STORMWATER MANAGEMENT & SERVICING REPORT CANADIAN WEAR TECHNOLOGIES

Project No.: CCO-22-0456

Prepared for:

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July 2021

MCINTOSH PERRY

TABLE OF CONTENTS

TABLES

APPENDICES

DRAWINGS

1.0 INTRODUCTION

McIntosh Perry Consulting Engineers Limited (McIntosh Perry) has prepared this Stormwater Management Report in support of proposed works at the Canadian Wear Technologies Plant in Cobourg, Ontario. The proposed works consist of the addition of a 10,000 ft^2 building to the existing building, with associated expansion of parking areas, access road, and associated stormwater control feature as well as modifications to the existing water service.

The main purpose of this report is to provide stormwater management design details in accordance with the recommendations and guidelines provided by the Ministry of the Environment, Conservation and Parks (MECP), Ganaraska Region Conservation Authority (GRCA) and the Town of Cobourg. These guidelines encourage the implementation of Best Management Practices (BMPs) for treating and controlling stormwater runoff.

The proposed development will be located on a currently developed lot, consisting of an operating commercial/industrial facility with associated asphalt driving and parking areas and landscaped area. It is anticipated that this report will be reviewed as part of the ongoing Site Plan Approval process for this property.

2.0 SITE DESCRIPTION

The subject property is located at 675 Brook Road North, Cobourg, Ontario: north of King Street East and Brook Road North Intersection and south of Elgin Street East and Brook Road North intersection. The property encompasses approximately 1.58 hectares and is bounded by Central Park Recycling to the north, Brook Road North, an undeveloped area to the east, and an undeveloped area comprised of pasture and wooded area to the south and west. See Location Plan in Appendix A for more details. The proposed works and areas affected by the proposed works are limited to the south and west side of the property ("the project area"), which consists of an existing building, asphalt and gravel parking/driving areas and landscaped area.

The land within the project area generally drains from the existing building to the northwest, with an approximate 2.9 m elevation difference from the highest to lowest elevations within the area. A portion of the area drains from the existing building to a ditch in the southeast portion of the property before draining to the roadside ditch along Brook Road North in the southeastern corner of property limits. The existing building appears to drain via pipe extending from the southeast corner of the existing building toward the southeast corner of the site, where it continues east across Brook Road North, ultimately outletting to a watercourse east of Brook Road North.

3.0 BACKGROUND STUDIES

A topographic survey originally completed by Ivan B. Wallace Ontario Land Surveyor Ltd. was provided by Bel-Con and used in the grading and drainage design.

Current and previous site layout drawings, including existing underground servicing, were provided by Bel-Con and utilized in the design.

4.0 SERVICING

4.1 Servicing Overview

The existing site is currently serviced by underground water, sanitary, storm and gas, and overhead hydro. The new addition will generally be serviced by existing services. Alterations, modifications and/or additions to servicing connections and internal works are to be designed by others and are anticipated to meet Ontario Building Code (OBC) requirements. However, it is noted that some water servicing alterations outside the building have been proposed and shown on the enclosed Grading Plan, and servicing information has been shown and noted as appropriate.

4.2 Water

Domestic water service for the existing building consists of a service line extended from a 12” (300mm) diameter main southwest of the site, connecting to the west side of the building. The existing sprinkler system is separately supplied via a 10” (250mm) service line which is connected to the same main southwest of the site, while also being routed through a pump station directly west of the northwest corner of the building, which is owned by the neighbouring property to the north.

It is proposed that the domestic service be abandoned, and water supply to the existing building and addition be provided by the existing 250mm diameter water service, which will be extended such that it not longer loops through the existing pump station. Alterations to the building connections, including confirmation of adequate flow to the building is to be confirmed by a mechanical engineer. Please see the enclosed Grading Plan for an illustration of the existing and proposed water layout, as well as details on external pipe capping/extension and reconnection. All capping and reconnection, including minimum cover over water services, is proposed to be completed to OBC requirements.

4.3 Sanitary

Sanitary servicing for the existing building is provided by an existing 150mm diameter pipe connected to the west side of the building, which drains south to a manhole south of the site, before turning west and ultimately connecting to a main on Cottesmore Avenue, southwest of the site. The sanitary service is proposed to remain and will be extended internally to service the building addition as required. Design of internal building works is to be completed by others.

4.4 Storm

The existing building utilizes a storm connection at the southeast corner of the building, draining southeast across Brook Road, ultimately outletting to a watercourse east of Brook Road. The proposed works are proposed to flow overland to a landscaped areas surrounding the building addition and access road and/or to a stormwater storage area in the northwest corner of the project area. See Section 5.0 for stormwater management design details.

5.0 PROPOSED STORMWATER MANAGEMENT

5.1 Design Criteria and Methodology

Stormwater management design for the site has been designed using GRCA Technical and Engineering Guidelines for Stormwater Management Submissions (GRCA Guidelines) as well as the MECP Stormwater Management Planning and Design Manual (March 2003) where applicable. These design guidelines promote stormwater management from an environmentally sustainable perspective. The intent of the stormwater management plan is to provide adequate stormwater treatment for both quantity and quality control.

The proposed stormwater management design for the building addition has been designed with the following design criteria:

- Limiting overall post-development peak flow rates to pre-development levels;
- Maintaining existing flow patterns; and
- Protection of water quality leaving the site, achieved through Best Management Practices.

Stormwater Best Management Practices (BMPs) will be implemented at the "lot level" and "conveyance" locations. These concepts will be explained further in Section 5.6. To summarize, where possible, proposed hard-surface runoff will be directed to grass surfaces and/or collected in grassed swales and/or drained in a controlled manner offsite via a rock flow check dam and stormwater storage area.

Given that the stormwater management plan will require that post-development flow rates do not exceed pre-development levels, no downstream infrastructure is anticipated to be affected by the proposed works.

5.2 Runoff Calculations

The rational method has been employed for the stormwater management calculations using the following methodology.

$$Q = 2.78CIA \text{ (L/s)}$$

Where C = Runoff coefficient
I = Rainfall intensity in mm/hr (per Rainfall Intensity Formulas from GRCA Guidelines)
A = Drainage area in hectares

The following coefficients were used to develop an average C for each area based on GRCA guidelines:

Impervious (Roofs, Paved Areas)	0.95
Gravel Parking & Driving Areas	0.95
Grassed areas	0.25

As per the GRCA Guidelines, runoff coefficients have been increased by 25% for a 100-year storm event to a maximum of 0.95. Rainfall intensities were derived from the Yarnell Rainfall Intensity Formula from the GRCA Guidelines for areas outside Clarington.

5.3 Pre-Development Drainage

The pre-development property consists of five (5) drainage areas. Drainage Areas A1, A2, and A3, which consist of the entrance driveway and existing parking areas and the existing building, are proposed to remain unchanged from the existing condition and are generally outside the project area. Area A1 drains north to a ditch along the access road to the property to the north of the subject property which drains east into the Brook Road North roadside ditch. Area A2 drains directly to the Brook Road North roadside ditch. Area A3 drains via underground pipe across Brook Road North to a watercourse east of the road. These areas have been displayed on the enclosed Pre & Post Development Drainage Plan for overall context.

Drainage Area A4 consists of a portion of the existing building which is to be removed, but mainly consists of grassed and treed area south of the existing building. This area drains overland to an existing grass lined swale/ ditch in the southeast section of the project area, where it drains to the roadside ditch along Brook Road North.

Drainage Area A5 consists of a portion of the existing building to be removed along with asphalt and grassed areas, drains to an existing grass ditch in the southwest section of the project area, where it drains southwest off site.

The Pre & Post Development Drainage Areas Plan (Appendix B) indicates the limits of this drainage area. Appendix B also contains the pre-development drainage calculations. The pre-development drainage area calculations are summarized below.

Table 1 - Pre-Development Drainage Summary

Drainage Area ID	Total Area (ha)	C (5-Yr)	C (100-Yr)	T_c (min)	5-yr Peak Flow (L/s)	100-yr Peak Flow (L/s)
A1	0.33	To Remain				
A2	0.34					
A3	0.13					
A4	0.49	0.27	0.33	17	28	56
A5	0.29	0.43	0.47	20	24	44
Total	**1.58**				**51**	**100**

5.4 Post-Development Drainage

The post-development drainage scheme for the proposed development site consists of five (5) drainage areas, similar to pre-development. Drainage Areas B1, B2, and B3 are equivalent to Areas A1, A2 and A3 and are proposed to remain unchanged.

Drainage Area B4 is similar to Drainage Area A4, and consists of the majority of the proposed building addition roof along with the relatively large grassed and treed area south of the building. The area is intended to continue to drain southeast via overland flow and/or via the existing grassed ditch in the southeast section of the property to the Brook Road North roadside ditch, similar to pre-development conditions.

Drainage Area B5 includes a portion of the proposed building, adjacent asphalt area and gravel access road, as well as landscaped area. The area is proposed to flow via overland flow and/or grassed swale to a stormwater swale, which is proposed to enlarge the existing grassed ditch in this location to provide stormwater storage required to meet pre-development levels for the project area with use of a restricted outlet (rock check dam).

The Pre & Post Development Drainage Plan (Appendix B) indicates the limits of the post development drainage areas. Appendix B also contains the post-development drainage calculations. The post-development drainage area calculations are summarized below.

Table 2 - Post-Development Unrestricted Drainage Summary

Drainage Area ID	Total Area (ha)	C (5-Yr)	C (100-Yr)	T_c (min)	5-yr Peak Flow (L/s)	100-yr Peak Flow (L/s)
B1	0.33	To Remain				
B2	0.34					
B3	0.13					
B4	0.51	0.35	0.40	16	38	72
B5	0.27	0.64	0.67	14	40	**67**
Total	**1.58**				78	**139**

5.5 Stormwater Quantity Control

Detailed stormwater peak flow rates and storage calculations have been provided in Appendix C. As seen in the calculations provided, the post-development flow rates will need to be restricted in order to match the pre-development levels. The proposed stormwater management design will examine both the 5- and 100-year storm events.

Post-development Drainage Area B5 flows via overland flow to a stormwater storage area located adjacent to the proposed relocated fire hydrant and northwest of the proposed building and gravel access road north of the building. The area will be restricted by use of a rock flow check dam at the downstream end of the proposed storage area, which will restrict discharge in major storm events in order to meet total pre-development flow rates for the site.

Please see Appendix C for detailed calculations illustrating that the flow rates are restricted to match pre-development and that the necessary storage is available.

5.6 Stormwater Quality Control

The entire development will employ Best Management Practices (BMPs) wherever possible. The intent of implementing stormwater BMPs throughout the entire development is to ensure that water quality concerns are addressed at all stages of the development. Stormwater BMPs will be implemented at lot and conveyance levels.

Lot level BMPs include the directing of runoff onto grassed areas and maintaining as much of the lot as possible to a natural/vegetated state.

The conveyance system to be employed within the project area will largely remain as overland sheet drainage, consistent with pre-development conditions. Site disturbance is proposed to be restricted to a limited area of the project area and overall property. All disturbed areas shall be landscaped as soon as possible, and temporary erosion and sediment control measures will be employed and maintained until the vegetation has re-established.

6.0 EROSION AND SEDIMENT CONTROL

6.1 Temporary Measures

Before construction begins, temporary silt fence, straw bales or rock flow check dams will need to be installed at all natural runoff outlets from the property. As the majority of the site's runoff is conveyed via sheet flow, concentrated outflows are not expected to be a concern for this development. While we have provided recommendations herein for erosion and sediment control practices, it is crucial that the eventual Contractor understand that the erosion and sediment control measure design is considered a living practice, and additional measures may be required depending on site conditions and rainfall events during construction. Furthermore, it is crucial that these measures remain monitored and maintained throughout construction.

The Contractor, at their discretion or at the instruction of the Town, Conservation Authority or the Contract Administrator shall increase the quantity of sediment and erosion controls on-site to ensure that the site is operating as intended and no additional sediment finds its way into the storm sewer network on site. The straw bales and silt fences shall be inspected weekly and after rainfall events. Care shall be taken to properly remove sediment from the fences and check dams as required.

Any work taking place through the spring thaw or into winter months shall be closely monitored for erosion along sloped areas. Should erosion be noted, the Contractor shall be alerted and shall take all necessary steps to rectify the situation. Should a spill occur, it is the Contractor's responsibility to ensure the proper authorities (MECP, Town of Cobourg, GRCA, etc.) are notified.

6.2 Permanent Measures

Rip rap will be placed at all locations that have the potential for concentrated flow. A rock flow check dam has been proposed at the downstream end of the stormwater storage area to control flow and will provide erosion and sediment control. It is crucial that the Contractor ensure that the geotextile is keyed in properly to ensure runoff does not undermine the rip rapped area. Additional rip rap is to be placed at erosion prone locations as identified by the Contractor / Contract Administrator / Municipality or Conservation Authority.

It is expected that the Contractor will promptly ensure that all disturbed areas receive topsoil and seed/sod, and that grass be established as soon as possible. Any areas of excess fill shall be removed or levelled as soon as possible and must be located a sufficient distance from any outlet to ensure that no sediment is washed out into the existing storm sewer network. As the vegetation growth provides a key component to the control of sediment for the site, it must be properly maintained once established.

7.0 SUMMARY

- The development consists of the addition of 10,000 ft^2 building with associated parking areas, gravel storage yard/ access road and drainage works with modifications to the existing water service;
- Rainfall from part of the project area will be conveyed by overland sheet flow toward a stormwater management feature located at an existing outlet, in order to meet quality and quantity control objectives;
- Based on calculations, flows from the site meet pre-development flow rates; and
- Best Management Practices (BMP's) will be implemented to meet the Municipality and Conservation Authority's requirements for quality control.

8.0 RECOMMENDATIONS

Based on the information presented in this report, we recommend that the Town of Cobourg and the Ganaraska Region Conservation Authority approve this Stormwater Management Report for engineering details in support of the proposed expansion at 675 Brook Road North in Cobourg, Ontario.

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STORMWATER MANAGEMENT & SERVICING REPORT
CANADIAN WEAR TECHNOLOGIES

APPENDIX A - LOCATION PLAN

600 300 0 600

Scale 1:25,000 Metres

LEGEND

- Site Boundary
- Local Road
- Major Road
- Railroad
- Watercourse
- Waterbody
- Wooded Area

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2021.

CLIENT:	BEL-CON DESIGN BUILDERS LTD.
PROJECT:	CANADIAN WEAR TECHNOLOGIES PROPOSED ADDITION
TITLE:	SITE LOCATION PLAN

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PROJECT NO:	CCO-22-0456	FIGURE:
Date	Jun., 07, 2021	00
GIS	EU	
Checked By	MS	

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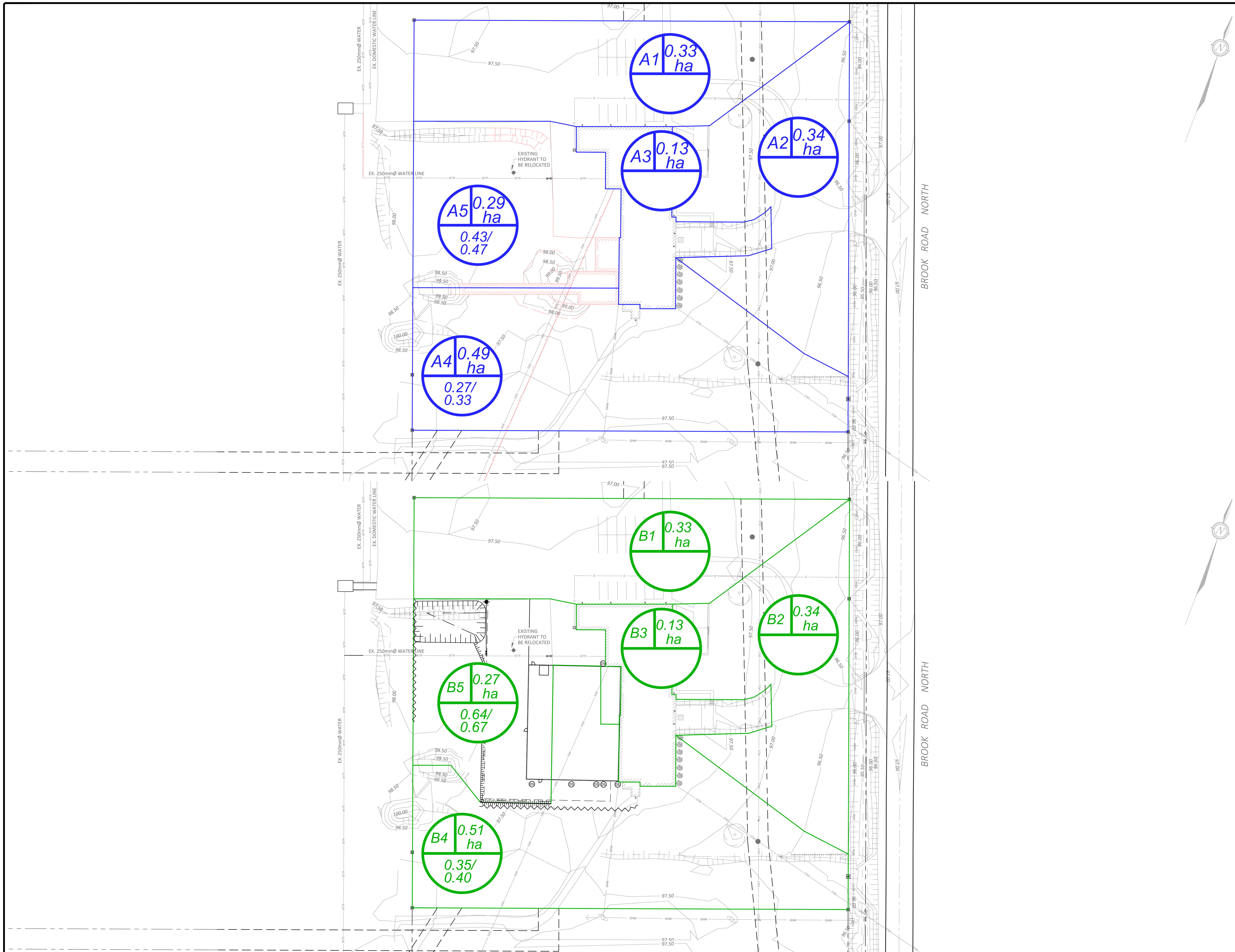
STORMWATER MANAGEMENT & SERVICING REPORT
CANADIAN WEAR TECHNOLOGIES

APPENDIX B – PRE- & POST-DEVELOPMENT DRAINAGE AREA PLAN & CALCULATIONS



LOCATION PLAN
N.T.S

PRE-DEVELOPMENT AREA I.D — A1 — AREA SIZE (HECTARES) x.xx ha — RUNOFF COEFFICIENT (5-YR/ 100-YR) X.XX/ X.XX

POST-DEVELOPMENT AREA I.D — B1 — AREA SIZE (HECTARES) x.xx ha — RUNOFF COEFFICIENT (5-YR/ 100-YR) X.XX/ X.XX

SCALE 1 : 500
0 10 20 30 40 50 Metres

No.	Revision/Issue	Date
0	ISSUED FOR REVIEW	JULY/26/2021

Check and verify all dimensions before proceeding with the work

Do not scale drawings

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Stamp: LICENSED PROFESSIONAL ENGINEER 2021/07/27 R. P. KENNEDY 100086734 PROVINCE OF ONTARIO

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Client:
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BELLEVILLE, ONTARIO, K8N 5T7

Project:
675 BROOK ROAD N
CANADIAN WEAR TECHNOLOGY
PROPOSED ADDITION
COBOURG ONTARIO

Drawing Title:
PRE & POST DEVELOPMENT DRAINAGE PLAN

Scale:	1:500	Project Number:	CCO-22-0454
Drawn by:	DL		
Checked By:		Drawing Number:	02
Designed By:	DL		

FILENAME: U:\Kingston\01 Document\2022\CCO-22-0456 - Bel-Con - Canadian Wear Tech\12 - Dwgs\CCO-22-0456 - Bel-Con - Canadian Wear Tech.dwg
LAST SAVED: Monday, July 26, 2021 LAST SAVED BY: d.longmuir

CCO-22-0456 - CANADIAN WEAR TECH - DRAINAGE AREAS

Pre-Development

Description	Drainage AreaID	Area (m^2)	Gravel (m^2)	C	Impervious (m^2)	C	Grass (m^2)	C (5-Year)	C (100-Year)	Average C (5-Year)	Average C (100-Year)
NW Side of Site - draining to northwest roadside ditch	*A1*	*3343*	*To remain*								
NE side of site - draining to Brook Road N ditch	*A2*	*3355*	*To remain*								
Building - draining to storm system crossing Brook Road N	*A3*	*1309*	*To remain*								
South side of site - draining to Brook Road N ditch	*A4*	*4915*	*0*	*0.95*	*151*	*0.95*	*4764*	*0.25*	*0.31*	**0.27**	**0.33**
West side of site - draining NW off site	*A5*	*2871*	*0*	*0.95*	*722*	*0.95*	*2149*	*0.25*	*0.31*	**0.43**	**0.47**
	Total	**15793**									

All impervious areas shown have been measured in the drawings.
Runoff coefficients as per GRCA guidelines

Post-Development

Description	Drainage AreaID	Area (m^2)	Gravel (m^2)	C	Impervious (m^2)	C	Grass (m^2)	C (5-year)	C (100-Year)	Average C (5-Year)	Average C (100-Year)
NW Side of Site - draining to northwest roadside ditch	*B1*	*3343*	*To remain*								
NE side of site - draining to Brook Road N ditch	*B2*	*3355*	*To remain*								
Building - draining to storm system crossing Brook Road N	*B3*	*1309*	*To remain*								
South side of site - draining to Brook Road N ditch	*B4*	*5127*	*106*	*0.95*	*603*	*0.95*	*4418*	*0.25*	*0.31*	**0.35**	**0.40**
West side of site - draining NW off site	*B5*	*2659*	*784*	*0.95*	*716*	*0.95*	*1159*	*0.25*	*0.31*	**0.64**	**0.67**
	Total	**15793**									

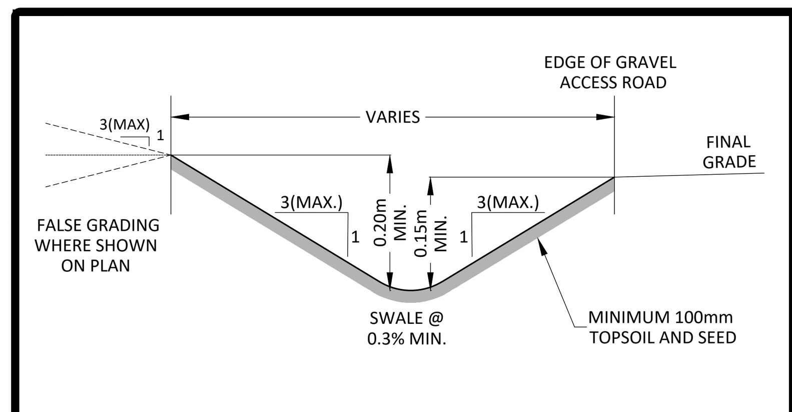
All impervious areas shown have been measured in the drawings.
Runoff coefficients as per GRCA guidelines

Time of Concentration

Drainage Area ID	Overland Flow Distance (m)	Slope of Land (%)	Sheet Flow Distance (m)	Sheet Flow Tc	Shallow Concentrated Flow Distance (m)	Shallow Concentrated Flow Velocity (m/s)	Shallow Concentrated Tc (min)	Flow Distance in Ditch (m)	Ditch Slope (%)	Ditch Tc (min)	Total Tc
Description											
A1	**To remain**										
A2											
A3											
A4	**135**	**2.1**	**30**	*11*	*105*	*0.31*	*6*	*0*	*0.0*	*0*	*17*
A5	**65**	**0.5**	**30**	*16*	*35*	*0.14*	*4*	*0*	*0.0*	*0*	*20*
Description											
B1	**To remain**										
B2											
B3											
B4	**135**	**2.1**	**30**	*10*	*105*	*0.31*	*6*	*0*	*0.0*	*0*	*16*
B5	**68**	**0.6**	**30**	*10*	*38*	*0.16*	*4*	*0*	*0.0*	*0*	*14*

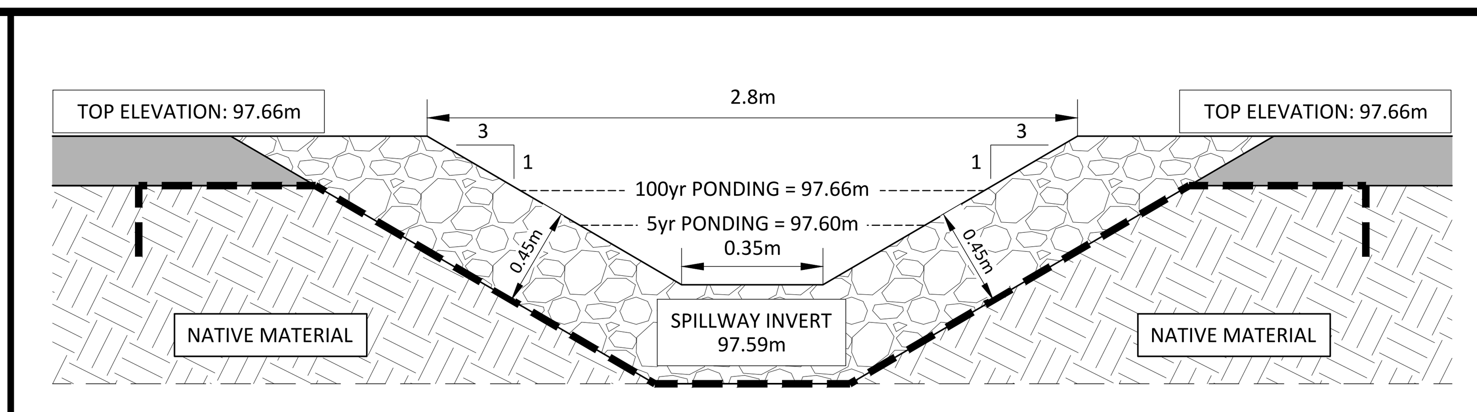
STORMWATER MANAGEMENT & SERVICING REPORT
CANADIAN WEAR TECHNOLOGIES

APPENDIX C – STORMWATER MANAGEMENT DESIGN



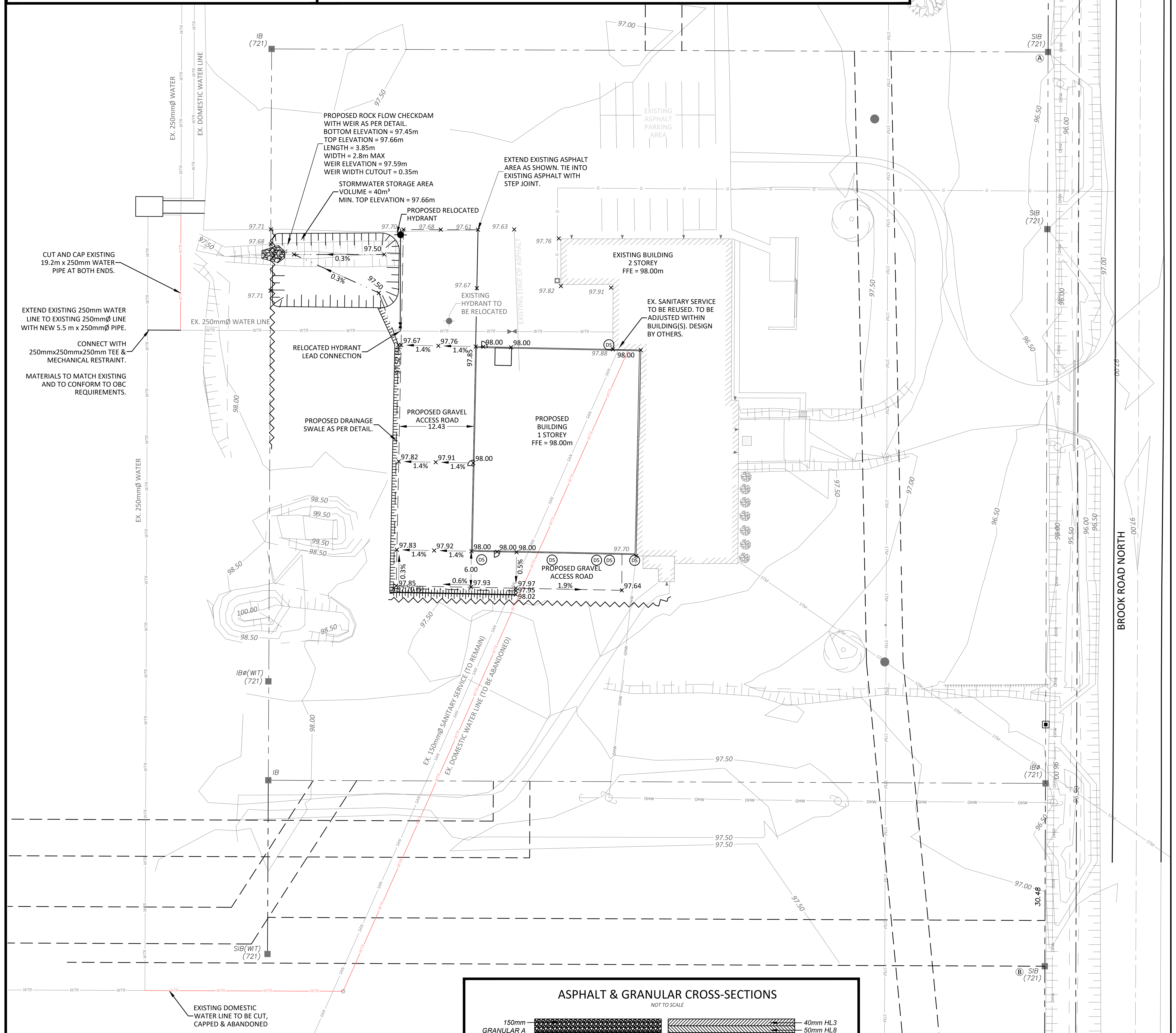
GRASS LINED SWALE DETAIL

NOT TO SCALE



WEIR END SECTION VIEW

NOT TO SCALE



LOCATION PLAN

N.T.S

EROSION AND SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THIS INCLUDES LIMITING THE AMOUNT OF EXPOSED SOIL AND INSTALLING SILT FENCES AND OTHER SEDIMENT TRAPS.
2. AT THE DISCRETION OF THE CONTRACT ADMINISTRATOR, CONSERVATION AUTHORITY OR MUNICIPALITY, ADDITIONAL SILT CONTROL DEVICES SHALL BE INSTALLED AT DESIGNATED LOCATIONS.
3. FOR SILT FENCE BARRIER, USE OPSD 219.110. GEOTEXTILE FOR SILT FENCE SHALL BE ACCORDING TO OPSS 1860, TABLE 3.
4. EXCEPT AS PROVIDED IN PARAGRAPHS 4.(a), and (b) BELOW, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS FEASIBLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY HAS TEMPORARILY OR PERMANENTLY CEASED.

a) WHERE THE INITIATION OF STABILIZATION MEASURES BY THE 14TH DAY AFTER CONSTRUCTION ACTIVITY TEMPORARILY OR PERMANENTLY CEASE IS PRECLUDED BY SNOW COVER, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS FEASIBLE.

b) WHERE CONSTRUCTION ACTIVITY WILL RESUME ON A PORTION OF THE SITE WITHIN 21 DAYS FROM WHEN ACTIVITIES CEASED, (E.G. THE TOTAL TIME PERIOD THAT CONSTRUCTION ACTIVITY IS TEMPORARILY CEASED IS LESS THAN 21 DAYS) THEN STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF SITE BY THE 14TH DAY AFTER CONSTRUCTION ACTIVITY TEMPORARILY CEASED.

5. SEDIMENT THAT IS ACCUMULATED BY THE TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED IN A MANNER THAT AVOIDS ESCAPE OF THE SEDIMENT TO THE DOWNSTREAM SIDE OF THE CONTROL MEASURE AND AVOIDS DAMAGE TO THE CONTROL MEASURE. SEDIMENT SHALL BE REMOVED TO THE LEVEL OF THE GRADE EXISTING AT THE TIME THE CONTROL MEASURE WAS CONSTRUCTED AND BE ACCORDING TO THE FOLLOWING:

a) FOR LIGHT-DUTY SEDIMENT BARRIERS, ACCUMULATED SEDIMENT SHALL BE REMOVED ONCE IT REACHES THE LESSER OF THE FOLLOWING:

i) A DEPTH OF ONE-HALF THE EFFECTIVE HEIGHT OF THE CONTROL MEASURE.

II) A DEPTH OF 300 MM IMMEDIATELY UPSTREAM OF THE CONTROL MEASURE.

b)FOR ALL CONTROL MEASURES, ACCUMULATED SEDIMENT SHALL BE REMOVED AS NECESSARY TO PERFORM MAINTENANCE REPAIRS.

c) ACCUMULATED SEDIMENT SHALL BE REMOVED IMMEDIATELY PRIOR TO THE REMOVAL OF THE CONTROL MEASURE.

d)ACCUMULATED SEDIMENT IS TO BE REMOVED AND DISPOSED OF AS PER OPSS 180.

6. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MONITORED TO ENSURE THEY ARE IN EFFECTIVE WORKING ORDER. THE CONDITION OF THE CONTROL MEASURES SHALL BE MONITORED PRIOR TO ANY FORECAST STORM EVENT AND FOLLOWING A STORM EVENT.
7. DUST CONTROL MEASURES SHOULD BE CONSIDERED PRIOR TO CLEARING AND GRADING. THE USE OF WATER, CALCIUM CHLORIDE FLAKES/SOLUTION OR MAGNESIUM CHLORIDE FLAKES/SOLUTION SHALL BE USED AS DUST SUPPRESSANTS AS PER OPSS 506. THIS IS TO LIMIT WIND EROSION OF SOILS WHICH MAY TRANSPORT SEDIMENTS OFFSITE, WHERE THEY MAY BE WASHED INTO THE RECEIVING WATER BY THE NEXT RAINSTORM.
8. STOCKPILED MATERIAL IS TO BE STORED AWAY FROM POTENTIAL RECEIVERS (E.G. WATERCOURSES), AND BE SURROUNDED BY EROSION CONTROL MEASURES WHERE MATERIAL IS TO BE LEFT IN PLACE IN EXCESS OF 14 DAYS.
9. IF REQUIRED, DEWATERING/SETTLING BASINS SHALL BE CONSTRUCTED AS PER OPSD 219.240 AND LOCATED ON FLAT GRADE UPSTREAM OF OTHER EXISTING MITIGATION MEASURES. WATERCOURSES SHALL NOT BE DIVERTED, OR BLOCKED, AND TEMPORARY WATERCOURSES CROSSINGS SHALL NOT BE CONSTRUCTED OR UTILIZED, UNLESS OTHERWISE SPECIFIED IN THE CONTRACT. IF CLOSURE OF ANY PERMANENT WATER PASSAGE IS NECESSARY, THE CONTRACTOR SHALL RELEASE ANY STRANDED FISH TO THE OPEN PORTION OF THE WATERCOURSE WITHOUT HARM.
10. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL CONFORM TO OPSS 805
11. WHERE DEWATERING IS REQUIRED, THE DISCHARGED WATER SHALL BE CONTROLLED IN ACCORDANCE WITH OPSS 518.
12. ALL SETTLING/FILTRATION BASINS SHALL BE EQUIPPED WITH TERRAFIX 270R GEOTEXTILE (OR APPROVED EQUIVALENT) AND SHALL BE CLEANED AND REPLACED AS REQUIRED.
13. FOR POTENTIAL SPILLS, THE CONTRACTOR SHALL HAVE ON SITE AT ALL TIMES AN EMERGENCY SPILL KIT THAT WILL INCLUDE AS A MINIMUM THE FOLLOWING ITEMS:

- 10 - 18 in. X 18 in. ABSORBENT PADS, - 5 LBS ZORBAL ABSORBING MATERIAL, -1 PAIR GOGGLES, 1 PAIR PVC GLOVES.

GENERAL NOTES:

1. ALL DIMENSIONS AND INVERTS MUST BE VERIFIED PRIOR TO CONSTRUCTION, IF THERE IS ANY DISCREPANCY THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY.
2. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION. GAS, HYDRO, TELEPHONE OR ANY OTHER UTILITY THAT MAY EXIST ON SITE OR WITHIN THE ROAD ALLOWANCE MUST BE LOCATED BY ITS OWN UTILITIES AND VERIFIED.
3. TOPSOIL TO BE STRIPPED AND STOCKPILED FOR REHABILITATION. CLEAN FILL TO BE PLACED IN FILL AREAS AND COMPACTED TO 95% STANDARD PROCTOR DENSITY.
4. ALL UNDERGROUND SERVICES, MATERIALS AND INSTALLATIONS TO BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND CODES OF THE TOWN AND PROVINCE.
5. ALL DISTURBED AREAS TO BE RESTORED TO ORIGINAL CONDITION OR BETTER UNLESS OTHERWISE SPECIFIED.
6. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES. THESE DRAWINGS ARE BASED ON LEGAL DRAWINGS PROVIDED BY THE TOWN OF CARLETON PLACE. LEGAL BOUNDARIES SHOWN ARE THE PLANS ARE APPROXIMATE ONLY AND MUST BE CONFIRMED BY THE CONTRACTOR.
7. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY DATA SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THESE PLANS.
8. CONNECT TO EXISTING SERVICES AS DETAILED. INCLUDE ALL RESTORATION WORK IF NECESSARY TO REINSTATE SURFACES TO THE CONDITION THAT EXISTED PRIOR TO CONSTRUCTION OR BETTER.
9. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS. IF THERE IS ANY DISCREPANCY THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY.
10. CONTRACTOR TO OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS FROM THE TOWN BEFORE COMMENCING CONSTRUCTION.
11. RESTORE ALL TRENCHES AND SURFACES OF PUBLIC ROAD ALLOWANCES TO CONDITION EQUAL OR BETTER THAN ORIGINAL CONDITION AND TO THE SATISFACTION OF TOWN AUTHORITIES.
12. ALL EXCESS MATERIAL GENERATED DURING EXCAVATION ACTIVITIES SHALL BE STOCKPILED ON SITE AT AN APPROVED LOCATION. NO OFF-SITE HAULING OF EXCESS MATERIAL IS REQUIRED.
13. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS UNLESS OTHERWISE NOTED.

WATERMAIN NOTES:

1. CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH ONTARIO BUILDING CODE AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS.
3. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS WILL BE COMPLETED BY THE CONTRACTOR. CONNECTION TO EXISTING WATERMAIN TO BE COMPLETED BY CONTRACTOR.
4. WATERMAINS AND/OR WATER SERVICES ARE TO HAVE A MINIMUM COVER OF 2.1m.
5. IF THE WATERMAIN MUST BE DEFLECTED TO MEET ALIGNMENT, ENSURE THAT THE AMOUNT OF DEFLECTION USED IS EQUAL TO OR LESS THAN THAT WHICH IS RECOMMENDED BY THE MANUFACTURER.
6. VALVES AND VALVE BOXES TO CONFORM WITH ONTARIO BUILDING CODE AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS.
7. FIRE HYDRANT C/W GATE VALVE AND BOX SHALL CONFORM TO ONTARIO BUILDING CODE AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS.
8. MECHANICAL RESTRAINTS TO CONFORM TO ONTARIO BUILDING CODE AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS.
9. WATERMAIN MATERIAL TO MEET OBC REQUIREMENTS AND EXISTING INFRASTRUCTURE.
10. ALL WATERMAINS TO BE EQUIPPED WITH TRACER WIRE.

REFERENCE POINTS:

No.	NORTHING	EASTING
A	4873015.59	728531.68
B	4872837.65	728597.23

LEGEND

PROPERTY BOUNDARY	
LEGAL BOUNDARY	
EX. ASPHALT	
EX. GRAVEL	
EX. DITCH	
REMOVALS	
PROPOSED ASPHALT	
PROPOSED GRAVEL	
PROPOSED DITCH	
PROPOSED RIPRAP	
PROPOSED TOP OF SLOPE	
BUILDING ENTRANCE	
PROPOSED ROOF DRAIN	
PROPOSED OVERLAND FLOW DIRECTION	
PROPOSED SILT FENCE	
PROPOSED WATER PIPE	XX.XXm - XXXmmØ WTR @ X.XX%
EXISTING STORM MANHOLE	
EXISTING CATCHBASIN	
EXISTING CATCHBASIN MANHOLE	
EXISTING SANITARY MANHOLE	
EXISTING FIRE HYDRANT	
EXISTING WATER VALVE	
PROPOSED WATER VALVE	
EXISTING HYDRO POLE	
EXISTING HYDRO	

SCALE 1 : 400

0 10 20 30 40 Metres

No.	Revision/Issue	Date
0	ISSUED FOR REVIEW	JULY/26/2021

Check and verify all dimensions before proceeding with the work *Do not scale drawings*

McINTOSH PERRY
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www.mcintoshperry.com

Stamp: LICENSED PROFESSIONAL ENGINEER 2021/07/27 R. P. KENNEDY 100086734 PROVINCE OF ONTARIO

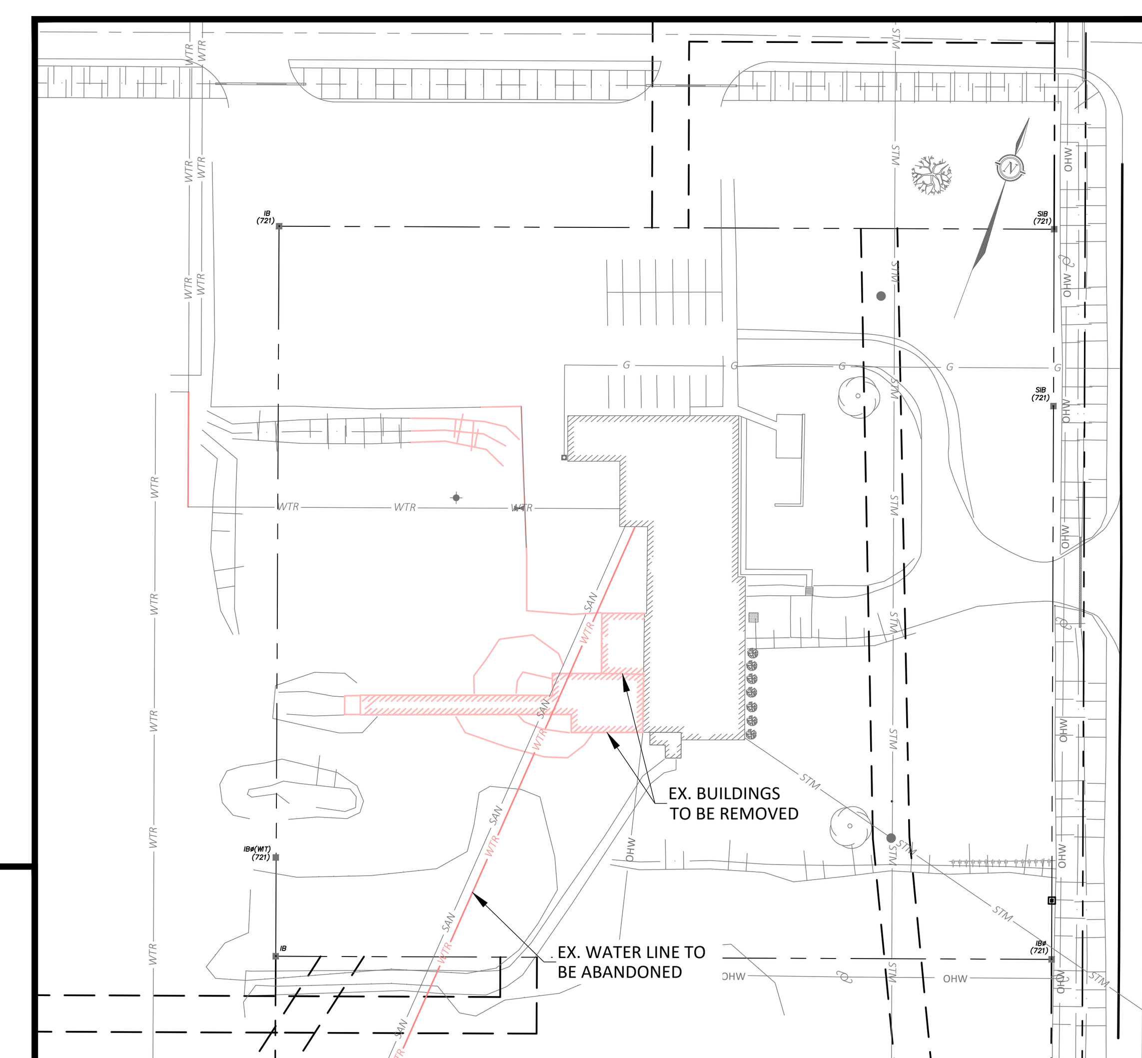
Stamp:

Client:
BEL-CON DESIGN BUILDERS LTD.
1-335 UNIVERSITY AVENUE
BELLEVILLE, ONTARIO, K8N 5T7

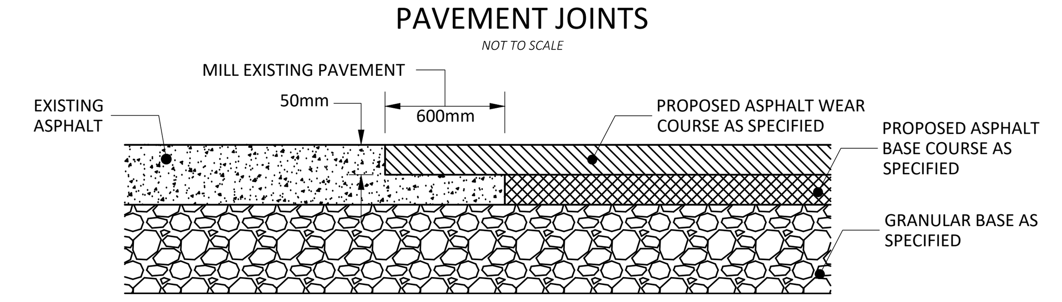
Project:
675 BROOK ROAD N
CANADIAN WEAR TECHNOLOGY
PROPOSED ADDITION
COBOURG ONTARIO

Drawing Title:
GRADING PLAN

Scale:	1:400	*Project Number:*	CCO-22-0454
Drawn by:	DL		
Checked By:		*Drawing Number:*	01
Designed By:	DL		



EXISTING CONDITIONS PLAN
SCALE: 1:1000

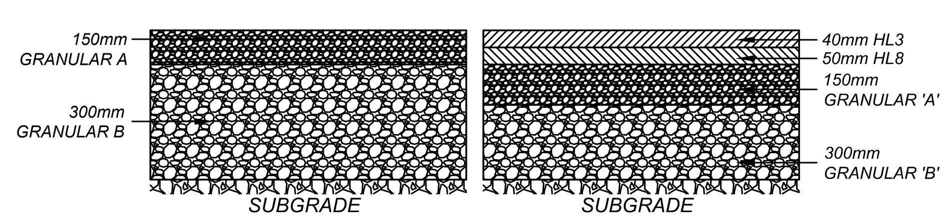


PAVEMENT JOINTS

NOT TO SCALE

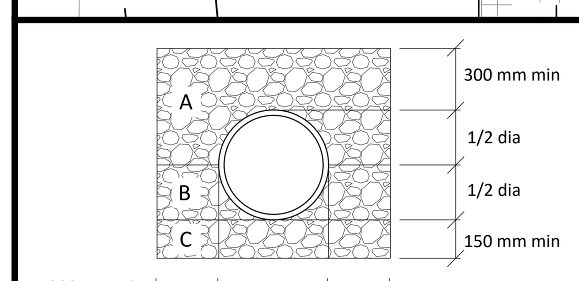
ASPHALT & GRANULAR CROSS-SECTIONS

NOT TO SCALE



NOTE: LIFTS OF ASPHALT ARE TO BE COMPACTED DEPTH

CROSS SECTION AS PER TYPICAL ASPHALT AND GRAVEL CROSS-SECTIONS. IT IS RECOMMENDED THAT A GEOTECHNICAL DESIGN IS COMPLETED TO DETERMINE SITE SPECIFIC CROSS-SECTIONS.



AREAS A,B,C TO BE COMPACTED GRANULAR 'A' APPROVED BEDDING MATERIAL.
AREA C TO BE LAID AND THOROUGHLY COMPACTED PRIOR TO INSTALLATION OF PIPE.
AREA B TO BE PLACED AROUND BASE OF PIPE AND THOROUGHLY COMPACTED TO SPRINGLINE OF PIPE.
AREA A TO BE PLACED AND COMPACTED IN MAXIMUM LIFTS OF 250mm WITH A MINIMUM COVER OF 300mm ON ALL PIPE MATERIAL.

WATER SERVICE BEDDING

NOT TO SCALE

FILENAME: U:\Kingston\02-Documents\2022\CCO-22-0456 - Bel-Con - Canadian Wear Tech\12 - Dwgs\CCO-22-0456 - Bel-Con - Canadian Wear Tech.dwg
LAST SAVED: Monday, July 26, 2021 LAST SAVED BY: d.longmuir
LAST PLOTTED: Monday, July 26, 2021 CTB FILE USED: ----

CCO-22-0456 - CANADIAN WEAR TECH - PEAK FLOW CALCULATIONS

Pre-Development Runoff Calculations					T_c (min)	I (mm/hr)		Q (L/s)	
Description	Drainage Area	Area (ha)	C (5-Y)	C (100-Y)		5-year	100-year	5-year	100-year
NW Side of Site - draining to northwest roadside ditch	A1	0.33	To remain						
NE side of site - draining to Brook Road N ditch	A2	0.34							
Building - draining to storm system crossing Brook Road N	A3	0.13							
South side of site - draining to Brook Road N ditch	A4	0.49	0.27	0.33	17	74	124	28	56
West side of site - draining NW off site	A5	0.29	0.43	0.47	20	69	117	24	44
	Total	**1.58**							

Post-Development Runoff Calculations					T_c (min)	I (mm/hr)		Q (L/s)	
Description	Drainage Area	Area (ha)	C (5-Y)	C (100-Y)		5-year	100-year	5-year	100-year
NW Side of Site - draining to northwest roadside ditch	B1	0.33	To remain						
NE side of site - draining to Brook Road N ditch	B2	0.34							
Building - draining to storm system crossing Brook Road N	B3	0.13							
South side of site - draining to Brook Road N ditch	B4	0.51	0.35	0.40	16	77	127	38	72
West side of site - draining NW off site	B5	0.27	0.64	0.67	14	83	134	40	67
	Total	**1.58**							

Note: *Intensities derived using the MTO IDF Curve Lookup tool for the site*

Outlet	Basin	Pre-Development (L/s)		Post-Development Unrestricted (L/s)		Δ (L/s)		Post-Development Actual (L/s)		Restriction Method
		5-year	100-year	5-year	100-year	5-year	100-year	5-year	100-year	
Watercourse	4	28	56	38	72	27	39	38	72	
	5	24	44	40	67			12	26	Check Dam
	Subtotal	**51**	**100**	**78**	**139**	**27**	**39**	**50**	**98**	

CCO-22-0456 - CANADIAN WEAR TECH - STORAGE CALCULATIONS

Storage Requirements for Area B2

5 Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
5	117	56	12	44	13
10	95	45	12	33	20
15	79	38	12	26	23
20	68	33	12	21	25
25	60	29	12	17	25
30	54	26	12	14	24
35	48	23	12	11	23
40	44	21	12	9	22
45	40	19	12	7	20
50	37	18	12	6	17
55	35	17	12	5	15
60	32	15	12	3	12
65	30	15	12	3	10
70	29	14	12	2	7
	Maximum Storage Required 5-year			**25**	m^3

Storage Requirements for Area B3

100 Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
5	169	84	26	58	17
10	147	73	26	47	28
15	130	65	26	39	35
20	116	58	26	32	38
25	105	52	26	26	40
30	96	48	26	22	39
35	89	44	26	18	38
40	82	41	26	15	36
45	77	38	26	12	32
50	72	36	26	10	29
55	67	33	26	7	25
60	64	32	26	6	20
65	60	30	26	4	15
70	57	28	26	2	10
75	54	27	26	1	4
80	52	26	26	0	-1
85	49	25	26	-1	-7
90	47	24	26	-2	-13
95	45	23	26	-3	-20
100	44	22	26	-4	-26
105	42	21	26	-5	-32
	Maximum Storage Required 100-year			**40**	m^3

Storage Provided

Elevation (m)	Volume (m^3)
97.45	0
97.46	0
97.47	0
97.48	1
97.49	1
97.50	3
97.51	4
97.52	6
97.53	9
97.54	11
97.55	13
97.56	16
97.57	18
97.58	20
97.59	23
97.60	25
97.61	28
97.62	30
97.63	32
97.64	35
97.65	37
97.66	40

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CCO-22-0456 - CANADIAN WEAR TECH - OUTFLOW CALCULATIONS

Flow Through A Check Dam:

$$Q = \frac{h^{2/3}\ w}{[(L/D)+25+L^2]^{0.5}}$$

Ref: "Site Erosion and Sediment Controls"
by Robert Pitt, Shirey Clark, Donald W. Lake

where:
Q = outflow (cfs)
h = ponding depth (ft)
w = width of check dam (ft)
L = horizontal flow path through check dam (ft)
D = average rock diameter (ft)

Input Data

h =	0.21	m	=	h =	0.69	ft
w =	2.8	m		w =	9.19	ft
L =	3.85	m		L =	12.63	ft
D =	0.3	m		D =	0.98	ft

Results

Q = *0.51* ft^3/s

Conversion factor (ft^3/s *to* m^3/s) *=* *0.028*

Q = *0.01* m^3/s

Q = *14.44 L/s*

Flow Through a Check Dam

h (m)	h (ft)	w (ft)	L (ft)	D (ft)	Q (ft^3/s)	Q (L/s)
0.00	0	9.19	12.63	0.98	0	0
0.01	0.033	9.19	12.63	0.98	0.07	2
0.02	0.066	9.19	12.63	0.98	0.11	3
0.03	0.098	9.19	12.63	0.98	0.14	4
0.04	0.131	9.19	12.63	0.98	0.17	5
0.05	0.164	9.19	12.63	0.98	0.20	6
0.06	0.197	9.19	12.63	0.98	0.22	6
0.07	0.230	9.19	12.63	0.98	0.25	7
0.08	0.262	9.19	12.63	0.98	0.27	8
0.09	0.295	9.19	12.63	0.98	0.29	8
0.10	0.328	9.19	12.63	0.98	0.31	9
0.11	0.361	9.19	12.63	0.98	0.33	9
0.12	0.394	9.19	12.63	0.98	0.35	10
0.13	0.427	9.19	12.63	0.98	0.37	10
0.14	0.459	9.19	12.63	0.98	0.39	11
0.15	0.492	9.19	12.63	0.98	0.41	12
0.16	0.525	9.19	12.63	0.98	0.43	12
0.17	0.558	9.19	12.63	0.98	0.44	13
0.18	0.591	9.19	12.63	0.98	0.46	13
0.19	0.623	9.19	12.63	0.98	0.48	14
0.20	0.656	9.19	12.63	0.98	0.49	14
0.21	0.689	9.19	12.63	0.98	0.51	14

For Weir Flow, C =	*1.84*

Invert Elevation	*97.59*
Weir Width	*350 mm*

Elevation	**Check Dam**		**Weir**		**Total**	
	H [m]	**Q [l/s]**	**H [m]**	**Q [l/s]**	**Q [l/s]**	*Volume (m^3)*
97.45	0.00	x	x	x	x	0
97.46	0.01	2	x	x	2	0
97.47	0.02	3	x	x	3	0
97.48	0.03	4	x	x	4	1
97.49	0.04	5	x	x	5	1
97.50	0.05	6	x	x	6	3
97.51	0.06	6	x	x	6	4
97.52	0.07	7	x	x	7	6
97.53	0.08	8	x	x	8	9
97.54	0.09	8	x	x	8	11
97.55	0.10	9	x	x	9	13
97.56	0.11	9	x	x	9	16
97.57	0.12	10	x	x	10	18
97.58	0.13	10	x	x	10	20
97.59	0.14	11	0.00	0	11	23
97.60	0.15	12	0.01	1	12	25 5-year
97.61	0.16	12	0.02	2	14	28
97.62	0.17	13	0.03	3	16	30
97.63	0.18	13	0.04	5	18	32
97.64	0.19	14	0.05	7	21	35
97.65	0.20	14	0.06	9	23	37
97.66	0.21	14	0.07	12	26	40 100-year

Notes: 1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.

*2. Orifice Equation: $Q = cA(2gh)^{1/2}$ (m^3/s *1000 = l/s)*

*3. Weir Equation: $Q = CLH^{3/2}$ (m^3/s *1000 = l/s)*

4. These Computations Do Not Account for Submergence Effects

5. H for orifice equations is depth of water above the centroide of the orifice.

6. H for weir equations is depth of water above the weir crest.

Reference: Urban Hydrology, Hydraulics and Stormwater Quality: engineering application and computer modeling / A. Akan, Robert J. Houghtalen, 2003.