC
Project No. 10-034	

Orchard Square

SIMCOE, NORFOLK COUNTY

Estimated Cost and Securities

Rev0 - 2024-03-08
Rev1 - 2024-08-21

Project #20-128

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT
	A. SANITARY SEWERS						
1	Connect New 200mm sanitary to EX MH On Property Line Along Lam Blvrd, including backfill and restoration. (Phase 1 Connection)	L.S.	1	$3,000	$3,000	100%	$3,000
3	Supply and install 200mm PVC sanitary sewers.						
	a) EX.SAMH To Proposed Commercial Building	metre	14.2	$250.00	$3,550	10%	$355
	b) EX. SAMH to SAMH2	metre	52.9	$250.00	$13,225	10%	$1,323
	c) SAMH2 To SAMH1	metre	23.9	$250.00	$5,975	10%	$598
	d) SAMH1 To Proposed Restaurant	metre	5.1	$250.00	$1,275	10%	$128
5	Supply and install 1200mm dia. precast concrete maintenance holes complete with benching.						
	a) SAMH1	L.S.	1	$10,000	$10,000	10%	$1,000
	b) SAMH2	L.S.	1	$10,000	$10,000	10%	$1,000
6	Flush and CCTV Video Sanitary System.	L.S.	1	$1,000	$1,000	10%	$100
	TOTAL SANITARY SEWERS				**$48,025**		**$7,503**
	B. WATERMAINS						
1	Connect new 150mm watermain To Ex 150mm Water (Phase 1 Connection)	L.S.	1	$5,000	$5,000	100%	$5,000
2	Supply and install 150mm dia. water main including all fittings and anodes within development site.	metre	12	$140.00	$1,680	10%	$168
3	Supply and install 100mm dia. water main including all fittings and anodes within development site.	metre	100	$120.00	$12,000	10%	$1,200
4	Supply and install private fire hydrant set complete with valve	each	1	$5,000.00	$5,000	10%	$500
5	Supply and install 50mm water services including all fittings and anodes within development site.	metre	13	$75.00	$975	10%	$98
	TOTAL WATERMAIN				**$24,655**		**$6,966**

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT
	C. STORM SEWERS						
1	Supply and install 200mm dia. storm sewers.						
	a) CBMH1 To Proposed Commercial Building	metre	19.6	$100.00	$1,960	10%	$196
	b) Proposed Resturant Connection	metre	2.3	$100.00	$230	10%	$23
	c) Stub to Future Residential	metre	4.0	$100.00	$400	10%	$40
2	Supply and install 300mm dia. storm sewers.						
	a) CB5 To CBMH5	metre	34.3	$130.00	$4,459	10%	$446
	b) CB4 To CBMH4	metre	23.1	$130.00	$3,003	10%	$300
	c) CB3 To CBMH3	metre	31.4	$130.00	$4,082	10%	$408
	d) CB1 To CBMH1	metre	28.0	$130.00	$3,640	10%	$364
	e) CBMH2 To CBMH3	metre	38.4	$130.00	$4,992	10%	$499
	f) STMH4 To CBMH4	metre	8.0	$130.00	$1,040	10%	$104
3	Supply and install 375mm dia. storm sewers.						
	a) STMH2 To STMH1	metre	32.8	$200.00	$6,560	10%	$656
	b) STMH1 To EX.MH	metre	19.8	$200.00	$3,960	100%	$3,960
	c) CBMH2 TO STMH4	metre	40.0	$200.00	$8,000	10%	$800
4	Supply and install 600mm dia. storm sewers.						
	a) CBMH5 To CBMH2	metre	10.1	$325.00	$3,283	10%	$328
	b) STMH3 To CBMH2	metre	4.8	$325.00	$1,560	10%	$156
5	Supply and install 1200mm dia. precast concrete maintenance holes complete with benching.						
	a) CBMH1	L.S.	1	$7,000	$7,000	10%	$700
	b) CBMH2	L.S.	1	$7,000	$7,000	10%	$700
	c) CBMH3	L.S.	1	$7,000	$7,000	10%	$700
	d) CBMH4	L.S.	1	$7,000	$7,000	10%	$700
	e) CBMH5	L.S.	1	$7,000	$7,000	10%	$700
	f) STMH1	L.S.	1	$7,000	$7,000	10%	$700
	g) STMH2	L.S.	1	$7,000	$7,000	10%	$700
	h) STMH3	L.S.	1	$7,000	$7,000	10%	$700
	i) STMH4	L.S.	1	$7,000	$7,000	10%	$700
6	Supply and install 600x600 precast concrete catch basins complete with grate, connections, and subdrains.						
	a) Within Development	each	4	$2,500	$10,000	10%	$1,000
7	Construct underground stormwater management facility.	L.S.	1	$200,000.00	$200,000	10%	$20,000
8	Flush and CCTV video storm system	L.S.	1	$2,000	$2,000	10%	$200
	TOTAL STORM SEWER				**$322,169**		**$35,781**

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT
	D. ROAD CONSTRUCTION						
	DEVELOPMENT SITE						
1	Sub-excavation to a depth of 540mm below finish grade for proposed asphalt areas.	L.S.	1	$28,080	$28,080	10%	$2,808
2	Supply, place and compact 300mm Granular 'B' Type 2 100% crushed limestone for asphalt area.	tonne	2527	$15.00	$37,908	10%	$3,791
3	Supply, place and compact 150mm Granular 'A' 100% crushed limestone for asphalt area.	tonne	1369	$20.00	$27,378	10%	$2,738
4	Supply, place and compact 50mm of HL8 base asphalt pavement for asphalt area.	tonne	702	$100.00	$70,200	10%	$7,020
5	Supply, place and compact 40mm of HL3 top asphalt pavement for asphalt area.	tonne	351	$110.00	$38,610	10%	$3,861
6	Construct Concrete Drive aisles and Garbage area	sqm	487	$100.00	$48,700	10%	$4,870
7	Construct Internal Concrete sidewalk	sqm	489	$50.00	$24,450	10%	$2,445
8	Construct Barrier curb	m	708	$40.00	$28,320	10%	$2,832
9	Adjust manholes to base asphalt.	each	10	$350.00	$3,500	10%	$350
10	Adjust manholes And Catch Basins to surface asphalt.	each	12	$350.00	$4,200	10%	$420
	COUNTY ROW						
1	Sub-excavation to a depth of 540mm below finish grade for proposed asphalt areas.	L.S.	1	$1,600	$1,600	100%	$1,600
2	Supply, place and compact 300mm Granular 'B' Type 2 100% crushed limestone for asphalt area.	tonne	144	$15.00	$2,160	100%	$2,160
3	Supply, place and compact 150mm Granular 'A' 100% crushed limestone for asphalt area.	tonne	78	$20.00	$1,560	100%	$1,560
4	Supply, place and compact 50mm of HL8 base asphalt pavement for asphalt area.	tonne	80	$100.00	$8,000	100%	$8,000
5	Supply, place and compact 40mm of HL3 top asphalt pavement for asphalt area.	tonne	20	$110.00	$2,200	100%	$2,200
6	Construct Concrete sidewalk	sqm	165	$50.00	$8,250	100%	$8,250
7	Construct curb and gutter.	m	130	$40.00	$5,200	100%	$5,200
	TOTAL ROAD CONSTRUCTION				**$340,316**		**$60,105**
	E. LANDSCAPING						
1	Landscaping Allowance	L.S.	1	$50,000.00	$50,000	100%	$50,000
	TOTAL LANDSCAPING				**$50,000**		**$50,000**
	F. RECORD DRAWINGS						
1	Complete record drawings for development site and work within county ROW.	L.S.	1	$4,000.00	$4,000	100%	$4,000
	TOTAL RECORD DRAWINGS				**$4,000**		**$4,000**

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT

SECURITY SUMMARY

A.	SANITARY SEWERS	$7,503
B.	WATERMAIN	$6,966
C.	STORM SEWERS	$35,781
D.	ROAD CONSTRUCTION	$60,105
E.	LANDSCAPING	$50,000
F.	RECORD DRAWINGS	$4,000
	GRAND TOTAL	**$164,353**

MEMO

June 6, 2022

GeoProcess RESEARCH ASSOCIATES
Knowledge
Research
Consulting

Verlinda Homes Ltd.
26 Main Street South
Box 1152
Waterford, ON
N0E 1Y0

Re: Species at Risk and Significant Wildlife Habitat Assessment
Waterford, Ontario

GeoProcess Research Associates Inc. (GRA) has been retained by Verlinda Homes Ltd. to complete a Species at Risk and Significant Wildlife Habitat Assessment for their Subject Property at the corner of Lam Boulevard and Old Highway 24, Waterford, ON (Map 1). Verlinda Homes is planning to redevelop the property for residential housing. It is GRA's understanding that members of the public have raised concerns related to the development, specifically with a pond which is within property. The pond is an anthropogenic feature, likely dug for irrigation. The pond does not have direct connections to a natural water-body (i.e., watercourse) and is enclosed by a perimeter chain-linked fenced. Questions have been asked regarding the wildlife the pond may support and whether any species at risk (SAR) are present. The following memo outlines the work GRA completed to assess the wildlife functionality of the pond.

This memo includes the following summaries:

- MECP Species at Risk Screening
- Significant Wildlife Habitat Screening
- Breeding Amphibian Screening
- Turtle Habitat Screening
- Incidental Wildlife

PROJECT NO. P2022-622

PO Box 65506 Dundas
DUNDAS, ON, L9H 6Y6
905.466.6721
www.geoprocessresearch.com

1. Species at Risk Screening and Assessment

The Endangered Species Act, 2007, S.O. 2007 was passed to protect the biodiversity of Ontario by using the best available scientific, community and aboriginal traditional knowledge and the precautionary principle as its doctrine. The purpose of the Act is to identify species at risk, protect species at risk and their habitats, and to promote the recovery of species at risk and stewardship activities which assist in these goals. The Committee on the Status of Species at Risk in Ontario (COSSARO) functions to maintain an up-to-date database of information pertaining to species in Ontario and their classification. COSSARO advises the Ministry of Northern Development, Mines, Natural Resources and Forestry, who makes and files a regulation that lists all plant and animal species classified by COSSARO as extirpated, endangered, threatened, or of special concern. This regulation is the Species at Risk in Ontario List, O. Reg 230/08. Ontario Regulation 242/08 provides general policies concerning exemptions and habitat specifications for those listed species, Species at Risk (SAR).

1.1. Method

An assessment and screening of potential Species at Risk was conducted for the property based on Federal and Provincial status. Following the MECP (2019) Client's Guide to Preliminary SAR Screening, this screening was based on a review of the following:

- Natural Heritage Information Centre (NHIC) Database, 1 km x 1 km square 17NH5851;
- Atlas of the Breeding Birds of Ontario;
- Ontario Reptile and Amphibian Atlas;
- Ontario Butterfly and Moth Atlas;
- i-Naturalist- NHIC Rare Species of Ontario; and,
- eBird hotspots.

1.2. Result

1.2.1. Natural Heritage Information (NHIC) Database

The NHIC database was queried on March 25th, 2022 to identify records of SAR and/or provincially significant species, natural areas, or wildlife concentration areas. The Subject Property does not fall within a 1 km x 1 km square, however, there is a square south of the Subject Property (17NH5851). The results of the query are presented below in Table 1.

Table 1. Results of the NHIC database query for the Subject Property

Common Name	Scientific Name	SRank[1]	SARO Status	COSEWIC Status
Snapping Turtle	*Chelydra serpentina*	S4	SC	SC
Northern Pin Oak	*Quercus ellipsoidalis*			

[1] The NHIC assigns subnational ranks (S-Ranks) for species and plant communities in Ontario using the best information and considering factors such as abundance, distribution, population trends, and threats.

1.2.2. SAR Screening

The SAR screening (Table 2) considers SAR with potential to occur in the Subject Property, in accordance with the additional resources listed in Section 1.1 and detailed in Appendix A.

Table 2. SAR Screening Summary

Scientific Name	Common Name	S_RANK	SARO Status	COSEWIC Status	Potential Habitat in Subject Property
Reptiles and Amphibians					
Chelydra serpentina	Snapping Turtle	S4	SC	SC	No, basking surveys did not detect Snapping Turtles using the pond
Graptemys geographica	Northern Map Turtle	S3	SC	SC	No
Heterodon platirhinos	Eastern Hog-nosed Snake	S3	THR	THR	No
Birds					
Colinus virginianus	Northern Bobwhite	S1?B	END	END	No
Protonotaria citrea	Prothonotary Warbler	S1B	END	END	No
Icteria virens	Yellow-breasted Chat	S1B	END	END	No
Rallus elegans	King Rail	S1B	END	END	No
Empidonax virescens	Acadian Flycatcher	S1B	END	END	No
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	SC	END	No
Chaetura pelagica	Chimney Swift	S3B	THR	THR	No
Chlidonias niger	Black Tern	S3B, S4M	SC	NAR	No
Haliaeetus leucocephalus	Bald Eagle	S4	SC	NAR	No
Falco peregrinus	Peregrine Falcon	S4	SC	NAR	No
Asio flammeus	Short-eared Owl	S4?B, S2S3N	SC	SC	No
Chordeiles minor	Common Nighthawk	S4B	SC	SC	No

Scientific Name	Common Name	S_RANK	SARO Status	COSEWIC Status	Potential Habitat in Subject Property
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	No
Riparia riparia	Bank Swallow	S4B	THR	THR	No
Hirundo rustica	Barn Swallow	S4B	THR	THR	Yes. 2-4 individuals were observed foraging in the field. Subject Property does not contain breeding habitat.
Hylocichla mustelina	Wood Thrush	S4B	SC	THR	No
Dolichonyx oryzivorus	Bobolink	S4B	THR	THR	No
Sturnella magna	Eastern Meadowlark	S4B, S3N	THR	THR	No
		Insects			
Danaus plexippus	Monarch	S2N,S4B	SC	END	Yes, Common Milkweed (*Asclepias syriaca*) was observed growing east of the pond.

2. Significant Wildlife Habitat Screening

2.1. Method

A screening for Significant Wildlife Habitat following the Ministry of Natural Resources and Forestry Significant Wildlife Habitat Technical Guide (2000) and Significant Wildlife Habitat Criteria Schedule for Ecoregion 7E (January 2015) was conducted for the Subject Property. Potential SWH identified was assessed during the complementary field studies.

2.2. Result

Significant wildlife habitat within the Subject Property was assessed based on the Ecoregion 7E Criterion Schedule (OMNRF 2015). The full SWH screening table is found in Appendix B. The habitats within the Subject Property area were screened against the habitat criteria found in MNRF (2015) as well as other criteria (e.g., the presence of indicator species). Identified SWH features were considered candidate unless they were confirmed through direct observations or background review. The five main categories of SWH are considered below:

1) Seasonal Concentration Areas of Animals- none of the 16 subcategories of SWH for this category were identified as candidate within the Subject Property:
2) Rare Vegetation Communities- none of the seven subcategories of rare vegetation communities were detected within the Subject Property.
3) Specialized Habitat for Wildlife- none of the eight subcategories of SWH for this category were found within the Subject Property.
4) Habitats for Species of Conservation Concern (not including Endangered or Threatened species)- None of the five subcategories of SWH were identified as candidate within the Subject Property.
5) Animal Movement Corridors: No movement corridors were identified within the Subject Property.

3. Breeding Amphibians

3.1. Method

Amphibian surveys were completed following the Marsh Monitoring Program protocol (Bird Studies Canada 2009). This required three visits between mid-April and the end of June when there were light winds and air temperatures of 5°C, 10°C and 17°C respectively. These surveys were completed on April 22, May 12 and June 1, 2022.

3.2. Result

One toad species and three frog species were detected calling from within the pond. Based on the species and numbers identified, the pond habitat does not meet the criteria for Significant Wildlife Habitat- Amphibian Breeding (Aquatic).

Table 3 summarizes the details and findings of the breeding amphibian surveys conducted for the Subject Property. Amphibians were surveyed at one station located centrally along the eastern edge of the pond outside of the metal fence (Map 2). One toad species and three frog species were detected calling from within the pond. Based on the species and numbers identified, the pond habitat does not meet the criteria for Significant Wildlife Habitat- Amphibian Breeding (Aquatic).

Table 3. Breeding Amphibian Summary

Visit	Start Time	Air Temp (°C)	Wind (Beau-fort)	Precip	Cloud Cover (10ths)	Species Calling (Call Code-Individuals)		Background Noise (Code – Notes)	Notes
						In Station	Out of Station		
Station A									
1 (>5°C)	21:55	8	1	None	2	Northern Leopard Frog (1-1)		2-3	Cars driving on Old HWY 26, which is adjacent to pond.
2 (>10°C)	21:40	20	0	None	0	American Toad (1-1),(2-2) and (2-3)		2	Six individuals were heard in total.
3 (>17°C)	22:00	20	1	None	3	Green Frog 3x (1-1) and Bullfrog (1-2)	Gray Tree Frog	2-3	Five individuals were heard in total.

4. Turtle Habitat

4.1. Method

One visual turtle encounter survey was completed on May 24th from 11:30 am-3pm by two surveyors. The air temperature was 18°C and skies were clear to partially cloudy. The air temperature was higher than the water temperature, which is recommended for basking surveys.

4.2. Result

Basking surveys did not detect any turtle species using the pond. The pond is manmade and surrounded by a chain-link fence. There are no suitable basking logs for turtles to use and the banks are steep and heavily vegetated with shrubs such as Staghorn Sumac (*Rhus typhina*). There are no natural heritage features, such as wetlands or swamps within 120 m of the pond, therefore, it is very unlikely the pond would attract SAR turtles.

The chain-link fencing will have a negative influence on ability of the pond to function as usable turtle habitat as it:

- Restrict the ability for turtles to migrate into or out of the pond. The free movement of turtles between habitat units is important to their long-term survival as there are no opportunities leave the pond if habitat conditions become degraded or there is a loss of foraging opportunities.
- Turtles lay the eggs outside of the pond in dry land. The fence will restrict the opportunities for turtles to find suitable nesting habitats (the steep banks of the pond do not provide good nesting opportunities).

5. Incidental Wildlife Observations

Formal surveys for mammals, reptiles, and insects were not completed, but incidental observations were completed during other survey times. Table 4 summarizes the wildlife observed during field visits.

Table 4. Incidental Wildlife Observations

Scientific Name	Common Name	S_Rank	Evidence	Abundance
Charadrius vociferus	Killdeer	S5	Visual/Audio	2
Turdus migratorius	American Robin	S5	Visual/Audio	5
Agelaius phoeniceus	Red-winged Blackbird	S5	Visual/ Audio (nest observed)	8
Hirundo rustica	Barn Swallow	S4B	Visual/Audio	2
Petrochelidon pyrrhonota	Cliff Swallow	S4 S5B	Visual	1
Tachycineta bicolor	Tree Swallow	S4 S5B	Visual/Audio	3
Zenaida macroura	Mourning Dove	S5	Visual/Audio	4
Melospiza melodia	Song Sparrow	S5	Audio	1
Cardinalis cardinalis	Northern Cardinal	S5	Audio	1
Passer domesticus	House Sparrow	SNA	Audio	1
Cathartes aura	Turkey Vulture	S5B, S3N	Visual	1
Sturnus vulgaris	European Starling	SNA	Visual/Audio	3
Lithobates catesbeianus	Bullfrog	S4	Audio	1
Lithobates pipiens	Northern Leopard Frog	S5	Visual	2
Lithobates clamitans	Green Frog	S5	Visual/Audio	6
Rhipicephalus sanguineus	Brown Dog Tick	SNA	Visual	10
Colias philodice	Clouded Sulphur	SNA	Visual	3

Members of the public also noted incidental observations of Red Fox (*Vulpes vulpes fulvus*). The entire Subject Property was scouted for potential den locations. There was no evidence of breeding Red Fox or potential den entrances. No Red Fox's were observed during the field investigations.

6. Conclusion

Based on field investigations, one SAR (Barn Swallow - Threatened) was detected foraging within the Subject Property. Although Common Milkweed was detected, it was sparse and would provide limited breeding habitat to the Monarch (Special Concern). The Subject Property does not provide Significant Wildlife Habitat based on the Ecoregion 7E Criterion Schedule. One toad species and three frog species were detected calling from within the pond. The Green Frog and Bullfrog were heard incidentally calling from the pond during basking surveys. Based on the species and numbers identified, the pond habitat does not meet the criteria for Significant Wildlife Habitat - Amphibian Breeding (Aquatic).

The pond is currently providing nesting habitat for Red-winged Blackbird as a female was observed sitting on an active nest. The Red-winged Blackbird is considered secure in Ontario and is one of the most abundant native birds in Ontario. It is a generalist, meaning it has a wide dietary and habitat range. Red-winged Blackbirds fiercely defend their territories and were the only bird species observed using the vegetated banks for perching and nesting.

Overall, the pond provided limited habitat to generalist species that are common and secure in Ontario. Refer to Appendix D for photos of the Subject Property.

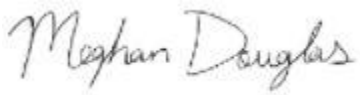
The following mitigation measures are recommended:

- Exclusion fencing should be installed around the pond to prevent wildlife from entering the site prior to site construction on pond decommission. Where required, redirect wildlife to areas where they can avoid the potential for incidental take, and still have access to habitats. Exclusionary fencing should be monitored daily throughout construction.
- Clearing of vegetation within the Subject Property as part of site preparation should be conducted in late summer or winter months (September-March) so as not to coincide with breeding bird season. If clearing is to proceed within the breeding bird window, the Subject Property should be screened by a qualified bird biologist to determine if any migratory song birds are nesting within work zone;
- Wildlife is to be safely removed and relocated to another pond or wetland feature during the pond decommissioning stage. Removal of trapped wildlife should be completed by a qualified biologist.
- Integration of Monarch host plant species such as Common Milkweed and Butterfly Milkweed (*Asclepias tuberosa*) in combination with a "Native Prairie Meadow Seed Mixture (OSC 8135)" (Appendix C) should be considered in the replanting stage to compensate for the minimal habitat loss.

Regards,

GEOPROCESS RESEARCH ASSOCIATES INC

Written By:



Meghan Douglas B.Sc., ERPG
Wildlife Ecologist and ISA Certified Arborist

Reviewed By:

Ken Glasbergen MSc., ERPG
Senior Ecologist, Principal

Maps

Legend

Subject Property

N

0 100 200 300 400 500 m

Prepared using QGIS and Google Satellite Imagery

GeoProcess RESEARCH ASSOCIATES

CREATED BY:	MD	PROJECT NO.:	P2022-622
CHECKED BY:	KG	DATE:	May 25, 2022

Map 1.

Key Map

Species at Risk and Significant Wildlife Habitat Assessment

Verlinda Homes Ltd.

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Legend

- Subject Property
- Amphibian Station

N

0 5 10 15 20 25 m

Prepared using QGIS and Google Satellite Imagery

GeoProcess RESEARCH ASSOCIATES

CREATED BY:	MD	PROJECT NO.:	P2022-622
CHECKED BY:	KG	DATE:	May 25, 2022

Map 2.

Amphibian Station

Species at Risk and Significant Wildlife Habitat Assessment

Verlinda Homes Ltd.

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Appendix A

Species at Risk Screening Sources

Screening Resource	Description
Natural Heritage Information Center (NHIC)	The Natural Heritage Information Center (NHIC), operated by the Ontario Ministry of Natural Resources and Forestry, collects, reviews, manages and distributes information on Ontario's biodiversity. Data distributed by the NHIC is used in conservation and natural resource management decision making and was a primary resource for this report. Through the NHIC Make-a-Map tool, data on species, plant communities, wildlife concentration areas and natural areas is made accessible to the public and professionals using generalized 1-kilometer grid units to protect sensitive information. The mapping interface provides current and historical occurrences of SAR within the specified grid unit. The database also identifies environmental designations which provide insight into habitat potential including wetland, areas of natural and scientific interests and woodlands.
Breeding Bird Atlas	The atlas divides the province into 10×10 km squares and then birders find as many breeding species as possible in each square. Atlassers who know birds well by song complete 5-minute "Point Counts", 25 of which are required to provide an index of the abundance of each species in a square. Data from every square are mapped to show the distribution of each species. Point count data from each square show how the relative abundance of each species varies across the province.
eBird	eBird data document bird distribution, abundance, habitat use, and trends through checklist data collected within a simple, scientific framework. Birders enter when, where, and how they went birding, and then fill out a checklist of all the birds seen and heard during the outing. eBird's free mobile app allows offline data collection anywhere in the world, and the website provides many ways to explore and summarize your data and other observations from the global eBird community. eBird hotspots that are within 1 km of the Subject Property are selected for species review.
Ontario Moth Atlas	The Ontario Moth Atlas is a project of the Toronto Entomologists' Association. The atlas currently covers about 250 species from 7 of the best-known families. The atlas presently includes 62,000 records. The last update of the atlas was in April 2020. The atlas is updated at least every 3 months. Most atlas data come from iNaturalist records. However, there is some data from Chris Schmidt of Agriculture Canada, the BOLD (Barcode of Life Datasystems) project of the University of Guelph, and from other records submitted directly to the TEA. The atlas uses the same 10×10 km squares at the Breeding Bird Atlas.
Ontario Butterfly Atlas	The Ontario Butterfly Atlas is a project of the Toronto Entomologists' Association (TEA). The TEA has been accumulating records and publishing annual seasonal summaries (Ontario Lepidoptera) for 50 years, with the first edition appearing in 1969. Atlas data comes from eButterfly records, iNaturalist records, BAMONA records, and records submitted directly to the TEA. The atlas uses the same 10×10 km squares at the Breeding Bird Atlas.
i-Naturalist	i-Naturalist is a nature app that helps public identify plants and animals. Using algorithms as well as scientists and taxonomic experts' multiple observations can be identified at a research scale. This data generated by the iNat community can be used in science and conservation. The program actively distributes the data in venues where scientists and land managers can find it. I-Naturalist has a project group for (NHIC) Rare species of Ontario. GRA only records observations with-in 1 km of the Subject Property.
Fisheries and Ocean Aquatic Species at Risk Maps	The DFO has compiled critical habitat and distribution data for aquatic species listed under the Species at Risk Act (SARA). The interactive map is intended to provide an overview of the distribution of aquatic species at risk and the presence of their critical habitat within Canadian waters. The official source of information is the Species at Risk Public Registry. Using this map, a 1 km radius circle is outlined around aquatic features located within the Subject Property.

Appendix B

Significant Wildlife Habitat Full Assessment (7E)

Table 5. Significant Wildlife Habitat Table for Ecoregion 7E

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
Seasonal Concentration Areas of Animals					
Waterfowl Stopover and Staging Areas (Terrestrial)	CUM, CUT1 - plus evidence of annual spring flooding within these ecosites *Fields with seasonal flooding and waste grains in certain areas are specific to Tundra Swan	Fields with sheet water during Spring (mid-March to May) •agricultural fields with waste grain are not SWH unless they have spring sheet water available.	No	No habitat features on the Subject Property	•Any mixed species aggregations of 100+ individuals • the flooded field plus 100-300m radius, dependant on localized site and adjacent land us • Annual Use of Habitat is documented from information sources or field studies •Specific evaluation methods required
Waterfowl Stopover and Staging Areas (Aquatic)	MAS1,MAS2,MAS3,SAS1,SAM1,SAF1,SWD1,SWD2,SWD3,SWD4,SWD5,SWD6, SWD7	Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. • Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify.	No	No habitat features on the Subject Property	•Aggregations of 100 + of species listed for 7 days, results in > 700 waterfowl use days. •Areas with annual staging for ruddyducks, canvasbacks and redheads. •The combined area of the ELC ecosites and a 100m radius area. •Wetland area and shorelines associated with sites identified within the SWHTG, Appendix K, are significant wildlife habitat. •Annual Use of Habitat is documented from information sources or field studies • Specific evaluation methods required
Shorebird Migratory Stopover Area	BBO1,BBO2,BBS1,BBS2,BBT1,BBT2,SDO1,SDS2,SDT1,MAM1,MAM2,MAM3,MAM4,MAM5	•Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. •Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores in May to mid-June and early	No	No habitat features on the Subject Property	•Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period. •Whimbrel stop briefly (<24hrs) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. •The area of significant shorebird habitat

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
		July to October. • No sewage treatment ponds.			includes the mapped ELC shoreline ecosites plus a 100m radius area. •Annual Use of Habitat is documented from information sources or field studies • Specific evaluation methods required
Raptor Wintering Area	Combo of one of each Community Series from Forest (FOD,FOM,FOC) and Upland (CUM,CUT,CUS,CUW). Bald Eagle: Forest on shoreline area adjacent to large rivers and lakes.	A combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. • Need to be > 20 ha. •Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands. • Field area of the habitat is to be wind swept with limited snow depth or accumulation.• Eagle sites have open water and large trees and snags available for roosting .	No	No habitat features on the Subject Property	•One or more Short-eared Owls or; •One of more Bald Eagles or;• At least 10 individuals and two of the listed hawk/owl species. •To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds. •for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area.• Specific evaluation methods required
Bat Hibernacula	CCR1,CCR2,CCA1,CCA2. * buildings are not to be considered SWH	May be found in caves, mine shafts, underground foundations and Karsts. •Active mine sites are not considered SWH.	No	No habitat features on the Subject Property	•All sites with confirmed hibernating bats are SWH. • area includes 200m radius around the entrance of the hibernaculum for most development types and 1000m for wind farms. •Studies are to be conducted during the peak swarming period (Aug. – Sept.). • Specific survey methods required
Bat Maternity Colonies	All Ecosites in: FOD,FOM,SWD,SWM.	Maternity colonies can be found in tree cavities, vegetation and often in building. *Building are not considered SWH. • Not found in caves or mines in ON. •Located in Mature Deciduous or mixed forest stands with >10/ha large diameter (>25cm dbh) wildlife trees. •Prefer snags in early stages of decay (class 1-3 or class 1 or class 2). •Silver-haired Bats prefer older mixed or	No	No habitat features on the Subject Property	•Confirmed use by: >10 Big Brown Bats >5 Adult female Silver Haired Bats. •The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies. • Specific evaluation methods required

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
Turtle Wintering Areas	Snapping and Midland Painted: SW,MA,OA,SA and FEO/BOO Series. Northern Map: Open water areas such as deeper rivers or streams and lakes.	deciduous forests with at least 21 snags/ha. Wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. •Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen. •Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH.	No	No habitat features on the Subject Property	•Presence of 5 over-wintering Midland Painted Turtles is significant, •One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant • The mapped ELC ecosite area with the over wintering turtles is the SWH. • If the hibernaculum in the Study Area is within a stream or river, the deep water pool where the turtles are over wintering is the SWH. • Search for congregations in Basking Areas in spring and fall.
Reptile Hibernaculum	Any ecosite other that very wet. •Talus, Rock Barren, Crevice, Cave, Alvar may be directly related. •Observations of congregations in spring or fall is good indicator.	Sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go below frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH.• Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line. •Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover.	No	No habitat features on the Subject Property	•Presence of snake hibernacula used by - a minimum of five individuals of a snake sp. or;- individuals of two or more snake spp.. •Congregations of -a minimum of five individuals of a snake sp. or; -individuals of two or more snake spp. near potential hibernacula (eg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct).• If there are Special Concern Species present, then site is SWH. •The feature in which the hibernacula is located plus a 30 m radius area is the SWH.• Hibernacula are used annually, often by the same individuals (strong site fidelity) and other life processes often take place near by

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles Cliff faces, bridge abutments, silos, barns. CUM1,CUS1,BLS1,CLO1,CLT1,CUT1,BLO1,BLT1,CLS1.	Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area, *does not include man-made structures or licenced Mineral Aggregate Operation.	No	No habitat features on the Subject Property	•Presence of 1 or more nesting sites with 8 or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50m radius habitat area from the peripheral nests. •Field surveys to observe and count swallow nests are to be completed during the breeding season. • Specific evaluation methods required
Colonially-Nesting Bird Breeding Habitat (Tree/Shrub)	SWM2,SWM3,SWM5,SWM6,SWD1,SWD2,SWD3,SWD4,SWD5,SWD6,SWD7,FET1	Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. •Most nests in trees are 11 to 15 m from ground, near the top of the tree.	No	No habitat features on the Subject Property	•Presence of 2 or more active nests of Great Blue Heron or other listed species. •The habitat extends from the edge of the colony and a minimum 300m radius or extent of the Forest Ecosite containing the colony or any island <15.0ha with a colony is the SWH. •Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells.
Colonially-Nesting Bird Breeding Habitat (Ground)	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1;50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1 – 6; MAS1 – 3; CUM,CUT,CUS	Nesting colonies on islands or peninsulas associated with open water or in marshy areas. Brewers Blackbird colonies found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands.	No	No habitat features on the Subject Property	•Presence of > 25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern. •Presence of 5 or more pairs for Brewer's Blackbird. •Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant. •The edge of the colony and a minimum 150m radius area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0ha with a colony is the SWH. •Studies would be done during May/June when actively nesting. • Specfic evaluation methods required

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
Migratory Butterfly Stopover Areas	Combo of one of each Field (CUM, CUT, CUS) and Forest (FOC, FOD,FOM,CUP).	Minimum 10 ha in size with combo of field and forest located within 5km of Lake Erie or Lake Ontario. •Should not be disturbed. • Field/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat. •Should provide protection from the elements, often spits of land or areas with the shortest distance to cross the Great Lakes.	No	No habitat features on the Subject Property. Field contained patchy and homogeneous plant growth .	•Presence of Monarch Use Days (MUD) during Fall migration (Aug/Oct) •Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD. •MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant.
Landbird Migratory Stopover Areas	All Ecosites within: FOC,FOM,FOD,SWC,SWM,SWD	Woodlots >5ha in size and within 5km of Lake Erie and Lake Ontario. • If woodlands are rare in area, smaller size can be considered. • If multiple woodlands located along shore line, those 2km from shoreline are more significant. • Sites have a variety of habitats; forest, grassland and wetland complexes. •The largest sites are more significant. •Woodlots and forest fragments are important habitats to migrating birds, these features located along the shore and located within 5km of Lake Erie and Lake Ontario are Candidate SWH.	No	No habitat features on the Subject Property	•Use of the habitat by >200 birds/day and with >35 spp with at least 10 bird spp. recorded on at least 5 different survey dates. •Studies should be completed during spring (Mar to May) and fall (Aug to Oct) migration using standardized assessment techniques. • Specific evaluation methods required

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
Deer Winter Congregation Areas	All forested ecosites within: FOC,FOM,FOD,SWC,SWM,SWD + conifer plantations much smaller than 50 ha may be used.	Woodlots >100 ha in size or if large woodlots are rare in a planning area woodlots >50ha. • Large woodlots > 100ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha. *Woodlots with high densities of deer due to artificial feeding are not significant.	No	No habitat features on the Subject Property	•Will be mapped by MNRF. • All woodlots exceeding the criteria are significant unless determined to be not by the MNRF. •Studies to be completed during winter when >20 cm of snow is on the ground, using aerial survey or pellet count.
Rare Vegetation Communities					
Cliffs and Talus Slopes	Any Ecosite within: TAO CLO TAS CLS TAT CLT	A Cliff is vertical to near vertical bedrock >3m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris. Most cliff and talus slopes occur along the Niagara Escarpment.	No	No habitat features on the Subject Property	•Confirm any ELC Vegetation Type for Cliffs or Talus Slopes
Sand Barren	SBO1 SBS1 SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicketlike (SBS1), or more closed and treed (SBT1). Tree cover always < 60%	A sand barren area >0.5ha in size. • Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. Usually located within other types of natural habitat such as forest or savannah. • Vegetation can vary from patchy and barren to tree covered, but less than 60%.	No	No habitat features on the Subject Property	•Confirm any ELC Vegetation Type for Sand Barrens. •Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
Alvar	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2, *Five Alvar Indicator Species:* 1) Carex crawei 2) Panicum philadelphicum 3) Eleocharis compressa 4) Scutellaria parvula 5) Trichostema brachiatum	An Alvar site > 0.5 ha in size, only known sites are found in the western islands of Lake Erie. • An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. • Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plants. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animals species. • Vegetation cover varies from patchy to barren with a less than 60% tree cover.	No	No habitat features on the Subject Property	•Studies that identify four of the five *Alvar Indicator Species* at a Candidate Alvar site is Significant. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). •The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses.
Old Growth Forest	FOD FOC FOM SWD SWC SWM	Woodland area is >0.5ha • Characterized by heavy mortality or turnover of overstorey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	No	No habitat features on the Subject Property	•If dominant trees species of the area are >140 years old, then the area containing these trees is Significant Wildlife Habitat. • The forested area containing the old growth characteristics will have experienced no recognizable forestry activities • The area of forest ecosites combined or an eco-element within an ecosite that contain the old growth characteristics is the SWH. • Determine ELC vegetation types for the forest forest area containing the old growth characteristics

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
Savannah	TPS1 TPS2 TPW1 TPW2 CUS2	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%. • No minimum size to site. • Site must be restored or a natural site. *Remnant sites such as railway right of ways are not considered to be SWH. • Remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario)	No	No habitat features on the Subject Property	•Field studies confirm one or more of the Savannah indicator species found in Appendix N, Ecoregion 7E of the SWHTG, OMNR (2000). •Entire area of the ELC Ecosite is SWH. •Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic species).
Tallgrass Prairie	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated by prairie grasses. •An open Tallgrass Prairie habitat has < 25% tree cover. •No minimum size to site. •Site must be restored or a natural site. *Remnant sites such as railway right of ways are not considered to be SWH.	No	No habitat features on the Subject Property	•Field studies confirm one or more of the Prairie indicator species in Appendix N, Ecoregion 7E of The SWHTG, OMNR (2000). •Area of the ELC Ecosite is the SWH. •Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.)
Other Rare Vegetation Communities	See the Significant Wildlife Habitat Technical Guide (OMNR, 200), Appendix M for Provincially Rare S1,S2 and S3 ELC Vegetation Types.	May include beaches, fens, forest, marsh, barrens, dunes and swamps. See OMNRF/NHIC for up to date list of rare vegetation communities.	No	No habitat features on the Subject Property	•Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG, OMNR (2000). •Area of the ELC Vegetation Type polygon is the SWH.
Specialized Habitat for Wildlife					

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
Waterfowl Nesting Area	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4. * Note: includes adjacency to Provincially Significant Wetlands	A waterfowl nesting area extends 120 m from a wetland (> 0.5 ha) or a wetland (>0.5ha) and any small wetlands (0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur. •Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites. • Upland areas should be at least 120 m wide so that predators such as racoons, skunks, and foxes have difficulty finding nests.	No	No habitat features on the Subject Property. Pond does not contain wetland features.	•Presence of 3 or more nesting pairs for listed species excluding Mallards OR •Presence of 10 or more nesting pairs for listed species including Mallards. •Any active nesting site of an American Black Duck is considered significant. •Nesting studies should be completed during the spring breeding season (April - June). •Specific evaluation methods required •A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m from the wetland and will provide enough habitat for waterfowl to successfully nest.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. *Nests located on man-made objects are not to be included as SWH. •Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy.	No	No habitat features on the Subject Property	One or more active Osprey or Bald Eagle nests in an area. •Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. •For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH. *with additional requirements•For a Bald Eagle the active nest and a 400-800 m radius around the nest is the SWH. * with additional requirements•To be significant a site must be used annually. •When found inactive, the site must be known to be inactive for > 3 years or suspected of not being used for >5 years before being considered not significant. •Observational studies to determine nest site use, perching sites and foraging areas need to be done from early March to mid August. • Specific evaluation methods required

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
Woodland Raptor Nesting Habitat	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3.	All natural or conifer plantation woodland/forest stands >30ha with >4ha of interior habitat. • Interior habitat determined with a 200m buffer. •Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest.	No	No habitat features on the Subject Property	Presence of 1 or more active nests from species list is considered significant. •Red-shouldered Hawk and Northern Goshawk – A 400m radius around the nest or 28 ha area of habitat is the SWH. (the 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest) •Barred Owl – A 200m radius around the nest is the SWH. •Broad-winged Hawk and Coopers Hawk,– A 100m radius around the nest is the SWH. •Sharp-Shinned Hawk – A 50m radius around the nest is the SWH. • Conduct field investigations from early March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area.
Turtle Nesting Areas	Exposed mineral soil (sand or gravel) areas adjacent (<100m) or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. •For an area to function as a turtle nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. *Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH.• Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used.	No	No habitat features on the Subject Property. Basking surveys did not detect turtles.	Presence of:- 5 or more nesting Midland Painted Turtles OR - One or more Northern Map Turtle or Snapping Turtle nesting is a SWH. •The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100m around the nesting area dependant on slope, riparian vegetation and adjacent land use is the SWH.• Travel routes from wetland to nesting area are to be considered within the SWH as part of the 30-100m area of habitat. •Field investigations should be conducted in prime nesting season typically late spring to early summer. •Observational studies observing the turtles nesting is a recommended method.

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
Seeps and Springs	Where ground water comes to the surface. Often they are found within headwater areas within forested habitats. •Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system.	No	No habitat features on the Subject Property	Presence of a site with 2 or more seeps/springs should be considered SWH. •The area of a ELC forest ecosite or an ecoelement within ecosite containing the seeps/springs is the SWH. •The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat.
Amphibian Breeding Habitat (Woodland)	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD •Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians.	Presence of a wetland, pond or woodland pool (including vernal pools) >500m^2 (about 25m diameter) within or adjacent (within 120m) to a woodland (no minimum size). • Some small wetlands may not be mapped and may be important breeding pools for amphibians. •Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat.	No	No habitat features on the Subject Property	Presence of breeding population of: - 1 or more of the listed newt/salamander species or - 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) or - 2 or more of the listed frog species with Call Level Codes of 3. •A combo of observational and call count surveys required during the spring (March-June) . •The habitat is the wetland area plus a 230m radius of woodland area. • If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat.
Amphibian Breeding Habitat (Wetlands)	ELC Community Classes SW, MA, FE, BO, OA and SA. •Typically these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.	Wetlands >500m^2 (about 25m diameter), supporting high species diversity are significant; •some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats. •Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for	No	No habitat features on the Subject Property. Pond does not contain wetland features and breeding amphibian surveys did not confirm habitat quality.	Presence of breeding population of: -1 or more of the listed newt/salamander species or -2 or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) or -2 or more of the listed frog/toad species with Call Level Codes of 3. or; -Wetland with confirmed breeding Bullfrogs are significant. •The ELC ecosite wetland area and the

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
		calling, foraging, escape and concealment from predators. • Bullfrogs require permanent water bodies with abundant emergent vegetation.			shoreline are the SWH. •A combo of observational and call count surveys will be required during the spring (March-June). •If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered.
Woodland Area-Sensitive Bird Breeding Habitat	All Ecosites withing: FOC FOM FOD SWC SWM SWD	Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha. •Interior forest habitat is at least 200 m from forest edge habitat.	No	No habitat features on the Subject Property	Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. *any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH. • Conduct field investigations in spring and early summer. • Specific evaluation methods required
Habitat for Species of Conservation Concern (Not including Endangered or Threatened Species)					
Marsh Bird Breeding Habitat	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites	Nesting occurs in wetlands. All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present. •For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water..	No	No habitat features on the Subject Property. One generalist species, the Red-winged Blackbird was observed nesting.	Presence of: - 5 or more nesting pairs of Sedge Wren or Marsh Wren or -breeding by any combination of 4 or more of the listed species. •any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH. •Area of the ELC ecosite is the SWH. •Breeding surveys should be done in May/June. • Specific evaluation methods required

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
Open Country Bird Breeding Habitat	CUM1 CUM2	Large grassland areas (includes natural and cultural fields and meadows) >30 ha. •Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years). •Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. •The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species.	No	No habitat features on the Subject Property	Presence of nesting or breeding of: -2 or more of the listed species. • A field with 1 or more breeding Short-eared Owls is to be considered SWH. •The area of SWH is the contiguous ELC ecosite field areas. •Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Specific evaluation methods required.
Shrub/Early Successional Bird Breeding Habitat	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 •Patches of shrub ecosites can be complexed into a larger habitat for some bird species.	Large field areas succeeding to shrub and thicket habitats>10ha in size. •Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no rowcropping, haying or livestock pasturing in the last 5 years). •Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species. •Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands.	No	No habitat features on the Subject Property	Presence of nesting or breeding of - 1 of the indicator species and at least 2 of the common species. •A habitat with breeding Yellowbreasted Chat or Golden-winged Warbler is to be considered as SWH. •The area of the SWH is the contiguous ELC ecosite field/thicket area. •Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Specific evaluation methods required

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
Terrestrial Crayfish	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM CUM1-with inclusions of above meadow marsh ecosites can be used by terrestrial crayfish.	Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish. •Usually the soil is not too moist so that the tunnel is well formed. •Can often be found far from water.	No	No habitat features on the Subject Property	Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites. • Area of ELC ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH. •Surveys should be done April to August in temporary or permanent water. • Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult.
Special Concern and Rare Wildlife Species	All plant and animal element occurrences (EO) within a 1 or 10km grid.	identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites	N/A	See SAR Screening Section	Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. •The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat.
Animal Movement Corridors					
Amphibian Movement Corridors	Corridors may be found in all ecosites associated with water.	Corridors will be determined based on identifying the significant breeding habitat for these species. Movement corridors between breeding habitat and summer habitat. Movement corridors must be determined when Amphibian breeding	NA	No habitat features on the Subject Property	Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and

Wildlife Habitat	Candidate SWH		Potential In the Study Area	Rationale	Confirmed Defining Criteria= Studies to confirm...
	ELC Ecosite Codes	Habitat Criteria			
		habitat is confirmed as SWH from this Schedule.			undeveloped areas are most significant. Corridors should have at least 15m of vegetation on both sides of waterway or be up to 200m wide of woodland habitat and with gaps <20m. Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat.
Exceptions for EcoRegion 7E					
Bat Migratory Stopover Area	No specific ELC types.	Long distance migratory bats typically migrate during late summer and early fall from summer breeding habitats throughout Ontario to southern wintering areas. Their annual fall migration may concentrate these species of bats at stopover areas.	No	No habitat features on the Subject Property	Only confirmed site is Long Point. Confirmation criteria and habitat areas are still being determined.

Appendix C

Native Prairie Meadow Seed Mixture

(OSC 8135)

Native Prairie Meadow Seed Mixture 8135

$100.80 – $162.00 / each

Size:	SKU:	Price:	Availability:	Quantity:	Total
500-g	Q-8135-500G	$100.80	In stock	0 + −	$0.0(
1-kg	Q-8135-1KG	$162.00	In stock	0 + −	$0.0(

ADD TO CART **$0.00**

Categories: Dry Meadow Mixes, Native Prairie Mixtures, Native Seed

DESCRIPTION ADDITIONAL INFORMATION

Description

Native Prairie Meadow Seed Mixture 8135. A diverse mix of flowering plants and grasses to create “a field of dreams” that when established, requires very little maintenance. Contains: Black Eyed Susan (Rudbeckia hirta), Early Goldenrod (Solidago juncea), Fowl Bluegrass (Poa palustris), Foxglove/Beardtongue (Penstemon digitalis), Indiangrass (Sorghastum nutans), Little Bluestem (Schizachyrium scoparium), New England Aster (Aster novae-angliae), Showy Tick Trefoil (Desmodium canadense), Switchgrass (Panicum virgatum), White Vervain (Verbena urticifolia), Wild Bergamot (Monarda fistulosa).

How to Grow

Native seed mixes do best when planted in the fall, typically between Oct. 15th and Nov. 15th. A late fall sowing allows the seed to be stratified naturally over the winter and early spring. An early spring sowing in April can work but due to the possibility of unseasonable weather preventing decent seed stratification, there is a greater chance that seed will remain dormant and not germinate until the spring of the following year.

Site Preparation. While there is little you can do to deal with the seeds of undesirable plants that are already in the soil, to help minimize unwanted competition in the seeding area, remove existing weeds by hand or apply an organic non–selective herbicide. Once all unwanted vegetation has been taken care of, loosen soil to 2.5 cm (1") depth with a stiff rake, cultivator or hoe. Prairie flowers and grasses germinate and establish themselves much better when the seed is planted into a bed of loose, well drained soil rather than dense, compacted topsoil. Broadcast the seed evenly and let Mother Nature do the rest. Smaller seed can be mixed with dry sand to improve distribution when sowing. Rain, snow and frost–heaving of the soil will work the seed down into the soil bed. If you do choose to do a spring planting, it is imperative to make sure the seed comes into good contact and with the soil. Irrigate as needed during the first growing season. Be prepared to cut the site at a height of 20 cm (8") twice during the first growing season and possibly once more early in the second season to help keep aggressive weeds in check while the native plants work through their establishment period. Hand removal of pockets of aggressive weeds may be required during the establishment period. Keep in mind that establishing a native planting from seed typically takes three to four years. **Sow at 500 g/180 m2 or 25 kgs/ ha**

OSC recommends sowing a nurse crop at the same time as the native seed blend. The purpose of a quick germinating nurse crop is to help prevent soil/wind erosion and seed movement, reduce weed competition and provide shelter for the target seed blend during the early establishment period. The nurse crop will die out over the winter after its job is done. For ease of application the nurse crop can be mixed with the native seed blend and applied at the same time. OSC recommends using annual rye or oats at a rate of 22–25 kg/ha (21–23 lb/acre). Note that winter will completely kill annual rye plants and some seed and completely kill **both** oat plants and seed.

Appendix D

Photos

Degraded open field with sparse vegetation cover

Common Milkweed growing sparsely in the southeast corner of field

Rockpiles were checked for den habitat and snake hibernacula

Old-field habitat. Barn, Tree and Cliff Swallows were observed foraging over the fields

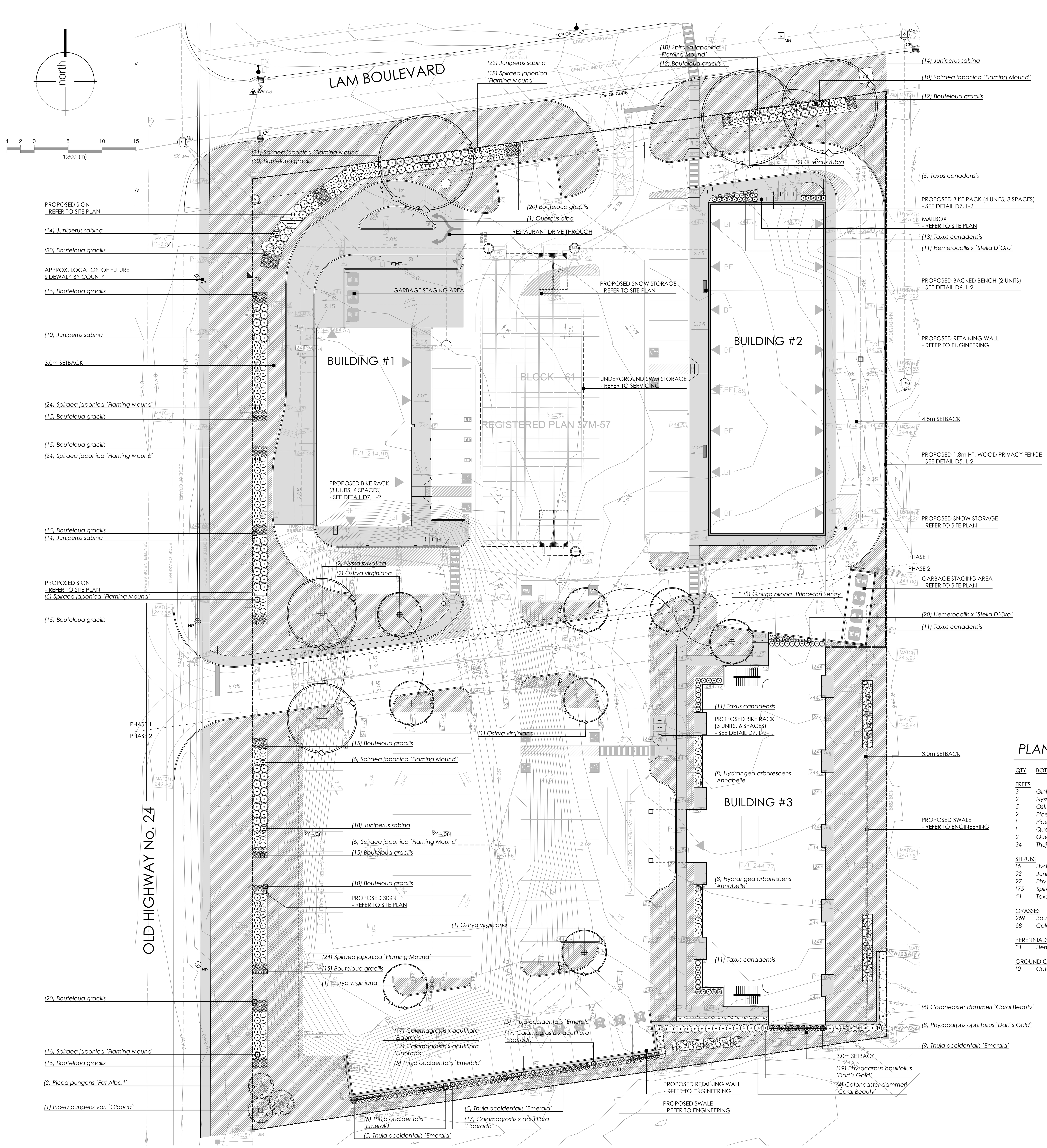
Eastern pond edge and metal chain-link fence

Western pond edge adjacent to Old Highway 24

Open pond with limited habitat for basking turtles,

Visual observation of Northern Leopard frog

project #: 24-048



LANDSCAPE NOTES:

1. All work to be carried out in accordance with by-laws and codes having jurisdiction over site location.
2. Complete all work to the satisfaction of the Landscape Architect.
3. Report any changes, discrepancies or substitutions to the Landscape Architect for review. Obtain approval from the Landscape Architect before proceeding.
4. It is the contractor's responsibility to determine existing service locations.
5. Exact locations of plant material will be determined by placement of site services such as hydro vaults, meters, utilities roof rain water leaders, driveways, light standards, etc.
6. All plant material locations to be staked or marked out and approved by Landscape Architect prior to installation.
7. Supply all plant material in accordance with the Canadian Standards for Nursery Stock (8th ed.).
8. Install plant material according to details shown.
9. Supply and place mulch in accordance with Canadian Landscape Standard (Section 10, Mulching). Disturbed soil areas around trees and shrubs are to be covered with shredded conifer bark mulch such as 'Cedar Bark Mulch' by All Treat Farms or 'Classic Cedar Mulch' by Gro-Bark, or approved equivalent. Alternative mulches must be approved by the Landscape Architect.
10. Contractor to utilize layout dimensions where provided
11. Provide planting bed area as noted on the drawing or to accommodate mature size of plant material.
12. All support systems must be removed by the contractor at time of final acceptance. No extras will be paid to complete this work
13. Supply and place topsoil in accordance with Canadian Landscape Standard (Section 4, Grading & Drainage and Section 6, Growing Medium) to a minimum depth of 150mm unless otherwise specified.
14. Supply and place sod in accordance with Canadian Landscape Standard (Section 7, Lawns & Grass and Section 8, Turfgrass Sod)unless otherwise specified.
15. Supply and place seed in accordance with Canadian Landscape Standard (Section 4, Grading & Drainage and Section 6, Growing Medium) unless otherwise specified. All 5:1 or greater slopes to be seeded with tacifier. Contractor to provide necessary erosion control protection as required to ensure soil stabilization and proper seed germination.
16. All dimensions in meters unless otherwise noted.
17. If discrepancies arise between plant material count shown on drawing and plant list, the drawing shall be considered correct.
18. Contractor to provide minimum one (1) year warranty (including trees on municipal property) from date accepted on all work unless otherwise specified.
19. Any site plan or grading and servicing shown is for information only. Refer to approved drawings.
20. Not for construction unless stamped, signed and dated by Landscape Architect.
21. Drawings not to be reproduced without written consent from Landscape Architect.
22. Approval of landscape plan to be obtained from municipality.
23. All plant material to be planted a minimum of 1.0m from any swales or ditches.
24. For grading and servicing information refer to the consulting Engineer's drawings.
25. For lighting information and power distribution refer to the electrical consultant's drawings.

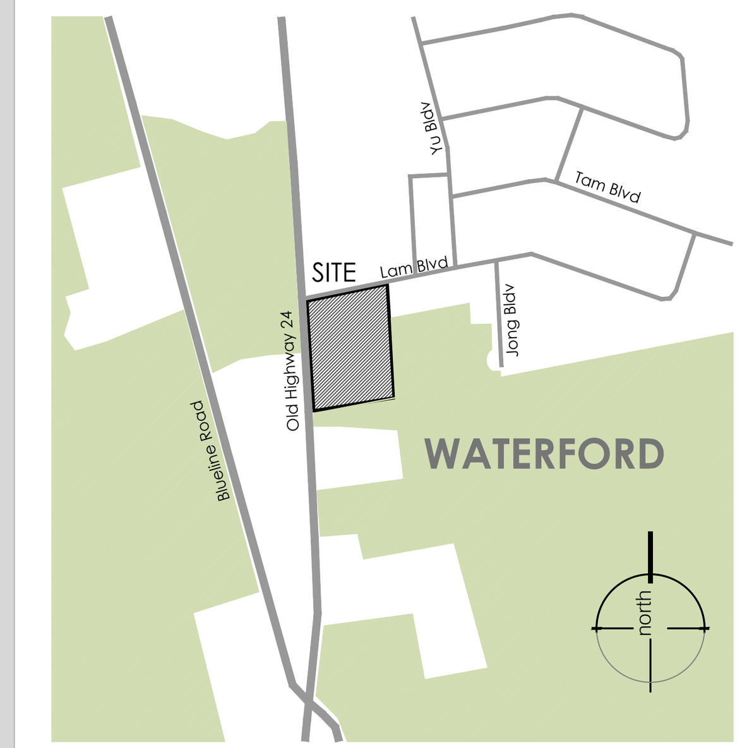
IRRIGATION NOTES:

1. The contractor is to design and install an irrigation system to efficiently irrigate all planting beds shown on plan. Plumbing and electrical work shall conform to the prevailing codes, and unless specified otherwise, the construction of the sprinkler system shall include the furnishing, installing and testing of all irrigation equipment, along with the restoration of the site to its original condition.
2. The design and layout is to be approved by the landscape architect and/or contract administrator.
3. The irrigation system will provide complete and appropriate coverage of the turf and planting areas shown on the drawings. Sprinklers are to direct water away from roads, sidewalks, driveways and buildings. The entire system shall be guaranteed to be complete and function perfectly in every detail for a period of one year from the date of its acceptance.
4. All work shall be carried out in accordance with by-laws and codes having jurisdiction over site location.
5. It is the responsibility of the plan user to inform themselves of the exact location of all underground and overhead utilities and structures before commencing the work.
6. All spray heads shall have pressure regulating devices.
7. The client shall be responsible for provision of 110 VAC power within 1 meter of the irrigation controller location.
8. The irrigation contractor shall be responsible for the supply and installation of a 2" backflow preventer to the local plumbing code inside of the utility room.
9. Mechanical Contractor to provide a 2" size water source complete with stub at the point of connection.
10. Irrigation design is based on a static water pressure of 65 psi at the point of connection.

PLANT SCHEDULE

QTY	BOTANICAL NAME	COMMON NAME	SIZE	COND.	MATURE HT. (M)	MATURE SPR. (M)	O.C. (M)	REMARKS
TREES								
3	*Ginkgo biloba `Princeton Sentry`*	*Princeton Sentry Maidenhair Tree*	50mm Cal.	W.B.	13.0	7.0	As Shown	
2	*Nyssa sylvatica*	*Sour Gum*	50mm Cal.	W.B.	12.0	10.0	As Shown	Native to Ontario
5	*Ostrya virginiana*	*Ironwood*	50mm Cal.	W.B.	10.0	7.0	As Shown	Native to Ontario
2	*Picea pungens `Fat Albert`*	*Fat Albert Colorado Spruce*	200cm Ht.	W.B.	8.0	4.0	As Shown	
1	*Picea pungens var. `Glauca`*	*Colorado Blue Spruce*	200cm Ht.	W.B.	16.0	5.0	As Shown	
1	*Quercus alba*	*White Oak*	50mm Cal.	W.B.	18.0	18.0	As Shown	Native to Ontario
2	*Quercus rubra*	*Red Oak*	50mm Cal.	W.B.	18.0	17.0	As Shown	Native to Ontario
34	*Thuja occidentalis `Emerald`*	*Emerald Cedar*	150cm Ht.	W.B.	5.0	1.0	As Shown	
SHRUBS								
16	*Hydrangea arborescens `Annabelle`*	*Annabelle Hydrangea*	50cm	#3 cont.	1.1	1.0	0.90	
92	*Juniperus sabina*	*Savin Juniper*	40cm	#3 cont.	1.0	1.25	1.0	
27	*Physocarpus opulifolius `Dart`s Gold`*	*Yellow Ninebark*	40cm	#3 cont.	1.1	1.1	0.90	
175	*Spiraea japonica `Flaming Mound`*	*Flaming Mound Spirea*	40cm	#3 cont.	0.70	0.90	0.75	
51	*Taxus canadensis*	*Canadian Yew*	40cm	#3 cont.	0.50	0.80	0.70	Native to Ontario
GRASSES								
269	*Bouteloua gracilis*	*Blue Grama Grass*	--	#1 cont.	0.50	0.30	0.25	Native to Ontario
68	*Calamagrostis x acutiflora `Eldorado`*	*Eldorado Feather Reed Grass*	--	#1 cont.	1.25	0.50	0.40	
PERENNIALS								
31	*Hemerocallis x `Stella D`Oro`*	*Stella D`Oro Daylily*	--	#1 cont.	0.30	0.50	0.40	
GROUND COVERS								
10	*Cotoneaster dammeri `Coral Beauty`*	*Coral Beauty Cotoneaster*	30cm	#3 cont.	0.40	1.5	1.3	

KEY MAP - N.T.S.



LEGEND

- property line
- proposed deciduous tree
- proposed coniferous tree
- proposed shrub
- proposed perennial
- min. 150mm topsoil, fine grade & sod
- C.I.P. concrete
- proposed 1.8m ht. wood privacy fence
- 244.53 proposed elevation

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1	2024-04-01	Issued for review
2	2024-07-16	Issued for submission

STAMP

CLIENT
Verlinda Homes Ltd.

MUNICIPALITY
Norfolk County
Waterfod

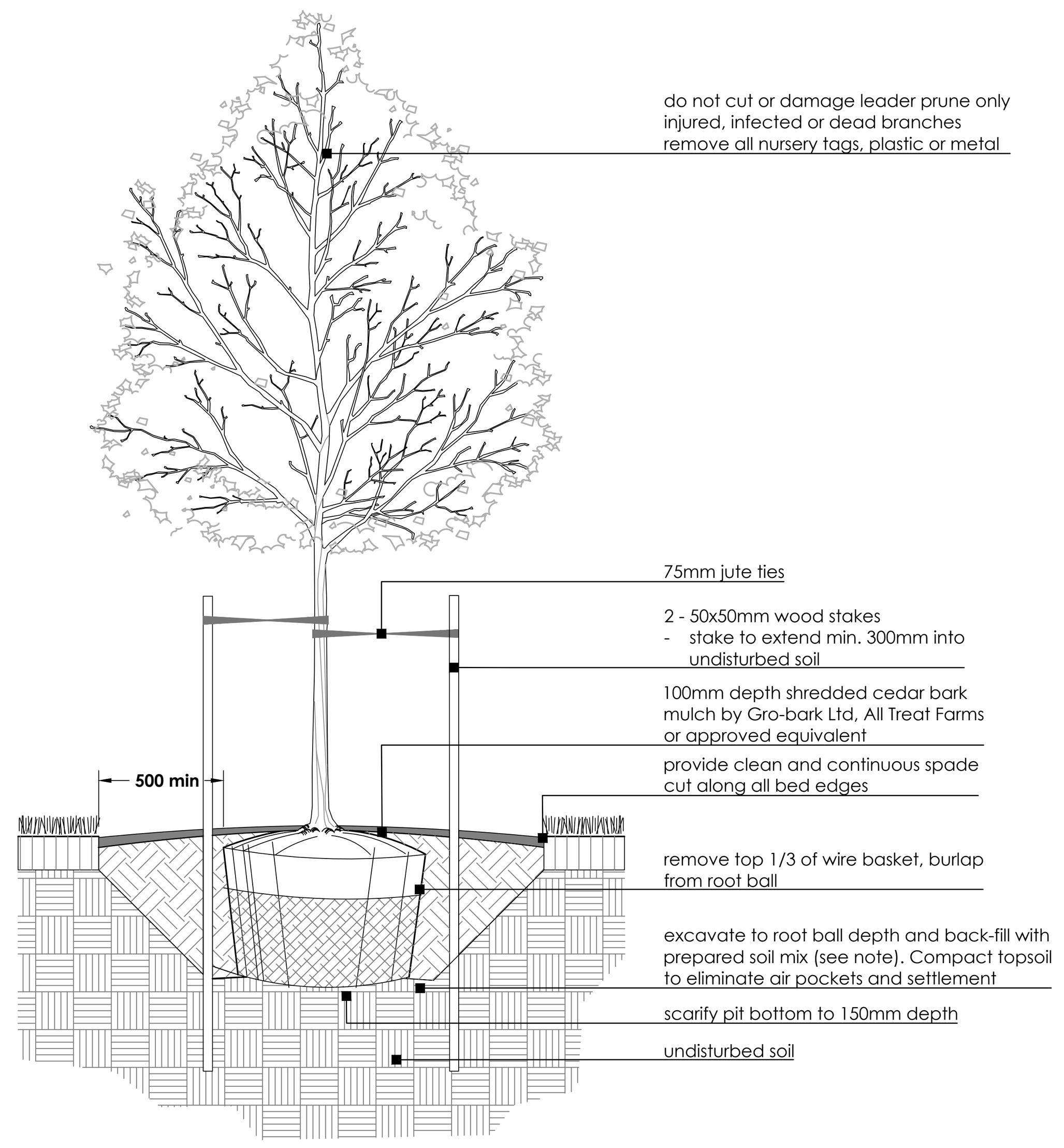
PROJECT
Orchard Square
Old Hwy 24, Norfolk County Rd.
24 & Lam Blvd. - Waterford

MUNICIPAL FILE NUMBER

SHEET
Landscape Plan
L-1

adesso design inc.
landscape architecture
69 John Street South, Suite 250
Hamilton, ON L8N 2B9
t. 905.526.8876
www.adessodesigninc.ca

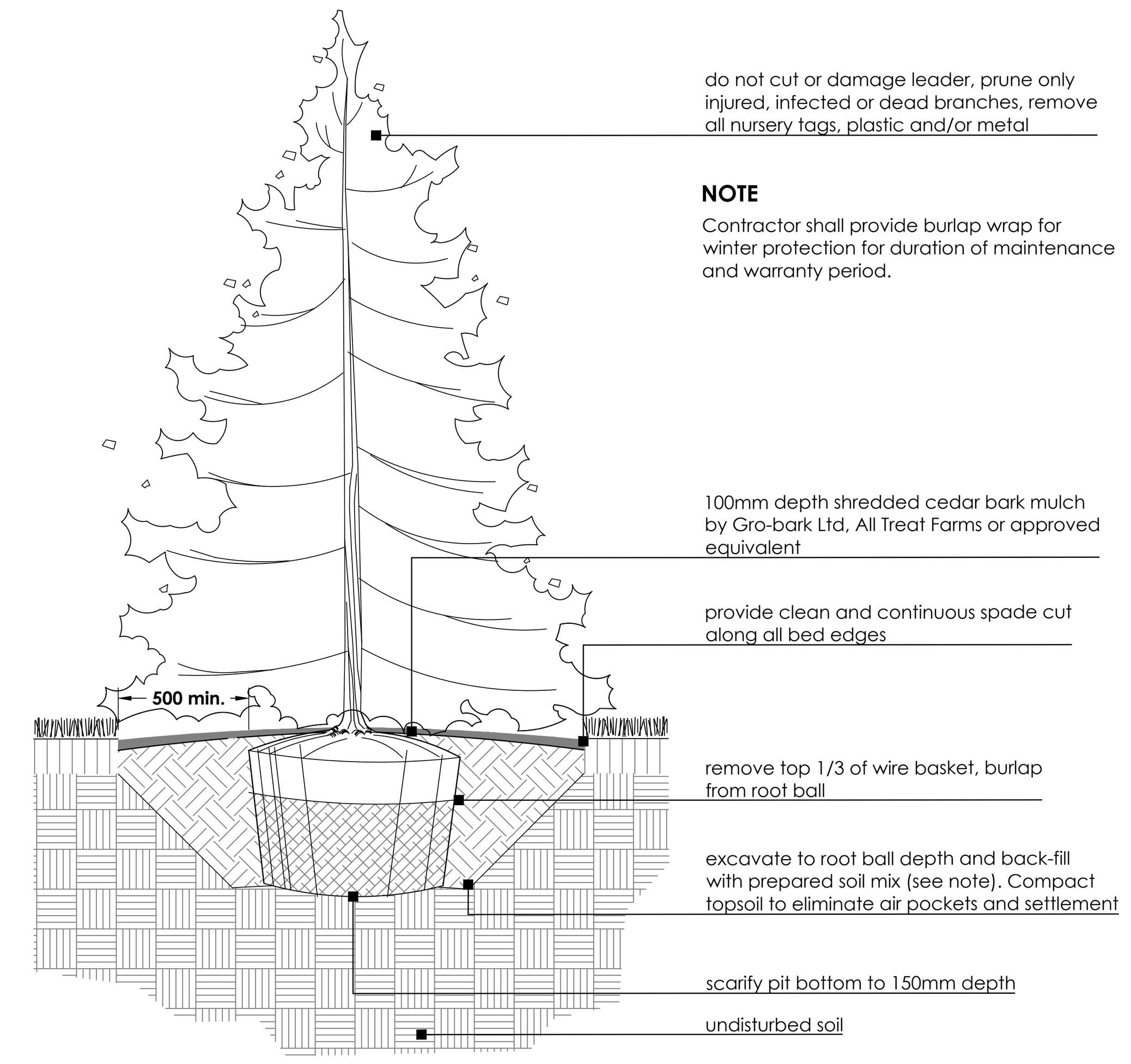
project #: 24-048



BALLED AND BURLAP /WIRE BASKET DECIDUOUS TREE

1 / L-2

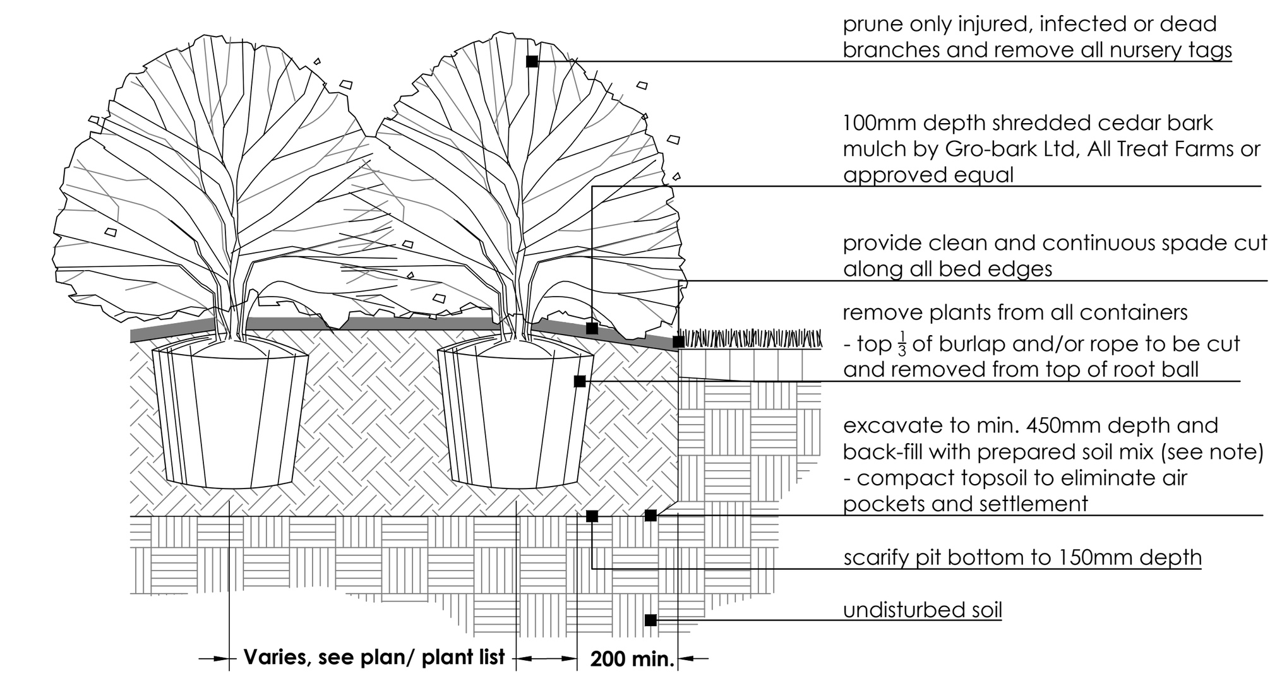
N.T.S



BALLED AND BURLAP/WIRE BASKET CONIFEROUS TREE

2 / L-2

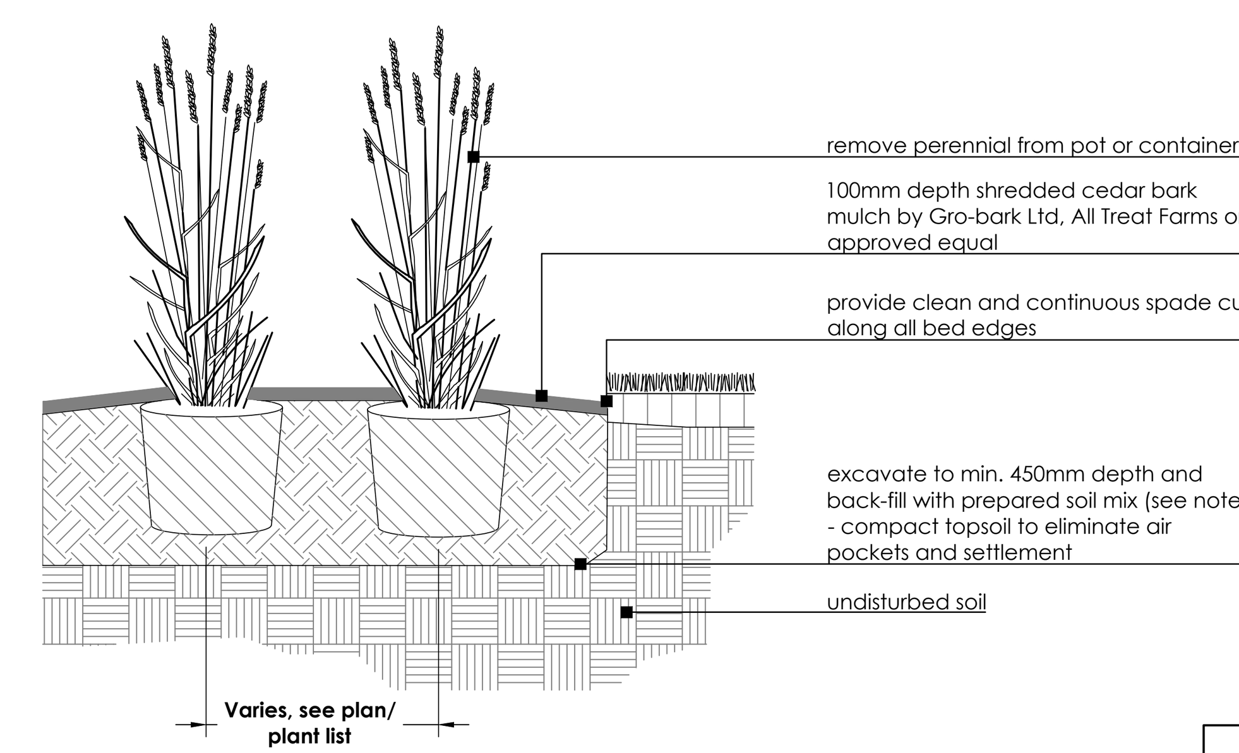
N.T.S



CONTAINER GROWN SHRUB

3 / L-2

N.T.S



CONTAINER GROWN PERENNIAL

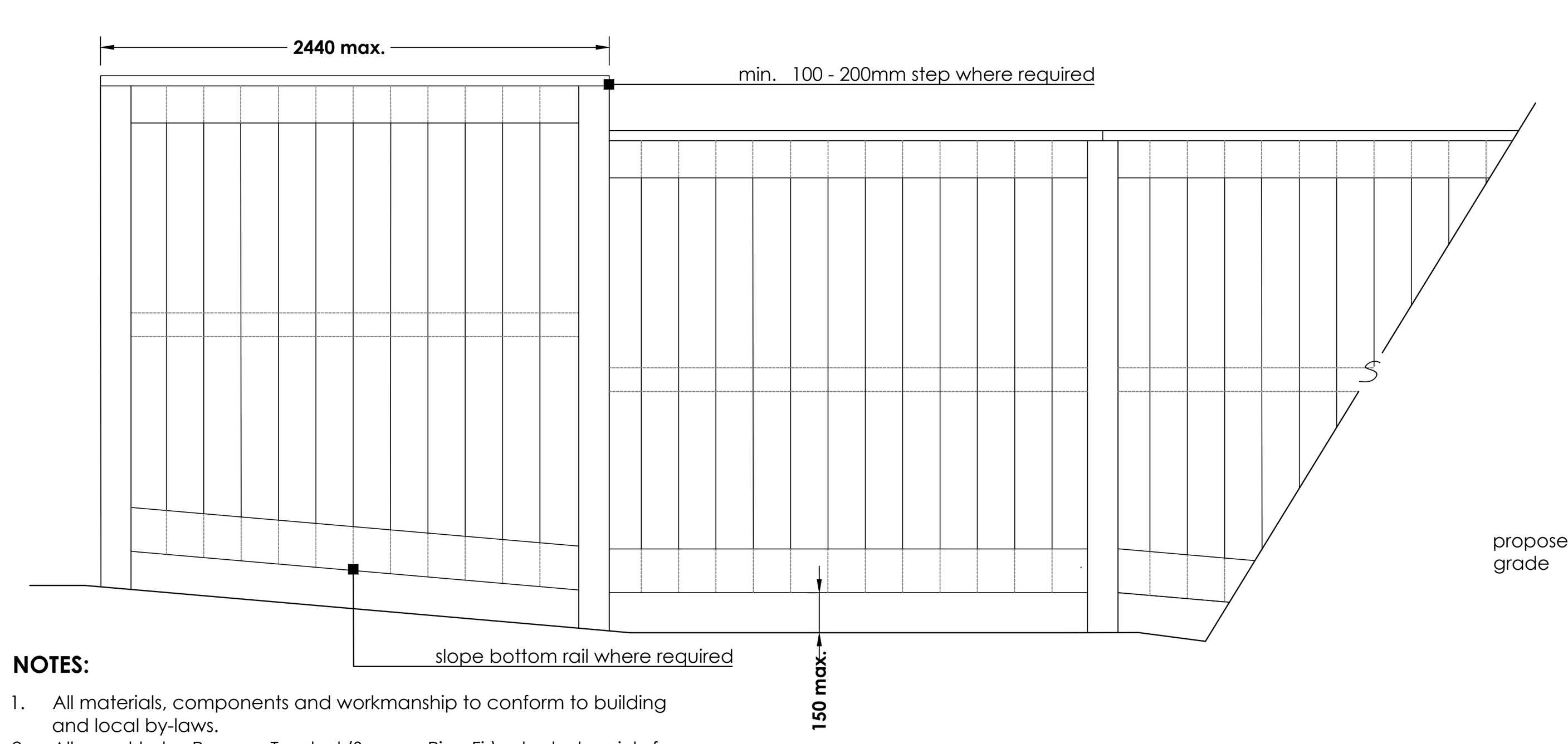
4 / L-2

N.T.S

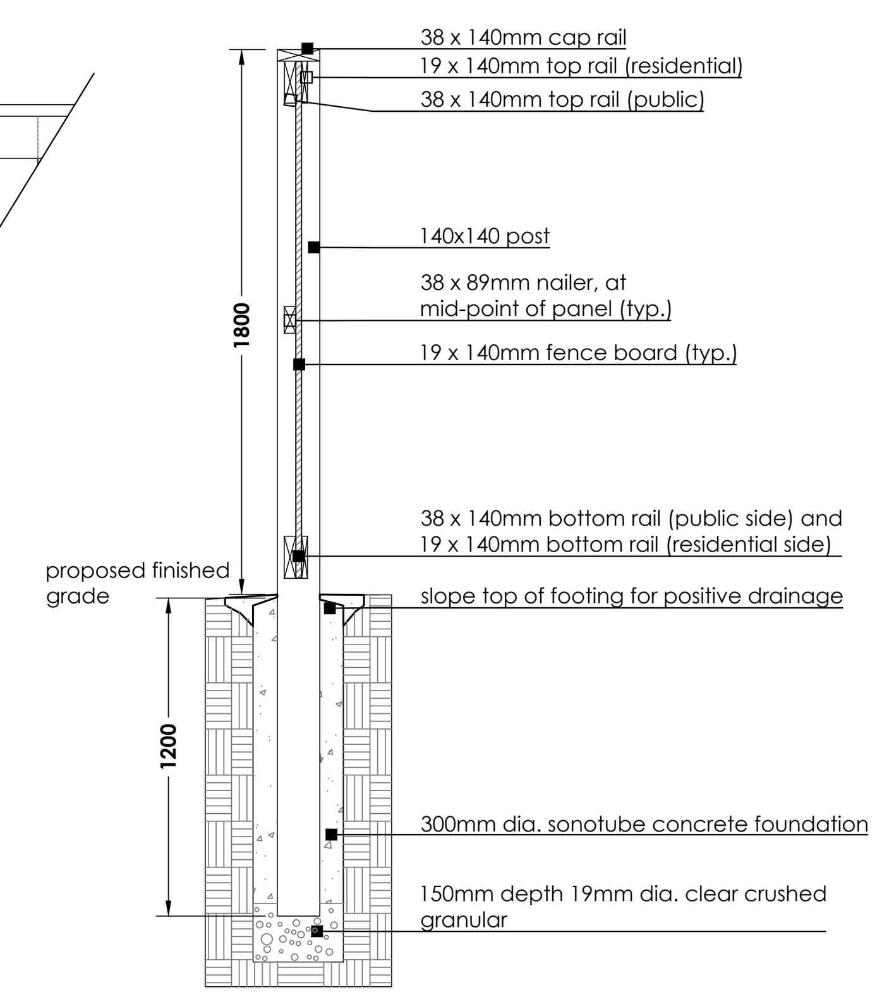
PLANTING NOTES:

1. Soil mixture: four (4) parts native soil, one (1) part well rotted compost.If existing soil is not suitable provide triple mix topsoil or approved equal.
2. Saucer shall be soaked with water and mulched immediately following planting.
3. Massed shrubs shall be planted in continuous mulched beds unless otherwise noted.
4. Staking schedule;
   < 30mm caliper size/ 2500mm ht. - one stake
   > 30mm caliper size/ 2500mm ht. - two stakes
   > 70mm caliper - three stakes
5. All support systems must be removed once tree is established.
6. All trees to be straight and planted vertically regardless of slope.
7. Top of root flare shall be positioned 50mm above grade.
8. The following depths of soil are required for planting;
   - 15cm topsoil for sod;
   - 30cm of topsoil for perennials;
   - 45cm of topsoil for shrubs;
   - 90cm of topsoil for trees

ELEVATION



SECTION



NOTES:

1. All materials, components and workmanship to conform to building and local by-laws.
2. All wood to be Pressure Treated (Spruce, Pine Fir) selected mainly for good appearance all members shall be free of wane and bark pockets. All torn grain shall be eliminated by sanding and planning. Members exhibiting moderate to heavy knots shall be well distributed throughout the site.
3. All cuts and holes that expose untreated wood should be liberally brush-coated with two applications of an end-cut preservative (copper naphthenate in ground contact or zinc naphthenate above ground) before the wood is installed. Follow the manufacturer's recommendations re: the application of suitable preservatives.
4. All wood to bear lumber grading stamp.
5. All fasteners shall have exterior grade finishes suitable for use with Pressure Treated lumber. Stainless steel, galvanized, zinc-dipped or ceramic-coated wood/deck screws are acceptable.
6. All galvanizing to be hot dipped in conformance to CSA standard C164.
7. Drive all fastener heads below surface of wood. Use sufficient size and quantity of fasteners to ensure a stable, secure structure.
8. Step fence panels minimum of 100 - 200mm at posts as required by grade conditions. Sloping of panels may be required for certain grade conditions - Consultant's approval required.
9. Lumber sizes are actual sizes rather than nominal sizes.
10. Concrete to have minimum compressive strength of 25 MPa @ 28 days with 5-7% air entertainment.
11. See landscape plan for fence location.

GENERAL LAYOUT NOTES

1. All fences adjacent to road allowances and walkways to be erected 0.15m onto private property. Fencing is not to be erected on the lot line or into any road allowance or easement.

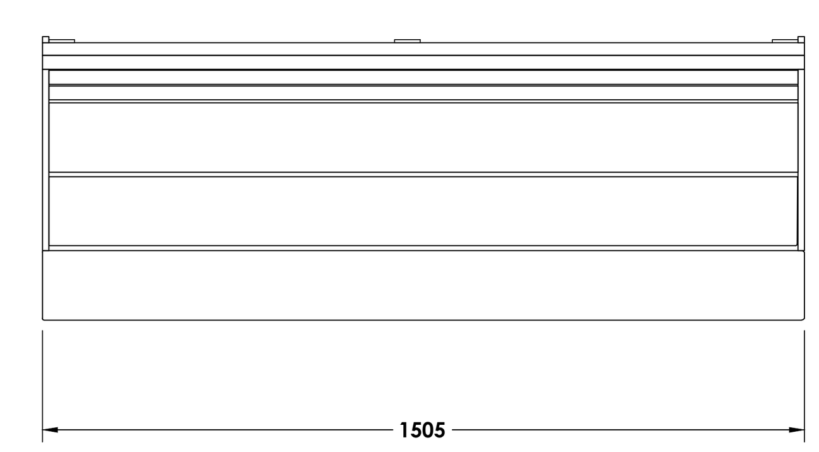
2. Footing and excavation to be entirely on proposed development lands.

WOOD PRIVACY FENCE (1.8M HEIGHT - PRESSURE TREATED)

5 / L-2

N.T.S.

PLAN



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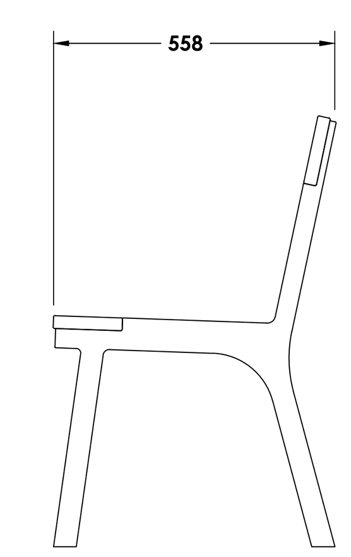

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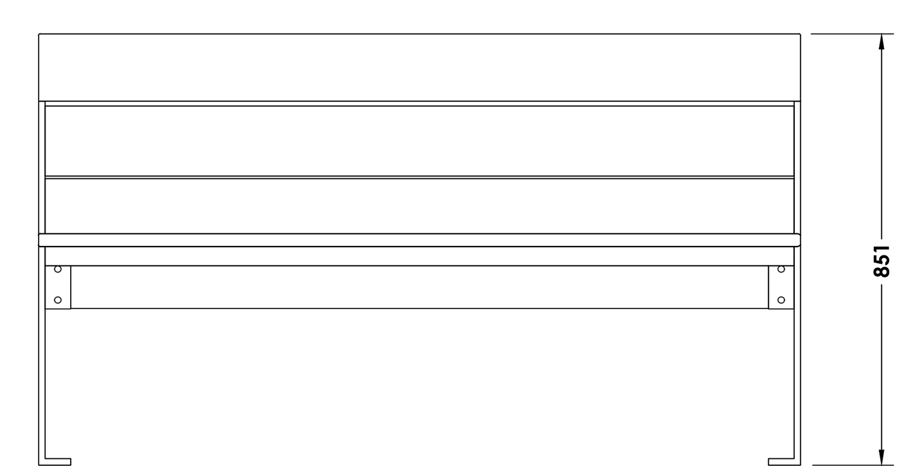


EQUIPARC BENCH - EP 1630-IPE-A

MODEL: EP 1630-IPE -A - With Backrest and arms - Collection: Plaza

BACK&ARMS: IPE with standard quality clear dye.
LEGS: Hot dipped galvanized steel
COLOR: (to be determined)
QUANTITY: 2, see landscape plan for layout.

NOTES: Handle with care, bench's finish can be scuffed by contact with tools, concrete, or other abrasive surfaces.

Contractor to protect the finish from damage during installation.
To be installed as per manufacturers specifications

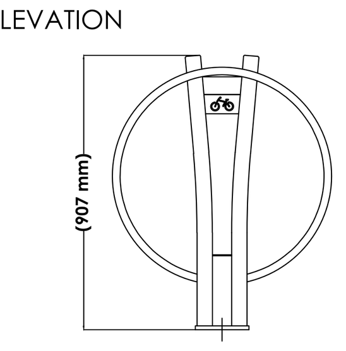
SUPPLIED BY: Equiparc (or approved equal)
1001 James-Brodie
St-Jean-Sur-Richelieu, QC, J2X 0C1
T: 450-346-1882
F: 866-346-2538
www.equiparc.com

BACKED BENCH BY EQUIPARC (OR APPROVED EQUAL)

6 / L-2

N.T.S.

ELEVATION



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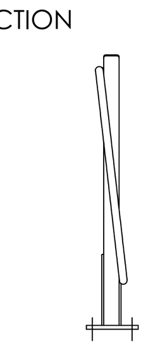
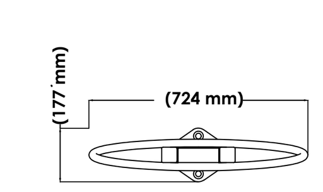


PLAN



EQUIPARC TANGO BIKE RACK

MODEL: EP 5980
FINISH: ALUMINUM, PAINTED
COLOUR: Meteor Gray semi-gloss
UNITS: 10, see landscape plan for layout.
NOTES: Handle with care, bike rack can be scuffed by contact with tools, concrete, or other abrasive surfaces. Contractor to protect the finish from damage during installation. To be installed as per manufacturers specifications.

SUPPLIED BY: Equiparc. - or approved equal
1001 James-Brodie
St-Jean-Sur-Richelieu, QC, J2X 0C1

T: 450-346-1882
F: 866-346-2538
www.equiparc.com

BIKE RACK BY EQUIPARC (OR APPROVED EQUAL)

7 / L-2

N.T.S.

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Details

L-2

adesso design inc.
landscape architecture

69 John Street South, Suite 250
Hamilton, ON L8N 2B9
t. 905.526.8876
www.adessodesigninc.ca

TYPICAL RECESSED DOWNLIGHT - BUILDING 1

TYPICAL POLE MOUNTED AREA LIGHT FIXTURE

TYPICAL TWIN POLE MOUNTED AREA LIGHT FIXTURE

TYPICAL WALL MOUNTED LIGHT FIXTURE

TYPICAL WALL MOUNTED LIGHT FIXTURE

[redacted]

[redacted]

TYPICAL WALL MOUNTED LIGHT FIXTURE - BUILDING 1

LEGEND

THIS LEGEND REPRESENTS THE SYMBOLS COMMONLY USED. NOT ALL SYMBOLS MAY APPEAR ON THE DRAWINGS. SHOULD A SYMBOL BE FOUND ON THE DRAWING AND NOT APPEARING ON THE LEGEND, THE CONTRACTOR SHALL SUBMIT A QUESTION TO HAVE THE SYMBOL CLARIFIED IN AN ADDENDUM PRIOR TO SUBMITTING A BID.

ABBREVIATIONS

AE	APPROVED EQUAL
AFF	ABOVE FINISHED FLOOR
CB	CIRCUIT BREAKER
ER	EXISTING TO BE RELOCATED
EX	EXISTING TO REMAIN
JB	JUNCTION BOX
REL	RELOCATED ITEM IN NEW LOCATION
REM	EXISTING TO BE REMOVED IN IT'S ENTIRETY
UNO	UNLESS NOTED OTHERWISE

LIGHTING FIXTURES

	SINGLE POLE MOUNTED LIGHT FIXTURE
	TWIN POLE MOUNTED LIGHT FIXTURES TYPES AS PER DRAWINGS
	TRIPLE POLE MOUNTED LIGHT FIXTURE TYPES AND ORIENTATION AS PER DRAWINGS
	QUAD POLE MOUNTED LIGHT FIXTURES REFER TO DRAWINGS FOR TYPES
	POST TOP MOUNTED AREA LIGHT FIXTURES. LETTER DENOTES TYPE.
	WALL OR COLUMN MOUNTED LIGHTING FIXTURES. LETTER DENOTES TYPE.
B-1-2	LIGHTING CIRCUITING NOTE. B-PANELBOARD I.D., 1-BRANCH CIRCUIT, 2-LOCAL (SWITCH) CIRCUIT.

SITE STATISTICS - OVERALL

AVERAGE	MINIMUM	MAXIMUM	MAX/AVG	AVG/MIN	MAX/MIN
1.33fc	0.0c	22.0fc	16.54	N/A	N/A

SITE STATISTICS - PHASE 1 PARKING

AVERAGE	MINIMUM	MAXIMUM	MAX/AVG	AVG/MIN	MAX/MIN
2.61fc	1.0fc	8.0fc	3.07	2.61	8.00

SITE STATISTICS - BUILDING 1 (DRIVE THRU)

AVERAGE	MINIMUM	MAXIMUM	MAX/AVG	AVG/MIN	MAX/MIN
5.67fc	1.3fc	19.8fc	3.49	4.36	15.23

SITE STATISTICS - BUILDING 1 - LOADING AND WASTE DISPOSAL

AVERAGE	MINIMUM	MAXIMUM	MAX/AVG	AVG/MIN	MAX/MIN
3.94fc	2.5fc	5.6fc	1.42	1.58	2.24

SITE STATISTICS - BUILDING 1 - WALKWAY AND SIDEWALK

AVERAGE	MINIMUM	MAXIMUM	MAX/AVG	AVG/MIN	MAX/MIN
12.79fc	4.9fc	22.0fc	1.72	2.61	4.49

SITE STATISTICS - BUILDING 1 - PARKING AREA (ASSUMED SPOTS)

AVERAGE	MINIMUM	MAXIMUM	MAX/AVG	AVG/MIN	MAX/MIN
3.09fc	1.3fc	8.0fc	2.59	2.38	6.15

SITE STATISTICS - PHASE 2 PARKING (CONTRIBUTION FROM PHASE 1)

AVERAGE	MINIMUM	MAXIMUM	MAX/AVG	AVG/MIN	MAX/MIN
0.35fc	0.0fc	2.8fc	8.00	N/A	N/A

THE PHOTOMETRIC DATA USED AS INPUT FOR THESE CALCULATIONS IS BASED ON ESTABLISHED IES PROCEDURES AND PUBLISHED FIXTURE RATINGS. FIELD PERFORMANCE WILL DEPEND ON ACTUAL LAMP, BALLAST, ELECTRICAL AND SITE CHARACTERISTICS.

FULL CUTOFF PERFORMANCE - FULL CUTOFF PERFORMANCE MEANS A LUMINAIRE DISTRIBUTION WHERE ZERO CANDELA INTENSITY OCCURS AT AN ANGLE AT OR ABOVE 90° ABOVE NADIR. ADDITIONALLY, THE CANDELA PER 1000 LAMP LUMENS DOES NOT NUMERICALLY EXCEED 10% (100 LUMENS) AT A VERTICAL ANGLE OF 80° ABOVE NADIR. THIS APPLIES TO ALL LATERAL ANGLES AROUND THE LUMINAIRE.

CUTOFF PERFORMANCE - CUTOFF PERFORMANCE MEANS A LUMINAIRE DISTRIBUTION WHERE THE CANDELA PER 1000 LAMP LUMENS DOES NOT NUMERICALLY EXCEED 2.5% (25 LUMENS) AT AN ANGLE ABOVE 90° ABOVE NADIR, AND 10% (100 LUMENS) AT A VERTICAL ANGLE 80° ABOVE NADIR. THIS APPLIES TO ALL LATERAL ANGLES AROUND THE LUMINAIRE.

DRAWING LIST

EP001	GENERAL NOTES, DRAWING LIST, LEGEND AND FIXTURE SCHEDULE
EP100	ELECTRICAL SITE PLAN LAYOUT - PHOTOMETRIC CALCULATIONS

SITE LIGHTING FIXTURE SCHEDULE

1. THE LIGHTING FIXTURES, BALLASTS AND LAMPS FOR THIS PROJECT HAVE BEEN SPECIFIED TO ENSURE THAT SPECIFIC AESTHETIC AND PERFORMANCE REQUIREMENTS WILL BE SATISFIED.
2. THE SPECIFIED LIGHTING FIXTURES ARE IDA APPROVED DARK-SKY FRIENDLY FIXTURES AND CONSISTENT WITH LEED GOALS & GREEN GLOBES CRITERIA FOR LIGHT POLLUTION REDUCTION. DIRECT GLARE WILL NOT BE OBSERVABLE (OUTSIDE THE ORIGINATING PROPERTY LIMITS) AT AN ANGLE GREATER THAN 85° FROM NADIR OF THE VERTICAL AXIS OF THE LIGHT SOURCE.
3. ALL ALTERNATE FIXTURES TO THE PROPOSED FIXTURES SHALL HAVE IES FILES FOR FIXTURES FROM A REPUTABLE LAB WITH IES LAB CERTIFICATION. SHOULD A PROPOSED FIXTURE PERFORMANCE FAIL TO MEET THE MINIMUM REQUIREMENTS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ANY ADDITIONAL EQUIPMENT TO BRING THE LIGHTING LEVELS UP TO THE REQUIRED VALUES.
4. INSTALLATION OF LIGHT FIXTURES SHALL BE ACCORDING TO MANUFACTURER'S RECOMMENDATION AND ACCORDING TO CODE REQUIREMENTS.
5. POLES LISTED BELOW ARE BASED ON STRESSCRETE DECORATIVE DIRECT BURIED POLES (THE TRADITIONAL - NON-FLUTED) FOR EXAMPLE PURPOSES. POLES SHALL BE SUBMITTED FOR ENGINEERS REVIEW C/W ENGINEERS STAMP. ALL POLES SHALL BE MOUNTED ON CONCRETE BASES AS NOTED IN SCHEDULE BELOW.

TYPE	DESCRIPTION	LAMP/ WATTAGE	VOLTAGE
EXT1	EXTERIOR SOFFIT MOUNTED, DOWNLIGHT STYLE LED FIXTURE TO MEET STANDARDS OF TENANT FIXTURE STANDARDS. COOPER LIGHTING HALO CAT. NO.: HC615D010 HM61240 61NDW WESCO NO. (849665 03548)	NOMINAL 1500 LUMENS, 11W INPUT	120V
EXT2	EXTERIOR WALL MOUNTED AREA LIGHT FIXTURE TO MEET TENANTS FIXTURE STANDARDS CREE LIGHTING CAT. NO.: SEC-EDG-2M-WM-02-E-UL-BK-525-40K WESCO NO.: (849655 03548)	NOMINAL 3500 LUMENS 35W INPUT	120V
WB	WALL MOUNTED, FULL CUT-OFF, LED ARCHITECTURAL AREA LIGHT, TYPE II DISTRIBUTION OPTICS. 0-10V ELECTRONIC DIMMING DRIVER STANDARD, WIRED FOR 120V, HOUSING MADE OF DIE CAST ALUMINUM PRECISE OPTICS FOR EFFICIENT LIGHT OUTPUT. FIXTURE B.U.G. RATING TO BE B2-U0-G2 OR BETTER. BASE OF DESIGN; LITHONIA LIGHTING WDGE4 CAT. No.: WDGE4 LED P2 40K 80CRI R2 MVOLT xx OR APPROVED EQUAL	15,000 NOMINAL LUMEN OUTPUT 106W INPUT 4000K	**120V (TBC)
WD	WALL MOUNTED, FULL CUT-OFF, LED ARCHITECTURAL AREA LIGHT, TYPE IV DISTRIBUTION OPTICS. 0-10V ELECTRONIC DIMMING DRIVER STANDARD, WIRED FOR 120V, HOUSING MADE OF DIE CAST ALUMINUM PRECISE OPTICS FOR EFFICIENT LIGHT OUTPUT. FIXTURE B.U.G. RATING TO BE B3-U0-G4 OR BETTER. BASE OF DESIGN; LITHONIA LIGHTING WDGE4 CAT. No.: WDGE4 LED P6 30K 80CRI R4 MVOLT xx OR APPROVED EQUAL	23,500 NOMINAL LUMEN OUTPUT 185W INPUT 3000K	**120V (TBC)
P1-T5W-P8	SINGLE, POLE MOUNTED, FULL CUT-OFF, LED AREA LIGHT, TYPE V DISTRIBUTION PATTERN OPTICS. 0-10V ELECTRONIC DIMMING DRIVER STANDARD. DRIVER MOUNTED TO DIE-CAST ALUMINUM BACK HOUSING SUITABLE FOR -40°C TO 40°C ENVIRONMENTS. CONSTRUCTED OF HINGED DIE-CAST ALUMINUM. PRECISE OPTICS FOR EFFICIENT LIGHT OUTPUT. FIXTURE TO BE MOUNTED ON 24'-0", 4" SQUARE POLE ON A 36" TALL CONCRETE BASE FOR A TOTAL MOUNTING HEIGHT OF 27'-0" (8.2m) A.F.G. FIXTURE B.U.G. RATING TO BE B5-U0-G5 OR BETTER. BASE OF DESIGN; LITHONIA LIGHTING D-SERIES AREA LUMINARE CAT. No.: DSX2 LED P8 40K 70CRI T5M xVOLT PER7 xx OR APPROVED EQUAL	55,000 NOMINAL LUMEN OUTPUT 466W INPUT 4000K	**120V (FIXTURE VOLTAGE TO BE SELECTED DURING BUILDING DESIGN AND SERVICING STAGE)
P1-T2S-P3	SINGLE, POLE MOUNTED, FULL CUT-OFF, LED AREA LIGHT, TYPE II DISTRIBUTION PATTERN OPTICS. 0-10V ELECTRONIC DIMMING DRIVER STANDARD. DRIVER MOUNTED TO DIE-CAST ALUMINUM BACK HOUSING SUITABLE FOR -40°C TO 40°C ENVIRONMENTS. CONSTRUCTED OF HINGED DIE-CAST ALUMINUM. PRECISE OPTICS FOR EFFICIENT LIGHT OUTPUT. FIXTURE TO BE MOUNTED ON 24'-0", 4" SQUARE POLE ON A 36" TALL CONCRETE BASE FOR A TOTAL MOUNTING HEIGHT OF 27'-0" (8.2m) A.F.G. FIXTURE B.U.G. RATING TO BE B3-U0-G5 OR BETTER. BASE OF DESIGN; LITHONIA LIGHTING D-SERIES AREA LUMINARE CAT. No.: DSX2 LED P3 40K 70CRI T2M xVOLT PER7 xx OR APPROVED EQUAL	29,000 NOMINAL LUMEN OUTPUT 222W INPUT 4000K	**120V (FIXTURE VOLTAGE TO BE SELECTED DURING BUILDING DESIGN AND SERVICING STAGE)
P1-T2S-P4	SINGLE, POLE MOUNTED, FULL CUT-OFF, LED AREA LIGHT, TYPE II DISTRIBUTION PATTERN OPTICS. 0-10V ELECTRONIC DIMMING DRIVER STANDARD. DRIVER MOUNTED TO DIE-CAST ALUMINUM BACK HOUSING SUITABLE FOR -40°C TO 40°C ENVIRONMENTS. CONSTRUCTED OF HINGED DIE-CAST ALUMINUM. PRECISE OPTICS FOR EFFICIENT LIGHT OUTPUT. FIXTURE TO BE MOUNTED ON 24'-0", 4" SQUARE POLE ON A 36" TALL CONCRETE BASE FOR A TOTAL MOUNTING HEIGHT OF 27'-0" (8.2m) A.F.G. FIXTURE B.U.G. RATING TO BE B3-U0-G5 OR BETTER. BASE OF DESIGN; LITHONIA LIGHTING D-SERIES AREA LUMINARE CAT. No.: DSX2 LED P4 40K 70CRI T2M xVOLT PER7 xx OR APPROVED EQUAL	34,500 NOMINAL LUMEN OUTPUT 277W INPUT 4000K	**120V (FIXTURE VOLTAGE TO BE SELECTED DURING BUILDING DESIGN AND SERVICING STAGE)

Notes:

No.	Revision	Date	By
1	ISSUED FOR SPA	204.06.12	J.R.

Electrical Engineering
12 Argyle Street N., Caledonia, ON, N3W 1B6
www.sei-ee.com

Seal

Project

G. DOUGLAS VALLEE LTD.

ORCHARD SQUARE
OLD HWY 24 / NORFOLD COUNTY RD. 24 & LAM BLVD.
WATERFORD, ON N0E 1Y0

Title

ELECTRICAL GENERAL NOTES LEGENDS AND SCHEDULES

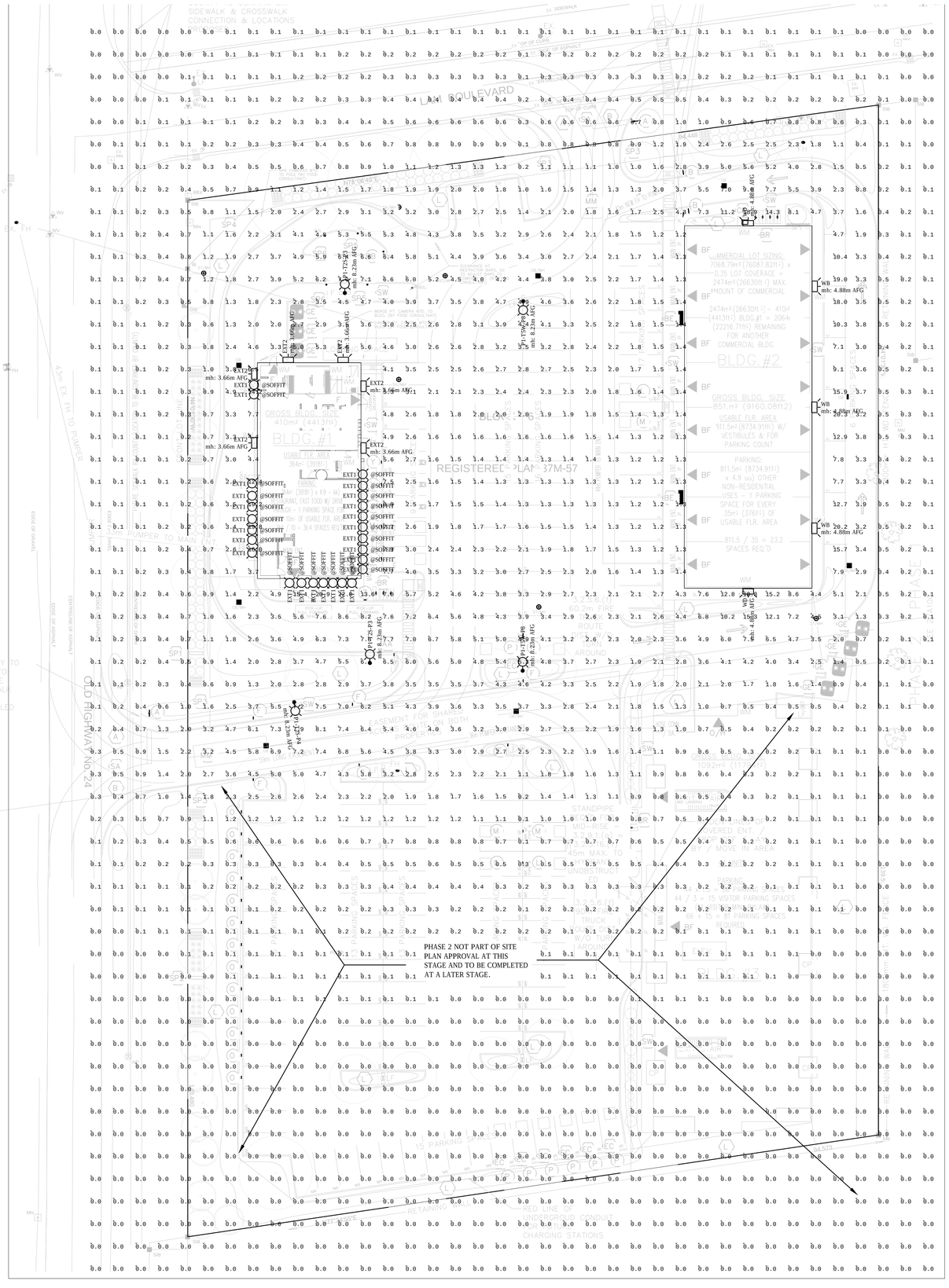
Drawn By:	Designed By:	Approved By:	Date:
J.R.	J.R.	K.S.	APR. 2024

Project No.	Scale
24-080	AS NOTED

Drawing No.	Sheet	Revision
EP001		B

ORIGINAL SHEET - ARCH D

File: P:\2024\24-080 Orchard Square Photometrics OHara\E_SPA\24-080 - Orchard Square - elec SPA.dwg
June 13, 2024 - 09:41am Plotted by: jrudy



1 / EP100 ELECTRICAL SITE PLAN - PHOTOMETRIC DRAWING
SCALE: 1:300

Notes:

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1	ISSUED FOR SPA	204.06.12	J.R.

Electrical Engineering
12 Argyle Street N., Caledonia, ON, N3W 1B6
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Seal

LICENSED PROFESSIONAL ENGINEER K. SÉGUIN PROVINCE OF ONTARIO

Project

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ORCHARD SQUARE
OLD HWY 24 / NORFOLD COUNTY RD. 24 & LAM BLVD.

WATERFORD, ON N0E 1Y0

Title

ELECTRICAL SITE PLAN PHOTOMETRIC CALCULATIONS

Drawn By:	Designed By:	Approved By:	Date:
J.R.	J.R.	K.S.	APR. 2024

Project No.	Scale
24-080	AS NOTED

Drawing No.	Sheet	Revision
EP100		B

ORIGINAL SHEET - ARCH D

File: P:\2024\24-080 Orchard Square Photometrics Ollaz\EL_SPA\24-080 - Orchard Square - elec SPA.dwg
June 13, 2024 - 09:42am Plotted by: jrudy

20-128 Orchard Square Phase 1

Comments by: Norfolk County
Development Application: SPPL2024084
Property Address: 750 Old Highway 24, Waterford

Comment On	Department	REF #	Date	Comment	Response	Task/Owner	Status
1st SUBMISSION							
1st Submission	Planning	1	3-May-24	Garbage pickup location required to be shown on site plan for building 2.	Coordinate with drawing A101A Site Plan Notes, General Notes, GE tag; Coordinate with drawing A101B Site Plan.	Vallee - Architecture	Complete
1st Submission	Planning	2	3-May-24	Fencing shown on East side of property.	Coordinate with drawing A101B Site Plan. Coordinate with Drawing L1.	Vallee - Architecture	Complete
1st Submission	Planning	3	3-May-24	Vehicular movement diagram to be provided for drive thru.	Coordinate with drawing A101B Site Plan.	Vallee - Architecture	Complete
1st Submission	Realty Services	1	3-May-24	The County will require postponements of any charges/mortgages (if any) on title to the County's Site Plan Agreement. We recommend that you connect with your solicitor and/or Lender if you are registering a mortgage on title.	Noted.	Vallee	Complete
1st Submission	Realty Services	2	3-May-24	The Owner should connect with their solicitor to obtain advice about removing the restrictive covenants registered on title.	Noted.	Vallee	Complete
1st Submission	Zoning	1	3-May-24	Can the zoning tables be labelled Building #1, #2, #3 This will help in future if commercial uses change for initial parking etc	Noted.	Vallee - Architecture	Complete
1st Submission	Fire	1	3-May-24	Ensure that there is adequate access to the parking lot of the development for fire apparatus.	Adequate fire access routes are shown on Drawing A101B Site Plan.	Vallee - Architecture	Complete
1st Submission	GIS	1	3-May-24	Please contact NorfolkGIS for new civic addresses when building. You can apply for a new civic address here. If a green sign is required in order to issue you an address (generally anywhere outside of an urban area) you will have to call Norfolk County Customer Service after applying to make payment before the address is issued (519-426-5870 or 226-NORFOLK). If you would like to apply for a new Civic Address because you are planning to build on a vacant parcel of land, this is dealt with as part of the building permit process. The building inspector can provide you with a copy of a Civic Address Request Form or it can be downloaded below. On the form there are several areas that need to be filled out with information, and a sketch showing the lot layout of the property for which the Civic Address is being requested. A sample sketch will be included with the form.	Noted.	Vallee	Complete
1st Submission	Canada Post	1	3-May-24	Please be advised that the Commercial development will be serviced by Community mailboxes and I will work with the developer on a centralized site location and the apartment building with 44 units will require a mail panel to be installed by the developer / owner for mail delivery. Connie Richardson Delivery Planning Officer Canada Post 519-521-0176 Connie.richardson@canadapost.ca	Noted. A proposed Canada Post community mailbox location is shown on Drawing A101B Site Plan, and will be coordinated with Canada Post during Phase 2 construction.	Vallee - Architecture	Complete
1st Submission	Building Department	1	3-May-24	A manhole or 45 degree connections are required on the storm building drain from the fast food restaurant. Midway between CB3 and CBMH3. [OBC 7.4.7.1(5)]	Noted. The roof leader from the proposed restaurant has been revised to enter CB3 directly.	Vallee - Civil	Complete
1st Submission	Building Department	2	3-May-24	The Functional Servicing Report (FSR) for the fast food restaurant and the mercantile building have indicated a reduction in fire flow requirements for having a sprinkler system. If building are to be sprinklered, fire department connection and fire service mains are to be indicated on the site plan. Otherwise, the reduction is to be removed in a revised functional servicing report.	The fast food restaurant will not have a sprinkler system, the FUS calculations and functional servicing report have been updated accordingly. The commerical building will have a sprinkler system. A fire department connection has been indicated on the site plan.	Vallee - Civil	Complete
1st Submission	Building Permit	1	3-May-24	The Owner shall agree to make application for a Building Permit, and obtain the necessary Building Permits prior to commencing construction.	Noted.	Vallee	Complete
1st Submission	Building Permit	2	3-May-24	AND FURTHR THAT all applicable law approvals as required by the Ontario Building Code and supporting documentation from approval agencies re submitted with a building permit application. [OBC Division A 1.4.1.3] Specifically: Site Plan Approval, removal of holding provision.	Noted.	Vallee	Complete

1st Submission	Building Permit	3	3-May-24	AND FURTHER THAT the Ontario Building Code requires that the project described above be designed and reviewed during construction by an architect, professional engineer or both that are licensed to practice in Ontario; including Site Servicing. NOW THEREFORE the Owner, being the person who intends to construct or have the building constructed hereby warrants that: 1. The undersigned architect and/or professional engineers have been retained to provide general reviews of the construction of the building to determine whether the construction is in general conformity with the plans and other documents that form the basis for the issuance of a building permit, in accordance with the performance standards of the Ontario Association of Architects (OAA) and/or Professional Engineers Ontario (PEO); 2. All general review reports by the architect and/or professional engineers will be forwarded promptly to the Chief Building Official, and 3. Should any retained architect or professional engineer cease to provide general reviews for any reason during construction, the Chief Building Official will be notified in writing immediately, and another architect or engineer will be appointed so that general review continues without interruption during construction.	The designers, Architects, Engineers, and Builders of Building #1 and #2 will be responsible and be required to be registered in the province of Ontario.	Vallee	Complete
1st Submission	Building Occupancy	1	3-May-24	AND FURTHER THAT All final letters of general conformity by the architect and/or professional engineers will be forwarded promptly to the Chief Building Official, including site services.	The designers, Architects, Engineers, and Builders of Building #1 and #2 will be responsible and be required to be registered in the province of Ontario.	Vallee	Complete
1st Submission	Paramedic Services	1	3-May-24	No Comments.	No response required.	Vallee	Complete
1st Submission	Agreement Administrator	1	3-May-24	As you are aware, a condition of your site plan approval will be to enter into a development agreement with the County. Thank you for meeting me to discuss your agreement requirements. I look forward to receiving the required information and registering your agreement.	No response required.	Vallee	Complete
1st Submission	Health and Social Services Built Environment & Active Transporation	1	3-May-24	H&SS encourages developments that make it easier for people to choose active forms of transportation (walking, cycling, wheeling) for short trips. • The development is within 1km from a RIDE Norfolk public transportation stop, which would allow residents easier connectivity to other amenities within Norfolk County and encourage another means of transportation. • Bike racks are noted in the application and encouraged. Here is a link to the essentials of bike parking: EssentialsofBikeParking_FINA.pdf (apbp.org). Environmental Health	Noted. Bike racks have been included in the proposed design. Refer to Drawing A101B Site Plan.	Vallee - Architecture	Complete
1st Submission	Health and Social Services Environmental Health	1	3-May-24	The facility referenced in this proposal is subject to one or more regulations under the Health Protection and Promotion Act which is enforced by Public Health Inspectors with the Haldimand-Norfolk Health Unit. Prior to the design, building, and operation of the proposed development, the Health Unit strongly suggests that the applicant contact the Environmental Health Team at 519-426-6170 ext. 3477 or ehthotline@hnhss.ca to be connected with a Public Health Inspector who can discuss the applicable requirements. Failure to do so could result in delays to the regulatory approval process.	Noted.	Vallee	Complete
1st Submission	Enbridge Gas	1	3-May-24	Enbridge Gas does not object to the proposed application(s) however, we reserve the right to amend or remove development conditions. This response does not signify an approval for the site/development. Please always call before you dig, see web link for additional details: https://www.enbridgegas.com/safety/digging-safety-for-contractors This response does not constitute a pipe locate, clearance for construction or availability of gas. The applicant shall use the Enbridge Gas Get Connected tool to determine gas availability, service and meter installation details and to ensure all gas piping is installed prior to the commencement of site landscaping and/or asphalt paving. (https://enbridge.outsystemsenterprise.com/GetConnected_Th/Login2?OriginalURL=htt ps%3A%2F%2Fe nbridge.outsystemsenterprise.com%2FGetConnectedApp_UI%2F) If the gas main(s) needs to be relocated as a result of changes in the alignment or grade of the future road allowances or for temporary gas pipe installations pertaining to phased construction, all costs are the responsibility of the applicant. In the event that easement(s) are required to service this development, and any future adjacent developments, the applicant will provide the easement(s) to Enbridge Gas at no cost.	Noted.	Vallee	Complete
1st Submission	Ministry of Transportation	1	3-May-24	No Comments.	No response required.	Vallee	Complete
1st Submission	Accessibility	1	3-May-24	No Comments.	No response required.	Vallee	Complete
1st Submission	Hydro One	1	3-May-24	No Comments.	No response required.	Vallee	Complete
1st Submission	Development Engineering General Comments	1	15-Jul-24	Securities were reviewed and found to be in general conformance with Norfolk County standards. Securities can be finalized as Site Plan reaches approval. Please see the attached marked of version for minor adjustments recognized at this time.	Noted. The securities estimate has been revised as noted.	Vallee - Civil	Complete

1st Submission	Development Engineering General Comments	2	15-Jul-24	All required documents noted in the Pre-Consultation Meeting Minutes as required for Site Plan Approval must be submitted for review and approval and all relevant reports and drawings are to be updated based on the full submission (e.g. Engineering drawings and reports, including the SWM Report and drawings showing the below-grade SWM facility are to be updated to reference findings and recommendations of geotechnical investigation)	All relevant reports and drawings have been updated.	Vallee - Civil	Complete
1st Submission	Development Engineering General Comments	3	15-Jul-24	Location of all proposed Pylon signs (Pylon 1 and Pylon 2 shown in Arch drawing package) are to be shown on both Servicing and Grading plans.	Noted. Locations are shown.	Vallee - Civil	Complete
1st Submission	Development Engineering General Comments	4	15-Jul-24	In this submission a mid block pedestrian crosswalk has been proposed. Norfolk County does not accept this arrangement. It is recommended by Norfolk County to install a municipal sidewalk along the south side of Lam Blvd to connect with the stop-controlled intersection. At the intersection pedestrians can cross Lam Blvd.	Coordinate with updated / re-submitted drawing A101B Site Plan. The cross walk, drop curbs and sidewalk have been removed. The proposed sidewalk along Old Hwy. #24 with connection to the main vehicular entrance to the site off Old Hwy. #24 will be used to access the site for pedestrians.	Vallee	Complete
1st Submission	Development Engineering General Comments	5	15-Jul-24	No snow storage is permitted within the municipal ROW. Please remove snow storage areas within the ROW from the Site Plan A101B.	Coordinate with updated / re-submitted drawing A101B Site Plan. The snow storage in the mnicipal ROW has been removed.	Vallee	Complete
1st Submission	Development Engineering General Comments	6	15-Jul-24	In general, these comments are specific to this phase of the development and do not include a comprehensive review of the future development of the Residential property. However, some comments have been provided for future reference.	Noted.	Vallee	Complete
1st Submission	Development Engineering General Comments	7	15-Jul-24	Prior to final approval Development Engineering will need to review the proposed Blanket Easement for Access being shared between the 2 concepts and properties shown.	Noted.	Vallee	Complete
1st Submission	Development Engineering General Comments	8	15-Jul-24	Prior to final approval Development Engineering will need to review the Shared Facilities Agreement or Blanket Easement pertaining to the shared concept between the 2 properties for the shared use of the onsite storm water system.	Noted.	Vallee	Complete
1st Submission	Development Engineering Servicing Plan DWG C101	9	15-Jul-24	All manholes, catchbasins, sidewalks, walkways, valves, curb stops, parking space line painting, etc. to be labelled or shown in legend with existing or proposed identification (labels, line types, etc.);	All manholes, catchbasins, valves and curb stops are labeled on C101. All sidewalks, parking space line painting, etc are shown on Drawing A101B Site Plan and A102 Site Plan Details.	Vallee	Complete
1st Submission	Development Engineering Servicing Plan DWG C101	10	15-Jul-24	All new/proposed barrier free parking spaces are required to meet Norfolk County Accessibility Design Guidelines (Section 3.1 Parking).	Coordinate with drawing A101B Site Plan. Coordinate with drawing A102 for all associated parking requirement details.	Vallee - Architecture	Complete
1st Submission	Development Engineering Servicing Plan DWG C101	11	15-Jul-24	Existing (and proposed) property lines and easements are to be shown.	Coordinate with drawing A101B Site Plan.	Vallee - Architecture	Complete
1st Submission	Development Engineering Servicing Plan DWG C101	12	15-Jul-24	Add a crossing detail at the crossing of the 200mm proposed sanitary pipe and the 200mm proposed watermain.	There is no crossing of a proposed 200mm sanitary and a proposed 200mm watermain. A crossing detail of the Phase 1 water service and the commercial building 200mm sanitary service is from on Drawing C105 which shows adequate vertical seperation.	Vallee - Civil	Complete
1st Submission	Development Engineering Servicing Plan DWG C101	13	15-Jul-24	Match the valve symbol to the one shown on Drawing GN.	Noted. The valve symbol has been corrected to match Drawing GN.	Vallee - Civil	Complete
1st Submission	Development Engineering Servicing Plan DWG C101	14	15-Jul-24	Specify the materials of all pipes.	All pipe materials are noted on Drawing GN.	Vallee - Civil	Complete
1st Submission	Development Engineering Servicing Plan DWG C101	15	15-Jul-24	The Domestic water service cannot be taken off the Hydrant lead. The Domestic service must be taken off in the ROW and a domestic valve installed at Property line. A sketch received by Environmental Services is attached at the end of these comments. Please contact Development Engineering if you have any questions.	Noted. The hydrant and water service layout has been revised per the sketch provided by Norfolk County.	Vallee - Civil	Complete
1st Submission	Development Engineering Servicing Plan DWG C101	16	15-Jul-24	In consultation with Norfolk County Environmental Services department, it has been determined that the Backflow Chamber will not be required for Phase 1 of this development. The water meters and RPZ assemblies will be installed inside the buildings. Consultation with Environmental Services to determine the configuration is recommended prior to building permit application.	Noted. The Servicing Plan has been updated to reflect this requirement.	Vallee - Civil	Complete
1st Submission	Development Engineering Servicing Plan DWG C101	17	15-Jul-24	At all proposed crossings, note inverts/obverts and/or show profile of crossing. Separation distances between all services has to be noted on the plan and any separation conflict clearances has to be labelled. Plan and Profile drawings are required as per Section 16.4.03 of Norfolk County Design Criteria.	All proposed crossings are shown Drawing C105, which shows adequate vertical seperation at all crossings.	Vallee - Civil	Complete
1st Submission	Development Engineering Servicing Plan DWG C101	18	15-Jul-24	It is unclear the purpose of placing a new Storm lateral within the Municipal ROW when an existing lateral and property line manhole already exists. Old Hwy 24 was recently paved, and it would be preferred to limit future road cuts if possible. If there is a known issue with the existing Storm infrastructure, please identify it in your next submission.	Noted. The design has been revised to utilize the existing storm manhole at the northwest corner of the development.	Vallee - Civil	Complete
1st Submission	Development Engineering Servicing Plan DWG C101	19	15-Jul-24	As shown in this drawing the future Residential building has a Storm connection to the neighboring property in a separate location than the parking lot. Prior to approving this connection location Development Engineering will require confirmation that the Shared Facilities Agreement acknowledges multiple connections to the shared Storm system.	Noted.	Vallee	Complete
1st Submission	Development Engineering Grading Plan DWG 102	20	15-Jul-24	All manholes, catchbasins, sidewalks, parking space line painting, etc. to be labelled or shown in legend with existing or proposed identification (labels, line types, etc.).	All manholes, catchbasins, valves and curb stops are labeled on C101. All sidewalks, parking space line painting, etc are shown on Drawing A101B Site Plan and A102 Site Plan Details.	Vallee	Complete

1st Submission	Development Engineering Grading Plan DWG 102	21	15-Jul-24	In the plan, provide the arrow in the legend depicting emergency overland flow direction. Please show Emergency Overland Flow directions.	Noted. Emergency overland flow direction arrows have been added to the plan.	Vallee - Civil	Complete
1st Submission	Development Engineering Grading Plan DWG 102	22	15-Jul-24	Specify and label tactile plates where needed.	Coordinate with drawing A101B Site Plan.	Vallee - Architecture	Complete
1st Submission	Development Engineering Grading Plan DWG 102	23	15-Jul-24	At the entrances, provide grade break elevations and slopes as per 16.5.01. Also, provide elevations of the existing edge of asphalt.	Noted. Elevations and slopes are shown at all entrances, including the existing edge of asphalt elevation.	Vallee - Civil	Complete
1st Submission	Development Engineering Grading Plan DWG 102	24	15-Jul-24	Add elevations for top grade of proposed sanitary manholes.	Noted. Top of casting elevations have been shown on all sanitary manholes.	Vallee - Civil	Complete
1st Submission	Development Engineering Grading Plan DWG 102	25	15-Jul-24	Add OPSD standards for curb and sidewalk. Similar to what is shown on Arch drawings or just reference them.	Coordinate with drawing A105 and A105A OPSD Details.	Vallee - Architecture	Complete
1st Submission	Development Engineering Grading Plan DWG 102	26	15-Jul-24	An area rough grading plan is required as the earth fill exceeds 0.5m as per 11.6.01.	Noted. An excess cut and fill drawing has been created.	Vallee - Civil	Complete
1st Submission	Development Engineering Grading Plan DWG 102	27	15-Jul-24	The existing ground contour to be extended 30m beyond the property limits to indicate the grading and drainage pattern of the adjacent land as per 16.4.02.	Noted. The viewport has been extended to show contours 30m beyond the property limits.	Vallee - Civil	Complete
1st Submission	Development Engineering Grading Plan DWG 102	28	15-Jul-24	Add roadway/driveway dimensions and curb radii.	Coordinate with drawing A101B Site Plan.	Vallee - Architecture	Complete
1st Submission	Development Engineering Grading Plan DWG 102	29	15-Jul-24	Show existing elevations at centerlines of Old Highway24 and Lam Boulevard at 20m intervals as per 16.4.02.	Noted. Existing road centreline elevations have been added.	Vallee - Civil	Complete
1st Submission	Development Engineering Grading Plan DWG 102	30	15-Jul-24	Where a retaining wall is 0.60m or higher, placement of fencing or a guard along the top of the wall is required as per 11.4.00.	A fence is proposed along the top of the retaining wall. Refer to drawing A101B Site Plan.	Vallee - Civil	Complete
1st Submission	Development Engineering Grading Plan DWG 102	31	15-Jul-24	Please add note that all entrances are to be constructed as per OPSD 350.010 or reference the ARCH drawings.	Coordinate with drawing A105A OPSD Details.	Vallee - Architecture	Complete
1st Submission	Development Engineering Grading Plan DWG 102	32	15-Jul-24	This plan shows filling of the ditch along Old HWY 24 to place the required sidewalk. Norfolk County is concerned the existing ditch is an outlet for upstream Strom water. A proper outlet must be identified as upstream storm water will not be permitted to flood onto old HWY 24.	Coordinate with drawing A101B Site Plan. There is a red note that the county is to confirm the location of future proposed sidewalk location. Note that the only water that enters this ditch is from the subject development site and from off Old Highway 24. No up stream storm water from other areas enter this ditch.	Vallee - Civil	Complete
1st Submission	Development Engineering Grading Plan DWG 102	33	15-Jul-24	T/G CB5 is only 3cm lower than the high point in driveway before flows cascade onto Old HWY 24. Please adjust this lid to provide the minimum ponding levels to contain the Major storm events.	All storm sewers have been sized to convey the 100-year storm event, therefore no ponding will occur in major storm events. Refer to the storm design sheet on Drawing STM.	Vallee - Civil	Complete
1st Submission	Development Engineering Grading Plan DWG 102	34	15-Jul-24	Please show 100yr ponding levels in your next submission.	All storm sewers have been sized to convey the 100-year storm event, therefore no ponding will occur in major storm events. Refer to the storm design sheet on Drawing STM.	Vallee - Civil	Complete
1st Submission	Development Engineering Grading Plan DWG 102	35	15-Jul-24	Please note that grading for the future Residential building was not reviewed in detail for this submission. A couple of things to consider for the future development of that site are as follows: i. Revise the swale along the east limit of the property so that Min. slope allowed is 1.5% as per Norfolk County Design Criteria, Section 16.5.01.	Noted. The swale slope has been revised.	Vallee - Civil	Complete
1st Submission	Development Engineering Erosion & Sediment Control Plan DWG 103		15-Jul-24	No Comments.	No response required.	Vallee - Civil	Complete
1st Submission	Development Engineering Site Section Plan DWG 104	36	15-Jul-24	Norfolk County is unclear as to the purpose of this drawing? Was this drawing supposed to include a cross-section of the Underground Storage system. This would be a preferred addition to the drawings.	Yes, this drawing has been updated to present the underground storage system cross-section.	Vallee - Civil	Complete
1st Submission	Development Engineering General Notes Plan DWG GN	37	15-Jul-24	Revise note No. 12 under “General Note” so that the Min. vertical clearance is 0.5m in all cases as per 10.3.1.	Noted. The notes have been updated as requested.	Vallee - Civil	Complete
1st Submission	Development Engineering General Notes Plan DWG GN	38	15-Jul-24	Revise note No. 16 under “General Note” so that the fire hydrants to be complied with AWWA C502	Noted. The notes have been updated as requested.	Vallee - Civil	Complete
1st Submission	Development Engineering General Notes Plan DWG GN	39	15-Jul-24	Under “Road & Boulevard Restoration”, add a note regarding the use of unshrinkable fill (OPSS 1359) up to the subgrade level for road cuts.	Noted. The notes have been updated as requested.	Vallee - Civil	Complete
1st Submission	Development Engineering General Notes Plan DWG GN	40	15-Jul-24	General Note 15. All 200mm Sanitary is to be PVC DR35 as a minimum. Please review this note and adjust as necessary.	Noted. The notes have been updated as requested.	Vallee - Civil	Complete
1st Submission	Development Engineering General Notes Plan DWG GN	41	15-Jul-24	The General Notes must include all references to the Sidewalk, Curb & Gutter and Entrance OPSD’s as shown in the Arch drawings.	Coordinate with drawing A105A OPSD Details.	Vallee - Architecture	Complete
1st Submission	Development Engineering Sanitary Drainage Area DWG SAN	42	15-Jul-24	For the sanitary sewer design sheet, match the slope of the pipe from restaurant to SAMH1 to the slope shown in both C101 and SAN.	Noted. The sanitary design sheet has been updated.	Vallee - Civil	Complete
1st Submission	Development Engineering Storm Drainage Area DWG STM	43	15-Jul-24	It is recognized that the entire site is not self-contained as typically required by Norfolk County. In review it appears most of the area not contained are grass areas and generally small in nature. The County accepts this concept.	No response required.	Vallee - Civil	Complete

1st Submission	Development Engineering Storm Drainage Area DWG STM	44	15-Jul-24	As mentioned above the County is concerned with external flows to the site as well as the impacts of filling in the ditch along Old Hwy 24. In your next submission it is recommended that if external areas are tributary to the site then those areas must be shown on this plan (or a separate large area plan)	Please note that the only water that enters the existing ditch is from the subject development site and from off Old Highway 24. No up stream storm water from other areas enter this ditch. The ditch has no designated outlet.	Vallee - Civil	Complete
1st Submission	Development Engineering Functional Servicing Report	45	15-Jul-24	Modelling completed by R. V. Anderson Associates Limited notes that available fire flow in the area of the proposed development maxes out at 91L/s under Maximum Day Demands – this is sufficient to support the proposed development of a restaurant and commercial estimated to require 83L/sec. However, it is not sufficient for the future residential development estimated to require 117L/sec.	No modeling has been provided - waiting on modeling from county. However, on the weight of that response provided by the County, we assume the county has no further concerns with water available for Phase 1 of the proposed development.	Vallee - Civil	Complete
1st Submission	Development Engineering Functional Servicing Report	46	15-Jul-24	In Appendix B, FUS Calculations, include additional notes on the sprinkler reduction of 40% (aligned with the FUS credit for standard water supply to system and Fire Department hose lines, etc.)	Noted. Additional notes on the sprinkler reduction of 40% have been provided on the FUS calculation sheets.	Vallee - Civil	Complete
1st Submission	Development Engineering Functional Servicing Report	47	15-Jul-24	The proposed peak Sanitary design flow is 4.15 L/s. The RVA report noted that there are existing downstream capacity issues – however the unit sewage rate (450 Lpcd) and the modelling software (InfoSewer) may generate overly conservative results. The proposed development is only contributing marginally to the overall downstream sewer capacity – increased risk to surcharging of the existing downstream sewer system from the proposed development is minimal. The overall downstream network should be reviewed as part of a separate assignment. If there are any questions, please contact Development Engineering.	No sanitary modeling has been provided - waiting on modeling from county. However, on the strength of this comment from the County, we understand that the County has no sanitary capacity concerns with this development proceeding.	Vallee - Civil	Complete
1st Submission	Development Engineering Functional Servicing Report	48	15-Jul-24	The FSR is to be updated to reference updated hydraulic modelling for sanitary and water, as the current ones are based on an old development layout.	No water or sanitary modeling has been provided - waiting on modeling from county. However, on the strength of comments 45 and 47 from the County, we understand that the County has no water or sanitary capacity concerns with this development proceeding	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	49	15-Jul-24	Verify the synthetic design storm chosen and provide a comprehensive justification for selecting the 4-hour Chicago distribution design storm.	The Norfolk County IDF Curve data was used for the Chicago distribution design storms. The storm duration should be selected dependent on the size of catchment and attenuation within the catchment. For smaller, urbanized catchments a shorter duration event (i.e. 3, 4, or 6 hour events) are reasonable durations. A 4-hour duration was selected as that is what has been typically accepted by Norfolk County in the past, and is what was used for the SWM design outlined in the 10-034 Yin Subdivision SWM Report. Note that Brant County requires a 3-hour duration, and the City of London recommends 3 to 6-hours.	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	50	15-Jul-24	To clarify the drainage route of major system flows from Catchment POST 1 towards the proposed SWM facility, please delineate the low points on the parking lot in Drawing - SWM.	All storm sewers have been sized to convey the 100-year storm event, therefore no ponding will occur in major storm events. Refer to the storm design sheet on Drawing STM.	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	51	15-Jul-24	Provide the high-level storm sewer sizing and capacity calculations, clarify how it will discharge into the existing storm sewer on the Old Highway 24, including any considerations for potential backflows.	All internal storm sewers have been sized to convey the 100-year storm event. Refer to the storm design sheet on Drawing STM. The existing storm sewer on Old Highway 24 was designed to accommodate a 15 L/s flow allowance from the subject site. Post-development flows from the subject property to the existing storm sewer have been controlled/reduced to less than or equal to this flow allowance. Therefore, no back flows will occur.	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	52	15-Jul-24	Provide storm sewer design sheet to demonstrate the adequacy of the existing downstream storm sewers.	A storm design sheet for the existing storm sewer network on Main Street (Old Highway 24) has been provided in Appendix F of the SWM Report in the 10-034 Yin's Subdivision - Phase 5 Stormwater Management Report dated December 10, 2010.	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	53	15-Jul-24	Prepare and extend HGL analysis from existing Old Highway 24 storm sewers to ensure no tailwater condition is present during 2-year to 100-year storm events. Provide underground storage facility outlet orifice elevation.	As presented in the 10-034 Yin's Subdivision - Phase 5 Stormwater Management Report dated December 10, 2010 (Appendix F of the SWM Report) The Old Highway 24 storm sewer were sized for the 2-year storm event, in accordance with the WSMD drain report. As part of the design, a peak flow allowance of 15L/s was assigned to the Orchard Square development site as part of that report, which has been met for all storm events. The underground storage facility outlet orifice elevation is provided in the SWM report, and on DWG C101.	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	54	15-Jul-24	Demonstrate proposed ROW has constant flow capacity (100-year less 5-year) with detailed calculations. Note maximum depth of ponding to be 0.15m above ROW centerline.	All storm sewers have been sized to convey the 100-year storm event, therefore no ponding will occur in major storm events. Refer to the storm design sheet on Drawing STM.	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	55	15-Jul-24	As mentioned, POST A-2 will be captured and infiltrated by two infiltration trenches/soakaway pits. Therefore, please provide the groundwater recharge calculation and clarify if this will affect the groundwater Water Surface Elevation Level (WSEL).	A pre to post-development water balance has been completed for the entire site, which details the impacts of the proposed infiltration basin and underground stormwater management facility. The post-development site has a 62% increase in infiltration compared to the pre-development site. Refer to the updated SWM Report for complete details.	Vallee - Civil	Complete

1st Submission	Development Engineering Stormwater Management Report	56	15-Jul-24	Quality control for the proposed case is currently managed by the StormTech Isolator PLUS Row, which is located beneath the parking lot in A1. However, this arrangement may necessitate relocating the quality control facility due to Norfolk County Design Criteria, as outlined in Section 7.4.00 Stormwater Management and Drainage, Stormwater Management Alternative Treatments, which states that quality management strategies cannot be situated within the parking areas.	Section 7.4.00 of the Norfolk County Design Criteria specifies that parking areas can be used to store stormwater as a surface-level quantity control strategy. This section states that quality management strategies cannot be accommodated within parking areas. We believe this requirement specifically refers to surface-level quality control strategies such as vegetation buffers, not underground systems. For example, OGS units are frequently located in parking lots. Please confirm.	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	57	15-Jul-24	Please include overland flow arrows – POST A-1, 75mm outlet orifice outlet from underground facility, Storm sewers, contours, and elevation labels for the subject site on Drawing – SWM.	Noted. Overland flow arrows, storm sewers, contours and elevations labels have been added to Drawing SWM. Outlet control details are presented on Drawing C101.	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	58	15-Jul-24	Please confirm and provide details that removing the irrigation pond won't affect groundwater recharge rates across the site, existing usage of the pond and doesn't impact any species if any in the pond.	The pond is an anthropogenic feature, likely dug for irrigation. The pond does not have direct connections to a natural watercourse and is enclosed by a perimeter chainlink fence. Removing the pond has no affect on groundwater recharge rates as the existing pond is likely lined to prevent infiltration. A Species at Risk and Significant Wildlide Habitat Assessment completed by GeoProcess Research Associates (June 6, 2022) confirmed that the existing irrigation pond provides limited habitat to generalist species that are common and secure in Ontario. The complete assessment has been included as part of this submission.	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	59	15-Jul-24	The SWM report states that the development outlets to the storm sewer along Old Highway No. 24 with an allowable outlet flow of 0.015m3/s based on the Yin's Submission Phase 5 SWM Report from 2010.	No response required.	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	60	15-Jul-24	Acknowledging that there are inconsistencies and potential low selection of CN curve numbers, the outlet flow allocated to the Lam Boulevard North Side subdivision is 0.015m3/s in 2010 Yin's Submission Phase 5 SWM Report (known as Commercial Block 3). This 0.015m3/s allowable outlet flow is based on the Waterford South Municipal Drain Report at Thompson Road (same drain as the Charles Street Subdivision) being designed to a 2-year design storm and reconstructing the storm sewer along Old Highway No. 24 to a 2-year design storm (which is discussed further below). As the 2010 Yin's Submission Phase 5 SWM Report was previously submitted and accepted by the County, the inconsistencies and potential low selection of CN curve numbers may not be able to be applied to the current review.	The CN value and corresponding IA values that are outlined in the report are only used in Visual Otthymo to define the soil characteristics for the pervious area portion of a given catchment area. The geotechnical investigation revealed the site soils can be classified as sand silt mixtures and well graded sands. Therefore, the selected CN value of 58 accurately represents the soil conditions of the previous land areas.	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	61	15-Jul-24	At the time of the 2010 Yin's Submission Phase 5 SWM Report, the Report states that the outlet for Phase 5 is the storm sewer along Old Highway No. 24 (which was constructed to provide an outlet for properties in the area of the Waterford South Municipal Drain) and a drainage report was not completed for the storm sewer along Old Highway No. 24. The Report also states that design information is unknown for the storm sewer along Old Highway No. 24 and, based on the area within the Waterford South Municipal Drain, the current (in 2010) storm sewer along Old Highway No. 24 has insufficient capacity to service the drainage area.	The unknown design information that the Yin Phase 5 SWM Report from 2010 refers to is for the Old Highway 24 sewer system before it was reconstructed. The storm sewer was reconstructed in 2011. The as-constructed drawings for this work have been included as part of this submission. A storm design sheet for the reconstructed storm sewer network on Main Street (Old Highway 24) is provided in Appendix F of the SWM Report in the 10-034 Yin's Subdivision - Phase 5 Stormwater Managemetn Report dated December 10, 2010. Therefore the storm sewers along Old Highway 24 do have sufficient capacity to recieve the designated flow allowance.	Vallee - Civil	Complete
1st Submission	Development Engineering Stormwater Management Report	62	15-Jul-24	The 2010 Yin's Submission Phase 5 SWM Report proposes to reconstruct the storm sewer along Old Highway No. 24 from Thompson Road to Phase 5 to a 2-year design storm capacity and to complete this work under the Drainage Act. From the submission documents, it is not clear if the storm sewer along Old Highway No. 24 was reconstructed. If it was not constructed, this would reduce the allowable outlet flow as the current (in 2010) storm sewer was determined to be insufficient for the watershed area. Additionally if the storm sewer along Old Highway No. 24 was reconstructed, it is also not clear if it was reconstructed under the Drainage Act or as a storm sewer.	The Old Highway 24 storm sewer was reconstructed in 2011 as a storm sewer. The as-constructed drawings for this work have been included as part of this submission.	Vallee - Civil	Complete
1st Submission	Development Engineering Traffic Impact Study	63	15-Jul-24	The Transportation Impact Study considers existing conditions, proposed nearby development (including the proposed Orchard Square development located southeast of Old Highway 24 and Lam Boulevard) as well as approved growth rate to the County's Integrated Sustainable Master Plan 2034 planning horizon - and is sufficient to support the proposed development application. Future Transportation Master Plan Updates are to consider the impacts of new development combined with updated growth projections (to 2051 / build-out planning horizon) and make updated recommendations for intersection control across Waterford.	No response required.	Vallee - Civil	Complete