BLOCK 14 (BRIDLEWOOD TRAILS – PHASE 2)
OTTAWA, ONTARIO

SERVICING DESIGN BRIEF

Prepared For:

Claridge Homes

Prepared By:

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Submitted: September 17, 2014

Novatech File No.: 114013
Report Reference No.: R-2014-148

NOVATECH
Engineers, Planners & Landscape Architects

September 17, 2014

City of Ottawa
Planning and Infrastructure Approvals
110 Laurier Street West, 4th Floor
Ottawa, ON, K1P 1J1

Attention: **Mr. Damien Whittaker**

Reference: **Block 14 (Bridlewood Trails – Phase 2 Subdivision)**
Servicing Design Brief
Our File No.: 114013

Please find enclosed herein for your review the Servicing Design Brief including the Hydraulic Network Analysis for Block 14 (Bridlewood Trails – Phase 2). The site is bounded by Tulum Crescent to the northwest, Overberg Way to the northeast and southeast and Terry Fox to the southwest.

This report addresses the approach to site servicing (sanitary/storm/watermain) and to stormwater management for the subject property. Also, the hydraulic analysis portion examines the proposed water distribution system as it relates to the existing infrastructure and future watermain distribution. This report demonstrates that the site servicing and stormwater management can be achieved and that the proposed water distribution system can provide adequate system pressures for the maximum day plus fire and the peak hour design conditions at all nodes throughout the development.

This report is submitted in support of the engineering detailed design for the Claridge Homes site plan application.

Trusting this report is adequate for your purposes. Should you have any questions, or require additional information pertaining to the enclosed report, please contact us.

Yours truly,

NOVATECH

Justin Gauthier, B. Eng.
Junior Engineer

JAG/jag

cc Shawn Malhotra, Claridge Homes

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1.0 INTRODUCTION

This Servicing Design Brief was prepared as part of the engineering detailed design for the Block 14 (Bridlewood Trails – Phase 2) Lands residential development.

1.1 The Site

The proposed Block 14 Site development located within the Bridlewood Trails Phase 2 development off Tulum Crescent and Overberg Way, owned by Claridge Homes, consists of a 0.93 ha site located in the City of Ottawa. The site is located southeast of Tulum Crescent, southwest and northwest of Overberg Way and northeast of Terry Fox Drive as shown on Figure 1a/1b – Key Plan.

The legal description of the property is designated as part of Plan of Subdivision of Part of Lot 30 and Part of the Road Allowance between Lots 30 and 31, Concession 9, Geographic Township of Goulbourn, and Blocks 6 and 10 Registered Plan 4M-1330 City of Ottawa.

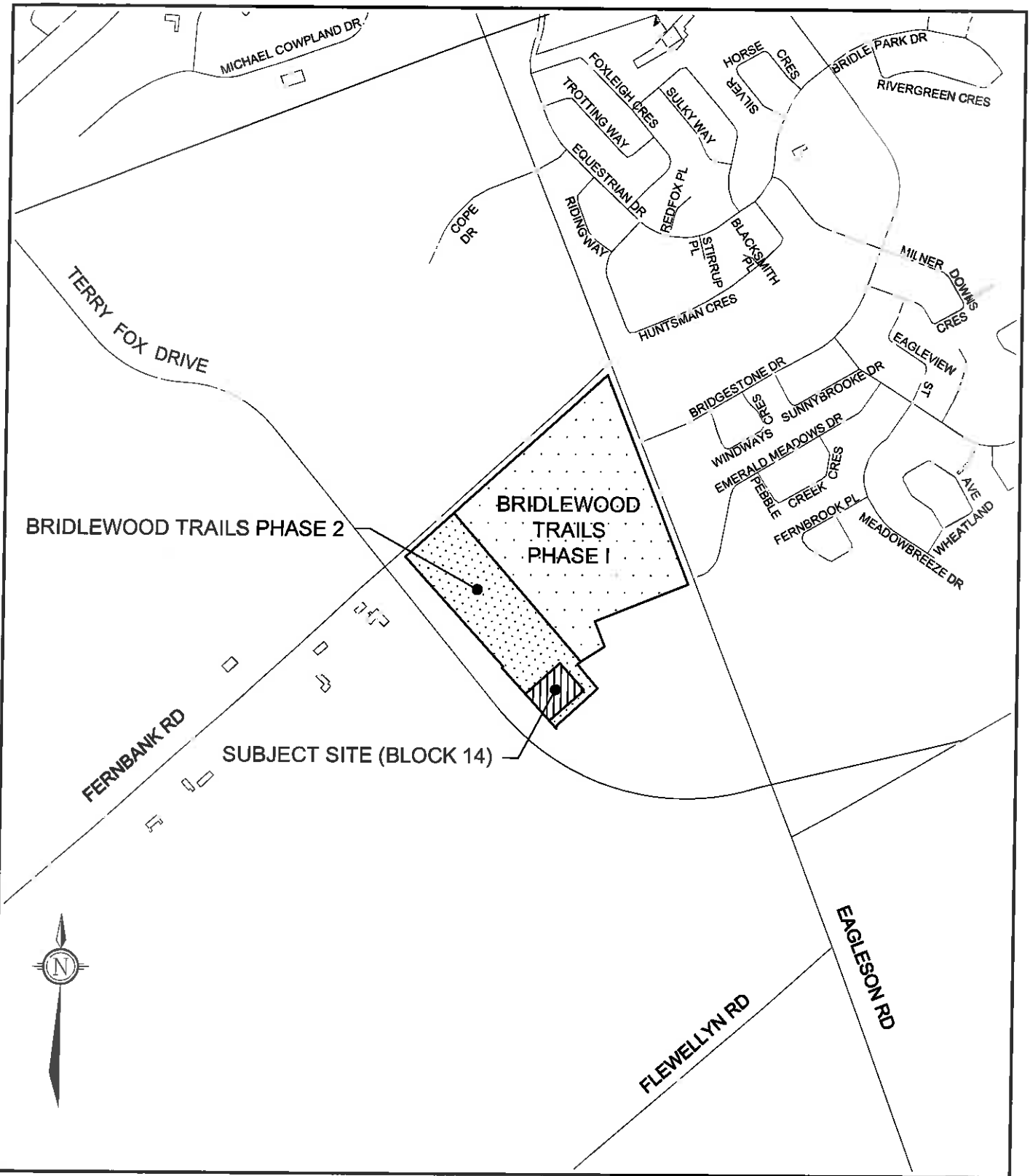
The Block 14 (Claridge) site is proposed to be developed as a residential site plan which will consist of approximately 72 zen type dwellings within 6 low-rise buildings and on-site parking with access from Overberg Way and Tulum Street as shown on Figure 2 – Site Plan.

The existing lands are presently vacant, but were previously occupied by farm land as shown on Figure 3 – Existing Conditions.

Figure 1a – Key Plan

1.2 Additional Reports

This Servicing Design Brief provides information on the considerations and approach by which Novatech Engineering Consultants Ltd. (NECL) has designed and evaluated the



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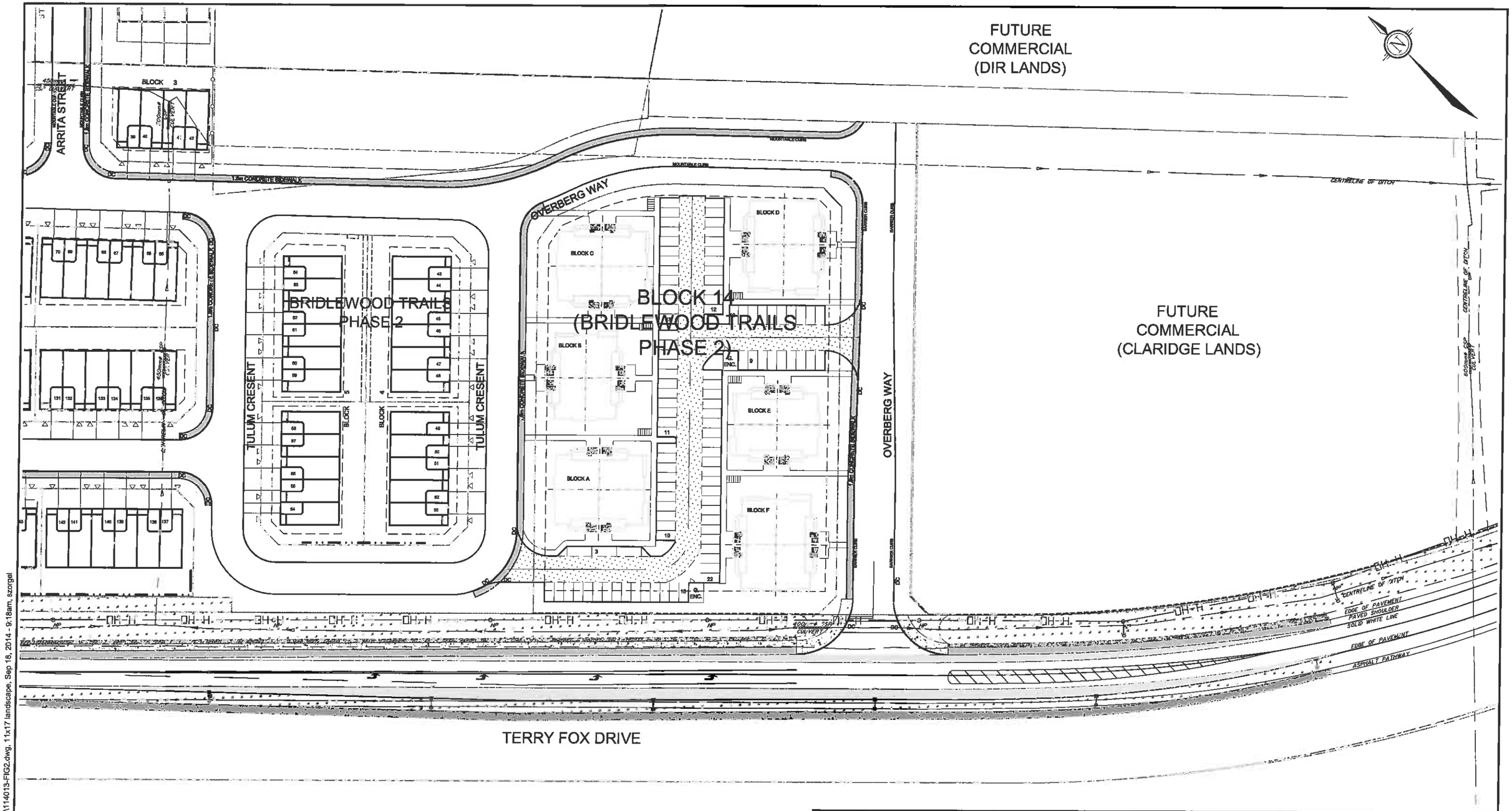
CITY OF OTTAWA

BLOCK 14
(BRIDLEWOOD TRAILS PHASE 2)

KEY PLAN

NTS | SEPT 2014 | 114013 | FIGURE 1b



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BLOCK 14
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SITE PLAN

SEPT 2014 114013 FIGURE 2

SHT11X17.DWG - 279mmX432mm

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EXISTING CONDITIONS

SEPT 2014 | 114013 | FIGURE 3

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proposed servicing system for the Block 14 lands. This report should be read in conjunction with the following:

- *Geotechnical Investigation – Proposed Residential Development, Fernbank Road and Terry Fox Drive, Kanata, Ontario* (Golder Associates, dated March 2011; Report No. 07-1121-0037).
- *Bridlewood Trails Phase 2 Stormwater Management Report* (Novatech, dated October 1, 2013; R-2011-118).
- *Bridlewood Trails Phase 2 Design Brief* (Novatech, dated September 26, 2013; R-2011-113).

1.3 Consultations and Approvals

There have been multiple consultations with the City regarding this proposed development which have preceded the proposed site being granted draft approval under the title Claridge Homes (Eagleson) Inc. Subdivision 5358 Fernbank Road File No.: D07-16-07-0025. Both Rideau Valley Conservation Authority (RVCA) and the Ministry of Environment (MOE) have been consulted with regards to the Bridlewood Trails – Phase 2 Subdivision which also accounted for this proposed development.

The City of Ottawa Servicing Study Guidelines for Development Applications was used to prepare this report.

1.4 Planning Context

The subject property is designated Enterprise Area in the City of Ottawa Official Plan. Enterprise Areas are generally areas of employment but may also accommodate the integration of medium and high-density housing, provided there are concentrated employment densities to support residential uses. Residential uses are to be well integrated within the Enterprise Area and the surrounding community, such that residential amenities and services are easily accessible. The proposed development conforms to these policies of the Official Plan.

The subject property is zoned R4Z in the City of Ottawa Zoning By-law 2008-250. The purpose of the R4 Zone is to allow a wide mix of residential building forms ranging from detached to low-rise apartment dwellings. The Z subzone imposes development standards which promote efficient land use and compact form while showcasing newer design approaches. The proposed development for Block 14 of Bridlewood Trails (Phase 2) complies with present zoning, both in terms of permitted uses and performance standards.

2.0 PRE-DEVELOPMENT CONDITIONS

2.1 The Site

The Claridge (Block 14)) site is approximately 0.93 hectares and is currently undeveloped and is mainly former agricultural lands that are currently fallow. There is access to the site via Tulum Crescent and Overberg Way, in Phase 2 of the Bridlewood Trails Subdivision development to the east. The Existing Conditions Plan is provided as Figure 3.

2.2 Existing Drainage

Under existing conditions, the site grading is relatively flat with sheet drainage to existing ditches along Terry Fox Drive and Fernbank Road, or to the Monahan Municipal Drain to the south of the site. Some drainage flows are conveyed through Bridlewood Trails – Phase 2 Subdivision minor storm system to the Monahan Drain.

2.3 Geotechnical Investigation

Golder Associates conducted a geotechnical review in support of the proposed residential development on the Claridge Homes Lands.

- The field program for this investigation was carried out in two phases. The first phase consisted of advancing three (3) boreholes (Numbered 07-1 to 07-3) to depths ranging from 6.4 to 8.5m below ground surface. The second phase consisted of advancing three (3) boreholes (Numbered 10-1 to 10-3) to depths ranging from 14.0 to 35.0m below ground surface;

The findings of this investigation are included in the report: *Geotechnical Investigation – Proposed Residential Development, Fernbank Road and Terry Fox Drive, Kanata, Ontario* (Golder Associates, dated March 2011, Report No. 07-1121-0037). The principal findings of the Geotechnical investigation are summarized as follows:

- A surficial layer of topsoil of thickness from 0.15m to 0.37m for all boreholes except borehole 07-2 and 10-3. Boreholes 07-2 and 10-3 had a layer of fill of thickness 0.12m and 0.13m respectively consisting of silty clay and sandy silt.
- A clayey silt, sandy silt and silty sand layer of thickness 1.5m to 3.4m was encountered below the topsoil.
- The clayey silt, sandy silt and silty sand layer are underlain by a thick deposit of sensitive silty clay of thickness 6.4m to 35.0m. Further lab testing indicates an apparent over consolidation of the silty clay deposit.
- Based on geological mapping, the bedrock in this area consists of limestone and the Gull River formation.
- Groundwater inflow was observed in test pits 07-2, 10-1 and 10-3 at depths of between 0.5m and 0.6m below ground surface.

The report provides engineering guidelines based on Golder Associates interpretation of the borehole information and project requirements. Refer to the final Geotechnical Report dated March 2011 by Golder Associates (Report No. 07-1121-0037) for complete details.

3.0 STORMWATER MANAGEMENT

A detailed stormwater management strategy has been developed for the proposed Block 14 development. The following section outlines the preliminary stormwater design concepts in support of the development.

3.1 Existing Conditions

Land Use

The proposed site, located within the Bridlewood Trails – Phase 2 development, is currently undeveloped and consists of former agricultural lands that are currently fallow. Access to the site is provided via Tulum Crescent and Overberg Way, in Phase 2 of the Bridlewood Trails subdivision.

Soils

A geotechnical investigation was completed by Golder Associates Ltd. for the Bridlewood Trails – Phase 2 development, which includes the Block 14 lands. The investigation indicated the following:

- A surficial layer of topsoil of thickness from 0.15m to 0.37m for all boreholes except borehole 07-2 and 10-3. Boreholes 07-2 and 10-3 had a layer of fill of thickness 0.12m and 0.13m respectively consisting of silty clay and sandy silt.
- A clayey silt, sandy silt and silty sand layer of thickness 1.5m to 3.4m was encountered below the topsoil.
- The clayey silt, sandy silt and silty sand layer are underlain by a thick deposit of sensitive silty clay of thickness 6.4m to 35.0m. Further lab testing indicates an apparent over consolidation of the silty clay deposit.
- Based on geological mapping, the bedrock in this area consists of limestone and the Gull River formation.
- Groundwater inflow was observed in test pits 07-2, 10-1 and 10-3 at depths of between 0.5m and 0.6m below ground surface.

Drainage

The site is relatively flat with sheet drainage to existing ditches along Terry Fox Drive and Fernbank Road, or to the northeast of the site across Overberg Way. Refer to Figure 3 – Existing Conditions Plan for details.

3.2 Stormwater Management Criteria

The stormwater management criteria used in the design of the Block 14 lands area taken from the *Bridlewood Trails – Phase 2 Stormwater Management Report* (Novatech, October 2013) and the City of Ottawa Sewer Design Guidelines (October 2012).

FUTURE
COMMERCIAL
(DIR LANDS)

ARRITA STREET

BLOCK 3

OVERBERG WAY

525mmØ STM

BRIDLEWOOD TRAILS
PHASE 2

TULUM CRESENT

BLOCK C

BLOCK D

525mmØ STM

BLOCK B

300mmØ STM

G. ENC.

BLOCK E

375mmØ STM

OVERBERG WAY

FUTURE
COMMERCIAL
(CLARIDGE LANDS)

BLOCK 14
(BRIDLEWOOD TRAILS
PHASE 2)

BLOCK A

BLOCK F

300mmØ STM

G. ENC.

EDGE OF PAVEMENT
PAVED SHOULDER
SOLID WHITE LINE
EDGE OF PAVEMENT
ASPHALT PATHWAY

TERRY FOX DRIVE

LEGEND

DIRECTION OF STORM FLOW

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STORM ALIGNMENT

SEPT 2014 114013 FIGURE 4

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Minor System (Storm Sewers)

- Storm sewers are to be designed using the Rational Method for a 1:5 year return period;
- The allowable minor system release rate to the downstream storm system is 120 L/s/ha;
- Inlet control devices (ICDs) will be installed in road catchbasins to control inflows to the storm sewers;
- Ensure that underside of footing (USF) elevations for both existing and proposed developments are a minimum of 0.3 m above the 1:100 year HGL in the storm sewer system.

Major System

- Overland flows are to be confined within the right-of-ways and/or defined drainage easements for all storms up to and including the 1:100 year event;
- Parking areas will provide sufficient on-site storage to control runoff for all storms up to the 100-year event to the allowable minor system release rate;
- ICD flow rates are to be calculated for each drainage area to ensure that the following stormwater management (SWM) objectives are satisfied:
    - Surface water accumulation at street low points, during all storm events, shall not be present by the end of the rainfall;
    - Major system flow depths on streets shall not exceed a total of 0.30m (static + dynamic) and shall be confined to the road right-of-way as well as not be within 0.30m (vertical) to the nearest building opening;
        - The maximum flow depth on streets under static and/or dynamic conditions shall be 0.30m mm;
    - The product of the 100 year flow depth (m) on street and flow velocity (m/s) shall not exceed 0.6.

Water Quality/ Quantity Control

- Quality control will be provided by the two Vortechnics units located at the storm outfalls to Cell 2 of the Monahan Drain Constructed Wetlands. The Monahan Drain is an interconnected system that is controlled by a weir at the outlet of the wetland;
- Quantity control for the Block 14 development lands will be provided by the ICDs installed in the road catchbasins;
- Overland flows from the perimeter of Block 14 will be directed to Phase 2 of Bridlewood Trails, and quantity control will be provided by Phase 2 ICDs.

Erosion and Sediment Control

- A qualified inspector should conduct daily visits during construction to ensure that the contractor is working in accord with the design drawings and that mitigation measures are being implemented as specified;
- Rock flow check dams are to be installed at the outlets to roadside ditches;

- Inserts are to be placed under the grates of all proposed and existing catchbasins and structures;
- After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to be removed.

3.3 Site Grading and Stormwater Management

Storm servicing for the Block 14 development will be provided using a dual drainage approach: Minor system flows will be conveyed by storm sewers, while major system flows will be conveyed overland along roadways.

Some areas around the perimeter of the development will drain onto the existing Phase 2 of the Bridlewood Trails subdivision. These flows will be directed to catchbasins on either Tulum Crescent or Overberg Way. There will also be some areas that will drain to the roadside ditch along Terry Fox Drive.

Minor System (storm sewers)

The proposed storm sewer system will be designed to convey peak flows associated with the 1:5 year event. Inflows to the storm sewers will be controlled using ICDs. The ICDs have been sized to limit inflows, such that the peak outflows from the storm sewer system meet the allowable release rate. The size of ICDs for each catchbasin is listed on the General Plan of Services Drawing (114013-GP).

Major System

The roadways and parking areas have been designed to store runoff from storms that exceed the minor system capacity. There is no minimum requirement for on-site storage for residential areas, however quantity control will be provided by the low points in the roadways and parking areas. These areas have been graded to ensure that the 100-year peak overland flows are confined within the right-of-ways at a maximum flow depth of 0.30 m (static ponding + cascading flow). The overland flow path has been designed in a saw toothed pattern to provide storage above the catchbasins.

3.4 Hydrologic & Hydraulic Modeling (Autodesk Storm & Sanitary Analysis)

The *City of Ottawa Sewer Design Guidelines* (October 2012) require hydrologic modeling for all dual drainage systems. The performance of the proposed storm drainage system was evaluated using the *Autodesk Storm and Sanitary Analysis* (SSA) hydrologic/hydraulic model.

Model Development

The 'Storm and Sanitary Analysis' model has been developed to account for both minor and major system flows, including the routing of flows through the storm sewer network (minor system), and overland along the road network (major system). The results of the analysis were used to:

- Ensure no ponding in the right-of-ways remains at the end of all storm events;
- Calculate the storm sewer hydraulic grade line for the 100-year storm event;

- Evaluate overland flow depths and ponding volumes in the right-of-way during the 100-year event; and
- Determine the total major and minor system runoff from the site.

Storm Drainage Areas

The drainage areas used in the SWM analysis are shown on the post-development storm drainage area plans (Drawing 114013-STM). Post-development drainage areas were delineated based on the proposed site grading.

Subcatchment Parameters

The hydrologic parameters for each subcatchment were developed based on the Site Plan (Figure 2) and the Storm Drainage Area Plan specified above. The model includes the proposed Block 14 development, and Phase 2 of the Bridlewood Trails subdivision, updated to match as built conditions.

Minor / Major System Modeling

The proposed storm sewer network (catchbasins, manholes, pipes, etc.) is represented in the model. Inflows to the storm sewer (minor system) are modeled based on the characteristics of each inlet.

- For each of the catchbasins, inflows to the storm sewer are based on the ICD specified for the inlet and the maximum depth of ponding. Storage volumes within the right-of-way are based on the grading design.

Catchbasins were modeled as storage nodes in the 'Storm and Sanitary Analysis' model to account for the provided surface storage within the roadways and parking areas of the Block 14 development. The storage nodes are connected by short rectangular channels meant to mimic the roadway at the high points between ponding areas. This allows for overflow from one ponding area to another.

Stage-storage curves for each of the catchbasins have been developed based on the available storage calculated by the Civil 3D Grading Plan (114013-GR) model.

Design Storms

The hydrologic analysis was completed using the following synthetic design storms and historical storms. The IDF parameters used to generate the design storms were taken from the *Ottawa Design Guidelines - Sewer* (November 2004).

4 Hour Chicago Storms:
5-year 4hr Chicago storm
100-year 4hr Chicago storm

24 Hour Chicago Storms:
5-year 24hr Chicago storm
100-year 24hr Chicago storm

12 Hour SCS Type II Storms:
5-year 12 hour SCS Type II storm
100-year 12 hour SCS Type II storm

The 4-hour Chicago distribution generates the highest peak flows for both the minor and major systems and was determined to be the critical storm distribution for the design of the storm drainage system.

The proposed drainage system has also been stress tested using a 4-hour Chicago design storm that has a 20% higher intensity and total volume compared to the 100-year event.

3.5 Results of Hydrologic/Hydraulic Analysis

The Autodesk SSA model was used to evaluate the performance of the proposed storm drainage system. The results of the analysis are summarized as follows.

Minor System / ICDs

The proposed storm sewers have been sized based on the uncontrolled 5-year peak flows calculated using the Rational Method. Inflows to the minor system will be restricted using ICDs to ensure the total minor system flow from the Block 14 lands does not exceed the allowable flow rates established based on the allowable additional flow to the Phase 1 storm sewer system. The ICDs specified at each inlet are indicated on the General Plan of Services (114013-GP), as well as in the Stormwater Management Report.

The 100-year 4-hour Chicago storm was also increased by 20% (intensity + total precipitation) to evaluate the impact of an extreme event on the performance of the minor system. The results of this analysis indicate little to no difference in the minor system peak flows resulting from the 20% increase in the 100-year storm due to the fact that inflows to the minor system are controlled by ICDs.

Major System

During larger storm events, the provided static storage within the roadways and parking areas will be sufficient and overland flow will not occur. The major system network was evaluated using the 'Autodesk Storm and Sanitary Analysis' model to ensure that the ponding depths conform to City standards.

Hydraulic Grade Line

The results of the analysis were used to ensure that a minimum freeboard of 0.30m is provided between the 100-year HGL and the designed underside of footing elevations. The 100-year HGL is indicated on the Plan and Profile Drawings (114013-P1, P2).

The HGL analysis confirms that all dwellings within Block 14 will have at least 0.30m of freeboard between the modeled hydraulic grade line and the underside of footing elevation.

4.0 SANITARY SEWER SYSTEM

4.1 Sanitary Flows

The sanitary sewage flows from the overall development area will be directed by 200mm gravity sewer pipes to a maintenance hole near the intersection of Tulum Crescent and

future Private Street within the Bridlewood Trails – Phase 2 Subdivision. Refer to Figure 5 – Sanitary Alignment.

4.2 Sanitary Design

The design flows were calculated for the development using estimated populations based on design plans and composition of the single family houses and in accordance with the City of Ottawa Sewer Design Guidelines.

The minimum pipe size required to convey is a 200mm diameter PVC pipe at a slope of 0.32%. This minimum sanitary sewer will achieve the minimum cleansing velocity of 0.60 m/s and will have a capacity of 19.4 L/s.

The sanitary sewer system for Bridlewood Trails – Phase 2 Subdivision, which included provision for servicing of the Block 14 lands, was detailed and approved in the *Bridlewood Trails Phase 2 Design Brief, September 26, 2013 by Novatech Engineering.*

Population estimates and sanitary flows from the site for the proposed development are calculated using design criteria from the City of Ottawa Sewer Design Guidelines.

Design Flow, Residential = 350 L/c/day
Residential Peaking Factor = Harmon Equation
Peak Correction Factor = 4.0
Infiltration Allowance = 0.28 L/s/ha
Condo Residential Dwelling = 2.1 people/unit

Using the above criteria, the peak design flow from the Claridge Lands, was determined to be 2.71 L/s (2.45 and 0.26 L/s). The existing infrastructure drawings/design sheets were reviewed to determine available capacity in the 200mm sewers located on Tulum Crescent to accommodate the proposed development serviceable area which was previously directed to the sewer on Overberg Way.

The peak sanitary flows are summarized below in Table 1.

Table 1: Sanitary Flow Summary

Development Condition	Population	Peak Res. Flow (L/s)	Peak Ext. Flow (L/s)	Peak Design Flow (L/s)
Internal Buildings (A-F)	151.2	2.45	0.26	2.71
Total Flow	151.2	2.45	0.26	2.71

The existing Tulum Crescent 200mm sewer in Bridlewood Trails Phase 2 was designed to have adequate capacity to accommodate the proposed development 2.71 L/s flow.

FUTURE
COMMERCIAL
(DIR LANDS)

BLOCK 16
PARK

ARRITA STREET

OVERBERG WAY

BRIDLEWOOD TRAILS
PHASE 2

TULUM CRESENT

TULUM CRESENT

BLOCK C

BLOCK D

BLOCK B

BLOCK A

BLOCK E

BLOCK F

200mmØ SAN

200mmØ SAN

200mmØ SAN

200mmØ SAN

G.
ENC.

G.
ENC.

OVERBERG WAY

BLOCK 14
(BRIDLEWOOD TRAILS
PHASE 2)

FUTURE
COMMERCIAL
(CLARIDGE LANDS)

DC

DC

EDGE OF PAVEMENT
PAVED SHOULDER
SOLID WHITE LINE
EDGE OF PAVEMENT
ASPHALT PATHWAY

TERRY FOX DRIVE

LEGEND

DIRECTION OF SANITARY FLOW

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SANITARY ALIGNMENT

SEPT 2014 114013 FIGURE 5

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SHT11X17.DWG - 279mmX432mm

5.0 WATER SUPPLY SYSTEM

As part of the detail design process, the City of Ottawa requires the developer to prepare a hydraulic network analysis of the proposed water distribution system within the Block 14 (Bridlewood Trails – Phase 2) development, confirming capacity in the water system as it relates to the existing infrastructure. A detailed hydraulic analysis was completed for Bridlewood Trails Phase 2 which included a preliminary site plan for Block 14 that contained Zen units. The current site plan contains matching Zen units and generates identical water demand. *Refer to Bridlewood Trails Phase 2 Hydraulic Network Analysis by Novatech Engineering Consultants Ltd., dated September 26, 2013, Ref: 2011-082* for further details.

The purpose of the hydraulic analysis is to confirm that the development can be adequately serviced from the existing 300mm watermain on Romina Street located in Bridlewood Trails Phase 1 with a revised watermain layout within Block 14.

The objectives of the hydraulic analysis are as follows:

- Review the existing water supply infrastructure for connection to the proposed network;
- Describe the design criteria necessary for the operation of the network;
- Develop a hydraulic model of the proposed water plant; and
- Evaluate the operating conditions of the proposed hydraulic network.

5.1 Design Criteria

The following design criteria (from the City of Ottawa) were used to assess the proposed watermain sizes:

Residential

Residential Demand:	350L per person per day
Townhouses:	2.7 persons per unit
Apartments\/Zen Units:	2.1 persons per unit
Maximum Daily Demand:	2.5 x Average Daily Demand
Peak Hour Demand:	2.2 x Maximum Daily Demand
Fire Flow Demand:	Fire Underwriters Survey
Fire Demand:	170.13 L/s for Residential Townhouses (Bridlewood Trails), 217.15 L/s for Block 14 as per Fire Underwriter's Survey for Public Fire Protection. 217.0 L/s for Block 15 Future Commercial as per City of Ottawa.

System Pressures:

Maximum (System):	690 kPa (100 psi) as per City of Ottawa Guidelines

Maximum (Service):	550 kPa (80 psi) as per Ontario Plumbing Code
Minimum:	275 kPa (40 psi) except during fire flow condition
Minimum (fire):	140 kPa (20 psi)

Friction Factors:

Size	C-Factor
Less than 200mm	100
200mm-300mm	110

Design Criteria for Water Demand:

Average Daily Demand; Maximum Daily Demand plus Fire Flow; and Peak Hour Demand.

5.2 Existing Water Supply System

An existing 300mm diameter watermain along Romina Street will provide water to the Bridlewood Trails Phase 2 and Block 14. The main feed is a 300mm watermain loop on Romina Street in Bridlewood Trails. Bridlewood Trails Phase 2 is serviced by 200mm diameter watermains fed from the 300mm diameter watermain on Romina Street (Option 1). A future third connection to Romina Street (Option 2) is illustrated in Figure 6 – Water Network Plan Showing Proposed Future Connection. The subject lands (Block 14) will be serviced by a looped 200mm diameter watermain connecting at Tulum Crescent and Overberg Way.

5.3 Boundary Conditions

The hydraulic grade line (HGL) boundary conditions were obtained from Bridlewood Trails Phase 2 since the hydraulic demand did not change. The maximum day plus fireflow boundary conditions were taken from the assumed commercial demand in Bridlewood Trails Phase 2 provided by the City of Ottawa as it matches with our current fireflow condition.

The hydraulic grade line (HGL) boundary conditions were obtained from the City of Ottawa based on two (2) options:

> Option 1: Only the residential townhouse units and Zen units are serviced by the two watermain connections off Romina Street.
>
> Option 2: The commercial block, the townhouse units and Zen units are serviced and a proposed third watermain connection to Romina Street is provided.

The HGL elevations for Option 1 at the 300mm diameter watermain (on Romina Street) are 145.2m for the maximum day plus fire flow (townhouses, Zen units), 154.6m for the peak hour flow and 164.3m for the high pressure check.

BRIDLEWOOD TRAILS
PHASE 1

ROMINA STREET

FUTURE P58
200mmØ WM

FUTURE
COMMERCIAL
(DIR LANDS)

FERNBANK ROAD

P26

P33

P40

P32

P36

P27

P46

P52

P54

FUTURE P57
200mmØ WM

P35
200mmØ WM

P31
200mmØ WM

BRIDLEWOOD TRAILS
PHASE 2

P37

P29

P28

200mmØ WM

P47

P51

P48

P50

P49

P56
200mmØ WM

200mmØ WM

P55

200mmØ WM

FUTURE
COMMERCIAL
(CLARIDGE LANDS)

BLOCK 14
(BRIDLEWOOD TRAILS
PHASE 2)

TERRY FOX DRIVE

LEGEND

- P7 — PROPOSED PIPE & ID NUMBER
- (31) ● PROPOSED NODE & ID NUMBER
- R1 EXISTING RESERVOIR & ID NUMBER
- P7 — EXISTING PIPE & ID NUMBER
- (31) ● EXISTING NODE & ID NUMBER

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NTS

CITY OF OTTAWA
BLOCK 14
(BRIDLEWOOD TRAILS PHASE 2)
WATER NETWORK PLAN
SHOWING PROPOSED
FUTURE CONNECTION

SEPT 2014 114013 FIGURE 6

SHT11X17.DWG - 279mmX432mm

M:\2014\114013\CAD\Design\Figures\Design Brief\114013-FIG6.dwg, 11x17 landscape, Sep 16, 2014 - 6:24pm, szorgel

The HGL elevations for Option 2 at the 300mm diameter watermain (on Romina Street) are 139.8m for the maximum day plus fire flow (townhouses, Zen units and commercial block),154.6m for the peak hour flow and 164.3m for the high pressure check.

Refer to the email correspondence located in Appendix B.

5.4 Proposed Water Supply System

The development will be serviced internally by a 200mm diameter watermain that will connect to Overberg Way and Tulum Crescent and 19mm services to each unit. Refer to Figure 6 – Water Network Plan Showing Proposed Future Connection for details.

5.5 Hydraulic Modeling

The hydraulic modelling program "EPANET for Windows Version 2.0" was used for the purpose of analyzing the performance of the proposed watermain network under the various operating conditions.

The following table summarizes the demands under the various combined operating conditions for Block 14 and Bridlewood Trails Phase 2 of the development. Refer to Appendix A for the detailed list of the demands listed by node and operating condition.

Table 2: Hydraulic Model Demand – Block 14 / Bridlewood Trails Phase 2

Description	Option 1	Option 2
No. of Inhabitants	680	680
Average Daily Flow	2.76 L/s	3.69 L/s *
Max. Daily Flow (MD)	6.89 L/s	8.29 L/s *
Peak Hour Flow (PH)	15.16 L/s	17.67 L/s *

*Includes Block 15 commercial flows

Detailed hydraulic modeling of the proposed system network was conducted for the Block 14 development (Bridlewood Trails Phase 2) to confirm the proposed layout has adequate capacity to service the development. The analysis pinpoints the minimum system pressures expected as a result of the maximum daily demand, the maximum daily demand plus fire flow and the peak hour demand design conditions for both options. Refer to Appendix A for the detailed results.

Table 3: Hydraulic Model Results Block 14

	Option 1		Option 2
Operating Condition	**Minimum Operating Pressure**	**Operating Condition**	**Minimum Operating Pressure**
Max Daily Demand + Fire Flow	**Watermain**	**Max Daily Demand + Fire Flow**	**Watermain**
MD = 0.05 L/s FF= 217.20 L/s at node N40	212.09 kPa 30.76 psi	MD = 0.05 L/s FF= 217.20 L/s at node N40	305.48 kPa 44.31 psi
MD = 0.26 L/s FF= 217.41 L/s at node N43	169.03 kPa 24.52 psi	MD = 0.26 L/s FF= 217.41 L/s at node N43	314.70 kPa 45.64 psi
MD = 1.02 L/s FF= 218.17 L/s at node N44	146.46 kPa 21.24 psi	MD = 1.02 L/s FF= 218.17 L/s at node N44	272.23 kPa 39.48 psi
		MD = 1.40 L/s FF= 217.00 L/s at node N46	283.02 kPa 41.05 psi
Peak Hour Demand		**Peak Hour Demand**	
PH = 15.16 L/s	577.42 kPa (At Node 44) 83.75 psi	PH = 17.67 L/s	577.61 kPa (At Node 44) 83.78 psi
Maximum High Pressure		**Maximum High Pressure**	
MHP = node N44	673.26 kPa 97.65 psi	MHP = node N44	673.26 kPa 97.65 psi
Maximum Time On Site		**Maximum Time On Site**	
MTS = node N45	12.7 hours	MTS = node N45	12.6 hours

Detailed hydraulic modeling of the proposed system network was conducted for the proposed Block 14 Development (Bridlewood Trails Phase 2). The results indicate that acceptable minimum system pressures will exist throughout the proposed distribution system under all design conditions and options. The proposed third connection to Romina in Option 2 is not required as part of the residential Phase 2 development or the Block 14 development. The commercial demands should be reviewed at such time as the commercial block is to be developed and the hydraulic system analysis revised accordingly.

The proposed water distribution system was checked for high pressures during average daily demand using a hydraulic boundary condition of 164.3m as provided by the City of Ottawa. The model indicates some pressures above 550 kPa (80 psi) exist within the subdivision, up to a maximum of 673.26 kPa (97.65 psi). Therefore pressure reducing valves will be required for all units. Refer to Appendix A for details.

5.6 Watermain Conclusions

The water distribution network as proposed can provide an adequate system pressure for the maximum day plus fire and the peak hour design conditions at all nodes throughout the development. These adequate pressures can be achieved under the current conditions of existing infrastructure.

6.0 ROADWAYS

6.1 Roadway Characteristics

The Block 14 development will have a roadway width of 7.0m throughout with parking along the sides.

6.2 Traffic

The traffic requirements for the development were previously analyzed as part of Bridlewood Trails – Phase 2 Subdivision.

6.3 Pedestrian Facilities

There is a 1.8m wide concrete sidewalk along Tulum Crescent and Overberg Way, as well as a 1.5m wide asphalt pathway proposed within the development fronting the units along Terry Fox Drive.

6.4 Noise

The units are all fronting the surrounding streets and have no dedicated outdoor amenity space, therefore noise attenuation (eg noise wall) will not be required on the site. A Noise Study will only be required for this development at Block 14 for the wall/window construction due to proximity to Terry Fox Drive. The Noise Control Study will be submitted under separate cover.

7.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures will be implemented during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987).

Typical erosion and sediment control measures recommended include, but are not limited to, the use of silt fences around perimeter of site (OPSD 219.110), filter fabric or inserts under catch basin/maintenance hole lids, heavy duty silt fence barrier (OPSD 219.130), straw bale check dams (OPSD 219.180), rock check dams (219.210 or OPSD 219.211), turbidity curtain (OPSD 219.260), dewatering trap (OPSD 219.240), temporary water passage system (OPSD 221.030), riprap (OPSS 511), mud mats, silt bags for dewatering operations, topsoil and sod to disturbed areas and natural grassed waterways. Dewatering and sediment control techniques will be developed for the individual situations based on the

above guidelines and utilizing typical measures to ensure erosion and sediment control is controlled in an acceptable manner and there is no negative impact to adjacent lands, water bodies or water treatment/conveyance facilities.

It will be the responsibility of the Contractor to submit a detailed construction schedule and appropriate staging, dewatering and erosion and sediment control plans to the Contract Administrator for review and approval prior to the commencement of work. A copy of the City of Ottawa Special Provision F-1004 is included in the Appendix which will become part of any contract and which outlines the contractual requirements which includes preparation of a detailed erosion and sediment control plan.

General

- All erosion and sediment control measures are to be installed to the satisfaction of the engineer, the municipality and the conservation authority prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and remain present during all phases of site preparation and construction.
- A qualified inspector should conduct daily visits during construction to ensure that the contractor is working in accordance with the design drawings and that mitigation measures are being implemented as specified.
    - A light duty silt fence barrier is to be installed in the locations shown on the Erosion and Sediment Control Plan.
    - Straw bale barriers are to be installed in drainage ditches.
    - Filter cloth is to be placed under the grates of all proposed and existing catchbasins and structures.
    - After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to be removed.
- The contractor shall ensure that proper dust control is provided with the application of water (and if required, calcium chloride) during dry periods.
- The contractor shall immediately report to the engineer or inspector any accidental discharges of sediment material into any ditch or sewer system. Appropriate response measures shall be carried out by the contractor without delay.
- The contractor acknowledges that failure to implement erosion and sediment control measures may result in penalties imposed by any applicable regulatory agency.

8.0 UTILITIES

The development will be serviced by hydro, phone, gas and cable, which will be constructed in a three-party trench, as per the City and utility standard right-of-way cross-sections. Canada Post will service the site with community mailboxes. Site lighting will be provided along roadways and walkways as per City standards.

9.0 PHASING

The proposed development will be constructed in one phase.

10.0 DEVIATIONS FROM SEWER DESIGN GUIDELINES

Specifics

No deviations from standard design required.

11.0 CONCLUSIONS

- Storm servicing for the development will be provided using a dual drainage system: minor system flows (up to the 5-year event) will be conveyed by storm sewers, while major system flows will be stored at low points in the roadways and parking areas. Flows that exceed the provided storage will be conveyed overland along defined overland flow routes to Tulum Crescent and Overberg Way.
- Water quality control for the proposed development will be provided by the Vortechnics units located at the outfalls to Cell 2 of the Monahan Drain Constructed Wetlands.
- Peak flows leaving the Block 14 site will be less than the flows anticipated as part of the Phase 1 design, and will therefore have no adverse impact on existing development downstream.
- A minimum clearance of 0.30m will be provided between the 100-year hydraulic grade line (HGL) and the designed underside of footing elevations.
- Sanitary service will be provided by 200mm-diameter sanitary sewer within the Block 14 development with an outlet connection at Tulum Crescent to an existing 200mm-diameter sanitary sewer.
- Water service will be provided by a 200mm-diameter watermain from Tulum Crescent and Overberg Way connected at both the southwest and southeast private street connections to provide a loop, with a combination of 50mm and 200mm diameter watermain within the development.
- Local private roadways will be 7.0m throughout the site with parking situated along the sides. Internal pathways will be provided to give pedestrian access within and through the development and sidewalks along Tulum Crescent and Overberg Way.
- Noise attenuation measures are not required (eg noise wall) on the site.
- Erosion and sediment control measures (i.e. filter fabric, silt fences, etc.) will be implemented prior to construction and are to remain in place until vegetation is established.
- Erosion and sediment control measures associated with construction are to be implemented as outlined in Section 7.0.

- The development will be serviced by hydro, phone, gas and cable, which will be constructed in a three-party trench, as per the City and utility standard right-of-way cross-sections. Canada Post will service the site with community mailboxes. Site lighting will be provided along roadways and pathways as per City standards.

It is recommended that the City of Ottawa approve the findings of this report in support of the engineering detail design for the Block 14 (Bridlewood Trails – Phase 2) site.

NOVATECH

Prepared by:

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Engineering Intern

Prepared/Reviewed by:

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Junior Engineer

Reviewed/Approved by:

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Project Engineer

APPENDIX A

Storm Sewer Design

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 114013
DESIGNED BY : SAZ
CHECKED BY : DDB

STORM SEWER DESIGN SHEET

5yr Design Event

PROJECT: **Block 14 (Bridlewood Trails Phase 2)**
DEVELOPER: **CLARIDGE HOMES**

LICENSED PROFESSIONAL ENGINEER
D. D. BLAIR
100122737
Sept. 17/2014
PROVINCE OF ONTARIO

DATE: 17-Sep-14

LOCATION					INDIV	INDIV	INDIV	ACCUM	TIME OF	RAINFALL	UNCONTROLLED	PROPOSED SEWER								RATIONAL METHOD	SWMHYMO MODEL
STREET	FROM M.H.	TO M.H.	Block 14 Area #	*Bridlewood Area #	AREA (ha)	R	2.78 AR	2.78 AR	CONC (min)	INTENSITY (mm/hr)	**PEAK FLOW (Q) (l/s)**	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE %	LENGTH (m)	**CAPACITY (L/s)**	FULL FLOW VELOCITY	TIME OF FLOW (min)	% FULL	% FULL
BLOCK 14																					
Block 14 Private Drive	200	202	1		0.09	0.84	0.21	0.21	10.00	104	**21.9**	DR 35	300	305	0.34	38.5	**58.8**	0.81	0.80	37%	37%
Block 14 Private Drive	202	204	2		0.14	0.81	0.32	0.53	10.80	100	**77.4**	DR 35	375	381	0.25	62.3	**91.5**	0.80	1.29	85%	50%
			3		0.12	0.74	0.25	0.77													
									12.09												
Block 14 Private Drive	210	204	4		0.11	0.81	0.25	0.25	10.00	104	**25.8**	DR 35	300	305	0.34	35.6	**58.8**	0.81	0.74	44%	37%
									10.74												
Block 14 Private Drive	204	206	5		0.14	0.80	0.31	1.33	12.09	94	**125.6**	CONC	525	533	0.16	33.0	**179.5**	0.80	0.68	70%	64%
Block 14 Private Drive	206	208						1.33	12.78	92	**121.8**	CONC	525	533	0.16	8.1	**179.5**	0.80	0.17	68%	70%
Block 14 Private Drive	208	136						1.33	12.94	91	**121.0**	CONC	525	533	0.16	21.0	**179.5**	0.80	0.44	67%	65%
Block 14 Private Drive	136	Ditch Outlet						1.33	13.38	89	**118.7**	CONC	525	533	0.16	8.7	**179.5**	0.80	0.18	66%	73%
									13.56												
Bridlewood Trails Phase 2																					
Overberg Way	140	138		17	0.17	0.66	0.31	0.31	10.00	104	**42.9**	DR 35	375	381	0.25	68.5	**91.5**	0.80	1.42	47%	36%
Block 14			6		0.03	0.54	0.05	0.36													
Block 14			7		0.03	0.66	0.06	0.41													
Overberg Way	138	134		18	0.10	0.68	0.19	0.60	11.42	97	**60.8**	CONC	450	457	0.20	71.2	**133.0**	0.81	1.46	46%	29%
Block 14			8		0.02	0.43	0.02	0.62													
Overberg Way	134	132		19	0.15	0.44	0.18	0.81	12.89	91	**80.0**	CONC	525	533	0.17	34.6	**185.0**	0.83	0.70	43%	26%
Block 14			9		0.04	0.63	0.07	0.88													
									13.58												
Tulum Crescent	144	142		20	0.23	0.69	0.44	0.44	10.00	104	**65.0**	DR 35	375	381	0.23	85.7	**87.7**	0.77	1.86	74%	21%
Block 14			10		0.05	0.57	0.08	0.52													
Block 14			11		0.06	0.62	0.10	0.62													
Tulum Crescent	142	132		21	0.07	0.71	0.14	0.76	11.86	95	**72.6**	DR 35	375	381	0.26	11.7	**93.3**	0.82	0.24	78%	38%
									12.09												
Overberg Way	132	130						1.64	13.58	88	**145.1**	CONC	525	533	0.14	21.8	**167.9**	0.75	0.48	86%	55%
Overberg Way	130	128		22	0.13	0.55	0.20	1.84	14.07	87	**202.0**	CONC	525	533	0.21	52.9	**205.6**	0.92	0.96	98%	60%
Overberg Way				23	0.19	0.30	0.16	2.00													
Overberg Way				24	0.23	0.52	0.33	2.33													
									15.03												
Tulum Crescent	150	148		25	0.11	0.50	0.15	0.15	10.00	104	**15.9**	DR 35	375	381	0.39	33.7	**114.2**	1.00	0.56	14%	11%
Tulum Crescent	148	146						0.15	10.56	101	**15.5**	DR 35	375	381	0.46	11.0	**124.1**	1.09	0.17	12%	10%
Tulum Crescent	146	128		26	0.36	0.62	0.62	0.77	10.73	100	**77.7**	DR 35	375	381	0.30	97.5	**100.2**	0.88	1.85	78%	19%
									12.58												
Overberg Way	128	126		27	0.16	0.71	0.32	3.42	15.03	83	**285.4**	CONC	525	533	0.43	41.7	**294.2**	1.32	0.53	97%	62%
Arrita Terrace	126	EX 110		28	0.25	0.55	0.38	3.80	15.55	82	**311.0**	CONC	525	533	0.41	80.0	**287.3**	1.29	1.04	108%	69%
									16.59												

* Areas taken from Bridlewood Trails Phase 2 storm drainage area plan, refer to drawing 106121-STM (Rev#8, dated october 31, 2013)

Notes:

1) The Block 14 storm sewers are sized for the 5 Yr uncontrolled flow using the Rational Method. Some of the downstream sewer flows in Bridlewood Trails Phase 2 were increased due to the Block 14 contribution. However these are theoretical uncontrolled flows calculated with the Rational Method. The SWMHYMO model simulates controlled flows which verify that there is adequate capacity in the existing storm sewer system within the Bridlewood Trails Phase 2 development in order to accommodate the additional flow from a portion of Block 14.

APPENDIX B

Sanitary Sewer Design

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 114013
DESIGNED BY : SAZ
CHECKED BY : DDB

SANITARY SEWER DESIGN SHEET

PROJECT: **Block 14 (Bridlewood Trails Phase 2)**
DEVELOPER: **Claridge Homes**

Date: 17-Sep-14

LOCATION			INDIVIDUAL				CUMULATIVE						PROPOSED SEWER							
STREET	FROM MH	TO MH	Block 14 Area	Apartment Units	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)	PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap
BLOCK 14																				
On-Site	207	205	1	24	0.050	0.270	0.050	0.270	4.0	0.82	0.08	0.89	34.5	200	203.20	DR 35	0.32	19.4	0.60	5%
On-Site	209	205	2	12	0.025	0.165	0.025	0.165	4.0	0.41	0.05	0.45	35.6	200	203.20	DR 35	0.32	19.4	0.60	2%
On-Site	205	203	3	36	0.076	0.395	0.151	0.830	4.0	2.45	0.23	2.68	62.3	200	203.20	DR 35	0.32	19.4	0.60	14%
On-Site	203	201	4		0.000	0.100	0.151	0.930	4.0	2.45	0.26	2.71	38.5	200	203.20	DR 35	0.32	19.4	0.60	14%
Off-Site	201	EX139			0.000	0.000	0.151	0.930	4.0	2.45	0.26	2.71	13.1	200	203.20	DR 35	0.32	19.4	0.60	14%

Notes:

1. **Q(d) = Q(p) + Q(i) , where**
   - **Q(d) = Design Flow (L/sec)**
   - **Q(p) = Population Flow (L/sec)**
   - **Q(i) = Extraneous Flow (L/sec)**

2. **Q(i) = 0.28 L/sec/ha**

3. **Q(p) = (PxqxM/86,400), where**
   - **P = Population (2.1 persons per apartment unit)**
   - **q = Average per capita flow = 350 L/cap/day - Residential**
   - **M = Harmon Formula (maximum of 4.0)**
   - **Min pipe size 200mm @ min. slope 0.32%**

3. **Block 14 was accounted for within the approved Bridlewood Trails Phase 2 subdivision sanitary sewer design. Refer to Bridlewood Trails Phase 2 Design Brief for details.**

APPENDIX C

Hydraulic Analysis

Fire Flow Calculations - Large Apartment Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Bridlewood Trails Phase 2 (Block 14) **DATE: July 30, 2014**

JOB#: 114013

C Coefficient related to type of construction

	[yes/no]	
• Wood frame		1.5
• Ordinary construction	yes	1
• Non-combustible construction		0.8
• Fire resistive construction (< 2 hrs)		0.7
• Fire resistive construction (> 2 hrs)		0.6
• Interpolation (Using FUS Tables)		

A Area of structure considered (m^2) *1,600* <==> 17,222 ft^2

(All floors excluding Basement, under 2-Storeys)

F Required fire flow (L/min)

$F = 220\ C\ (A)^{0.5}$ ***8,800 L/min***

Occupancy hazard reduction of surcharge

	[yes/no]		
• Non-combustible		-25%	
• Limited combustible		-15%	
• Combustible	yes	0%	
• Free burning		15%	
• Rapid burning		25%	
		8,800 L/min	(1)

Sprinkler Reduction

• Non-combustible - Fire Resistive (3)	no	50%	***0 L/min*** (2)

Exposure surcharge (cumulative (%))

	[yes/no]			
0 - 3 m		25%		
3.1 - 10 m	yes	20%	1 side	20%
10.1 - 20 m		15%		
20.1 - 30 m	yes	10%	2 side	20%
30.1- 45 m		5%		
		Cumulative Total		**40%**

3,520 L/min

Fire Wall Separation

• Number of Party Walls * 1000 L/min

3,520 L/min (3)

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***12,320 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***205.33 L/s***
	or	***2,712 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Small Apartment Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Bridlewood Trails Phase 2 (Block 14) **DATE: July 30, 2014**

JOB#: 114013

C	**Coefficient related to type of construction**	[yes/no]		
	• Wood frame		1.5	
	• Ordinary construction	yes	1	
	• Non-combustible construction		0.8	
	• Fire resistive construction (< 2 hrs)		0.7	
	• Fire resistive construction (> 2 hrs)		0.6	
	• Interpolation (Using FUS Tables)			
A	**Area of structure considered (m^2)**	***1,370***	<==>	14,747 ft^2
	(All floors excluding Basement, under 2-Storeys)			
F	**Required fire flow (L/min)**			
	$F = 220\ C\ (A)^{0.5}$			***8,143 L/min***
	Occupancy hazard reduction of surcharge	[yes/no]		
	• Non-combustible		-25%	
	• Limited combustible		-15%	
	• Combustible	yes	0%	
	• Free burning		15%	
	• Rapid burning		25%	
				8,143 L/min (1)
	Sprinkler Reduction			
	• Non-combustible - Fire Resistive (3)	no	50%	***0 L/min*** (2)
	Exposure surcharge (cumulative (%))	[yes/no]		
	0 - 3 m		25%	
	3.1 - 10 m	yes	20%	2 side 40%
	10.1 - 20 m		15%	
	20.1 - 30 m	yes	10%	2 side 20%
	30.1- 45 m		5%	
			Cumulative Total	**60%**
				4,886 L/min
	Fire Wall Separation			
	• Number of Party Walls * 1000 L/min			
				4,886 L/min (3)
	REQUIRED FIRE FLOW [(1) - (2) + (3)]			***13,029 L/min***
	(2,000 L/min < Fire Flow < 45,000 L/min)		***or***	***217.15 L/s***
			or	***2,869 IGPM***

BY: *Drew Blair*

Fire Flow Calculations - Townhouse Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Bridlewood Trails Phase 2 **DATE: July 15, 2013**

JOB#: 106121

C Coefficient related to type of construction

	[yes/no]	
• Wood frame	yes	1.5
• Ordinary construction		1
• Non-combustible construction		0.8
• Fire resistive construction (< 2 hrs)		0.7
• Fire resistive construction (> 2 hrs)		0.6
• Interpolation (Using FUS Tables)		

A Area of structure considered (m^2) ***220*** <==> 2,368 ft^2

(All floors excluding Basement, under 2-Storeys)

F Required fire flow (L/min)

$F = 220\ C\ (A)^{0.5}$ ***4,895 L/min***

Occupancy hazard reduction of surcharge

	[yes/no]	
• Non-combustible		-25%
• Limited combustible		-15%
• Combustible	yes	0%
• Free burning		15%
• Rapid burning		25%

4,895 L/min (1)

Sprinkler Reduction

• Non-combustible - Fire Resistive (3)	no	50%	***0 L/min*** (2)

Exposure surcharge (cumulative (%))

	[yes/no]			
0 - 3 m	yes	25%	2 side	50%
3.1 - 10 m		20%		
10.1 - 20 m	yes	15%	1 side	15%
20.1 - 30 m	yes	10%	1 side	10%
30.1- 45 m		5%		
		Cumulative Total		**75%**

3,671 L/min

Fire Wall Separation

• Number of Party Walls * 1000 L/min	2 walls	

5,671 L/min (3)

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***10,566 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***176.1 L/s***
	or	***2,326 IGPM***

BY: *Drew Blair*

Population and Consumption Rate Calculations - Scenario 1

Node	Number of Units	Persons per Unit	Population	Consumption Rates (L/s)		
				Average Daily	Maximum Daily	Maximum Hourly
R1	0	2.7	0	0.00	0.00	0.00
R2	0	2.7	0	0.00	0.00	0.00
N21	14	2.7	38	0.15	0.38	0.84
N22	24	2.7	65	0.26	0.66	1.44
N23	20	2.7	54	0.22	0.55	1.20
N24	11	2.7	30	0.12	0.30	0.66
N25	19	2.7	51	0.21	0.52	1.14
N26	12	2.7	32	0.13	0.33	0.72
N28	24	2.7	65	0.26	0.66	1.44
N29	6	2.7	16	0.07	0.16	0.36
N30	24	2.7	65	0.26	0.66	1.44
N37	11	2.7	30	0.12	0.30	0.66
N38	18	2.7	49	0.20	0.49	1.08
N39	2	2.7	5	0.02	0.05	0.12
N40	2	2.7	5	0.02	0.05	0.12
N41	6	2.7	16	0.07	0.16	0.36
N42	3	2.7	8	0.03	0.08	0.18
N43	12	2.1	25	0.10	0.26	0.56
N44	48	2.1	101	0.41	1.02	2.25
N45	12	2.1	25	0.10	0.26	0.56
Total	**268**	**2.61**	**680**	**2.76**	**6.89**	**15.16**

Water Demand Parameters

Towns	2.7	persons/unit
Residential Demand	350	L/c/day
Residential Max Day	2.5	x Avg Day
Residential Peak Hour	2.2	x Max Day
Town Fire Flow	170.13	L/s
Zen Fire Flow (small)	217.15	L/s

AVERAGE DAY DEMAND / HIGH PRESSURE CHECK
Scenario 1

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi	Age hours
Resvr 1	164.30	-1.38	164.30	0.00	0.00	0.00	0.0
Resvr 2	164.30	-1.37	164.30	0.00	0.00	0.00	0.0
Junc 21	94.95	0.15	164.30	69.35	680.32	98.67	0.5
Junc 22	94.98	0.26	164.30	69.32	680.03	98.63	10.5
Junc 23	94.84	0.22	164.30	69.46	681.40	98.83	4.3
Junc 24	94.79	0.12	164.30	69.51	681.89	98.90	2.5
Junc 25	94.73	0.21	164.30	69.57	682.48	98.99	0.5
Junc 26	94.77	0.13	164.30	69.53	682.09	98.93	0.9
Junc 28	94.70	0.26	164.30	69.60	682.78	99.03	6.4
Junc 29	94.95	0.07	164.30	69.35	680.32	98.67	6.1
Junc 30	95.03	0.26	164.30	69.27	679.54	98.56	6.1
Junc 37	95.00	0.12	164.30	69.30	679.83	98.60	0.9
Junc 38	95.07	0.20	164.30	69.23	679.15	98.50	2.0
Junc 39	95.13	0.02	164.30	69.17	678.56	98.42	3.4
Junc 40	95.48	0.02	164.30	68.82	675.12	97.92	6.3
Junc 41	95.38	0.07	164.30	68.92	676.11	98.06	4.1
Junc 42	95.37	0.03	164.30	68.93	676.20	98.07	2.2
Junc 43	95.34	0.10	164.30	68.96	676.50	98.12	6.9
Junc 44	95.67	0.41	164.30	68.63	673.26	97.65	12.1
Junc 45	95.30	0.10	164.30	69.00	676.89	98.17	12.7

Maximum Pressure in Block 14
Maximum Pressure in Bridlewood Phase 2
Maximum Age

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	83.00	200	110	-1.38	0.04	0.02	0.046
Pipe P2	83.00	200	110	-1.37	0.04	0.02	0.046
Pipe P27	90.00	200	110	0.09	0.00	0.00	0.105
Pipe P28	87.54	200	110	-0.07	0.00	0.00	0.000
Pipe P29	78.56	200	110	-0.19	0.01	0.00	0.053
Pipe P30	90.00	200	110	-0.17	0.01	0.00	0.056
Pipe P31	97.00	200	110	-0.24	0.01	0.00	0.065
Pipe P32	38.00	200	110	0.99	0.03	0.01	0.047
Pipe P35	73.00	200	110	0.50	0.02	0.00	0.056
Pipe P36	84.00	200	110	0.17	0.01	0.00	0.058
Pipe P37	91.20	200	110	-0.45	0.01	0.00	0.055
Pipe P40	66.00	200	110	-0.36	0.01	0.00	0.059
Pipe P46	47.00	200	110	-1.14	0.04	0.02	0.048
Pipe P47	65.00	200	110	-0.50	0.02	0.00	0.053
Pipe P48	35.00	200	110	-0.23	0.01	0.00	0.040
Pipe P49	70.00	200	110	-0.21	0.01	0.00	0.072
Pipe P50	50.00	200	110	-0.07	0.00	0.00	0.307
Pipe P51	52.00	200	110	0.14	0.00	0.00	0.072
Pipe P52	74.00	200	110	0.52	0.02	0.00	0.050
Pipe P53	50.00	200	110	0.35	0.01	0.00	0.057
Pipe P54	51.00	200	110	0.25	0.01	0.00	0.065
Pipe P55	33.00	200	110	0.10	0.00	0.00	0.000
Pipe P56	122.00	200	110	-0.26	0.01	0.00	0.054

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr 1	154.60	-7.60	154.60	0.00	0.00	0.00
Resvr 2	154.60	-7.53	154.60	0.00	0.00	0.00
Junc 21	94.95	0.84	154.56	59.61	584.77	84.81
Junc 22	94.98	1.44	154.53	59.55	584.19	84.73
Junc 23	94.84	1.20	154.54	59.70	585.66	84.94
Junc 24	94.79	0.66	154.54	59.75	586.15	85.01
Junc 25	94.73	1.14	154.56	59.83	586.93	85.13
Junc 26	94.77	0.72	154.55	59.78	586.44	85.06
Junc 28	94.70	1.44	154.56	59.86	587.23	85.17
Junc 29	94.95	0.36	154.54	59.59	584.58	84.79
Junc 30	95.03	1.44	154.53	59.50	583.70	84.66
Junc 37	95.00	0.66	154.54	59.54	584.09	84.71
Junc 38	95.07	1.08	154.53	59.46	583.30	84.60
Junc 39	95.13	0.12	154.53	59.40	582.71	84.52
Junc 40	95.48	0.12	154.53	59.05	579.28	84.02
Junc 41	95.38	0.36	154.53	59.15	580.26	84.16
Junc 42	95.37	0.18	154.53	59.16	580.36	84.17
Junc 43	95.34	0.56	154.53	59.19	580.65	84.22
Junc 44	95.67	2.25	154.53	58.86	577.42	83.75
Junc 45	95.30	0.56	154.53	59.23	581.05	84.27

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	83.00	200	110	-7.60	0.24	0.53	0.036
Pipe P2	83.00	200	110	-7.53	0.24	0.52	0.036
Pipe P27	90.00	200	110	0.47	0.01	0.00	0.053
Pipe P28	87.54	200	110	-0.40	0.01	0.00	0.056
Pipe P29	78.56	200	110	-1.04	0.03	0.01	0.048
Pipe P30	90.00	200	110	-0.94	0.03	0.01	0.049
Pipe P31	97.00	200	110	-1.30	0.04	0.02	0.046
Pipe P32	38.00	200	110	5.42	0.17	0.29	0.038
Pipe P35	73.00	200	110	2.73	0.09	0.08	0.042
Pipe P36	84.00	200	110	0.97	0.03	0.01	0.048
Pipe P37	91.20	200	110	-2.48	0.08	0.07	0.042
Pipe P40	66.00	200	110	-1.96	0.06	0.04	0.044
Pipe P46	47.00	200	110	-6.29	0.20	0.38	0.037
Pipe P47	65.00	200	110	-2.75	0.09	0.08	0.042
Pipe P48	35.00	200	110	-1.26	0.04	0.02	0.047
Pipe P49	70.00	200	110	-1.14	0.04	0.02	0.047
Pipe P52	74.00	200	110	2.89	0.09	0.09	0.041
Pipe P50	50.00	200	110	-0.39	0.01	0.00	0.053
Pipe P51	52.00	200	110	0.75	0.02	0.01	0.051
Pipe P53	50.00	200	110	1.96	0.06	0.04	0.044
Pipe P54	51.00	200	110	1.40	0.04	0.02	0.046
Pipe P55	33.00	200	110	0.56	0.02	0.00	0.052
Pipe P56	122.00	200	110	-1.41	0.04	0.02	0.046

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr 1	139.80	-119.98	139.80	0.00	0.00	0.00
Resvr 2	139.80	-104.06	139.80	0.00	0.00	0.00
Junc 21	94.95	0.38	132.46	37.51	367.97	53.37
Junc 22	94.98	0.66	127.21	32.23	316.18	45.86
Junc 23	94.84	0.55	132.03	37.19	364.83	52.91
Junc 24	94.79	0.30	132.76	37.97	372.49	54.02
Junc 25	94.73	0.52	134.16	39.43	386.81	56.10
Junc 26	94.77	0.33	133.03	38.26	375.33	54.44
Junc 28	94.70	0.66	133.33	38.63	378.96	54.96
Junc 29	94.95	0.16	132.38	37.43	367.19	53.26
Junc 30	95.03	0.66	129.42	34.39	337.37	48.93
Junc 37	95.00	0.30	125.72	30.72	301.36	43.71
Junc 38	95.07	0.49	124.79	29.72	291.55	42.29
Junc 39	95.13	0.05	122.22	27.09	265.75	38.54
Junc 40	95.48	217.20	117.10	21.62	212.09	30.76
Junc 41	95.38	0.16	118.56	23.18	227.40	32.98
Junc 42	95.37	0.08	120.09	24.72	242.50	35.17
Junc 43	95.34	0.26	119.39	24.05	235.93	34.22
Junc 44	95.67	1.02	118.69	23.02	225.83	32.75
Junc 45	95.30	0.26	118.69	23.39	229.46	33.28

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	83.00	200	110	-119.98	3.82	88.42	0.024
Pipe P2	83.00	200	110	-104.06	3.31	67.93	0.024
Pipe P27	90.00	200	110	-36.21	1.15	9.61	0.028
Pipe P28	87.54	200	110	64.02	2.04	27.62	0.026
Pipe P29	78.56	200	110	-64.68	2.06	28.15	0.026
Pipe P30	90.00	200	110	-22.17	0.71	3.87	0.031
Pipe P31	97.00	200	110	-22.33	0.71	3.93	0.031
Pipe P32	38.00	200	110	66.68	2.12	29.79	0.026
Pipe P35	73.00	200	110	43.72	1.39	13.63	0.028
Pipe P36	84.00	200	110	36.87	1.17	9.94	0.028
Pipe P37	91.20	200	110	-65.34	2.08	28.69	0.026
Pipe P40	66.00	200	110	-22.63	0.72	4.02	0.030
Pipe P46	47.00	200	110	-155.80	4.96	143.45	0.023
Pipe P47	65.00	200	110	-44.90	1.43	14.32	0.028
Pipe P48	35.00	200	110	-108.43	3.45	73.31	0.024
Pipe P49	70.00	200	110	-108.38	3.45	73.24	0.024
Pipe P50	50.00	200	110	-66.09	2.10	29.31	0.026
Pipe P51	52.00	200	110	66.25	2.11	29.44	0.026
Pipe P52	74.00	200	110	110.60	3.52	76.05	0.024
Pipe P53	50.00	200	110	44.27	1.41	13.95	0.028
Pipe P54	51.00	200	110	44.01	1.40	13.80	0.028
Pipe P55	33.00	200	110	0.26	0.01	0.00	0.065
Pipe P56	122.00	200	110	42.73	1.36	13.07	0.028

MAXIMUM DAY + FIRE FLOW DEMAND AT N43
Scenario 1

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr 1	139.80	-120.27	139.80	0.00	0.00	0.00
Resvr 2	139.80	-103.77	139.80	0.00	0.00	0.00
Junc 21	94.95	0.38	132.43	37.48	367.68	53.33
Junc 22	94.98	0.66	127.43	32.45	318.33	46.17
Junc 23	94.84	0.55	132.12	37.28	365.72	53.04
Junc 24	94.79	0.30	132.83	38.04	373.17	54.12
Junc 25	94.73	0.52	134.19	39.46	387.10	56.14
Junc 26	94.77	0.33	133.09	38.32	375.92	54.52
Junc 28	94.70	0.66	133.33	38.63	378.96	54.96
Junc 29	94.95	0.16	132.46	37.51	367.97	53.37
Junc 30	95.03	0.66	129.58	34.55	338.94	49.16
Junc 37	95.00	0.30	125.61	30.61	300.28	43.55
Junc 38	95.07	0.49	125.08	30.01	294.40	42.70
Junc 39	95.13	0.05	123.06	27.93	273.99	39.74
Junc 40	95.48	0.05	119.01	23.53	230.83	33.48
Junc 41	95.38	0.16	118.85	23.47	230.24	33.39
Junc 42	95.37	0.08	118.69	23.32	228.77	33.18
Junc 43	95.34	217.41	112.57	17.23	169.03	24.52
Junc 44	95.67	1.02	114.42	18.75	183.94	26.68
Junc 45	95.30	0.26	114.42	19.12	187.57	27.20

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	83.00	200	110	-120.27	3.83	88.81	0.024
Pipe P2	83.00	200	110	-103.77	3.30	67.58	0.024
Pipe P27	90.00	200	110	-36.92	1.18	9.97	0.028
Pipe P28	87.54	200	110	63.02	2.01	26.83	0.026
Pipe P29	78.56	200	110	-63.68	2.03	27.35	0.026
Pipe P30	90.00	200	110	-21.83	0.69	3.77	0.031
Pipe P31	97.00	200	110	-21.99	0.70	3.82	0.031
Pipe P32	38.00	200	110	65.68	2.09	28.97	0.026
Pipe P35	73.00	200	110	43.06	1.37	13.25	0.028
Pipe P36	84.00	200	110	37.58	1.20	10.30	0.028
Pipe P37	91.20	200	110	-64.34	2.05	27.88	0.026
Pipe P40	66.00	200	110	-22.29	0.71	3.91	0.031
Pipe P46	47.00	200	110	-156.80	4.99	145.16	0.023
Pipe P47	65.00	200	110	-32.91	1.05	8.06	0.029
Pipe P48	35.00	200	110	-95.44	3.04	57.87	0.025
Pipe P49	70.00	200	110	-95.39	3.04	57.82	0.025
Pipe P50	50.00	200	110	19.74	0.63	3.13	0.031
Pipe P51	52.00	200	110	-19.58	0.62	3.08	0.031
Pipe P52	74.00	200	110	123.59	3.93	93.42	0.024
Pipe P53	50.00	200	110	143.09	4.55	122.53	0.023
Pipe P54	51.00	200	110	-74.32	2.37	36.42	0.026
Pipe P55	33.00	200	110	0.26	0.01	0.00	0.065
Pipe P56	122.00	200	110	-75.60	2.41	37.59	0.025

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr 1	139.80	-120.24	139.80	0.00	0.00	0.00
Resvr 2	139.80	-103.80	139.80	0.00	0.00	0.00
Junc 21	94.95	0.38	132.43	37.48	367.68	53.33
Junc 22	94.98	0.66	127.41	32.43	318.14	46.14
Junc 23	94.84	0.55	132.11	37.27	365.62	53.03
Junc 24	94.79	0.30	132.82	38.03	373.07	54.11
Junc 25	94.73	0.52	134.19	39.46	387.10	56.14
Junc 26	94.77	0.33	133.08	38.31	375.82	54.51
Junc 28	94.70	0.66	133.33	38.63	378.96	54.96
Junc 29	94.95	0.16	132.45	37.50	367.88	53.36
Junc 30	95.03	0.66	129.56	34.53	338.74	49.13
Junc 37	95.00	0.30	125.62	30.62	300.38	43.57
Junc 38	95.07	0.49	125.05	29.98	294.10	42.66
Junc 39	95.13	0.05	122.97	27.84	273.11	39.61
Junc 40	95.48	0.05	118.81	23.33	228.87	33.19
Junc 41	95.38	0.16	118.83	23.45	230.04	33.37
Junc 42	95.37	0.08	118.85	23.48	230.34	33.41
Junc 43	95.34	0.26	114.76	19.42	190.51	27.63
Junc 44	95.67	218.17	110.60	14.93	146.46	21.24
Junc 45	95.30	0.26	110.60	15.30	150.09	21.77

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	83.00	200	110	-120.24	3.83	88.78	0.024
Pipe P2	83.00	200	110	-103.80	3.30	67.62	0.024
Pipe P27	90.00	200	110	-36.85	1.17	9.93	0.028
Pipe P28	87.54	200	110	63.12	2.01	26.91	0.026
Pipe P29	78.56	200	110	-63.78	2.03	27.43	0.026
Pipe P30	90.00	200	110	-21.86	0.70	3.78	0.031
Pipe P31	97.00	200	110	-22.02	0.70	3.83	0.031
Pipe P32	38.00	200	110	65.78	2.09	29.05	0.026
Pipe P35	73.00	200	110	43.12	1.37	13.29	0.028
Pipe P36	84.00	200	110	37.51	1.19	10.26	0.028
Pipe P37	91.20	200	110	-64.44	2.05	27.96	0.026
Pipe P40	66.00	200	110	-22.32	0.71	3.93	0.031
Pipe P46	47.00	200	110	-156.70	4.99	144.99	0.023
Pipe P47	65.00	200	110	-34.26	1.09	8.68	0.029
Pipe P48	35.00	200	110	-96.88	3.08	59.51	0.025
Pipe P49	70.00	200	110	-96.83	3.08	59.45	0.025
Pipe P50	50.00	200	110	-6.77	0.22	0.43	0.036
Pipe P51	52.00	200	110	6.93	0.22	0.45	0.036
Pipe P52	74.00	200	110	122.15	3.89	91.40	0.024
Pipe P53	50.00	200	110	115.14	3.66	81.93	0.024
Pipe P54	51.00	200	110	114.88	3.66	81.59	0.024
Pipe P55	33.00	200	110	0.26	0.01	0.00	0.065
Pipe P56	122.00	200	110	-103.55	3.30	67.32	0.024

MAXIMUM DAY + FIRE FLOW DEMAND SUMMARY

Scenario 1

Maximum day plus fire flow demand was modeled for each node.
The following is a summary of the minimum pressures that occurred for each operating condition.

Fire at Junction	Demand (L/s)			Minimum Pressure			
	Maximum Daily	Fire Flow	Max Day + Fire	(m)	kPa	psi	Node
N40	0.05	217.15	217.20	21.62	212.09	30.76	N40
N43	0.26	217.15	217.41	17.23	169.03	24.52	N43
N44	1.02	217.15	218.17	14.93	146.46	21.24	N44

Population and Consumption Rate Calculations - Scenario 2

Node	Number of Units	Persons per Unit	Population	Consumption Rates (L/s)		
				Average Daily	Maximum Daily	Maximum Hourly
R1	0	2.7	0	0.00	0.00	0.00
R2	0	2.7	0	0.00	0.00	0.00
R3	0	2.7	0	0.00	0.00	0.00
N21	14	2.7	38	0.15	0.38	0.84
N22	24	2.7	65	0.26	0.66	1.44
N23	20	2.7	54	0.22	0.55	1.20
N24	11	2.7	30	0.12	0.30	0.66
N25	19	2.7	51	0.21	0.52	1.14
N26	12	2.7	32	0.13	0.33	0.72
N28	24	2.7	65	0.26	0.66	1.44
N29	6	2.7	16	0.07	0.16	0.36
N30	24	2.7	65	0.26	0.66	1.44
N37	11	2.7	30	0.12	0.30	0.66
N38	18	2.7	49	0.20	0.49	1.08
N39	2	2.7	5	0.02	0.05	0.12
N40	2	2.7	5	0.02	0.05	0.12
N41	6	2.7	16	0.07	0.16	0.36
N42	3	2.7	8	0.03	0.08	0.18
N43	12	2.1	25	0.10	0.26	0.56
N44	48	2.1	101	0.41	1.02	2.25
N45	12	2.1	25	0.10	0.26	0.56
N46				0.93	1.40	2.51
Total	**268**	**2.61**	**680**	**3.69**	**8.29**	**17.67**

Water Demand Parameters

Towns	2.7	persons/unit
Residential Demand	350	L/c/day
Residential Max Day	2.5	x Avg Day
Residential Peak Hour	2.2	x Max Day
Commercial Demand	28000	L/ha/day
Commercial Max Day	1.5	L/ha/day
Commercial Peak Hour	1.8	L/ha/day
Town Fire Flow	170.13	L/s
Zen Fire Flow (small)	217.15	L/s
Commercial Fire Flow	217.00	L/s

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi	Age hours
Resvr 1	164.30	-1.35	164.30	0.00	0.00	0.00	0.0
Resvr 2	164.30	-1.34	164.30	0.00	0.00	0.00	0.0
Resvr 3	164.30	-1.00	164.30	0.00	0.00	0.00	0.0
Junc 21	94.95	0.15	164.30	69.35	680.32	98.67	0.5
Junc 22	94.98	0.26	164.30	69.32	680.03	98.63	10.3
Junc 23	94.84	0.22	164.30	69.46	681.40	98.83	4.4
Junc 24	94.79	0.12	164.30	69.51	681.89	98.90	2.5
Junc 25	94.73	0.21	164.30	69.57	682.48	98.99	0.5
Junc 26	94.77	0.13	164.30	69.53	682.09	98.93	0.9
Junc 28	94.70	0.26	164.30	69.60	682.78	99.03	6.4
Junc 29	94.95	0.07	164.30	69.35	680.32	98.67	6.2
Junc 30	95.03	0.26	164.30	69.27	679.54	98.56	6.3
Junc 37	95.00	0.12	164.30	69.30	679.83	98.60	0.9
Junc 38	95.07	0.20	164.30	69.23	679.15	98.50	2.1
Junc 39	95.13	0.02	164.30	69.17	678.56	98.42	3.7
Junc 40	95.48	0.02	164.30	68.82	675.12	97.92	8.3
Junc 41	95.38	0.07	164.30	68.92	676.11	98.06	5.2
Junc 42	95.37	0.03	164.30	68.93	676.20	98.07	2.2
Junc 43	95.34	0.10	164.30	68.96	676.50	98.12	5.4
Junc 44	95.67	0.41	164.30	68.63	673.26	97.65	9.7
Junc 45	95.30	0.10	164.30	69.00	676.89	98.17	12.6
Junc 46	95.40	0.93	164.30	68.90	675.91	98.03	2.0

Maximum Pressure in Block 14
Maximum Pressure in Bridlewood Phase 2
Maximum Age

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	83.00	200	110	-1.35	0.04	0.02	0.046
Pipe P2	83.00	200	110	-1.34	0.04	0.02	0.046
Pipe P27	90.00	200	110	0.10	0.00	0.00	0.084
Pipe P28	87.54	200	110	-0.10	0.00	0.00	0.090
Pipe P29	78.56	200	110	-0.16	0.01	0.00	0.068
Pipe P30	90.00	200	110	-0.16	0.01	0.00	0.062
Pipe P31	97.00	200	110	-0.23	0.01	0.00	0.070
Pipe P32	38.00	200	110	0.96	0.03	0.01	0.049
Pipe P35	73.00	200	110	0.48	0.02	0.00	0.055
Pipe P36	84.00	200	110	0.16	0.01	0.00	0.065
Pipe P37	91.20	200	110	-0.42	0.01	0.00	0.053
Pipe P40	66.00	200	110	-0.35	0.01	0.00	0.053
Pipe P46	47.00	200	110	-1.10	0.03	0.02	0.048
Pipe P47	65.00	200	110	-0.49	0.02	0.00	0.051
Pipe P48	35.00	200	110	-0.19	0.01	0.00	0.110
Pipe P49	70.00	200	110	-0.17	0.01	0.00	0.034
Pipe P50	50.00	200	110	-0.08	0.00	0.00	0.000
Pipe P51	52.00	200	110	0.15	0.00	0.00	0.061
Pipe P52	74.00	200	110	0.49	0.02	0.00	0.053
Pipe P53	50.00	200	110	0.31	0.01	0.00	0.061
Pipe P54	51.00	200	110	0.28	0.01	0.00	0.056
Pipe P55	33.00	200	110	0.10	0.00	0.00	0.000
Pipe P56	122.00	200	110	-0.23	0.01	0.00	0.065
Pipe P57	90.00	200	110	-0.07	0.00	0.00	0.172
Pipe P58	225.00	200	110	-1.00	0.03	0.01	0.048

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr 1	154.60	-6.58	154.60	0.00	0.00	0.00
Resvr 2	154.60	-6.60	154.60	0.00	0.00	0.00
Resvr 3	154.60	-4.46	154.60	0.00	0.00	0.00
Junc 21	94.95	0.84	154.57	59.62	584.87	84.83
Junc 22	94.98	1.44	154.55	59.57	584.38	84.76
Junc 23	94.84	1.20	154.55	59.71	585.76	84.96
Junc 24	94.79	0.66	154.55	59.76	586.25	85.03
Junc 25	94.73	1.14	154.57	59.84	587.03	85.14
Junc 26	94.77	0.72	154.56	59.79	586.54	85.07
Junc 28	94.70	1.44	154.57	59.87	587.32	85.18
Junc 29	94.95	0.36	154.55	59.60	584.68	84.80
Junc 30	95.03	1.44	154.55	59.52	583.89	84.69
Junc 37	95.00	0.66	154.55	59.55	584.19	84.73
Junc 38	95.07	1.08	154.55	59.48	583.50	84.63
Junc 39	95.13	0.12	154.55	59.42	582.91	84.54
Junc 40	95.48	0.12	154.55	59.07	579.48	84.05
Junc 41	95.38	0.36	154.55	59.17	580.46	84.19
Junc 42	95.37	0.18	154.55	59.18	580.56	84.20
Junc 43	95.34	0.56	154.55	59.21	580.85	84.25
Junc 44	95.67	2.25	154.55	58.88	577.61	83.78
Junc 45	95.30	0.56	154.55	59.25	581.24	84.30
Junc 46	95.40	2.51	154.56	59.16	580.36	84.17

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	83.00	200	110	-6.58	0.21	0.41	0.037
Pipe P2	83.00	200	110	-6.60	0.21	0.41	0.037
Pipe P27	90.00	200	110	0.76	0.02	0.01	0.050
Pipe P28	87.54	200	110	-1.04	0.03	0.01	0.048
Pipe P29	78.56	200	110	-0.40	0.01	0.00	0.057
Pipe P30	90.00	200	110	-0.72	0.02	0.01	0.051
Pipe P31	97.00	200	110	-1.08	0.03	0.01	0.048
Pipe P32	38.00	200	110	4.78	0.15	0.23	0.038
Pipe P35	73.00	200	110	2.32	0.07	0.06	0.043
Pipe P36	84.00	200	110	0.68	0.02	0.01	0.052
Pipe P37	91.20	200	110	-1.84	0.06	0.04	0.044
Pipe P40	66.00	200	110	-1.74	0.06	0.03	0.045
Pipe P46	47.00	200	110	-4.98	0.16	0.24	0.038
Pipe P47	65.00	200	110	-2.42	0.08	0.06	0.042
Pipe P48	35.00	200	110	-0.31	0.01	0.00	0.055
Pipe P49	70.00	200	110	-0.19	0.01	0.00	0.060
Pipe P50	50.00	200	110	-0.79	0.03	0.01	0.049
Pipe P51	52.00	200	110	1.15	0.04	0.02	0.047
Pipe P52	74.00	200	110	1.89	0.06	0.04	0.044
Pipe P53	50.00	200	110	0.56	0.02	0.00	0.053
Pipe P54	51.00	200	110	1.95	0.06	0.04	0.044
Pipe P55	33.00	200	110	0.56	0.02	0.00	0.052
Pipe P56	122.00	200	110	-0.86	0.03	0.01	0.050
Pipe P57	90.00	200	110	-1.95	0.06	0.04	0.044
Pipe P58	225.00	200	110	-4.46	0.14	0.20	0.039

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr 1	139.80	-84.32	139.80	0.00	0.00	0.00
Resvr 2	139.80	-73.93	139.80	0.00	0.00	0.00
Resvr 3	139.80	-67.18	139.80	0.00	0.00	0.00
Junc 21	94.95	0.38	135.98	41.03	402.50	58.38
Junc 22	94.98	0.66	133.02	38.04	373.17	54.12
Junc 23	94.84	0.55	135.64	40.80	400.25	58.05
Junc 24	94.79	0.30	136.04	41.25	404.66	58.69
Junc 25	94.73	0.52	136.81	42.08	412.80	59.87
Junc 26	94.77	0.33	136.18	41.41	406.23	58.92
Junc 28	94.70	0.66	136.40	41.70	409.08	59.33
Junc 29	94.95	0.16	135.83	40.88	401.03	58.16
Junc 30	95.03	0.66	134.22	39.19	384.45	55.76
Junc 37	95.00	0.30	132.54	37.54	368.27	53.41
Junc 38	95.07	0.49	131.73	36.66	359.63	52.16
Junc 39	95.13	0.05	130.02	34.89	342.27	49.64
Junc 40	95.48	217.20	126.62	31.14	305.48	44.31
Junc 41	95.38	0.16	128.45	33.07	324.42	47.05
Junc 42	95.37	0.08	130.36	34.99	343.25	49.78
Junc 43	95.34	0.26	130.39	35.05	343.84	49.87
Junc 44	95.67	1.02	129.24	33.57	329.32	47.76
Junc 45	95.30	0.26	129.24	33.94	332.95	48.29
Junc 46	95.40	1.40	133.00	37.60	368.86	53.50

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	83.00	200	110	-84.32	2.68	46.02	0.025
Pipe P2	83.00	200	110	-73.93	2.35	36.07	0.026
Pipe P27	90.00	200	110	-24.41	0.78	4.63	0.030
Pipe P28	87.54	200	110	45.68	1.45	14.79	0.027
Pipe P29	78.56	200	110	-46.34	1.48	15.19	0.027
Pipe P30	90.00	200	110	-15.96	0.51	2.11	0.032
Pipe P31	97.00	200	110	-16.12	0.51	2.15	0.032
Pipe P32	38.00	200	110	48.34	1.54	16.42	0.027
Pipe P35	73.00	200	110	31.59	1.01	7.47	0.029
Pipe P36	84.00	200	110	25.07	0.80	4.87	0.030
Pipe P37	91.20	200	110	-47.00	1.50	15.59	0.027
Pipe P40	66.00	200	110	-16.42	0.52	2.22	0.032
Pipe P46	47.00	200	110	-108.35	3.45	73.21	0.024
Pipe P47	65.00	200	110	-41.71	1.33	12.50	0.028
Pipe P48	35.00	200	110	-86.90	2.77	48.66	0.025
Pipe P49	70.00	200	110	-86.85	2.76	48.61	0.025
Pipe P50	50.00	200	110	-74.44	2.37	36.53	0.026
Pipe P51	52.00	200	110	74.60	2.37	36.68	0.026
Pipe P52	74.00	200	110	66.34	2.11	29.51	0.026
Pipe P53	50.00	200	110	-8.34	0.27	0.63	0.035
Pipe P54	51.00	200	110	57.18	1.82	22.41	0.027
Pipe P55	33.00	200	110	0.26	0.01	0.00	0.065
Pipe P56	122.00	200	110	55.90	1.78	21.49	0.027
Pipe P57	90.00	200	110	-65.78	2.09	29.06	0.026
Pipe P58	225.00	200	110	-67.18	2.14	30.21	0.026

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr 1	139.80	-79.09	139.80	0.00	0.00	0.00
Resvr 2	139.80	-68.51	139.80	0.00	0.00	0.00
Resvr 3	139.80	-77.84	139.80	0.00	0.00	0.00
Junc 21	94.95	0.38	136.41	41.46	406.72	58.99
Junc 22	94.98	0.66	134.11	39.13	383.87	55.67
Junc 23	94.84	0.55	136.24	41.40	406.13	58.90
Junc 24	94.79	0.30	136.57	41.78	409.86	59.45
Junc 25	94.73	0.52	137.20	42.47	416.63	60.43
Junc 26	94.77	0.33	136.69	41.92	411.24	59.64
Junc 28	94.70	0.66	136.81	42.11	413.10	59.91
Junc 29	94.95	0.16	136.40	41.45	406.62	58.98
Junc 30	95.03	0.66	135.08	40.05	392.89	56.98
Junc 37	95.00	0.30	133.30	38.30	375.72	54.49
Junc 38	95.07	0.49	133.06	37.99	372.68	54.05
Junc 39	95.13	0.05	132.14	37.01	363.07	52.66
Junc 40	95.48	0.05	130.32	34.84	341.78	49.57
Junc 41	95.38	0.16	130.25	34.87	342.07	49.61
Junc 42	95.37	0.08	130.18	34.81	341.49	49.53
Junc 43	95.34	217.41	127.42	32.08	314.70	45.64
Junc 44	95.67	1.02	128.24	32.57	319.51	46.34
Junc 45	95.30	0.26	128.24	32.94	323.14	46.87
Junc 46	95.40	1.40	130.87	35.47	347.96	50.47

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	83.00	200	110	-79.09	2.52	40.86	0.025
Pipe P2	83.00	200	110	-68.51	2.18	31.32	0.026
Pipe P27	90.00	200	110	-23.85	0.76	4.44	0.030
Pipe P28	87.54	200	110	40.82	1.30	12.01	0.028
Pipe P29	78.56	200	110	-41.48	1.32	12.37	0.028
Pipe P30	90.00	200	110	-14.32	0.46	1.72	0.033
Pipe P31	97.00	200	110	-14.48	0.46	1.76	0.033
Pipe P32	38.00	200	110	43.48	1.38	13.49	0.028
Pipe P35	73.00	200	110	28.37	0.90	6.12	0.029
Pipe P36	84.00	200	110	24.51	0.78	4.67	0.030
Pipe P37	91.20	200	110	-42.14	1.34	12.73	0.028
Pipe P40	66.00	200	110	-14.78	0.47	1.83	0.032
Pipe P46	47.00	200	110	-102.56	3.26	66.13	0.024
Pipe P47	65.00	200	110	-21.78	0.69	3.75	0.031
Pipe P48	35.00	200	110	-62.10	1.98	26.12	0.026
Pipe P49	70.00	200	110	-62.05	1.98	26.08	0.026
Pipe P50	50.00	200	110	12.76	0.41	1.39	0.033
Pipe P51	52.00	200	110	-12.60	0.40	1.36	0.033
Pipe P52	74.00	200	110	80.48	2.56	42.21	0.025
Pipe P53	50.00	200	110	93.00	2.96	55.17	0.025
Pipe P54	51.00	200	110	-47.97	1.53	16.19	0.027
Pipe P55	33.00	200	110	0.26	0.01	0.00	0.048
Pipe P56	122.00	200	110	-49.25	1.57	17.00	0.027
Pipe P57	90.00	200	110	-76.44	2.43	38.37	0.025
Pipe P58	225.00	200	110	-77.84	2.48	39.68	0.025

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr 1	139.80	-81.38	139.80	0.00	0.00	0.00
Resvr 2	139.80	-70.59	139.80	0.00	0.00	0.00
Resvr 3	139.80	-73.47	139.80	0.00	0.00	0.00
Junc 21	94.95	0.38	136.22	41.27	404.86	58.72
Junc 22	94.98	0.66	133.76	38.78	380.43	55.18
Junc 23	94.84	0.55	136.03	41.19	404.07	58.61
Junc 24	94.79	0.30	136.38	41.59	408.00	59.18
Junc 25	94.73	0.52	137.05	42.32	415.16	60.21
Junc 26	94.77	0.33	136.51	41.74	409.47	59.39
Junc 28	94.70	0.66	136.64	41.94	411.43	59.67
Junc 29	94.95	0.16	136.20	41.25	404.66	58.69
Junc 30	95.03	0.66	134.79	39.76	390.05	56.57
Junc 37	95.00	0.30	132.95	37.95	372.29	54.00
Junc 38	95.07	0.49	132.63	37.56	368.46	53.44
Junc 39	95.13	0.05	131.59	36.46	357.67	51.88
Junc 40	95.48	0.05	129.49	34.01	333.64	48.39
Junc 41	95.38	0.16	129.67	34.29	336.38	48.79
Junc 42	95.37	0.08	129.86	34.49	338.35	49.07
Junc 43	95.34	0.26	128.68	33.34	327.07	47.44
Junc 44	95.67	218.17	123.42	27.75	272.23	39.48
Junc 45	95.30	0.26	123.42	28.12	275.86	40.01
Junc 46	95.40	1.40	131.78	36.38	356.89	51.76

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	83.00	200	110	-81.38	2.59	43.09	0.025
Pipe P2	83.00	200	110	-70.59	2.25	33.11	0.026
Pipe P27	90.00	200	110	-24.45	0.78	4.65	0.030
Pipe P28	87.54	200	110	42.29	1.35	12.82	0.028
Pipe P29	78.56	200	110	-42.95	1.37	13.19	0.028
Pipe P30	90.00	200	110	-14.82	0.47	1.84	0.032
Pipe P31	97.00	200	110	-14.98	0.48	1.88	0.032
Pipe P32	38.00	200	110	44.95	1.43	14.35	0.028
Pipe P35	73.00	200	110	29.35	0.93	6.52	0.029
Pipe P36	84.00	200	110	25.11	0.80	4.88	0.030
Pipe P37	91.20	200	110	-43.61	1.39	13.57	0.028
Pipe P40	66.00	200	110	-15.28	0.49	1.95	0.032
Pipe P46	47.00	200	110	-105.46	3.36	69.63	0.024
Pipe P47	65.00	200	110	-25.09	0.80	4.87	0.030
Pipe P48	35.00	200	110	-66.89	2.13	29.97	0.026
Pipe P49	70.00	200	110	-66.84	2.13	29.92	0.026
Pipe P50	50.00	200	110	-21.19	0.67	3.56	0.031
Pipe P51	52.00	200	110	21.35	0.68	3.61	0.031
Pipe P52	74.00	200	110	80.07	2.55	41.81	0.025
Pipe P53	50.00	200	110	58.64	1.87	23.48	0.026
Pipe P54	51.00	200	110	130.45	4.15	103.24	0.024
Pipe P55	33.00	200	110	0.26	0.01	0.00	0.065
Pipe P56	122.00	200	110	-87.98	2.80	49.78	0.025
Pipe P57	90.00	200	110	-72.07	2.29	34.40	0.026
Pipe P58	225.00	200	110	-73.47	2.34	35.65	0.026

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr 1	139.80	-64.36	139.80	0.00	0.00	0.00
Resvr 2	139.80	-55.90	139.80	0.00	0.00	0.00
Resvr 3	139.80	-105.03	139.80	0.00	0.00	0.00
Junc 21	94.95	0.38	137.48	42.53	417.22	60.51
Junc 22	94.98	0.66	135.91	40.93	401.52	58.24
Junc 23	94.84	0.55	137.36	42.52	417.12	60.50
Junc 24	94.79	0.30	137.58	42.79	419.77	60.88
Junc 25	94.73	0.52	138.02	43.29	424.67	61.59
Junc 26	94.77	0.33	137.66	42.89	420.75	61.02
Junc 28	94.70	0.66	137.75	43.05	422.32	61.25
Junc 29	94.95	0.16	137.46	42.51	417.02	60.48
Junc 30	95.03	0.66	136.57	41.54	407.51	59.10
Junc 37	95.00	0.30	135.38	40.38	396.13	57.45
Junc 38	95.07	0.49	135.21	40.14	393.77	57.11
Junc 39	95.13	0.05	134.59	39.46	387.10	56.14
Junc 40	95.48	0.05	133.36	37.88	371.60	53.90
Junc 41	95.38	0.16	133.32	37.94	372.19	53.98
Junc 42	95.37	0.08	133.27	37.90	371.80	53.92
Junc 43	95.34	0.26	131.41	36.07	353.85	51.32
Junc 44	95.67	1.02	131.96	36.29	356.00	51.63
Junc 45	95.30	0.26	131.96	36.66	359.63	52.16
Junc 46	95.40	218.40	124.25	28.85	283.02	41.05

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	83.00	200	110	-64.36	2.05	27.90	0.026
Pipe P2	83.00	200	110	-55.90	1.78	21.49	0.027
Pipe P27	90.00	200	110	-19.18	0.61	2.96	0.031
Pipe P32	38.00	200	110	35.54	1.13	9.29	0.028
Pipe P28	87.54	200	110	32.88	1.05	8.04	0.029
Pipe P29	78.56	200	110	-33.54	1.07	8.34	0.029
Pipe P30	90.00	200	110	-11.63	0.37	1.17	0.034
Pipe P31	97.00	200	110	-11.79	0.38	1.20	0.034
Pipe P35	73.00	200	110	23.12	0.74	4.19	0.030
Pipe P36	84.00	200	110	19.84	0.63	3.16	0.031
Pipe P37	91.20	200	110	-34.20	1.09	8.65	0.029
Pipe P40	66.00	200	110	-12.09	0.38	1.26	0.033
Pipe P46	47.00	200	110	-83.16	2.65	44.84	0.025
Pipe P47	65.00	200	110	-17.79	0.57	2.58	0.032
Pipe P48	35.00	200	110	-50.18	1.60	17.60	0.027
Pipe P49	70.00	200	110	-50.13	1.60	17.57	0.027
Pipe P50	50.00	200	110	10.26	0.33	0.93	0.034
Pipe P51	52.00	200	110	-10.10	0.32	0.90	0.034
Pipe P52	74.00	200	110	65.06	2.07	28.47	0.026
Pipe P53	50.00	200	110	75.09	2.39	37.12	0.026
Pipe P54	51.00	200	110	-38.54	1.23	10.79	0.028
Pipe P55	33.00	200	110	0.26	0.01	0.00	0.065
Pipe P56	122.00	200	110	-39.82	1.27	11.47	0.028
Pipe P57	90.00	200	110	113.37	3.61	79.61	0.024
Pipe P58	225.00	200	110	-105.03	3.34	69.11	0.024

MAXIMUM DAY + FIRE FLOW DEMAND SUMMARY

Scenario 2

Maximum day plus fire flow demand was modeled for each node.
The following is a summary of the minimum pressures that occurred for each operating condition.

Fire at Junction	Demand (L/s)			Minimum Pressure			
	Maximum Daily	Fire Flow	Max Day + Fire	(m)	kPa	psi	Node
N40	0.05	217.15	217.20	31.14	305.48	44.31	N40
N43	0.26	217.15	217.41	32.08	314.70	45.64	N43
N44	1.02	217.15	218.17	27.75	272.23	39.48	N44
N46	1.40	217.00	218.40	28.85	283.02	41.05	N46

APPENDIX D

Correspondence

Steve Zorgel

From: Whittaker, Damien <Damien.Whittaker@ottawa.ca>
Sent: August-14-13 10:02 AM
To: Drew Blair
Subject: FW: Bridlewood Trails Phase 2. 3rd Submission review. D07-16-07-0025

Drew,

Please find watermain Boundary conditions below. Conditions are suitable for all connection points. Note that the department that provides analysis made adjustments to their system model recently that would result in minor changes to the boundary conditions originally provided for this project; the new boundary conditions should not be compared with previously provided boundary conditions.

Scenario 1: No Commercial development
PKHR = 154.6 m
Max HGL = 164.3 m
MXDY+Fire (176 L/s) = 145.2 m
MXDY+Fire (211 L/s) = 140.6 m

Scenario 2: With Commercial development
Boundary conditions as above, but assuming 13,000 Lpm fire for the commercial area,
MXDY+Fire (217 L/s) = 139.8 m

The design should clarify if an additional connection (P58) is required as part of Phase 2, or only as part of the subsequent commercial development.

Regards,

Damien Whittaker, P.Eng • **Project Manager** • **Development Review, Suburban (West)**
City of Ottawa • 110 Laurier Avenue West, Ottawa, Ontario K1P 1J1
☎ 613-580-2424 x16968 • damien.whittaker@ottawa.ca • 01-14

From: Drew Blair [mailto:D.Blair@novatech-eng.com]
Sent: August 12, 2013 4:38 PM
To: Whittaker, Damien
Subject: RE: Bridlewood Trails Phase 2. 3rd Submission review. D07-16-07-0025

Hi Damien,

I have attached revised demands for both scenarios: towns/zens only and towns/zens plus commercial Block 15. I have updated the fire demand flows for the town units and the apartment units to reflect the revised fire flow calculations submitted in the July 15 Hydraulic Analysis report. Our understanding is that these fire flow demands are accepted and approved by the City. We will require updated boundary conditions from the City; R1 and R2 for towns/zens only and R1, R2 and R3 for towns/zens and commercial block 15.

As discussed, we trust this won't delay the transfer of review for the MOE submission.

Thanks,

Drew

From: Whittaker, Damien [mailto:Damien.Whittaker@ottawa.ca]
Sent: August-12-13 3:49 PM
To: Drew Blair
Subject: Bridlewood Trails Phase 2. 3rd Submission review. D07-16-07-0025

Drew,

I discussed the watermain analysis with Tim. Analysis is required for both scenarios, with updated fire demand calculations.

Tim proposed an alternative that the development include the watermain looping for the future scenario to be built now. This would reduce the scenarios to be modelled to one.

Regards,

Damien Whittaker, P.Eng • **Project Manager** • **Development Review, Suburban (West)**
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APPENDIX E

Excerpts from the Uniform Plumbing Code

607.0 Gravity Supply Tanks

Gravity tanks for potable water shall be tightly covered, and have not less than a sixteen (16) square inch (10,323 mm^2) overflow screened with copper screen having not less than fourteen (14) nor more than eighteen (18) openings per linear inch (25.4 mm).

608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves

608.1 Inadequate Water Pressure. Whenever the water pressure in the main or other source of supply will not provide a residual water pressure of at least fifteen (15) pounds per square inch (103.4 kPa), after allowing for friction and other pressure losses, a tank and a pump or other means which will provide said fifteen (15) pound (103.4 kPa) pressure shall be installed. Whenever fixtures and/or fixture fittings are installed, which require residual pressure higher than fifteen (15) pounds per square inch (103.4 kPa), that minimum residual pressure shall be provided.

608.2 Excessive Water Pressure. Where local static water pressure is in excess of eighty (80) pounds per square inch (552 kPa), an approved type pressure regulator preceded by an adequate strainer shall be installed and the static pressure reduced to eighty (80) pounds per square inch (552 kPa) or less. For potable water services up to and including one and one-half (1-1/2) inch (38 mm) regulators, provision shall be made to prevent pressure on the building side of the regulator from exceeding main supply pressure. Approved regulators with integral bypasses are acceptable. Each such regulator and strainer shall be accessibly located and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping. All pipe size determinations shall be based on eighty (80) percent of the reduced pressure when using Table 6-5.

608.3 Any water system provided with a check valve or a pressure regulating device which does not have a bypass feature at its source shall be provided with an approved, listed, adequately sized pressure relief valve.

Any water system containing storage water heating equipment shall be provided with an approved, listed, adequately sized combination pressure and temperature relief valve, except for listed non-storage instantaneous heaters having an inside diameter of not more than three (3) inches (76 mm). Each such approved combination temperature and pressure relief valve shall be installed on the water heating device in an approved location based on its listing requirements and the manufacturer's instructions. Each such combination temperature and pressure relief valve shall be provided with a drain as required in Section 608.5.

In addition to the required pressure or combination pressure and temperature relief valve, an approved, listed expansion tank or other device designed for intermittent operation for thermal expansion control shall be installed whenever the building supply pressure is greater than the required relief valve pressure setting or when any device is installed that prevents pressure relief through the building supply. The tank or device shall be sized in accordance with the manufacturer's recommendation.

608.4 Each pressure relief valve shall be an approved automatic type with drain, and each such relief valve shall be set at a pressure of not more than one hundred fifty (150) pounds per square inch (1035 kPa). No shutoff valve shall be installed between the relief valve and the system or in the drain line.

608.5 Relief valves located inside a building shall be provided with a drain, not smaller than the relief valve outlet, of galvanized steel, hard drawn copper piping and fittings, CPVC, or listed relief valve drain tube with fittings which will not reduce the internal bore of the pipe or tubing (straight lengths as opposed to coils) and shall extend from the valve to the outside of the building with the end of the pipe not more than two (2) feet (610 mm) nor less than six (6) inches (152 mm) above the ground or the flood level of the area receiving the discharge and pointing downward. Such drains may terminate at other approved locations. No part of such drain pipe shall be trapped and the terminal end of the drain pipe shall not be threaded.

608.6 Any water heating device connected to a separate storage tank and having valves between said heater and tank shall be provided with an approved water pressure relief valve.

608.7 Vacuum Relief Valves. Where a hot water storage tank or an indirect water heater is located at an elevation above the fixture outlets in the hot water system, a vacuum relief valve shall be installed on the storage tank or heater.

609.0 Installation, Testing, Unions, and Location

609.1 Installation. All water piping shall be adequately supported to the satisfaction of the Administrative Authority. Burred ends shall be reamed to the full bore of the pipe or tube. Changes in direction shall be made by the appropriate use of fittings, except that changes in direction in copper tubing may be made with bends, provided that such bends are made with bending equipment which does not deform or create a loss in the cross-sectional area of the tubing. Provisions shall be made for expansion

APPENDIX F

Erosion and Sediment Control

EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

Scope of Work

The work under the applicable items includes the preparation, implementation and monitoring of an Erosion and Sediment Control Plan to prevent sediment-laden runoff resulting from the Contractor's construction operations from entering all sewers and watercourses both within and downstream from the Working Area. The plan shall include management and monitoring of water discharged from dewatering operations. The specification is limited to the management of sediment laden water and the management of contaminants such as hydrocarbons and volatile organic compounds present within groundwater at the site shall be managed as described elsewhere in the contract documents.

General

The Contractor acknowledges that surface erosion and sediment runoff resulting from construction operations has potential to cause a detrimental impact to any downstream watercourse, and that all construction operations that may impact upon water quality shall be carried out in a manner that strictly meets the requirements of all applicable legislation and regulations.

Accordingly, the Contractor shall be responsible for determining and conforming to the requirements of the Ontario Ministry of the Environment (MOE), the Ontario Ministry of Natural Resources, the City of Ottawa, applicable Conservation Authorities and any other Governmental Regulatory Agencies (collectively "Regulatory Agencies") having jurisdiction in the Working Area or over any potentially affected watercourses.

Erosion and Sediment Control Plan

Before commencing the Work, the Contractor shall submit to the Contract Administrator six copies of a detailed Erosion and Sediment Control Plan. The ESC Plan will consist of a written description and detailed drawings indicating the on-site activities and measures to be used to control erosion and sediment movement for each step of the Work. The written description shall be signed by, and the drawings shall bear the stamp and signature of a qualified Professional Engineer licensed in Ontario, herein designated as the Engineer of Record (EOR).

The Contractor acknowledges that the scheduling of the implementation of erosion and sediment controls is the key component for successful sediment control. Accordingly, the ESC Plan will contain a detailed schedule which identifies the following:

- Phasing of the steps for the installation of all control measures.
- Inspection, monitoring and maintenance of all control measures during construction.

EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

- Phasing of the removal and disposal of the control measures.

The Contractor acknowledges that no one measure is likely to be 100% effective for erosion protection and controlling sediment runoff and water discharges from the site. Therefore, where necessary the ESC Plan will implement sequential measures arranged in such a manner so as to mitigate sediment release from construction operations and achieve specific maximum permitted criteria where applicable. Suggested on-site measures may include, but shall not be limited to, the following methods: sediment ponds, filter bags, pump filters, settling tanks, silt fences, straw bales, filter cloths, check dams and/or berms, or other recognized technologies and methods available at the time of construction. Specific measures shall be installed in accordance with the requirements of OPSS 805 where appropriate, or in accordance with manufacturer's recommendations.

Inspection and Monitoring of Mitigation Measures

The Contractor shall be solely responsible for inspecting, monitoring and maintaining the effectiveness of the ESC Plan upon implementation. The Contractor shall submit to the Contract Administrator weekly inspection reports demonstrating the performance of the installed measures, identifying deficiencies and indentifying required maintenance issues. These reports shall be prepared, signed by the EOR and provided to the Contract Administrator within 48 hours of the inspection.

- Maintenance issues are defined as any measure which is not functioning to the satisfaction of the EOR and in the opinion of the EOR may be repaired by the contractor with subsequent re-inspection at the next scheduled EOR site inspection.
- Deficiencies are defined as any measure or lack of measure which has potential to cause an adverse environmental impact at the site given the current/forecasted conditions and schedule of the work.

Maintenance issues which have previously been identified but not adequately corrected shall be considered deficiencies.

Deficiencies shall be immediately corrected. Corrective actions shall be re-inspected and documented by the EOR. Re-inspection reports shall be specific to the deficiency observed and may be written field reports.

EOR monitoring reports submitted shall include:

- The date and time of the inspection and monitoring.
- General description of the mitigating measures being utilized at the site.
- Confirmation as to the effectiveness of the measures inspected.

EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

- Description of any maintenance issue which requires minor repair, improvement or maintenance.
- Description of any deficiency observed including timeline for correction and re-inspection.
- Deficiency re-inspection reports outstanding for the site.

The Contractor shall notify the Contract Administrator in all situations where a regulatory agency has identified deficiencies in erosion/sediment control measures, quality of runoff or quality of water quality discharged from dewatering operation.

Where in the opinion of the Contract Administrator either the proof of performance submitted is or the measures implemented are considered inadequate, the Contractor shall have the EOR review measures in the presence of the Contract Administrator within 24 hours of being notified in writing.

The Contractor shall monitor all weather forecasts and schedule the Work in order to minimize the risk of sediment-laden water from entering any watercourse or sewer system. The ESC Plan shall contain a Contingency Plan to include the provision of additional labour, equipment or materials to install additional control measures, and detail an emergency response plan in case of an accidental event. As such, the Contractor shall have additional control materials on site at all times which are easily accessible and may be implemented at a moment's notice.

Contractor's Responsibilities

The Contractor shall ensure that all workers, including sub-contractors, in the Working Area are aware of the importance of the erosion and sediment control measures and informed of the consequences of the failure to comply with the requirements of all Regulatory Agencies and the specifications detailed herein.

The Contractor shall periodically, and when requested by the Contract Administrator or EOR, clean out accumulated sediment deposits as required at the sediment control devices, including those deposits that may originate from outside the construction area. Accumulated sediment shall be removed in such a manner that prevents the deposition of this material into any sewer or watercourse and avoids damage to the control measure. The sediment shall be removed from the site at the Contractor's expense and managed in compliance with the requirements for excess earth material, as specified elsewhere in the Contract.

The Contractor shall immediately report to applicable regulatory agencies and the Contract Administrator any accidental discharges of sediment material into either the watercourse or the storm sewer system. Failure to report will be constitute a breach of this specification and the Contractor may also be subject to the penalties imposed by any

EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

applicable Regulatory Agency. Appropriate response measures, including any repairs to existing control measures or the implementation of additional control measures, shall be carried out by the Contractor without delay.

The sediment control measures shall be removed when, in the opinion of the EOR, the measure(s) is no longer required. No control measure may be permanently removed without prior written authorization from the EOR. All sediment and erosion control measures shall be removed in a manner that avoids the entry of sediment or debris into any sewer or watercourse within or downstream of the Working Area. All accumulated sediment shall be removed from the Working Area at the Contractor's expense and managed in compliance with the requirements for excess earth material, as specified elsewhere in the Contract. Any seeding and mulching, temporary cover, sodding or original turf cover that is disturbed by the removal of the control measures and accumulated sediment, shall be brought to final grade and restored. Payment for the supply and placing of ground cover at these locations shall be made under the applicable items listed elsewhere in the Contract.

Where, in the opinion of either the Contract Administrator or a Regulatory Agency, any of the terms specified herein have either not been complied with or not performed in a suitable manner, the Contract Administrator or Regulatory Agency has the right to immediately withdraw its permission to continue the work but may renew its permission upon being satisfied that the defaults and/or deficiencies in the performance of this specification by the Contractor have been remedied. No compensation will be made to the Contractor for the withdrawal of permission to do the work resulting from non-compliance with the requirements of this specification and the Regulatory Agencies.

In addition to any other remedy and/or penalty provided by law, where there has been default or non-compliance with any of the terms specified herein and the Contractor refuses to perform or rectify same within forty-eight (48) hours of the receipt of the written demand of the Contract Administrator to do so, the Owner is hereby entitled to enter upon the Working Area and either complete the work in conformity with the Contract or have the work done that it considers necessary to complete the Work to its intended condition, whichever, in the Owner's sole opinion, is the most reasonable course of action. The Contractor and the Owner further agree that the costs incurred for any such work shall be retained by the Owner from monies otherwise due to the Contractor.

Monitoring of Water Quality Impacts and Point Source Discharges

The Contractor shall monitor runoff quality and quantity of water discharged from dewatering operations. The work shall include turbidity monitoring of impacts to watercourses (upstream vs downstream conditions), total suspended solids (TSS) monitoring of point sources such as those from dewatering operations. Discharge shall be in accordance with site specific constraints, regulatory requirements and sewer use bylaw

requirements. Where no specific criteria has otherwise been identified, the contractor shall meet the following discharge objective.

Source	Objective	Monitoring Frequency (min)
Watercourse Impacts	Downstream turbidity not to exceed upstream levels by greater than 25%	Minimum of daily for first three days of operation Minimum of twice weekly on an ongoing basis Daily for situations where the work is being conducted within 20 metres of a watercourse.
Discharge from Dewatering Operations	TSS maximum level of 25 mg/L	Minimum of daily for first three days of operation Minimum of twice weekly on an ongoing basis

Monitoring frequency to increase where scheduled construction operations have potential to impair water quality.

Mitigation and Action by Contractor Where Monitoring Indicates Water Impacts or Discharges Over Criteria or Objectives

Where site specific criteria or objectives are not attained, the Contractor and/or EOR shall immediately notify applicable regulatory agency of the monitoring results and possible impacts to sewers and watercourses. The Contractor shall implement an Action/Mitigation Plan acceptable to the EOR and applicable regulatory agency prior to continuing or resuming construction activities.

Measurement and Basis of Payment

Item – Erosion and Sediment Control Plan and Monitoring

Payment at the Contract price for the item "Erosion and Sediment Control Plan and Monitoring" shall be full compensation for the preparation and monitoring of the Erosion and Sediment Control Plan.

Payment shall be based upon the following schedule:

a) 25% upon satisfactory submission and implementation of the ESC Plan; and,
b) 75% pro-rated into equal payments over the term of the contract.

EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

This payment schedule may only be modified as agreed upon in writing between the Contractor and the Contract Administrator.

Item – Erosion and Sediment Control Measures

Payment at the Contract price for the item "Erosion and Sediment Control Measures" shall be full compensation for the implementation and maintenance of erosion and sediment control measures required for the site, and shall include all labour, equipment and materials to supply, construct, monitor and maintain all erosion and sediment control measures detailed therein.

Payment shall be based upon the following schedule:

a) 20% upon satisfactory installation of the control measures;
b) 70% pro-rated into equal payments over the term of the contract; and,
c) 10% upon successful completion and removal of the ESC Plan protection measures.

This payment schedule may only be modified as agreed upon in writing between the Contractor and the Contract Administrator.

Warrant: For work which is conducted in close proximity to watercourses or environmentally sensitive areas.

APPENDIX G

Development Servicing Study Checklist

NOVATECH
Engineers, Planners & Landscape Architects

Project Name: Block 14 (Bridlewood Trails - Phase 2) Project Number: 114013
Date: September 17, 2014

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Executive Summary (for larger reports only).	NA		
Date and revision number of the report.	Y	Cover	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	Fig 1	
Plan showing the site and location of all existing services.	Y	Fig 2	
Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Y	1.0, 2.0	
Summary of Pre-consultation Meetings with City and other approval agencies.	Y	1.2	
Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Y	1.3	
Statement of objectives and servicing criteria.	Y	3.0, 4.0, 5.0	
Identification of existing and proposed infrastructure available in the immediate area.	Y		General Plan of Services 114013
Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Y	3.0	
Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y	3.0	

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	NA		
Proposed phasing of the development, if applicable.	Y	9.0	
Reference to geotechnical studies and recommendations concerning servicing.	Y	2.3	
All preliminary and formal site plan submissions should have the following information:			
Metric scale	Y		Grading Plan 114013
North arrow (including construction North)	Y		Grading Plan 114013
Key plan	Y		Grading Plan 114013
Name and contact information of applicant and property owner	Y		Grading Plan 114013
Property limits including bearings and dimensions	Y		Grading Plan 114013
Existing and proposed structures and parking areas	Y		Grading Plan 114013
Easements, road widening and rights-of-way	Y		Grading Plan 114013
Adjacent street names	Y		Grading Plan 114013

Development Servicing Study Checklist

4.2 Water	Addressed (Y/N/NA)	Section	Comments
Confirm consistency with Master Servicing Study, if available.	Y	5.0	
Availability of public infrastructure to service proposed development.	Y	5.2	
Identification of system constraints.	Y	5.0	
Identify boundary conditions.	Y	5.2	
Confirmation of adequate domestic supply and pressure.	Y	5.4	
Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Y	5.4	
Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Y	5.4	
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	Y	5.0	
Address reliability requirements such as appropriate location of shut-off valves.	Y	5.0	
Check on the necessity of a pressure zone boundary modification.	NA		
Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	Y	5.4	
Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Y	5.3	
Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	NA		
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	5.1	
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Y		Appendix D

Development Servicing Study Checklist

4.3 Wastewater	Addressed (Y/N/NA)	Section	Comments
Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Y	4.0	
Confirm consistency with Master Servicing Study and/or justifications for deviations.	Y	4.2, 10.0	
Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	NA		
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	4.0	
Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Y	4.2	
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Y		Appendix B
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	4.1	
Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	NA		
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	NA		
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	NA		
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	Y		Appendix B
Special considerations such as contamination, corrosive environment etc.	NA		

Development Servicing Study Checklist

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	3.0	
Analysis of the available capacity in existing public infrastructure.	Y		Appendix A
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y		Fig 3, Fig 4, Fig 5
Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Y	3.0	
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	3.0	
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	3.0	
Set-back from private sewage disposal systems.	NA		
Watercourse and hazard lands setbacks.	Y		Appendix A
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Y	1.2	
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Y	1.2	
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y		Appendix A
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Y	3.0	
Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Y	3.0	Appendix A
Any proposed diversion of drainage catchment areas from one outlet to another.	NA		
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	Y	3.0	
If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	NA		

Development Servicing Study Checklist

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Identification of municipal drains and related approval requirements.	Y	3.0	
Description of how the conveyance and storage capacity will be achieved for the development.	Y	3.0	
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y		Appendix A
Inclusion of hydraulic analysis including HGL elevations.	Y		Appendix A
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	7.0	
Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	Y	3.0	
Identification of fill constrains related to floodplain and geotechnical investigation.	NA		

Development Servicing Study Checklist

4.5 Approval and Permit Requirements	Addressed (Y/N/NA)	Section	Comments
Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Y	1.2	
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	NA		
Changes to Municipal Drains.	NA		
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	NA		

4.6 Conclusion	Addressed (Y/N/NA)	Section	Comments
Clearly stated conclusions and recommendations.	Y	10.0	
Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	NA		
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y		

GENERAL NOTES:

1. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.
3. CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
4. BEFORE COMMENCING CONSTRUCTION, PROVIDE PROOF OF COMPREHENSIVE ALL RISK AND OPERATIONAL LIABILITY INSURANCE INCLUDING BLASTING. INSURANCE POLICY TO NAME THE OWNER, ENGINEER AND THE CITY AS CO-INSURED. AMOUNT OF INSURANCE TO BE SPECIFIED BY OWNER'S AGENT.
5. CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
6. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL LIABILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS.
7. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
8. RESTORE ALL TRENCHES AND SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF CITY OF OTTAWA AUTHORITIES. REINSTATE TULUM CRESCENT AND OVERBERG WAY TO EXISTING CONDITIONS OR BETTER AS PER CITY OF OTTAWA STANDARD R-10.
   - ASPHALT RESTORATION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA R-10.
   - THICKNESS OF GRANULAR MATERIAL AND ASPHALT LAYERS SHALL BE IN ACCORDANCE WITH PAVEMENT STRUCTURE NOTES.
   - BOULEVARDS SHALL BE REINSTATED WITH 150mm OF TOPSOIL, SEED AND MULCH.
9. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ALL ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER.
10. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
11. ALL FENCING TO BE LOCATED 0.15m INSIDE PROPERTY LINE.
12. CONCRETE SIDEWALK TO BE CONSTRUCTED AS PER CITY STANDARD SC-3, SC-5, SC-7 AND SC-8. SIDEWALK WIDTHS ARE AS PER STANDARD CROSS-SECTIONS ON 109119-D1.
13. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARDSURFACE AREAS AND DIMENSIONS.
14. REFER TO SERVICING DESIGN BRIEF (R-2014-148, DATED SEPTEMBER 17, 2014) AND STORMWATER MANAGEMENT REPORT (R-2014-147, DATED SEPTEMBER 17, 2014) PREPARED BY NOVATECH.
15. REFER TO GEOTECHNICAL REPORT (NO. 07-1121-0037, DATED MARCH 2014) , PREPARED BY GOLDER ASSOCIATES FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.
16. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
17. PROVIDE LINE / PARKING PAINTING.
18. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING THE AS-BUILT ELEVATION OF EVERY DESIGN GRADE SHOWN ON THIS PLAN.
19. ALL MATERIALS AND CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS. ONTARIO PROVINCIAL STANDARDS APPLY WHERE NO CITY STANDARDS ARE AVAILABLE.
20. PERFORATED PIPE SUB-DRAINS TO BE PROVIDED AT SUBGRADE LEVEL EXTENDING FROM THE ROADSIDE CATCHBASIN FOR A DISTANCE OF 3.0m, PARALLEL TO THE CURB IN TWO DIRECTIONS
21. ALL PRIVATE APPROACHES MUST BE CONSTRUCTED AS PER CITY SPECIFICATIONS SC13.
22. CURRENT / LATEST CITY STANDARDS HAVE BEEN USED IN THIS PROJECT.

GRADING NOTES:

1. REMOVE ALL ORGANIC MATTER AND TOPSOIL FROM AREAS THAT ARE TO BE PAVED.
2. GRADE AND/OR FILL WHERE REQUIRED.
3. MATCH EXISTING ELEVATIONS AT ALL PROPERTY LINES.
4. ENSURE POSITIVE DRAINAGE WHETHER INDICATED OR NOT.
5. MINIMUM OF 2% AND MAXIMUM OF 5% GRADE FOR GRASSED AREAS UNLESS OTHERWISE NOTED. SIDEWALK CROSSFALL NOT TO EXCEED 2%.
6. MAXIMUM TERRACING GRADE IS 3:1.
7. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
8. MINIMUM REARYARD SWALE GRADE IS 1.5%. MINIMUM REARYARD SWALE GRADE WITH THE INSTALLATION OF A SUBDRAIN SYSTEM IS 1.0%. (UNLESS OTHERWISE NOTED)
9. CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC1.1).
10. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.

EROSION AND SEDIMENT CONTROL NOTES:

1. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE CITY OF OTTAWA, APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL SUCH AS BUT NOT LIMITED TO INSTALLING FILTER CLOTHS ACROSS MANHOLE/CATCHBASIN LIDS TO PREVENT SEDIMENTS FROM ENTERING STRUCTURES AND INSTALL AND MAINTAIN A LIGHT DUTY SILT FENCE BARRIER AS REQUIRED.
2. TO PREVENT SURFACE EROSION FROM ENTERING THE STORM SYSTEM DURING CONSTRUCTION, FILTER CLOTH WILL BE PLACED UNDER ALL PROPOSED AND SURROUNDING CATCHBASINS AND MANHOLES. THE FILTER CLOTH WILL REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION COMPLETE.
3. ANY ON-SITE STOCKPILES SHALL BE LOCATED IN AREAS TO BE DESIGNATED BY THE ENGINEER AND WELL AWAY FROM DRAINAGE SWALES, OUTLET DITCHES AND REAR YARD CATCHBASINS.
4. CONTRACTOR IS TO INSTALL LIGHT DUTY SILT FENCE AS PER OPSD 219.110 AROUND PERIMETER OF SITE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. SILT FENCE TO BE INSTALLED ON THE PROPERTY LINE. CONTRACTOR SHALL MAINTAIN SILT FENCE FOR THE DURATION OF THE CONTRACT.
5. CONTRACTOR IS TO INSTALL STRAW BALES AS PER OPSD 219.180 AS INDICATED AND DIRECTED BY THE ENGINEER PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
6. ALL AREAS DISTURBED BY CONSTRUCTION ARE TO BE TREATED WITH IMPORTED TOPSOIL, SEED AND MULCH.
7. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

NOTES: PAVEMENT STRUCTURE

1. SUBGRADE MATERIAL SHALL BE PLACED IN MAXIMUM 300mm LIFTS AND COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY.
2. ROADWAY GRANULAR MATERIAL SHALL BE PLACED IN MAXIMUM 300mm LIFTS AND COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY.
3. ASPHALTIC CONCRETE TO BE COMPACTED TO AT LEAST 97% OF MARSHALL DENSITY.
4. ALL ROADWAYS TO HAVE 3% CROSSFALL INCLUDING SUBGRADE AND GRANULAR BASE, UNLESS OTHERWISE NOTED.
5. ROADWAY SUBGRADE TO BE INSPECTED BY THE GEOTECHNICAL ENGINEER AT THE TIME OF CONSTRUCTION TO REVIEW THE GRANULAR 'B' DEPTH AND FOR THE NECESSITY OF A WOVEN GEOTEXTILE BELOW THE GRANULAR MATERIALS.
6. PRIOR TO THE PLACEMENT OF TOPLIFT, CONTRACTOR IS TO ADJUST ALL STRUCTURES AS PER CITY OF OTTAWA STANDARD R-2.

PAVEMENT STRUCTURE DETAILS

DRIVING AISLES

- 40mm HL3
- 50mm HL8
- 150mm GRANULAR 'A'
- 450mm GRANULAR 'B' TYPE II
- SUBGRADE TO BE FILL, IN SITU SOIL, OR O.P.S.S. GRANULAR 'B' TYPE 1 OR 2 MATERIAL PLACED OVER IN SITU SOIL OR FILL

PARKING STALLS

- 50mm HL8
- 150mm GRANULAR 'A'
- 375mm GRANULAR 'B' TYPE II
- SUBGRADE TO BE FILL, IN SITU SOIL, OR O.P.S.S. GRANULAR 'B' TYPE 1 OR 2 MATERIAL PLACED OVER IN SITU SOIL OR FILL

ASPHALT PATHWAY

- 50mm HL3
- 150mm GRANULAR 'A'
- SUBGRADE TO BE FILL, IN SITU SOIL, OR O.P.S.S. GRANULAR 'B' TYPE 1 OR 2 MATERIAL PLACED OVER IN SITU SOIL OR FILL

SEWER NOTES:

1. SPECIFICATIONS:

ITEM	SPEC No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM / SANITARY MANHOLE (1200Ø)	701.010	OPSD
CB, FRAME & COVER	S19.1, 400.020	CITY OF OTTAWA / OPSD
STORM / SANITARY MH FRAME & COVER	401.010	OPSD
SEWER TRENCH - BEDDING (GRANULAR A)	S6, S7	CITY OF OTTAWA / OPSD
COVER (GRANULAR A OR GRANULAR B TYPE I, WITH MAXIMUM PARTICLE SIZE = 25mm)	S6, S7	CITY OF OTTAWA / OPSD
CATCHBASIN LEAD	PVC DR 35	
STORM SEWER	PVC DR 35 (UP TO 375mmØ) OR 50-D CONCRETE (450mmØ AND LARGER)	
SANITARY SEWER	PVC DR 35	

2. INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 1.5m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
3. SERVICE ARE TO BE CONSTRUCTED TO WITHIN 1.0m OF FOUNDATION WALL AND CAPPED, AT A MINIMUM SLOPE OF 1.0% UNLESS OTHERWISE INDICATED.
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
5. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
6. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
7. ALL CATCHBASINS AND CATCHBASIN MANHOLES ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED. STORM SEWER MAINTENANCE HOLES HAVING SEWERS LESS THAN 900mmØ SHALL BE CONSTRUCTED WITH A 300mm SUMP. STORM SEWER MAINTENANCE HOLE HAVING STORM SEWERS 900mmØ AND OVER ARE TO BE BENCHED AS PER OPSD 701.021.
8. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH, CLEAN AND RE-TELEVISE ALL SEWERS & APPURTENANCES.
9. FULL PORT BACKWATER VALVES ARE REQUIRED ON THE SANITARY SERVICES. INSTALLED AS PER THE MANUFACTURERS RECOMMENDATIONS AND A BACKWATER VALVE IS REQUIRED ON THE STORM SERVICES / FOUNDATION DRAINS FOR EACH BUILDING; INSTALLED AS PER STD. DWG S14.
10. WATERTIGHT COVERS TO BE LOCATED WITHIN STORMWATER MANAGEMENT PONDING AREAS.

WATERMAIN NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
WATERMAIN CROSSING BELOW SEWER	W25	CITY OF OTTAWA
WATERMAIN (200mm)	PVC DR 18	
WATERMAIN (50mm)	TYPE K COPPER COMPLETE WITH PRESSURE REDUCING VALVE	
50mm WATER SERVICE CONNECTIONS	W33	CITY OF OTTAWA

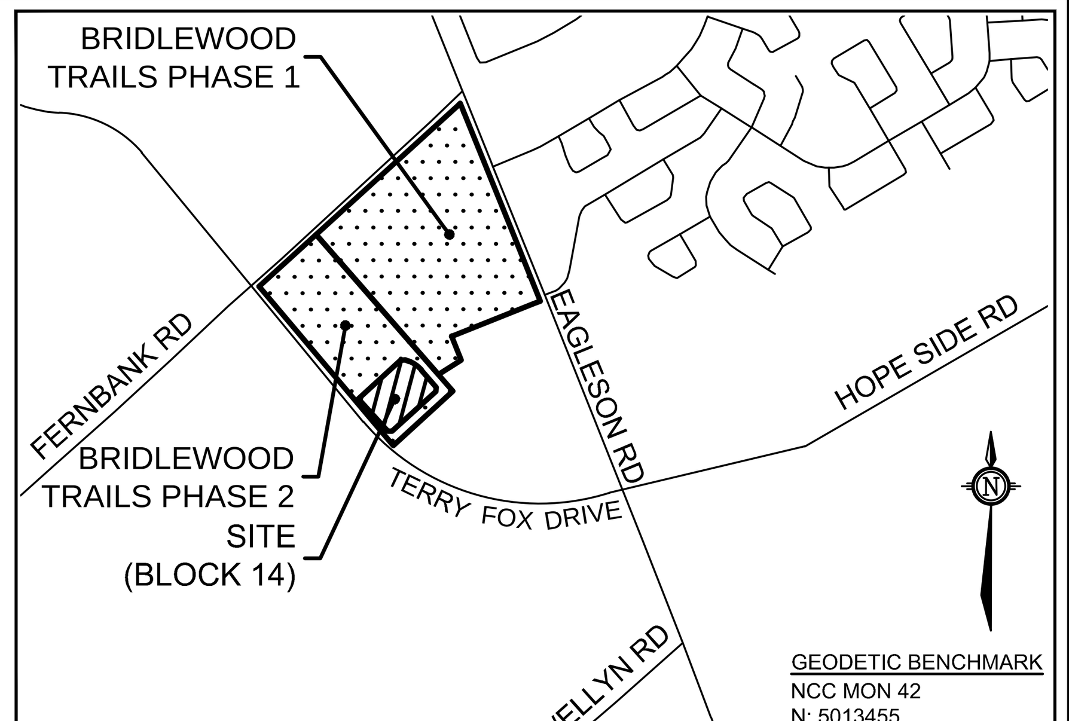
2. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS.
3. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
4. PROVIDE THERMAL INSULATION FOR ALL WATERMAIN WITH LESS THAN 2.4m COVER.
5. PROVIDE MINIMUM 0.50m CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS WHEN WATERMAIN IS BELOW AND MINIMUM 0.25m CLEARANCE WHEN WATERMAIN IS ABOVE.
6. WATER SERVICE IS TO BE CONSTRUCTED TO WITHIN 1.0m OF FOUNDATION WALL AND CAPPED, UNLESS OTHERWISE INDICATED.

UTILITY NOTES:

1. CONTRACTOR TO CONTACT RESPECTIVE UTILITY COMPANIES TO DETERMINE EXACT LOCATION OF EXISTING UTILITIES BEFORE COMMENCING WORK. CONTRACTOR TO ASSUME ALL LIABILITY FOR DAMAGE TO EXISTING UTILITIES.
2. EXTEND ENCASED DUCT CROSSINGS 2.5m FROM PROPERY LINE ON EACH SIDE.
3. CONTRACTOR SHALL EXCAVATE, BACKFILL, AND RESTORE ALL SURFACES TO EXISTING CONDITIONS FOR HYDRO PRIMARY, BELL, AND CABLEVISION CABLES.
4. CONTRACTOR SHALL SUPPLY AND INSTALL ALL DUCT WORK AND TRANSFORMER PAD. SINGLE PHASE TRANSFORMER PAD PER HYDRO OTTAWA DETAIL UCS0003.
5. TEMPORARILY COIL ALL SERVICE WIRES ON A 76mm X 76mm X 2.4m WOODEN POST FOR EACH UNIT WITH ENOUGH CONDUCTOR TO ALLOW FOR COMPLETION OF TRENCHING AND BUILDING CONNECTION.
6. MINIMUM 1.5m CLEARANCE TO BE PROVIDED FROM WATER SERVICES TO ALL PEDESTALS, TRANSFORMER PADS, ROAD DUCT CROSSINGS, AND STREET LIGHTS.
7. MINIMUM 3.0m CLEARANCE TO BE PROVIDED FROM HYDRANT TO ALL ABOVE GROUND STRUCTURES INCLUDING STREETLIGHTS, BELL PEDESTALS, CABLE PEDESTALS, TRANSFORMERS, SECTIONALIZERS, ETC.

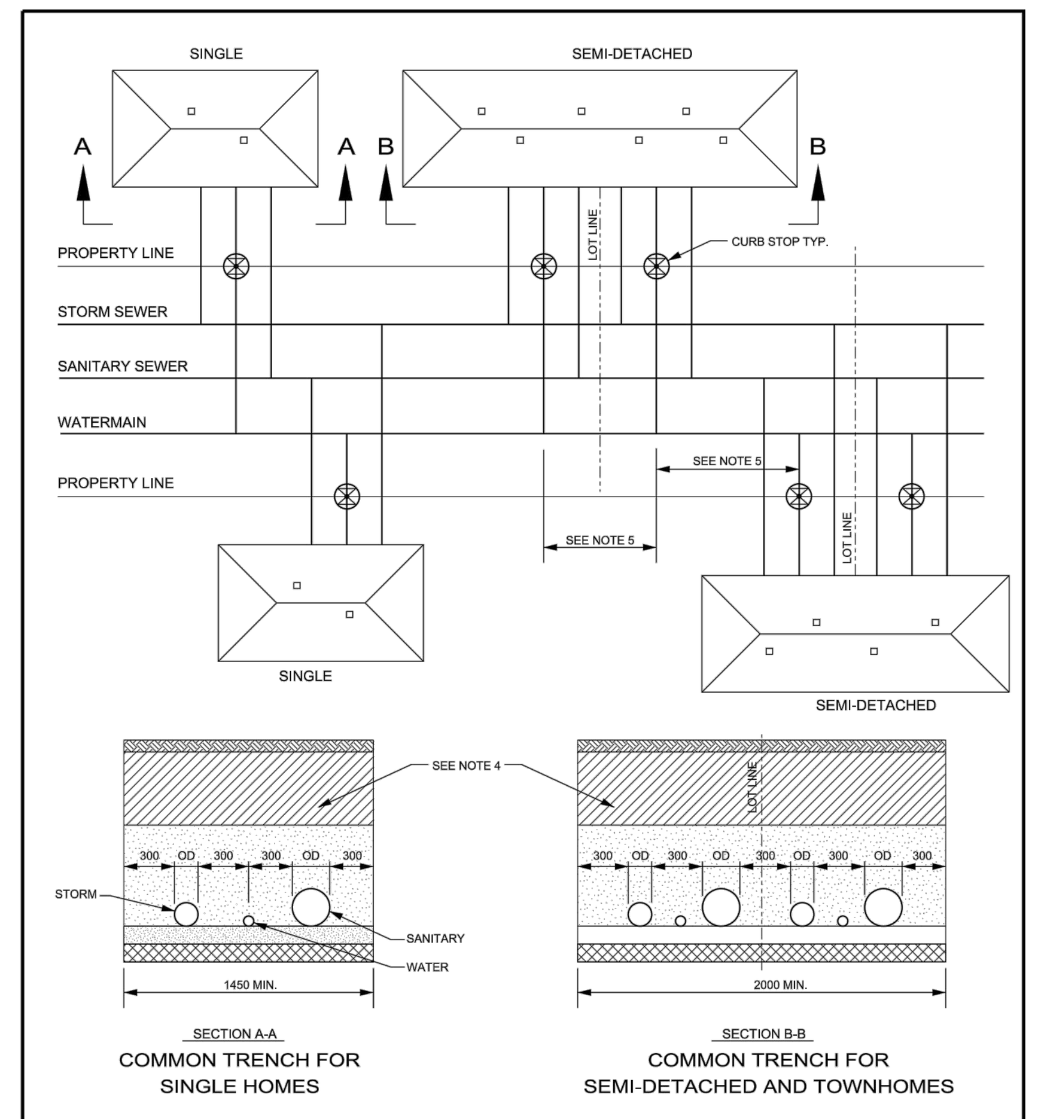
LEGEND

Symbol	Description
200mmØ	PROPOSED WATERMAIN AND DIAMETER
	PROPOSED VALVE LOCATION
V&VB	VALVE & VALVE BOX
HYD	PROPOSED HYDRANT C/W VALVE & LEAD
T/F=98.45	PROPOSED TOP OF BOTTOM FLANGE
RED	PROPOSED 50mm TO 19mm WATER SERVICE REDUCER
BEND	PROPOSED BEND AND THRUSTBLOCK 11.25°, 22.5°, 45° or TEE (SEE PLAN AND PROFILES)
101	PROPOSED SANITARY MH & SEWER
100	PROPOSED STORM MH & SEWER
	PROPOSED HEADWALL
CB 100	PROPOSED ROAD CATCHBASIN
	DIRECTION OF FLOW
DC	PROPOSED DEPRESSED CURB
	CLAY DYKE AS PER CITY OF OTTAWA DETAIL S8.
97.32 / 96.52(ASB)	PROPOSED ELEVATION / EXISTING ELEVATION (AS BUILT)
97.75(VPI)	PROPOSED POINT OF VERTICAL INFLECTION
97.75(VPI)HP	PROPOSED POINT OF VERTICAL INFLECTION (HIGH POINT)
97.75(VPI)LP	PROPOSED POINT OF VERTICAL INFLECTION (LOW POINT)
97.75(CLD)	PROPOSED CENTRELINE OF DITCH
97.75(T/S)	PROPOSED TOP OF SLOPE
97.75(TC)	PROPOSED TOP OF CURB
97.75(T/B)	PROPOSED TOP OF NOISE BARRIER
FF=	FINISHED FLOOR ELEVATION
T/F=	TOP OF FOUNDATION ELEVATION
USF=	UNDERSIDE OF FOOTING ELEVATION
MUSF=	MINIMUM UNDERSIDE OF FOOTING ELEVATION
127.55	PROPOSED TERRACE ELEVATION
	MAXIMUM 3:1 SIDESLOPE
	PROPOSED CENTRELINE SWALE
2.0%	PROPOSED GRADE AND DIRECTION
	MAJOR OVERLAND FLOW ROUTE
HYD	PROPOSED HYDRANT LOCATION
T/F=127.55	PROPOSED TOP OF BOTTOM FLANGE
V&VB	PROPOSED VALVE AND VALVE BOX
819	PROPOSED SANITARY MANHOLE
820	PROPOSED STORM MANHOLE
	PROPOSED SERVICE LOCATION (REFER TO DETAIL)
CMB	PROPOSED COMMUNITY MAIL BOX
	PROPOSED STREET LIGHT
	PROPOSED SILT FENCE
92.08	PONDING AREA WITH SPILLWAY ELEVATION
98.00 / 97.50 / 97.00	*EXISTING* CONTOUR LINE AND CONTOUR ELEVATION
200mmØ WM	*EXISTING WATERMAIN*
HYD	*EXISTING HYDRANT C/W VALVE & LEAD*
T/F=97.71	*EXISTING TOP OF FLANGE*
MH 101	*EXISTING SANITARY MH & SEWER*
MH 102	*EXISTING STORM MH & SEWER*
CB 59	*EXISTING ROADSIDE CATCH BASIN WITH 3.0m SUBDRAIN IN TWO DIRECTIONS (PARALLEL WITH CURB FACE)*
CB 60	*EXISTING ROADSIDE CATCH BASIN WITH INLET CONTROL DEVICE*
OH-H	*EXISTING OVERHEAD HYDRO*
	EXISTING FIRE HYDRANT
109	*EXISTING SANITARY MANHOLE*
110	*EXISTING STORM MANHOLE*
	EXISTING VALVE
HP	*EXISTING HYDRO POLE*
CB 59	*EXISTING ROADSIDE CATCH BASIN WITH 3.0m SUBDRAIN IN TWO DIRECTIONS (PARALLEL WITH CURB FACE)*
CB 60	*EXISTING ROADSIDE CATCH BASIN WITH INLET CONTROL DEVICE*



KEY PLAN
N.T.S.

GEODETIC BENCHMARK
NCC MON 42
N: 5013455
E: 355641
ELEV: 96.939



NOTES:
1. NO HORIZONTAL BENDS IN RIGHT-OF-WAY UNLESS OTHERWISE APPROVED BY THE CITY. MAXIMUM OF TWO 22.5° HORIZONTAL BENDS FOR SANITARY AND STORM SERVICES.
2. 1% MINIMUM SANITARY AND STORM SERVICE GRADIENT WITH 2% PREFERRED.
3. STORM SERVICE LATERAL SHALL BE LOCATED TO THE LEFT OF SANITARY SERVICE LATERAL WHEN LOOKING AT THE STRUCTURE FROM THE STREET. SERVICE SIZES IN CONFORMANCE WITH S11.
4. SEE S7 FOR PIPE FOUNDATION, EMBEDMENT AND FINAL BACKFILL REQUIREMENTS.
5. MULTIPLE TAPS WITH SADDLES IN PVC WATERMAIN SHALL BE STAGGARED AND MINIMUM 600mm APART.
6. ELEVATION OF SERVICES VARIABLE DEPENDING ON GRADIENT AND/OR DEPTH OF COVER.
7. ALL DIMENSIONS ARE IN MILLIMETRES.

N.T.S.

Ottawa — TYPICAL SINGLE, SEMI-DETACHED AND TOWNHOUSE LOT SERVICING — DATE: MARCH 2011 — REV DATE: — DWG. No.: S11.3

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

CLARIDGE CONDOS
210 Gladstone Avenue, Suite 2001
Ottawa, Ontario K2P OY6
Tel : (613) 233 6030
Fax : (613) 233 8290

No.	REVISION	DATE	BY
1.	ISSUED FOR SITE PLAN APPLICATION	SEPT 17/14	JAG

SCALE

DESIGN: JAG/SAZ
CHECKED: DDB
DRAWN: RBG
CHECKED: JAG
APPROVED: DDB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
D.D. BLAIR
100122737
Sept. 17/2014
PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY of OTTAWA
BLOCK 14 (BRIDLEWOOD TRAILS PHASE 2)

DRAWING NAME
NOTES AND LEGENDS

PROJECT No. 114013
REV: REV # 1
DRAWING No. 114013-NL

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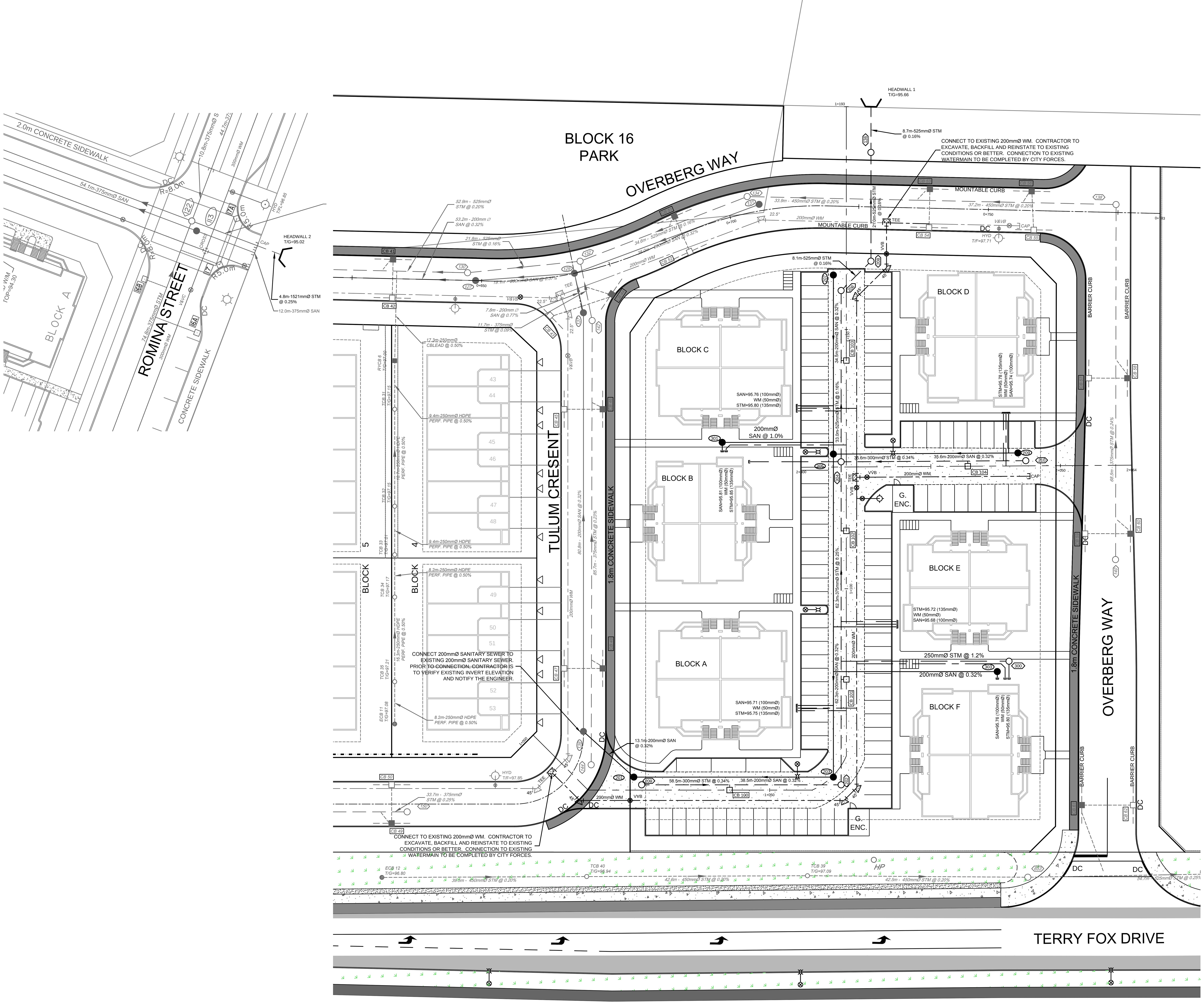
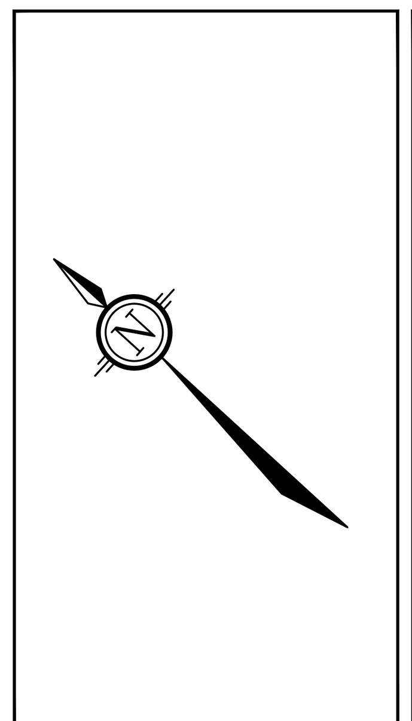
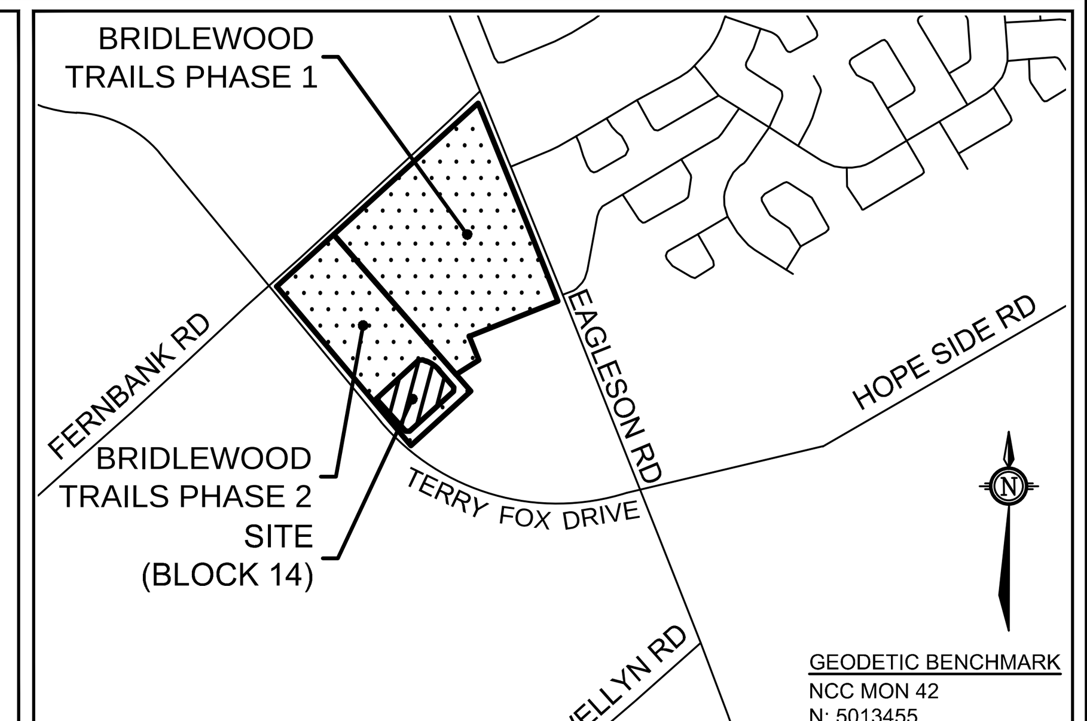
PLAN41.DWG - 841mmx594mm





NORTH



KEY PLAN
N.T.S.

GEODETIC BENCHMARK
NCC MON 42
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LEGEND

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HYD	PROPOSED HYDRANT C/W VALVE & LEAD
T/F=98.45	PROPOSED TOP OF BOTTOM FLANGE
RED	PROPOSED 50mm TO 19mm WATER SERVICE REDUCER
BEND	PROPOSED BEND AND THRUSTBLOCK 11.25°, 22.5°, 45° or TEE (SEE PLAN AND PROFILES)
101	PROPOSED SANITARY MH & SEWER
100	PROPOSED STORM MH & SEWER
	PROPOSED HEADWALL
CB 100	PROPOSED ROAD CATCHBASIN
	DIRECTION OF FLOW
DC	PROPOSED DEPRESSED CURB
	CLAY DYKE AS PER CITY OF OTTAWA DETAIL S8.
200mmØ WM	*EXISTING WATERMAIN*
HYD	*EXISTING HYDRANT C/W VALVE & LEAD*
T/F=97.71	*EXISTING TOP OF FLANGE*
MH 101	*EXISTING SANITARY MH & SEWER*
MH 102	*EXISTING STORM MH & SEWER*
CB 59	*EXISTING ROADSIDE CATCH BASIN WITH 3.0m SUBDRAIN IN TWO DIRECTIONS (PARALLEL WITH CURB FACE)*
CB 60	*EXISTING ROADSIDE CATCH BASIN WITH INLET CONTROL DEVICE*

SERVICE MANHOLE TABLE

SERVICE	MH No.	SERVICE LOCATION	T/G ELEVATION	INVERT
SAN	301	BLOCK B	98.17	E. = 95.72 S. = 95.78
SAN	303	BLOCK F	98.19	W. = 95.67 S. = 95.73
STM	300	BLOCK F	98.18	W. = 95.60 S. = 95.75

CATCHBASIN TABLE

CB No.	STREET	STATION	T/G ELEVATION	INVERT	ICD DIA.
CB 100	TULUM ENTRANCE	1+042.28	97.87	96.17	83mm
CB 101	TULUM ENTRANCE	1+082.51	97.86	96.16	83mm
CB 102	TULUM ENTRANCE	1+111.17	97.85	96.31	83mm
CB 103	TULUM ENTRANCE	1+144.03	97.84	96.14	83mm
CB 104	OVERBERG ENTRANCE	2+032.12	97.59	96.12	83mm

REFER TO 114013-NL FOR ADDITIONAL NOTES

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NOTE:
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No.	REVISION	DATE	BY
1.	ISSUED FOR SITE PLAN APPLICATION	SEPT 17/14	JAG

SCALE
1:400
1:400
0 4 8 12 16
HORIZONTAL

DESIGN	JAG/SAZ
CHECKED	DDB
DRAWN	RBG
CHECKED	JAG
APPROVED	DDB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
D.D. BLAIR
100122737
Sept. 17/2014
PROVINCE OF ONTARIO

NOVATECH
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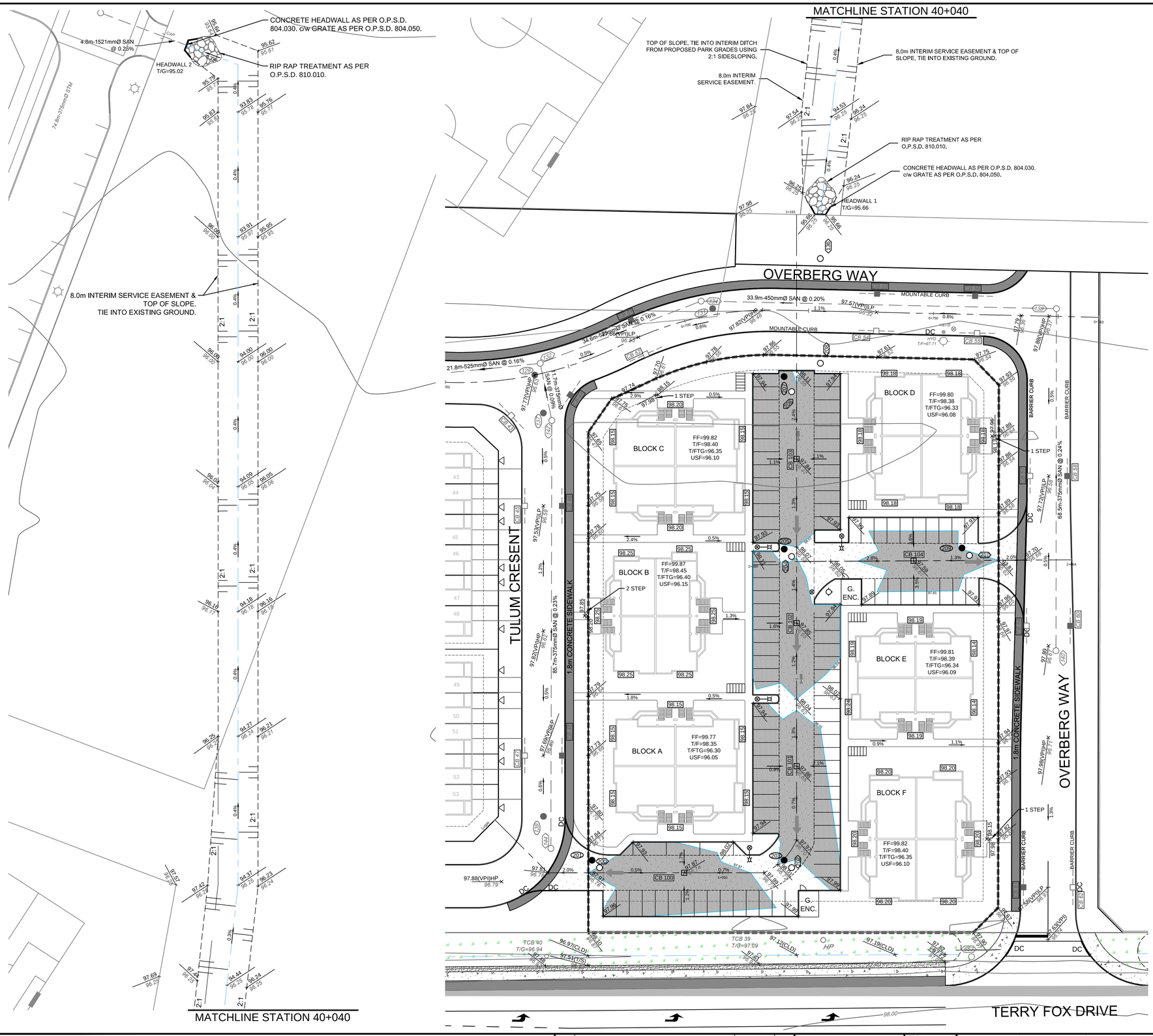
Website www.novatech-eng.com

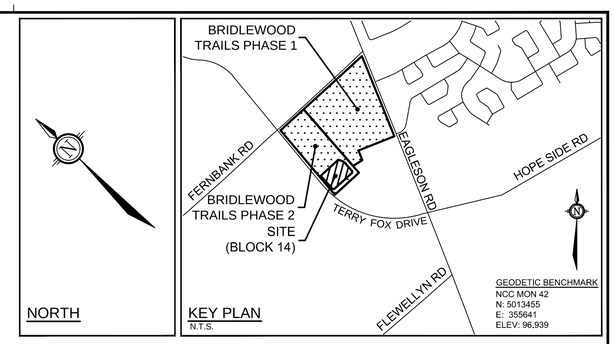
LOCATION
CITY of OTTAWA
BLOCK 14 (BRIDLEWOOD TRAILS PHASE 2)

DRAWING NAME
GENERAL PLAN OF SERVICES

PROJECT No.
114013
REV
REV # 1
DRAWING No.
114013-GP

PLAN\A1\DWG - 841mmx594mm





LEGEND

- PROPOSED ELEVATION / EXISTING ELEVATION (AS BUILT)
- PROPOSED POINT OF VERTICAL INFLECTION
- PROPOSED POINT OF VERTICAL INFLECTION (HIGH POINT)
- PROPOSED POINT OF VERTICAL INFLECTION (LOW POINT)
- PROPOSED CENTRELINE OF DITCH
- PROPOSED TOP OF SLOPE
- PROPOSED TOP OF CURB
- PROPOSED TOP OF NOISE BARRIER
- FF= FINISHED FLOOR ELEVATION
- T/F= TOP OF FOUNDATION ELEVATION
- USF= UNDERSIDE OF FOOTING ELEVATION
- MUSF= MINIMUM UNDERSIDE OF FOOTING ELEVATION
- PROPOSED TERRACE ELEVATION
- MAXIMUM 3:1 SIDESLOPE
- PROPOSED CENTRELINE SWALE
- PROPOSED GRADE AND DIRECTION
- MAJOR OVERLAND FLOW ROUTE
- PROPOSED HYDRANT LOCATION
- T/F=127.55 PROPOSED TOP OF BOTTOM FLANGE
- PROPOSED VALVE AND VALVE BOX
- PROPOSED SANITARY MANHOLE
- PROPOSED STORM MANHOLE
- PROPOSED SERVICE LOCATION (REFER TO DETAIL)
- PROPOSED COMMUNITY MAIL BOX
- PROPOSED STREET LIGHT
- PROPOSED SILT FENCE
- PONDING AREA WITH SPILLWAY ELEVATION
- EXISTING CONTOUR LINE AND CONTOUR ELEVATION
- EXISTING OVERHEAD HYDRO
- EXISTING FIRE HYDRANT
- EXISTING SANITARY MANHOLE
- EXISTING STORMMANHOLE
- EXISTING VALVE
- EXISTING HYDRO POLE
- EXISTING ROADSIDE CATCH BASIN WITH 3.0m SUBDRAIN IN TWO DIRECTIONS (PARALLEL WITH CURB FACE)
- EXISTING ROADSIDE CATCH BASIN WITH INLET CONTROL DEVICE

REFER TO 114013-NL DRAWING FOR ADDITIONAL NOTES

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SCALE 1:400 (1:400 0 4 8 12 16)

DESIGN JAG/SAZ
CHECKED DDB
DRAWN RBG
CHECKED JAG
APPROVED DDB

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LICENSED PROFESSIONAL ENGINEER D.D. BLAIR 100122737 Sept. 17/2014 PROVINCE OF ONTARIO

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LOCATION
CITY or TOWNSHIP
NAME OF DEVELOPMENT

DRAWING NAME
GRADING & EROSION AND SEDIMENT CONTROL PLAN

PROJECT No. 114013
REV REV # 1
DRAWING No. 114013-GR

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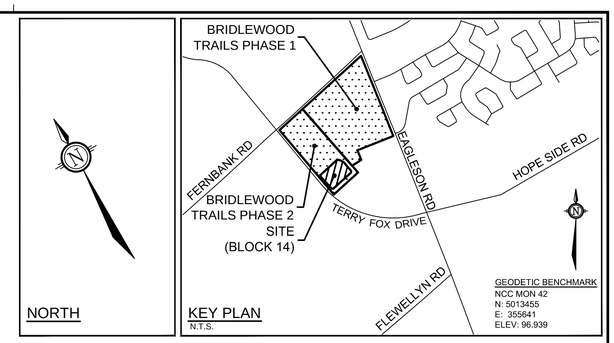

LEGEND

AREA 1 / 815-813 / 0.81 / 89.1
- AREA ID
- MANHOLE TO MANHOLE
- POPULATION EQUIVALENT
- AREA IN HECTARES

- SANITARY DRAINAGE AREA BOUNDARY
- PROPOSED SANITARY SEWER AND MANHOLE
- POPOSED SANITARY SEWER WITH DIRECTION OF FLOW
- EXISTING SANITARY SEWER AND MANHOLE
- EXISTING SANITARY SEWER WITH DIRECTION OF FLOW

REFER TO 114013-SAN FOR ADDITIONAL NOTES

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APPROVED DDB

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LOCATION
CITY of OTTAWA
BLOCK 14 (BRIDLEWOOD TRAILS PHASE 2)

DRAWING NAME
SANITARY DRAINAGE AREAS PLAN

PROJECT No. 114013
REV REV # 1
DRAWING No. 114013-SAN

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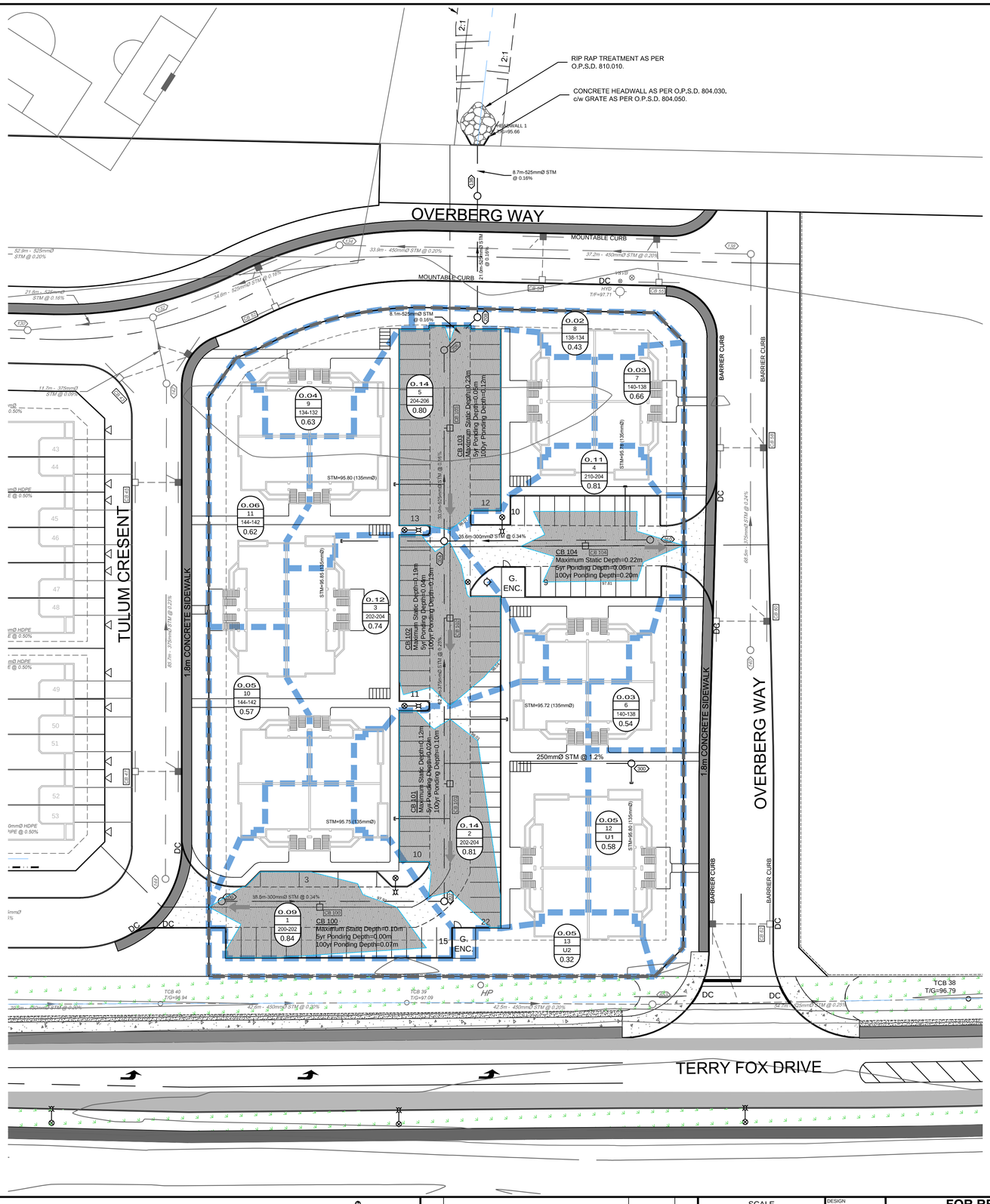

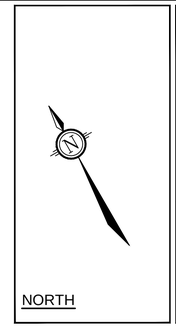

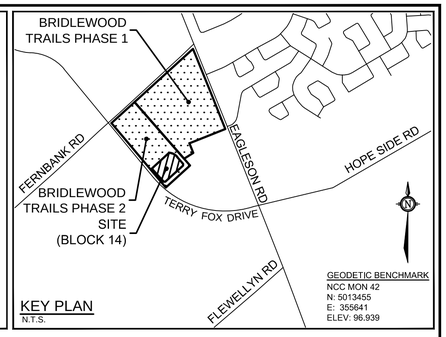

LEGEND

- PROPOSED STORM MH & SEWER WITH DIRECTION OF FLOW
- PROPOSED CATCH BASIN
- PROPERTY LINE
- DRAINAGE AREA BOUNDARY
- MAJOR OVERLAND FLOW ROUTE
- PONDING - 1:100 YEAR & 1:5 YEAR EVENT

1.00 / 1 / 105-103 / 0.50
- DRAINAGE AREA (hectares)
- AREA IDENTIFICATION
- MANHOLE TO MANHOLE
- RUN-OFF COEFFICIENT

REFER TO 114013-NL FOR ADDITIONAL NOTES

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1:400
0 4 8 12 16

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LOCATION
CITY of OTTAWA
BLOCK 14 (BRIDLEWOOD TRAILS PHASE 2)

DRAWING NAME
STORM DRAINAGE AREAS PLAN

PROJECT No. 114013
REV REV # 1
DRAWING No. 114013-STM

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PLAN A1.DWG - 841mmx594mm