FUNCTIONAL SERVICING and STORMWATER MANAGEMENT REPORT

IN SUPPORT OF

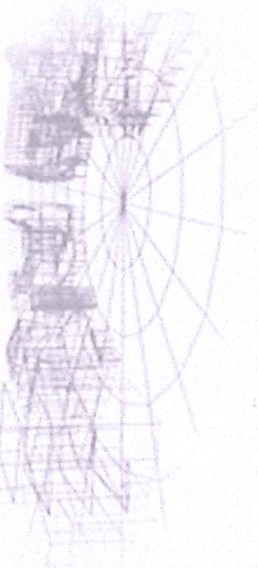
ZONING BY LAW-AMENDMENT and PLAN OF SUBDIVISION

CITY PARK (DIXIE ROAD) INC.

2103-2119 PRIMATE RD., 1351 & 1357 WEALTHY PL., 2116 & 2112 DIXIE RD.

CITY OF MISSISSAUGA

REGIONAL MUNICIPALITY OF PEEL



October 16, 2018

C.E. FILE: 17-017

350 Creditstone Road, Unit 200
Concord, ONTARIO L4K 3Z2

TELEPHONE: (905) 695-2096
FACSIMILE: (905) 695-2099

CE

TABLE OF CONTENTS

PAGE NO.

APPENDIX 'A' – Key Map

APPENDIX 'B' – Credit Valley Conservation Watershed Map

APPENDIX 'C' – Topographic Survey

APPENDIX 'D' – E-mail correspondence with Region of Peel with regards to Watermain Distribution Modelling dated November 3, 2017 .

APPENDIX 'E'
- Servicing Plan
- Grading Plan

APPENDIX 'F' – Sanitary Design Sheet

APPENDIX 'G' – External Sanitary Sewer Drainage Plan – Applewood East Acres

APPENDIX 'H' – E-mail correspondence with City with regards to storm quality control requirements.

APPENDIX 'I'
- Infiltration Quantity Analysis.
- ChamberMaxx Design Specifications
- Pre-treatment OGS manhole design – CDS 2020 model

APPENDIX 'J'
- Stormwater Quantity Control Analysis
- Stage Storage Analysis
- Pre-development Storm Tributary Plan
- Storm Tributary Plan

APPENDIX 'K' – Geotechnical Investigation prepared by Bruce A Brown Associates Limited, dated October 4, 2018

A.0. - INTRODUCTION

The property is located on the West side of Dixie Road, East of Primate Road, and North of Wealthy Place, City of Mississauga, see Appendix 'A' for Key Map. The subject site is known as 2103-2119 Primate Road, 1351 & 1357 Wealthy Place, 2116 & 2112 Dixie Road, City of Mississauga, Regional Municipality of Peel and is approximately 1.2651 Ha in size. The subject lands are located within a residential area. Due to the established Regional Road Widening of Dixie Road, the total developable area has been reduced to 1.1115 ha. The site location is within Lake Ontario Shoreline East Tributaries Subwatershed. Refer to Credit Valley Conservation Watersheds & Subwatersheds Map in Appendix 'B'. The proposal consists of a 8 Freehold detached units fronting existing municipal Primate Road, and 18 condominium detached units fronting a proposed common element condo road. In support of the proposed development, we provide this report to identify the methodology of the municipal servicing. More specifically the report will substantiate the ability to provide municipal sanitary, water servicing, and provide a conceptual resolution for storm water management.

B.0. - EXISTING TOPOGRAPHICAL CHARACTERISTICS

See attached in Appendix 'C' the Topographic Survey. The site consists of 8 existing detached homes situated on developed residential lots, with sparse tree covering. The properties also have pool and shed structures. These will be removed to accommodate the development.

The majority (79.6%) of the property presently drains in north-easterly direction towards the Regional Dixie Road R.O.W. The balance of the subject lands; approximately 20.4% drains in a southerly direction towards the road ditches of Wealthy Place and Primate Road R.O.W. In addition, a significant external area (0.2829 ha) to the west consisting of existing rear-lot grassed areas drains through the subject property to the Dixie Road R.O.W. Refer to Appendix 'J' for the Pre-development Storm Tributary Plan illustrating existing drainage patterns, catchments and associated areas.

The existing grading of the Site is comprised of moderate slopes, with an approximately 2.8 metre difference in elevation between the highest and lowest point of the site. The highest grade is at an elevation of 111.59 m adjacent to North property line of the subject lands, and the lowest elevation is 108.77m at the Southeast corner.

C.0. WATER SUPPLY

The water supply capacity must be confirmed to ensure the proposed site plan development can be adequately serviced per Region of Peel requirements. As per the e-mail correspondence with Region of Peel dated November 3, 2017, Appendix 'D', external modelling information will be provided by the Region after the first submission of the Functional Servicing Report. Watermain analysis will be carried out after the modelling information is provided.

The 8 freehold detached dwellings fronting Primate Road will be serviced by the existing 150mm dia. main via new 19mm dia. copper services.

The site plan will be serviced by a single 150mm dia. main connection to Wealthy Place. A valvebox and detector valve chamber is placed inside the property line at Wealthy Place per Region of Peel standards. The proposed 150mm diameter watermain connection will run from the Site driveway entrance (at Wealthy Place cul-de-sac)- southerly along the existing Wealthy Place roadway and connect to an existing 150mm diameter watermain on the east side of Wealthy Place, north of Primate Road. Internally 150mm dia. main will be looped to provide better circulation. Two private hydrants are proposed to provide 75m fire coverage for the site plan. The hydrant on the North side also serves as a flushing point. Each detached unit will have a separate 19mm dia. copper service complete with a waterbox. The watermain layout has been presented on the Servicing Plan - Drawing # 17-017-02, Appendix 'E'. It is expected that no future/external developments will be connecting to this site plan, thus the mains do not need to be oversized. Once the deep services have been constructed up to base asphalt, full occupancy demands are expected to occur in a year.

D.0. SANITARY SERVICING

There are 8 existing detached homes on the subject property that are to be demolished. Two homes are serviced from Dixie Road sanitary sewer, two homes are serviced from Wealthy Place, and three homes are serviced from Primate Road. The 8 service connections are to be de-commissioned.

D.1. CONDOMINIUM DEVELOPMENT (LOTS 1 – 18)

The proposed development is comprised of 18 detached condominium dwellings (Lot 1 – 18) on 0.8817ha fronting onto a condominium road. Based on Region of Peel's "Sanitary Sewer Design Criteria Manual – Section 2" criteria the peak sanitary flow from the proposed development is calculated as follows:

Residential population estimation

(Based on 50 persons per hectare)

= 50 persons/hectare x 0.8817 ha = 44.09 persons

Average daily flow

(Based on 302.8 litres / capita / day)

= 44.09 persons x 302.8 / (24x60x60) = 0.15 litres / second

Peaking Factor

(Based on the Harmon formula)

$K = 1 + 14/ (4 + P^{1/2})$, where P is population in thousands

$K = 1 + 14/ (4 + (44.09/1000)^{1/2}) = 4.3$, however the peaking factor is limited to the range of 2 – 4.

Maximum Sanitary Flow

(Based on Avg. daily flow times the Peaking factor)

Max. Sanitary Flow = 0.15 litres / second x 4 = 0.62 litres / second

Wet Weather Infiltration

Area (0.2 litres / second / gross hectare) = 0.2 x 0.8817 = 0.18 litres / second

Manhole (0.28 litres / second / manhole) = 0.28 x 7 = 1.96 litres / second

Sewer (0.028 litres / second / m) = 0.028 x 192.3 = 5.38 litres /second

Total = 0.18 + 1.96 + 5.38 = 7.52 litres / second

Total Design Sanitary Flow

(Based on Max. Sanitary Flow + Infiltration)

Total Design Sanitary Flow = 0.62 + 7.52 = 8.14 litres / second

To service the site for sanitary sewage a 250mm diameter connection, Region's minimum size, is proposed to connect to the existing 250 mm diameter municipal sanitary sewer within Wealthy Place. Refer to the Site Servicing Plan (Dwg# 17-017-02) for details of the proposed connection. A 250mm diameter sewer at 1.5% slope has a full flow capacity of 72.77 litres per second well above the calculated total design flow of 8.14 litres per second (approximately 11.2%). See attached Sanitary Sewer Design Chart, Appendix 'F'. It is expected that no future/external development will be connected to this site plan, thus sewers do not need to be oversized. Once the sewers have been constructed up to base asphalt, full occupancy demands are expected to occur in a year. As per the external sanitary sewer drainage plan for the surrounding area (Appendix 'G') the site discharge is conveyed by a 250mm sewer along Wealthy Place, Courtland Crescent, Harvest Road before ultimately discharging to a 1050mm dia. sanitary trunk sewer on North Service Road.

D.2. FREE-HOLD LOTS (LOTS 19 – 26)

There are 8 detached homes on 0.2284 ha fronting onto municipal Primate Road.

Residential population estimation

(Based on 50 persons per hectare)

= 50 persons/hectare x 0.2284 ha = 11.42 persons

Average daily flow

(Based on 302.8 litres / capita / day)

= 11.42 persons x 302.8 / (24x60x60) = 0.04 litres / second

Peaking Factor

(Based on the Harmon formula)

$K = 1 + 14/ (4 + P^{1/2})$, where P is population in thousands

$K = 1 + 14/ (4 + (11.4 / 1000)^{1/2}) = 4.41$, however the peaking factor is limited to the range of 2 – 4.

Maximum Sanitary Flow

(Based on Avg. daily flow times the Peaking factor)

Max. Sanitary Flow = 0.04 litres / second x 4 = 0.16 litres / second

Wet Weather Infiltration

Area (0.2 litres / second / gross hectare) = 0.2 x 0.2284 = 0.05 litres / second

Total Design Sanitary Flow

(Based on Max. Sanitary Flow + Infiltration)

Total Design Sanitary Flow = 0.16 + .05 = 2.1 litres / second

To service these 8 lots, residential service connections will be made to the existing 250mm diameter sewer on Primate Road. The existing 250mm diameter sewer at 0.81% slope has a full flow capacity of 53.47 litres per second well above the calculated total design flow of 2.1 litres per second (approximately 3.9%). Similar to the site plan, the freehold lots discharge is conveyed by a 250mm sewer along Primate Road, Courtland Crescent, Harvest Road before ultimately discharging to a 1050mm dia. sanitary trunk sewer on North Service Road.

E.0. - STORM WATER MANAGEMENT

As per consultation with the City of Mississauga and Region of Peel; the Pre-development Storm Tributary Plan verifies that the primary storm outlet for this Site is Dixie Road. Under pre-development conditions, as shown on DWG 17-017-05 in Appendix 'J' a total of 1.168 ha of area, identified as Area A, drains north-easterly towards Dixie Road and includes external drainage area from the west. The balance of the tributary area equal to 0.2265 hectares, identified as Area B, drains southerly to Primate Road and easterly to Wealthy Place.

E.1. STORMWATER QUANTITY CONTROL

City and Region criteria for this site requires the 100 year post- development flows be restricted to 2 year pre-development flow level.

As mentioned in a previous section, Section A.0.; the total developable land is 1.1115 Ha. This excludes the lands that will be conveyed for Regional road widening, which will be graded uncontrolled towards Dixie Road. The free-hold lots; Lots 19 – 26 (0.2287 ha) identified as Area D, will be graded to drain overland towards Primate Road via a rear to front drainage pattern design. The balance of the site (0.8828 ha) identified as Area C, along with an external area of 0.2829 ha from the west has been designed to drain to the Dixie Road storm sewer system. Please refer to DWG 17-017-06 in Appendix 'J' for the Storm Tributary Plan.

E.1.1. DIXIE ROAD OUTLET (CONDOMINIUM DEVELOPMENT)

The Dixie Road Outlet defines the primary stormwater outlet for proposed development limiting the maximum Site discharge to pre-development levels. Under post-development conditions a total area of

1.1657 ha (includes external) will be captured and controlled internally by the Site storm sewer system and discharged to the existing 300mm dia. storm sewer on Dixie Road.

The maximum allowable site discharge is limited to the 2-year pre-development discharge of **66.34 lps.** A SWM control system is proposed to provide sufficient quantity control and on-Site storage restricting discharge to the maximum allowable 2-year pre-development level. A 125 mm diameter orifice pipe is proposed at the inlet of the Storm Control Manhole (CTRL STMMH). A controlled discharge of 50.95 lps (over-controlled) will outlet via the orifice into the proposed 300 mm dia. storm sewer and connect to the existing CBMH#22 on Dixie Road. From CBMH#22 the existing 300mm dia. storm sewer drains easterly. In addition a very minor uncontrolled landscaped area will drain overland directly to Dixie Road having a peak flow of 0.40 lps. Therefore the total discharge from the Site is 51.35 lps and considerably less than the pre-development flow level.

Please find within Appendix 'J', the Stormwater Management Quantity Analysis (using the modified 'Rationale' method) with the applicable calculations.

Refer to these calculations for details of control, on-site underground storage within the proposed sewer SWM system, and orifice pipe design for the CTRL STMMH. The proposed storm sewer system layout is indicated on the Servicing Plan Dwg# 17-017-02.

The maximum storage required during the 100-year storm event is 213.91 cubic metres. For a design head of 1.31 metres; representative of a maximum Top of Water Level (TWL) elevation of 108.72 metres, the underground storage (storm sewer pipe network & ChamberMaxx) within the proposed storm sewer system totals 215.30 cu.m., thereby meeting the storage requirement. Refer to Appendix 'I' for design details of the ChamberMaxx underground storage facility as provided by the supplier / manufacturer.

As noted previously; to control discharge a standard 125 mm dia. orifice pipe (@ Inv 107.35) is proposed immediately upstream of CTRL STMMH.

E.1.2. PRIMATE ROAD OUTLET (FREE-HOLD LOTS)

The free-hold lots fronting Primate Road must drain independently of the condominium portion of the development and are tributary to the existing storm sewer on Primate Road. As on-site control and storage is not feasible for single detached lots fronting an existing municipal road; a direct comparison of pre to post development drainage has been completed and is provided in the Stormwater Management Quantity Analysis (Appendix 'J'). As noted in section D and E of the Analysis; the pre and post development flows are approximately equal and therefore impacts to the downstream storm sewer system will be negligible. In addition, given that rear yard soak away pits are proposed to capture roof drainage for these lots; runoff will be further reduced under post-development conditions. Further details of the soak away pit designs will be provided in Section E.2. of this report.

E.2. STORMWATER RETENTION MEASURES (LIDs)

Retaining runoff on- site will reduce the runoff volume to the existing drainage systems on Dixie Road and Primate Road. The water balance target for the subject development is based on the following criteria: *the minimum on-site runoff retention requires the proponent to retain all runoff from a small design rainfall event, typically **5 mm** through infiltration, evapotranspiration and rainwater reuse.*

E.2.1. GEOTECHNICAL ASSESSMENT

A geotechnical investigation was conducted by Bruce A Brown Associates Limited and the complete report is attached in Appendix 'K'. Please refer to the report titled 'Geotechnical Investigation for 2116 and 2122 Dixie Road' dated October 4th, 2018. As identified from the five test pits dug; the native soils consist predominately of sandy soils and inherently have high permeability. As noted in the geotechnical report the sandy soils have superior hydraulic conductivity equal to 5 x 10-5 m/sec or 180 mm/hour,

which well exceeds the minimum MOECC requirement of 15 mm/hour. In addition, as indicated with the test pit data; the groundwater ranges from 3.3 to 3.6 metres below existing ground elevation.

Low Impact Development (LID) techniques such as subsurface infiltration trenches and soakaway pits will be highly effective for stormwater retention.

E.2.2. ON-SITE WATER RETENTION (CONDOMINIUM DEVELOPMENT, LOTS 1-18)

ROOF AREAS

Rear-yard sub-surface soak away pits have been designed to capture roof drainage from all condominium lots. As noted above; the minimum capture requirement is 5mm of daily rainfall however these infiltration pits will be designed to capture 10mm daily rainfall. Based on an average roof area of 100 square metres the 10mm volume per house / lot is equal to 1.00 cubic metres. Using a depth of pit of 0.75 metres with a bottom area of 4.50 square metres(3.0mx1.5m); the trench volume provided is 3.38 cubic metres. Clear stone storage media is placed in the pits having a void ratio of 0.40; therefore the retained water storage volume is 1.35 cubic metres which exceeds the minimum 1.00 cubic metre design volume. Although the roof drainage is considered clean and free of grit / silt; the additional storage provides a longevity factor for the soak away pit. Refer to Appendix 'I' for the Infiltration Quantity Analysis – Soak Away Pit Design.

PAVEMENT AND LANDSCAPED AREAS

The balance of runoff from the condominium Site is generated from the private roadway, parking spaces, driveways and soft landscaped areas. All drainage from these areas is captured into the proposed storm sewer / stormwater management system and eventually conveyed to the ChamberMaxx quantity storage facility at the downstream end of the system. As noted in previous Section E.1.1. of this report; the underground ChamberMaxx facility provides quantity control storage up to the 100-year event, however as the chambers are open bottom they also provide a means for infiltration. Again, infiltration potential is very high for this development given the permeable native sandy soils. A clear stone bed

below the entire footprint of the ChamberMaxx facility provides the require storage media for the infiltration design. The infiltration bed below the ChamberMaxx facility will be designed to retain 5mm of daily rainfall from the contributing drainage areas. Based on a total drainage area of 7036 square metres (pavement and landscaped areas); the 5mm daily volume requirement is equal to 18.81 cubic metres. Using a infiltration bed depth of 0.20 metres with a bottom area of 240.00 square metres; the trench volume provided is 48.00 cubic metres. Clear stone storage media is used in the infiltration bed having a void ratio of 0.40; therefore the retained water storage volume is 19.20 cubic metres which exceeds the 18.81 cubic metre design volume requirement. Given the potential for pollutants / grit contained in the stormwater being directed to the facility; pre-treatment is provided using an oil/grit separator manhole immediately upstream of the ChamberMaxx facility and is detailed in Section 6.3. of this report. It should be also noted that infiltration systems are recommended by the MOECC to be a minimum of 1 metre above groundwater or bedrock levels. The infiltration bed below the Chambermaxx is at a bottom elevation of 107.2 metres while the measured groundwater as confirmed in the Geotechnical Investigation is at an approximate elevation of 106.2 metres. Although, this elevation difference just meets the 1 metre recommendation; the Geotechnical Engineer further advises the 1 metre minimum preferred criteria is not crucial given the properties of the native sandy soils. The highly permeable soils reduce potential for mounding of groundwater below the infiltration bed and provide long-term quality benefits being a highly effective filter media. Refer to Appendix 'I' for the Infiltration Quantity Analysis – Infiltration Bed Design.

6.2.3 ON-SITE WATER RETENTION (FREE- HOLD LOTS, LOTS 19 – 26)

Rear-yard sub-surface soak away pits have been designed to capture roof drainage from all the free-hold lots fronting Primate Road. As noted previously; the minimum capture requirement is 5mm of daily rainfall however these infiltration pits will be designed to capture 10mm daily rainfall. Based on roof

areas ranging from 93 to 116 square metres; the 10mm volume per house / lot ranges from 0.93 to 1.17cubic metres. Using a depth of pit of 0.75 metres with a bottom area of 4.50 square metres(3.0mx1.5m); the trench volume provided is 3.38 cubic metres. Clear stone storage media is placed in the pits having a void ratio of 0.40; therefore the retained water storage volume is 1.35 cubic metres which exceeds the minimum design volumes. Although the roof drainage is considered clean and free of grit / silt; the additional storage provides a longevity factor for the soak away pit. Refer to Appendix 'I' for the Infiltration Quantity Analysis – Soak Away Pit Design.

WATER BALANCE

As described above, runoff from roof areas is retained; however the balance of the lot areas including soft landscaped areas (lawns) and driveways will drain overland to Primate Road. To confirm that the Water Balance target of 5mm is achieved for the free-hold lots; the percentage volume of daily rainfall that will be retained on-site under post-development conditions requires an analysis of the drainage patterns, surface conditions and implemented retention measures (i.e. soft landscaping, and soak away pits). Refer to Appendix 'I' for the Water Balance calculation for the free-hold lots (Lots 19-26). As indicated in the calculations; the 5mm Daily Rainfall volume for the Area D is **11.44 cu.m.** Based on the characteristics of various surface areas (initial abstraction) and roof drainage capture; a total daily retained volume of **14.16 cu.m.** is achieved for these lots. Therefore, **123.8 % (14.16 / 11.44)** of the average daily rainfall, which corresponds to **6.19 mm,** will be retained on-site. **The minimum on-site water retention target of 5 mm will be achieved under post-development conditions.**

6.3. STORMWATER QUALITY CONTROL

As per e-mail correspondence with the City, no quality control will be required, see Appendix 'H'. However, given that the infiltration bed below the ChamberMaxx facility will receive stormwater from pavement and soft landscaped areas that may contain pollutants / grit; pre-treatment is highly recommended.

Oil / Grit Separator Manhole

As indicated on the Servicing Plan we have proposed installation of an oil / grit separator manhole as a pre-treatment measure. A CDS unit; **CDS20-20m** will be installed upstream of Chambermaxx unit, downstream of the site storm system capturing drainage from condominium development Site.

The **CDS20_20m** manhole has been sized according to the **site drainage area of 1.1657 hectares** for Level 1 (Enhanced Protection) quality control (min. 80% TSS removal), as required by the Credit Valley Conservation Authority (CVC).

The manufacturer/supplier provided sizing verification; the output file printout is attached in Appendix 'I' for reference. As noted, a **CDS20-20m** provides **83.0% annual TSS removal and treats 98% of annual runoff volume.** A cross-sectional detail of the model, also provided by the manufacturer is shown on the engineering drawing #17-017-09.

F.0. EROSION AND SEDIMENT CONTROLS (ESC)

Prior to the Building Construction Program, the on-site sediment controls for the impoundment and filtering of the sediment-laden flow shall consist of the following measures:

A siltation control fence shall be installed along the entire perimeter of the development lands. This will control the quality of runoff and localize the areas of intense erosion and sedimentation.

Construction access mud-mat will be installed to minimize the transportation of on-site soils onto existing municipal roads (i.e.: limit mud-tracking). Filter fabric shall be wrapped around all proposed catch-basin and rear-lot catchbasin lids in accordance with approved details. The proposed catchbasins shall be constructed with 0.60 meter sumps. Salt and sand from winter road maintenance, silt and other debris washed into the catchbasins will be collected in the sump areas instead of entering the storm conveyance system. For details on the proposed ESC measures refer to DWGs 17-017-07 & 08: Erosion Sedimentation Control Plan Stage I & II respectively.

Regular maintenance and all necessary repairs shall be performed including the safe disposal of all sediment material. Maintenance, which in most cases will require the removal of sediment and the installation of a new device, shall be conducted when the level of performance of the implemented control device is reduced to less than 40% of its initial capacity based on the Engineers observation.

G.0. CONCLUSIONS AND RECOMMENDATIONS

In summary, the existing municipal services are such that they can support the subject development.

On a basis of our investigation and examination, it is the conclusion of the writer that:

- The subject development can be drained for sanitary sewage purposes.
- The existing municipal water supply can adequately service the subject development;
- Adequate storm drainage and storm water management facilities qualitative can be provided within the subject development area to neutralize the impact of urbanized runoff.
- No additional storm runoff shall be conveyed from the subject lands to Dixie Road
- The first 5mm of daily rainfall will be retained On-Site.

The existing municipal services are such that they can support the subject development.

Respectfully Submitted:

CONDELAND ENGINEERING LIMITED

PLANNERS, PROJECT MANAGERS AND CONSULTING ENGINEERS

Shazia Nishat

Shazia Nishat , P.Eng.

Intermediate Designer

Michael Hall

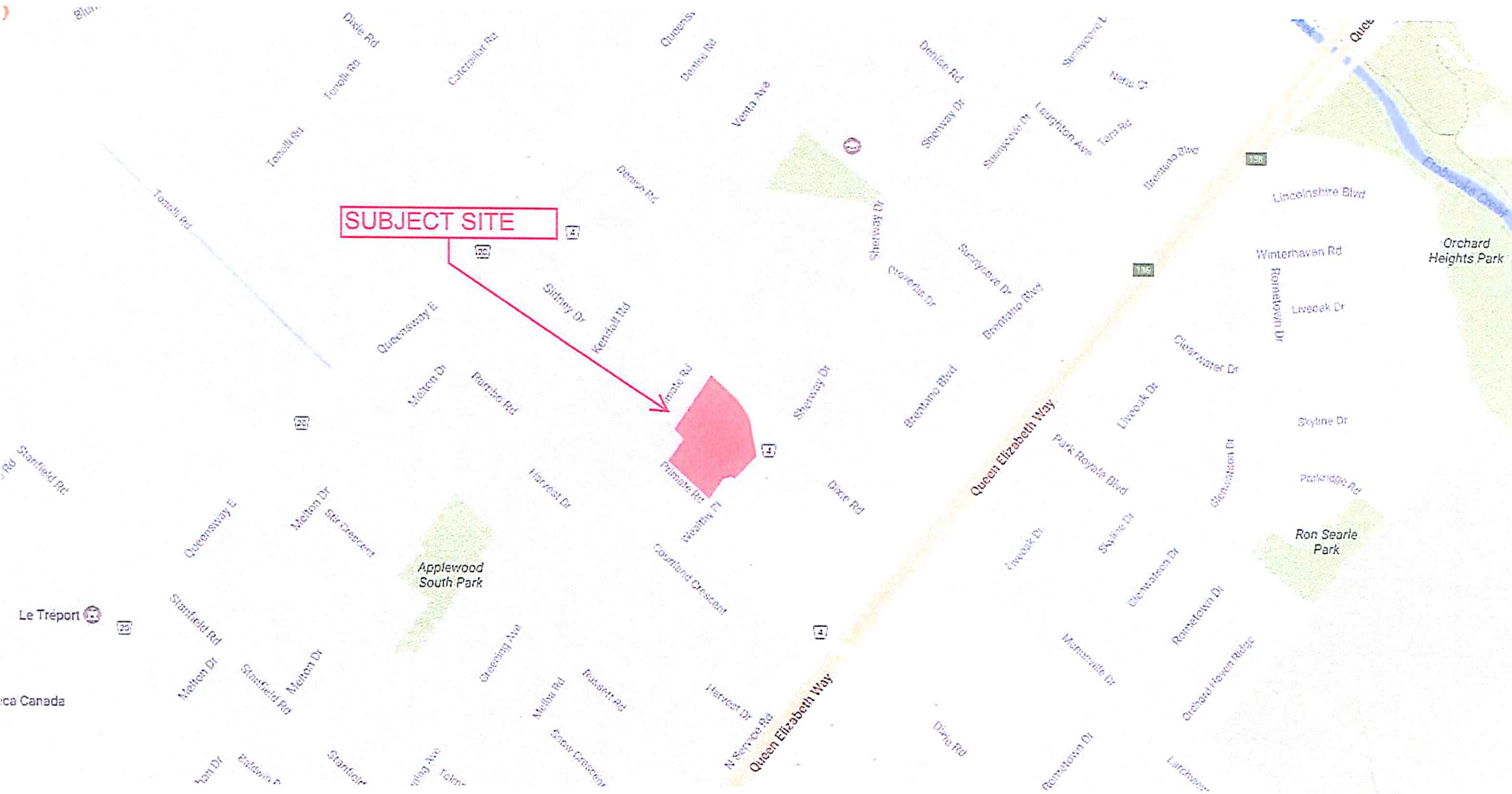
Michael Hall, P.Eng.

Senior Engineer

LICENSED PROFESSIONAL ENGINEER
M. E. HALL
OCT 05 2018
PROVINCE OF ONTARIO

APPENDIX 'A'

- Key Map

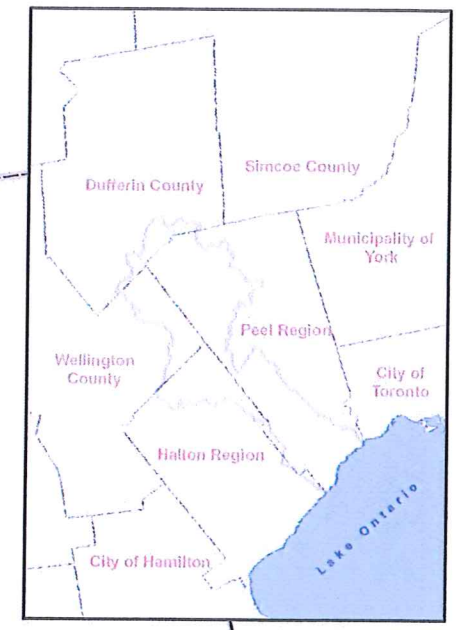

SUBJECT SITE
Queen Elizabeth Way
Applewood South Park
Ron Searle Park
Orchard Heights Park
Le Tréport
Lincolnshire Blvd
Winterhaven Rd
Venta Ave
Sherway Dr
Brentano Blvd
Park Royale Blvd
Queensway E
Melton Dr
Kendall Rd
Dixie Rd
Courtland Crescent
Stanfield Rd
Tonolli Rd
Clearwater Dr
Skyline Dr

KEY MAP N.T.S.

APPENDIX 'B'

- Credit Valley Conservation Watershed Map

Credit Valley Conservation Watershed



WHO WE ARE

The Credit River watershed is comprised of 1,000 square kilometers of land, drained by the Credit River and its 1,500 kilometers of tributaries. It is located in one of the most rapidly urbanizing parts of Canada, within the Greater Toronto area. The river's headwaters are located above the Niagara Escarpment. This area is the source of four rivers: the Credit, Humber, Etobicoke and Nottawasaga. A small part of the Oak Ridges Moraine, as well as a number of other moraines are located within the watershed's boundary.

LAKE ONTARIO SHORELINE EAST TRIBUTARIES SUBWATERSHED

SUBJECT SITE

WHAT IS A WATERSHED?

A watershed is an area of land that drains into a river or a lake. The boundary of a watershed is based on the elevation of a landscape. A drop of water that lands anywhere inside this boundary will eventually end up at the Credit River, before emptying into Lake Ontario. This determination of oundaries is based on the natural shape of the land and therefore the watershed falls across many municipal boundaries. Credit Valley Conservation helps to manage the natural resources found in the Credit River watershed.

WHAT IS A SUBWATERSHED?

A smaller basin within a larger drainage area where all of runoff or base flow drains to a central point of the larger watershed is called subwatershed. Fletcher Creek drains runoff and baseflow from surrounding areas and brings into the central point of the watershed or the Credit River.

0 1 2 4 6 8 Km

- CVC Boundary
- Subwatersheds
- Lakes and Ponds
- Rivers and Streams

Major Transportation Network

- Highway
- Major road

Created June 2009

APPENDIX 'C'

- Topographic Survey

PLAN OF SURVEY SHOWING TOPOGRAPHY OF
LOTS 26, 27, 28, 29, 30 AND 31 AND
PART OF LOT 18
REGISTERED PLAN 473 AND
PART OF LOT 6, CONCESSION 1
SOUTH OF DUNDAS STREET
(GEOGRAPHIC TOWNSHIP OF TORONTO)
CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

SCALE 1:250

RADY-PENTEK & EDWARD SURVEYING LTD., O.L.S.

METRIC

SURVEYOR'S CERTIFICATE

NOTES

BEARING NOTE

DISTANCE NOTE

BENCHMARK NOTE

CAUTION

RADY-PENTEK & EDWARD SURVEYING LTD.
ONTARIO LAND SURVEYORS

Nov 30, 2017 - 08:22:07

APPENDIX 'D'

- E-mail correspondence with Region of Peel with regards to Watermain Distribution Modelling dated November 3, 2017.

Gmail by Google

Steven Nguyen <steven@condeland.com>

City Park (Dixie) Inc. - Watermain Connection Site Plan

Clark, Carol <carol.clark@peelregion.ca> Fri, Nov 3, 2017 at 2:18 PM
To: Steven Nguyen <steven@condeland.com>
Cc: "Sniatenchuk, Bernadette" <bernadette.sniatenchuk@peelregion.ca>, "Frandsen, Iwona" <iwona.frandsen@peelregion.ca>

Good Afternoon Steven,

This site has not been circulated to the Region of Peel, for Site Plan approval and therefore is premature for Site Plan Servicing review. We were also recently requested to provide modelling for this site and advised that Site Plan circulation is required, per the attached email.

With the future Site Servicing Submission, please include the non-refundable $400 First Submission application fee as per current fee by-law 60-2016. Payment shall be in the form of a certified Cheque, money order or bank draft and made payable to the Region of Peel. All fees may be subject to change on annual basis pending Council approval. Once your application is received, it will be forwarded to a Servicing Technical Analyst for review and comments.

Please Refer to the most current Region of Peel Standards and Design Criteria per the links below. This will assist you with your servicing layout . Servicing for the proposed development must comply with the Local Municipality's Requirements for the Ontario Building Code and most current Region of Peel standards.

Complete Public Works Design, Standards Specification & Procedures Manual: http://www.peelregion.ca/pw/other/standards/

Water Design Criteria: http://www.peelregion.ca/pw/other/standards/linear/design/pdfs/water-design.pdf

Sanitary Sewer Design Criteria: http://www.peelregion.ca/pw/other/standards/linear/design/pdfs/sani-sewer.pdf

Storm Sewer Design Criteria: http://www.peelregion.ca/pw/other/standards/linear/design/pdfs/sewer-design.pdf

For location of existing water and sanitary sewer Infrastructure please contact Records at 905-791-7800 extension 7882 or by e-mail at

PWServiceRequests@peelregion.ca.

Please note that Site Servicing approvals are required prior to the local municipality issuing Building Permit.

Regards,

Carol Clark
Supervisor, Site Plan Servicing
Engineering, Development Services
Public Works

(905) 791-7800 ext. 7838
(905) 791-1442
carol.clark@peelregion.ca

Region of Peel
working with you

From: Steven Nguyen [mailto:steven@condeland.com]
Sent: November 3, 2017 10:04 AM
To: Clark, Carol
Subject: City Park (Dixie) Inc. - Watermain Connection Site Plan

[Quoted text hidden]

---------- Forwarded message ----------
From: "Clark, Carol" <carol.clark@peelregion.ca>
To: "Kumar, Abhi" <Abhi.Kumar@wsp.com>, "Sniatenchuk, Bernadette" <bernadette.sniatenchuk@peelregion.ca>
Cc:
Bcc:
Date: Fri, 20 Oct 2017 14:47:21 +0000
Subject: RE: FW: Hydraulic Model Request

Good Morning Abhi,

Thank you, the information you provided is very helpful.

During the Pre-consultation (application number DARC 17-192) comments were provided that modelling will be done with the Plan of Subdivision through the receipt of a Functional Servicing Report. Please refer to the attached link for Functional Servicing Report criteria: http://www.peelregion.ca/pw/other/standards/linear/reports/pdfs/swm-fsr-final-july2009.pdf

We require this report before we can conduct the modelling. If you provide the report and the Subdivision application number, we will review the report and if it is satisfactorily completed, we will forward it for modelling.

Sincerely,

Carol Clark
Supervisor, Site Plan Servicing
Engineering, Development Services
Public Works

(905) 791-7800 ext. 7838
(905) 791-1442
carol.clark@peelregion.ca

Region of Peel
working with you

From: Kumar, Abhi [mailto:Abhi.Kumar@wsp.com]
Sent: October 20, 2017 9:50 AM
To: Clark, Carol
Subject: Re: FW: Hydraulic Model Request

Hey Carol,

Please see my answers highlighted below; I have also attached a site plan for your perusal.

Please let me know if any other info. is needed. Thanks.

- Site Plan number and/or Plan of Subdivision number or any other Planning application number associated with your development

  DARC 17-192

- Site address and/or legal description

  2103-2119 Primate Road, 1351 & 1357 Wealthy Place, 2116 & 2112 Dixie Road, Mississauga (see attachment)

- Connection points and sizes to Peel's infrastructure

  150mm dia. PVC connection to Primate Road, see attach preliminary servicing plan.

- Type of residential development i.e. single family dwelling, townhouses etc.

  8 single detach freehold units and 18 potls single detach.

Thanks,

Abhi

Abhishek Kumar, MSc, EIT

Engineering Intern

Hydrualics

wsp

T+ 1 905-882-1100 #6475

100 Commerce Valley Drive W

Thornhill, Ontario,

L3T 0A1, Canada

APPENDIX 'E'

- Servicing Plan
- Grading Plan

A) PLANNING AND BUILDING DEPARTMENT

I) "I HEREBY CERTIFY THAT THIS DRAWING CONFORMS IN ALL RESPECTS TO THE SITE DEVELOPMENT PLANS AS APPROVED BY THE CITY OF MISSISSAUGA UNDER FILE NUMBER ____________

II) "THE CITY OF MISSISSAUGA REQUIRES THAT ALL WORKING DRAWINGS SUBMITTED TO THE BUILDING DIVISION AS PART OF AN APPLICATION FOR THE ISSUANCE OF A BUILDING PERMIT SHALL BE CERTIFIED BY THE ARCHITECT OF ENGINEER AS BEING IN CONFORMITY WITH THE SITE DEVELOPMENT PLAN AS APPROVED BY THE CITY OF MISSISSAUGA."

III) "GRADES WILL BE MET WITHIN A 33% MAXIMUM SLOPE AT THE PROPERTY LINES AND

IV) "THE STRUCTURAL DESIGN OF ANY RETAINING WALL OVER 0.60M IN HEIGHT OR ANY RETAINING WALL LOCATED ON A PROPERTY LINE IS TO BE SHOWN ON THE SITE GRADING PLAN FOR THIS PROJECT AND IS TO BE APPROVED BY THE CONSULTING ENGINEER FOR THE PROJECT."

CONSTRUCTION & RESTORATION WORKS FOR MUNICIPAL R.O.W.s. PRIMATE ROAD, WEALTHY PLACE AND DIXIE ROAD

1. PROPOSED STORM, SANITARY, AND WATER CONNECTIONS WITHIN EXISTING MUNICIPAL R.O.W.s ARE TO BE BACKFILLED WITH UNSHRINKABLE FILL UP TO BASE OF EXISTING ROAD GRANULAR. EXISTING ROAD GRANULAR AND ASPHALT TO BE MATCHED WITH MINIMUM THICKNESS IN ACCORDANCE WITH CITY STANDARD 2220.03.

2. TRENCH CONSTRUCTION / RESTORATION SHALL BE IN ACCORDANCE WITH CITY STANDARDS 2220.03, 2220.031, AND 2220.032.

3. BOULEVARD AREAS SHALL BE RESTORED TO EXISTING CONDITIONS OR BETTER WITH MIN 150mm THICK TOPSOIL +No.1 NURSERY SOD.

NOTE:
EXISTING CULVERTS TO BE REMOVED

SANITARY MANHOLE DATA

EX.SANMH TOP.108.81 (1200MM DIA) OPSD 701.010 EX. S.INV.105.08 N.INV.105.18	SANMH2A TOP.109.03 (1200MM DIA) OPSD 701.010 W.INV.105.887 NW.INV.105.872 S.INV.105.797	SANMH4A TOP.109.49 (1200MM DIA) OPSD 701.010 N.INV.106.762 E.INV.106.672	SANMH6A TOP.109.08 (1200MM DIA) OPSD 701.010 N.INV.106.151 SE.INV.106.076
SANMH1A TOP.108.95 (1200MM DIA) OPSD 701.010 NW.INV.105.503 SE.INV.105.428	SANMH3A TOP.109.12 (1200MM DIA) OPSD 701.010 W.INV.106.131 E.INV.106.056	SANMH5A TOP.110.26 (1200MM DIA) OPSD 701.010 S.INV.107.511	SANMH7A TOP.109.20 (1200MM DIA) OPSD 701.010 S.INV.106.453

STORM MANHOLE DATA

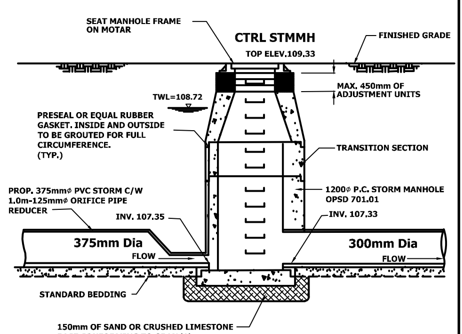
STMMH1 TOP.110.11 (1200MM DIA) OPSD 701.010 S.INV.108.00 W.INV.108.10	STMMH3 TOP.109.14 (1200MM DIA) OPSD 701.010 W.INV.107.55 E.INV.107.53	STMMH5 TOP.109.24 (1200MM DIA) OPSD 701.010 NW.INV.107.70 S.INV.107.62	STMMH7 TOP.109.84 (1200MM DIA) OPSD 701.010 SE.INV.108.05 SW.INV.108.11	
STMMH2 TOP.109.51 (1200MM DIA) OPSD 701.010 N.INV.107.81 E.INV.107.76 W.INV.108.00	STMMH4 TOP.108.91 (1200MM DIA) OPSD 701.010 NW.INV.107.53	STMMH6 TOP.109.13 (1200MM DIA) OPSD 701.010 N.INV.107.52 SE.INV.107.49	CDSMH TOP.109.00 N.INV.107.45 W.INV.107.45 S.INV.107.45 E.INV.107.40	CTRL STMMH TOP.109.33 SE.INV.107.35 NE.INV.107.33

RLCB, DCB AND CATCH BASIN DATA

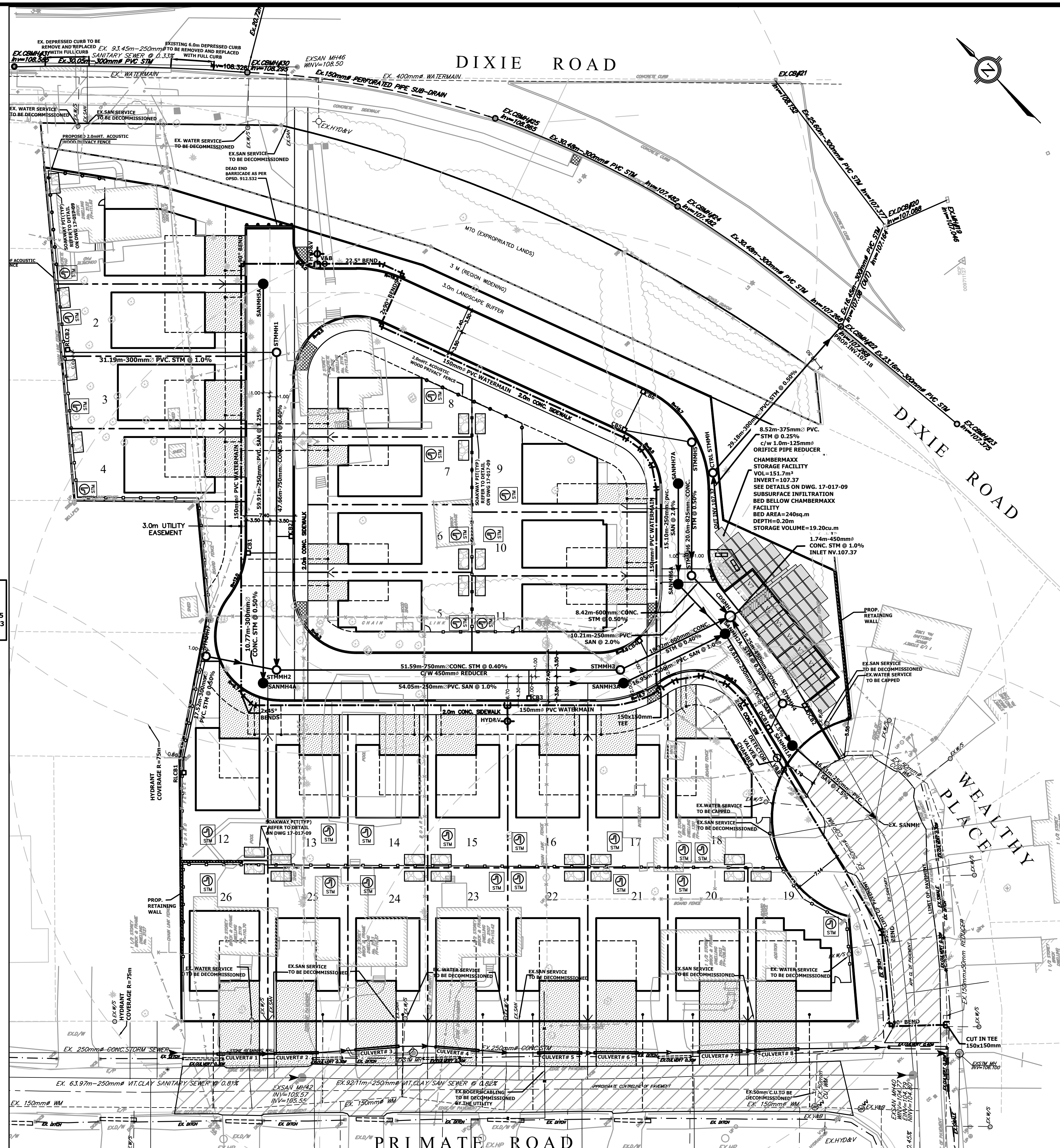
RLCB 1 TOP:109.60 INV.108.20	CB1 TOP.109.67	CB4 TOP.109.20	DCB1 TOP.108.83
RLCB 2 TOP:110.48 INV.108.78	CB2 TOP.109.70	CB5 TOP.109.31	DCB2 TOP.108.83
	CB3 TOP.109.20	CB6 TOP.109.31	

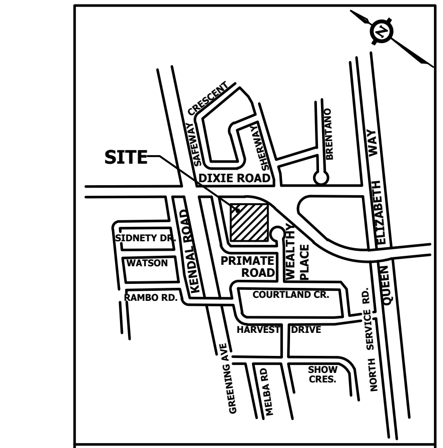
NOTE:
PROPOSED WATERMAIN DEPTH SHALL BE THE STANDARD 1.70m BELOW CENTERLINE OF ROADWAY EXCEPT AT CROSSING LOCATIONS WHERE DEPTH IS SPECIFIED

ORIFICE TUBE TO BE INSTALLED AS PER THIS DETAIL ON THE UPSTREAM OF CTRL STMMH



ORIFICE TUBE DETAIL FOR CONTROL MH
N.T.S.





KEY PLAN
N.T.S.

PLAN OF SURVEY SHOWING TOPOGRAPHY OF LOTS 26, 27, 28, 29, 30 AND 31 AND PART OF LOT 18
REGISTERED PLAN 473 AND PART OF LOT 6, CONCESSION 1 SOUTH OF DUNDAS STREET
(GEOGRAPHIC TOWNSHIP OF TORONTO)
CITY OF MISSISSAUGA REGIONAL MUNICIPALITY OF PEEL

LEGEND

VC VALVE AND CHAMBER	EXISTING CULVERT
VB VALVE AND BOX	PROPOSED CULVERT
EXISTING MANHOLE	PROPOSED WATERMAIN (150mm PVC WATERMAIN)
PROPOSED STM MANHOLE	PROPOSED SAN SERVICE
PROPOSED SAN MANHOLE	PROPOSED 19mm WATER SERVICE AND CURB STOP
PROPOSED CATCHBASIN	PROPOSED DITCH
PROPOSED FIRE HYDRANT	EXISTING DITCH
SUMP PUMP DISCHARGE TO SURFACE (STM)	PROPOSED CENTERLINE/STA
LIMIT OF BOUNDARY	LOT LINE
HYD. HYDRANT 75m RADIUS COVERAGE CONFIRMATION	TACTILE SURFACE
	RETAINING WALL
COMMUNITY MAIL BOX	SOAKWAY PIT (3.0x1.5x0.75) REFER TO DETAIL ON DWG 17-017-09

BENCHMARK NOTE
ELEVATIONS SHOWN HEREON ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK No. 351 HAVING AN ELEVATION OF 108.675 METRES LOCATED ON THE EAST FACE AT THE MAIN ENTRANCE OF APPLEWOOD PUBLIC SCHOOL ON THE WEST SIDE OF HARVEST DRIVE, 30.5 METRES SOUTH OF KENDALL ROAD.

2.	CITY COMMENTS FROM AUGUST 8, 2018	OCT.16/2018	M.E.H.
1.	FIRST SUBMISSION	JAN.09/2018	S.Ng.
REVISION BLOCK		DATE	APPR. BY

CITY PARK (DIXIE) INC.

2103-2119 PRIMATE ROAD, 1351 & 1357 WEALTHY PLACE, 2116& 2112 DIXIE ROAD

LICENSED PROFESSIONAL ENGINEER
M.E.HALL
OCT.16/18
PROVINCE OF ONTARIO

APPROVED AS TO FORM IN RELIANCE UPON THE PROFESSIONAL SKILL AND ABILITY OF CONDELAND ENGINEERING LIMITED AS TO DESIGN AND SPECIFICATION

DIRECTOR OF DEVELOPMENT/ TRANSPORTATION ENGINEERING
DATE: ____________

CONDELAND
CONSULTING ENGINEERS & PROJECT MANAGERS
350 Creditstone Road, Unit 200
Concord, Ontario L4K 3Z2
P: (905) 695-2096
F: (905) 695-2099

MISSISSAUGA
Region of Peel
Working for you

SERVICING PLAN

DESIGNED BY: M.E.H./ S.N.	DATE: OCTOBER 2018	CHECKED BY: M.E.H.
DRAWN BY: G.M./ M.A.	DRAWING NO.	
SCALES HOR 1:300	17-017 – 02	CITY FILE DARC 17-192

1. ALL SURFACE DRAINAGE WILL BE SELF CONTAINED, COLLECTED AND DISCHARGED AT A LOCATION TO BE APPROVED PRIOR TO THE ISSUANCE OF A BUILDING PERMIT.

2. THE PORTIONS OF THE DRIVEWAY WITHIN THE MUNICIPAL BOULEVARD WILL BE PAVED BY THE APPLICANT.

3. ALL EXCESS EXCAVATED MATERIAL WILL BE REMOVED FROM THE SITE

4. THE EXISTING DRAINAGE PATTERN WILL BE MAINTAINED

A) PLANNING AND BUILDING DEPARTMENT

I) "I HEREBY CERTIFY THAT THIS DRAWING CONFORMS IN ALL RESPECTS TO THE SITE DEVELOPMENT PLANS AS APPROVED BY THE CITY OF MISSISSAUGA UNDER FILE NUMBER _____"

II) "THE CITY OF MISSISSAUGA REQUIRES THAT ALL WORKING DRAWINGS SUBMITTED TO THE BUILDING DIVISION AS PART OF AN APPLICATION FOR THE ISSUANCE OF A BUILDING PERMIT SHALL BE CERTIFIED BY THE ARCHITECT OF ENGINEER AS BEING IN CONFORMITY WITH THE SITE DEVELOPMENT PLAN AS APPROVED BY THE CITY OF MISSISSAUGA."

III) "GRADES WILL BE MET WITHIN A 33% MAXIMUM SLOPE AT THE PROPERTY LINES AND

IV) "THE STRUCTURAL DESIGN OF ANY RETAINING WALL OVER 0.60M IN HEIGHT OR ANY RETAINING WALL LOCATED ON A PROPERTY LINE IS TO BE SHOWN ON THE SITE GRADING PLAN FOR THIS PROJECT AND IS TO BE APPROVED BY THE CONSULTING ENGINEER FOR THE PROJECT."

CONSTRUCTION & RESTORATION WORKS FOR MUNICIPAL R.O.W.s. PRIMATE ROAD, WEALTHY PLACE AND DIXIE ROAD

1. PROPOSED STORM, SANITARY, AND WATER CONNECTIONS WITHIN EXISTING MUNICIPAL R.O.W.s ARE TO BE BACKFILLED WITH UNSHRINKABLE FILL UP TO BASE OF EXISTING ROAD GRANULAR. EXISTING ROAD GRANULAR AND ASPHALT TO BE MATCHED WITH MINIMUM THICKNESS IN ACCORDANCE WITH CITY STANDARD 2220.03.

2. TRENCH CONSTRUCTION / RESTORATION SHALL BE IN ACCORDANCE WITH CITY STANDARDS 2220.03, 2220.031, AND 2220.032.

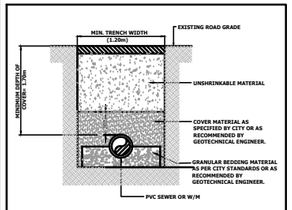
3. BOULEVARD AREAS SHALL BE RESTORED TO EXISTING CONDITIONS OR BETTER WITH MIN 150mm THICK TOPSOIL +No.1 NURSERY SOD.

PROPOSED CULVERT TABLE

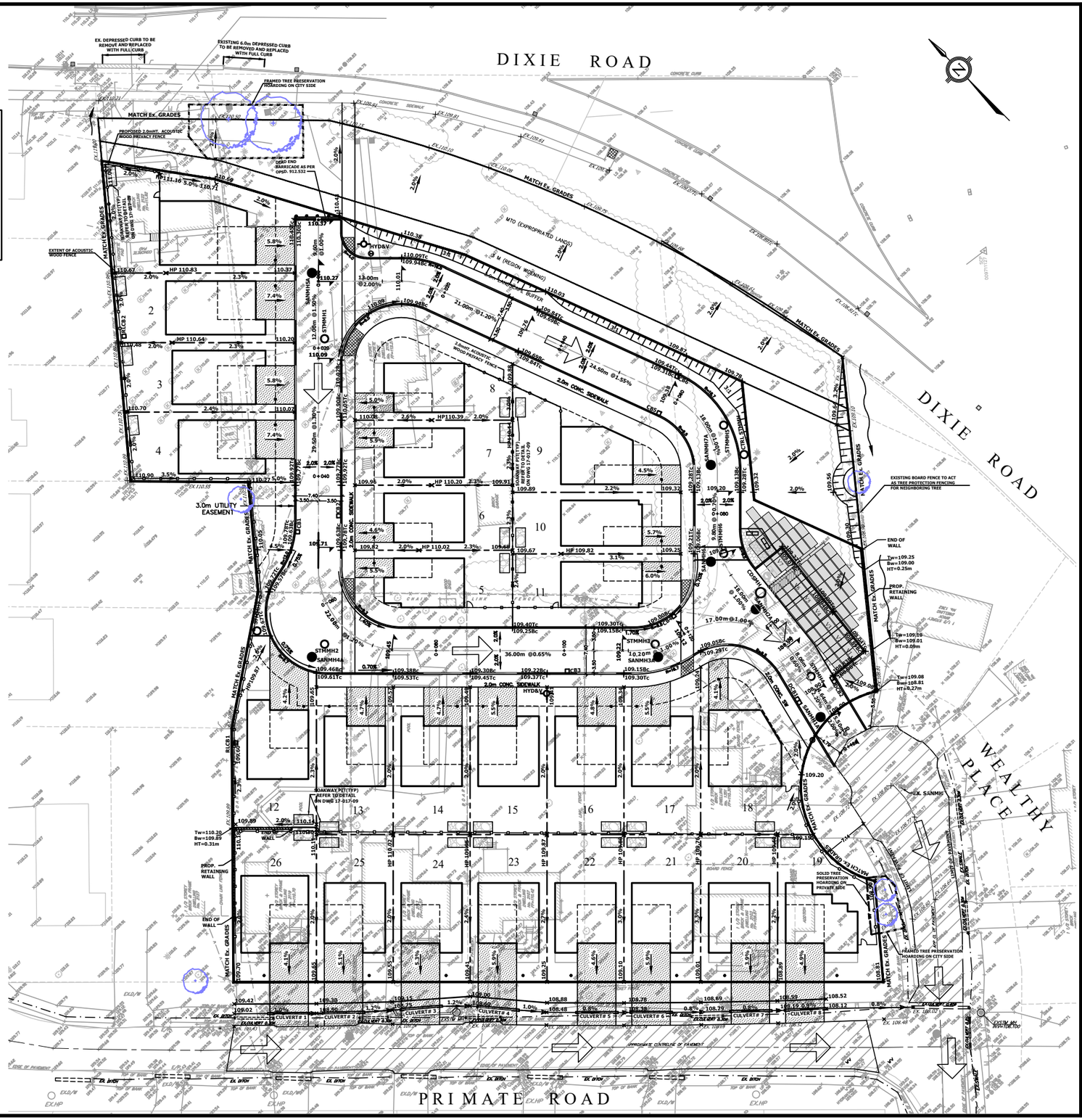
LOT No	SIZE	LENGTH	W INV	E INV
LOT 26	300mmØ	6.6m	108.97	108.90
LOT 25	300mmØ	6.6m	108.89	108.81
LOT 24	300mmØ	6.6m	108.73	108.66
LOT 23	300mmØ	6.6m	108.59	108.52
LOT 22	300mmØ	6.6m	108.44	108.39
LOT 21	300mmØ	6.6m	108.37	108.32
LOT 20	300mmØ	6.6m	108.25	108.20
LOT 19	300mmØ	6.6m	108.18	108.12

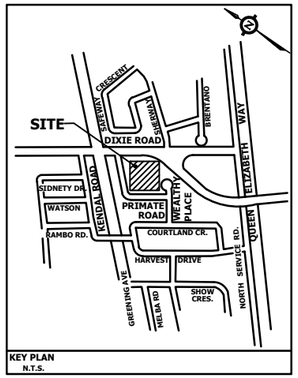
NOTE:
EXISTING CULVERTS TO BE REMOVED

GRIND AND PAVE 40mm
HL3 ASPHALT OVERLAY
FOLLOWING SERVICING WORKS



TYPICAL TRENCH BOX CROSS-SECTION OF PROPOSED SEWER OR WATERMAIN IN EXISTING ROADS (N.T.S)





KEY PLAN
N.T.S.

PLAN OF SURVEY SHOWING TOPOGRAPHY OF LOTS 26, 27, 28, 29, 30 AND 31 AND PART OF LOT 18 REGISTERED PLAN 473 AND PART OF LOT 6, CONCESSION 1 SOUTH OF DUNDAS STREET
(GEOGRAPHIC TOWNSHIP OF TORONTO)
CITY OF MISSISSAUGA REGIONAL MUNICIPALITY OF PEEL

LEGEND

- EXISTING MANHOLE
- PROPOSED STM MANHOLE
- PROPOSED SAN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED FIRE HYDRANT
- SUMP PUMP (DETAIL REFER TO DWG 15-048-09)
- LIMIT OF BOUNDARY
- PROPOSED CHAIN LINK FENCE
- PROPOSED WOOD ACOUSTIC FENCE
- PROPOSED TRANSFORMER
- PROPOSED LIGHT STANDARD
- COMMUNITY MAIL BOX
- 180.00 PROPOSED ELEVATION
- 215.93 EXISTING ELEVATION
- EXISTING LIGHT STANDARD
- EXISTING HYDRO POLE
- STANDARD IRON BAR
- EXISTING WATER METER LOCATION
- PROPOSED DRAINAGE ARROW
- EXISTING DRAINAGE PATTERN
- EMERGENCY OVER LAND FLOW ROUTE
- RETAINING WALL
- 3:1 SLOPE
- SWALE
- SOAKWAY PIT (3.0x1.5x0.75) REFER TO DETAIL ON DWG 17-017-09

BENCHMARK NOTE
ELEVATIONS SHOWN HEREON ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK No. 351 HAVING AN ELEVATION OF 108.675 METRES LOCATED ON THE EAST FACE AT THE MAIN ENTRANCE OF APPLEWOOD PUBLIC SCHOOL ON THE WEST SIDE OF HARVEST DRIVE, 30.5 METRES SOUTH OF KENDALL ROAD.

REVISION BLOCK		DATE	APPR. BY
2.	CITY COMMENTS FROM AUGUST 8, 2018	OCT.16/2018	M.E.H.
1.	FIRST SUBMISSION	JAN.09/2018	S.Ng.

CITY PARK (DIXIE) INC.

2103-2119 PRIMATE ROAD, 1351 & 1357 WEALTHY PLACE, 2116& 2112 DIXIE ROAD

LICENSED PROFESSIONAL ENGINEER M.E.HALL OCT.16/18 PROVINCE OF ONTARIO

APPROVED AS TO FORM IN RELIANCE UPON THE PROFESSIONAL SKILL AND ABILITY OF CONDELAND ENGINEERING LIMITED AS TO DESIGN AND SPECIFICATION

DIRECTOR OF DEVELOPMENT/ TRANSPORTATION ENGINEERING
DATE: _____

CONDELAND
CONSULTING ENGINEERS & PROJECT MANAGERS
350 Creditstone Road, Unit 200 P: (905) 695-2096
Concord, Ontario L4K 3Z2 F: (905) 695-2099

MISSISSAUGA | Region of Peel Working for you

GRADING PLAN

DESIGNED BY: M.E.H./ S.N.	DATE: OCTOBER 2018		CHECKED BY: M.E.H.
DRAWN BY: G.M./ M.A.	DRAWING NO. 17-017-03		
SCALES HOR 1:300			CITY FILE DARC 17-192

APPENDIX 'F'

- Sanitary Design Sheet

LOCATION	FROM M.H.	TO M.H.	AREA (ha)	DENSITY (ppha)	POPULATION	CUMULATIVE AREA (ha)	CUMULATIVE POPULATION	PEAKING FACTOR	PEAK DAY FLOW = (7)(8)/192(L/s)	INFILTRATION (L/s)	TOTAL FLOW = (9) + (12) (L/s)	PIPE LENGTH (m)	PIPE DIAMETER (mm)	GRADIENT (%)	FULL FLOW CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	ACTUAL FLOW VELOCITY (m/s)	UPPER END INVERT (m)	UPPER END MH LOSSES (m)	LOWER END INVERT (m)	PERCENTAGE UTILIZATION (%)	RIM ELEV(m)	COVER TO OBVERT (m)
CITY PARK (DIXIE ROAD) INC. SITE - 2103-2119 PRIMATE RD., 1351 & 1357 WEALTHY PL., 2116 & 2112 DIXIE RD.																							
CITY PARK (DIXIE ROAD) INC. SITE																							
Private Road	**MH5A**	**MH4A**	0.3288	50.00	16	0.3288	16	4.00	0.230	2.023	2.254	59.91	250	1.25%	66.43	1.35	0.61	107.511		106.762	3.4%	110.27	2.51
Private Road	**MH4A**	**MH3A**	0.2175	50.00	11	0.5463	27	4.00	0.383	3.860	4.243	54.05	250	1.00%	59.41	1.21	0.70	106.672	0.090	106.131	7.1%	109.51	2.59
Private Road	**MH3A**	**MH2A**	0.0556	50.00	3	0.6019	30	4.00	0.422	4.626	5.048	16.95	250	1.00%	59.41	1.21	0.72	106.056	0.075	105.887	8.5%	109.14	2.83
Private Road	**MH7A**	**MH6A**	0.2221	50.00	11	0.2221	11	4.00	0.156	0.747	0.903	15.10	250	2.00%	84.02	1.71	0.55	106.453		106.151	1.1%	109.22	2.52
Private Road	**MH6A**	**MH2A**	0.0255	50.00	1	0.2476	12	4.00	0.174	1.318	1.492	10.21	250	2.00%	84.02	1.71	0.64	106.076	0.075	105.872	1.8%	109.09	2.76
Private Road	**MH2A**	**MH1A**	0.0322	50.00	2	0.8817	44	4.00	0.618	6.780	7.398	19.61	250	1.50%	72.77	1.48	0.94	105.797	0.090	105.503	10.2%	108.96	2.91
																			0.075				
MUNICIPAL ROAD																							
Wealthy Place	**MH1A**	**EX.MH41**			0	0.8817	44	4.00	0.618	7.522	8.140	16.51	250	1.50%	72.77	1.48	0.96	105.428	0.075	105.180	11.2%	108.98	3.30
Wealthy Place	**EX.MH41**	**EX.MH40**			0	0.8817	44	4.00	0.618	8.896	9.514	39.07	250	0.77%	52.13	1.06	0.79	105.080	0.100	104.800	18.2%	108.78	3.45

REGION OF PEEL CRITERIA
POPULATION DENSITY CRITERIA:
Single Detached = 50 persons / ha
Dom. Sewage Flows = 302.8 L/cap/day
PEAKING FACTOR = $1 + 14/(4+P^{(1/2)})$, (min. 2 - max. 4)
WET WEATHER INFILTRATION
(area) = 0.2 L/s/ha
(manhole)= 0.28 L/s/mh
(Sewer)= 0.028 L/s/m

PROJECT: CITY PARK (DIXIE ROAD) INC.
CONTRACT NO: 17-017
LOCATION: 2103-2119 PRIMATE RD., 1351 & 1357 WEALTHY PL., 2116 & 2112 DIXIE RD.

MISSISSAUGA, ONTARIO

CONSULTANT: CONDELAND ENGINEERING LIMITED
DESIGNED BY : S.N.
CHECKED BY: M.E.H.
DATE: October 5, 2018

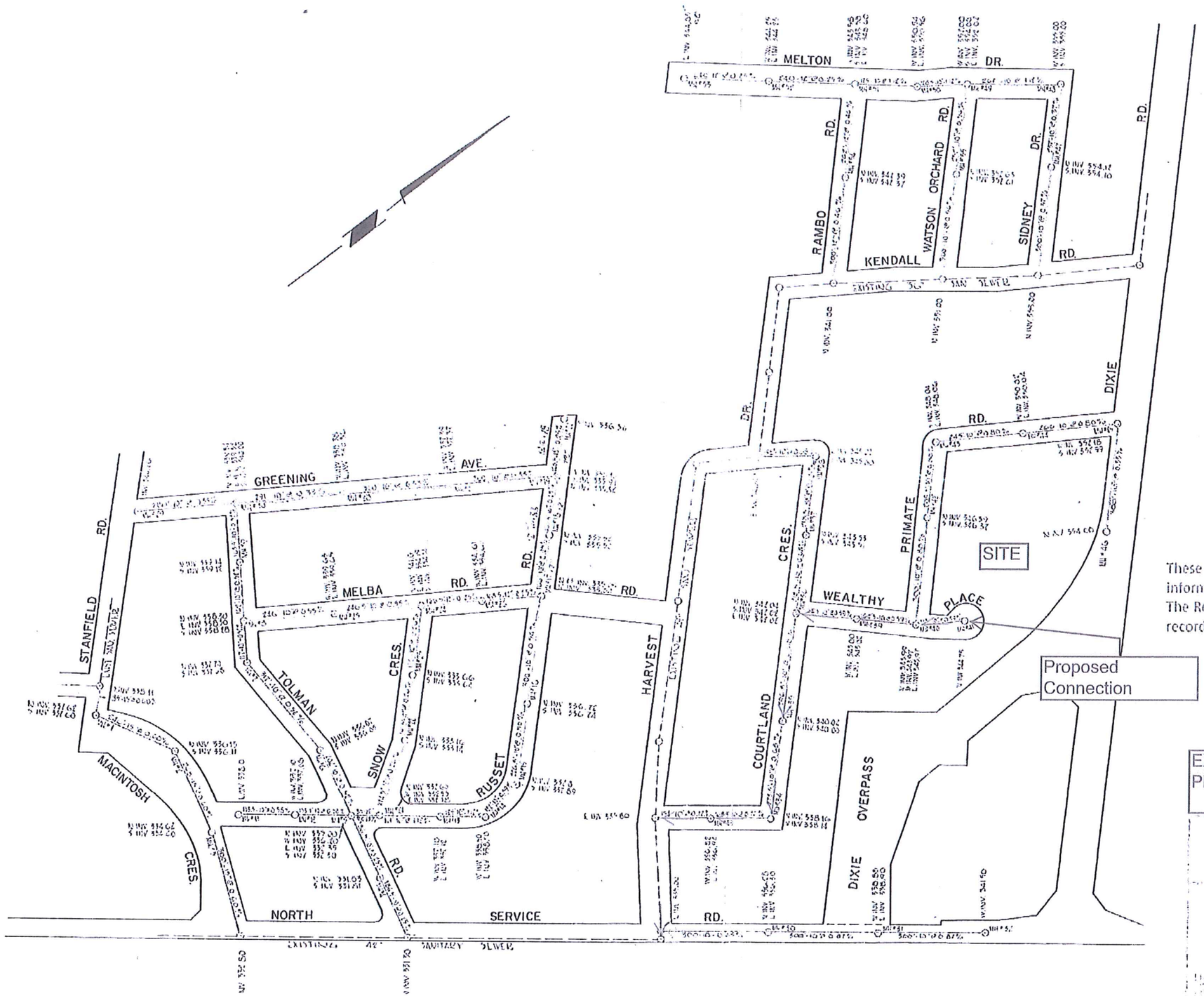
CITY OF MISSISSAUGA / REGION OF PEEL

SANITARY SEWER DESIGN SHEET

SHEET 1 OF 1

APPENDIX 'G'

- External Sanitary Sewer Drainage Plan – Applewood East Acres



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.

EXTERNAL SANITARY SEWER DRAINAGE PLAN

TOWNSHIP OF TORONTO
SEWER SYSTEM
DRAINING DEPARTMENT

PROPOSED SANITARY SEWERS
APPLEWOOD - EAST ACRES
P.N 27-61

687 I.S.D.S.
I.S.2 G SUKKEL

APPENDIX 'H'

- E-mail correspondence with City with regards to storm quality control requirements.

350 Creditstone Road, Unit 200,
Concord, Ontario, L4K 3Z2

Tel: (905) 695-2096 (ext. 26), Fax: (905) 695-2099
Email: mike@condeland.com

On Mon, Jun 5, 2017 at 10:12 AM, Ghazwan Yousif <Ghazwan.Yousif@mississauga.ca> wrote:

Hi Michael,

For the first site Dixie Road, Primate Road and Wealthy Place, this site within the Applewood watershed, which required to control 100 year post development flow to the 2 year pre development level. Outlet is the existing 250mm storm sewer on Primate Rd. the Plan and profile drawing # C05179. No quality control will be required. For water balance first 5mm of rain to be retained within your site. I will send you the drainage plan and design sheet later

For the North-west corner of Main Street and Wyndham Street, this site within the Streetsville area which is under special requirements so you require to control 100 year post to the 2 year pre. Storm sewer outlet is the existing 250mm storm sewer on Wyndham Street also 450mm on Main Street. The Plan and profile drawing # C12986, C21791. Please note that this site within the CVC regulated area. No quality control will be required. For water balance first 5mm of rain to be retained within your site. I will send you the drainage plan and design sheet later

Regards,

Ghazwan

APPENDIX 'I'

- Infiltration Quantity Analysis
- ChamberMaxx Design Specifications
- Pre-treatment OGS manhole design – CDS 2020 model

- Infiltration Quantity Analysis

SOAKAWAY PIT DESIGN FOR CONDO LOTS - CITY PARK (DIXIE) INC.

CITY OF MISSISSAUGA

CONDELAND Engineering Ltd.

October 5, 2018

*Percolation Rate Used= 100 (mm/hr)

** Geotechnical Investigation by Bruce A Brown Associates Limited,dated Oct 4,2018 confirms a soils percolation rate of 5 x 10-5 m /sec or 180 mm/ hour given the sandy soils - conservatively use 100 mm / hr for infiltration trench sizing*

Trench Design

Calculate Trench Bottom Area Using Equation = 4.3 (MOE SWM Manual)

A = 1000 V/ PnT

Where

A = Trench Bottom Area (sq.m)

V = Runoff Volume to be infiltrated

P = Percolation rate in mm/hr

n = Porosity of the Storage Media (Clear Stone = 0.4)

T= Retention Time in hours

Calculating Runoff Volume to be Infiltrated (Entire Roof Draining to Back)

Lot #	Approx. Imp. Area	
1 to 18	100.00 m²	*(average roof area)*

Drawdown Time in hours 24.00 hr

Roof runoff from a 10 mm storm event must be retained on-site, therefore: 10.0 mm 24hr rainfall

Total Site Runoff Volume to be Infiltrated **Individual Lots**

Lot #	Volume
1 to 18	1.00 cu.m.

Calculating Required Trench Bottom Area

Lot #	V (cu.m)	P (mm/h)		n	T (h)rs	Required Trench Bottom Area (sq.m)
1 to 18	1.00		100	0.40	24.00	1.04

Calculating Depth of Storage Media (Trench Depth)

Using Equation 4.2 (MOE SWM Manual)

D = PT/1000

Where

D = Depth of Storage Media (m)

P = Percolation Rate (mm/hr) = 100.00

T = Retention or Drawdown Time (hrs) = 24.00

Depth (m)= D = 2.40 Use Depth(m) = 0.75

Percolation Rate Over Trench Area, or Qinfiltration

Lot #	Trench Bottom Length (m)	Trench Bottom Width (m)	Trench Bottom Area (sq.m)	Qinfiltration (cum/h)	Qinfiltration (lps)
1 to 18	3.0	1.5	4.50	75.000	**20.835**

Checking Storage availability

Lot #	Trench Bottom Area (sq.m)	Trench Depth (m)	Trench Volume (cu.m)	n, porosity of Storage Media (clear stone)	Storage Media Volume (cu.m)
1 to 18	4.50	0.75	3.38	0.40	**1.35**

INFILTRATION BED DESIGN (BELOW CHAMBERMAXX FACILITY) - CITY PARK (DIXIE) INC.

CITY OF MISSISSAUGA
CONDELAND Engineering Ltd.

October 5, 2018

*Percolation Rate Used= 100 (mm/hr)

** Geotechnical Investigation by Bruce A Brown Associates Limited,dated Oct 4,2018 confirms a soils percolation rate of 5 x 10-5 m /sec or 180 mm/ hour given the sandy soils - conservatively use 100 mm / hr for infiltration trench sizing*

Trench Design
Calculate Trench Bottom Area Using Equation = 4.3 (MOE SWM Manual)

A = 1000 V/ PnT
Where
A = Trench Bottom Area (sq.m)
V = Runoff Volume to be infiltrated
P = Percolation rate in mm/hr
n = Porosity of the Storage Media (Clear Stone = 0.4)
T= Retention Time in hours

Calculating Runoff Volume to be Infiltrated

Lots 1-18	Area	Runoff Coeff.	Approx. Imp. Area
Tot. Road Area	3081.00 m²	0.90	2772.90 m²
Tot. Landscape Area	3955.00 m²	0.25	988.75 m²
TOTAL	**7036.00 m²**		**3761.65 m²**

(Note that roof areas have been excluded as separate soak away pits are provided for each lot located in the rear yards)

First 5mm of every rainfall event must be retained on-site, therefore: 5.0 mm 24hr rainfall

Area ID	Total Site Runoff Volume to be Infiltrated
Lots 1-18	**18.81 cu.m.**
Total Volume Required	**18.81 cu.m.**

Calculating Required Trench Bottom Area
P (Percolation rate mm/h) = 100
T = Retention Time (hrs) = 24.00

Area ID	Runoff Volume (cu.m)	n = Porosity of storage media	Retention Time (T) hrs	Required Trench Bottom Area (sq.m)
Lots 1-18	18.81	0.40	24.00	**19.59**

Calculating Depth of Storage Media (Trench Depth)

Using Equation 4.2 (MOE SWM Manual)

D = PT/1000

Where
D = Depth of Storage Media (m)
P = Percolation Rate (mm/hr) = 100.00
T = Retention or Drawdown Time (hrs) = 24.00

Depth (m)= D = 2.40 Use Depth(m) = 0.20

Percolation Rate Over Trench Area, or Qinfiltration

Area ID	P (m/h)	Trench Bottom Area (sq.m.)	Qinfiltration (cum/h)	Qinfiltration (lps)
Lots 1-18	0.100	240.0	0.020	**0.006**

Checking Storage Availability (Chambermaxx below outlet invert)

Area	Trench Bottom Area (sq.m)	Trench Depth (m)	Trench Volume (cu.m)	n, porosity of Storage Media (clear stone)	Storage Media Volume (cu.m)
Lots 1-18	240.00	0.20	48.00	0.40	**19.20**
			Total Volume Provided		**19.20 cu.m.**

SOAKAWAY PIT DESIGN FOR FREE-HOLD LOTS - CITY PARK (DIXIE) INC.

CITY OF MISSISSAUGA

CONDELAND Engineering Ltd.

October 5, 2018

*Percolation Rate Used= 100 (mm/hr)

** Geotechnical Investigation by Bruce A Brown Associates Limited,dated Oct 4,2018 confirms a soils percolation rate of 5 x 10-5 m /sec or 180 mm/ hour given the sandy soils - conservatively use 100 mm / hr for infiltration trench sizing*

Trench Design

Calculate Trench Bottom Area Using Equation = 4.3 (MOE SWM Manual)

A = 1000 V/ PnT

Where

A = Trench Bottom Area (sq.m)

V = Runoff Volume to be infiltrated

P = Percolation rate in mm/hr

n = Porosity of the Storage Media (Clear Stone = 0.4)

T= Retention Time in hours

Calculating Runoff Volume to be Infiltrated (Entire Roof Draining to Back)

Lot #	Approx. Imp. Area
19	93.15 m²
20	94.55 m²
21	94.55 m²
22	94.55 m²
23	94.55 m²
24	94.55 m²
25	94.49 m²
26	116.79 m²
TOTAL	777.18 m²

Drawdown Time in hours 24.00 hr

Roof runoff from a 10 mm storm event must be retained on-site, therefore: 10.0 mm 48hr rainfall

Total Site Runoff Volume to be Infiltrated **Individual Lots**

Lot #	Volume
19	0.93 cu.m.
20	0.95 cu.m.
21	0.95 cu.m.
22	0.95 cu.m.
23	0.95 cu.m.
24	0.95 cu.m.
25	0.94 cu.m.
26	1.17 cu.m.
Total Volume Required	7.77 cu.m.

Calculating Required Trench Bottom Area

Lot #	V (cu.m)	P (mm/h)		n	T (h)rs	Required Trench Bottom Area (sq.m)
19	0.93		100	0.40	24.00	0.97
20	0.95		100	0.40	24.00	0.98
21	0.95		100	0.40	24.00	0.98
22	0.95		100	0.40	24.00	0.98
23	0.95		100	0.40	24.00	0.98
24	0.95		100	0.40	24.00	0.98
25	0.94		100	0.40	24.00	0.98
26	1.17		100	0.40	24.00	1.22

Calculating Depth of Storage Media (Trench Depth)

Using Equation 4.2 (MOE SWM Manual)

D = PT/1000

Where

D = Depth of Storage Media (m)

P = Percolation Rate (mm/hr) = 100.00

T = Retention or Drawdown Time (hrs) = 24.00

Depth (m)= D = 2.40 Use Depth(m) = 0.75

Percolation Rate Over Trench Area, or Qinfiltration

Lot #	Trench Bottom Length (m)	Trench Bottom Width (m)	Trench Bottom Area (sq.m)	Qinfiltration (cum/h)	Qinfiltration (lps)
19	3.0	1.5	4.50	75.000	**20.835**
20	3.0	1.5	4.50	75.000	**20.835**
21	3.0	1.5	4.50	75.000	**20.835**
22	3.0	1.5	4.50	75.000	**20.835**
23	3.0	1.5	4.50	75.000	**20.835**
24	3.0	1.5	4.50	75.000	**20.835**
25	3.0	1.5	4.50	75.000	**20.835**
26	3.0	1.5	4.50	75.000	**20.835**

Checking Storage availability

Lot #	Trench Bottom Area (sq.m)	Trench Depth (m)	Trench Volume (cu.m)	n, porosity of Storage Media (clear stone)	Storage Media Volume (cu.m)
19	4.50	0.75	3.38	0.40	**1.35**
20	4.50	0.75	3.38	0.40	**1.35**
21	4.50	0.75	3.38	0.40	**1.35**
22	4.50	0.75	3.38	0.40	**1.35**
23	4.50	0.75	3.38	0.40	**1.35**
24	4.50	0.75	3.38	0.40	**1.35**
25	4.50	0.75	3.38	0.40	**1.35**
26	4.50	0.75	3.38	0.40	**1.35**
			Total Volume Provided		**10.80**

WATER BALANCE CALCULATION

Site Area D (Lots 19-26, Freehold Lots on Primate Rd.) = 2287.00 sq.m.

Based on daily rainfall target depth of 5 mm
Total Daily Rainfall volume for the Site = **2287.00 * 0.01** **11.44** **cu.m.**

Drainage Catchment Area (sq.m.)		Initial Abstraction	Total Volume Retained (cu.m.)	
Paved Area =	291	1.0 mm	**291.00 * 1.00**	0.29 cu.m.
Soft Landscaped Area =	1219	5.0 mm	**1219.00 * 5.00**	6.10 cu.m.
*Roof Areas =	777	n/a		7.77 cu.m.
2287.0			**Total Retained Volume =**	**14.16 cu.m.**
		% =	**14.16 / 11.44**	**123.8%**
			Total Retained Depth =	**6.19 mm**

*** Refer to Soakaway Design Sheet for Total Retained Volume from Full Roof Areas**

Therefore the minimum water balance target of 5mm has been achieved.

PROJECT: CITY PARK (DIXIE) INC.
CONTRACT #: 17-017
DESIGNED BY:S.N.
CHECKED BY: M.H.
DATE:September 27th 2018

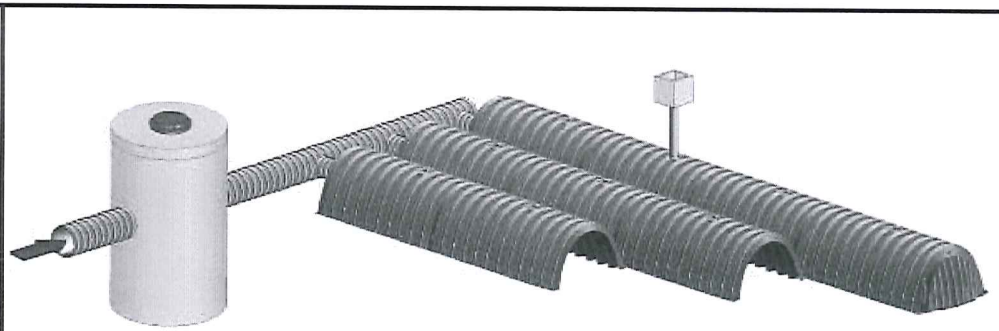
CE

- ChamberMaxx Design Specifications

DYODS™
Design Your Own Detention System

CHAMBERMaxx™

CONTECH® ENGINEERED SOLUTIONS



Project Summary

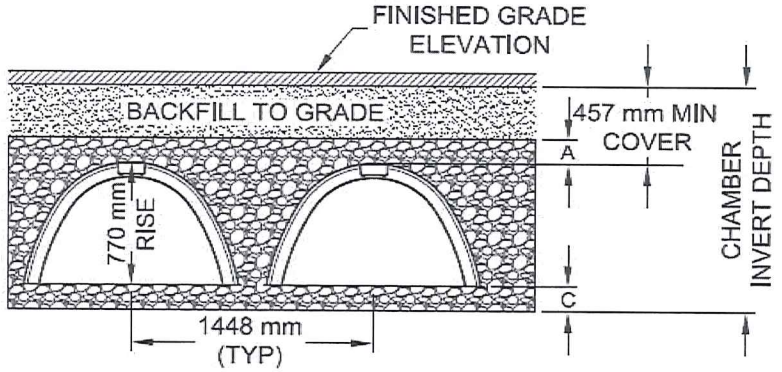
Date:	9/20/2018
Project Name:	City Park (Dixie) Inc
City, Province:	Mississauga, ON
Designed By:	JAK
Company:	CES
Telephone:	

Enter Information in Blue Cells

ChamberMaxx Calculator

Storage Volume Required (m^3):	156.0
Chamber Invert Depth Below Asphalt (m):	1.45
Limiting Width (m):	13.0
Porous Stone Backfill Included For Storage:	Yes
Depth A: Porous Stone Above Chamber (mm):	152
Depth C: Porous Stone Below Chamber (mm):	152
Stone Porosity (0 to 40%):	40

Waterway Area (m^2) 0.980



System Sizing

Use Custom Layout (at right) for layout adjustment

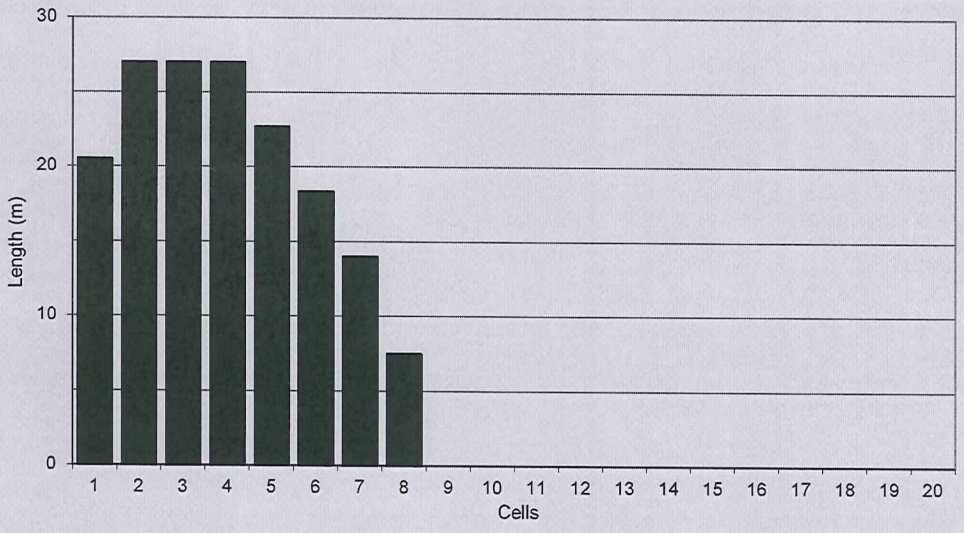
Required Chambers:	72	Chambers	
Chamber Storage:	96.7	m^3	
Porous Stone Storage:	66.7	m^3	
Total Storage Provided:	163.4	m^3	104.7% of Req'd Storage
Rectangular Footprint (W x L):	12.08 m x 21.81 m		

Additional Units Required = 0

Custom Layout

To adjust layout, select the appropriate number of chambers in the light blue boxes below.

9	12	12	12	10	8	6	3												



CONTECH Materials

ChamberMaxx Middle Units:	56	Chambers @ 2.17m installed length
ChamberMaxx Start Units:	8	Chambers @ 2.44m installed length
ChamberMaxx End Units:	8	Chambers @ 2.26m installed length
Manifold Fittings (1 manifold):	7	ea Tees and 1ea Elbow
Scour Protection Netting:	13	m long x 2.3 m wide
Approximate Truckloads:	1	Trucks

Construction Quantities

Total Excavation:	448	m^3 (assumes 100mm thick asphalt)
Stone Backfill:	167	m^3 stone
Remaining Backfill to Asphalt:	159	m^3 backfill per specifications
Non-Woven Geotextile:	370	m^2 for top and sides of excavation

***Construction Quantities are approximate and should be verified upon final design*

Summary for Pond 1P: City Park (Dixie) Inc

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.000 m	47.3 m³	**12.05 mW x 20.23 mL x 0.90 mH Field A** 219.2 m³ Overall - 100.9 m³ Embedded = 118.2 m³ x 40.0% Voids
#2A	0.000 m	96.7 m³	**Contech ChamberMaxx 2016** x 72 Inside #1 Inside= 1,259 mmW x 640 mmH => 0.616 m² x 2.17 mL = 1.34 m³ Outside= 1,259 mmW x 762 mmH => 0.643 m² x 2.17 mL = 1.39 m³ Row Length Adjustment= +0.10 m x 0.616 m² x 8 rows
#3B	0.000 m	4.2 m³	**1.22 mW x 12.80 mL x 0.90 mH Field B** 14.0 m³ Overall - 3.6 m³ Embedded = 10.5 m³ x 40.0% Voids
#4B	0.000 m	3.6 m³	**CMP Round 24** x 2 Inside #3 Effective Size= 610 mmW x 610 mmH => 0.292 m² x 6.10 mL = 1.78 m³ Overall Size= 610 mmW x 610 mmH x 6.10 mL
		151.7 m³	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Pond 1P: City Park (Dixie) Inc - Chamber Wizard Field A

Chamber Model = Contech ChamberMaxx 2016 (Contech® ChamberMaxx® capped at 47.2cf for air pocket)
Inside= 1,259 mmW x 640 mmH => 0.616 m² x 2.17 mL = 1.34 m³
Outside= 1,259 mmW x 762 mmH => 0.643 m² x 2.17 mL = 1.39 m³
Row Length Adjustment= +0.10 m x 0.616 m² x 8 rows

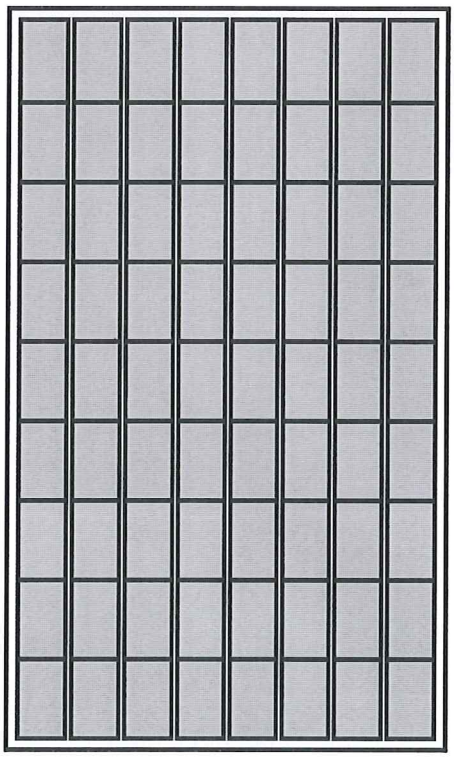
1,306 mm Wide + 142 mm Spacing = 1,448 mm C-C Row Spacing

9 Chambers/Row x 2.17 m Long +0.10 m Row Adjustment = 19.62 m Row Length +305 mm End Stone x 2 = 20.23 m Base Length
8 Rows x 1,306 mm Wide + 142 mm Spacing x 7 + 305 mm Side Stone x 2 = 12.05 m Base Width
770 mm Chamber Height + 130 mm Cover = 0.90 m Field Height

72 Chambers x 1.34 m³ +0.10 m Row Adjustment x 0.616 m² x 8 Rows = 96.69 m³ Chamber Storage
72 Chambers x 1.39 m³ +0.10 m Row Adjustment x 0.643 m² x 8 Rows = 100.92 m³ Displacement

219.17 m³ Field - 100.92 m³ Chambers = 118.25 m³ Stone x 40.0% Voids = 47.30 m³ Stone Storage

Chamber Storage + Stone Storage = 143.99 m³ = 0.144 Ml
Overall Storage Efficiency = 65.7%
Overall System Size = 20.23 m x 12.05 m x 0.90 m



Pond 1P: City Park (Dixie) Inc - Chamber Wizard Field B

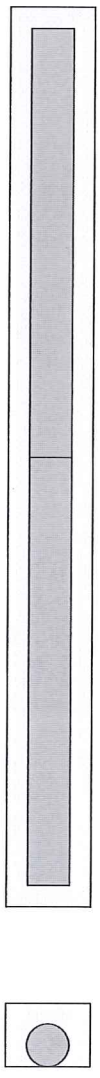
Chamber Model = CMP Round 24 (Round Corrugated Metal Pipe)
Effective Size= 610 mmW x 610 mmH => 0.292 m² x 6.10 mL = 1.78 m³
Overall Size= 610 mmW x 610 mmH x 6.10 mL

2 Chambers/Row x 6.10 m Long = 12.19 m Row Length +305 mm End Stone x 2 = 12.80 m Base Length
1 Rows x 610 mm Wide + 305 mm Side Stone x 2 = 1.22 m Base Width
610 mm Chamber Height + 290 mm Cover = 0.90 m Field Height

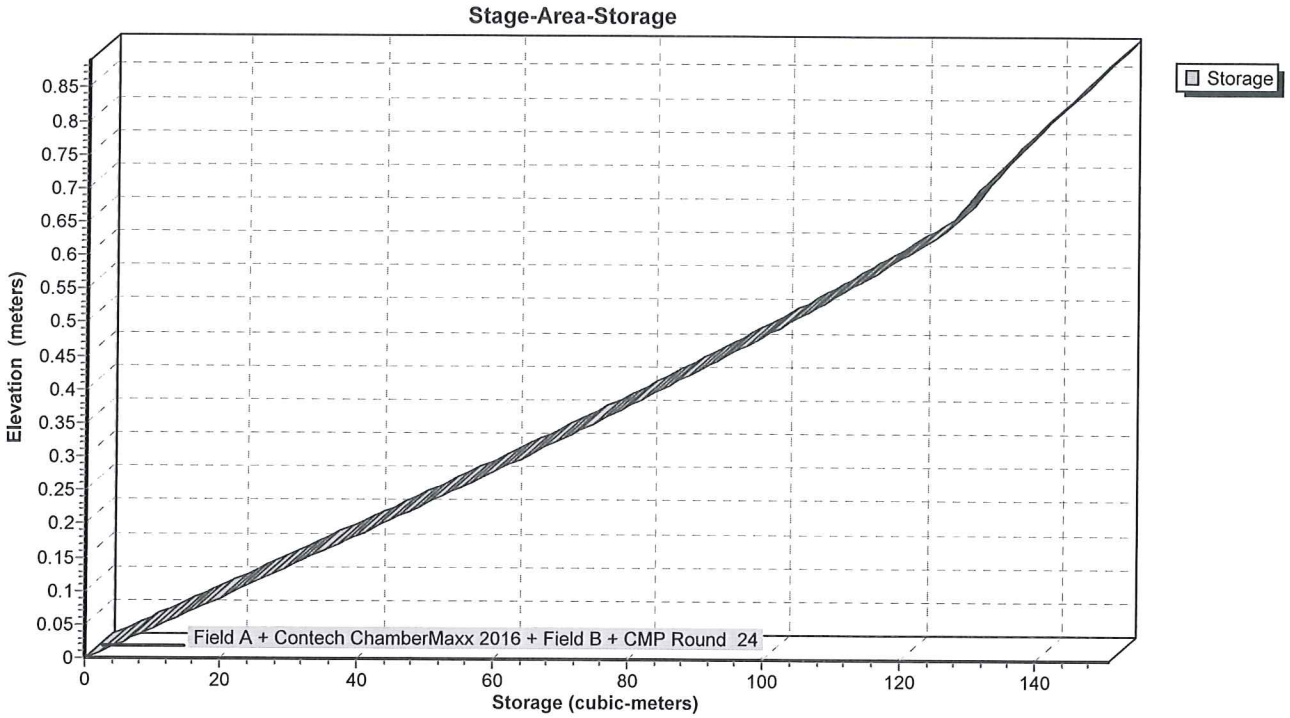
2 Chambers x 1.78 m³ = 3.56 m³ Chamber Storage

14.03 m³ Field - 3.56 m³ Chambers = 10.48 m³ Stone x 40.0% Voids = 4.19 m³ Stone Storage

Chamber Storage + Stone Storage = 7.75 m³ = 0.008 Ml
Overall Storage Efficiency = 55.2%
Overall System Size = 12.80 m x 1.22 m x 0.90 m



Pond 1P: City Park (Dixie) Inc



Stage-Area-Storage for Pond 1P: City Park (Dixie) Inc

Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)
0.000	0.0	0.520	106.7
0.010	2.2	0.530	108.4
0.020	4.4	0.540	110.2
0.030	6.7	0.550	111.9
0.040	8.9	0.560	113.7
0.050	11.1	0.570	115.4
0.060	13.3	0.580	117.0
0.070	15.5	0.590	118.7
0.080	17.7	0.600	120.3
0.090	19.8	0.610	121.9
0.100	22.0	0.620	123.5
0.110	24.2	0.630	125.0
0.120	26.4	0.640	126.5
0.130	28.5	0.650	127.3
0.140	30.7	0.660	128.1
0.150	32.8	0.670	128.9
0.160	35.0	0.680	129.7
0.170	37.1	0.690	130.6
0.180	39.2	0.700	131.4
0.190	41.4	0.710	132.4
0.200	43.5	0.720	133.3
0.210	45.6	0.730	134.3
0.220	47.7	0.740	135.3
0.230	49.8	0.750	136.3
0.240	51.9	0.760	137.3
0.250	54.0	0.770	138.3
0.260	56.1	0.780	139.4
0.270	58.1	0.790	140.4
0.280	60.2	0.800	141.5
0.290	62.3	0.810	142.5
0.300	64.3	0.820	143.5
0.310	66.3	0.830	144.6
0.320	68.4	0.840	145.6
0.330	70.4	0.850	146.6
0.340	72.4	0.860	147.7
0.350	74.4	0.870	148.7
0.360	76.4	0.880	149.8
0.370	78.4	0.890	**150.8**
0.380	80.3		
0.390	82.3		
0.400	84.2		
0.410	86.2		
0.420	88.1		
0.430	90.0		
0.440	91.9		
0.450	93.8		
0.460	95.7		
0.470	97.5		
0.480	99.4		
0.490	101.2		
0.500	103.1		
0.510	104.9		

– Pre-treatment OGS manhole design – CDS 2020 model

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name:	City Park (Dixie)	**Engineer:**	**Condeland Engineering**
Location:	Mississauga, ON	**Contact:**	Michael Hall
OGS #:	1	**Report Date:**	19-Sep-18

Area	1.1657	ha	**Rainfall Station #**	204	
Weighted C	0.534		**Particle Size Distribution**	FINE	
CDS Model	2020		**CDS Treatment Capacity**	31	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.4%	9.4%	0.9	0.9	2.8	98.1	9.2
1.0	11.0%	20.4%	1.7	1.7	5.6	97.3	10.7
1.5	10.1%	30.5%	2.6	2.6	8.3	96.5	9.7
2.0	9.6%	40.1%	3.5	3.5	11.1	95.7	9.2
2.5	7.9%	48.0%	4.3	4.3	13.9	94.9	7.5
3.0	6.4%	54.4%	5.2	5.2	16.7	94.1	6.0
3.5	4.4%	58.8%	6.1	6.1	19.4	93.3	4.1
4.0	4.2%	63.0%	6.9	6.9	22.2	92.5	3.9
4.5	3.7%	66.7%	7.8	7.8	25.0	91.7	3.4
5.0	3.3%	70.0%	8.7	8.7	27.8	90.9	3.0
6.0	5.6%	75.6%	10.4	10.4	33.3	89.3	5.0
7.0	4.0%	79.6%	12.1	12.1	38.9	87.7	3.5
8.0	3.5%	83.1%	13.8	13.8	44.4	86.1	3.0
9.0	2.2%	85.3%	15.6	15.6	50.0	84.5	1.9
10.0	1.7%	87.0%	17.3	17.3	55.6	82.9	1.4
15.0	6.3%	93.3%	26.0	26.0	83.3	75.0	4.7
20.0	2.3%	95.6%	34.6	31.2	100.0	63.2	1.4
25.0	1.8%	97.3%	43.3	31.2	100.0	50.5	0.9
30.0	0.8%	98.2%	51.9	31.2	100.0	42.1	0.4
35.0	0.9%	99.0%	60.6	31.2	100.0	36.1	0.3
40.0	0.3%	99.3%	69.2	31.2	100.0	31.6	0.1
45.0	0.5%	99.8%	77.9	31.2	100.0	28.1	0.1
50.0	0.2%	100.0%	86.5	31.2	100.0	25.3	0.0
							89.5
						Removal Efficiency Adjustment[2] =	6.5%
						Predicted Net Annual Load Removal Efficiency =	**83.0%**
						Predicted % Annual Rainfall Treated =	**98.0%**

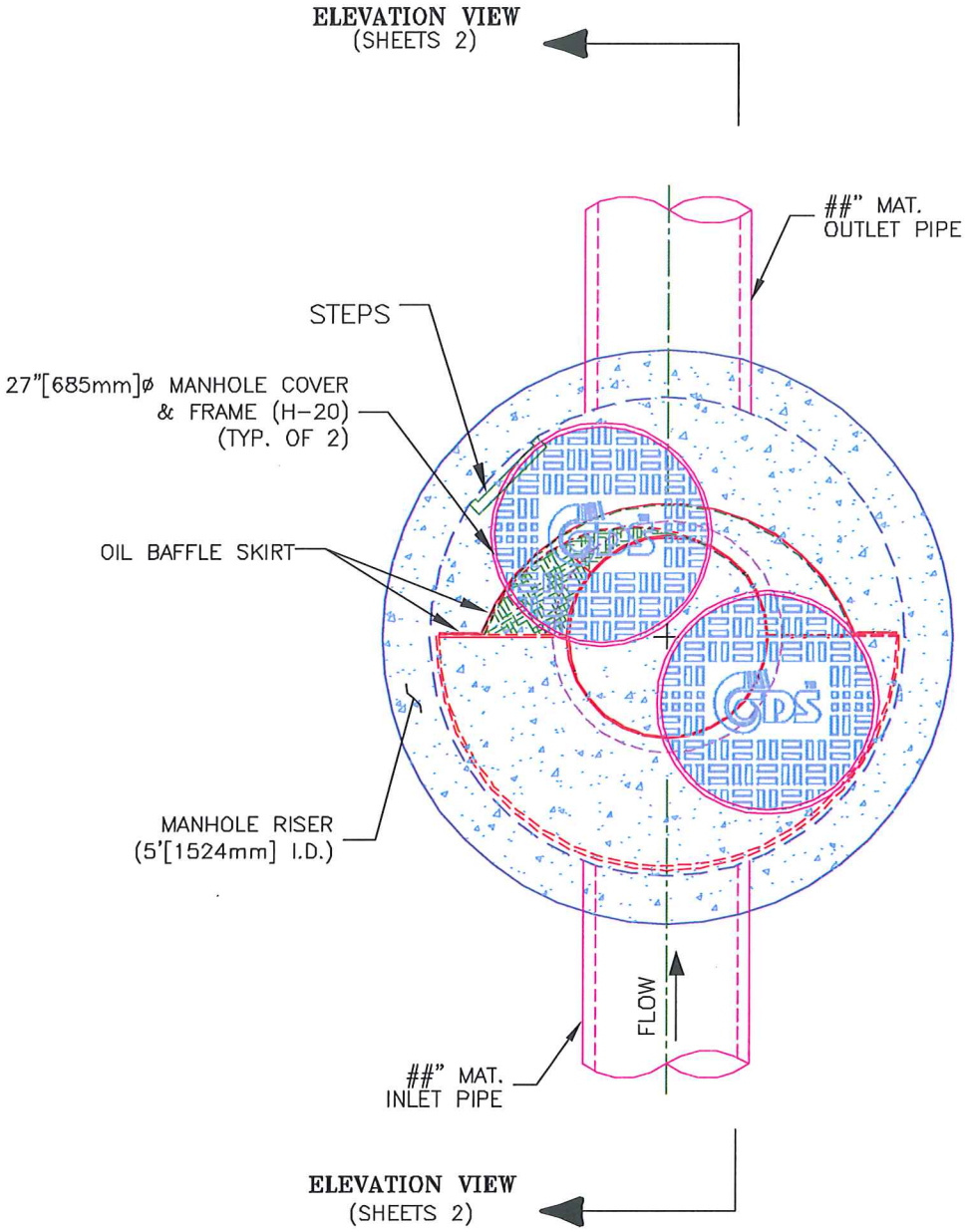
* Based on 44 years of hourly rainfall data from Canadian Station 6158733, Toronto ON (Airport)

** CDS Efficiency based on testing conducted at the University of Central Florida

*** Adjustment for use of 60 minute time step data on site with a time of concentration less than 30 minutes

**** CDS design flowrate and scaling based on standard manufacturer model & product specifications

PLAN VIEW

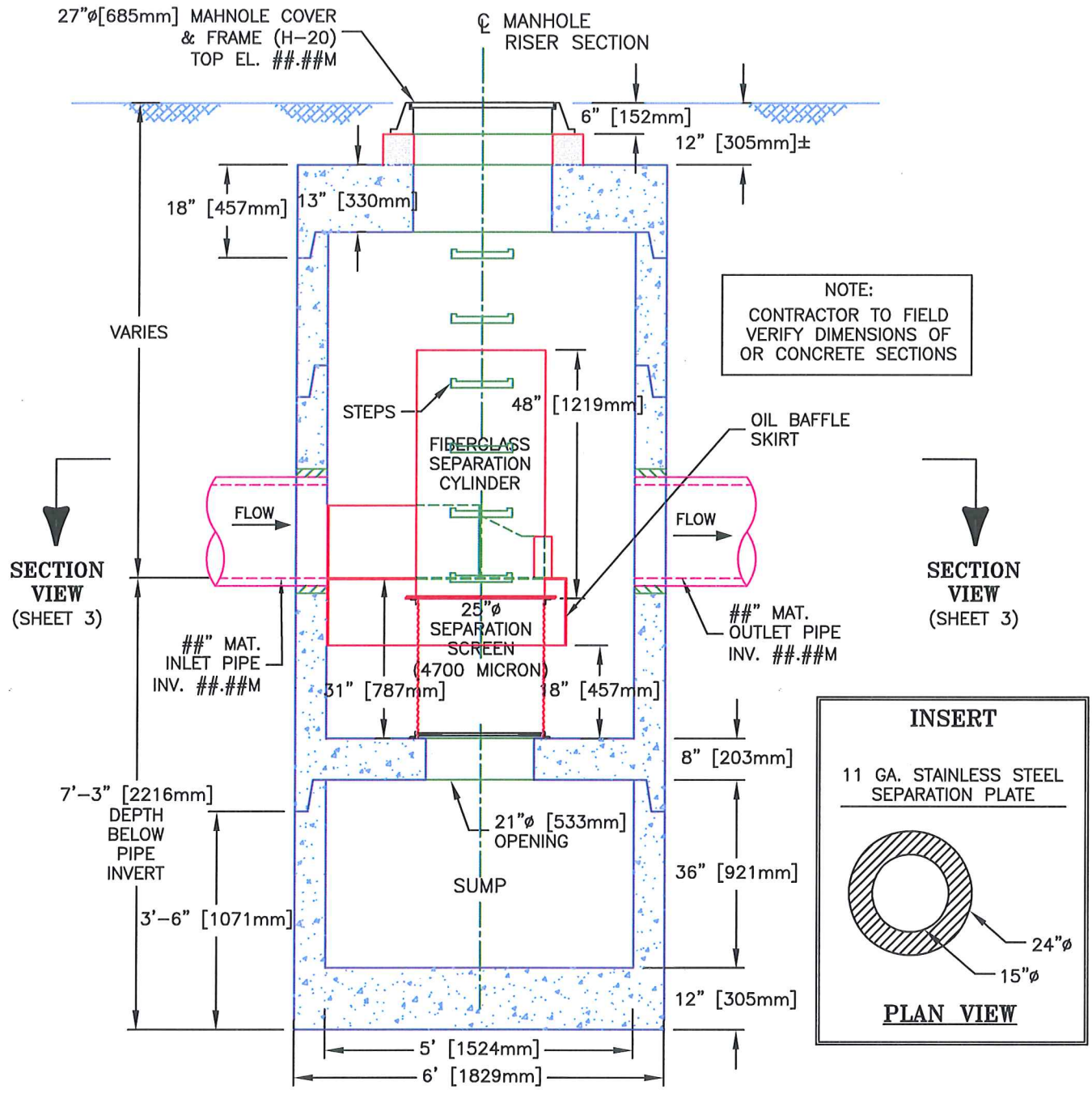


MODEL CDS20_20m, 31 L/s TREATMENT CAPACITY STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 2'
		DATE ##/##/##	SHEET
		DRAWN INITIALS	1
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577

ELEVATION VIEW



MODEL CDS20_20m, 31 L/s TREATMENT CAPACITY STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 2.5'
		DATE ##/##/##	SHEET 2
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577

APPENDIX 'J'

- Stormwater Quantity Control Analysis
- Stage Storage Analysis
- Pre-development Storm Tributary Plan
- Post-development Storm Tributary Plan

CONDELAND ENGINEERING LIMITED
TECHNICAL DIVSION
SITE PLAN STORM WATER MANAGEMENT

PROJECT NUMBER: 17-017

PROJECT LOCATION: 2103-2119 Primate Rd, 1351 & 1357 Wealthy Pl, 2116 & 2112 Dixie Rd

CITY OF MISSISSAUGA

CLIENT: **CITY PARK (DIXIE ROAD) INC.** 21/09/2018

A. SITE CRITERIA

TOTAL SITE AREA (includes external): 13944.00 SQ.M.

	(Site Area)	(External Area)	(Total Area)		
EXISTING CONDITIONS	11115.00 SQ.M.	2829.00 SQ.M.	13944.00 SQ.M.		
				Runoff Coefficient	
Site Area draining to Dixie Rd.	8850.00 SQ.M.	2829.00 SQ.M.	11679.00 SQ.M.	**0.34**	
HARD SURFACES	1425.00 SQ.M.	0.00 SQ.M.	1425.00 SQ.M.	0.90	
SOFT SURFACES	7425.00 SQ.M.	2829.00 SQ.M.	10254.00 SQ.M.	0.25	*(0.3 for Ext.)*
Site Area draining to Primate Rd./ Wealthy Pl.	2265.00 SQ.M.	0.00 SQ.M.	2265.00 SQ.M.	**0.49**	
HARD SURFACES	842.00 SQ.M.	0.00 SQ.M.	842.00 SQ.M.	0.90	
SOFT SURFACES	1423.00 SQ.M.	0.00 SQ.M.	1423.00 SQ.M.	0.25	*(0.3 for Ext.)*

PROPOSED CONDO. DEVELOPMENT - STORM OUTLET TO DIXIE ROAD

B.		(Controlled Area)	(Un-Controlled Area)	(Total Area)	
	PROPOSED CONDITIONS	11657.00 SQ.M.	36.00 SQ.M.	11693.00 SQ.M.	Runoff Coefficient **0.53**
	HARD SURFACES	4873.00 SQ.M.	0.00 SQ.M.	4873.00 SQ.M.	0.90
	SOFT SURFACES	3955.00 SQ.M.	36.00 SQ.M.	3991.00 SQ.M.	0.25
	SOFT SURFACES (EXTERNAL)	2829.00 SQ.M.	0.00 SQ.M.	2829.00 SQ.M.	0.30

SITE CONTROL REQUIREMENTS
(NO ROOF TOP CONTROLS HAVE BEEN IMPLEMENTED, THEREFORE BUILDING AND PAVEMENT AREAS WILL BE COMBINED BELOW:)

MAX ALLLOWABLE SITE DISCHARGE (BASED ON 2YRS, 15min.TC, 0.34 runoff coeff.) = (11679x 0.34) x (2.778*(610*(15+4.6)^(-0.78))/10000)
(2-YR PRE-DEVELOPMENT FLOW TO DIXIE ROAD) **66.34 LPS**

C. STORM NETWORK

C.1 BUILDING, PAVEMENT, & LANDSCAPED CONTROLLED AND UNCONTROLLED RUNOFF AREA

	CONTROLLED AREA	UN-CONTROLLED AREA	100 YR-RUNOFF COEFFICIENT
BUILDING / PAVEMENT / DRIVEWAY AREA:	4873.00 SQ.M.	0.00 SQ.M.	0.90
SOFT LANDSCAPED AREA:	3955.00 SQ.M.	36.00 SQ.M.	0.25
EXTERNAL AREA:	2829.00 SQ.M.	0.00 SQ.M.	0.30
TOTAL AREA=	11657.00 SQ.M.	36.00 SQ.M.	

C.2. EQUIVALENT RUNOFF COEFFICIENT FOR P&B&L AREAS

R(100YR)=	0.5339	0.2500
CONTROLLED		

C.3. STORAGE REQUIREMENTS FOR P&B&L AREAS

100-YR STORM CONTROL

RAN (CONTROLLED)= 1.7288

RAN (UNCONTROLLED)= 0.0025

The maximum Controlled discharge is the maximum allowable Site discharge less the Uncontrolled discharge = 66.34 - 0.40 LPS

Qctrl-discharge = 65.95 LPS

HOWEVER FOR 125mm DIA SHORT TUBE ORIFICE (SECT C.5.) WITH HEAD
1.31 M MAXIMUM ORIFICE DISCHARGE IS =

Qctrl-discharge = 50.95 LPS

TIME (min)	INTENSITY mm/hr	Qcontrolled lps	Qtotal lps	Qctrl-discharge lps	change in flow lps	storage volume cu.m.
15.00	158.27	273.61	273.61	50.95	222.66	200.40
20.00	130.68	225.91	225.91	50.95	174.96	209.96
25.00	111.89	193.44	193.44	50.95	142.49	213.74
30.00	98.21	169.79	169.79	50.95	118.84	**213.91**
35.00	87.76	151.72	151.72	50.95	100.77	211.62
40.00	79.50	137.43	137.43	50.95	86.48	207.55
45.00	72.78	125.82	125.82	50.95	74.87	202.15
50.00	67.21	116.19	116.19	50.95	65.24	195.71
55.00	62.50	108.05	108.05	50.95	57.10	188.42

therefore total storage required= during the the 100 yr storm **213.91** CU.M.

C.4. STORAGE PROVIDED

TOTAL UNDER GROUND STORAGE @ MAX. TOP OF WATER LEVEL (T.W.L.) = 108.72 M

SEE STORAGE DATA ATTACHED 215.30

TOTAL STORAGE PROVIDED = **215.30** **CU.M.** > **213.91** **(VERIFIED)**

C.5. ORIFICE DESIGN

FOR A STANDARD 125MM DIA. ORIFICE PIPE

MAX. PIPE OUTFLOW= 50.95 LPS
UNCONT. OUTFLOW = 0.40 LPS (Overland flow to Dixie Road)

TOTAL SITE MAX. OUTFLOW (Overcontrolled)= **51.35** LPS <= 2yr pre-develop = 66.34 l/s

MAX. STORAGE LEVEL

MAX. T.W.L.= 108.72 M
PIPE INVERT = 107.35 M
HEAD = 1.31 M

STORAGE REQ. = 213.91 CU.M.
STORAGE PROV. = 215.30 CU.M.

Q= ca(2gh)^0.5 C= 0.82

A= 0.0123 sq.m.
diameter= 125.00 mm

THEREFORE A 125mm DIA. ORIFICE PIPE IS VERIFIED

PROPOSED FREEHOLD LOTS - STORM OUTLET TO PRIMATE ROAD / WEALTHY PLACE

THIS DRAINAGE CATCHMENT REFERS TO THE FREE HOLD LOTS (19-26) FRONTING PRIMATE ROAD THAT MUST DRAIN INDEPENDENTLY FROM CONDO DEVELOPMENT

D.	*PROPOSED CONDITIONS*	(Total Area) 2287.00 SQ.M.	Runoff Coefficient **0.51**	
	HARD SURFACES	1068.00 SQ.M.	0.80	**
	SOFT SURFACES	1219.00 SQ.M.	0.25	

** *Impervious runoff coefficient conservatively reduced to account for all roof top drainage being directed to rear yard infiltration facilities*

E. COMPARISION OF POST TO PRE - DEVELOPMENT FLOWS (2 YEAR AND 100 YEAR EVENTS

2-YEAR STORM

	EX. COEFF.	EX. FLOW		PROP. COEFF.	PROP. FLOW		*Change from Pre to Post*	
To Primate Road	0.49	**18.53**	LPS	0.51	**19.29**	LPS	**0.76**	LPS

100-YEAR STORM

	EX. COEFF.	EX. FLOW		PROP. COEFF.	PROP. FLOW		*Change from Pre to Post*	
To Primate Road	0.49	**48.96**	LPS	0.51	**50.96**	LPS	**2.00**	LPS

AS CALCULATED ABOVE; POST-DEVELOPMENT FLOWS BEING DIRECTED TO PRIMATE ROAD ARE APPROXIMATELY EQUAL TO PRE-DEVELOPMENT FLOW LEVELS. A MINOR INCREASE IN FLOW (4.0%) IS NOT SIGNIFICANT AND SHOULD NOT HAVE ANY ADVERSE IMPACTS. THIS FLOW PATTERN IS IN ACCORDANCE WITH CITY REQUIREMENTS ENSURING ANY RUNOFF FROM THE FRONTING FREE-HOLD LOTS IS CONVEYED OVERLAND TO THE MUNICIPAL R.O.W.

prepared by,
CONDELAND ENGINEERING LIMITED

Mike Hall, P.Eng.

STREET	MANHOLE FROM	MANHOLE TO	LENGTH (M)	SEWER SLOPE %	SEWER SIZE (MM)	INVERT DROP	INVERT ELEVATION UPPER END	INVERT ELEVATION MANHOLE LOSSES	INVERT ELEVATION LOWER END	PIPE WATER DEPTH (M) UPPER	PIPE WATER DEPTH (M) LOWER	PIPE WATER DEPTH PERCENTAGE (%) UPPER	PIPE WATER DEPTH PERCENTAGE (%) LOWER	FULL PIPE AREA (SQM)	PARTIAL AREA PERCENTAGE (%) UPPER	PARTIAL AREA PERCENTAGE (%) LOWER	PIPE VOLUME (CU.M)	1.0m of 450mm REDUCER PIPE ADJUSTMENT (CU.M)
STORAGE PIPE (100-YEAR)																		
TOP OF WATER LEVEL =	108.72			**100-Year Storm**														
	MH5	MH6	20.00	0.50%	825	0.10	107.62		107.52	0.83	0.83	100.0%	100.0%	0.5346	100.0%	100.0%	10.69	9.94
	MH6	CDS MH	8.42	0.50%	600	0.04	107.49	0.03	107.45	0.60	0.60	100.0%	100.0%	0.2827	100.0%	100.0%	2.38	2.13
	MH4	CDS MH	15.25	0.50%	450	0.08	107.53		107.45	0.45	0.45	100.0%	100.0%	0.1590	100.0%	100.0%	2.43	2.43
	MH1	MH2	47.66	0.40%	750	0.19	108.00		107.81	0.72	0.75	96.3%	100.0%	0.4418	97.9%	100.0%	20.83	20.27
	MH2	MH3	51.59	0.40%	750	0.21	107.76	0.05	107.55	0.75	0.75	100.0%	100.0%	0.4418	100.0%	100.0%	22.79	22.23
	MH3	CDS MH	18.32	0.40%	600	0.07	107.53	0.025	107.45	0.60	0.60	100.0%	100.0%	0.2827	100.0%	100.0%	5.18	4.93
	CDS MH	CHAMBERMaxx	2.50	1.00%	450	0.03	107.40	0.05	107.38	0.45	0.45	100.0%	100.0%	0.1590	100.0%	100.0%	0.40	0.40
	CHAMBERMaxx	CTRLMH	10.70	0.25%	375	0.03	107.38	0	107.35	0.38	0.38	100.0%	100.0%	0.1104	100.0%	100.0%	1.18	1.28
	CHAMBERMaxx Facility (refer to sizing spreadsheet from Contech)																	**151.70**
		ORIFICE CONTROL UPSTREAM OF CONTROL MH																
		INV:	107.35											TOTAL STORAGE PROVIDED =				**215.30**
DOWNSTREAM OF STORAGE PIPE																		
	CTRLMH	Ex.CBMH22	29.18	0.50%	300	0.15	107.33	0.025	107.18									

STAGE STORAGE TABLE - Storm Pipes

Orifice 1 pipe Inv. = 107.35 m C = 0.82 Q= ca(2gh)^0.5

Orifice 1 diameter = 125.0 mm

T.W.L. (m)	Head 1 (m)	Head 2 (m)	Q-Orif.1 (cms)	Q-Orif.2 (cms)	Qctrl-dis (cms)	Qmax-Orif-dis (cms)	Storage Vol. Ha-m	
107.35	0.00		0.00000		**0.00000**	-	-	
107.37	0.00		0.00000		**0.00000**	-	-	
107.52	0.11		0.01455		**0.01455**	-	-	
107.67	0.26		0.02258		**0.02258**	-	-	
107.82	0.41		0.02842		**0.02842**	-	-	
107.97	0.56		0.03325		**0.03325**	-	-	
108.12	0.71		0.03747		**0.03747**	-	-	
108.27	0.86		0.04125		**0.04125**	-	-	
108.42	1.01		0.04472		**0.04472**	-	-	
108.57	1.16		0.04794		**0.04794**	-	-	
108.72	1.31		0.05095		**0.05095**	**0.06634**	**0.021530**	**100yr**

DIXIE ROAD

AREA A

AREA B

EXTERNAL 1
0.2829HA
C=0.30

PRIMATE ROAD

WEALTHY PLACE

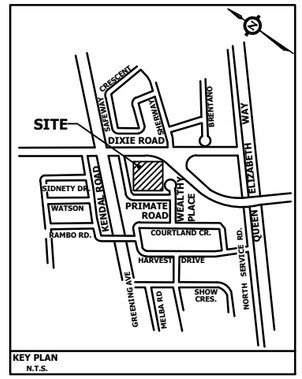
DIXIE ROAD

PRIMATE ROAD

PREDEVELOPMENT DRAINAGE SUMMARY

AREA A (TO DIXIE ROAD)		
	COEFF	AREA HA
SOFT	0.25	0.7425
HARD	0.90	0.1425
EXTERNAL	0.30	0.2829
TOTAL	0.34	1.1679

AREA B (TO WEALTHY PLACE AND PRIMATE ROAD)		
	COEFF	AREA HA
SOFT	0.25	0.1423
HARD	0.90	0.0842
TOTAL	0.49	0.2265



KEY PLAN
N.T.S.

PLAN OF SURVEY SHOWING TOPOGRAPHY OF LOTS 26, 27, 28, 29, 30 AND 31 AND PART OF LOT 18 REGISTERED PLAN 473 AND PART OF LOT 6, CONCESSION 1 SOUTH OF DUNDAS STREET
(GEOGRAPHIC TOWNSHIP OF TORONTO)
CITY OF MISSISSAUGA REGIONAL MUNICIPALITY OF PEEL

LEGEND

- STORM DRAINAGE AREA
- 0.132 / C=0.25 — AREA IN HECTARES / COEFFICIENT
- HARD AREA
- SOFT AREA

BENCHMARK NOTE
ELEVATIONS SHOWN HEREON ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK No. 351 HAVING AN ELEVATION OF 108.675 METRES LOCATED ON THE EAST FACE AT THE MAIN ENTRANCE OF APPLEWOOD PUBLIC SCHOOL ON THE WEST SIDE OF HARVEST DRIVE, 30.5 METRES SOUTH OF KENDALL ROAD.

REVISION BLOCK		DATE	APPR. BY
2.	CITY COMMENTS FROM AUGUST 8, 2018	OCT.16/2018	M.E.H.
1.	FIRST SUBMISSION	JAN.09/2018	S.Ng.

CITY PARK (DIXIE) INC.

2103-2119 PRIMATE ROAD, 1351 & 1357 WEALTHY PLACE, 2116& 2112 DIXIE ROAD

PROFESSIONAL ENGINEER M.E.HALL OCT.16/18 PROVINCE OF ONTARIO

APPROVED AS TO FORM IN RELIANCE UPON THE PROFESSIONAL SKILL AND ABILITY OF CONDELAND ENGINEERING LIMITED AS TO DESIGN AND SPECIFICATION

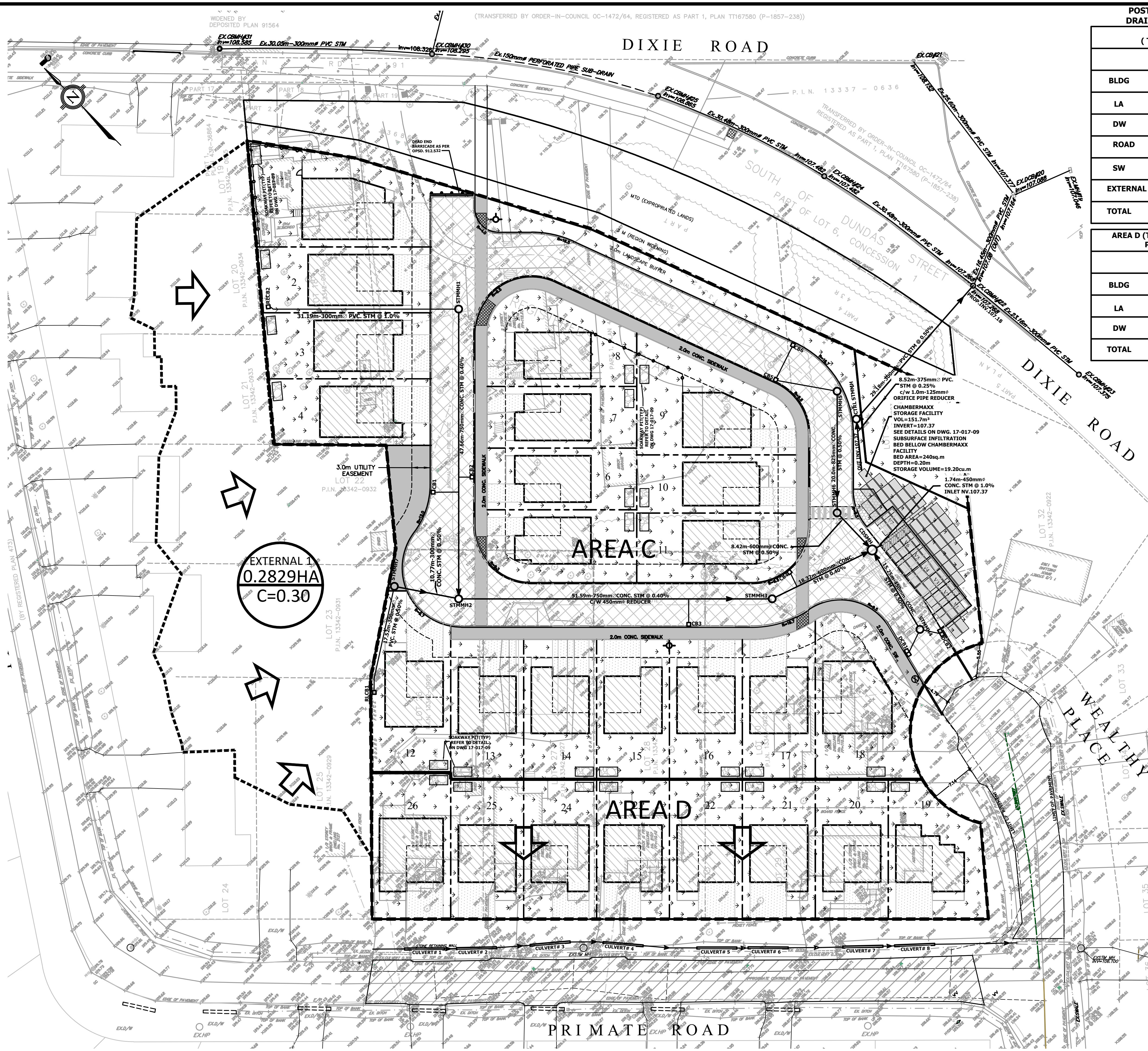
DIRECTOR OF DEVELOPMENT/ TRANSPORTATION ENGINEERING
DATE:

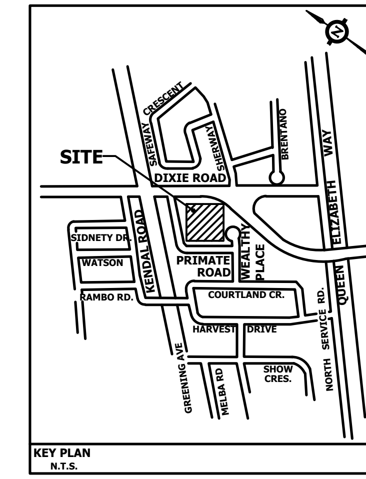
CONDELAND
CONSULTING ENGINEERS & PROJECT MANAGERS
350 Cruditstone Road, Unit 200 P: (905) 695-2096
Concord, Ontario L4K 3Z2 F: (905) 695-2099

MISSISSAUGA | Region of Peel Working for you

PREDEVELOPMENT STORM TRIBUTARY PLAN

DESIGNED BY: M.E.H./ S.N.	DATE: OCTOBER 2018	CHECKED BY: M.E.H.	
DRAWN BY: G.M./ M.A.	DRAWING NO.		
SCALES HOR 1:300	17-017-05	CITY FILE DARC 17-192	





POST-DEVELOPMENT DRAINAGE SUMMARY

AREA C (TO DIXIE ROAD)		
	COEFF	AREA HA
BLDG	0.90	0.1792
LA	0.25	0.3955
DW	0.90	0.0545
ROAD	0.90	0.1891
SW	0.90	0.0645
EXTERNAL	0.30	0.2829
TOTAL	0.53	1.1657

AREA D (TO WEALTHY PLACE AND PRIMATE ROAD)		
	COEFF	AREA HA
BLDG	0.90	0.0777
LA	0.25	0.1219
DW	0.90	0.0291
TOTAL	0.50	0.2287

PLAN OF SURVEY SHOWING TOPOGRAPHY OF LOTS 26, 27, 28, 29, 30 AND 31 AND PART OF LOT 18
REGISTERED PLAN 473 AND PART OF LOT 6, CONCESSION 1 SOUTH OF DUNDAS STREET
(GEOGRAPHIC TOWNSHIP OF TORONTO)
CITY OF MISSISSAUGA REGIONAL MUNICIPALITY OF PEEL

LEGEND

- STORM DRAINAGE AREA
- 489m2 — AREA IN m²
- 0.9 — COEFFICIENT
- DENOTES BUILDING AREA
- DENOTES LANDSCAPING AREA
- DENOTES DRIVEWAY AREA
- DENOTES ROAD AREA
- DENOTES SIDEWALK AREA

BENCHMARK NOTE

ELEVATIONS SHOWN HEREON ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK No. 351 HAVING AN ELEVATION OF 108.675 METRES LOCATED ON THE EAST FACE AT THE MAIN ENTRANCE OF APPLEWOOD PUBLIC SCHOOL ON THE WEST SIDE OF HARVEST DRIVE, 30.5 METRES SOUTH OF KENDALL ROAD.

		DATE	APPR. BY
2.	CITY COMMENTS FROM AUGUST 8, 2018	OCT.16/2018	M.E.H.
1.	FIRST SUBMISSION	JAN.09/2018	S.Ng.
REVISION BLOCK			

CITY PARK (DIXIE) INC.

2103-2119 PRIMATE ROAD, 1351 & 1357 WEALTHY PLACE, 2116& 2112 DIXIE ROAD

LICENCED PROFESSIONAL ENGINEER
M.E.HALL
OCT.16/18
PROVINCE OF ONTARIO

APPROVED AS TO FORM IN RELIANCE UPON THE PROFESSIONAL SKILL AND ABILITY OF CONDELAND ENGINEERING LIMITED AS TO DESIGN AND SPECIFICATION

DIRECTOR OF DEVELOPMENT/ TRANSPORTATION ENGINEERING
DATE: ____________

CONDELAND
CONSULTING ENGINEERS & PROJECT MANAGERS
350 Creditstone Road, Unit 200
Concord, Ontario L4K 3Z2
P: (905) 695-2096
F: (905) 695-2099

MISSISSAUGA
Region of Peel
Working for you

STORM TRIBUTARY PLAN

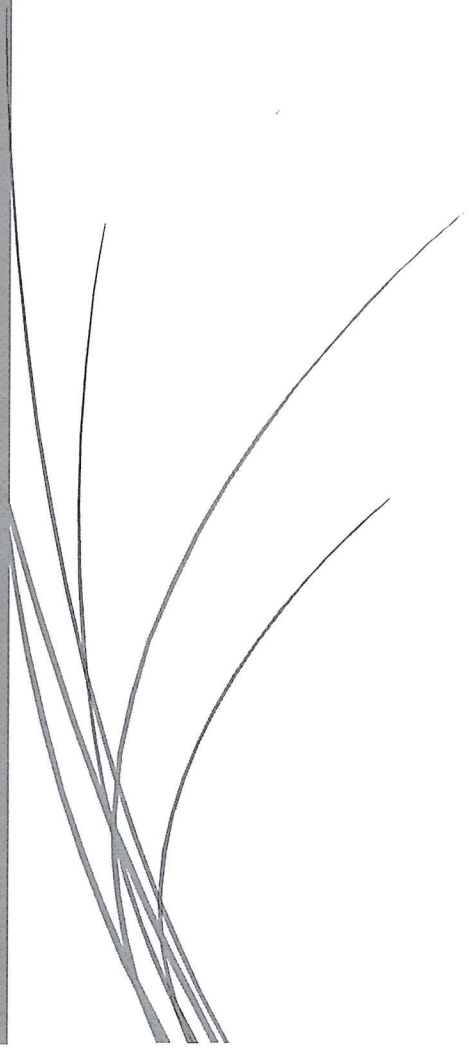
DESIGNED BY: M.E.H./ S.N.	DATE: OCTOBER 2018	CHECKED BY: M.E.H.	
DRAWN BY: G.M./ M.A.	DRAWING NO. 17-017-06		
SCALES HOR 1:300		CITY FILE DARC 17-192	

APPENDIX 'K'

- Geotechnical Investigation prepared by Bruce A Brown Associates Limited, dated October 4, 2018

October 4, 2018

Geotechnical Investigation for 2116 and 2122 Dixie Road, City of Mississauga



Project 08*3368 BRUCE A BROWN ASSOCIATES LIMITED

CONSULTANTS IN THE ENVIRONMENTAL AND APPLIED EARTH SCIENCES

Contents

Enclosures:

Appendix A Statement of Limitations for Geotechnical Evaluations

Appendix B Site Location Plan & Test Pit Locations

Appendix C Test Pit Logs

Distribution: 2 copies and 1 pdf to Client, mmonass@cityparkhomes.ca

1 copy to file

BRUCE A. BROWN ASSOCIATES LIMITED
Consultants in the Environmental and Applied Earth Sciences
101-102Aerodrome Crescent
Toronto, Ontario, Canada M4G 4J4
Tel: (416) 424-3355 Email bruce@brownassociates.ca

Project 08*3368
June 18, 2018

Attn: Mr. Chris Zeppa

Central by City Park Homes Inc.,

950 Nashville Road

Kleinburg, ON

L0J 1C0

Dear Mr. Zeppa,

Re: Geotechnical Report for
Proposed Residential Redevelopment,
2116 and 2122 Dixie Road, Mississauga

1.0 Introduction

Brown Associates Limited was authorized by Mr. Chris Zeppa of City Park Homes to conduct a geotechnical investigation for proposed redevelopment of 2116 and 2122 Dixie Road, Mississauga. The redevelopment also takes in existing residences at 2103 to 2119 Primate Road, and 1351 and 1357 Wealthy Place, where these rear yards abut the Dixie property, which was a former single family residence, now demolished. This investigation has been carried out in conformity with the provision of the Statement of Limitations for geotechnical evaluations, which is attached as **Appendix A**, and forms a part of this report.

This investigation involved the advancement of five test pits to about 4m depth below grade, using a track-mounted hydraulic backhoe. Boreholes stood open for sufficient time for

groundwater to equilibrate before backfilling. Test pits are shown on the general site plan attached as **Appendix B**.

1.1 Previous Investigations

No previous geotechnical investigations for this site are known. Earlier studies by Brown Associates include a designated substances investigation prior to the demolition of the former house and garage on this site, an initial Phase 1 environmental report in 2008, when the residence was still standing, and an updated Phase 1 environmental report in 2018.

1.2 Site Description

The site is located on the west side of Dixie Road, just north of the Queen Elizabeth Way and North Service Road, incorporating the vacant lot at 2116-2122 Dixie Road, two single family residences on Wealthy Court numbers 1351 and 1357, each having a detached bungalow residence, and four properties on the east side of Primate Road, numbers 2103, 2107, 2113, and 2119, each developed with a *circa* 1950s detached bungalow residence. A Site Location Plan, Appendix B, is attached for reference.

The property has a frontage of approximately 109.4m on Dixie Road. The Dixie parcel has mature deciduous and conifer trees on perimeters and surrounding the former residence and garage. The original pavements for circular driveway and garage slab remain. It is nearly flat-lying, sloping to the west. The site has full municipal services, including sanitary sewers, gas, water and hydro.

1.3 Regional Soil Conditions

The area is underlain by shallow sediments, predominantly fine sand, extending to Georgian Bay Formation bedrock which is anticipated within 6 to 8 meters from grade. Georgian Bay Formation comprises shale with limestone layers of Lower Ordovician age.

2.0 Field Investigations

2.1 Clearing of Services

Public underground services were cleared under the Ontario One Call Program under ticket number 20183722843 (Promark-Telecon Inc.)

2.2 Site Investigation

2.2.1 Test Pits

On October 4, five test pits were excavated using a track-mounted Komatsu PC 88 HR excavator operated by Turbo Contracting. A Test Pit Location Plan and Test Pit Logs are attached.

Representative soil samples were obtained from face of test pit or retrieved from the bucket by our principal geotechnical engineer. A pocket penetrometer was also used on faces of excavation.

Logs of the excavations and subsurface condition were made, and are attached as **Appendix C**. Grades are related to geodetic elevations taken from an available topographic survey. All soils were found to be aesthetically clean without evidence of potential environmental concerns. All soils were undisturbed except in the top 0.9m of Test Pit 2 where a vitrified 100mm tile was found, originating as part of the former Class 4 onsite private waste system serving the former residence.

2.3 Subsurface Conditions

A consistent depth of 150mm of loose sandy black topsoil was found in all test locations, underlain by compact fine ochre sand with silt, grading to fine ochre sand with trace silt by 0.9m and to uniform compact light grey-brown fine sand by about 1m. Fine sand became dense by 1.3m depth and showed traces of depositional bedding plane for the remaining depth. By 2.5m depth, sand transitioned to fine sand with medium sand and by 3m depth transitioned to medium sand with fine sand and to medium light grey wet sand by about 3.3m depth below grade. Test Pits extended to between 3.75 and 5.2m below grade. Water equilibrated at the base of each test pit together with minor caving of side walls below depth of saturation after about 15 to 20 minutes.

3.0 Recommendations

3.1 Foundation Requirements – Slab-on-Grade

Slab-on-grade construction requires stripping of all topsoil and roots to depths of at least 200mm from present grades. Additional soil surcharge should be compacted in minimal lifts to achieve

at least 95% Standard Proctor Density. A concrete slab reinforced with 00-00 welded wire mesh generally will require 150mm of clear 19mm limestone bedding for lightly loaded structures.

3.2 Foundation Requirements - Conventional Footings

The existing native sand is compact and becomes dense by frost penetration depths, permitting use of conventional strip footings and column pads founded on original, undisturbed soils, with minimum depth of cover of 1.4m. A safe allowable bearing capacity of 140 kPa SLS (240 KPA SLS) is available. Full depth foundations for basements will be founded on dense fine sand at 2m below grade for which a safe allowable bearing capacity of 200 kPa SLS (350 ULS) is available on undisturbed material. Below 3m depth, design bearing is reduced by a factor of 2 because of proximity to saturated sand.

Excavated sand is not frost-susceptible and may be used without limitation for structural backfill. It is responsive to compactive effort using vibratory smooth drum equipment. Three 15M rebars are recommended to be supported on bricks or chairs to obtain at least 75mm cover beneath, for all load-bearing bases or walls. Minimum dimension of column pads shall be 750mm to prevent punching.

3.3 Bedding for Services

New services between depths of 1.5m and 3.0m may be bedded on native sand which will generally meet mechanical requirements of Granular "B", and local material may be used for backfill material up to spring line and to full depth. Any service trench deeper than 4m will require use of a moveable shear box because of the depth of saturation of medium sand.

3.4 Pavement Design

Any excavation shall be backfilled with Granular "B" soils or available recycled crusher-run concrete compacted to 95% Standard Proctor Density or better. The new internal road shall have a minimum of 200mm of Granular "B" compacted to at least 95% of Standard Proctor Density. An additional 2000mm of Granular "A" or 19mm crusher-run limestone shall be compacted in two or more lifts to 95% Standard Proctor Density or better.

A 75mm thickness of HL-8 base course asphaltic concrete shall be placed, and may stand through a full season, if required, before finishing with 30mm top course of HL-3 asphaltic concrete. A tack coat will be required on top of base course pavements when top course is deferred.

3.5 Earthquake Design

Earthquake factors for v and F, as applied in the Ontario Building Code, may be taken as 0.05 and 1.0 respectively for this site. All shallow overburden is Class C for earthquake design purposes.

The 2015 National Building Code of Canada interpolated seismic hazard values are determined for a 2% in 50-year (0.000404 per annum) probability of exceedance. Values are for "*firm ground*" (NBCC soil Class C, such the sand found at this site) with average overburden shear wave velocities of 360 – 760 $m.s^{-1}$.) Median (50^{th} percentile) values are given in units of g for spectral acceleration (Sa(T) where T is the period in seconds) and peak ground accelerations (PGA).

Only two significant figures are used. These values have been interpolated using Sheppard's Method from a 10-km spaced grid of points, based on site coordinates of 43.599527° North and 79.571437° West.

National Building Code Seismic Hazard Values

2% in 50 years (0.000424 per annum) probability:

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA
0.226	0.117	0.059	0.028	0.145g

3.6 Soil Permeability

Drywells or infiltration trenches should be effective means for surface water control. They should be designed based on a minimum depth of 1.25m to be below the silty sand zone and into the uniform sand which has superior hydraulic conductivity, estimated 5×10^{-5} $m.sec^{-1}$. The best performance would be to excavate trenches to 1.25m depth, provide 100mm of 20-50mm clear stone base and use proprietary prefabricated arches to maximize storage volumes prior to backfilling. Drywalls with inverts between 2.5 and 3.25m depth below grade will encounter coarser sand with a marginally better hydraulic conductivity of 7.5×10^{-5} $m.sec^{-1}$; however capacity may become limited by the effect of true water table mounding beneath such structures.

3.7 Deep Excavation and Shoring

Excavation to frost depth for perimeters and column pads may have vertical cuts to 1.4m depth, from underside of topsoil horizon. Deeper excavations shall not have vertical cuts beyond 1.4m faces, and near surface materials shall be trimmed back, as required, at 1:1 to match surrounding grades. For services cuts, in the alternative, a moveable shear box can be used to protect personnel. A geotechnical engineer, on examination, may be able to certify free-standing vertical faces between 0.5 and 2.5m depths below grade. Excavations below 3.5m depth will require shoring or slopes to be cut back to 2.5:1 H:V.

If deeper excavations are required, lateral soil pressure for permanent or temporary structures may be determined using the following equation:

$P = K (\gamma H+q)$ where,

P = lateral earth pressure kPa	kPa
K = lateral earth pressure coefficient	0.4
γ = unit weight of fine sand or granular	21.0 kN/m^3
H = depth of wall below finished grade	m
q = surcharge loads adjacent to wall	kPa

This formula assumes free-draining conditions created by perimeter drainage systems to prevent any hydrostatic pressures from building behind perimeter walls, and is therefore valid to depths of 3.5m below original grade.

For temporary shoring, where there are building foundations or services behind temporary shoring within a distance of 0.5H, K= Ko = earth pressure coefficient at rest should be 4.0, and where there are services between 0.5H and H beyond the wall and a minor amount of movement for temporary shoring is acceptable, K= may be 0.33.

Where slight to moderate ground movement is acceptable on the Balsam Street frontage only, for temporary shoring K = Ka = 0.25 active earth pressure coefficient.

4.0 Qualification

Brown Associates has 47 years of experience in the geo-environmental characterization of sites in the Toronto centered region. This firm carries $2M environmental liability insurance and $2M errors and omissions insurance, and enjoys a claims-free status.

5.0 Closure

Thank you for this opportunity to be of service. Should questions arise, please do not hesitate to call.

Yours very truly,

BRUCE A. BROWN ASSOCIATES LIMITED

Bruce A. Brown, Ph.D., MCIP, RPP, P.Eng., QPESA

Appendix A: Statement of Limitations for Geotechnical Evaluations

Bruce A. Brown Associates Limited

Geo-environmental Report
General Conditions and Limitations

Section 1: Use of the Report

1.1 The factual data, interpretations and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation or if the project is not initiated within two years of the date of the report, Brown Associates should be given an opportunity to confirm that the recommendations are still valid.

1.2 Subsoils, groundwater, or other conditions which may affect design or implementation may differ between actual test locations and may not be appropriate for areas beyond those investigated.

1.3 The comments given in this report are intended only for the guidance of the design engineer. The number of test holes to determine all the relevant underground conditions which may affect construction costs, techniques and equipment choice, scheduling and sequence of operations, would be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual test hole data, as to how subsurface conditions may affect their work.

1.4 With the exception of instances where this firm is specifically retained to confirm field conditions, or to supervise construction or excavation, the responsibility of Bruce A. Brown Associates Limited shall be restricted to accurate interpretation of conditions at test location(s). No responsibility can be taken for the procedures or the sequence of effort carries out by any contractor, even when his final result would be to implement the recommended design, unless field supervision is requested form this firm.

Section 2: Follow Up

2.1 All details of the design and proposed construction may not be known at the time of submission of Brown Associates' report. It is recommended that Brown Associates be retained during the final design stage to review the design drawings and specifications related to foundations, earthworks, retaining systems and drainage, to determine that they are consistent with the intent of Brown Associates' report.

2.2 Retaining Brown Associates during construction is recommended to confirm and to document that the subsurface conditions throughout the site do not materially differ from those given in Brown Associates' report and to confirm and to document that construction activities did not adversely affect the design intent of Brown Associates' recommendations.

Section 3: Soil and Rock Conditions

3.1 Soils and rock descriptions in this report are based on commonly accepted methods of classification and identification employed in professional geotechnical practice. Classification and identification of soil and rock involves judgement and Brown Associates does not guarantee descriptions as exact, but implies accuracy only to the extent that is common in current geotechnical practice.

3.2 The soils and rock conditions described in this report are those observed at the time of study. Unless

otherwise noted, those conditions form the basis of the recommendations in the report. The condition of the soil and rock may be significantly altered by construction activities (traffic, excavation, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil and rock must be protected from these changes or disturbances during and after construction.

Section 4: Logs of Test Holes and Subsurface Interpretations

4.1 Soil and rock formations are variable to a greater or lesser extent. The test hole logs indicate the approximate subsurface conditions only at the locations of the test holes. Boundaries between zones on the logs are often not distinct, but rather are transitional and have been interpreted. The precision with which subsurface conditions are indicated depends on the method of boring, the frequency of sampling and the uniformity of subsurface conditions. The spacing of test holes, frequency of sampling and type of boring also reflect budget and schedule considerations.

4.2 Subsurface conditions between test holes are inferred and may vary significantly from conditions encountered at the test holes.

4.3 Groundwater conditions described in this report refer only to those observed at the place and time of observation noted in the report. These conditions may vary seasonally or as a consequence of construction activities on the site or on adjacent sites.

Section 5: Changed Conditions

5.1 Where conditions encountered at the site differ significantly from those anticipated in this report, either due to a natural variability of subsurface conditions or due to construction activities, it is a condition of the use, or reliance by the client, of this report that Brown Associates be notified of the changes and provided with an opportunity to review the recommendations of this report. Recognition of changed soil and rock conditions requires experience and it is recommended that an experienced geotechnical engineer be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Section 6: Drainage

6.1 Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage systems can have serious consequences. Brown Associates can assume no responsibility for the effects of drainage unless Brown Associates is specifically involved in the detailed design and follow-up site supervision and inspection during construction of the drainage system.

Appendix B: Site Location Plan & Test Pit Locations

PLAN OF SURVEY SHOWING TOPOGRAPHY OF
LOTS 26, 27, 28, 29, 30 AND 31 AND
PART OF LOT 18
REGISTERED PLAN 473 AND
PART OF LOT 6, CONCESSION 1
SOUTH OF DUNDAS STREET
(GEOGRAPHIC TOWNSHIP OF TORONTO)
CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

SCALE 1:250

RADY-PENTEK & EDWARD SURVEYING LTD., O.L.S.

METRIC

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.

2. THE SURVEY WAS COMPLETED ON THE ____ DAY OF ______, 2017

DATE ____________, 2017

C. WANDIA
ONTARIO LAND SURVEYOR

NOTES

■	DENOTES MONUMENT FOUND
□	DENOTES MONUMENT SET
SIB	DENOTES STANDARD IRON BAR
SSIB	DENOTES SHORT STANDARD IRON BAR
IB	DENOTES IRON BAR
CP	DENOTES CONCRETE PIN
P.I.N.	DENOTES PROPERTY IDENTIFIER NUMBER
MEAS	DENOTES MEASURED
CALC'D	DENOTES CALCULATED
PL1	DENOTES REGISTERED PLAN 473
PL2	DENOTES PLAN RD-191
PL3	DENOTES PLAN OF SURVEY BY BAIRD & MUCKLESTONE, O.L.S. DATED JULY 30, 1954
PL4	DENOTES PLAN OF SURVEY BY BAIRD & MUCKLESTONE, O.L.S. DATED AUGUST 12, 1953
PL5	DENOTES PLAN OF SURVEY BY BAIRD & MUCKLESTONE, O.L.S. DATED AUGUST 14, 1953
PL6	DENOTES PLAN OF SURVEY BY BAIRD & MUCKLESTONE, O.L.S. DATED AUGUST 10, 1953
PL7	DENOTES PLAN 43R-33843
PL8	DENOTES PLAN 43R-36854
(680)	DENOTES CHRISTOPHER PEAT, O.L.S.
(1557)	DENOTES THAM SURVEYING LIMITED, O.L.S.
(OU)	DENOTES ORIGIN UNKNOWN
(RPE)	DENOTES RADY-PENTEK & EDWARD SURVEYING LTD., O.L.S.
(B&M)	DENOTES BAIRD & MUCKLESTONE, O.L.S.
CB	DENOTES CATCH BASIN
HV	DENOTES HYDRO VAULT
UP	DENOTES UTILITY POLE
LS	DENOTES LAMP STANDARD
MH	DENOTES MANHOLE
MHW	DENOTES MANHOLE WATER
MHSA	DENOTES MANHOLE SANITARY
MHST	DENOTES MANHOLE STORM
WV	DENOTES WATER VALVE
-W-	DENOTES OVERHEAD WIRE
TS	DENOTES TRAFFIC SIGNAL
FF	DENOTES FINISHED FLOOR ELEVATION
BF	DENOTES BOARD FENCE
CLF	DENOTES CHAIN LINK FENCE
PF	DENOTES PICKET FENCE
⌀	DENOTES DIAMETER
⊙	DENOTES DECIDUOUS TREE
*	DENOTES CONIFEROUS TREE
SCP	DENOTES SPECIFIED CONTROL POINT

BEARING NOTE

BEARINGS ARE GRID, UTM ZONE 17, NAD83 (ORIGINAL), DERIVED FROM
SCP 073750371 NORTH 4829758.433 EAST 616045.252
SCP 009711127 NORTH 4828329.638 EAST 615073.771

COORDINATES ARE UTM ZONE 17, NAD83 (ORIGINAL), TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10, AND CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

DISTANCE NOTE

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.99973.

BENCHMARK NOTE

ELEVATIONS SHOWN HEREON ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK No. 331 HAVING AN ELEVATION OF 108.875 METRES LOCATED ON THE EAST FACE AT THE MAIN ENTRANCE OF APPLEWOOD PUBLIC SCHOOL ON THE WEST SIDE OF HARVEST DRIVE, 323 METRES SOUTH OF KENDALL ROAD

CAUTION

TO OBTAIN GEODETIC ELEVATIONS (1978 G.S.C. RE-ADJUSTMENT), SUBTRACT 0.12m (0.39') FROM THE VALUES SHOWN HEREON.

PROJECT 084 3368 TEST PIT LOCATION PLAN

RADY-PENTEK & EDWARD SURVEYING LTD.
ONTARIO LAND SURVEYORS
643 Chrislea Road, Suite 7
Woodbridge, Ontario L4L 8A3
Tel.(416)635-5000 Fax (416)635-5001
Tel.(905)264-0881 Fax (905)264-2099
Website: www.r-pe.ca
DRAWN: I.A. CHECKED: C.W.
JOB No. 16-313 CAD FILE No.16-313-PL

Nov 30, 2017 - 08:22:07

Appendix C: Test Pit Logs

Test Pit 1. Elevation 110.4 geodetic. Invert 106.6 masl.

0.0 Loose, black sandy topsoil. Non-cohesive, non-plastic, with roots.
0.18 Ochre to light brown fine sand with silt. Loose, uniform, non-plastic, becoming firm by 0.5m and compact by 1.0m depth.
1.0 Light brown fine sand, compact, uniform, dry, grading to light grey-brown becoming dense by 2m depth.
2.0 Dense, fine grained grey-brown uniform sand, minor horizontal bedding plane, grading to fine sand with medium sand, to medium dense sand by 3m depth.
3.8 Invert of test pit in uniform light grey medium sand. Saturated below 3.3m.
Water equilibration at 3.5m after one hour with minor side wall collapse below 3.5m depth. GWL = 106.90m

Test Pit 2. Elevation 109.9 geodetic. Invert 106.15 masl.

0.0 Loose, black sandy topsoil. Non-cohesive, non-plastic, with roots.
0.15 Ochre to light brown fine sand with silt. Loose, uniform, non-plastic, becoming firm by
1.0 0.5m and compact by 1.0m depth. Vitrified clay pipe at 0.9m depth, no stone bedding. Light brown fine sand, compact, uniform, dry, grading to light grey-brown becoming dense by 2m depth. Non-plastic, non-cohesive.
2.0 Dense, fine grained grey-brown uniform sand, minor horizontal bedding plane, grading to fine sand with medium sand, to medium dense sand by 3m depth.
3.9 Invert of test pit in uniform light grey medium sand. Saturated below 3.3m.
Water equilibration at 3.6m after one hour with minor side wall collapse below 3.5m depth. GWL = 106.30m

Test Pit 3. Elevation 109.8 geodetic. Invert 106.2 masl.

0.0 Loose, black sandy topsoil. Non-cohesive, non-plastic, with roots.
0.20 Ochre to light brown fine sand with silt. Loose, uniform, non-plastic, becoming firm by 0.5m and compact by 1.2m depth.
1.0 Light brown fine sand, compact, uniform, dry, grading to light grey-brown becoming dense by 2m depth.
3.0 Dense, fine grained grey-brown uniform sand, minor horizontal bedding plane, grading to fine sand with medium sand, to medium dense sand by 3m depth.

3.9 Invert of test pit in uniform light grey medium sand. Saturated below 3.3m. Water equilibration at 3.6m after one hour with minor side wall collapse below 3.4m depth. GWL = 106.20m

Test Pit 4. Elevation 109.9 geodetic. Invert 106.0 masl.

0.0 Loose, black sandy topsoil. Non-cohesive, non-plastic, with roots.

0.22 Ochre to light brown fine sand with silt. Loose, uniform, non-plastic, becoming firm by 0.3m and compact by 0.9m depth.

1.0 Light brown fine sand, compact, uniform, dry, grading to light grey-brown becoming dense by 2m depth.

3.0 Dense, medium grained grey-brown uniform sand, minor horizontal bedding plane, by 3m depth.

3.9 Invert of test pit in uniform light grey medium sand. Saturated below 3.3m. Water equilibration at 3.3m after one hour with minor side wall collapse below 3.6m depth. GWL = 106.60m

Test Pit 5. Elevation 110.4 geodetic. Invert 106.4 masl.

Loose, black sandy topsoil. Non-cohesive, non-plastic, with roots.

0.17 Ochre to light brown fine sand with silt. Loose, uniform, non-plastic, becoming firm by 0.5m and compact by 1.0m depth.

1.0 Light brown fine sand, compact, uniform, dry, grading to light grey-brown becoming dense by 2m depth.

2.0 Dense, fine grained grey-brown uniform sand, minor horizontal bedding plane, grading to fine sand with medium sand, to medium dense sand by 3m depth.

4.2 Invert of test pit in uniform light grey medium sand. Saturated below 3.3m. Water equilibration at 3.5m after one hour with minor side wall collapse below 3.5m depth. GWL = 106.90m

All test pits backfilled and compacted to grade on completion of program.