June 21, 2019

Attention: **AMA Investments**

Reference: **84 Nancy Street, Town of Caledon**
Proposed Rezoning
Functional Servicing Report

Dear Sir:

This document is the Preliminary Functional Servicing and Stormwater Management Repot for the proposed condominium building at 84 Nancy Street, Town of Caledon. This report should be read in conjunction with other documentation prepared for the rezoning application.

The property is located at 84 Nancy Street in the community of Bolton in the Town of Caledon, Region of Peel (Figure 1).

A conceptual site plan has been prepared by others. A preliminary site servicing and grading plan has been prepared by Calder Engineering Ltd. and is included in Attachment A.

This document has been prepared in support of the Rezoning Application. Information provided herein is preliminary in nature and subject to detailed design.

EXISTING CONDITION

Under the Town of Caledon Zoning By-law 2006-50 the property is zoned EPA1/EPA2. The property comprises approximately 0.8 ha and consists of a residential dwelling near the northern limit of the property and a number of outbuildings. The remainder of the property is grassed.

The property slopes in a generally northerly and westerly direction with an approximate elevation difference of 16 metres from the highest point located near the southwest corner of the property.

Drainage along Nancy Street in front of the property is via sheet flow on the asphalt surface and via roadside ditches (Photo 1).

PROPOSED CONDITION

The proposal is to demolish the existing building and construct a multi-storey condominium building. The proposed condition is subject to detailed design and is shown on the Preliminary Site Servicing and Grading Plan provided in Appendix A. At this stage, 150 condominium units are being considered for the site. The conceptual design includes both surface and internal parking.

NANCY STREET RIGHT-OF-WAY

The section of Nancy Street from Elizabeth Street towards Queen Street is currently a rural cross-section with asphalt road surface, no curbs or sidewalks, and shallow roadside ditches on both sides of the pavement surface. The pavement extends into private property near the south limit of the road.

As part of the project, it is proposed to construct a storm sewer on Nancy Street to service the property. At this stage and subject to detailed design, it is proposed that the ditches along Nancy Street would be maintained.

SANITARY SERVICING

Based on available records, existing sanitary sewers near the property are shown on Figure 2. There is an existing 200mm sanitary sewer along the Nancy Street and Queen Street frontages of the property. The sewer size increases to 250mm near downstream limit of the property.

Sanitary design flows were calculated on a per person basis with the residential population determined by the Region of Peel design criteria (Region of Peel, 2009) applying the "Apartment" population density of 475 persons/hectare.

Based on the site area of 0.8 ha and a population density of 475 persons/hectare for apartment usage per Region of Peel Design criteria, the residential population for this property would be 380 persons.

With a population of less than 1,000 persons, the design sanitary flow was taken as 0.013 m^3/s (13 L/s) per Region of Peel standards; this value includes the Peaking Factor. Based on the above, consistent with the Region of Peel design criteria and Ontario Building Code, the proposed building should be serviced with a minimum 150 millimetre (mm) diameter sanitary service at a minimum grade of 2.0 percent. The full pipe flow for a 150 mm sanitary service at a 2.0 percent grade with Manning's n of 0.013 is 21.5 L/s.

Subject to detailed design, it is proposed to install a new service connection complete with sampling manhole connecting to the existing 200mm diameter sanitary sewer on Nancy Street.

WATER SERVICING

Based on available records, existing watermains near the property are shown on Figure 2. There is an existing 300mm and 400mm watermain along the Nancy Street and Queen Street frontages of the property and it is our understanding that the property has an existing 19mm domestic service.

The water demand for the project was estimated using the Region of Peel Watermain Design Criteria Manual (Region of Peel, 2009). The average water demand for the residential use was

estimated to be 106,400 L/day or 1.23 L/s based on an average consumption rate of 280 L/capita/day.

The overall estimated water demand for the project is summarized in Table 1.

TABLE 1
ESTIMATED WATER DEMAND

Use	Population or Area	Average Consumption Rate (L/cap/day)	Average Day Demand (L/day)	Peak Hour Demand (L/day)	Maximum Day Demand (L/day)
Residential	380 people[2]	280	106,400	319,200	212,800

Note:
1. Units: L/cap/day – litres per capita per day; L/day – litres per day.
2. Residential population calculated per Region of Peel Sanitary Design Criteria.

The proposed building is to be sprinklered, and as such, both a fire and domestic line are required. At this stage and subject to detailed design, it is proposed to connect to the 300mm watermain on Nancy St to install a new 150mm fireline and 100mm domestic line. The existing water service to the property must be located and disconnected per Region of Peel standards.

STORM SERVICING

Based on available records, the existing storm sewer network is shown on Figure 3. There are no existing storm sewers on Nancy Street south of Elizabeth Street. Drainage along Nancy Street in front of the property is via sheet flow on the asphalt surface and via shallow roadside ditches (refer to Photo 1).

At this stage and subject to detailed design, it is proposed to construct a new municipal storm sewer and connect to one of the existing storm sewers in the area. Three potential connection points have been identified (Figure 3):

1. On Nancy Street north of Elizabeth Street
   There is an existing 300mm storm sewer on Nancy Street approximately 30m north of Elizabeth Street. The reported upstream invert of the 300mm storm sewer is 223.2m at a depth of approximately 1.8m below the road centreline.
2. On Elizabeth Street west of Nancy Street
   There is an existing 450mm storm sewer on Elizabeth Street approximately 90m west of Nancy Street. The reported upstream invert of the 450mm storm sewer is 219.4m at a depth of approximately 2.4m below the road centreline.
3. On Elizabeth Street east of Nancy Street
   There is an existing 400mm storm sewer on Elizabeth Street approximately 50m east of Nancy Street. The reported upstream invert of the 400mm storm sewer is approximately 223.8m at a depth of approximately 1.6m below the road centreline.

At this stage, it is proposed to connect to the existing sewer on Elizabeth Street east of Nancy

(Point 3). This location is preferred for the following reasons:

- Based on available records, the roadside ditches along Nancy Street are currently directed to this sewer
- This is the closest sewer to the property (shortest length of new sewer construction)
- Elizabeth Street generally slopes away from Nancy Street in both directions. The road slope is favourable for sewer construction (i.e. both the sewer and road would be sloping in the same direction)

Subject to detailed design, it is proposed to size the street storm sewer system for the 5-year design storm consistent with Town of Caledon design guidelines. Preliminary sizing calculations have been completed for the proposed external storm sewer and are attached (Attachment B). Note that these preliminary sizing calculations were completed excluding the impact of quantity controls on the subject property.

STORMWATER MANAGEMENT

Stormwater Management Criteria

The proposed development is under the jurisdiction of the Town of Caledon, Region of Peel and the Toronto and Region Conservation Authority (TRCA). As the site is under 5 ha in size (i.e. the subject property is 0.8 ha), we understand that TRCA staff defers site specific stormwater management review to Town of Caledon Staff.

Based on this, the following stormwater management criteria will likely apply to this development:

- Quantity Control: Post to peak flow control for the 2 through 100 year return periods
- Water Balance: Retention of the 5mm of precipitation on-site through evapotranspiration, infiltration and/or reuse
- Quality Control: 80% TSS removal (Enhanced – Level 1)
- Erosion Control: Erosion protection in accordance with TRCA policies

Existing Drainage Patterns

A pre-development drainage plan was prepared (Figure 4a). As illustrated, the majority of the property drains to the northeast towards the Nancy/Elizabeth intersection and small portion towards the west to the Ted Houston Memorial Park.

Drainage along Nancy Street in front of the property is via sheet flow on the asphalt surface and via shallow roadside ditches (Photo 1).

Proposed Drainage Patterns

A post-development drainage plan was prepared (Figure 4b). At this stage, it is proposed that runoff from the development be collected and conveyed to a new storm sewer on Nancy Street.

Peak Flow Control and Computed Storage Volumes

Subject to detailed design, peak flow from the subject property will be achieved by the following:

- Roof top controls; and
- Underground storage.

The Rational Method was applied to compute peak flow rates and in conjunction with a mass curve approach used to estimate the on-site storage requirements. Supporting computations are provided in Attachment B for the 2-year through 100-year design events. The rainfall intensities used in this analysis are based on the Town of Caledon IDF Curves (Town of Caledon Standard 104). Notwithstanding the existing development on the site, the composite runoff coefficient for the existing site condition was assumed as 0.25 (i.e. fully landscaped). The composite runoff coefficient for the post-development condition was calculated based on the current conceptual site plan as 0.63. Subject to detailed design, it is proposed to restrict peak flows from the post-development condition to the pre-development peak flows associated with the 5-year design event.

Summarized in Table 2 are estimated storm water release rates and storage volumes. Control flow roof drains are proposed for the building to utilize rooftop storage. The respective computations account for the effect of control flow roof drains. The estimated maximum rooftop ponding depth under the 100-year design event is 73 mm.

Table 2: Stormwater Release Rates and Storage Volumes

Return Period	Pre-development Release Rate (L/s)	Target Post-Development Release Rate (L/s)	Storage required (cu.m.)
2-year	41.9	41.9	18.2
5-year	53.6	53.6	23.6
10-year	65.5	53.6	35.7
25-year	76.4	53.6	51.5
50-year	86.1	53.6	66.1
100-year	96.0	53.6	82.1

Notes:

1. Units: L/s – litres per second; cu.m. – cubic metres

Water Balance

It is our understanding that the water balance related criterion for this property is retention of storm runoff from the first 5 millimetres (mm) of rainfall through infiltration, evapotranspiration

and/or reuse. It has been assumed that landscape areas will naturally retain at least the first 5 millimetres of precipitation. Based on the conceptual site plan, the equivalent volume to be provided for asphalt and building areas is 22.5 cu.m. (4,494 sq.m. x 0.005 m).

Subject to detailed design it is proposed that this volume be provided through granular media within a bioretention area on the property.

Quality Control

It is proposed to provide Enhanced Level 1 Protection (80% longterm TSS removal) for the property. Subject to detailed design it is proposed to achieve this via provision of Low Impact Development features such as bioretention areas and dry swales designed in general conformance with the CVC/TRCA guidelines or end-of-pipe solutions such as an oil-grit separator at the downstream limit of the site.

EROSION AND SEDIMENT CONTROL

Standard erosion and sediment controls (e.g., mud mats at site access/egress points, siltation fencing) consistent with the Erosion & Sediment Control Guideline for Urban Construction manual prepared by the Greater Golden Horseshoe Area Conservation Authorities (2006) are to be provided at the time of construction to minimize sediment transport from the site.

It is anticipated that that the Erosion and Sediment Control Plan would be prepared at the detailed design stage.

If you require any additional information or clarification of any item, please feel free to contact myself at (905) 857-7600.

Sincerely,

CALDER ENGINEERING LTD.

Kristine Campbell, B.A.Sc.
Water Resources Analyst

Robert J. Whyte, M.Sc., P.Eng.
Project Manager

Photo 1: Nancy Street, facing south from Elizabeth (Source: Google Streetview, 2016)

FIGURE 1: SITE LOCATION

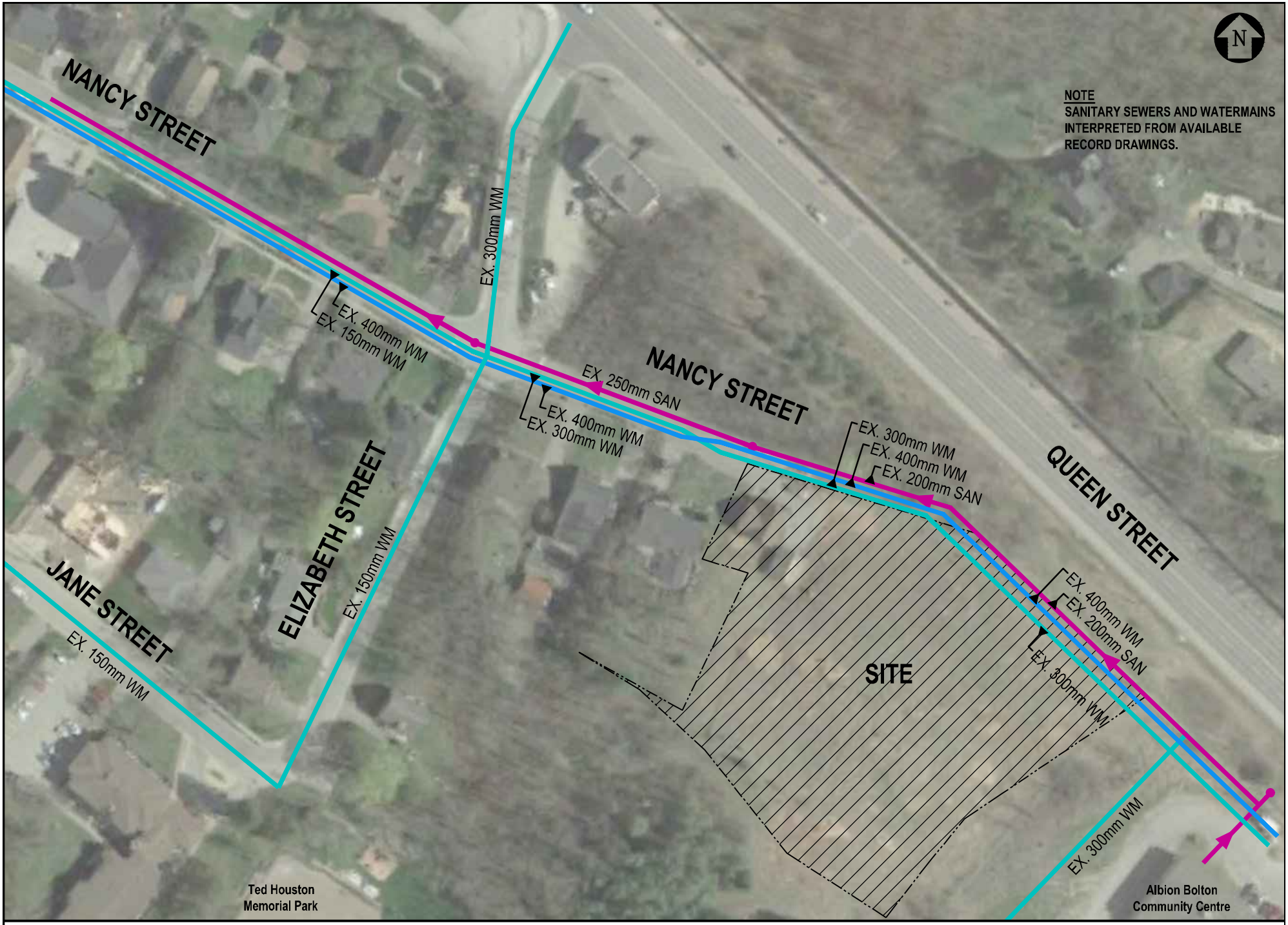
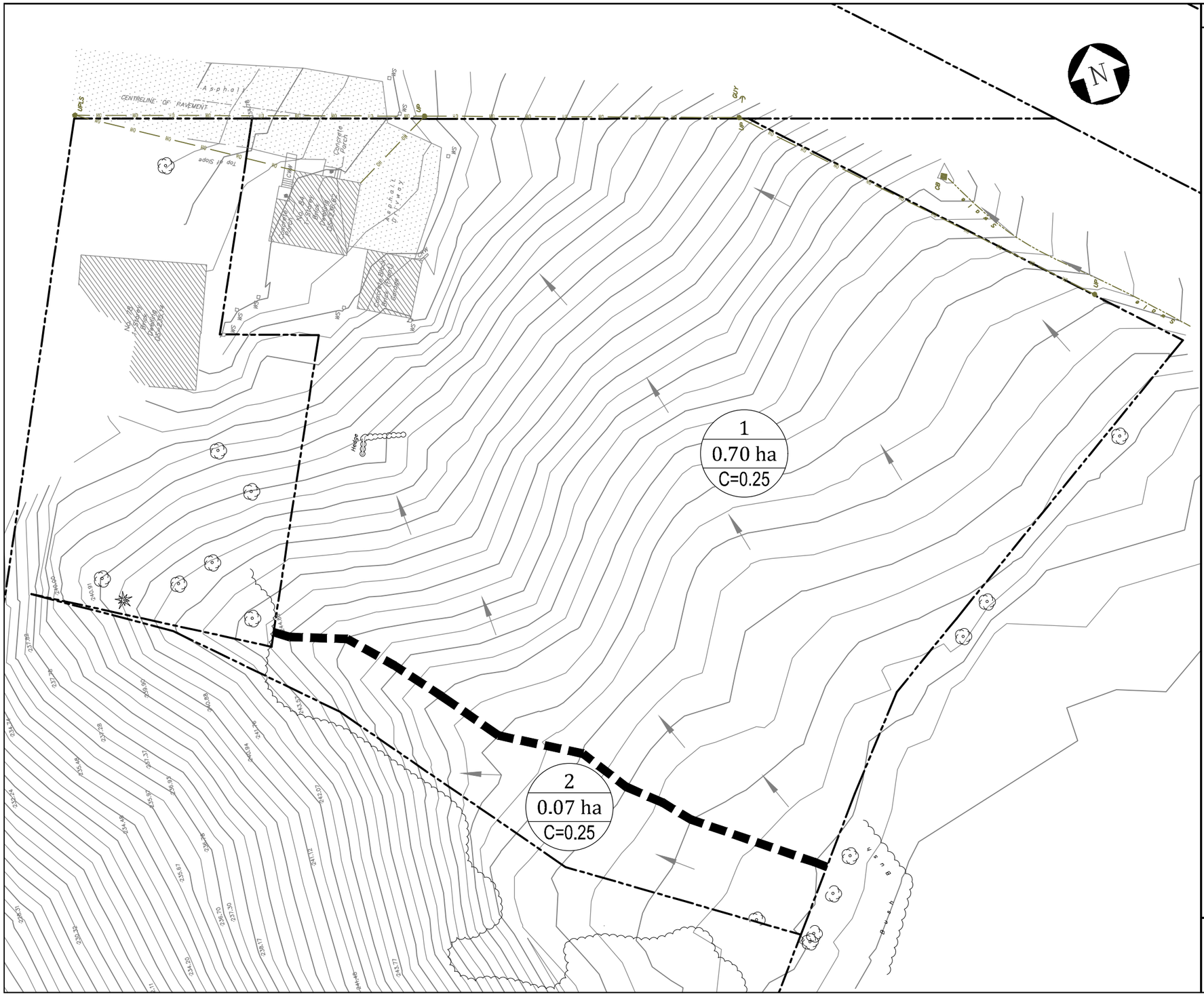


FIGURE 2: EXISTING SANITARY AND WATER SERVICING

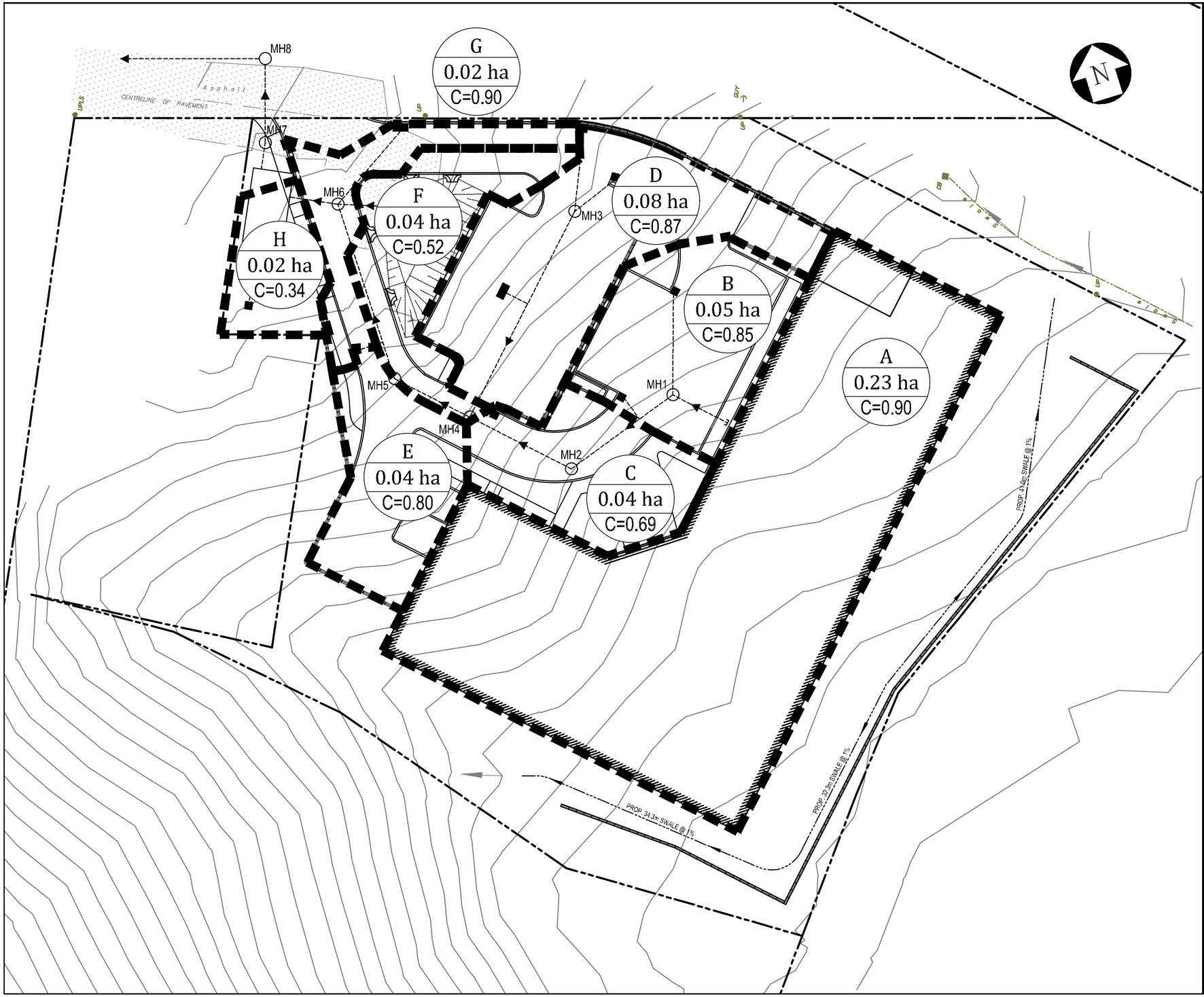
FIGURE 3: EXISTING STORM SERVICING



LEGEND

- A / 0.22 ha / C=0.90 — CATCHMENT ID; DRAINAGE AREA; COMPOSITE RUNOFF COEFFICIENT
- EXISTING DRAINAGE BOUNDARY

FIGURE 4A
EXISTING STORM DRAINAGE PLAN



LEGEND

A 0.22 ha C=0.90	CATCHMENT ID DRAINAGE AREA COMPOSITE RUNOFF COEFFICIENT
MH1	PROPOSED STORM MANHOLE
	PROPOSED DOUBLE CATCHBASIN
	PROPOSED SINGLE CATCHBASIN
	PROPOSED STORM SEWER
	PROPOSED DRAINAGE BOUNDARY

FIGURE 4B
PROPOSED STORM DRAINAGE PLAN

FIGURE 5: PROPOSED EXTERNAL AREA DRAINAGE PLAN

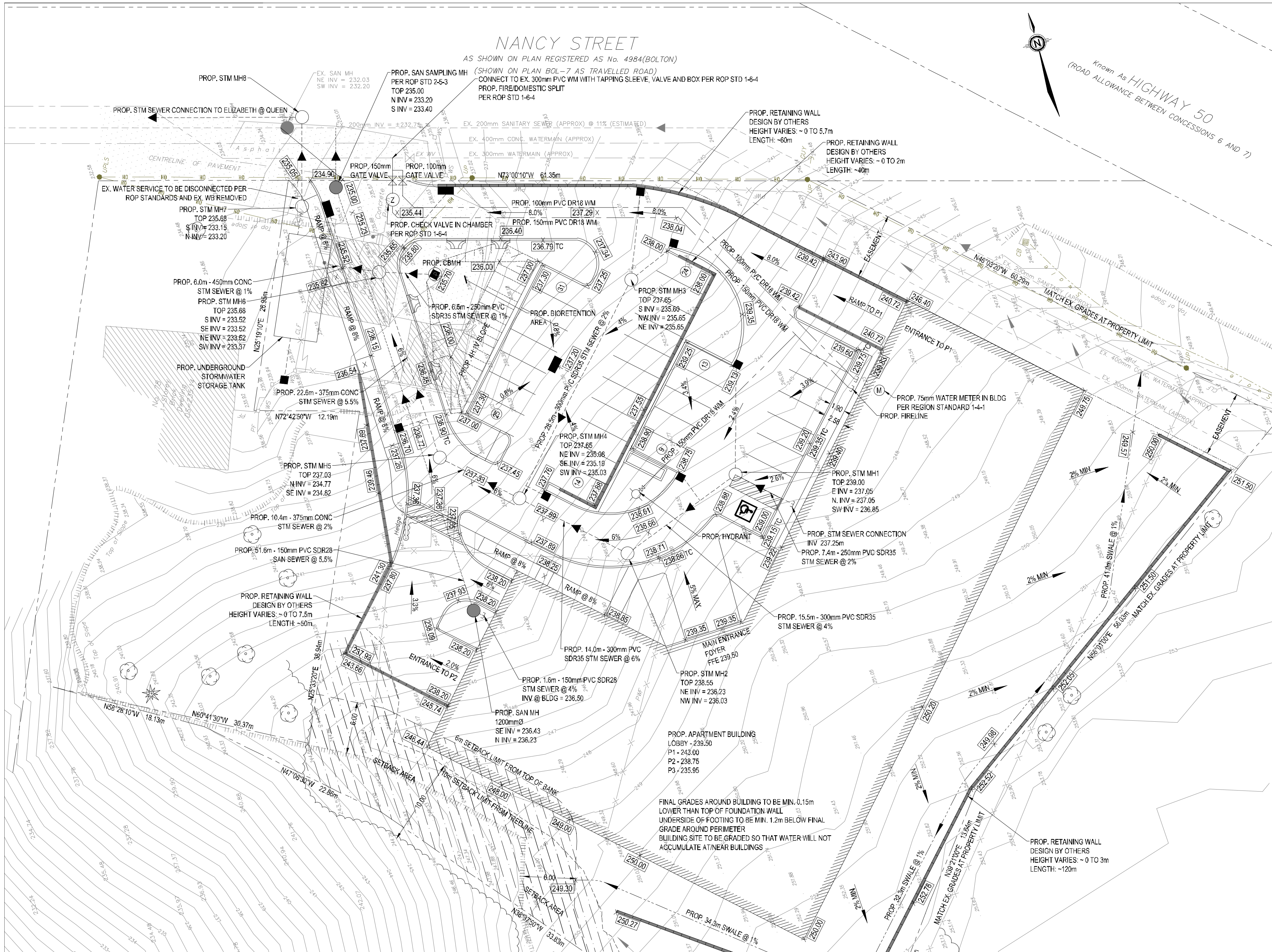
ATTACHMENT A

FUNCTIONAL SERVICING REPORT

84 NANCY STREET, TOWN OF CALEDON

Enclosures:

- Preliminary Site Servicing and Grading Plan



GENERAL NOTES - STORM SEWERS

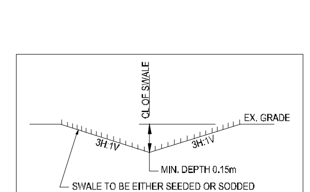
1. STORM SEWER CONSTRUCTION TO COMPLY WITH TOWN OF CALEDON STANDARD 101. REFER TO GENERAL NOTES 2 TO 11.
2. STORM SEWER TO BE PROVIDED ON ALL ROADS WITH CURB AND GUTTER.
3. PLACE ALL CATCH BASIN LATERALS AT 2% GRADE UNLESS OTHERWISE NOTED. PIPE SIZE MINIMUM 250mm DIA. SINGLE. 300mm DIA DOUBLE.
4. STORM SEWERS SHALL BE CONSTRUCTED WITH BEDDING AS PER OPSD 802.020 FOR RIGID PIPE OR OPSD 802.010 WITH GRANULAR 'A' FOR FLEXIBLE PIPE UNLESS APPROVED OTHERWISE BY THE DIRECTOR OF PUBLIC WORKS AND ENGINEERING.
5. MAINTENANCE HOLE TOPS (FRAMES) AND CATCHBASIN (FRAMES) ARE TO BE SET TO BASE COURSE ASPHALT AND THEN ADJUSTED TO FINAL GRADE WHEN THE TOP LIFT OF ASPHALT IS PLACED.
6. ALL CONNECTIONS TO THE STORM MAIN SHALL BE MADE WITH A STORM MANHOLE OR APPROVED FACTORY TEE CONNECTIONS AS PER OPSD 708.01 OR 708.03.
7. PIPE MATERIAL TO BE REINFORCED CONCRETE WITH A STRENGTH OF 50 N/m/mm CERTIFIED CLASS II) OR PVC CERTIFIED TO C.S.A. STANDARD A247.2-1982, CLASS 50-D (PREVIOUSLY C.S.A. STANDARD A257.2-1974 CLASS II) OR PVC CERTIFIED TO C.S.A. STANDARDS 182.2 AND 182.4 MAX. PVC PIPE DIA. IS 600mm BIG O BOSS 2000 POLYETHYLENE PIPE WITH GASKETED BELL WITH SPIGOT JOINTS CERTIFIED C.S.A. B182.6 FOR STORM SEWERS UP TO 900mm DIA. WHERE ONLY CONNECTION STD CATCHBASINS ARE CONSIDERED.
8. STORM SEWER TO BE MINIMUM 300mm DIA. WITH JOINTS CONFORMING TO C.S.A. STANDARD A 257.3.
9. ALL PIPE BEDDING MUST CONFORM TO OPSD MAXIMUM COVER TABLE. NO FLEXIBLE PIPE SEWERS WILL BE INSTALLED WITH A DEPTH COVER GREATER THAN 6m UNLESS SPECIFICALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS AND ENGINEERING.
10. ALL PIPE HANDLING INSTRUCTIONS MUST BE IN STRICT COMPLIANCE WITH MANUFACTURERS INSTALLATION GUIDES AND THE OCPA OR UNIBELL GUIDELINES.
11. STORM SEWER MANHOLES SHALL BE BENCHED TO THE OBVERT OF THE OUTLET PIPE.
12. ALL CATCHBASINS SHALL HAVE 0.3m SUMPS EXCEPT CATCHBASIN MANHOLES WHICH SHALL BE PROVIDED WITH BENCHING.
13. FROST PROTECTION TO BE PROVIDED WHERE 1.5m OF COVER CAN NOT BE ACHIEVED.

SANITARY SEWER NOTES

1. ALL MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO THE CURRENT REGION OF PEEL PUBLIC WORKS STANDARDS AND SPECIFICATIONS.
2. ALL CONCRETE AND PLASTIC PIPE SHALL HAVE RUBBER GASKET JJOINTS.
3. ALL SEWERS SHALL BE CONSTRUCTED WITH BEDDING IN ACCORDANCE WITH OPSD 802.03 CLASS 'B' UNLESS OTHERWISE NOTED.
4. PROPOSED SANITARY LATERAL TO BE PVC SDR 28.
5. ALL SANITARY SEWER BEDDING AS PER ROP STANDARD 2-3-1.
6. SANITARY LATERALS TO BE AT MINIMUM 2% SLOPE.
7. ALL MANHOLES SHALL BE AS PER ROP STANDARD 2-5-2 AND 2-5-3 WITH BENCHING PER ROP STANDARD 2-5-20.
8. MANHOLE FRAME AND COVER SHALL BE PER ROP STANDARD 2-6-4.
9. MANHOLE STEPS PER ROP STANDARD 2-6-11.
10. MANHOLES DEEPER THAN 5.0m MUST BE EQUIPPED WITH SAFETY PLATFORMS PER ROP STANDARD 2-6-14.
11. ALL PLUGS TO BE MARKED WITH 2" x 4" x 6' STUDS
12. SANITARY MUST BE MODIFIED IN THE FIELD TO PREVENT I&I (INFLOW AND INFILTRATION)

GRADING NOTES

1. DRIVEWAY GRADES TO BE BETWEEN 2% AND 8%.
2. ALL SLOPES ARE TO BE 4H:1V MAXIMUM, UNLESS OTHERWISE NOTED.
3. A MINIMUM OF 1.5m CLEARANCE IS TO BE PROVIDED FROM THE LIMIT OF THE DRIVEWAY TO EXISTING UTILITY STRUCTURES WITHIN THE MUNICIPAL RIGHT-OF-WAY. IF THIS CLEARANCE IS NOT MAINTAINED THEY SHALL BE RELOCATED AT THE APPLICANT'S EXPENSE.
4. DISTURBED BOULEVARD AREAS TO BE RESTORED WITH MINIMUM 150mm TOPSOIL AND SOD.
5. DISTURBED SITE AREAS TO BE RESTORED WITH MINIMUM 100mm TOPSOIL AND EITHER SEED OR SOD.
6. ACCESSIBLE PARKING ACCESS AISLES TO TERMINATE WITH CURB RAMP IN CONFORMANCE WITH OBC 3.8.3.2(2).



TYPICAL SWALE SECTION
NTS

GENERAL NOTES

1. ALL PROPOSED CONSTRUCTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. CONSTRUCTION FOR THIS PROJECT TO COMPLY WITH THE MOST CURRENT VERSION OF THE DEVELOPMENT STANDARDS, POLICIES, AND GUIDELINES OF THE TOWN OF CALEDON, REGION OF PEEL STANDARDS AND SPECIFICATIONS AND THE ONTARIO BUILDING CODE.
3. ALL ELEVATIONS ARE IN METERS AND REFERENCED TO GEODETIC DATUM. ALL DIMENSIONS ARE IN METRIC UNITS.
4. BASE MAPPING FROM TOPOGRAPHIC SURVEY BY ERTL SURVEYORS. ACTUAL GROUND CONTOURS MAY VARY FROM THOSE SHOWN.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LAYOUT AND SURVEY CONTROL DURING CONSTRUCTION.
6. A MINIMUM OF 1.5m CLEARANCE IS TO BE PROVIDED FROM THE LIMITS OF ALL SIDEWALKS AND DRIVEWAYS TO EXISTING UTILITY STRUCTURES WITHIN THE MUNICIPAL RIGHT-OF-WAY. IF THIS CLEARANCE IS NOT MAINTAINED THEY SHALL BE RELOCATED AT THE APPLICANT'S EXPENSE.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES AND SERVICES PRIOR TO AND DURING CONSTRUCTION. LOCATION OF EXISTING UTILITIES AND SERVICES WHERE SHOWN ARE APPROXIMATE AND TO BE VERIFIED IN THE FILED BY THE CONTRACTOR. ANY DAMAGE OR CHANGES SHALL BE REPAIRED OR MADE AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE APPROPRIATE UTILITY.
8. THE CONTRACTOR SHALL DELINEATE THE REQUIRED WORKING AREA ON-SITE PRIOR TO THE START OF WORK AND SHALL CONFINE OPERATIONS WITHIN THE DEFINED AREA.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVISION, MAINTENANCE AND RESTORATION OF ALL CONSTRUCTION ACCESS REQUIREMENTS.
10. WORKING AREAS, ACCESS REQUIREMENTS, AND TEMPORARY MATERIAL STORAGE AREAS TO BE MAINTAINED IN GOOD REPAIR BY THE CONTRACTOR AT ALL TIMES. AREAS AFFECTED BY THE CONTRACTOR'S ACTIVITIES ARE TO BE REINSTATED TO EXISTING CONDITIONS OR BETTER.
11. SEDIMENT CONTROL MEASURES SHALL BE INSTALLED PRIOR TO ANY CONSTRUCTION ON THE SITE AND SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD TO THE SATISFACTION OF THE TOWN OF CALEDON.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFIRMING WITH THE OWNER OR ARCHITECT THE LOCATION OF BUILDING SANITARY AND WATER SERVICE CONNECTIONS.
13. RETAINING WALLS TO BE DESIGNED BY OTHERS AND IN CONFORMANCE WITH GOOD ENGINEERING PRACTICES AND THE ONTARIO BUILDING CODE. RETAINING WALLS TO BE DESIGNED BY QUALIFIED ENGINEER IF HEIGHT EXCEEDS 1.0m.
14. MAIN ENTRANCE OF BUILDING TO BE BARRIER-FREE WITH EITHER A POWER DOOR OPERATOR OR AUTOMATIC SLIDING DOOR FEATURE AS PER THE BARRIER-FREE SECTION OF THE ONTARIO BUILDING CODE.
15. LIGHTING NOTES:
   - 15.1. LIGHTING FIXTURES SHALL BE INSTALLED IN SUCH A MANNER THAT ALL LIGHT EMITTED FROM THE FIXTURE EITHER DIRECTLY FROM THE LAMP OR DIFFUSING ELEMENT OR INDIRECTLY BY REFLECTION OR REFRACTION FROM ANY PART OF THE FIXTURE IS PROJECTED BELOW THE LAMP AND ONTO THE LOT THE LIGHTING IS INTENDED TO SERVE.
   - 15.2. THE MAXIMUM HEIGHT OF ALL LIGHTING FIXTURES IS 9.0m.
   - 15.3. THE MINIMUM DISTANCE OF LIGHTING FIXTURES FROM ANY LOT LINE IS 4.5m.
   - 15.4. EXTERIOR LIGHTING AT BUILDING MAIN ENTRANCE AND ACCESSIBLE PARKING SPACE(S) SHALL BE AT A LIGHTING LEVEL NOT LESS THAN 35 LUX.
16. ALL GENERAL BACKFILL TO BE APPROVED MATERIAL AND COMPACTED TO MINIMUM 95% STANDARD PROCTOR MAX. DRY DENSITY UNLESS OTHERWISE STATED.
17. THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND DISPOSAL OF ALL DEBRIS AND EXCESS MATERIAL.
18. STORM DRAINAGE TO BE SELF-CONTAINED AND SHALL NOT ADVERSELY AFFECT ADJACENT PROPERTIES. DISCHARGE TO BE TO A LOCATION APPROVED BY THE PUBLIC WORKS AND ENGINEERING DEPARTMENT.
19. GRADING SHALL NOT EXTEND ONTO ADJACENT PROPERTIES WITHOUT PRIOR WRITTEN CONSENT FROM ADJACENT PROPERTY OWNER(S).
20. IT IS THE OWNER AND CONTRACTOR RESPONSIBILITY TO CONFIRM ALL LEGAL PROPERTY BOUNDARIES AND EASEMENTS PRIOR TO CONSTRUCTION.
21. ALL ERRORS, OMISSIONS AND/OR CHANGE OF CONDITIONS AT THE SITE SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PERFORMANCE THE RELATED WORK.

WATERMAIN / WATER SERVICE NOTES

1. ALL MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO THE CURRENT REGION OF PEEL PUBLIC WORKS STANDARDS AND SPECIFICATIONS.
2. WATERMAINS AND/OR WATER SERVICE MATERIALS 100mm (4") UP TO 300mm (12") MUST BE PVC DR18.
3. WATERMAINS AND/OR WATER SERVICES TO HAVE A MINIMUM COVER OF 1.7m WITH A MINIMUM HORIZONTAL SPACING OF 1.2m FROM THEMSELVES AND ALL OTHER UTILITIES.
4. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED WITH AT LEAST A 50mm (2") OUTLET ON 100mm (4") AND LARGER LINES. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE LINE. THEY MUST ALSO BE HOSED OR PIPED TO ALLOW THE WATER TO DRAIN ONTO A PARKING LOT OR DOWN A DRAIN. ON FIRE LINES, FLUSHING OUTLET TO BE 100mm (4") DIAMETER MINIMUM ON A HYDRANT.
5. ALL CURB STOPS TO BE 3.0m (10') OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED.
6. HYDRANT AND VALVE SET TO REGION STANDARD 1-6-1 DIMENSION A AND B, 0.7m (2') AND 0.9m (3') AND TO HAVE PUMPER NOZZLE. FLANGE SET BETWEEN 50mm AND 150mm ABOVE FINISHED GRADE.
7. WATERMAINS TO BE INSTALLED TO GRADES AS SHOWN ON APPROVED SITE PLAN. COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHERE REQUESTED BY INSPECTOR.
8. WATERMAINS MUST HAVE A MINIMUM VERTICAL CLEARANCE OF 0.3m (12") OVER AND 0.5m (20") UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING.
9. ALL PROPOSED WATER PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING FROM EXISTING SYSTEMS.
10. ALL LIVE TAPPING AND OPERATION OF REGION WATER VALVES SHALL BE ARRANGED THROUGH THE REGIONAL INSPECTOR ASSIGNED OR BY CONTACTING THE OPERATIONS AND MAINTENANCE DIVISION.
11. LOCATION OF ALL EXISTING UTILITIES IN THE FIELD TO BE ESTABLISHED BY THE CONTRACTOR.
12. THE CONTACTOR(S) SHALL BE SOLELY RESPONSIBLE FOR LOCATES, EXPOSING, SUPPORTING AND PROTECTING OF ALL UNDERGROUND AND OVERHEAD UTILITIES AND STRUCTURES EXISTING AT THE TIME OF CONSTRUCTION IN THE AREA OF THEIR WORK WHETHER SHOWN ON THE PLANS OR NOT AND FOR ALL REPAIRS AND CONSEQUENCES RESULTING FROM DAMAGE TO SAME.
13. THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE TO GIVE 72 HOURS WRITTEN NOTICE TO THE UTILITIES PRIOR TO CROSSING SUCH UTILITIES, FOR THE PURPOSE OF INSPECTION BY THE CONCERNED UTILITY. THIS INSPECTION WILL BE FOR THE DURATION OF THE CONSTRUCTION, WITH THE CONTRACTOR RESPONSIBLE FOR ALL COSTS ARISING FROM SUCH INSPECTION.
14. ALL PROPOSED WATER PIPING MUST BE ISOLATED THROUGH A TEMPORARY CONNECTION THAT SHALL INCLUDE AN APPROPRIATE CROSS-CONECTION CONTROL DEVICE, CONSISTENT WITH THE DEGREE OF HAZARD, FOR BACKFLOW PREVENTION OF THE ACTIVE DISTRIBUTION SYSTEM, CONFORMING TO REGION OF PEEL STANDARDS 1-7-7 OR 1-7-8.
15. THE REGION OF PEEL SHALL CONDUCT THE OPERATION OF EXISTING VALVES AND HYDRANTS IF REQUIRED.

CONSTRUCTION ON EXISTING ROADS

1. A ROAD OCCUPANCY PERMIT MUST BE OBTAINED PRIOR TO COMMENCING ANY WORKS WITHIN THE ROAD ALLOWANCE. CONTRACTOR TO CONFORM TO REQUIREMENTS OF THE ROAD OCCUPANCY PERMIT.
2. A MINIMUM OF 48 HOURS PRIOR TO COMMENCING CONSTRUCTION WITHIN THE MUNICIPAL RIGHT OF WAY THE CONTRACTOR MUST CONTACT THE FOLLOWING:

TOWN OF CALEDON PUBLIC WORKS	905-584-2272
REGION OF PEEL	905-781-7800
ENBRIDGE GAS	905-758-7924
HYDRO ONE	519-941-1211
BELL CANADA	416-296-6927
DUFFERIN-PEEL CATHOLIC SCHOOL BOARD	905-890-1221
PEEL DISTRICT SCHOOL BOARD	905-890-1010
FIRE AND EMERGENCY SERVICES	905-584-1477

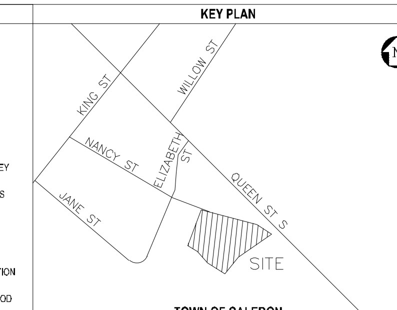
3. ROAD MUST BE MAINTAINED TO A MINIMUM OF ONE LANE AT ALL TIMES FOR EMERGENCY ACCESS AS PER THE OTM GUIDELINES.
4. NOTIFICATION TO FIRE AND EMERGENCY SERVICES AND SCHOOL BOARDS REQUIRED TO BE PROVIDED A MINIMUM OF 48 HOURS PRIOR TO COMMENCING WORK.
5. CONTRACTOR IS RESPONSIBLE FOR PROPERLY COMPACTING THE BACKFILL MATERIAL AND REPLACING ALL SURFACES TO ORIGINAL CONDITION OR BETTER.
6. BACKFILL MATERIALS AND PLACEMENT SHALL CONFORM TO THE ROAD OCCUPANCY PERMIT UNLESS OTHERWISE SPECIFIED.
7. IF APPLICABLE, SUBDRAINS MUST REMAIN INTACT AND AT GRADE DURING CONSTRUCTION AND RESTORATION.
8. TOP ASPHALT ASPHALT COLD JOINTS TO BE SEALED WITH T-BOND HOT ASPHALT JOINT TAPE FROM MCASPHALT OR DENSO BRAND BY DENSO. THESE SEALANTS ARE TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRAFFIC CONTROL IN ACCORDANCE WITH OTM BOOK 7 - TEMPORARY CONDITIONS.
10. THE MINIMUM PAVEMENT DESIGN FOR THE ASPHALT DRIVEWAY APRON WITHIN THE MUNICIPAL ROAD ALLOWANCE SHALL BE AS FOLLOWS:
   -40mm HL3 ASPHALT
   -50mm HL8 ASPHALT
   -150mm GRANULAR 'A'
   -300mm GRANULAR 'B'

FIRE ROUTE NOTES

1. FIRE ROUTE TO COMPLY WITH THE ONTARIO BUILDING CODE.
2. STRUCTURAL DESIGN OF THE FIRE ROUTE IS REQUIRED TO SUPPORT AN 18-TON VEHICLE.
3. FIRE ROUTE CHANGE IN GRADIENT NOT MORE THAN 1 IN 12.5 OVER A MINIMUM DISTANCE OF 15m.
4. CENTRELINE RADIUS OF FIRE ROUTE NOT LESS THAN 12m.
5. FIRE ROUTE SIGNS SHALL BE PERMANENTLY MOUNTED ON A RIGID SIGN POST, POLE OR BUILDING STRUCTURE.
6. FIRE ROUTE SIGNS SHALL BE ERECTED AT A HEIGHT OF BETWEEN 1.9m AND 2.5m AS MEASURED FROM THE EDGE OF THE TRAVELLED PORTION OF THE DESIGNATED ROUTE, TO THE BOTTOM EDGE OF THE SIGN.
7. FIRE ROUTE SIGNS SHALL BE INSTALLED AT A DISTANCE OF BETWEEN 0.3m AND 3m FROM THE TRAVELLED PATH EDGE OF THE DESIGNATED ROUTE.
8. STANDARD FIRE ROUTE SIGNS SHALL BE INSTALLED ALONG THE ROUTE AT APPROXIMATELY 30m INTERVALS OR AS FREQUENTLY AS IS NECESSARY TO IDENTIFY THE ROUTE IN THE JUDGEMENT OF THE FIRE CHIEF OR HIS/HER DESIGNATE.

PRELIMINARY
SUBJECT TO DETAILED DESIGN

KEY PLAN



KEY PLAN — TOWN OF CALEDON — NTS

LEGEND

— — —	PROPERTY LINE
264	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
267.20	EXISTING ELEVATION
266.30	PROPOSED ELEVATION
→	EX. DRAINAGE DIRECTION
MIN 2% →	PROP. DRAINAGE DIRECTION AND SLOPE
▬	PROP. DOUBLE CATCHBASIN
■	PROP. SINGLE CATCHBASIN
	PROP. CURB OUTLET

5m 0 5m 10m
SCALE 1:250

BENCHMARK

TOPOGRAPHIC SURVEY BY ERTL SURVEYORS. REFER TO SURVEY BY SAME FOR FURTHER INFORMATION.
REGION OF PEEL BENCHMARK No. 73
ELEVATION = 226.567m

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DESIGNED BY | APPROVED BY

N°	Date	Revisions	Dwn.	Dsg'd.	Chk'd.
A	21/JUN/19	ISSUED FOR REZONING APPLICATION	KC	KC	RJW

Client:
AMA INVESTMENTS

Project Name:
84 NANCY STREET
TOWN OF CALEDON, REGION OF PEEL

Title Name:
SITE SERVICING AND GRADING PLAN

Drawing N°: **17-185-01** | Sheet N°: 1 OF 1 | Scale: 1:250 | Rev. N°: A

ATTACHMENT B

FUNCTIONAL SERVICING REPORT

84 NANCY STREET, TOWN OF CALEDON

Enclosures:

- Stormwater Management Calculations

TABLE A.1

STORM WATER MANAGEMENT COMPUTATIONS

REZONING APPLICATION

84 Nancy Street

TOWN OF CALEDON

REGION OF PEEL

AREA CALCULATIONS

Catchment ID	Landscape Area	Hard Surface	Contolled Building Roof	Total Area	C
A	0	0	2266.672	2266.672	0.90
B	38.453	460.153	0	498.606	0.85
C	128.393	270.144	0	398.537	0.69
D	30.925	742.442	0	773.367	0.87
E	55.383	320.959	0	376.342	0.80
F	232.198	159.913	0	392.111	0.52
G	0	245.776	0	245.776	0.90
H	167.851	27.829	0	195.68	0.34
Property	3293.812	2227.216	2266.672	7787.7	0.63

WATER BALANCE - RETENTION OF 5mm ON-SITE

WATER BALANCE REQUIRED

It was assumed that pervious areas would naturally retain the first 5mm of precipitation.

Total Impervious Area	4494	sq.m.
Water Balance Volume (5mm)	22.5	cu.m.

TABLE A.2
STORM WATER MANAGEMENT COMPUTATIONS
REZONING APPLICATION
84 Nancy Street
TOWN OF CALEDON
REGION OF PEEL

SITE STORMWATER MANAGEMENT CALCULATIONS: **2-Year**

PART A: **ROOF TOP CONTROLS**

Building Roof
Roof area to be fitted with control flow roof drains, per Zurn ZCF-121 "Control Flo" Roof Drain or equal rated at 18.9 liters/minute per 25.4 mm of depth per notch for dead level roof.

Roof Area	=	2266.7	sq.m		
Intensity	=	85.7	mm/h		
Tc	=	10.0	min.		
No. of drains	=	12			
Notches/drain	=	1			
Max. Rainfall Ponding Depth	=	26.8	mm		
Peak Roof Release Rate	=	4.0	L/s	===>	17.61 L/s/ha
Equiv. Roof Runoff Coeff.	=	0.07			

PART B: **PRE-DEVELOPMENT CONDITION**

LAND USE	RUNOFF COEFF.	AREA (sq.m)	AC
GRASSED	0.25	7033.5	1758.4
TOTALS:		7033.5	1758.4
COMPOSITE C			0.25

POST-DEVELOPMENT CONDITION
ROOF (TO 42 L/s/ha) + UNCONTROLLED SURFACE:

USE	RUNOFF COEFF.	AREA (sq.m)	AC
CONTROLLED BUILDING ROOF	0.07	2266.7	167.6
LANDSCAPE	0.25	3240.4	810.1
ASPHALT/SIDEWALK	0.90	2280.7	2052.6
TOTALS:		2227.2 7787.7	3030.3
PROPOSED SITE COMPOSITE C			0.39

PART C: **DESIGN RELEASE RATES**

IDF CURVE USING RATIONAL METHOD
I = a/(b+Tc)^c

DESIGN STORM PARAMETERS			
	a	b	c
2-Year	1070	7.85	0.8759

DESIGN RELEASE RATE (ROOF AND CONTROLLED SURFACE)		
ITEM	**(min. & mm/h)**	**Flow L/s**
Pre-Development (2-year)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	85.7	41.9
Post-Development (with Control-Flow Roof Drains)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	85.7	72.2

PART C: **ROOF PONDING DEPTH DETERMINATION**

Building Roof

MASS INFLOW-OUTFLOW CURVE
FOR DETENTION STORAGE TO CONTROL PEAK ROOF RELEASE RATE

Roof Area: 0.227 ha
C: 0.90

TIME (min.)	TIME (seconds)	RAINFALL (mm/h)	AC (X 1.25)	INLET VOLUME (cu.m)	RELEASE RATE (L/sec)	VOLUME (cu.m)	STORAGE VOLUME (cu.m)
10	600	85.7	0.26	36.4	1.2	0.7	35.7
15	900	69.0	0.26	44.0	1.4	1.3	42.7
20	1200	58.1	0.26	49.4	1.6	1.9	47.4
…							
60	3600	26.6	0.26	67.9	2.2	8.0	59.9
65	3900	25.0	0.26	69.1	2.3	8.8	60.2
70	4200	23.6	0.26	70.2	2.3	9.7	60.5
75	4500	22.3	0.26	71.2	2.3	10.5	60.7
80	4800	21.2	0.26	72.2	2.4	11.4	60.8

STORAGE VOLUME REQ'D TO MAINTAIN DESIGN RELEASE RATE (cu.m) 60.8
MAXIMUM ROOF PONDING DEPTH (mm): 26.8

PART D: **SURFACE STORAGE**
STAGE STORAGE CURVE FOR REQUIRED QUANTITY CONTROL DETENTION

MASS INFLOW-OUTFLOW CURVE
FOR DETENTION STORAGE TO CONTROL PEAK RELEASE RATE

Area: 0.779 ha
C: 0.39

TIME min.	TIME seconds	RAINFALL mm/hour	AC	INLET VOLUME cu.m	RELEASE RATE L/s	VOLUME cu.m	STORAGE VOLUME cu.m
10	600	85.7	0.30	43.3	41.9	25.1	18.2
15	900	69.0	0.30	52.3	41.9	37.7	14.6
20	1200	58.1	0.30	58.6	41.9	50.2	8.4
25	1500	50.2	0.30	63.4	41.9	62.8	0.6
30	1800	44.4	0.30	67.2	41.9	75.4	-8.1

STORAGE VOLUME TO MAINTAIN DESIGN RELEASE RATE (cu.m): 18.2

TABLE A.3
STORM WATER MANAGEMENT COMPUTATIONS
REZONING APPLICATION
84 Nancy Street
TOWN OF CALEDON
REGION OF PEEL

SITE STORMWATER MANAGEMENT CALCULATIONS: 5-Year

PART A: ROOF TOP CONTROLS

Building Roof
Roof area to be fitted with control flow roof drains, per Zurn ZCF-121 "Control Flo" Roof Drain or equal rated at 18.9 liters/minute per 25.4 mm of depth per notch for dead level roof.

Roof Area	=	2266.7	sq.m		
Intensity	=	109.7	mm/h		
Tc	=	10.0	min.		
No. of drains	=	12			
Notches/drain	=	1			
Max. Rainfall Ponding Depth	=	38.2	mm		
Peak Roof Release Rate	=	5.7	L/s	===>	25.08 L/s/ha
Equiv. Roof Runoff Coeff.	=	0.08			

PART B: PRE-DEVELOPMENT CONDITION

LAND USE	RUNOFF COEFF.	AREA (sq.m)	AC
GRASSED	0.25	7033.5	1758.4
TOTALS:		7033.5	1758.4
COMPOSITE C			0.25

POST-DEVELOPMENT CONDITION
ROOF (TO 42 L/s/ha) + UNCONTROLLED SURFACE:

USE	RUNOFF COEFF.	AREA (sq.m)	AC
CONTROLLED BUILDING ROOF	0.08	2266.7	186.6
LANDSCAPE	0.25	3240.4	810.1
ASPHALT/SIDEWALK	0.90	2280.7	2052.6
TOTALS:		2227.2 7787.7	3049.3
PROPOSED SITE COMPOSITE C			0.39

PART C: **DESIGN RELEASE RATES**

IDF CURVE USING RATIONAL METHOD
I = a/(b+Tc)^c

DESIGN STORM PARAMETERS			
	a	b	c
5-Year	1593	11	0.8789

DESIGN RELEASE RATE (ROOF AND CONTROLLED SURFACE)		
ITEM	**(min. & mm/h)**	**Flow L/s**
Pre-Development (5-year)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	109.7	53.6
Post-Development (with Control-Flow Roof Drains)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	109.7	92.9

PART C: **ROOF PONDING DEPTH DETERMINATION**

Building Roof

MASS INFLOW-OUTFLOW CURVE
FOR DETENTION STORAGE TO CONTROL PEAK ROOF RELEASE RATE

Roof Area: 0.227 ha
C: 0.90

TIME (min.)	TIME (seconds)	RAINFALL (mm/h)	AC (X 1.25)	INLET VOLUME (cu.m)	RELEASE RATE (L/sec)	VOLUME (cu.m)	STORAGE VOLUME (cu.m)
10	600	109.7	0.26	46.6	1.5	0.9	45.7
15	900	90.9	0.26	58.0	1.9	1.7	56.2
20	1200	77.9	0.26	66.2	2.2	2.6	63.6
…							
60	3600	37.6	0.26	95.9	3.1	11.3	84.5
65	3900	35.4	0.26	97.8	3.2	12.5	85.3
70	4200	33.5	0.26	99.6	3.3	13.7	85.9
75	4500	31.8	0.26	101.3	3.3	15.0	86.3
80	4800	30.2	0.26	102.8	3.4	16.2	86.6

STORAGE VOLUME REQ'D TO MAINTAIN DESIGN RELEASE RATE (cu.m) 86.6
MAXIMUM ROOF PONDING DEPTH (mm): 38.2

PART D: **SURFACE STORAGE**
STAGE STORAGE CURVE FOR REQUIRED QUANTITY CONTROL DETENTION

MASS INFLOW-OUTFLOW CURVE
FOR DETENTION STORAGE TO CONTROL PEAK RELEASE RATE

Area: 0.779 ha
C: 0.39

TIME min.	TIME seconds	RAINFALL mm/hour	AC	INLET VOLUME cu.m	RELEASE RATE L/s	VOLUME cu.m	STORAGE VOLUME cu.m
10	600	109.7	0.30	55.7	53.6	32.1	23.6
15	900	90.9	0.30	69.3	53.6	48.2	21.1
20	1200	77.9	0.30	79.2	53.6	64.3	14.9
25	1500	68.3	0.30	86.8	53.6	80.4	6.4
30	1800	60.9	0.30	92.9	53.6	96.4	-3.6

STORAGE VOLUME TO MAINTAIN DESIGN RELEASE RATE (cu.m): 23.6

TABLE A.4
STORM WATER MANAGEMENT COMPUTATIONS
REZONING APPLICATION
84 Nancy Street
TOWN OF CALEDON
REGION OF PEEL

SITE STORMWATER MANAGEMENT CALCULATIONS: **10-Year**

PART A: **ROOF TOP CONTROLS**

Building Roof
Roof area to be fitted with control flow roof drains, per Zurn ZCF-121 "Control Flo" Roof Drain or equal rated at 18.9 liters/minute per 25.4 mm of depth per notch for dead level roof.

Roof Area	=	2266.7	sq.m		
Intensity	=	134.2	mm/h		
Tc	=	10.0	min.		
No. of drains	=	12			
Notches/drain	=	1			
Max. Rainfall Ponding Depth	=	46.2	mm		
Peak Roof Release Rate	=	6.9	L/s	===>	30.36 L/s/ha
Equiv. Roof Runoff Coeff.	=	0.08			

PART B: **PRE-DEVELOPMENT CONDITION**

LAND USE	RUNOFF COEFF.	AREA (sq.m)	AC
GRASSED	0.25	7033.5	1758.4
TOTALS:		7033.5	1758.4
COMPOSITE C			0.25

POST-DEVELOPMENT CONDITION

LAND USE	RUNOFF COEFF.	AREA (sq.m)	AC
CONTROLLED BUILDING ROOF	0.08	2266.7	184.7
LANDSCAPE	0.25	3293.8	823.5
ASPHALT/SIDEWALK	0.90	2227.2	2004.5
TOTALS:		7787.7	3012.6
PROPOSED SITE COMPOSITE C			0.39

PART C: **DESIGN RELEASE RATES**

IDF CURVE USING RATIONAL METHOD
I = a/(b+Tc)^c

DESIGN STORM PARAMETERS			
	a	b	c
5-Year	1593	11	0.8789
10-Year	2221	12	0.908

DESIGN RELEASE RATE (ROOF AND CONTROLLED SURFACE)		
ITEM	**(min. & mm/h)**	**Flow L/s**
Pre-Development (5-year)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	109.7	53.6
Pre-Development (10-year)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	134.2	65.5
Post-Development (with Control-Flow Roof Drains)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	134.2	112.3

PART C: **ROOF PONDING DEPTH DETERMINATION**

Building Roof

MASS INFLOW-OUTFLOW CURVE
FOR DETENTION STORAGE TO CONTROL PEAK ROOF RELEASE RATE

Roof Area: 0.227 ha
C: 0.90

TIME (min.)	TIME (seconds)	RAINFALL (mm/h)	AC (X 1.25)	INLET VOLUME (cu.m)	RELEASE RATE (L/sec)	VOLUME (cu.m)	STORAGE VOLUME (cu.m)
10	600	134.2	0.26	57.0	1.9	1.1	55.9
15	900	111.4	0.26	71.0	2.3	2.1	68.9
20	1200	95.5	0.26	81.2	2.7	3.2	78.0
…							
60	3600	45.7	0.26	116.6	3.8	13.8	102.8
65	3900	43.0	0.26	118.8	3.9	15.2	103.6
70	4200	40.6	0.26	120.9	4.0	16.7	104.2
75	4500	38.5	0.26	122.7	4.0	18.1	104.6
80	4800	36.6	0.26	124.4	4.1	19.6	104.8

STORAGE VOLUME REQ'D TO MAINTAIN DESIGN RELEASE RATE (cu.m) 104.8
MAXIMUM ROOF PONDING DEPTH (mm): 46.2

PART D: **SURFACE STORAGE**
STAGE STORAGE CURVE FOR REQUIRED QUANTITY CONTROL DETENTION

MASS INFLOW-OUTFLOW CURVE
FOR DETENTION STORAGE TO CONTROL PEAK RELEASE RATE

Area: 0.779 ha
C: 0.39

TIME min.	TIME seconds	RAINFALL mm/hour	AC	INLET VOLUME cu.m	RELEASE RATE L/s	VOLUME cu.m	STORAGE VOLUME cu.m
10	600	134.2	0.30	67.4	53.6	32.1	35.2
15	900	111.4	0.30	83.9	53.6	48.2	35.7
20	1200	95.5	0.30	95.9	53.6	64.3	31.6
25	1500	83.7	0.30	105.0	53.6	80.4	24.7
30	1800	74.6	0.30	112.4	53.6	96.4	15.9

STORAGE VOLUME TO MAINTAIN DESIGN RELEASE RATE (cu.m): 35.7

TABLE A.5
STORM WATER MANAGEMENT COMPUTATIONS
REZONING APPLICATION
84 Nancy Street
TOWN OF CALEDON
REGION OF PEEL

SITE STORMWATER MANAGEMENT CALCULATIONS: **25-Year**

PART A: **ROOF TOP CONTROLS**

Building Roof
Roof area to be fitted with control flow roof drains, per Zurn ZCF-121 "Control Flo" Roof Drain or equal rated at 18.9 liters/minute per 25.4 mm of depth per notch for dead level roof.

Roof Area	=	2266.7	sq.m		
Intensity	=	156.5	mm/h		
Tc	=	10.0	min.		
No. of drains	=	12			
Notches/drain	=	1			
Max. Rainfall Ponding Depth	=	56.9	mm		
Peak Roof Release Rate	=	8.5	L/s	===>	37.34 L/s/ha
Equiv. Roof Runoff Coeff.	=	0.09			

PART B: **PRE-DEVELOPMENT CONDITION**

LAND USE	RUNOFF COEFF.	AREA (sq.m)	AC
GRASSED	0.25	7033.5	1758.4
TOTALS:		7033.5	1758.4
COMPOSITE C			0.25

POST-DEVELOPMENT CONDITION

LAND USE	RUNOFF COEFF.	AREA (sq.m)	AC
CONTROLLED BUILDING ROOF	0.09	2266.7	194.7
LANDSCAPE	0.25	3293.8	823.5
ASPHALT/SIDEWALK	0.90	2227.2	2004.5
TOTALS:		7787.7	3022.6
PROPOSED SITE COMPOSITE C			0.39

PART C: **DESIGN RELEASE RATES**

IDF CURVE USING RATIONAL METHOD
I = a/(b+Tc)^c

DESIGN STORM PARAMETERS			
	a	b	c
5-Year	1593	11	0.8789
25-Year	3158	15	0.9335

DESIGN RELEASE RATE (ROOF AND CONTROLLED SURFACE)		
ITEM	**(min. & mm/h)**	**Flow L/s**
Pre-Development (5-year)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	109.7	53.6
Pre-Development (25-year)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	156.5	76.4
Post-Development (with Control-Flow Roof Drains)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	156.5	131.4

PART C: **ROOF PONDING DEPTH DETERMINATION**

Building Roof

MASS INFLOW-OUTFLOW CURVE
FOR DETENTION STORAGE TO CONTROL PEAK ROOF RELEASE RATE

Roof Area: 0.227 ha
C: 0.90

TIME (min.)	TIME (seconds)	RAINFALL (mm/h)	AC (X 1.25)	INLET VOLUME (cu.m)	RELEASE RATE (L/sec)	VOLUME (cu.m)	STORAGE VOLUME (cu.m)
10	600	156.5	0.26	66.5	2.2	1.3	65.2
15	900	132.0	0.26	84.1	2.8	2.5	81.7
20	1200	114.3	0.26	97.2	3.2	3.8	93.3
…							
60	3600	56.1	0.26	143.1	4.7	16.9	126.2
65	3900	52.8	0.26	146.0	4.8	18.7	127.3
70	4200	49.9	0.26	148.5	4.9	20.5	128.1
75	4500	47.3	0.26	150.9	5.0	22.3	128.6
80	4800	45.0	0.26	153.0	5.0	24.1	128.9

STORAGE VOLUME REQ'D TO MAINTAIN DESIGN RELEASE RATE (cu.m) 128.9
MAXIMUM ROOF PONDING DEPTH (mm): 56.9

PART D: **SURFACE STORAGE**
STAGE STORAGE CURVE FOR REQUIRED QUANTITY CONTROL DETENTION

MASS INFLOW-OUTFLOW CURVE
FOR DETENTION STORAGE TO CONTROL PEAK RELEASE RATE

Area: 0.779 ha
C: 0.39

TIME min.	TIME seconds	RAINFALL mm/hour	AC	INLET VOLUME cu.m	RELEASE RATE L/s	VOLUME cu.m	STORAGE VOLUME cu.m
10	600	156.5	0.30	78.8	53.6	32.1	46.7
15	900	132.0	0.30	99.7	53.6	48.2	51.5
20	1200	114.3	0.30	115.2	53.6	64.3	50.9
25	1500	100.9	0.30	127.1	53.6	80.4	46.7
30	1800	90.4	0.30	136.6	53.6	96.4	40.2

STORAGE VOLUME TO MAINTAIN DESIGN RELEASE RATE (cu.m): 51.5

TABLE A.6
STORM WATER MANAGEMENT COMPUTATIONS
REZONING APPLICATION
84 Nancy Street
TOWN OF CALEDON
REGION OF PEEL

SITE STORMWATER MANAGEMENT CALCULATIONS: 50-Year

PART A: ROOF TOP CONTROLS

Building Roof
Roof area to be fitted with control flow roof drains, per Zurn ZCF-121 "Control Flo" Roof Drain or equal rated at 18.9 liters/minute per 25.4 mm of depth per notch for dead level roof.

Roof Area	=	2266.7	sq.m		
Intensity	=	176.2	mm/h		
Tc	=	10.0	min.		
No. of drains	=	12			
Notches/drain	=	1			
Max. Rainfall Ponding Depth	=	64.4	mm		
Peak Roof Release Rate	=	9.6	L/s	===>	42.29 L/s/ha
Equiv. Roof Runoff Coeff.	=	0.09			

PART B: PRE-DEVELOPMENT CONDITION

LAND USE	RUNOFF COEFF.	AREA (sq.m)	AC
GRASSED	0.25	7033.5	1758.4
TOTALS:		7033.5	1758.4
COMPOSITE C			0.25

POST-DEVELOPMENT CONDITION

LAND USE	RUNOFF COEFF.	AREA (sq.m)	AC
CONTROLLED BUILDING ROOF	0.09	2266.7	195.9
LANDSCAPE	0.25	3293.8	823.5
ASPHALT/SIDEWALK	0.90	2227.2	2004.5
TOTALS:		7787.7	3023.8
PROPOSED SITE COMPOSITE C			0.39

PART C: **DESIGN RELEASE RATES**

IDF CURVE USING RATIONAL METHOD
I = a/(b+Tc)^c

DESIGN STORM PARAMETERS			
	a	b	c
5-Year	1593	11	0.8789
50-Year	3886	16	0.9495

DESIGN RELEASE RATE (ROOF AND CONTROLLED SURFACE)		
ITEM	**(min. & mm/h)**	**Flow L/s**
Pre-Development (5-year)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	109.7	53.6
Pre-Development (50-year)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	176.2	86.1
Post-Development (with Control-Flow Roof Drains)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	176.2	148.0

PART C: **ROOF PONDING DEPTH DETERMINATION**

Building Roof

MASS INFLOW-OUTFLOW CURVE
FOR DETENTION STORAGE TO CONTROL PEAK ROOF RELEASE RATE

Roof Area: 0.227 ha
C: 0.90

TIME (min.)	TIME (seconds)	RAINFALL (mm/h)	AC (X 1.25)	INLET VOLUME (cu.m)	RELEASE RATE (L/sec)	VOLUME (cu.m)	STORAGE VOLUME (cu.m)
10	600	176.2	0.26	74.9	2.5	1.5	73.4
15	900	149.1	0.26	95.1	3.1	2.8	92.2
20	1200	129.4	0.26	110.0	3.6	4.3	105.6
…							
60	3600	63.6	0.26	162.3	5.3	19.2	143.1
65	3900	59.9	0.26	165.5	5.4	21.2	144.3
70	4200	56.6	0.26	168.4	5.5	23.2	145.1
75	4500	53.6	0.26	171.0	5.6	25.3	145.7
80	4800	51.0	0.26	173.3	5.7	27.3	146.0

STORAGE VOLUME REQ'D TO MAINTAIN DESIGN RELEASE RATE (cu.m) 146.0
MAXIMUM ROOF PONDING DEPTH (mm): 64.4

PART D: **SURFACE STORAGE**
STAGE STORAGE CURVE FOR REQUIRED QUANTITY CONTROL DETENTION

MASS INFLOW-OUTFLOW CURVE
FOR DETENTION STORAGE TO CONTROL PEAK RELEASE RATE

Area: 0.779 ha
C: 0.39

TIME min.	TIME seconds	RAINFALL mm/hour	AC	INLET VOLUME cu.m	RELEASE RATE L/s	VOLUME cu.m	STORAGE VOLUME cu.m
10	600	176.2	0.30	88.8	53.6	32.1	56.7
15	900	149.1	0.30	112.7	53.6	48.2	64.5
20	1200	129.4	0.30	130.4	53.6	64.3	66.1
25	1500	114.3	0.30	144.1	53.6	80.4	63.7
30	1800	102.5	0.30	155.0	53.6	96.4	58.5

STORAGE VOLUME TO MAINTAIN DESIGN RELEASE RATE (cu.m): 66.1

TABLE A.7
STORM WATER MANAGEMENT COMPUTATIONS
REZONING APPLICATION
84 Nancy Street
TOWN OF CALEDON
REGION OF PEEL

SITE STORMWATER MANAGEMENT CALCULATIONS: **100-Year**

PART A: **ROOF TOP CONTROLS**

Building Roof
Roof area to be fitted with control flow roof drains, per Zurn ZCF-121 "Control Flo" Roof Drain or equal rated at 18.9 liters/minute per 25.4 mm of depth per notch for dead level roof.

Roof Area	=	2266.7	sq.m		
Intensity	=	196.5	mm/h		
Tc	=	10.0	min.		
No. of drains	=	12			
Notches/drain	=	1			
Max. Rainfall Ponding Depth	=	72.5	mm		
Peak Roof Release Rate	=	10.8	L/s	===>	47.63 L/s/ha
Equiv. Roof Runoff Coeff.	=	0.09			

PART B: **PRE-DEVELOPMENT CONDITION**

LAND USE	RUNOFF COEFF.	AREA (sq.m)	AC
GRASSED	0.25	7033.5	1758.4
TOTALS:		7033.5	1758.4
COMPOSITE C			0.25

POST-DEVELOPMENT CONDITION

LAND USE	RUNOFF COEFF.	AREA (sq.m)	AC
CONTROLLED BUILDING ROOF	0.09	2266.7	197.7
LANDSCAPE	0.25	3293.8	823.5
ASPHALT/SIDEWALK	0.90	2227.2	2004.5
TOTALS:		7787.7	3025.7
PROPOSED SITE COMPOSITE C			0.39

PART C: **DESIGN RELEASE RATES**

IDF CURVE USING RATIONAL METHOD
I = a/(b+Tc)^c

DESIGN STORM PARAMETERS			
	a	b	c
5-Year	1593	11	0.8789
100-Year	4688	17	0.9624

DESIGN RELEASE RATE (ROOF AND CONTROLLED SURFACE)		
ITEM	**(min. & mm/h)**	**Flow L/s**
Pre-Development (5-year)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	109.7	53.6
Pre-Development (100-year)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	196.5	96.0
Post-Development (with Control-Flow Roof Drains)		
Time of Concentration (min.):	10.0	
Peak Intensity & Flow:	196.5	165.2

PART C: **ROOF PONDING DEPTH DETERMINATION**

Building Roof

MASS INFLOW-OUTFLOW CURVE
FOR DETENTION STORAGE TO CONTROL PEAK ROOF RELEASE RATE

Roof Area: 0.227 ha
C: 0.90

TIME (min.)	TIME (seconds)	RAINFALL (mm/h)	AC (X 1.25)	INLET VOLUME (cu.m)	RELEASE RATE (L/sec)	VOLUME (cu.m)	STORAGE VOLUME (cu.m)
10	600	196.5	0.26	83.5	2.7	1.6	81.9
15	900	166.9	0.26	106.4	3.5	3.1	103.3
20	1200	145.1	0.26	123.4	4.0	4.9	118.5
…							
60	3600	71.7	0.26	182.8	6.0	21.6	161.2
65	3900	67.5	0.26	186.4	6.1	23.9	162.5
70	4200	63.7	0.26	189.6	6.2	26.1	163.5
75	4500	60.4	0.26	192.5	6.3	28.4	164.1
80	4800	57.4	0.26	195.2	6.4	30.8	164.4

STORAGE VOLUME REQ'D TO MAINTAIN DESIGN RELEASE RATE (cu.m) 164.4
MAXIMUM ROOF PONDING DEPTH (mm): 72.5

PART D: **SURFACE STORAGE**
STAGE STORAGE CURVE FOR REQUIRED QUANTITY CONTROL DETENTION

MASS INFLOW-OUTFLOW CURVE
FOR DETENTION STORAGE TO CONTROL PEAK RELEASE RATE

Area: 0.779 ha
C: 0.39

TIME min.	TIME seconds	RAINFALL mm/hour	AC	INLET VOLUME cu.m	RELEASE RATE L/s	VOLUME cu.m	STORAGE VOLUME cu.m
10	600	196.5	0.30	99.1	53.6	32.1	67.0
15	900	166.9	0.30	126.2	53.6	48.2	78.0
20	1200	145.1	0.30	146.4	53.6	64.3	82.1
25	1500	128.5	0.30	162.0	53.6	80.4	81.6
30	1800	115.3	0.30	174.4	53.6	96.4	78.0

STORAGE VOLUME TO MAINTAIN DESIGN RELEASE RATE (cu.m): 82.1

5 YEAR STORM DESIGN SHEET - PROPOSED DEVELOPMENT

Location			Drainage Area				Runoff			Pipe Flow						
Catchment	From MH	To MH	A (ha)	C	A x C	Acc. A x C	Tc (min)	I (mm/hr)	Q (L/s)	Pipe Length (m)	Pipe Diameter (m)	Pipe Slope (%)	Full Flow Capacity (L/s)	Full Flow Velocity (m/s)	Time of flow (min.)	% full
A	BLDG	MH1	0.23	0.90	0.20	0.20	10.00	109.68	62.15	7.4	0.25	2.00	84.1	1.7	0.07	73.9%
B	MH1	MH2	0.05	0.85	0.04	0.25	10.07	109.35	74.84	15.5	0.30	4.00	193.4	2.7	0.09	38.7%
C	MH2	MH4	0.04	0.69	0.03	0.27	10.17	108.92	82.87	14.0	0.30	6.00	236.9	3.4	0.07	35.0%
D	MH3	MH4	0.08	0.87	0.07	0.07	10.00	109.68	20.59	28.5	0.30	2.00	136.8	1.9	0.25	15.1%
	MH4	MH5	0.00			0.34	10.25	108.56	102.98	10.4	0.38	2.00	248.0	2.2	0.08	41.5%
E	MH5	MH6	0.04	0.80	0.03	0.37	10.32	108.22	111.75	22.6	0.38	5.50	411.2	3.7	0.10	27.2%
F	CBMH	MH6	0.04	0.52	0.02	0.02	10.00	109.68	6.15	6.5	0.25	1.00	59.5	1.2	0.09	10.3%
G	MH6	STORAGE	0.02	0.90	0.02	0.41	10.42	107.77	123.96	6.0	0.45	1.00	285.1	1.8	0.06	43.5%
H	STORAGE	MH7	0.02	0.34	0.01	0.42	10.42	107.77	125.96	3.3	0.38	1.00	175.3	1.6	0.03	71.8%

Notes

Manning's n = 0.013

$$I = \frac{A}{(t_c + B)^C}$$

where: A= 1593

B= 11

C= 0.8789

CONSULTANT: Calder Engineering Ltd.
PROJECT: 84 Nancy Street
PROJECT NO: 17-185
LOCATION: Town of Caledon

TOWN OF CALEDON

Calder Engineering Ltd.

5 YEAR STORM DESIGN SHEET - EXTERNAL

Location			Drainage Area				Runoff			Pipe Flow						
Catchment	From MH	To MH	A (ha)	C	A x C	Acc. A x C	Tc (min)	I (mm/hr)	Q (L/s)	Pipe Length (m)	Pipe Diameter (m)	Pipe Slope (%)	Full Flow Capacity (L/s)	Full Flow Velocity (m/s)	Time of flow (min.)	% full
Property	MH7	MH8	0.80	0.63	0.50	0.50	10.00	109.68	153.55	9.6	0.38	2.00	248.0	2.2	0.07	61.9%
Nancy Street	MH8	MH9	0.70	0.60	0.42	0.92	10.07	109.35	280.67	80.0	0.40	5.00	465.7	3.7	0.36	60.3%
Elizabeth Stree	MH9	MH10	0.57	0.60	0.34	1.27	10.43	107.74	378.87	60.0	0.40	3.00	360.7	2.9	0.35	105.0%
Ex. Sewer			0.00			1.27	10.78	106.22	373.54	20.0	0.40	4.70	451.5	3.6	0.09	82.7%

Notes

Manning's n = 0.013

$$I = \frac{A}{(t_c + B)^C}$$

where: A= 1593

B= 11

C= 0.8789

CONSULTANT: Calder Engineering Ltd.

PROJECT: 84 Nancy Street

PROJECT NO: 17-185

LOCATION: Town of Caledon

TOWN OF CALEDON

Calder Engineering Ltd.