

TOWN OF CALEDON
PLANNING
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April 20, 2026

4848 Mayfield Road

Functional Servicing and Stormwater Management Report

VERSION 1 ▪ SEPTEMBER 2023

REPORT PREPARED FOR

2738183 Canada Inc.

REPORT PREPARED BY

TYLin

**T.Y. LIN
INTERNATIONAL
CANADA INC.**

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TYLin PROJECT NUMBER 10722

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1 INTRODUCTION

TYLin has been retained by 2738183 Ontario Inc. for civil consulting engineering services in support of a Temporary Zoning By-Law Amendment (TZBA) at 4848 Mayfield Road, Caledon, Ontario, herein referred to as the 'site'. This Functional Servicing and Stormwater Management Report has been prepared in support of the TZBA process.

The site is currently occupied by a two-storey residential dwelling, a detached steel building, several smaller sheds, a gravel driveway with access onto Mayfield Road, and a gravel parking area. **Figure 1-1** shows the location plan of the site in relation to the adjacent roads. The Cambells Cross Creek, which is a tributary to West Humber River, flows through the northern quadrant of the site and is regulated by the Toronto and Region Conservation Authority (TRCA). Per the Town of Caledon Zoning Map 5 (By-Law 2006-50) the site is currently zoned A1 (Agricultural) with a portion of the site zoned EPA2 (Environmental Protection Area) where the creek traverses the site.

The site is bounded by Mayfield Road to the south-east, agricultural lands to the south-west, and a tributary of the West Humber River to the north-west and north-east.

The proposed development involves amending the site for trailer storage by constructing a gravel parking lot that provides parking for up to 15 trucks and trailers. A stormwater management tank will be constructed to meet Humber River release rate targets set out by the TRCA. The improved parking lot will meet the Town and Region's engineering standards, and the parking lot layout is depicted on the conceptual site plan **Figure 1-2**.

The purpose of this report is to provide a brief of the proposed servicing, grading, and stormwater management strategy for the proposed development, which includes the following:

- Preliminary site grading plan;
- Preliminary site servicing plan;
- Preliminary stormwater management plan; and
- Preliminary erosion and sediment control plan.

Figure 1-1: Location Plan



Image Sourced from Google Earth Pro

Figure 1-2: Concept Plan



Image By Glen Schnarr & Associates Inc.

1.1 Background Information

The following design criteria was used in the preparation of this report:

- Town of Caledon - Development Standards Manual Version 5.0 (2019)
- Toronto and Region Conservation Authority - Storm Water Management Criteria Version 1.0 (2012)
- Region of Peel - Public Works Design, Specifications & Procedures Manual – Regional Roads and Traffic (February 2010)

The following historical drawings of the subject area were used in the preparation of the report and are included in **Appendix A**:

- Region of Peel Mayfield Road Reconstruction Drawings
- TRCA Humber River Watershed Map
- TRCA Hum-137 (HEQRAS Model)

The following information was used in the preparation of the report:

- Topographic survey prepared by Tarasick McMillan Kubicki Ltd. (November 18, 2022), included in **Appendix A**.
- Natural Environmental Limits prepared by Dillion Consulting Ltd. (June 2023)

2 EXISTING CONDITIONS

4848 Mayfield Road is located approximately 200m southeast of the Mayfield Road and Bramalea Road intersection. Mayfield Road was recently widened in this area and there is an existing asphalt driveway which is connected to the north side of Mayfield Road. The site lies directly west of an existing culvert crossing of Mayfield Road and the creek that traverses the site drains through the culvert.

Per the as-built record drawings received from Peel Region, the widening of Mayfield Road works included the construction of a storm sewer network. This existing storm sewer network collects drainage from Mayfield Road and discharges at the existing culvert located to the north-east of the site. Mayfield Road additionally has utility poles, with overhead hydro and bell lines, and an existing 750mm watermain within the right-of-way. The as-built record drawings referenced are provided in **Appendix A**.

The entire site is approximately 2.78 Ha, of which approximately 1.64 Ha of the site sits atop an existing slope creating a local plateau above the creek. Approximately 0.30 Ha of the site, located on the local plateau, is proposed to be developed with the proposed truck parking area. At the bottom of the slope lies the floodplain to the Cambells Cross Creek, tributary to West Humber River.

This existing slope of the local plateau varies from 4V:1H to the northeast and is steeper at 2V:1H to the northwestern edge. The sites existing table lands drains from the southwestern property line to the crest of the slope typically between 2% and 5%. The southwestern property line is acting as a highpoint with the neighbouring property, as such the site is not accepting external drainage from the adjacent property.

There is an existing 2-storey residential building and steel building located north-east of the existing entrance and a steel building located along the south-west property line near the existing gravel parking lot. Based on the topographic survey identifying a two separate well covers, it is assumed that the existing 2-storey building is serviced privately through a well and septic system. This existing residential dwelling, well and septic system are proposed to remain. Additionally per the as-built drawings, there are no water or wastewater service connections to the existing building on site.

3 SITE GRADING

A preliminary site grading plan for the site is shown on drawing **GR01** in **Appendix D**.

Per the Town of Caledon's grading criteria, relevant grading criteria includes:

- Provide proper surface drainage, preserve existing trees, and direct flow away from houses
- Driveways must slope away from dwellings (2% - 6%)
- Swale depths (Min. 150mm, Preferred 250mm, Max. 450mm)
- Design details of walls over 0.6m are to be submitted with grading plans and stamped by a Professional Engineer.

3.1 Grading Design

For most of the site, the existing grading and drainage pattern will remain, where current storm runoff reaches the edge of the table lands and then flows to the creek. Near the southwest corner of the proposed parking lot, the existing steel building and drainage patterns will remain.

The parking lot area will be regraded to promote drainage towards the southeastern edge of the parking lot. Along the southeast edge, a bioretention facility with catch basins within is proposed that is connected to a storm water management tank. The storm water management tank and bioretention facility are further detailed in section 4.0 of this report. The bioretention facility will have 3:1 side slopes and match the existing grades on the opposite side of the parking lot. The parking lot is generally graded to promote drainage to the proposed bioretention facility.

The northeastern and northwestern corners of the parking lot will be required to be raised to promote positive drainage towards the proposed storm sewer system and bioretention facility. In the north-east corner of the parking lot a 6.6m long toe wall is proposed to raise the parking lot and promote drainage to the storm sewer system. There is a minor encroachment into the 10m dripline buffer of 13.5m² in the area of the toe wall. To balance the small area encroaching the dripline buffer, Dillon Consulting Ltd., is proposing to offer compensation to the dripline in other localized areas. Refer to the Environmental Impact Study, prepared by Dillon Consulting, for more information pertaining to the environmental limits, encroachment and compensation.

4 STORMWATER MANAGEMENT AND SERVICING

The storm water management servicing plan is presented in drawing **SS01** in **Appendix D**.

As the proposed stormwater outlet for the development is directed to the TRCA regulated creek, the proposed stormwater management strategy for the site is based on TRCA criteria.

The design criteria for the site are as follows:

- **Water Quality:** “Enhanced” level of protection (80%) TSS Removal.
- **Water Quantity:** Control Post development to pre-development flows per the Humber River watershed Sub Basin 36 (Equation F) of Table E.1 (Appendix A – TRCA Stormwater Management Criteria August 2012)
- **Erosion Control and Water Balance:** 5.0mm of on-site retention for impervious areas, with no initial abstraction for impervious areas.

4.1 Drainage Strategy

The parking lot will be graded to flow to a series of catch basins located within a bioretention facility that drain to a stormwater storage system that provides the storage required to meet the quantity control. Prior to entering the storage tank, the stormwater will be cleaned with an oil-grit-separator or other approved equivalent. A treatment train approach is achieved through the bioretention facility and the oil grit separator prior to being released to the creek to achieve the target 80% TSS removal. The flow out of the storage tank will be controlled with an orifice plate/weir wall prior to discharging through a headwall that will be placed above the 100-year floodline elevation. The 100-year floodline elevation was determined by TRCA’s HEQ-RAS modelling for the creek, in conjunction with the site-specific topographic survey, and is included in **Appendix A**. The relevant TRCA HEQ-RAS cross section information is shown on **Drawing No. GR01 and SS01**.

There is a potential for the storage tank to have an open bottom to allow for infiltration opportunities. We acknowledge that at the time of writing of this report the soils infiltration rate is unknown. A geotechnical/hydrogeology study will be required to confirm infiltration rates and seasonally high groundwater level to ensure adequate infiltration opportunities and inform the detailed design of infiltration facilities.

4.2 Peak Flow and Storage Requirements

The site lies within the Humber River Sub Basin 36, and the post development is required to match flow rates determined by ‘Equation F’ determined by the TRCA. The watershed map is included in **Appendix A**.

Approximately 0.30 Ha of the site is being developed to support the parking lot, and the release rates for this area for the 2-to-100-year storm event are, per equation F, are presented in **Table 4-1**:

Table 4-1: Humber River "Equation F" Release Rates

Return Period	Target Unit Release Rate (L/s/Ha)	Target Release Rate Development Area = 0.30 Ha (L/s)	Target Release Rate (m ³ /s)
2	9.91	3.1	0.003
5	15.29	4.8	0.005
10	18.73	5.9	0.006
25	23.62	7.4	0.007
50	27.74	8.7	0.009
100	31.21	9.8	0.010

A Visual OTTHYMO (VO) model was performed to determine the storage requirements to meet the target release rates. The Town of Caledon IDF rainfall curve data (Town Standard Drawing No. 103) was used in the analysis. The VO analysis was performed with the input that 0.30 Ha of the site being developed with gravel having an increased runoff coefficient of 0.90 per Town of Caledon standards. The predevelopment runoff coefficient for the area was taken as 0.25.

The VO Model has been in **Appendix B**. The VO model results are presented in **Table 4-2**.

Table 4-2: Humber River "Equation F" Release Rates

Return Period	Peak Discharge (m ³ /s)	Peak Storage (m ³)
2	0.0077	77
5	0.011	110
10	0.0132	132
25	0.0163	163
50	0.0183	183
100	0.0206	206

Based on the results of the VO Model, the site will require a peak storage of 206 m³ in the 100-year storm event. Based on this requirement, a storage tank, such as a CULTEC (or equivalent) is the most appropriate solution.

A conceptual design report for a CULTEC system using a Recharger 360HD model is included in **Appendix C** and its layout is demonstrated on **Drawing No. SS01** and **SS02** in **Appendix D**. This preliminary design exceeds the storage requirement and provides 122.2 m³ within the chambers and

provides an additional 102.3 m³ of storage within the porous stones with a porosity ratio of 0.40. The methods to achieve the storage and quantity control targets will be further refined at the detailed design stage of the development.

4.3 Water Balance and Erosion Control

Per TRCA requirements, the site at a minimum must retain 5.0mm onsite retention for all impervious areas for erosion storage and water balance.

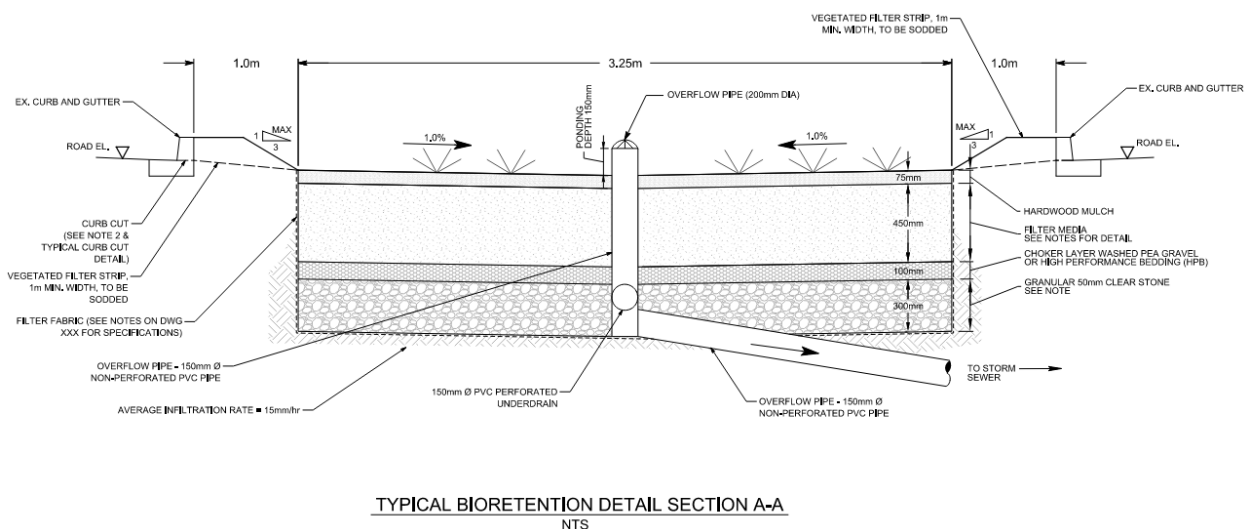
With 3,000 m² of the site becoming impervious, 15.0 m³ of storage is required to retain the 5mm rainfall event on site. The bottom stone layer of the CULTEC storage tank, with a porosity ratio of 0.40, can provide 40.9 m³ of dead storage, which is sufficient to meet the requirement. Additionally, the bioretention facility inlet area accepting drainage from the parking lot can be designed to provide additional water balance volume and erosion opportunities.

4.4 Low Impact Development (LID) Technologies

The site has the potential to utilize low impact development (LID) technologies with a bioretention facility. LID technologies can provide additional infiltration opportunities, should the soils on the site be suitable. At the time of writing this servicing and stormwater management report, a hydrogeological and geotechnical investigation has not been completed. The site also has a private well, which will affect the locations of where LID technologies can be utilized within the site, as they require a 30m infiltration setback per TRCA SWM criteria.

The ditched area that the parking lot drains to has the potential to become a bioretention facility. A similar bioretention facility used within the Greater Toronto Area is demonstrated in **Figure 4.1** for illustration purposes.

Figure 4-1: Potential Bioretention Facility



The bioretention facility can provide improved infiltration and act as the initial stage of a treatment train for quality control purposes of storm water. The filter media depth and other modifications (such as having the overflow pipe being perforated) can be made to adjust the sites specific criteria. To promote infiltration in the bioretention facility, there is potential for the catch basins lids to be raised and allow for ponding prior to entering the storm sewer system. This allows for minor storm events to have an opportunity to infiltrate prior entering the stormwater tank and being released to the creek.

5 MUNICIPAL SERVICES

Based on the as-built drawings, the site currently has no municipal services and it is assumed the existing dwelling utilizes a private well and septic tank for water and wastewater. The existing private services will be maintained. As shown on **Drawing No. SS01**, the existing private services are not anticipated to conflict with the construction activities with the parking lot improvements.

6 EROSION AND SEDIMENT CONTROL

During construction, silt fences will be placed around the work area along with double row silt fences parallel to the existing slope on the site. The silt fences shall be cleaned after every rainfall event or when silt accumulates to 50% height of the fences. A construction mud mat will be provided at the edge of the existing asphalt driveway. Once constructed, the silt fence will required to be installed around the bioretention facility to keep silts from entering the system while the remainder of the parking lot is constructed to final grade.

Refer to the Erosion and Sediment Control Plan **ESC01** provided in **Appendix D**.

7 UTILITIES

A preliminary utility investigation was made for existing underground utility infrastructure in Mayfield Road. This information is for reference purposes only and further utility coordination is outside the scope of this report.

It was found that within Mayfield Road the following utilities and civil services are present:

- Watermain, Storm Sewers, and an abandoned Sanitary Sewer
- Abandoned and active gas lines (within southern side of road centreline)
- Existing buried and aerial Rogers and Bell cables
- Hydro One aerial cables
- Alectra buried duct banks

As the area of work is internal to the site, approximately 150m from Mayfield Road, no public utility conflicts are anticipated. Internal electrical cables to the existing steel building is unknown and the contractor shall perform onsite locates prior to construction.

8 CONCLUSIONS

Based on this review and analysis, it can be concluded that the proposed development meets the TRCA's criteria for release rates to the Humber River Sub Basin 36 and applicable erosion storage and water balance criteria.

A summary of our findings are as follows:

- The parking lot can be graded to maintain the existing property line elevations and graded to drain to an internal stormwater sewer system and bioretention facility.
- The proposed internal storm system meets the applicable TRCA criteria for providing quality and quantity control.
- The site will require quantity control storage to match the TRCA release rate requirements. For the 100-year storm event, 206 m³ of storage is required and is being provided via underground an storage tank.

We trust you find the contents of this report satisfactory. Should you have any questions or comments please do not hesitate to contact the undersigned. Sincerely,

T.Y.Lin International Canada Inc.



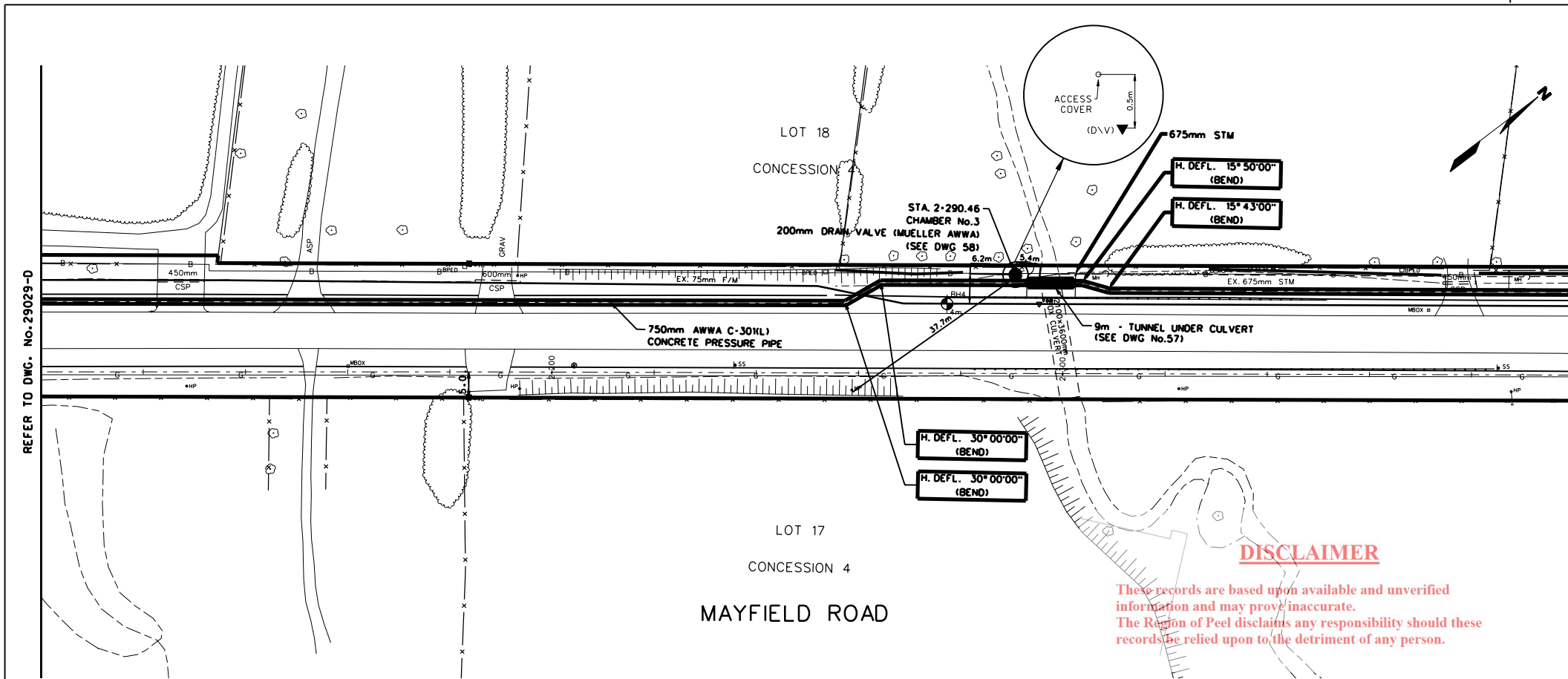
Monica Ruiz, P.Eng., PMP
Director of Development



Caleb Donald
Project Manager

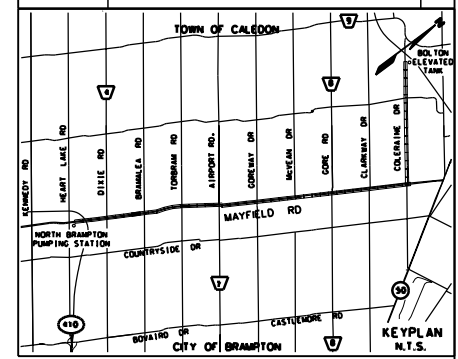
APPENDIX A

**As-Built Drawings and
TRCA Humber River Maps**



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMANS			HYDRO U/G CABLE		
TRANSIT			ONT. HYDRO		
PARKS & REC.			CTV		
ONT. CLEAN WATER					

REVISIONS		
DATE	DETAILS	INIT.
MARCH 2002	CONSTRUCTION RECORD	T.M.

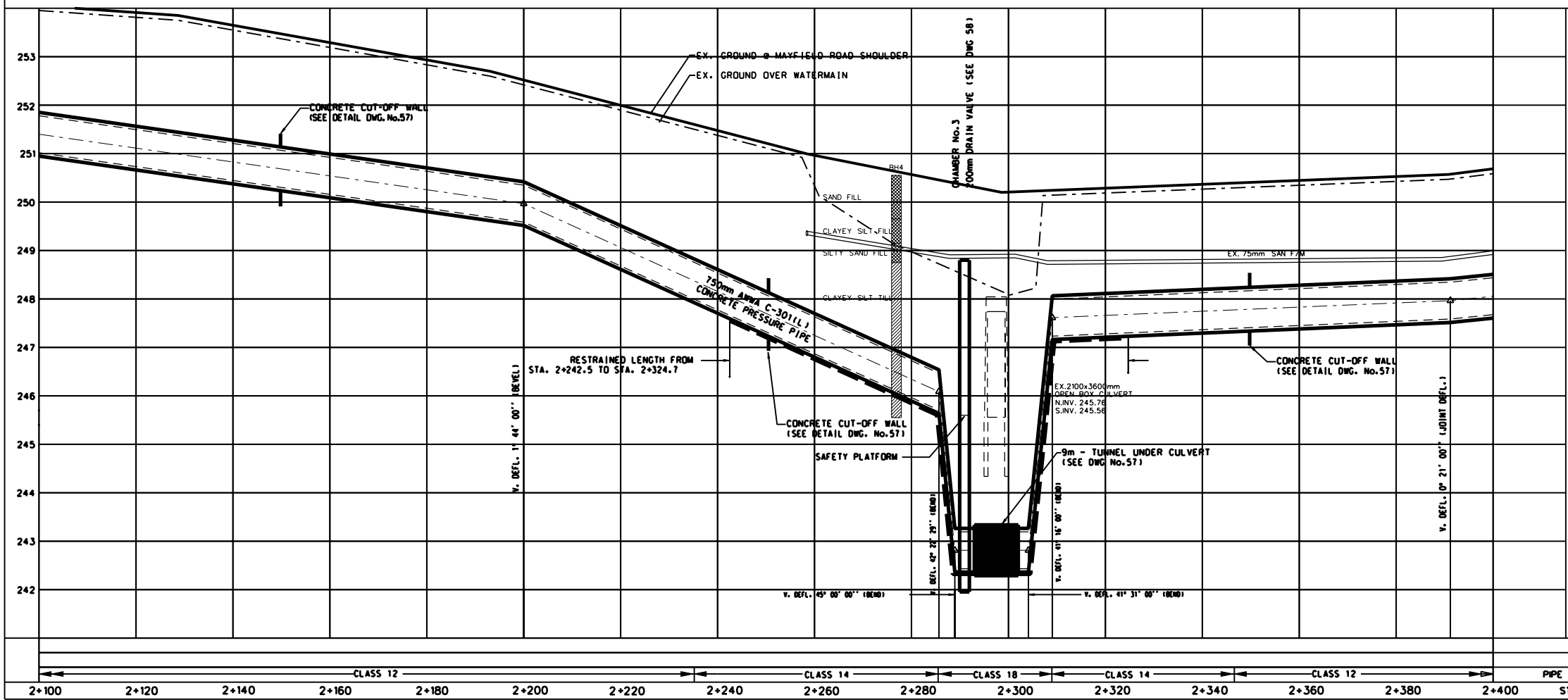


DISCLAIMER
 These records are based upon available and unverified information and may prove inaccurate. The Region of Peel disclaims any responsibility should these records be relied upon to the detriment of any person.

NOTE:
 CHAMBER SWING TIES ARE TO ACCESS COVER

CONSTRUCTION RECORD
 CONSTRUCTION PERIOD JAN. 2001 TO AUG. 2001

FOR GENERAL NOTES SEE PLAN 1



General Notes

- All Driveways ASPHALT Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In The Field
- ⊙ Denotes Building - Not Located
- ⊙ Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (ISAN)

B.M. No. Elev.
 The Contractor is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction Location of Existing Utilities Approximate Only, To Be Verified In Field By Contractor.

KMK Consultants Limited
 Consulting Engineers, Project Managers, Ecological Planners, Landscape Architects

DESIGNED BY: CHKD.
 APPROVED BY: A. VARIA

NOTICE TO CONTRACTOR
 48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
 CITY OF BRAMPTON WORKS DEPT.
 TOWN OF CALEDON WORKS DEPT.
 BELL TELEPHONE COMPANY
 CONSUMERS GAS COMPANY
 MINISTRY OF TRANSPORTATION
 HYDRO ELECTRIC POWER COMM. OF ONTARIO
 HYDRO ELECTRIC COMM. TOWN OF CALEDON
 HYDRO ELECTRIC COMM. CITY OF BRAMPTON
 CABLE TELEVISION

10m 0 10 20 30m HORIZONTAL SCALE
 1m 0 1 2 3m VERTICAL SCALE

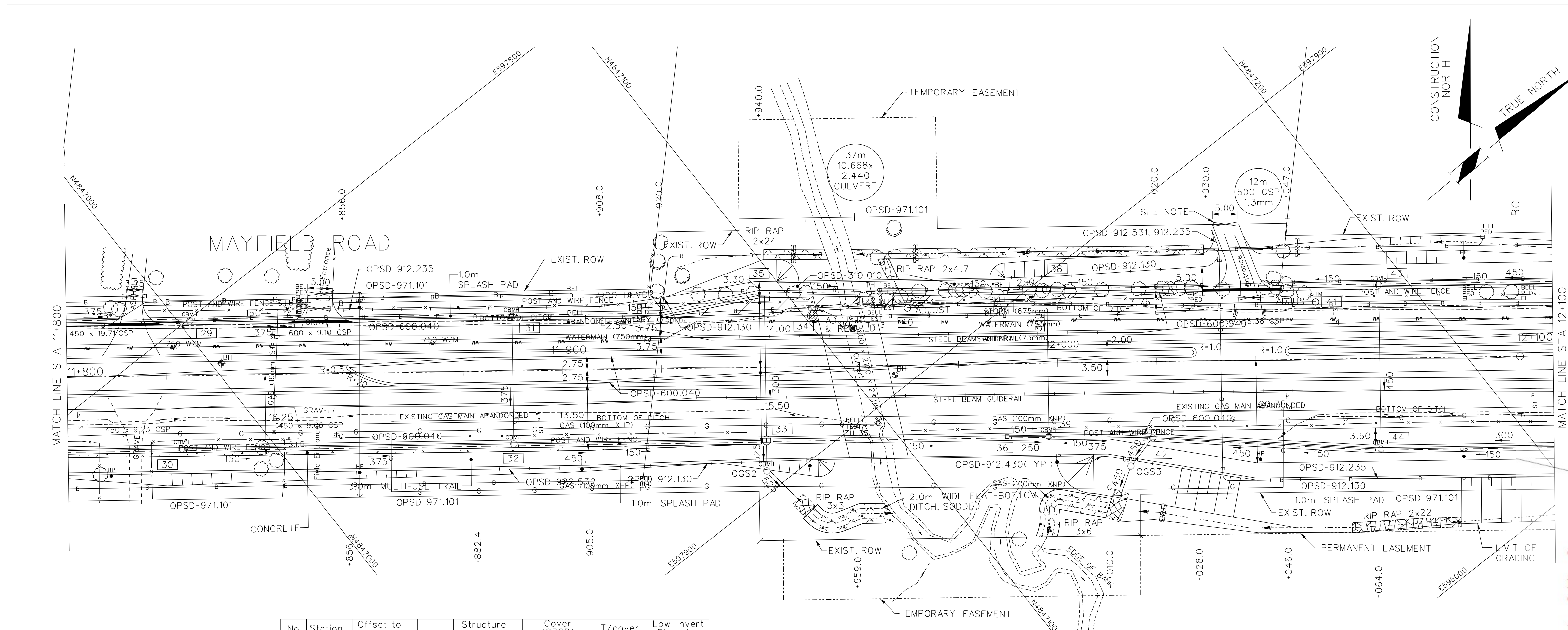
Region of Peel Public Works

MAYFIELD ROAD

PROPOSED 750mm BOLTON FEEDERMAIN

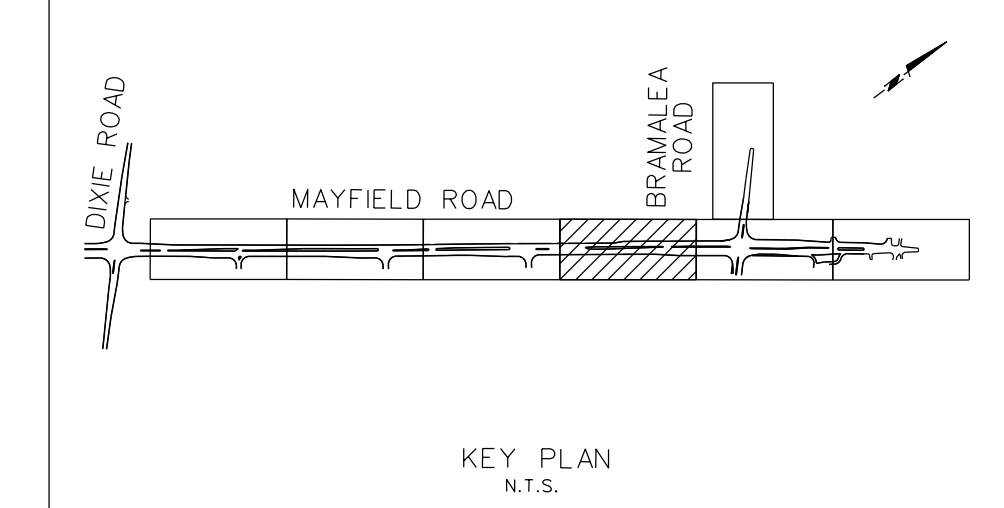
Sta. 2+100 To Sta. 2+400

Lot: _____ Ref No. 2199-A-25 Project No. 99-1930
 Checked by R.V. Drawn by G.D. Plan No. 29029-D
 Date SEPT 00 Sheet 8 of 8



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMANS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
CONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS					
DATE	REVISION No.	DETAILS	INIT.	TY	
JUNE 25, 2013	1	AS-BUILT	JK		
DEC 12, 2016					



NOTE
1. SUPPLY AND INSTALL 1-4.9m FARM GATE AND 1-1.2m WALK GATE.

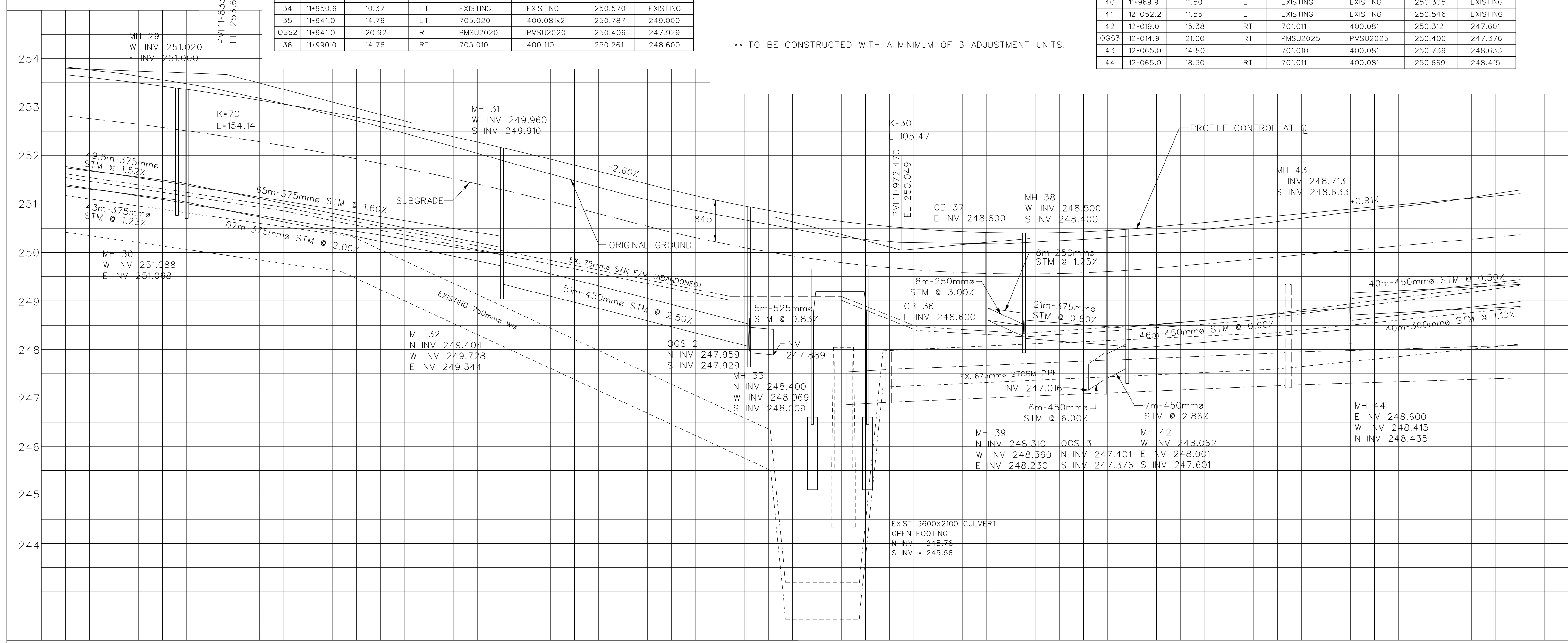
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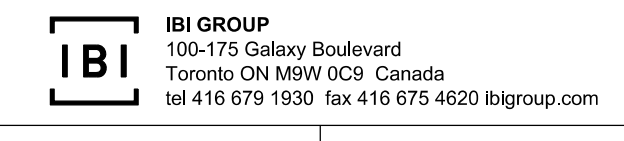
No.	Station	Offset to structure	Structure (OPSD)	Cover (OPSD)	T/covers	Low Invert Elevation
29	11-825.0	11.01	LT 701.010	400.081	253.280	251.000
30	11-823.0	14.76	RT 701.010	400.081	253.234	251.068
31	11-890.0	11.01	LT 701.010	400.081	252.078	249.910
32	11-890.0	14.76	RT 701.010	400.081	252.003	249.344
33	11-941.0	14.76	RT 701.011	400.081w2	250.787	248.009
34	11-950.6	10.37	LT EXISTING	EXISTING	250.570	EXISTING
35	11-941.0	14.76	LT 705.020	400.081w2	250.787	249.000
OGS2	11-941.0	20.92	RT PMSU2020	PMSU2020	250.406	247.929
36	11-990.0	14.76	RT 705.010	400.110	250.261	248.600

No.	Station	Offset to structure	Structure (OPSD)	Cover (OPSD)	T/covers	Low Invert Elevation
37	11-990.0	14.76	LT 705.010	400.081	250.261	248.600
38	11-997.7	14.76	LT 701.011	400.081x2	250.250	248.400
39	11-997.7	14.76	RT 701.011	400.110	250.250	248.230
40	11-969.9	11.50	LT EXISTING	EXISTING	250.305	EXISTING
41	12-052.2	11.55	LT EXISTING	EXISTING	250.546	EXISTING
42	12-019.0	15.38	RT 701.011	400.081	250.312	247.601
OGS3	12-014.9	21.00	RT PMSU2025	PMSU2025	250.400	247.376
43	12-065.0	14.80	LT 701.010	400.081	250.739	248.633
44	12-065.0	18.30	RT 701.011	400.081	250.669	248.415

** TO BE CONSTRUCTED WITH A MINIMUM OF 3 ADJUSTMENT UNITS.

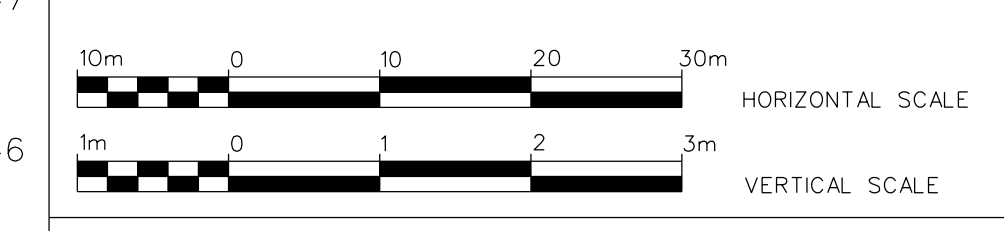


General Notes
 -- All Driveways ASPHALT Unless Otherwise Noted.
 -- All Service Locations Are Approximate And Must Be Located Accurately In The Field.
 (Symbol) Denotes Building - Not Located
 (Symbol) Denotes Building Located
 (Symbol) Type 'B' Bedding Unless Otherwise Noted (SAN)
 B.M. No. Elev.
 The Contractor is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction Location of Existing Utilities Approximate Only. To Be Verified In Field By Contractor.



Designed by _____ Chkd. _____ Designed by _____

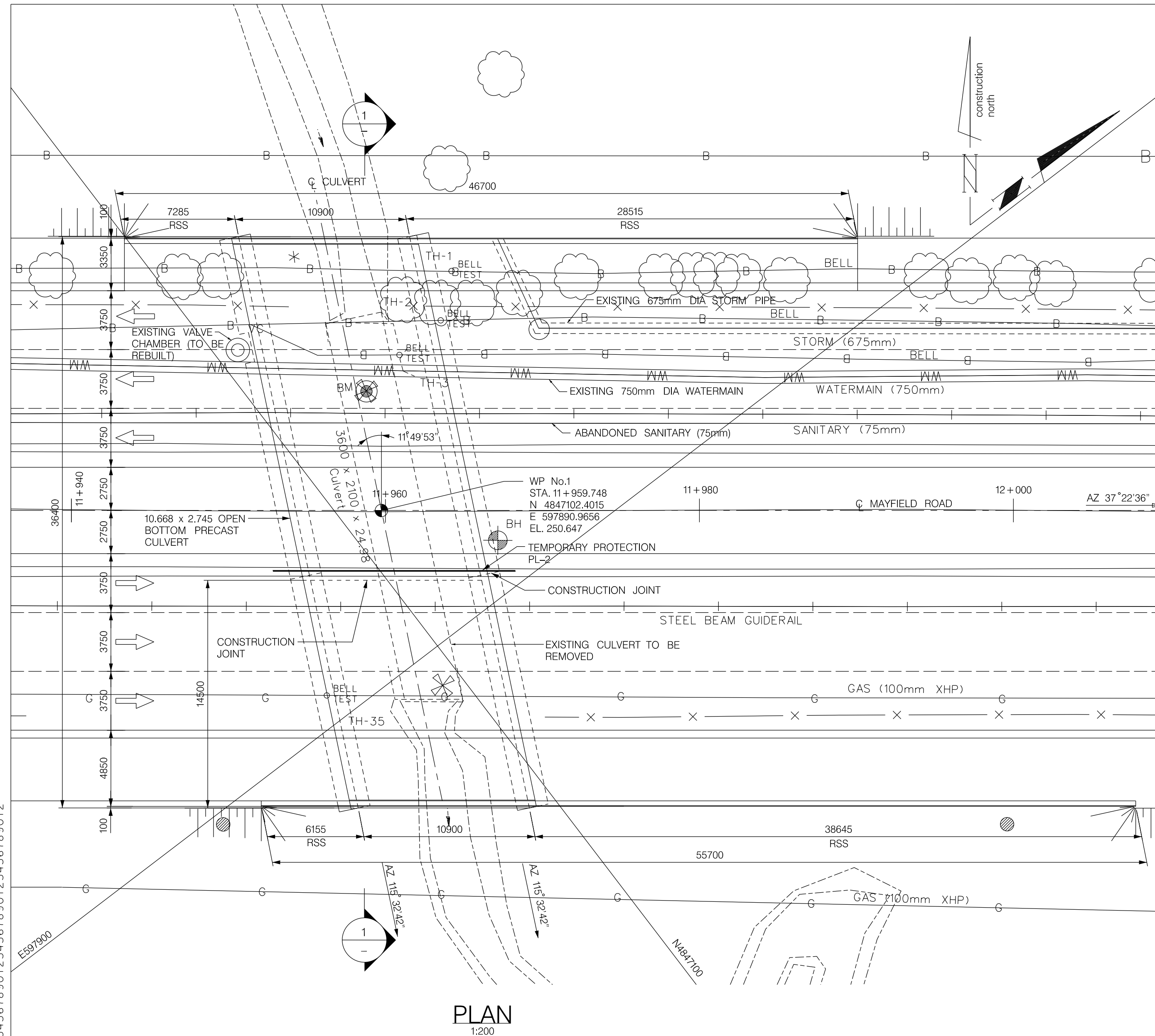
NOTICE TO CONTRACTOR
 48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING
 THE REGIONAL MUNICIPALITY OF PEEL
 CITY OF MISSISSAUGA WORKS DEPT.
 CITY OF BRAMPTON WORKS DEPT.
 TOWN OF CALEDON WORKS DEPT.
 BELL CANADA
 ENERSOURCE TELECOM
 ROGERS CABLE
 ENBRIDGE INCORPORATED-GAS DISTRIBUTION
 ONTARIO MINISTRY OF TRANSPORTATION
 HYDRO ONE NETWORKS
 ENERSOURCE, HYDRO MISSISSAUGA
 HYDRO ONE BRAMPTON
 CABLE TELEVISION/FIBROPTIC PROVIDERS:
 BELL CANADA
 ENERSOURCE TELECOM
 HYDRO ONE TELECOM
 ALLSTREAM
 PSN (PUBLIC SECTOR NETWORK)
 FUTUREWAY (FIBROBROADBAND)



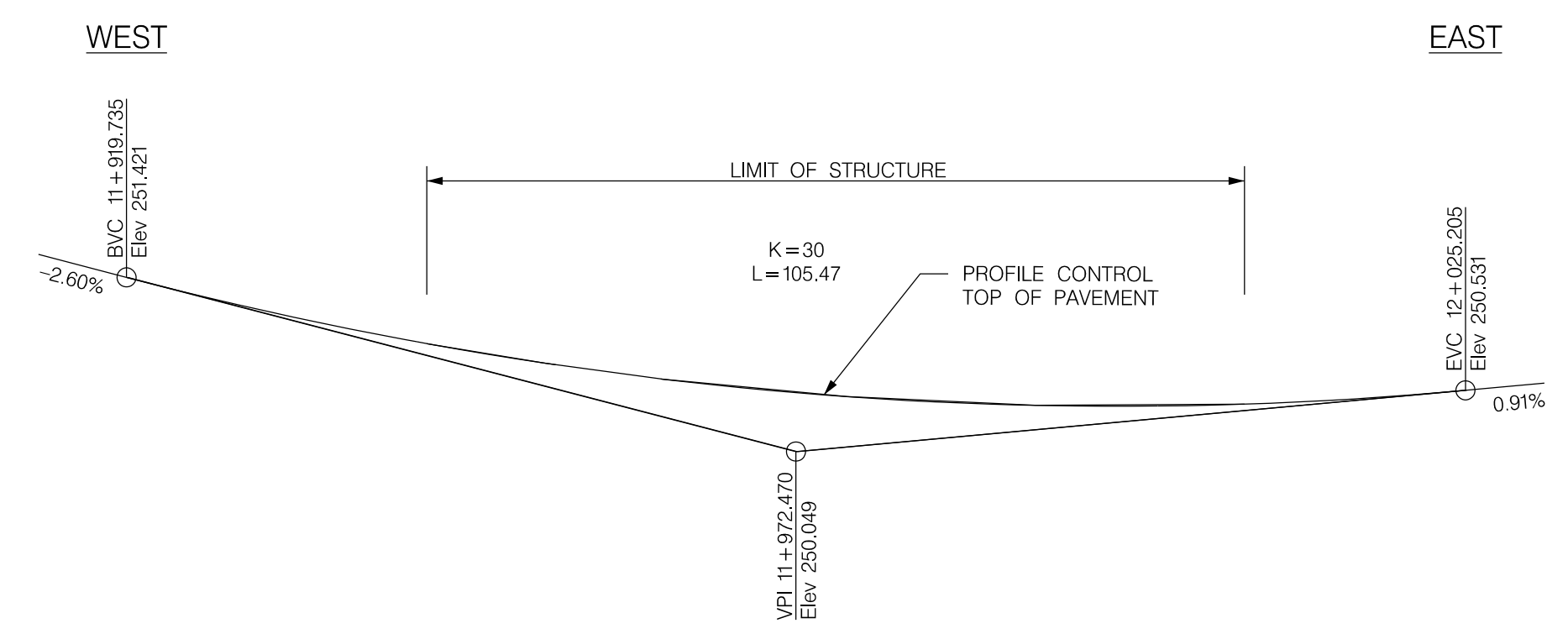
MAYFIELD ROAD
 (FROM EAST OF DIXIE ROAD
 TO EAST OF BRAMALEA ROAD)
 NEW CONSTRUCTION
 STA. 11+800 TO STA. 12+100

253.666	253.433	253.142	252.794	252.389	251.927	251.414	250.962	250.644	250.458	250.406	250.488	250.666	250.849	251.031	251.214	€ PROP EL.
253.830	253.559	253.181	252.720	252.185	251.622	251.091	250.676	250.317	250.197	250.216	250.344	250.529	250.772	251.000	251.286	€ EXIST EL.
11+800	11+820	11+840	11+860	11+880	11+900	11+920	11+940	11+960	11+980	12+000	12+020	12+040	12+060	12+080	12+100	CHANNAGE

CAD Area	Area B-30/C-06	Project No.	04-4060
Checked by J.K.	Drawn by S.Y. ANJ	Project No.	06-4040
Date MAY 08, 2013	Sheet 12 of 52	Plan No.	58282-D



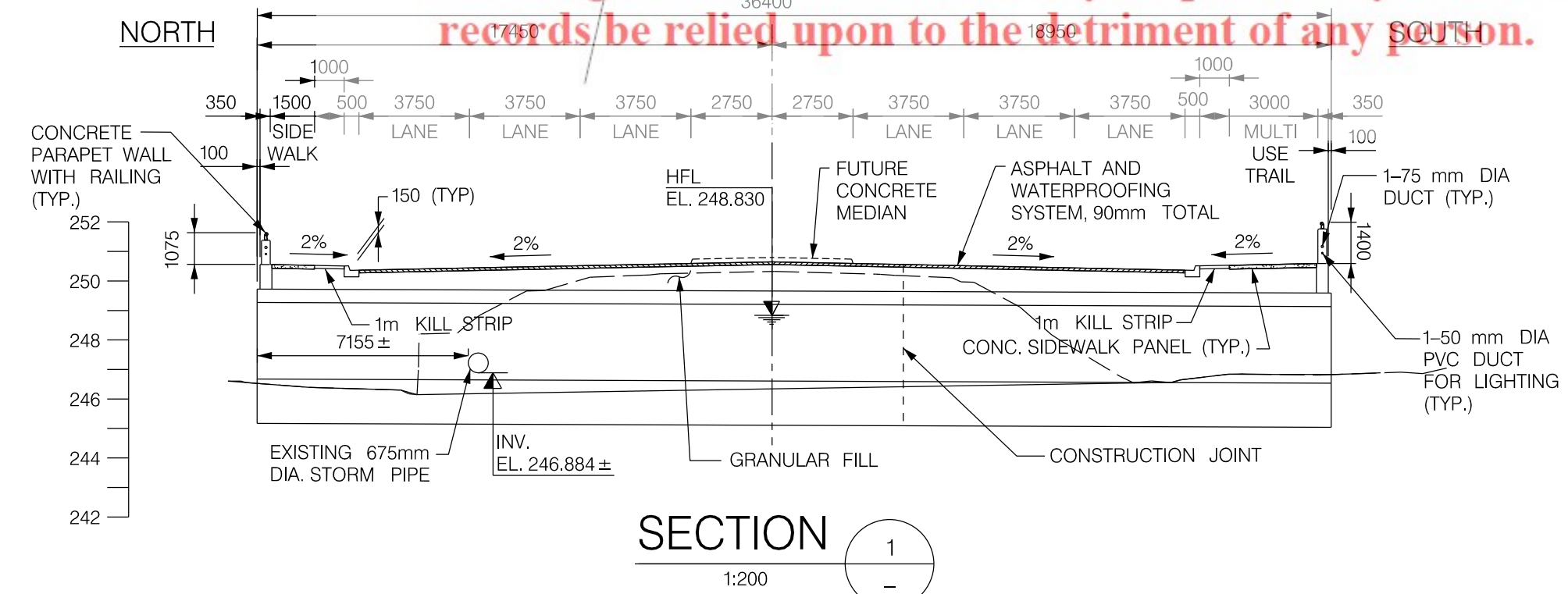
PLAN
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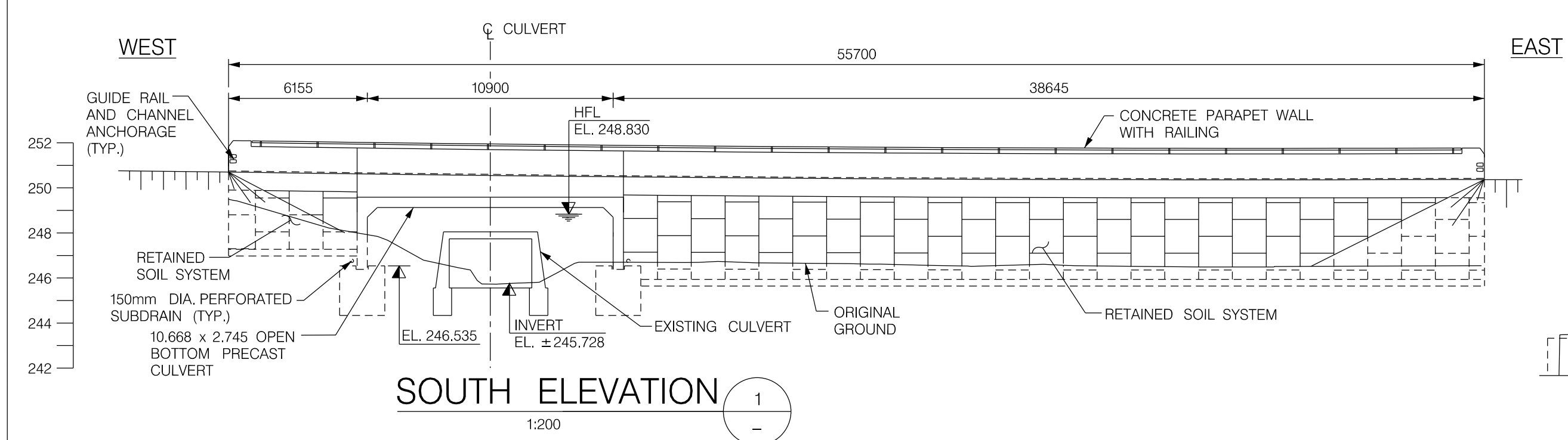
PROFILE OF MAYFIELD ROAD
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:50

DISCLAIMER

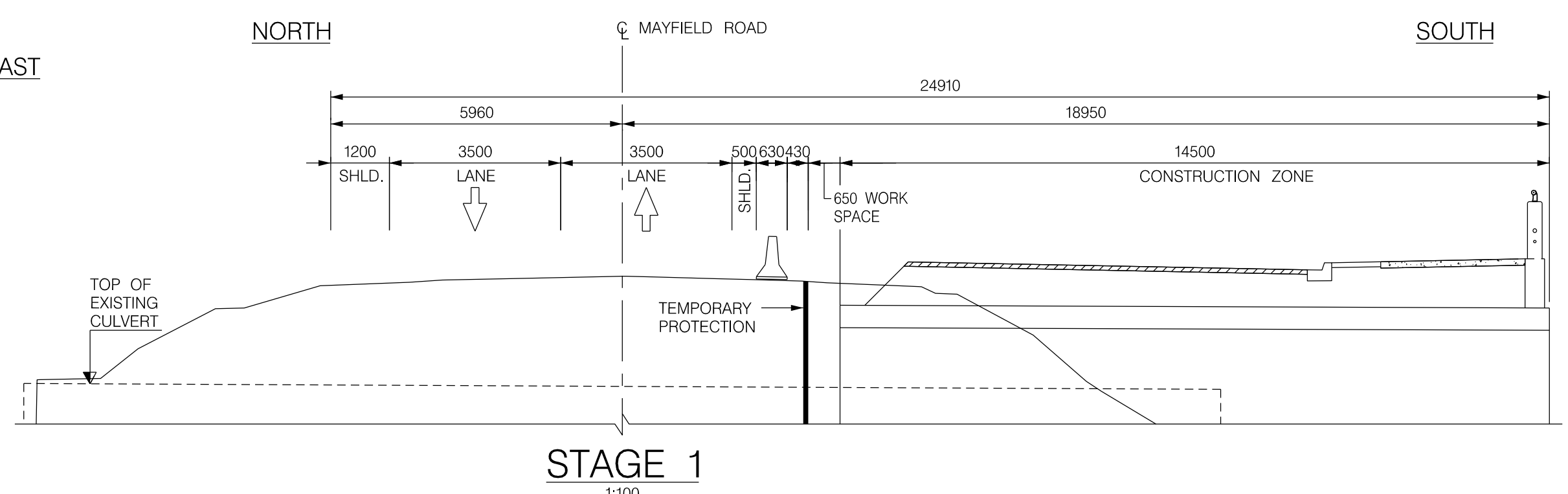
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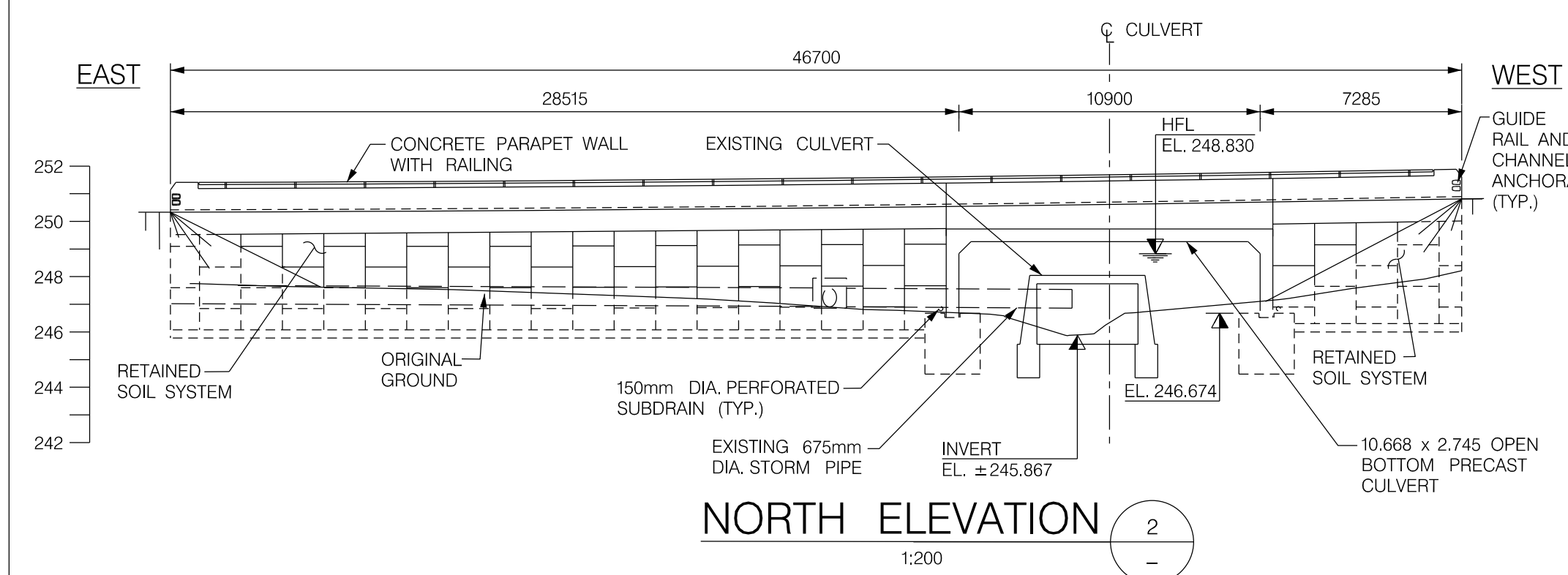
SECTION 1
1:200



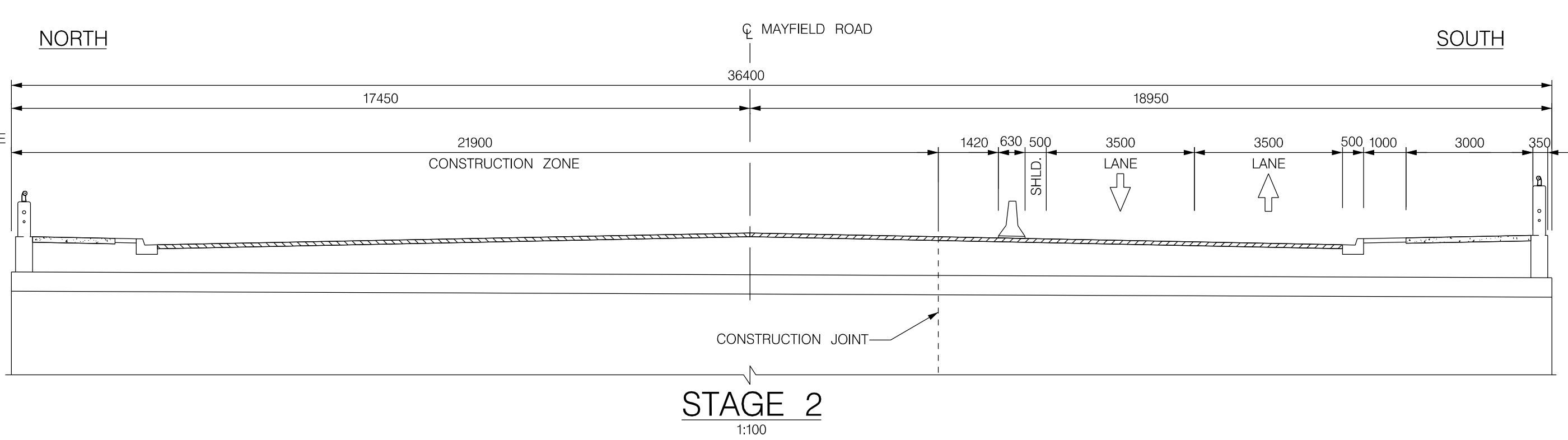
SOUTH ELEVATION 1
1:200



STAGE 1
1:100



NORTH ELEVATION 2
1:200



STAGE 2
1:100

SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMANS			HYDRO U/G CABLE		
TRANSIT			ONT. HYDRO		
PARKS & REC.			CTV		
ONT. CLEAN WATER					

REVISIONS		
DATE	DETAILS	INIT.
DEC 12, 2016	AS-BUILT	AMS

GENERAL NOTES

- DESIGN CODE : CHBDC CANCSA-S6-06
- CLASS OF CONCRETE**
ALL CONCRETE.....35 MPa
(UNLESS NOTED OTHERWISE)
- CLEAR COVER TO REINFORCING STEEL**
FOOTINGS.....100±25mm
UNLESS OTHERWISE SPECIFIED.....70±20mm
- REINFORCING STEEL**
REINFORCING STEEL SHALL BE GRADE 400W UNLESS OTHERWISE SPECIFIED.
BAR MARKS WITH PREFIX 'C' DENOTE COATED BARS.
BAR MARKS WITH PREFIX 'S' DENOTE STAINLESS STEEL BARS.
STAINLESS REINFORCING STEEL SHALL BE TYPE 316LN, DUPLEX 2205 AND HAVE A MINIMUM YIELD STRENGTH OF 500 MPa, UNLESS OTHERWISE SPECIFIED.
UNLESS SHOWN OTHERWISE, TENSION LAP SPLICES SHALL BE CLASS B.
BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS USING MINIMUM BEND DIAMETERS, WHILE STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS. ALL HOOKS SHALL BE IN ACCORDANCE WITH THE STRUCTURAL STANDARD DRAWINGS SS12-1 AND SS12-2 UNLESS INDICATED OTHERWISE.
- RETAINED SOIL SYSTEM**
RETAINED SOIL SYSTEM WALLS SHALL HAVE THE FOLLOWING ATTRIBUTES:
APPLICATION : VERTICAL WALL
PERFORMANCE : HIGH
APPEARANCE : HIGH
- CONSTRUCTION NOTES**
REMOVAL OF CULVERT AND ANY IN-WATER WORK IS PERMITTED ONLY BETWEEN JULY 1 AND SEPTEMBER 15 UNLESS OTHERWISE GRANTED IN WRITING BY MNR.
BACKFILL SHALL BE PLACED SIMULTANEOUSLY BEHIND BOTH SIDES OF CULVERT KEEPING THE HEIGHT OF THE BACKFILL APPROXIMATELY THE SAME. AT NO TIME SHALL THE DIFFERENCE IN ELEVATION BE GREATER THAN 500mm.
THE CROSS SECTION OF THE ROAD SHOWN ON THIS DRAWING REPRESENTS ULTIMATE CONFIGURATION OF THE LANES.
THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS OF THE EXISTING WORK AND ALL DETAILS ON SITE AND REPORT DISCREPANCIES TO THE CONTRACT ADMINISTRATOR BEFORE PROCEEDING WITH THE WORK.

APPLICABLE STANDARD DRAWINGS

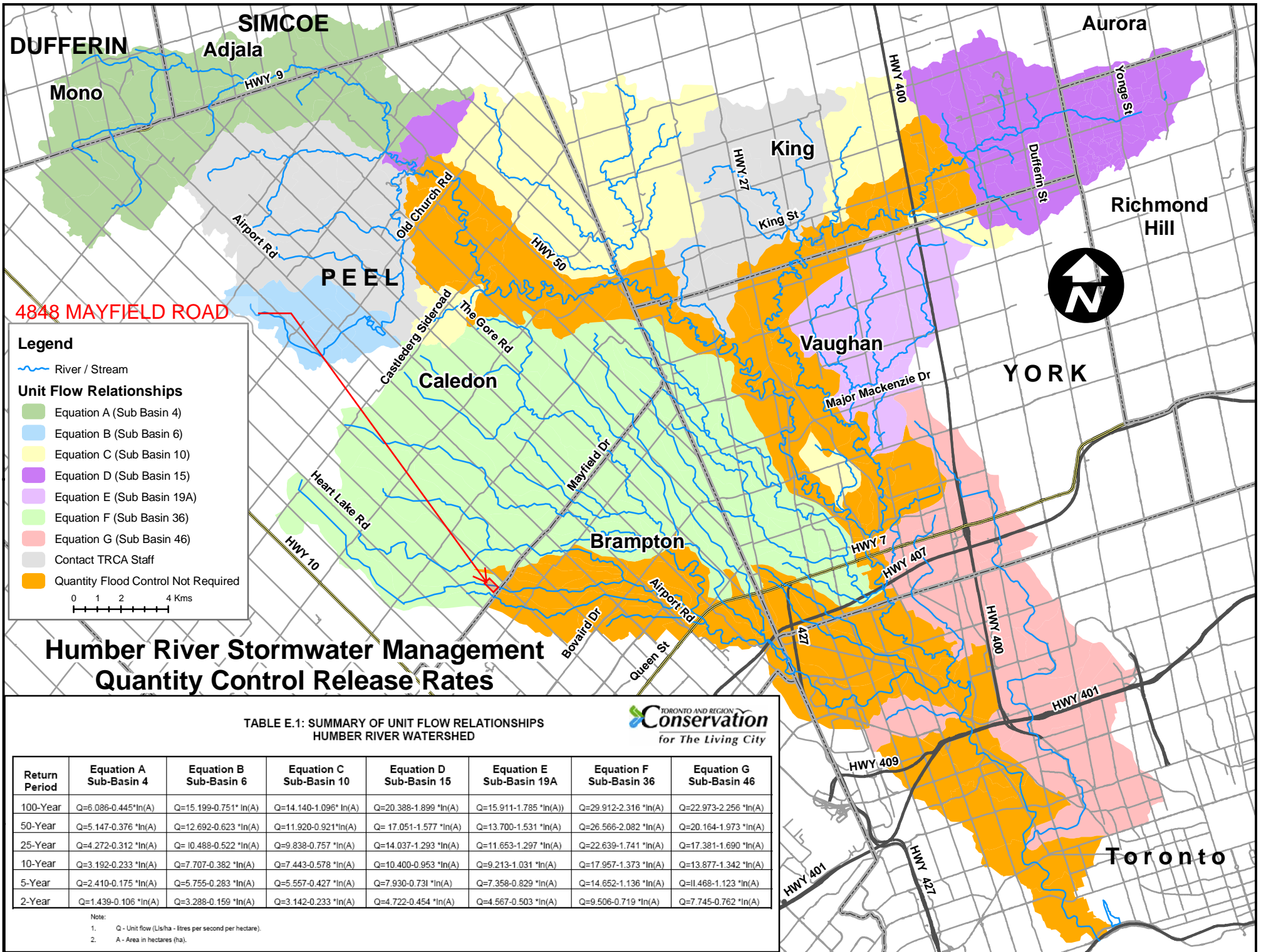
- OPSD 803.010 BACKFILL AND COVER FOR CONCRETE CULVERTS
- OPSD 3419.100 BARRIERS AND RAILINGS, STEEL BEAM, GUIDE RAIL AND CHANNEL ANCHORAGE

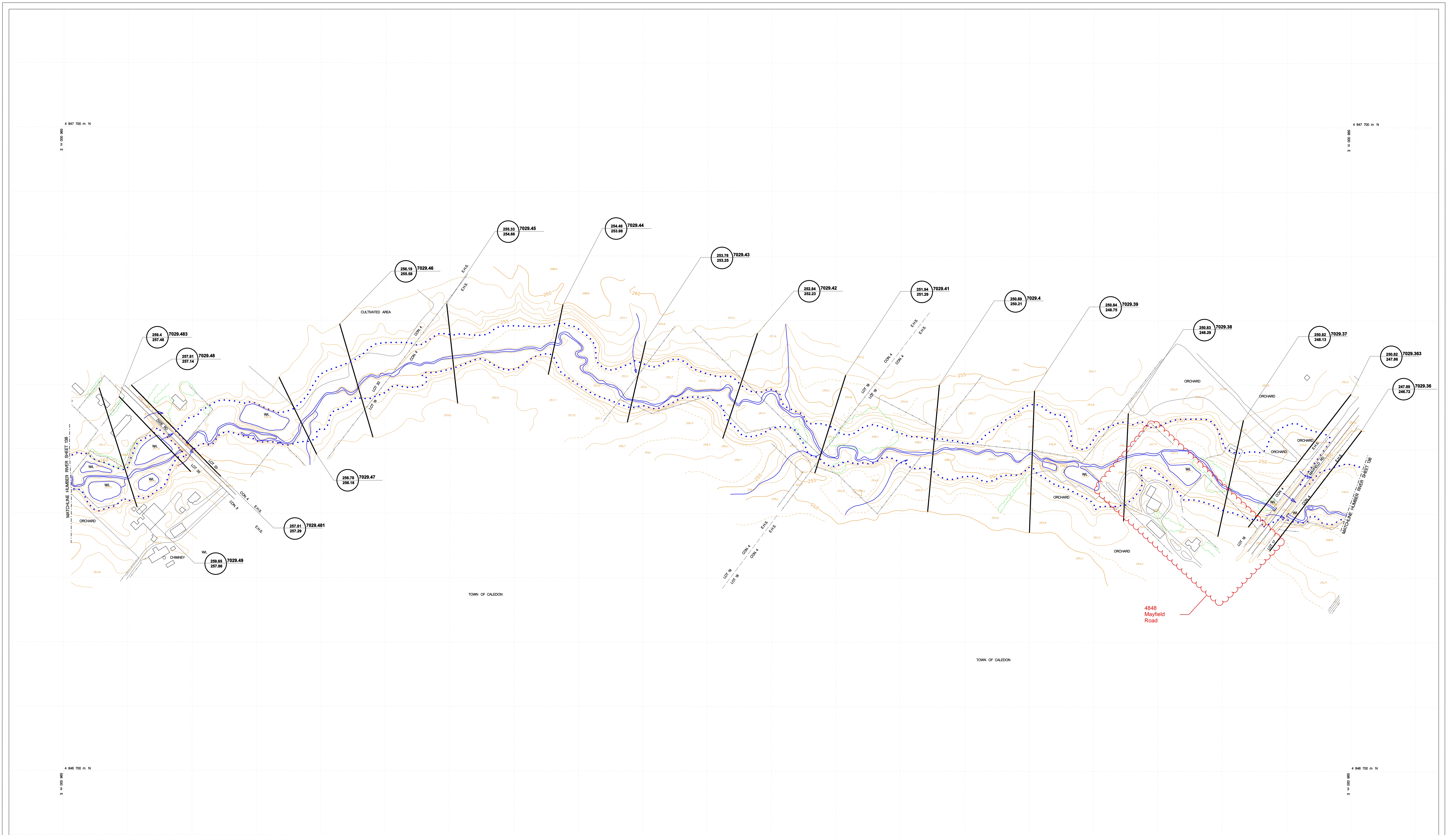
IBI GROUP
100-175 Galaxy Boulevard
Toronto ON M9W 0C9 Canada
tel 416 679 1930 fax 416 675 4620 ibigroup.com

Region of Peel
Working for you

MAYFIELD ROAD
BRIDGE AT 11+960
WEST OF BRAMALEA ROAD (H3)
GENERAL ARRANGEMENT

CAD Area	Area B-30/C06	Project No.	04-4060
Checked by	R.W.	Drawn by	S.Z.
Date	MAY 08, 2013	Sheet	25 of 52
		Plan No.	58295-D





NO.	DESCRIPTION	BY	DATE

LEGEND	
Contour - Index	Roads - Hard Surface, with Median
Contour - Intermediate	Driveway, or Loose Surface
Contour - Supplementary	Gravel Lane, Cart Track, wagon Road
Contour - Approximate	Footpath, Trail
Depression	Bridge Footbridge
Spot Elevation - Water Level	Fence
River, Stream, Canal	Elev., Cut and Fill
Approach to Alignment	Culvert
Disappearing	Dam, Retain. Dam
Split	Pipeline
Lake	Power Transmission Line, with Poles, with pylons
Flooded Land	Runway
Marsh, Swamp	Railway
Drain, Drain	Wooded Area
Roads	Chimney
Reservoir	Hedge
Falls	Well
Building, Garage, Shed	Regulatory Flood Line
Under Construction - Foundation	

PLEASE NOTE:
 FLOODLINE ELEVATIONS ARE SUBJECT TO
 CHANGE DUE TO REVISED INFORMATION.

clarifica

PLEASE NOTE:
 THIS MAP WAS ORIGINALLY
 COMPILED BY MARSHALL MACKLIN
 MONAGHAN LTD. IN 1977. THIS MAP WAS
 DIGITIZED BY GSP GEOGRAPHICS INC.
 IN 2005.

PLEASE NOTE:
 THE PROFESSIONAL ENGINEER'S
 STAMP VERIFIES THE FLOOD
 LINE AND ASSOCIATED DATA
 NOT THE MAP DATA
 UNLESS OTHERWISE NOTED

E. J. GRAHAM
 LICENSED PROFESSIONAL ENGINEER
 PROVINCE OF ONTARIO

FLOOD PLAN MAPPING PROGRAM

FLOODLINE APPROVED DATE: 2006-04-05

**TORONTO AND REGION
 Conservation**
for The Living City

5 Shoreham Drive Downsview Ontario M3N 1S4 (416) 661-6600

Scale 1:2000

CONTOUR INTERVAL 1.0 METRES:

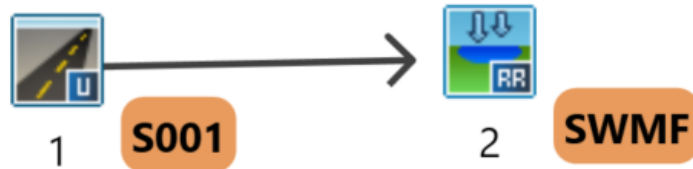
HUMBER RIVER

SHEET No. 137

APPENDIX B

VISUAL OTTHYMO (VO) MODEL

VO Schematic



VO Output

Run: Caloden_2yr-3hr-Chicago Show All Runs													
Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m ² /s]	TP [hr]	RV [mm]	DWF [m ² /s]	Max. Used Vol [ha.m]	TSSC [mg/l]	TPPC [mg/l]	TSSL [Kg]	TPPL [g]
Caloden_2yr-3hr-Chicago	1	Outflow	0.017	0.570	0.099	1.000	25.076	0.000	N/A	0.000	0.000	0.000	0.000
Caloden_2yr-3hr-Chicago	2	Outflow	0.017	0.570	0.006	1.917	24.199	0.000	0.011	0.000	0.000	0.000	0.000

Run: Caloden_5yr-3hr-Chicago Show All Runs													
Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m ² /s]	TP [hr]	RV [mm]	DWF [m ² /s]	Max. Used Vol [ha.m]	TSSC [mg/l]	TPPC [mg/l]	TSSL [Kg]	TPPL [g]
Caloden_5yr-3hr-Chicago	1	Outflow	0.017	0.570	0.132	1.000	38.036	0.000	N/A	0.000	0.000	0.000	0.000
Caloden_5yr-3hr-Chicago	2	Outflow	0.017	0.570	0.009	1.950	37.159	0.000	0.017	0.000	0.000	0.000	0.000

Run: Caloden_10yr-3hr-Chicago Show All Runs													
Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m ² /s]	TP [hr]	RV [mm]	DWF [m ² /s]	Max. Used Vol [ha.m]	TSSC [mg/l]	TPPC [mg/l]	TSSL [Kg]	TPPL [g]
Caloden_10yr-3hr-Chicago	1	Outflow	0.017	0.570	0.166	1.000	46.306	0.000	N/A	0.000	0.000	0.000	0.000
Caloden_10yr-3hr-Chicago	2	Outflow	0.017	0.570	0.011	1.883	45.430	0.000	0.020	0.000	0.000	0.000	0.000

Run: Caloden_25yr-3hr-Chicago Show All Runs													
Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m ² /s]	TP [hr]	RV [mm]	DWF [m ² /s]	Max. Used Vol [ha.m]	TSSC [mg/l]	TPPC [mg/l]	TSSL [Kg]	TPPL [g]
Caloden_25yr-3hr-Chicago	1	Outflow	0.017	0.570	0.199	1.000	58.137	0.000	N/A	0.000	0.000	0.000	0.000
Caloden_25yr-3hr-Chicago	2	Outflow	0.017	0.570	0.013	1.917	57.263	0.000	0.026	0.000	0.000	0.000	0.000

Run: Caloden_50yr-3hr-Chicago Show All Runs													
Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m ² /s]	TP [hr]	RV [mm]	DWF [m ² /s]	Max. Used Vol [ha.m]	TSSC [mg/l]	TPPC [mg/l]	TSSL [Kg]	TPPL [g]
Caloden_50yr-3hr-Chicago	1	Outflow	0.017	0.570	0.228	1.000	66.304	0.000	N/A	0.000	0.000	0.000	0.000
Caloden_50yr-3hr-Chicago	2	Outflow	0.017	0.570	0.016	1.883	65.430	0.000	0.029	0.000	0.000	0.000	0.000

Run: Caloden_100yr-3hr-Chicago Show All Runs													
Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m ² /s]	TP [hr]	RV [mm]	DWF [m ² /s]	Max. Used Vol [ha.m]	TSSC [mg/l]	TPPC [mg/l]	TSSL [Kg]	TPPL [g]
Caloden_100yr-3hr-Chicago	1	Outflow	0.017	0.570	0.258	1.000	75.273	0.000	N/A	0.000	0.000	0.000	0.000
Caloden_100yr-3hr-Chicago	2	Outflow	0.017	0.570	0.018	1.883	74.398	0.000	0.034	0.000	0.000	0.000	0.000

 ** SIMULATION:Caloden_100yr-3hr-Chicago **

```

CHICAGO STORM          IDF curve parameters: A=4688.000
Ptotal= 87.03 mm      B= 17.000
                       C= 0.962
used in:  INTENSITY = A / (t + B)^C

Duration of storm = 3.00 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	4.88	0.83	196.54	1.67	12.48	2.50	4.51
0.17	6.96	1.00	83.09	1.83	9.60	2.67	3.91
0.33	11.02	1.17	41.25	2.00	7.66	2.83	3.44
0.50	21.03	1.33	25.07	2.17	6.29		
0.67	62.12	1.50	17.06	2.33	5.28		

```

CALIB
STANDHYD ( 0001) Area (ha)= 0.57
ID= 1 DT= 1.0 min Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00
    
```

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.40	0.17
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	2.00	2.00
Length (m)=	61.64	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	4.88	0.767	62.12	1.517	17.06	2.27	6.29
0.033	4.88	0.783	62.12	1.533	17.06	2.28	6.29
0.050	4.88	0.800	62.12	1.550	17.06	2.30	6.29
0.067	4.88	0.817	62.12	1.567	17.06	2.32	6.29
0.083	4.88	0.833	62.12	1.583	17.06	2.33	6.29
0.100	4.88	0.850	196.53	1.600	17.06	2.35	5.28
0.117	4.88	0.867	196.54	1.617	17.06	2.37	5.28
0.133	4.88	0.883	196.54	1.633	17.06	2.38	5.28
0.150	4.88	0.900	196.54	1.650	17.06	2.40	5.28
0.167	4.88	0.917	196.54	1.667	17.06	2.42	5.28
0.183	6.96	0.933	196.54	1.683	12.48	2.43	5.28
0.200	6.96	0.950	196.54	1.700	12.48	2.45	5.28
0.217	6.96	0.967	196.54	1.717	12.48	2.47	5.28
0.233	6.96	0.983	196.54	1.733	12.48	2.48	5.28
0.250	6.96	1.000	196.54	1.750	12.48	2.50	5.28
0.267	6.96	1.017	83.09	1.767	12.48	2.52	4.51
0.283	6.96	1.033	83.09	1.783	12.48	2.53	4.51
0.300	6.96	1.050	83.09	1.800	12.48	2.55	4.51
0.317	6.96	1.067	83.09	1.817	12.48	2.57	4.51
0.333	6.96	1.083	83.09	1.833	12.48	2.58	4.51
0.350	11.02	1.100	83.09	1.850	9.60	2.60	4.51
0.367	11.02	1.117	83.09	1.867	9.60	2.62	4.51
0.383	11.02	1.133	83.09	1.883	9.60	2.63	4.51
0.400	11.02	1.150	83.09	1.900	9.60	2.65	4.51
0.417	11.02	1.167	83.09	1.917	9.60	2.67	4.51
0.433	11.02	1.183	41.25	1.933	9.60	2.68	3.91
0.450	11.02	1.200	41.25	1.950	9.60	2.70	3.91
0.467	11.02	1.217	41.25	1.967	9.60	2.72	3.91
0.483	11.02	1.233	41.25	1.983	9.60	2.73	3.91
0.500	11.02	1.250	41.25	2.000	9.60	2.75	3.91
0.517	21.03	1.267	41.25	2.017	7.66	2.77	3.91
0.533	21.03	1.283	41.25	2.033	7.66	2.78	3.91
0.550	21.03	1.300	41.25	2.050	7.66	2.80	3.91
0.567	21.03	1.317	41.25	2.067	7.66	2.82	3.91
0.583	21.03	1.333	41.25	2.083	7.66	2.83	3.91
0.600	21.03	1.350	25.07	2.100	7.66	2.85	3.44
0.617	21.03	1.367	25.07	2.117	7.66	2.87	3.44
0.633	21.03	1.383	25.07	2.133	7.66	2.88	3.44
0.650	21.03	1.400	25.07	2.150	7.66	2.90	3.44
0.667	21.03	1.417	25.07	2.167	7.66	2.92	3.44
0.683	62.12	1.433	25.07	2.183	6.29	2.93	3.44
0.700	62.12	1.450	25.07	2.200	6.29	2.95	3.44
0.717	62.12	1.467	25.07	2.217	6.29	2.97	3.44
0.733	62.12	1.483	25.07	2.233	6.29	2.98	3.44
0.750	62.12	1.500	25.07	2.250	6.29	3.00	3.44

Max.Eff.Inten.(mm/hr)=	196.54	112.16
over (min)	5.00	6.00
Storage Coeff. (min)=	1.18 (ii)	5.02 (ii)
Unit Hyd. Tpeak (min)=	5.00	6.00
Unit Hyd. peak (cms)=	0.45	0.21

TOTALS			
PEAK FLOW (cms)=	0.22	0.05	0.258 (iii)
TIME TO PEAK (hrs)=	1.00	1.05	1.00
RUNOFF VOLUME (mm)=	86.03	50.19	75.27
TOTAL RAINFALL (mm)=	87.03	87.03	87.03
RUNOFF COEFFICIENT =	0.99	0.58	0.86

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 83.0 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.

RESERVOIR (0002)			
OVERFLOW IS OFF			
IN= 2----> OUT= 1			
DT= 1.0 min			
	OUTFLOW	STORAGE	STORAGE
	(cms)	(ha.m.)	(ha.m.)
	0.0000	0.0000	0.0130 0.0260
	0.0056	0.0110	0.0160 0.0290
	0.0090	0.0170	0.0180 0.0340
	0.0110	0.0200	0.0000 0.0000

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0001)	0.570	0.258	1.00	75.27
OUTFLOW: ID= 1 (0002)	0.570	0.018	1.88	74.40

PEAK FLOW REDUCTION [Qout/Qin] (%) =	6.90
TIME SHIFT OF PEAK FLOW (min) =	53.00
MAXIMUM STORAGE USED (ha.m.) =	0.0335

** SIMULATION: Caloden_10yr-3hr-Chicago **

CHICAGO STORM		IDF curve parameters:	
Ptotal = 56.26 mm		A=2221.000	B= 12.000
		C= 0.908	
used in: INTENSITY = A / (t + B)^C			
Duration of storm = 3.00 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	3.65	0.83	134.16	1.67	8.06	2.50	3.42
0.17	4.89	1.00	50.03	1.83	6.42	2.67	3.05
0.33	7.23	1.17	24.37	2.00	5.30	2.83	2.75
0.50	12.87	1.33	15.14	2.17	4.50		
0.67	37.17	1.50	10.64	2.33	3.89		

CALIB		Area (ha) = 0.57	
STANDHYD (0001)		Total Imp (%) = 70.00	Dir. Conn. (%) = 70.00
ID= 1 DT= 1.0 min			

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha) =	0.40	0.17
Dep. Storage (mm) =	1.00	5.00
Average Slope (%) =	2.00	2.00
Length (m) =	61.64	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	3.65	0.767	37.17	1.517	10.64	2.27	4.50
0.033	3.65	0.783	37.17	1.533	10.64	2.28	4.50
0.050	3.65	0.800	37.17	1.550	10.64	2.30	4.50

0.067	3.65	0.817	37.17	1.567	10.64	2.32	4.50
0.083	3.65	0.833	37.17	1.583	10.64	2.33	4.50
0.100	3.65	0.850	134.16	1.600	10.64	2.35	3.89
0.117	3.65	0.867	134.16	1.617	10.64	2.37	3.89
0.133	3.65	0.883	134.16	1.633	10.64	2.38	3.89
0.150	3.65	0.900	134.16	1.650	10.64	2.40	3.89
0.167	3.65	0.917	134.16	1.667	10.64	2.42	3.89
0.183	4.89	0.933	134.16	1.683	8.06	2.43	3.89
0.200	4.89	0.950	134.16	1.700	8.06	2.45	3.89
0.217	4.89	0.967	134.16	1.717	8.06	2.47	3.89
0.233	4.89	0.983	134.16	1.733	8.06	2.48	3.89
0.250	4.89	1.000	134.16	1.750	8.06	2.50	3.89
0.267	4.89	1.017	50.04	1.767	8.06	2.52	3.42
0.283	4.89	1.033	50.03	1.783	8.06	2.53	3.42
0.300	4.89	1.050	50.03	1.800	8.06	2.55	3.42
0.317	4.89	1.067	50.03	1.817	8.06	2.57	3.42
0.333	4.89	1.083	50.03	1.833	8.06	2.58	3.42
0.350	7.23	1.100	50.03	1.850	6.42	2.60	3.42
0.367	7.23	1.117	50.03	1.867	6.42	2.62	3.42
0.383	7.23	1.133	50.03	1.883	6.42	2.63	3.42
0.400	7.23	1.150	50.03	1.900	6.42	2.65	3.42
0.417	7.23	1.167	50.03	1.917	6.42	2.67	3.42
0.433	7.23	1.183	24.37	1.933	6.42	2.68	3.05
0.450	7.23	1.200	24.37	1.950	6.42	2.70	3.05
0.467	7.23	1.217	24.37	1.967	6.42	2.72	3.05
0.483	7.23	1.233	24.37	1.983	6.42	2.73	3.05
0.500	7.23	1.250	24.37	2.000	6.42	2.75	3.05
0.517	12.87	1.267	24.37	2.017	5.30	2.77	3.05
0.533	12.87	1.283	24.37	2.033	5.30	2.78	3.05
0.550	12.87	1.300	24.37	2.050	5.30	2.80	3.05
0.567	12.87	1.317	24.37	2.067	5.30	2.82	3.05
0.583	12.87	1.333	24.37	2.083	5.30	2.83	3.05
0.600	12.87	1.350	15.14	2.100	5.30	2.85	2.75
0.617	12.87	1.367	15.14	2.117	5.30	2.87	2.75
0.633	12.87	1.383	15.14	2.133	5.30	2.88	2.75
0.650	12.87	1.400	15.14	2.150	5.30	2.90	2.75
0.667	12.87	1.417	15.14	2.167	5.30	2.92	2.75
0.683	37.17	1.433	15.14	2.183	4.50	2.93	2.75
0.700	37.17	1.450	15.14	2.200	4.50	2.95	2.75
0.717	37.17	1.467	15.14	2.217	4.50	2.97	2.75
0.733	37.17	1.483	15.14	2.233	4.50	2.98	2.75
0.750	37.17	1.500	15.14	2.250	4.50	3.00	2.75

Max.Eff.Inten. (mm/hr)= 134.16 56.24
 over (min) 5.00 6.00
 Storage Coeff. (min)= 1.38 (ii) 5.85 (ii)
 Unit Hyd. Tpeak (min)= 5.00 6.00
 Unit Hyd. peak (cms)= 0.43 0.19

TOTALS
 PEAK FLOW (cms)= 0.15 0.02 0.166 (iii)
 TIME TO PEAK (hrs)= 1.00 1.07 1.00
 RUNOFF VOLUME (mm)= 55.26 25.44 46.31
 TOTAL RAINFALL (mm)= 56.26 56.26 56.26
 RUNOFF COEFFICIENT = 0.98 0.45 0.82

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 83.0 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.

RESERVOIR (0002) OVERFLOW IS OFF
 IN= 2----> OUT= 1
 DT= 1.0 min
 OUTFLOW STORAGE OUTFLOW STORAGE
 (cms) (ha.m.) (cms) (ha.m.)

0.0000	0.0000	0.0130	0.0260
0.0056	0.0110	0.0160	0.0290
0.0090	0.0170	0.0180	0.0340
0.0110	0.0200	0.0000	0.0000

AREA QPEAK TPEAK R.V.
 (ha) (cms) (hrs) (mm)
 INFLOW : ID= 2 (0001) 0.570 0.166 1.00 46.31
 OUTFLOW: ID= 1 (0002) 0.570 0.011 1.88 45.43

PEAK FLOW REDUCTION [Qout/Qin] (%) = 6.67
 TIME SHIFT OF PEAK FLOW (min) = 53.00
 MAXIMUM STORAGE USED (ha.m.) = 0.0203

 ** SIMULATION: Caloden_25yr-3hr-Chicago **

CHICAGO STORM IDF curve parameters: A=3158.000
 Ptotal= 68.95 mm B= 15.000
 C= 0.933

used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 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	4.28	0.83	156.47	1.67	10.11	2.50	3.99
0.17	5.90	1.00	63.86	1.83	7.92	2.67	3.51
0.33	9.00	1.17	31.72	2.00	6.44	2.83	3.13
0.50	16.53	1.33	19.56	2.17	5.38		
0.67	47.76	1.50	13.56	2.33	4.59		

CALIB STANDHYD (0001) Area (ha)= 0.57
 ID= 1 DT= 1.0 min Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00

IMPERVIOUS PERVIOUS (i)
 Surface Area (ha)= 0.40 0.17
 Dep. Storage (mm)= 1.00 5.00
 Average Slope (%)= 2.00 2.00
 Length (m)= 61.64 40.00
 Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	4.28	0.767	47.76	1.517	13.56	2.27	5.38
0.033	4.28	0.783	47.76	1.533	13.56	2.28	5.38
0.050	4.28	0.800	47.76	1.550	13.56	2.30	5.38
0.067	4.28	0.817	47.76	1.567	13.56	2.32	5.38
0.083	4.28	0.833	47.76	1.583	13.56	2.33	5.38
0.100	4.28	0.850	156.47	1.600	13.56	2.35	4.59
0.117	4.28	0.867	156.47	1.617	13.56	2.37	4.59
0.133	4.28	0.883	156.47	1.633	13.56	2.38	4.59
0.150	4.28	0.900	156.47	1.650	13.56	2.40	4.59
0.167	4.28	0.917	156.47	1.667	13.56	2.42	4.59
0.183	5.90	0.933	156.47	1.683	10.11	2.43	4.59
0.200	5.90	0.950	156.47	1.700	10.11	2.45	4.59

0.217	5.90	0.967	156.47	1.717	10.11	2.47	4.59
0.233	5.90	0.983	156.47	1.733	10.11	2.48	4.59
0.250	5.90	1.000	156.47	1.750	10.11	2.50	4.59
0.267	5.90	1.017	63.86	1.767	10.11	2.52	3.99
0.283	5.90	1.033	63.86	1.783	10.11	2.53	3.99
0.300	5.90	1.050	63.86	1.800	10.11	2.55	3.99
0.317	5.90	1.067	63.86	1.817	10.11	2.57	3.99
0.333	5.90	1.083	63.86	1.833	10.11	2.58	3.99
0.350	9.00	1.100	63.86	1.850	7.92	2.60	3.99
0.367	9.00	1.117	63.86	1.867	7.92	2.62	3.99
0.383	9.00	1.133	63.86	1.883	7.92	2.63	3.99
0.400	9.00	1.150	63.86	1.900	7.92	2.65	3.99
0.417	9.00	1.167	63.86	1.917	7.92	2.67	3.99
0.433	9.00	1.183	31.72	1.933	7.92	2.68	3.51
0.450	9.00	1.200	31.72	1.950	7.92	2.70	3.51
0.467	9.00	1.217	31.72	1.967	7.92	2.72	3.51
0.483	9.00	1.233	31.72	1.983	7.92	2.73	3.51
0.500	9.00	1.250	31.72	2.000	7.92	2.75	3.51
0.517	16.53	1.267	31.72	2.017	6.44	2.77	3.51
0.533	16.53	1.283	31.72	2.033	6.44	2.78	3.51
0.550	16.53	1.300	31.72	2.050	6.44	2.80	3.51
0.567	16.53	1.317	31.72	2.067	6.44	2.82	3.51
0.583	16.53	1.333	31.72	2.083	6.44	2.83	3.51
0.600	16.53	1.350	19.56	2.100	6.44	2.85	3.13
0.617	16.53	1.367	19.56	2.117	6.44	2.87	3.13
0.633	16.53	1.383	19.56	2.133	6.44	2.88	3.13
0.650	16.53	1.400	19.56	2.150	6.44	2.90	3.13
0.667	16.53	1.417	19.56	2.167	6.44	2.92	3.13
0.683	47.76	1.433	19.56	2.183	5.38	2.93	3.13
0.700	47.76	1.450	19.56	2.200	5.38	2.95	3.13
0.717	47.76	1.467	19.56	2.217	5.38	2.97	3.13
0.733	47.76	1.483	19.56	2.233	5.38	2.98	3.13
0.750	47.76	1.500	19.56	2.250	5.38	3.00	3.13

Max.Eff.Inten. (mm/hr)= 156.47 76.60
 over (min) = 5.00 6.00
 Storage Coeff. (min)= 1.30 (ii) 5.50 (ii)
 Unit Hyd. Tpeak (min)= 5.00 6.00
 Unit Hyd. peak (cms)= 0.44 0.20

TOTALS
 PEAK FLOW (cms)= 0.17 0.03 0.199 (iii)
 TIME TO PEAK (hrs)= 1.00 1.05 1.00
 RUNOFF VOLUME (mm)= 67.95 35.26 58.14
 TOTAL RAINFALL (mm)= 68.95 68.95 68.95
 RUNOFF COEFFICIENT = 0.99 0.51 0.84

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 83.0 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.

RESERVOIR (0002)
 IN= 2----> OUT= 1
 DT= 1.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0130	0.0260
0.0056	0.0110	0.0160	0.0290
0.0090	0.0170	0.0180	0.0340
0.0110	0.0200	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	0.570	0.199	1.00	58.14
OUTFLOW: ID= 1 (0002)	0.570	0.013	1.92	57.26

PEAK FLOW REDUCTION [Qout/Qin] (%) = 6.49
 TIME SHIFT OF PEAK FLOW (min) = 55.00
 MAXIMUM STORAGE USED (ha.m.) = 0.0258

 ** SIMULATION: Caloden_2yr-3hr-Chicago **

CHICAGO STORM
 Ptotal= 32.71 mm

IDF curve parameters: A=1070.000
 B= 7.850
 C= 0.876

used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 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	2.22	0.83	85.72	1.67	4.48	2.50	2.10
0.17	2.87	1.00	26.59	1.83	3.65	2.67	1.89
0.33	4.06	1.17	12.64	2.00	3.08	2.83	1.73
0.50	6.86	1.33	7.99	2.17	2.66		
0.67	19.60	1.50	5.76	2.33	2.34		

CALIB
 STANDHYD (0001)
 ID= 1 DT= 1.0 min

Area (ha) = 0.57
 Total Imp (%) = 70.00 Dir. Conn. (%) = 70.00

	IMPERVIOUS (ha)	PERVIOUS (i)
Surface Area	0.40	0.17
Dep. Storage	1.00	5.00
Average Slope (%)	2.00	2.00
Length (m)	61.64	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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)
0.017	2.22	0.767	19.60	1.517	5.76	2.27	2.66
0.033	2.22	0.783	19.60	1.533	5.76	2.28	2.66
0.050	2.22	0.800	19.60	1.550	5.76	2.30	2.66
0.067	2.22	0.817	19.60	1.567	5.76	2.32	2.66
0.083	2.22	0.833	19.60	1.583	5.76	2.33	2.66
0.100	2.22	0.850	85.72	1.600	5.76	2.35	2.34
0.117	2.22	0.867	85.72	1.617	5.76	2.37	2.34
0.133	2.22	0.883	85.72	1.633	5.76	2.38	2.34
0.150	2.22	0.900	85.72	1.650	5.76	2.40	2.34
0.167	2.22	0.917	85.72	1.667	5.76	2.42	2.34
0.183	2.87	0.933	85.72	1.683	4.48	2.43	2.34
0.200	2.87	0.950	85.72	1.700	4.48	2.45	2.34
0.217	2.87	0.967	85.72	1.717	4.48	2.47	2.34
0.233	2.87	0.983	85.72	1.733	4.48	2.48	2.34
0.250	2.87	1.000	85.72	1.750	4.48	2.50	2.34
0.267	2.87	1.017	26.59	1.767	4.48	2.52	2.10
0.283	2.87	1.033	26.59	1.783	4.48	2.53	2.10
0.300	2.87	1.050	26.59	1.800	4.48	2.55	2.10
0.317	2.87	1.067	26.59	1.817	4.48	2.57	2.10
0.333	2.87	1.083	26.59	1.833	4.48	2.58	2.10
0.350	4.06	1.100	26.59	1.850	3.65	2.60	2.10

0.367	4.06	1.117	26.59	1.867	3.65	2.62	2.10
0.383	4.06	1.133	26.59	1.883	3.65	2.63	2.10
0.400	4.06	1.150	26.59	1.900	3.65	2.65	2.10
0.417	4.06	1.167	26.59	1.917	3.65	2.67	2.10
0.433	4.06	1.183	12.64	1.933	3.65	2.68	1.89
0.450	4.06	1.200	12.64	1.950	3.65	2.70	1.89
0.467	4.06	1.217	12.64	1.967	3.65	2.72	1.89
0.483	4.06	1.233	12.64	1.983	3.65	2.73	1.89
0.500	4.06	1.250	12.64	2.000	3.65	2.75	1.89
0.517	6.86	1.267	12.64	2.017	3.08	2.77	1.89
0.533	6.86	1.283	12.64	2.033	3.08	2.78	1.89
0.550	6.86	1.300	12.64	2.050	3.08	2.80	1.89
0.567	6.86	1.317	12.64	2.067	3.08	2.82	1.89
0.583	6.86	1.333	12.64	2.083	3.08	2.83	1.89
0.600	6.86	1.350	7.99	2.100	3.08	2.85	1.73
0.617	6.86	1.367	7.99	2.117	3.08	2.87	1.73
0.633	6.86	1.383	7.99	2.133	3.08	2.88	1.73
0.650	6.86	1.400	7.99	2.150	3.08	2.90	1.73
0.667	6.86	1.417	7.99	2.167	3.08	2.92	1.73
0.683	19.60	1.433	7.99	2.183	2.66	2.93	1.73
0.700	19.60	1.450	7.99	2.200	2.66	2.95	1.73
0.717	19.60	1.467	7.99	2.217	2.66	2.97	1.73
0.733	19.60	1.483	7.99	2.233	2.66	2.98	1.73
0.750	19.60	1.500	7.99	2.250	2.66	3.00	1.73

Max.Eff.Inten.(mm/hr)= 85.72 21.30
 over (min) 5.00 7.00
 Storage Coeff. (min)= 1.65 (ii) 7.00 (ii)
 Unit Hyd. Tpeak (min)= 5.00 7.00
 Unit Hyd. peak (cms)= 0.40 0.16

TOTALS

PEAK FLOW (cms)= 0.09 0.01 0.099 (iii)
 TIME TO PEAK (hrs)= 1.00 1.08 1.00
 RUNOFF VOLUME (mm)= 31.71 9.63 25.08
 TOTAL RAINFALL (mm)= 32.71 32.71 32.71
 RUNOFF COEFFICIENT = 0.97 0.29 0.77

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 83.0 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.

RESERVOIR (0002)
 IN= 2----> OUT= 1
 DT= 1.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0130	0.0260
0.0056	0.0110	0.0160	0.0290
0.0090	0.0170	0.0180	0.0340
0.0110	0.0200	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	0.570	0.099	1.00	25.08
OUTFLOW: ID= 1 (0002)	0.570	0.006	1.92	24.20

PEAK FLOW REDUCTION [Qout/Qin] (%) = 5.67
 TIME SHIFT OF PEAK FLOW (min) = 55.00
 MAXIMUM STORAGE USED (ha.m.) = 0.0110

 ** SIMULATION: Caloden_50yr-3hrChicago **

CHICAGO STORM
 Ptotal= 77.60 mm

IDF curve parameters: A=3886.000
 B= 16.000
 C= 0.950
 used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 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	4.54	0.83	176.19	1.67	11.20	2.50	4.21
0.17	6.37	1.00	73.10	1.83	8.68	2.67	3.68
0.33	9.92	1.17	36.22	2.00	6.99	2.83	3.25
0.50	18.63	1.33	22.14	2.17	5.78		
0.67	54.62	1.50	15.18	2.33	4.89		

CALIB
 STANDHYD (0001)
 ID= 1 DT= 1.0 min

Area (ha)= 0.57
 Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00

	IMPERVIOUS (ha)	PERVIOUS (i)
Surface Area	0.40	0.17
Dep. Storage (mm)	1.00	5.00
Average Slope (%)	2.00	2.00
Length (m)	61.64	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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)
0.017	4.54	0.767	54.62	1.517	15.18	2.27	5.78
0.033	4.54	0.783	54.62	1.533	15.18	2.28	5.78
0.050	4.54	0.800	54.62	1.550	15.18	2.30	5.78
0.067	4.54	0.817	54.62	1.567	15.18	2.32	5.78
0.083	4.54	0.833	54.62	1.583	15.18	2.33	5.78
0.100	4.54	0.850	176.19	1.600	15.18	2.35	4.89
0.117	4.54	0.867	176.19	1.617	15.18	2.37	4.89
0.133	4.54	0.883	176.19	1.633	15.18	2.38	4.89
0.150	4.54	0.900	176.19	1.650	15.18	2.40	4.89
0.167	4.54	0.917	176.19	1.667	15.18	2.42	4.89
0.183	6.37	0.933	176.19	1.683	11.20	2.43	4.89
0.200	6.37	0.950	176.19	1.700	11.20	2.45	4.89
0.217	6.37	0.967	176.19	1.717	11.20	2.47	4.89
0.233	6.37	0.983	176.19	1.733	11.20	2.48	4.89
0.250	6.37	1.000	176.19	1.750	11.20	2.50	4.89
0.267	6.37	1.017	73.10	1.767	11.20	2.52	4.21
0.283	6.37	1.033	73.10	1.783	11.20	2.53	4.21
0.300	6.37	1.050	73.10	1.800	11.20	2.55	4.21
0.317	6.37	1.067	73.10	1.817	11.20	2.57	4.21
0.333	6.37	1.083	73.10	1.833	11.20	2.58	4.21
0.350	9.92	1.100	73.10	1.850	8.68	2.60	4.21
0.367	9.92	1.117	73.10	1.867	8.68	2.62	4.21
0.383	9.92	1.133	73.10	1.883	8.68	2.63	4.21
0.400	9.92	1.150	73.10	1.900	8.68	2.65	4.21
0.417	9.92	1.167	73.10	1.917	8.68	2.67	4.21
0.433	9.92	1.183	36.22	1.933	8.68	2.68	3.68
0.450	9.92	1.200	36.22	1.950	8.68	2.70	3.68
0.467	9.92	1.217	36.22	1.967	8.68	2.72	3.68
0.483	9.92	1.233	36.22	1.983	8.68	2.73	3.68
0.500	9.92	1.250	36.22	2.000	8.68	2.75	3.68

0.517	18.63	1.267	36.22	2.017	6.99	2.77	3.68
0.533	18.63	1.283	36.22	2.033	6.99	2.78	3.68
0.550	18.63	1.300	36.22	2.050	6.99	2.80	3.68
0.567	18.63	1.317	36.22	2.067	6.99	2.82	3.68
0.583	18.63	1.333	36.22	2.083	6.99	2.83	3.68
0.600	18.63	1.350	22.14	2.100	6.99	2.85	3.25
0.617	18.63	1.367	22.14	2.117	6.99	2.87	3.25
0.633	18.63	1.383	22.14	2.133	6.99	2.88	3.25
0.650	18.63	1.400	22.14	2.150	6.99	2.90	3.25
0.667	18.63	1.417	22.14	2.167	6.99	2.92	3.25
0.683	54.62	1.433	22.14	2.183	5.78	2.93	3.25
0.700	54.62	1.450	22.14	2.200	5.78	2.95	3.25
0.717	54.62	1.467	22.14	2.217	5.78	2.97	3.25
0.733	54.62	1.483	22.14	2.233	5.78	2.98	3.25
0.750	54.62	1.500	22.14	2.250	5.78	3.00	3.25

Max.Eff.Inten.(mm/hr)= 176.19 93.59
 over (min) = 5.00 6.00
 Storage Coeff. (min)= 1.24 (ii) 5.25 (ii)
 Unit Hyd. Tpeak (min)= 5.00 6.00
 Unit Hyd. peak (cms)= 0.45 0.21

TOTALS
 PEAK FLOW (cms)= 0.19 0.04 0.228 (iii)
 TIME TO PEAK (hrs)= 1.00 1.05 1.00
 RUNOFF VOLUME (mm)= 76.60 42.29 66.30
 TOTAL RAINFALL (mm)= 77.60 77.60 77.60
 RUNOFF COEFFICIENT = 0.99 0.55 0.85

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 83.0 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.

RESERVOIR (0002)
 IN= 2---> OUT= 1
 DT= 1.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0130	0.0260
0.0056	0.0110	0.0160	0.0290
0.0090	0.0170	0.0180	0.0340
0.0110	0.0200	0.0000	0.0000

INFLOW : ID= 2 (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
0.570	0.570	0.228	1.00	66.30
OUTFLOW: ID= 1 (0002)	0.570	0.016	1.88	65.43

PEAK FLOW REDUCTION [Qout/Qin] (%) = 7.09
 TIME SHIFT OF PEAK FLOW (min) = 53.00
 MAXIMUM STORAGE USED (ha.m.) = 0.0294

 ** SIMULATION: Caloden_5yr-3hr-Chicago **

CHICAGO STORM
 Ptotal= 47.24 mm

IDF curve parameters: A=1593.000
 B= 11.000
 C= 0.879
 used in: INTENSITY = A / (t + B)^C
 Duration of storm = 3.00 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	3.46	0.83	109.68	1.67	7.17	2.50	3.26
0.17	4.52	1.00	40.71	1.83	5.81	2.67	2.93
0.33	6.48	1.17	20.28	2.00	4.87	2.83	2.67
0.50	11.07	1.33	12.91	2.17	4.19		
0.67	30.47	1.50	9.28	2.33	3.67		

CALIB
 STANDHYD (0001)
 ID= 1 DT= 1.0 min
 Area (ha)= 0.57
 Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00

IMPERVIOUS PERVIOUS (i)
 Surface Area (ha)= 0.40 0.17
 Dep. Storage (mm)= 1.00 5.00
 Average Slope (%)= 2.00 2.00
 Length (m)= 61.64 40.00
 Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	3.46	0.767	30.47	1.517	9.28	2.27	4.19
0.033	3.46	0.783	30.47	1.533	9.28	2.28	4.19
0.050	3.46	0.800	30.47	1.550	9.28	2.30	4.19
0.067	3.46	0.817	30.47	1.567	9.28	2.32	4.19
0.083	3.46	0.833	30.47	1.583	9.28	2.33	4.19
0.100	3.46	0.850	109.68	1.600	9.28	2.35	3.67
0.117	3.46	0.867	109.68	1.617	9.28	2.37	3.67
0.133	3.46	0.883	109.68	1.633	9.28	2.38	3.67
0.150	3.46	0.900	109.68	1.650	9.28	2.40	3.67
0.167	3.46	0.917	109.68	1.667	9.28	2.42	3.67
0.183	4.52	0.933	109.68	1.683	7.17	2.43	3.67
0.200	4.52	0.950	109.68	1.700	7.17	2.45	3.67
0.217	4.52	0.967	109.68	1.717	7.17	2.47	3.67
0.233	4.52	0.983	109.68	1.733	7.17	2.48	3.67
0.250	4.52	1.000	109.68	1.750	7.17	2.50	3.67
0.267	4.52	1.017	40.71	1.767	7.17	2.52	3.26
0.283	4.52	1.033	40.71	1.783	7.17	2.53	3.26
0.300	4.52	1.050	40.71	1.800	7.17	2.55	3.26
0.317	4.52	1.067	40.71	1.817	7.17	2.57	3.26
0.333	4.52	1.083	40.71	1.833	7.17	2.58	3.26
0.350	6.48	1.100	40.71	1.850	5.81	2.60	3.26
0.367	6.48	1.117	40.71	1.867	5.81	2.62	3.26
0.383	6.48	1.133	40.71	1.883	5.81	2.63	3.26
0.400	6.48	1.150	40.71	1.900	5.81	2.65	3.26
0.417	6.48	1.167	40.71	1.917	5.81	2.67	3.26
0.433	6.48	1.183	20.28	1.933	5.81	2.68	2.93
0.450	6.48	1.200	20.28	1.950	5.81	2.70	2.93
0.467	6.48	1.217	20.28	1.967	5.81	2.72	2.93
0.483	6.48	1.233	20.28	1.983	5.81	2.73	2.93
0.500	6.48	1.250	20.28	2.000	5.81	2.75	2.93
0.517	11.07	1.267	20.28	2.017	4.87	2.77	2.93
0.533	11.07	1.283	20.28	2.033	4.87	2.78	2.93
0.550	11.07	1.300	20.28	2.050	4.87	2.80	2.93
0.567	11.07	1.317	20.28	2.067	4.87	2.82	2.93
0.583	11.07	1.333	20.28	2.083	4.87	2.83	2.93
0.600	11.07	1.350	12.91	2.100	4.87	2.85	2.67
0.617	11.07	1.367	12.91	2.117	4.87	2.87	2.67
0.633	11.07	1.383	12.91	2.133	4.87	2.88	2.67
0.650	11.07	1.400	12.91	2.150	4.87	2.90	2.67

0.667	11.07	1.417	12.91	2.167	4.87	2.92	2.67
0.683	30.47	1.433	12.91	2.183	4.19	2.93	2.67
0.700	30.47	1.450	12.91	2.200	4.19	2.95	2.67
0.717	30.47	1.467	12.91	2.217	4.19	2.97	2.67
0.733	30.47	1.483	12.91	2.233	4.19	2.98	2.67
0.750	30.47	1.500	12.91	2.250	4.19	3.00	2.67

Max.Eff.Inten.(mm/hr)= 109.68 39.30
 over (min) 5.00 7.00
 Storage Coeff. (min)= 1.50 (ii) 6.34 (ii)
 Unit Hyd. Tpeak (min)= 5.00 7.00
 Unit Hyd. peak (cms)= 0.42 0.17

TOTALS

PEAK FLOW (cms)= 0.12 0.02 0.132 (iii)
 TIME TO PEAK (hrs)= 1.00 1.08 1.00
 RUNOFF VOLUME (mm)= 46.24 18.93 38.04
 TOTAL RAINFALL (mm)= 47.24 47.24 47.24
 RUNOFF COEFFICIENT = 0.98 0.40 0.81

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 83.0 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.

RESERVOIR(0002)		OVERFLOW IS OFF			
IN= 2----> OUT= 1		DT= 1.0 min			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)	
	0.0000	0.0000	0.0130	0.0260	
	0.0056	0.0110	0.0160	0.0290	
	0.0090	0.0170	0.0180	0.0340	
	0.0110	0.0200	0.0000	0.0000	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	
INFLOW : ID= 2 (0001)	0.570	0.132	1.00	38.04	
OUTFLOW: ID= 1 (0002)	0.570	0.009	1.95	37.16	
PEAK FLOW REDUCTION [Qout/Qin] (%)	= 6.63				
TIME SHIFT OF PEAK FLOW	(min)= 57.00				
MAXIMUM STORAGE USED	(ha.m.)= 0.0165				

APPENDIX C

CULTECT Conceptual Design



CULTEC Stormwater Design Calculator

Date:	December 15, 2022
Project Information:	
10722 - 4848 Mayfield Road 4848 Mayfield Caledon Ontario Canada	

Project Number:	10722
Calculations Performed By:	
Heikki Loorand TYLin	

RECHARGER 360HD

Recharger 360HD Chamber Specifications		
Height	914	mm
Width	1524	mm
Length	1.27	meters
Installed Length	1.12	meters
Bare Chamber Volume	1.04	cu. meters
Installed Chamber Volume	1.76	cu. meters



Breakdown of Storage Provided by Recharger 360HD Stormwater System		
Within Chambers	205.34	cu. meters
Within Feed Connectors	0.58	cu. meters
Within Stone	161.16	cu. meters
Total Storage Provided	367.1	cu. meters
Total Storage Required	340.00	cu. meters

Materials List

Recharger 360HD		
Total Number of Chambers Required	192	pieces
Separator Row Chambers	12	pieces
Chamber Units	192	pieces
End Caps	32	pieces
HVLV FC-48 Feed Connectors	30	pieces
CULTEC No. 410 Non-Woven Geotextile	1208	sq. meters
CULTEC No. 4800 Woven Geotextile	61	meters
Stone	403	cu. meters

Separator Row Qty Included in Total

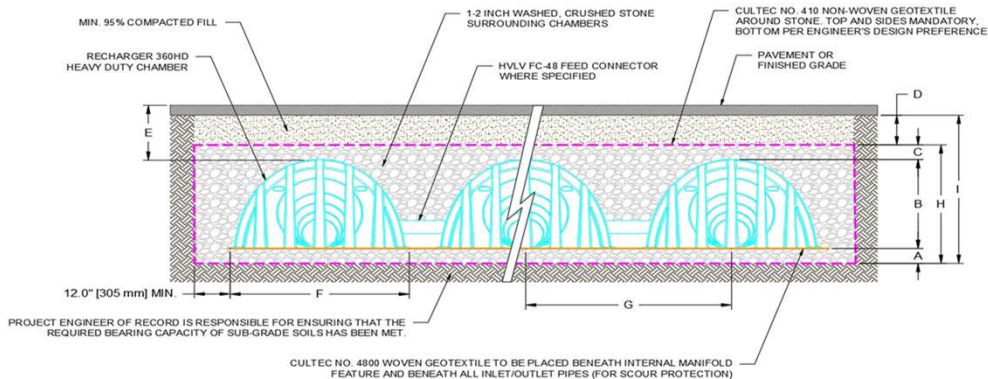
Based on 2 Internal Manifolds

Bed Detail



Bed Layout Information		
Number of Rows Wide	16	pieces
Number of Chambers Long	12	pieces
Chamber Row Width	27.81	meters
Chamber Row Length	14.19	meters
Bed Width	28.42	meters
Bed Length	14.79	meters
Bed Area Required	420.51	sq. meters
Length of Separator Row	14.19	meters

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	229	mm
B	Chamber Height	914	mm
C	Depth of Stone Above Units	305	mm
D	Depth of 95% Compacted Fill	305	mm
E	Max. Depth Allowed Above the Chamber	3.66	meters
F	Chamber Width	1524	mm
G	Center to Center Spacing	1.75	meters
H	Effective Depth	1.45	meters
I	Bed Depth	1.75	meters



CULTEC Stage-Storage Calculations

Date: December 15, 2022

Project Information:
 10722 - 4848 Mayfield Road
 4848 Mayfield
 Caledon
 Ontario
 Canada

Project Number:
 10722

Chamber Model - **Recharger 360HD**
 Number of Rows - 16 units
 Total Number of Chambers - 192 units
 HVLV FC-24 Feed Connectors - 30 units
 Stone Void - 40 %
 Stone Base - 229 mm
 Stone Above Units - 305 mm
 Area - 420.51 m²
 Base of Stone Elevation - 249.50

Recharger 360HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation	
in	mm	ft ³	m ³	ft ³	m ³	ft ³	m ³	ft ³	m ³	ft ³	m ³	ft	m
57.0	1448	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	12950.90	366.73	4.750	250.95
56.0	1422	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	12800.02	362.46	4.670	250.92
55.0	1397	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	12649.14	358.18	4.580	250.90
54.0	1372	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	12498.27	353.91	4.500	250.87
53.0	1346	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	12347.39	349.64	4.420	250.85
52.0	1321	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	12196.51	345.37	4.330	250.82
51.0	1295	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	12045.63	341.09	4.250	250.80
50.0	1270	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	11894.75	336.82	4.170	250.77
49.0	1245	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	11743.87	332.55	4.080	250.74
48.0	1219	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	11592.99	328.28	4.000	250.72
47.0	1194	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	11442.12	324.00	3.920	250.69
46.0	1168	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	11291.24	319.73	3.830	250.67
45.0	1143	15.7	0.4	0.0	0.0	144.6	4.1	160.318	4.5	11140.36	315.46	3.750	250.64
44.0	1118	33.3	0.9	0.0	0.0	137.5	3.9	170.876	4.8	10980.04	310.92	3.670	250.62
43.0	1092	49.6	1.4	0.0	0.0	131.1	3.7	180.615	5.1	10809.17	306.08	3.580	250.59
42.0	1067	83.6	2.4	0.0	0.0	117.4	3.3	201.043	5.7	10628.55	300.97	3.500	250.57
41.0	1041	105.6	3.0	0.0	0.0	108.7	3.1	214.218	6.1	10427.51	295.27	3.420	250.54
40.0	1016	122.1	3.5	0.0	0.0	102.0	2.9	224.142	6.3	10213.29	289.21	3.330	250.52
39.0	991	135.9	3.8	0.0	0.0	96.5	2.7	232.417	6.6	9989.15	282.86	3.250	250.49
38.0	965	147.9	4.2	0.0	0.0	91.7	2.6	239.596	6.8	9756.73	276.28	3.170	250.47
37.0	940	158.5	4.5	0.0	0.0	87.5	2.5	245.969	7.0	9517.13	269.49	3.080	250.44
36.0	914	168.0	4.8	0.0	0.0	83.7	2.4	251.707	7.1	9271.16	262.53	3.000	250.41
35.0	889	176.8	5.0	0.0	0.0	80.2	2.3	256.938	7.3	9019.46	255.40	2.920	250.39
34.0	864	184.7	5.2	0.0	0.0	77.0	2.2	261.719	7.4	8762.52	248.13	2.830	250.36
33.0	838	192.4	5.4	0.0	0.0	73.9	2.1	266.323	7.5	8500.80	240.72	2.750	250.34
32.0	813	199.2	5.6	0.0	0.0	71.2	2.0	270.412	7.7	8234.48	233.17	2.670	250.31
31.0	787	205.5	5.8	0.0	0.0	68.7	1.9	274.202	7.8	7964.07	225.52	2.580	250.29
30.0	762	211.5	6.0	0.0	0.0	66.3	1.9	277.749	7.9	7689.86	217.75	2.500	250.26
29.0	737	217.0	6.1	0.0	0.0	64.1	1.8	281.077	8.0	7412.11	209.89	2.420	250.24
28.0	711	222.2	6.3	0.0	0.0	62.0	1.8	284.210	8.0	7131.04	201.93	2.330	250.21
27.0	686	227.1	6.4	0.0	0.0	60.0	1.7	287.158	8.1	6846.83	193.88	2.250	250.19
26.0	660	231.5	6.6	0.0	0.0	58.3	1.7	289.763	8.2	6559.67	185.75	2.170	250.16
25.0	635	235.9	6.7	0.0	0.0	56.5	1.6	292.400	8.3	6269.91	177.54	2.080	250.14
24.0	610	240.1	6.8	0.0	0.0	54.9	1.6	294.909	8.4	5977.51	169.26	2.000	250.11
23.0	584	244.0	6.9	0.0	0.0	53.3	1.5	297.281	8.4	5682.60	160.91	1.920	250.08
22.0	559	247.7	7.0	0.0	0.0	51.8	1.5	299.525	8.5	5385.32	152.49	1.830	250.06
21.0	533	251.0	7.1	0.0	0.0	50.5	1.4	301.462	8.5	5085.79	144.01	1.750	250.03
20.0	508	254.3	7.2	0.0	0.0	49.1	1.4	303.488	8.6	4784.33	135.48	1.670	250.01
19.0	483	257.6	7.3	0.0	0.0	47.9	1.4	305.409	8.6	4480.84	126.88	1.580	249.98
18.0	457	260.3	7.4	0.0	0.0	46.8	1.3	307.047	8.7	4175.43	118.23	1.500	249.96
17.0	432	263.2	7.5	0.0	0.0	45.6	1.3	308.772	8.7	3868.39	109.54	1.420	249.93
16.0	406	265.9	7.5	0.0	0.0	44.5	1.3	310.417	8.8	3559.61	100.80	1.330	249.91
15.0	381	268.5	7.6	0.0	0.0	43.5	1.2	311.970	8.8	3249.20	92.01	1.250	249.88
14.0	356	270.6	7.7	0.0	0.0	42.6	1.2	313.261	8.9	2937.23	83.17	1.170	249.86
13.0	330	273.0	7.7	0.0	0.0	41.7	1.2	314.652	8.9	2623.97	74.30	1.080	249.83
12.0	305	274.8	7.8	0.0	0.0	40.9	1.2	315.782	8.9	2309.31	65.39	1.000	249.80
11.0	279	276.9	7.8	0.0	0.0	40.1	1.1	317.046	9.0	1993.53	56.45	0.920	249.78
10.0	254	279.5	7.9	0.0	0.0	39.1	1.1	318.579	9.0	1676.49	47.47	0.830	249.75
9.0	229	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	1357.91	38.45	0.750	249.73
8.0	203	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	1207.03	34.18	0.670	249.70
7.0	178	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	1056.15	29.91	0.580	249.68
6.0	152	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	905.27	25.63	0.500	249.65
5.0	127	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	754.39	21.36	0.420	249.63
4.0	102	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	603.51	17.09	0.330	249.60
3.0	76	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	452.64	12.82	0.250	249.58
2.0	51	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	301.76	8.54	0.170	249.55
1.0	25	0.0	0.0	0.0	0.0	150.9	4.3	150.879	4.3	150.88	4.27	0.080	249.53
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.000	249.50
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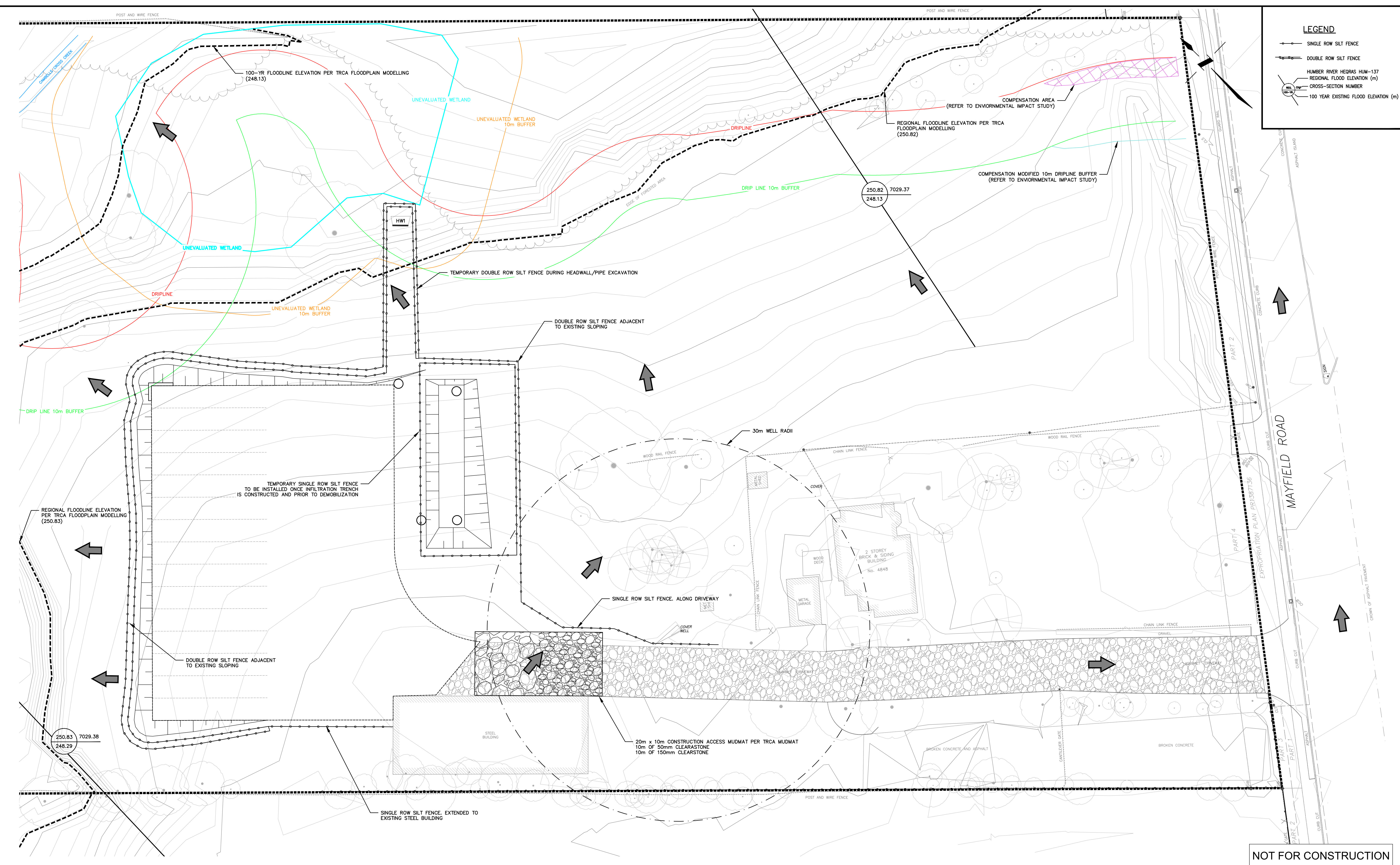
Recharger 360HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation	
in	mm	ft ³	m ³	ft ³	m ³	ft ³	m ³	ft ³	m ³	ft ³	m ³	ft	m
-19.0													
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APPENDIX D

Engineering Drawings

File: G:\Projects\2022\10722-4848 Mayfield Road\600_CADD\FSR\Design Drawings\Erosion\10722-Erosion_Plan.dwg Layout: ESC01 - 24x36 Date: Sep 06, 2023 3:34pm. Edt By: calehdnald



LEGEND

- SINGLE ROW SILT FENCE
- DOUBLE ROW SILT FENCE
- HUMBER RIVER HEQRAS HUM-137
- REGIONAL FLOOD ELEVATION (m)
- CROSS-SECTION NUMBER
- 100 YEAR EXISTING FLOOD ELEVATION (m)

NOT FOR CONSTRUCTION

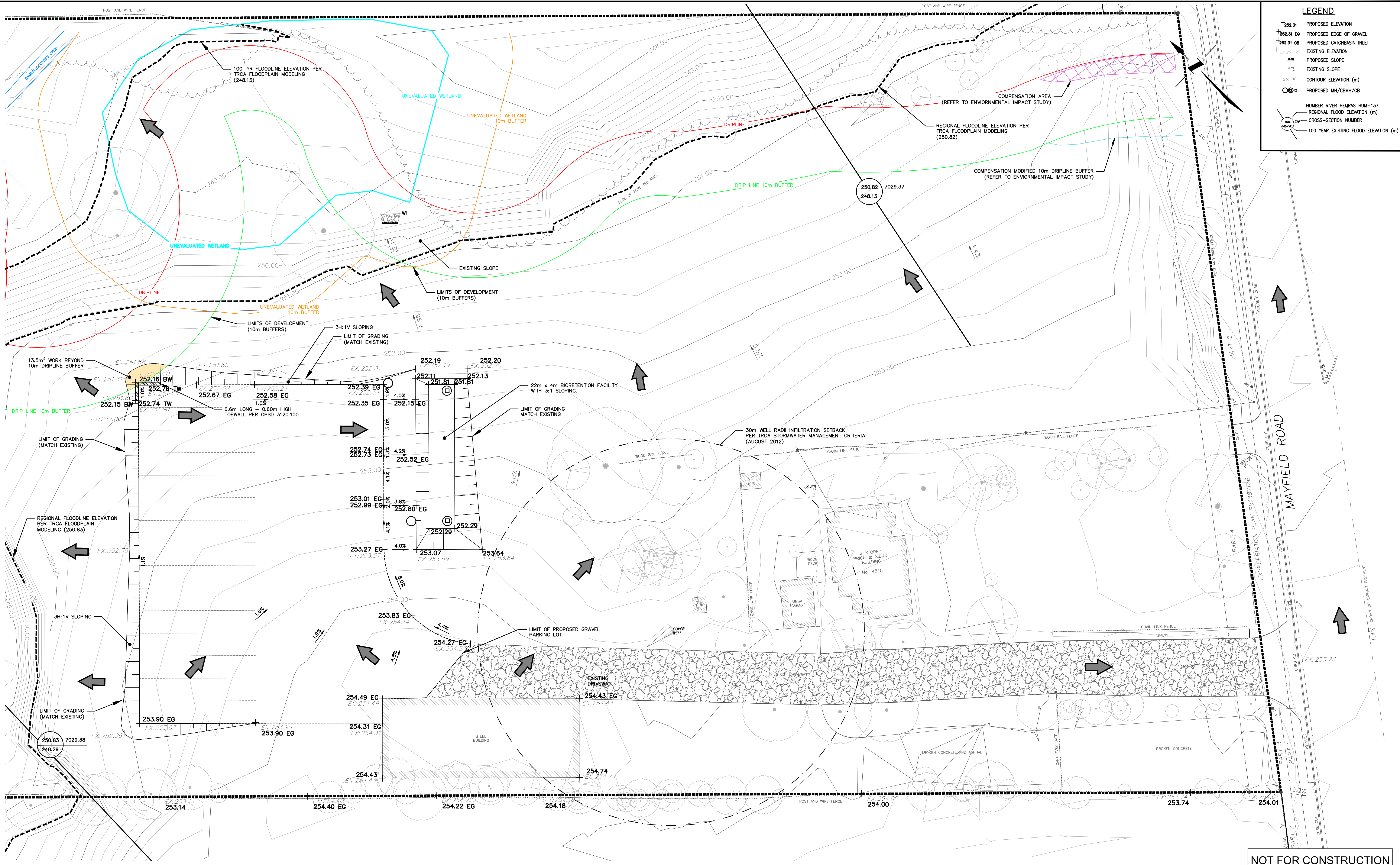


8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700
f: 905.738.0065

4848 Mayfield Road
Temporary Zoning By-Law Amendment
EROSION CONTROL PLAN

SCALE: 1:250	PROJECT No: 10722
DATE: AUGUST 2023	FIGURE No:
DESIGNED BY: C.D.	DRAWN BY: C.D./H.L.
CHECKED BY: M.R.	CHECKED BY: M.R.

File: G:\Projects\2022\10722-4848 Mayfield Road\600_CADD\FSR\Design Drawings\Grading\10722_Grading (Issue).dwg, Layout: GR01 - 24x36 Date: Sep 08, 2023 - 3:25pm, Edit By: calabro.david



LEGEND	
\pm 252.31	PROPOSED ELEVATION
\pm 252.31 EG	PROPOSED EDGE OF GRAVEL
\pm 252.31 CB	PROPOSED CATCHBASIN INLET
Ex: 252.30	EXISTING ELEVATION
0.0%	PROPOSED SLOPE
0.0%	EXISTING SLOPE
252.00	CONTOUR ELEVATION (m)
252.00	PROPOSED MH/CBMH/CB
\odot	HUMBER RIVER HEORAS HUM-137
\ominus	REGIONAL FLOOD ELEVATION (m)
\ominus	CROSS-SECTION NUMBER
\ominus	100 YEAR EXISTING FLOOD ELEVATION (m)

NOT FOR CONSTRUCTION

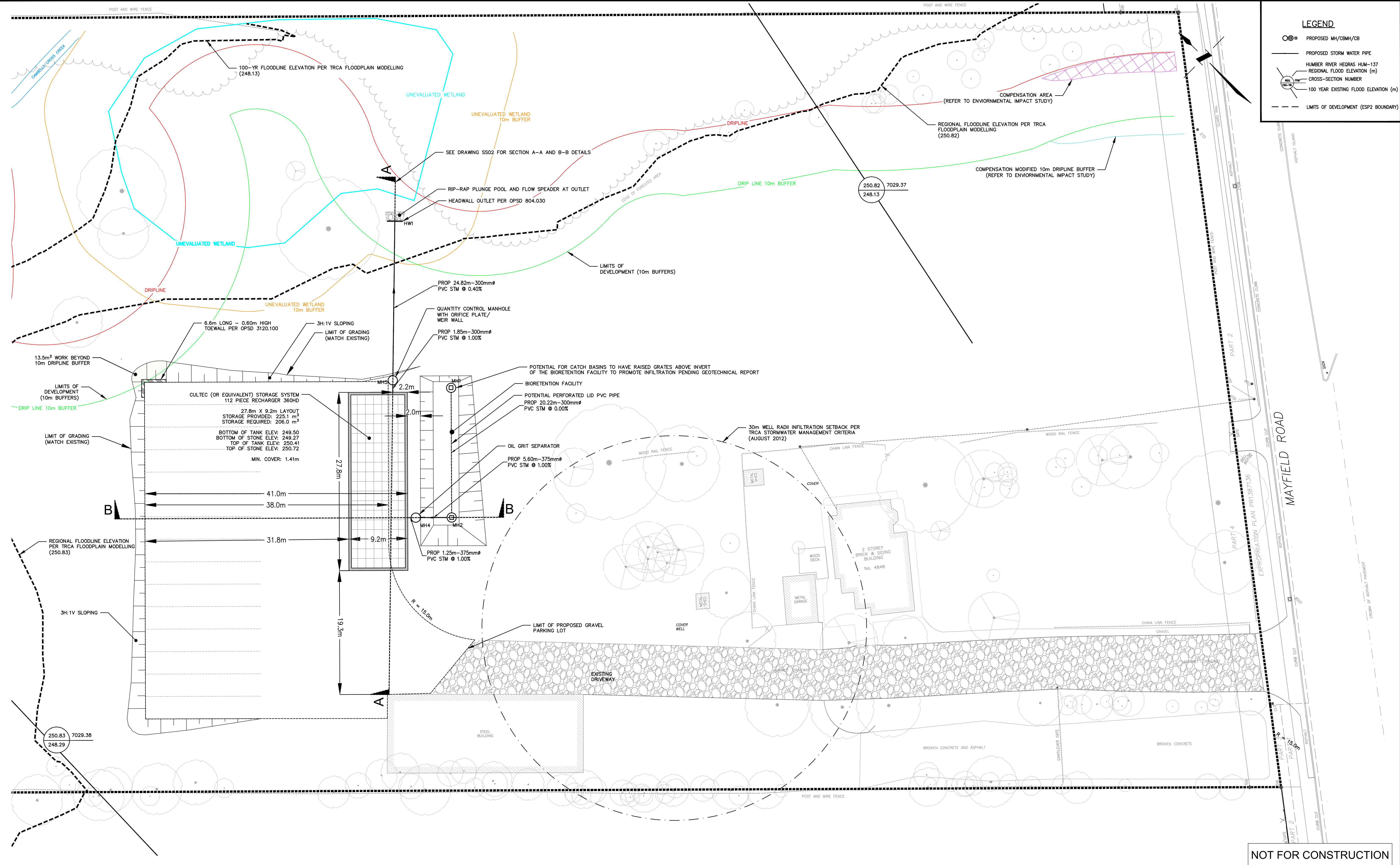


8800 Dufferin Street,
Suite 200
Vaughan, ON
L4K 0C5
p: 905.738.5700
f: 905.738.0065

4848 Mayfield Road Temporary Zoning By-Law Amendment SITE GRADING PLAN

SCALE: 1:250	PROJECT No: 10722
DATE: AUGUST 2023	FIGURE No: GR 01
DESIGNED BY: C.D.	DRAWN BY: C.D./H.L.
CHECKED BY: M.R.	CHECKED BY: M.R.

File: G:\Projects\2021\10722 - 4848 Mayfield Road\600_CADD\FSD\Design Drawings\General Plan\10722 - General Plan.dwg - Layout - SS01 - 24x36 Date: Sep 05, 2023 - 12:22pm - Ed: By: caledonaid



LEGEND	
	PROPOSED MH/CMH/CB
	PROPOSED STORM WATER PIPE
	HUMBER RIVER HQRAS HUM-137
	REGIONAL FLOOD ELEVATION (m)
	CROSS-SECTION NUMBER
	100 YEAR EXISTING FLOOD ELEVATION (m)
	LIMITS OF DEVELOPMENT (ESP2 BOUNDARY)

NOT FOR CONSTRUCTION



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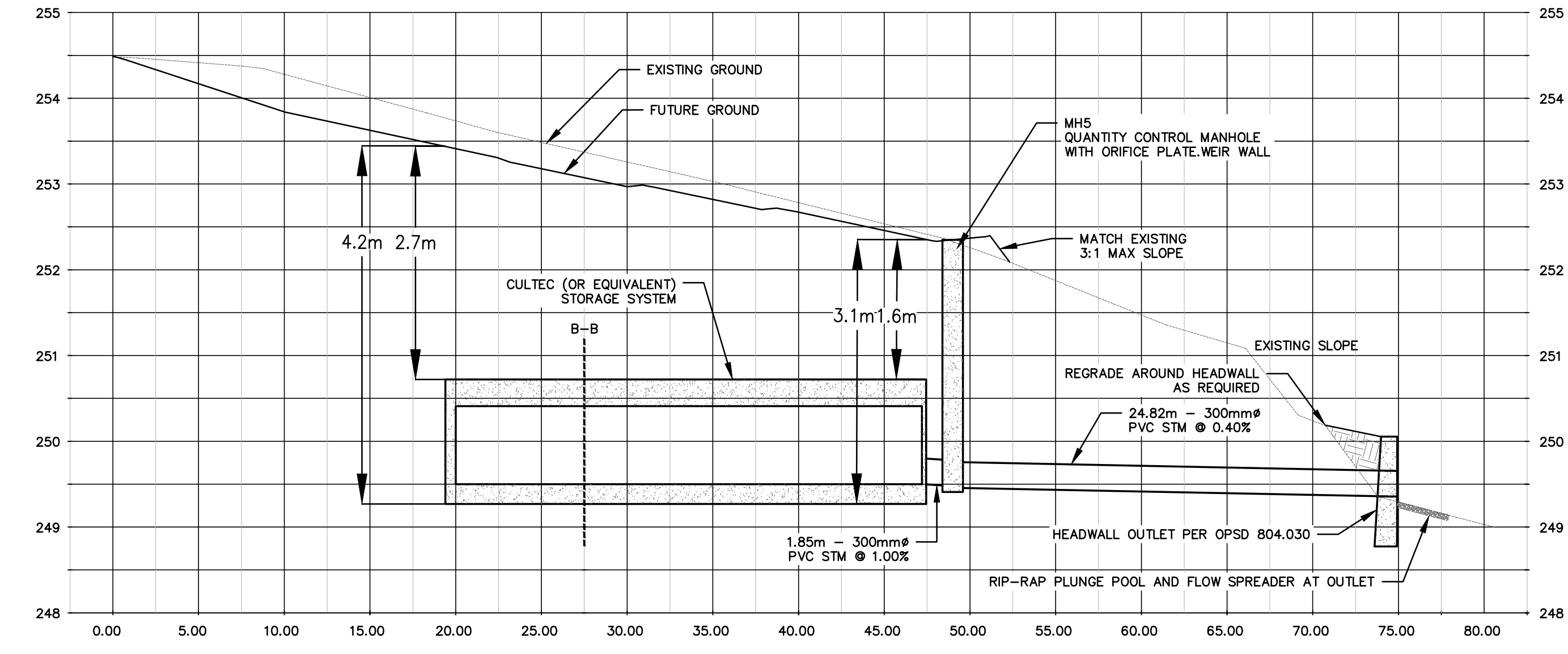
4848 Mayfield Road Temporary Zoning By-Law Amendment SITE SERVICING PLAN

SCALE: 1:250	PROJECT No: 10722
DATE: AUGUST 2023	FIGURE No:
DESIGNED BY: C.D.	DRAWN BY: C.D./H.L.
CHECKED BY: M.R.	CHECKED BY: M.R.
	SS 01

File: C:\Projects\2022\10722 - 4848 Mayfield Road\600_CADD\FSD\Design Drawings\General Plans\10722 - General Plan.dwg, Layout: SS02 - 24x36 Date: Sep 06, 2023 - 3:23pm, Edit By: calehdnadd

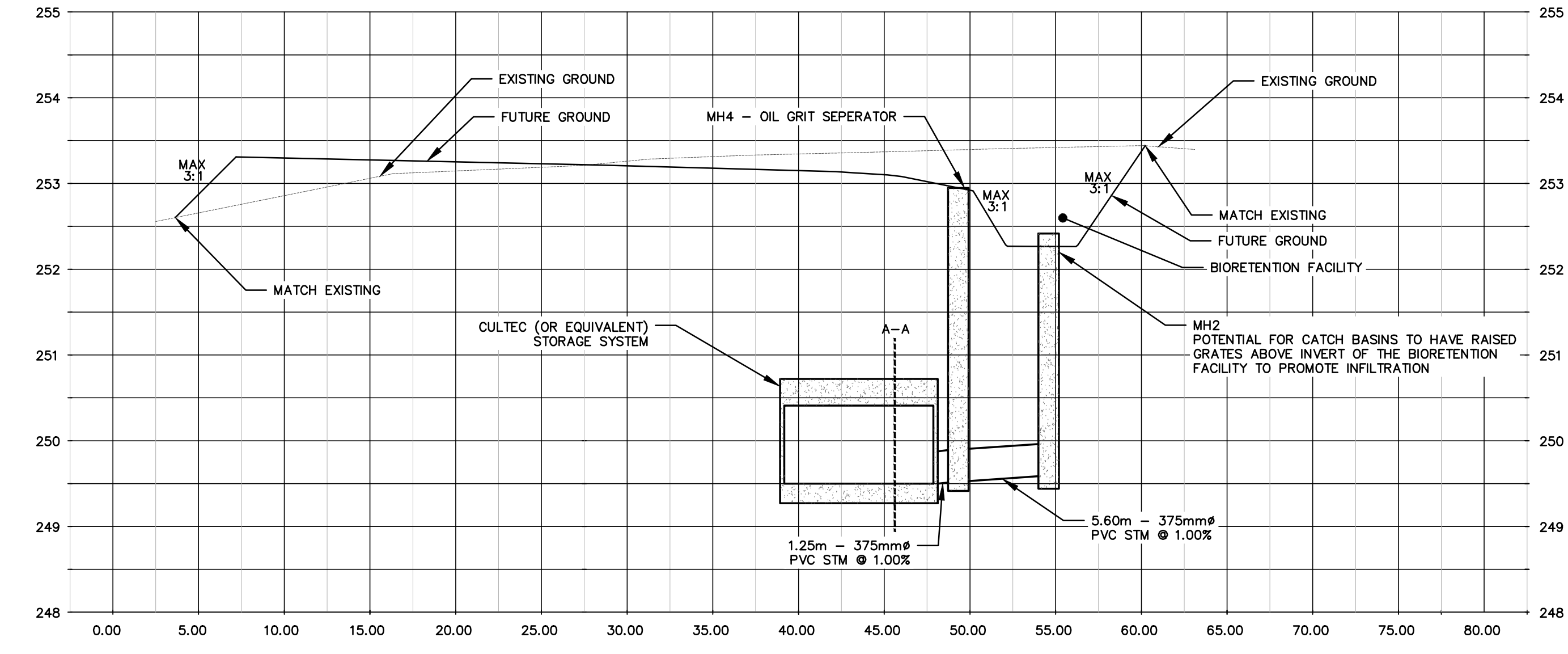
A-A

HORIZONTAL 1:250
VERTICAL 1:50



B-B

HORIZONTAL 1:250
VERTICAL 1:50



NOT FOR CONSTRUCTION

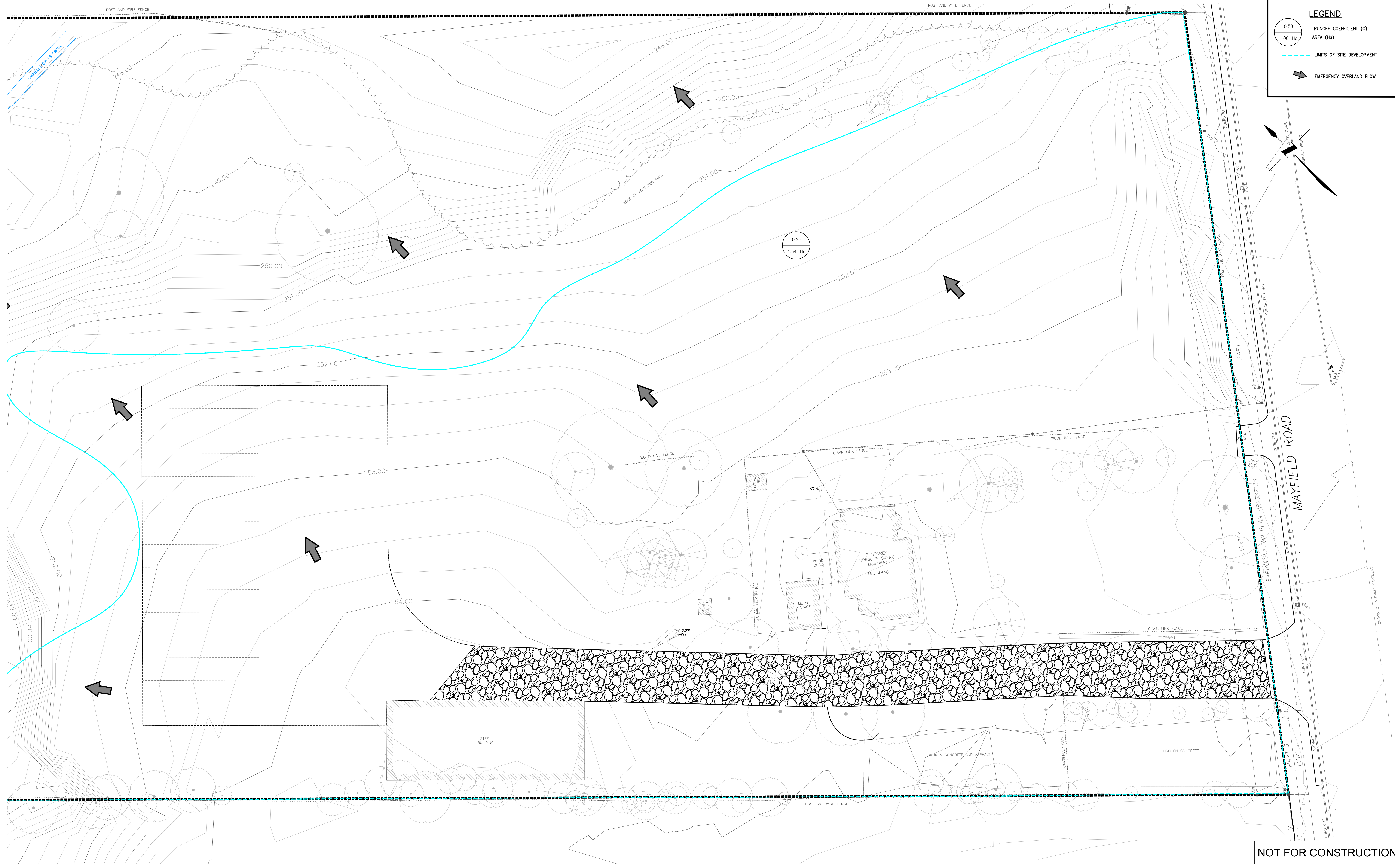


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4848 Mayfield Road
Temporary Zoning By-Law Amendment
SITE SERVICING PLAN

SCALE: 1:250	PROJECT No: 10722
DATE: AUGUST 2023	FIGURE No:
DESIGNED BY: C.D.	DRAWN BY: C.D./H.L.
CHECKED BY: M.R.	CHECKED BY: M.R.
	SS 01

File: G:\Projects\2021\10722 - 4848 Mayfield Road\600 - CADD\FSR\Design Drawings\Drainage\10722 - Predevelopment.dwg, Layout: PREDEVELOPMENT Date: Sep 06, 2023 - 3:32pm, Edit By: celabonaid



LEGEND

- 0.50 RUNOFF COEFFICIENT (C)
- 100 Ha AREA (Ha)
- LIMITS OF SITE DEVELOPMENT
- ➔ EMERGENCY OVERLAND FLOW

NOT FOR CONSTRUCTION

TYLin

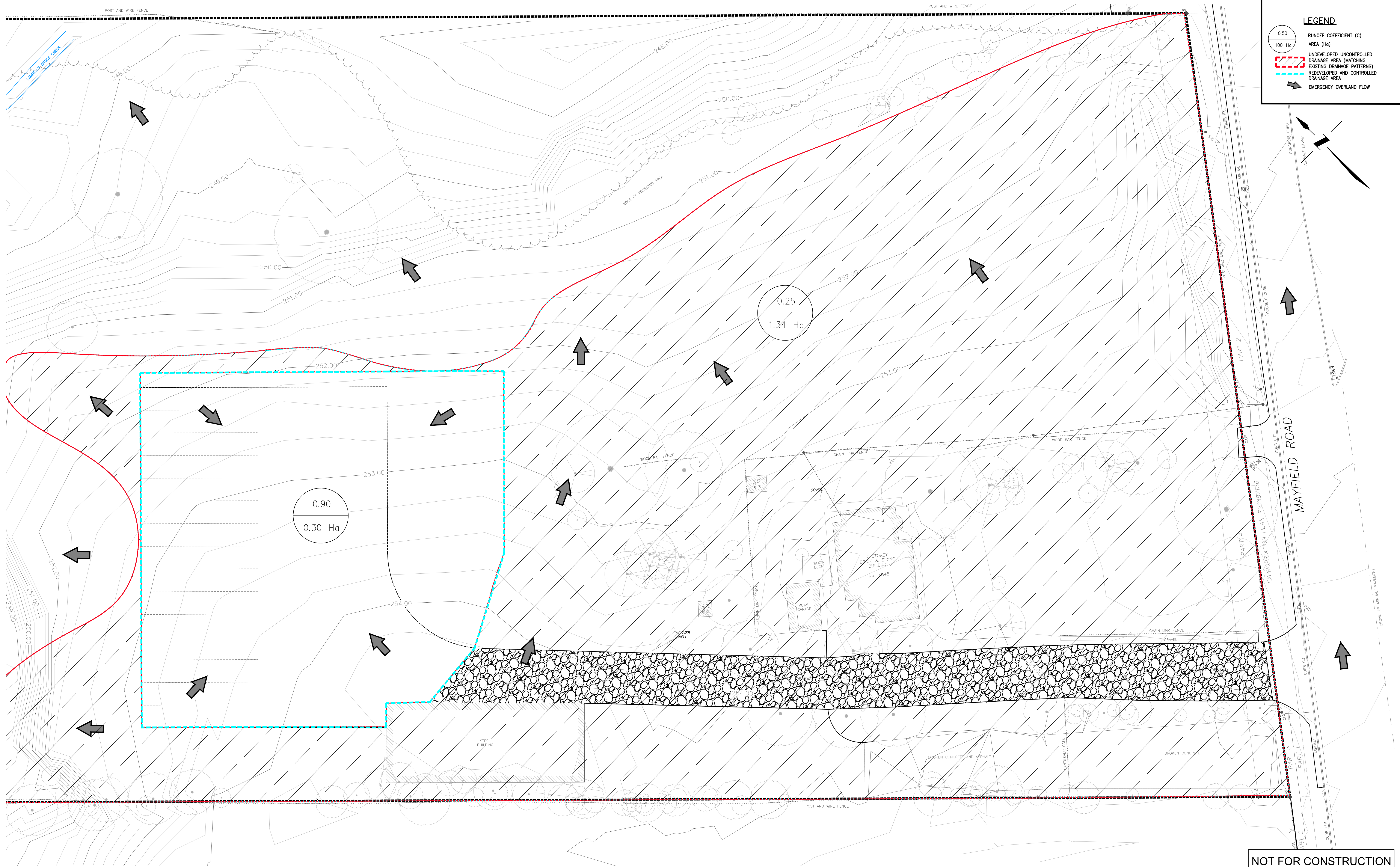
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4848 Mayfield Road
Temporary Zoning By-Law Amendment
PRE DEVELOPMENT DRAINAGE AREAS

SCALE: 1:250	PROJECT No: 10722
DATE: AUGUST 2023	FIGURE No: STM 01
DESIGNED BY: C.D.	DRAWN BY: C.D./H.L.
CHECKED BY: M.R.	CHECKED BY: M.R.

File: G:\Projects\2021\10722 - 4848 Mayfield Road\600 - CADD\SR\Design Drawings\Drainage\10722 - PostDevelopment.dwg Layout: POSTDEVELOPMENT Date: Sep 06, 2023 - 3:33pm. Edit By: calabb.donald



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4848 Mayfield Road
Temporary Zoning By-Law Amendment
POST DEVELOPMENT DRAINAGE AREAS

SCALE: 1:250	PROJECT No: 10722
DATE: AUGUST 2023	FIGURE No: STM 02
DESIGNED BY: C.D.	DRAWN BY: C.D., H.L.
CHECKED BY: M.R.	CHECKED BY: M.R.

APPENDIX E

Civil Engineering Services Cost Estimate



4848 MAYFIELD ROAD

SITE SERVICING AND PARKING

TOWN OF CALEDON

PROJECT NO. 10722

LETTER OF CREDIT COST ESTIMATE

PART	DESCRIPTION		TOTAL
A	GENERAL AND EROSION CONTROL	\$	27,625.00
B	STORM SEWERS	\$	13,359.00
C	STORM STRUCTURES	\$	275,500.00
D	GRAVEL PARKING LOT	\$	44,242.50
		SUB-TOTAL \$	360,726.50
		15% CONTINGENCY \$	54,108.98
		H.S.T. \$	53,928.61
		TOTAL ESTIMATE \$	468,764.09

Item No.	Spec. Code	Item Description	Unit	Quantity	Unit Price	Total
		PART 'A' GENERAL AND EROSION CONTROL				
A1		Mobilization and Demobalization	LS	1.0	\$ 10,000.00	\$ 10,000.00
A2		Layout	LS	1.0	\$ 5,000.00	\$ 5,000.00
		ESC				
A3		Singel Row Silt Fence	m	190.0	\$ 25.00	\$ 4,750.00
A4		Double Row Silt Fence	m	225.0	\$ 35.00	\$ 7,875.00
		TOTAL PART 'B' STORM SEWERS				\$ 27,625.00

Item No.	Spec. Code	Item Description	Unit	Quantity	Unit Price	Total
		PART 'B' STORM SEWERS				
B1		MH 1 to MH 2 300mm Perforated PVC Avg. Depth 2.4m	m	20.2	\$ 250.00	\$ 5,050.00
B2		MH 2 to MH 4 375mm PVC Avg. Depth 3.0m	m	5.6	\$ 270.00	\$ 1,512.00
B3		MH 4 to Cultec 375mm PVC Avg. Depth 3.3m	m	1.3	\$ 270.00	\$ 351.00
B4		Cultec to MH 5 300mm PVC Avg. Depth 3.1m	m	1.9	\$ 260.00	\$ 494.00
B5		MH 5 to HW1 300mm PVC Avg. Depth 1.8m	m	24.8	\$ 240.00	\$ 5,952.00
		TOTAL PART 'B' STORM SEWERS				\$ 13,359.00

Item No.	Spec. Code	Item Description	Unit	Quantity	Unit Price	Total
		PART 'C' STORM STRUCTURES				
C1		MH 1 - 1200mm dia. OPSD 701.010 Incl. DICB Gate 2.1m depth	LS	1	\$ 6,500.00	\$ 6,500.00
C2		MH 2 - 1200mm dia. OPSD 701.010 Incl. DICB Gate 2.7m depth	LS	1	\$ 6,500.00	\$ 6,500.00
C3		MH 4 - 1200mm dia. OGS OPSD 701.010 3.3m depth	LS	1	\$ 45,000.00	\$ 45,000.00
C4		MH 5 - 1200mm dia. OPSD 701.010 Incl. Orifice Plate and Weir 2.7m depth	LS	1	\$ 8,000.00	\$ 8,000.00
C5		Headwall OPSD 804.030 c/w rip-rap	LS	1	\$ 27,000.00	\$ 27,000.00
C6		Cultec Volume:225m ³	LS	1	\$ 157,500.00	\$ 157,500.00
C7		Bioretention Facility	LS	1	\$ 25,000.00	\$ 25,000.00
		PART 'C' STORM STRUCTURES				\$ 275,500.00

Item No.	Spec. Code	Item Description	Unit	Quantity	Unit Price	Total
		PART 'D' GRAVEL PARKING LOT				
D1		Fine Grade and Compact Subgrade	m ²	2,125.0	\$ 1.50	\$ 3,187.50
D2		Supply and Place 19mm Clearstone 300mm Compacted Depth	m ²	2,125.0	\$ 18.00	\$ 38,250.00
D3		Retaining Wall / Toe Wall c/w Railing per OPSD 3120.100	m	6.6	\$ 425.00	\$ 2,805.00
		TOTAL PART 'D' GRAVEL PARKING LOT				\$ 44,242.50