TATHAM ENGINEERING

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150 & 160 King Street East, Thornbury

FUNCTIONAL SERVICING REPORT

2706499 Ontario Ltd. & Thornbury Hills Inc.

File 122030 | May 30, 2022

Document Control

File:

122030

Date:

May 30, 2022

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Issue	Date	Description
1	May 30, 2022	Draft Plan of Submission Application

Document Contents

Drawings

Appendices

1 Introduction

Tatham Engineering has been retained by 2706499 Ontario Ltd. & Thornbury Hills Inc to prepare a Functional Servicing Report to support a Site Plan Application for the proposed 150 & 160 King Street Development, Town of The Blue Mountains.

1.1 OBJECTIVE

The primary objective of this report is to address the servicing requirements of the Town of the Blue Mountains and Grey County with respect to the existing and proposed sanitary servicing, water supply and distribution, drainage and stormwater management (SWM), safe vehicular access to the site and utilities common to support a residential development (phone, hydro, cable, gas, etc.).

1.2 SUPPORTING REPORTS

An additional report has been prepared in conjunction with this report addressing the transportation requirements for the proposed development.

2 Development Site

2.1 SITE LOCATION & DESCRIPTION

The 1.41 ha site consists of 2 properties, 150 and 160 King Street East (Highway 26) on the east side of the Village of Thornbury, in the Town of The Blue Mountains. The site is legally described as Town Plot Part Lots 6 to 14 North East King Street. The site is bounded by the Georgian Trail to the north, Grey Street North to the east, King Street to the south and Elgin Street North to west. The site is surrounded by buildings with commercial uses in all directions and some single detached residential homes to the south. The 1.41 ha site is currently vacant and is primarily grass covered with a moderate number of trees. The subject properties are zoned as C1 – *Village Commercial* and are not regulated by the Grey Sauble Conservation Authority (GSCA).

2.2 PROPOSED DEVELOPMENT

Two, 3 Storey buildings are being proposed at 150 King Street East having commercial uses on the ground floor and apartments on the second and third floors. Each building will have 24 residential units. Additionally, a 69-unit, 3 storey hotel building is proposed at 160 King Street. 88 parking spots will be provided at 160 King Street and 138 parking spots at 150 King Street for a total of 226 parking spots.

2.3 SURFACE CONDITIONS

A topographic survey of the subject property was completed by JoeTOPO on March 28, 2020. The site peaks roughly at its east west centre splitting drainage between the east and west of the site. The property generally slopes north with the majority of runoff traveling through a ditch along the Georgian Trail to either the northeast or northwest corner of the site. At the northwest corner of the site runoff from a 0.65 ha area (Catchment 101) enters an existing storm sewer along Elgin Street North and flows north to Georgian Bay. Near the northeast corner of the site runoff from a 0.61 ha (Catchment 102) area crosses the Georgian Trail via a 650 mm diameter CSP culvert, enters an existing ditch on Grey Street North and flows north to Georgian Bay. A 0.15 ha area (Catchment 103) at the eastern most extent of the site drains east directly to the Grey Street North ditch, which is the same ultimate outlet as the runoff from Catchment 102. There are 3 existing catch basins and a ditch inlet catch basin along the south border of the site that connect to a storm sewer running east along the south of King St. Based on the topographic survey these catch basins currently receive a negligible amount of runoff from the project site and are only picking up runoff from the north half of King Street East. Refer to the Pre-Development Drainage Plan (DP01) for details on existing drainage areas.

2.4 SUBSURFACE CONDITIONS

A geotechnical investigation, submitted under two separate covers, was completed by EXP Services Inc. dated April 22, 2022. One report was submitted addressing the "Proposed three-Storey Apartment Buildings" to be constructed at 150 King Street and a separate report was submitted addressing the "Proposed Three-Storey Hotel" to be constructed at 160 King Street. The initial fieldwork was conducted on March 24, 2020 and consisted of 8 boreholes across 150 and 160 King Street with a maximum depth of 6.5 m. Additional fieldwork was performed on April 11, 2022 and consisted of 4 boreholes within the footprints of the proposed buildings, with a maximum depth of 8.1 m. The boreholes extended to a maximum depth of 5 meters below existing ground surface. Subsurface conditions are as follows:

- 50 to 300 mm of surficial topsoil was encountered in 6 boreholes;
- 0.6 to 1.8 m of fill was encountered at the surface or below the topsoil in 5 boreholes;
- Sandy silt was encountered below the topsoil in 4 boreholes and at the surface of another borehole extending to a depth of 0.7 m to 1.5 m;
- Sand was observed beneath the topsoil or fill in two boreholes extending to depths of 1.5 and 1.6 m and intercepting the till layer in 1 borehole between 1.4 and 2.1 m deep; and
- Glacial till was encountered at the base of 4 boreholes extending to the exploration depths of 4.6 to 8.1 m. The till deposit was typically comprised of sandy silt, grading to silt till with depth and contained trace gravel and clay.

Groundwater was assessed in open boreholes during the fieldwork and additionally piezometers were installed in 3 boreholes. Groundwater was observed in 9 of the 12 boreholes over the two inspections ranging in depth from surface to 5.8 m. The observed water levels show the groundwater to be higher at the east side of the site, trending downward to the west.

3 Water Supply & Distribution

3.1 EXISTING INFRASTRUCTURE

There is an existing 400 mm watermain running east-west on King Street East south of the project site. The watermain runs along the north side of King Street East for 20 m east of the King Street East and Elgin Street North intersection. After this section the watermain crosses King Street East and runs along the south side of the street.

The Town of The Blue Mountains Water Treatment Plant has a water supply capacity of 16,390 m^3/day (including the 1,250 m^3/day received from the Town of Collingwood), as per *The Town of The Blue Mountains 2020 Year End Water and Wastewater Capacity Assessment*. The report indicates that 2,345 m^3/day is available (86% of rated capacity).

3.2 PROPOSED INFRASTRUCTURE

The proposed water strategy for the 150 & 160 King Street development includes connecting to the existing 400 mm diameter watermain near the King Street East and Elgin Street North intersection. 240 m of proposed 250 mm diameter watermain will run underneath the project site connecting to all three buildings.

Two fire hydrants internal to the site are proposed to provide the requisite fire flows for the development.

Refer to Appendix B for the calculations pertaining to the sizing of the proposed watermain. See the Site Servicing Plan (SS01) for the proposed water system details.

3.3 WATER DEMANDS ASSESSMENT

3.3.1 Water Supply Demands

A detailed analysis of the expected potable water requirements for the development was prepared (Appendix B) and is summarized as follows:

Peak Hour Flow: 6.14 L/s

Daily Average: 88,992 L/day = 89 m^3/day

Maximum Day: 352,764 L/day = 353 m^3/day

Fire Demand: 217 L/s

It is expected that there will be adequate flow and pressure to service the property, however, the proposed water system will need to be added to the Town's overall water model to ensure the demands can be provided.

3.3.2 Water Supply Demands

As outlined above, the Town of The Blue Mountains drinking water treatment plant has a rated capacity of 16,390 m^3/day, with 2,345 m^3/day available. The proposed maximum day demand of 353 m^3/day for the proposed development could be accommodated by the treatment plant (excess capacity is 1,992 m^3/day).

The Town of The Blue Mountains operates a hydraulic model of their water distribution system. We request that the Town add the proposed development to their model and confirm that the above demand flows can be achieved within the applicable pressure ranges as outlined above.

4 Sanitary Sewage Collection & Conveyance

4.1 EXISTING INFRASTRUCTURE

There are existing sanitary services bordering the site are along Elgin Street North at the west border of the site. It is proposed that a sanitary service extend east from the Elgin Street North sanitary sewer and service all buildings onsite. The Sanitary sewer drains via gravity to the Mill Sewage Lift Station northwest of the site. From the Mill Sewage Lift Station sanitary sewage is pumped via a 300 mm diameter force main to the Thornbury Wastewater Treatment Plant (WWTP).

Reviewing the Town of the Blue Mountains *Water & Wastewater Capacity Assessment* for 2020, the Thornbury Wastewater Treatment Plant (WWTP) has a firm-built capacity of 3,580 m^3/day. In 2020, the Thornbury WWTP influent flow was 3,115 m^3/day, 87% of the rated capacity. The Town has applied for and acquired an Environmental Compliance Approval (ECA) for the construction of Phase 1A of the Thornbury WWTP upgrades, which will increase the average daily flow capacity of the WWTP to 5,330 m^3/day. The Construction of the Proposed Works portion of the new ECA expires October 1, 2023. Phase 1B of the upgrade will increase the average daily flow capacity in the Thornbury WWTP to 7,080 m^3/day and a peak daily flow capacity of 16,187 m^3/day. The Town is able to reserve units based on the Phase 1A design.

Currently the Thornbury Wastewater Treatment Plant has allocated 3,854 m^3/day and reserved another 352 m^3/day. After the Phase 1A upgrade is complete, the plant will be operating at 79% of its average day flow rated capacity.

4.2 PROPOSED INFRASTRUCTURE

Sanitary discharge from the project site will drain to the Elgin Street North sanitary sewer via 260 m of 200 mm diameter PVC sanitary sewer. The proposed sanitary sewer will require the installation of 4 new sanitary maintenance holes internal to the project site. The connection point to the existing sewer was investigated and it was confirmed that the existing sanitary sewer is at sufficient depth for a sanitary service connection to the proposed buildings.

The proposed sanitary sewer system can be seen on the Site Servicing Plan (SS01).

4.3 SANITARY DEMANDS ASSESSMENT

4.3.1 Sewage Demands

An analysis of the expected sanitary flows to be generated by the development was prepared (Appendix A) and is summarized as follows:

Peak Flow: 4.58 L/s

Daily Average: 1.26 L/s = 109 m^3/day

The existing 200 mm diameter sanitary sewer will have adequate capacity to service the property including the existing and proposed building.

4.3.2 Sewage Capacity

As noted above, after phase 1A upgrade, the Thornbury WWTP will have an average day flow capacity of 5,330 m^3/day and has a surplus capacity of 1,124 m^3/day whereas the average day flow for the proposed development is 109 m^3/day (excess capacity is 1,015 m^3/day).

Therefore, the Thornbury WWTP will be able to accommodate the increased sanitary flows from the proposed development.

The Town of The Blue Mountains operates a hydraulic model of their sanitary sewer system. We request that the Town add the proposed development to their model and confirm that the downstream sewer system can accommodate the proposed development.

5 Stormwater Management

5.1 DRAINAGE CATCHMENTS

Under post development conditions, the project site has been divided into four catchment areas; a 0.54 ha area in the northwest of the site (Catchment 201), a 0.11 ha area in the southwest of site (Catchment 203), a 0.68 ha area in the northeast of the site (Catchment 202) and a 0.09 ha area in the southeast of site (Catchment 204). Catchments 201 and 203 share the same ultimate outlet of the Elgin Street north storm sewer which outlets to Georgian Bay downstream. Catchments 202 and 204 share the same ultimate outlet of the Grey Street North storm sewer which outlets to Georgian Bay downstream. The total areas that outlet from site to the Elgin Street North storm sewer and the Grey Street North ditch will be maintained. Refer to the Post Development Drainage Plan (DP02) for details on existing drainage areas.

5.2 QUANTITY CONTROL

Stormwater management quantity control will not be provided as the site is approximately 200 m away from Georgian Bay and there are no expected flooding risks downstream of the site. Safe conveyance of the 100 year storm flows to Georgian Bay will be provided.

5.3 CONVEYANCE

5.3.1 Internal Conveyance

For Catchments 201 and 202 internal conveyance will be provided by storm sewer networks internal to site. The internal storm sewer networks will require the installation of 7 new catch basins, a storm manhole and 2 OGS units with catch basin lids. The internal storm sewer network is designed to convey the 5 year storm. During large storm events runoff will overflow the north curb of the site and drain to the existing ditch along the Georgian Trail. The ditch follows the site drainage split and will direct runoff to either the northwest or northeast site outlet. Refer to Storm Area Plan (SWM01) for details.

5.3.2 External Conveyance

At the northwest outlet of the site the storm sewer on Elgin Street North is proposed to be resized to accommodate storm flows with return periods of up to 100 years from the Applewood residential development located immediately north of the site at the intersection of Huron Street East and Elgin Street North. A memo was prepared by Tatham Engineering addressing the effects of the Applewood Development on the Elgin Street North Storm Sewer. The storm sewer was redesigned based on its total drainage area and proposed land use at the Applewood site. The

storm sewer design sheet and drainage areas have been revised based on the proposed land uses at the 150 and 160 King Street East site and detailed topographic data acquired. The revised storm sewer design sheet confirms that the updated Elgin Street North storm sewer will still have adequate capacity to convey the 100 year storm after 150 and 160 King Street is developed. The Applewood external stormwater management memo, the existing and revised storm sewer design sheets and the Elgin Street North storm sewer plan and profile drawing have been included in Appendix D.

Runoff from the northeast outlet of the site will pass through an existing 650 mm diameter CSP culvert under the Georgian trail before entering the Grey Street North ditch and traveling north to Georgian Bay. The existing 650 mm diameter CSP culvert has been confirmed to have adequate capacity to convey the 100 year storm flow of 0.225 m^3/s. A 100 year storm sewer sizing sheet was created to determine the outflow from the eastern site outlet to the 650 mm culvert see Appendix A. A culvert report was created to determine if the culvert had adequate capacity to convey the 100 year storm flow see Appendix D for details. The Grey Street North ditch has a relatively small drainage area and expected to be able to continue to convey storm flows. Runoff from south of the site is directed east along the King Street East storm sewer and does not enter the Grey Street North ditch, therefore the ditch is only receiving runoff from lots adjacent to it over an approximately 200 m stretch. Additionally, the topography of the road is such that any runoff overtopping the ditch will sheet flow over the road toward Georgian Bay before flooding any buildings.

5.4 QUALITY CONTROL

Quality control will be provided by means of Oil Grit Separator (OGS) units which will provide a minimum of 80% total solids removal and will treat 90% of the surface runoff generated from its contributing drainage area. Quality control will not be provided for catchments 203 and 204 as they will remain largely pervious post development and they represent small portions of the site. The post development Catchments 201 and 202 will be largely impervious with Catchment 201 having impervious ground cover of 94% and Catchment 203 having impervious ground cover of 88%. Appropriate OGS units for Catchments 201 and 203 have been determined using Imbrium's Stormceptor Sizing Tool. The Stormceptor EFO4 unit has been determined to be appropriate for meeting quantity control targets for both catchments. Refer to Appendix C for the Stormceptor Sizing Reports.

6 Utilities

6.1 ELECTRICAL SERVICES

Electrical services front the proposed site along Elgin Street North and King Street East. Tatham Engineering will be reviewing the proposed development from an electrical servicing standpoint and will confirm if external plant upgrades are required to service the site following submission of an electrical distribution plan.

Enbridge has confirmed they have capacity to add 55 residential units at the location without need for reinforcing their existing infrastructure at the time of contact. Rogers has stated they would likely service the development by extending existing services on Bay Street East and Elgin Street. Bell has been contacted regarding available services in the area.

7 Summary

As outlined above, existing infrastructure surrounding the subject property can adequately service the development for sanitary sewage and potable water. Additionally, a Stormwater Management Plan included in this report confirms that applicable stormwater management targets will be met. A Traffic Impact Study submitted under a separate cover confirms that the proposed development will not adversely affect the existing surrounding road network. A summary of the servicing strategy is as follows:

- Potable water and the required fire flow will be provided by connecting into the existing 400 mm diameter watermain located on King Street East near the King Street East, Elgin Street North intersection. 240 m of 250 mm diameter water services will be installed internal to the project site to service the three proposed buildings.
- Sanitary flows from the proposed development will drain to the existing 200 mm diameter sanitary sewer along Elgin Street North, west of the proposed site. 260 m of sanitary sewer and four new sanitary manholes will be required to service the development site.
- Stormwater quality treatment will be provided to a 0.54 ha catchment draining west and a 0.68 ha catchment draining east. Quality control will be provided by two Stormceptor EFO4s one at either of the site's outlets. The Stormceptor will provide at least 80% total solids removal and treat 90% of the surface runoff generated from its contributing drainage area. Quality control will not be provided to a 0.11 ha area draining west and to 0.09 ha area draining east as they will remain largely pervious areas post development. Quantity control will not be provided to larger 0.54 ha and 0.68 ha catchments as the runoff from these catchments can be safely conveyed to the nearby Georgian Bay.
- Electrical services fronting the proposed site are available along Elgin Street North and King Street East. Tatham Engineering will review electrical servicing and confirm if external plant upgrades are required to service the site. Enbridge has confirmed capacity in the area. Rogers has confirmed they have services in the area. Bell has been contacted regarding their ability to service the site.

Additional details related to the various servicing components will be provided at the detailed design stage for approval by the Town and relevant regulatory agencies.

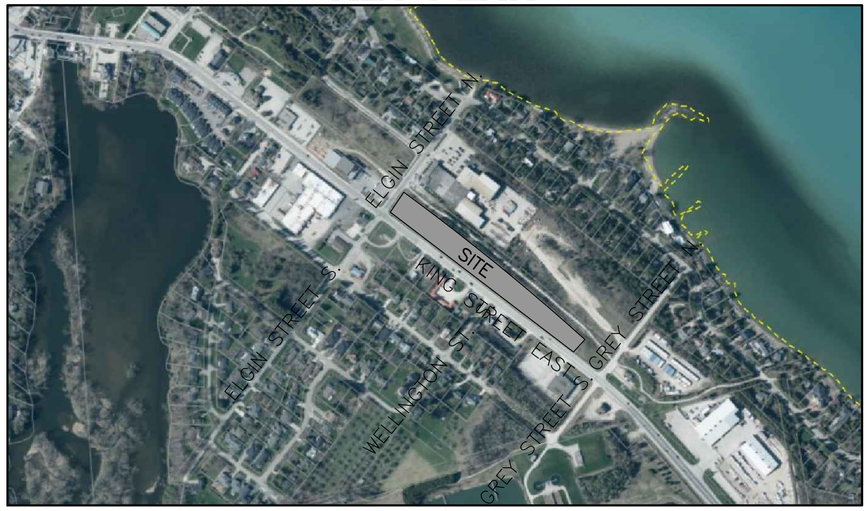
150 & 160 KING STREET EAST, THORNBURY

2706499 ONTARIO INC.

TOWN OF THE BLUE MOUNTAINS

Dwg.No.	Description
122030-IN-1	KEY PLAN/DRAWING INDEX
122030-DP-1	PRE-DEVELOPMENT DRAINAGE PLAN
122030-DP-2	POST DEVELOPMENT DRAINAGE PLAN
122030-SS-1	SITE SERVICING PLAN
122030-SS-2	SITE SERVICING PLAN
122030-SG-1	SITE GRADING PLAN
122030-SG-2	SITE GRADING PLAN
122030-SC-1	SILTATION AND EROSION CONTROL PLAN
122030-STM-1	STORM AREA PLAN
122030-SAN-1	SANITARY AREA PLAN
122030-TT-1	TRUCK TURNING PLAN
122030-DE-1	DETAILS AND NOTES

KEY PLAN

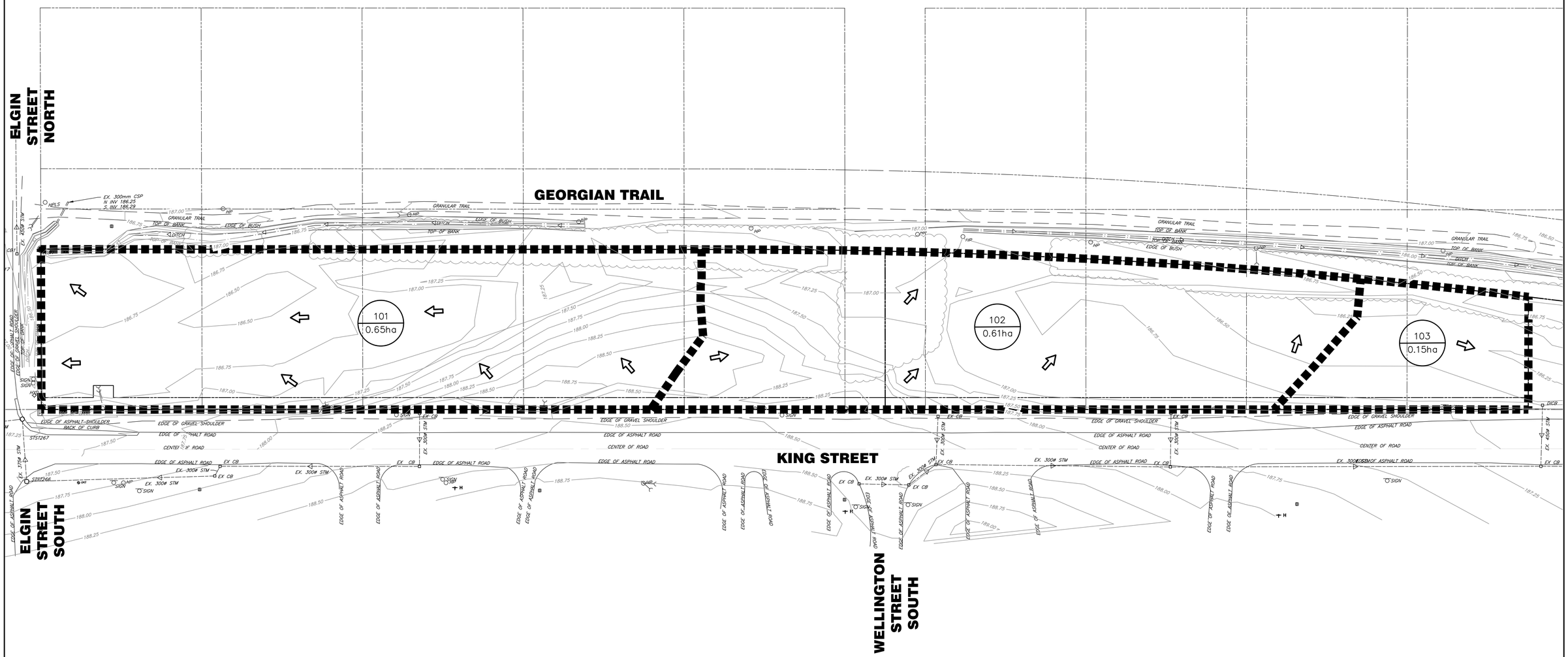


TATHAM ENGINEERING

Contract No. 122030

LEGEND

- 200ø SAN — EXISTING SANITARY MAIN/ SIZE /DIRECTION OF FLOW
- 375ø STM — EXISTING STORM SEWER/ SIZE/ DIRECTION OF FLOW
- 150ø WATERMAIN — EXISTING WATERMAIN/ SIZE
- EXISTING GAS MAIN
- EXISTING SANITARY SERVICE
- EXISTING PROPERTY LINE
- EXISTING EASEMENT LINE
- EXISTING CENTERLINE
- EXISTING EDGE OF ASPHALT
- EXISTING EDGE OF SHOULDER
- EXISTING DITCH
- EXISTING FENCE LINE
- EXISTING EDGE OF BUSH
- TBM — EXISTING TEMPORARY BENCHMARK
- BH9 — EXISTING BOREHOLE/ NUMBER
- SAN MH17 — EXISTING SANITARY MANHOLE/ NUMBER
- EXISTING CULVERT
- EXISTING WATERMAIN PLUG AND THRUST BLOCK
- CABLE PED — EXISTING CABLE PEDESTAL
- BELL MH — EXISTING BELL MANHOLE
- BELL PED — EXISTING BELL PEDISTAL
- BP — EXISTING BELL POLE
- HP — EXISTING HYDRO POLE
- HGP — EXISTING HYDRO GUY POLE
- EXISTING HYDRO GUY WIRE
- EXISTING GAS MARKER
- SIB — EXISTING STANDARD IRON BAR
- SIGN — EXISTING TRAFFIC SIGN
- EXISTING DECIDUOUS TREE
- 200ø SAN — PROPOSED SANITARY SEWER/ SIZE/ DIRECTION OF FLOW
- 450ø STM — PROPOSED STORM SEWER/ SIZE/ DIRECTION OF FLOW
- 150ø WATERMAIN — PROPOSED WATERMAIN/SIZE
- PROPOSED SANITARY SERVICE
- PROPOSED WATER SERVICE
- PROPOSED DITCH
- PROPERTY LINE
- LOT LINE
- PROPOSED CENTERLINE
- PROPOSED EDGE OF ASPHALT
- PROPOSED EDGE OF SHOULDER
- PROPOSED PRIVACY FENCE (SEE LANDSCAPE PLANS)
- PROPOSED CHAINLINK FENCE (SEE LANDSCAPE PLANS)
- PROPOSED RETAINING WALL
- PROPOSED RETAINING WALL WITH ACOUSTIC BARRIER
- SAN MH40 — PROPOSED SANITARY MANHOLE/ NUMBER
- C.O. — PROPOSED SANITARY CLEANOUT
- DICB — PROPOSED DITCH INLET CATCHBASIN
- STM MH9 — PROPOSED STORM MANHOLE/ NUMBER
- CBMH12 — PROPOSED CATCHBASIN MANHOLE/ NUMBER
- DCBMH22 — PROPOSED DOUBLE CATCHBASIN MANHOLE/ NUMBER
- CB — PROPOSED CATCHBASIN
- DCB — PROPOSED DOUBLE CATCHBASIN
- PROPOSED HEADWALL
- PROPOSED CULVERT
- PROPOSED RIPRAP
- HYD & WV — PROPOSED HYDRANT & WATER VALVE
- WV — PROPOSED WATER VALVE
- VC — PROPOSED WATER VALVE CHAMBER
- PRVC — PROPOSED PRESSURE REDUCING WATER VALVE CHAMBER
- ARVC — PROPOSED AIR RELIEF VALVE CHAMBER
- PROPOSED BLOWOFF
- PROPOSED WATERMAIN PLUG
- PROPOSED PAD MOUNT HYDRO TRANSFORMER
- PROPOSED BELL GRADE LEVEL BOX
- PROPOSED BELL PEDESTAL
- PROPOSED CABLE PEDESTAL
- PROPOSED BOLLARD LUMINAIRE
- LS — PROPOSED LIGHT STANDARD
- CS — PROPOSED CHARGING STATION
- PROPOSED CURB CUT
- PROPOSED TRAFFIC SIGN
- VERTICAL POINT OF INFLECTION
- MB — PROPOSED COMMUNITY MAILBOX
- RCD — ROCK CHECK DAM
- SBCD — STRAW BALE CHECK DAM
- TACTILE PLATE (OPSD 310.039)



LEGEND

- CATCHMENT ID / CATCHMENT AREA (ha): 101 / 0.5ha
- CATCHMENT BOUNDARY
- EXISTING MAJOR OVERLAND FLOW
- EXISTING CONTOUR/ELEVATION 290.0

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BENCHMARKS

TBM1 – ELEVATION 186.52
ELEVATIONS SHOWN HEREON ARE GEODETIC AND REFER TO THE TOP OF IRON BAR, NORTH WEST CORNER OF LOT.

TBM2 – ELEVATION 185.37
ELEVATIONS SHOWN HEREON ARE GEODETIC AND REFER TO THE TOP OF IRON BAR, NORTH EAST CORNER OF LOT.

TBM3 – ELEVATION 188.63
ELEVATIONS SHOWN HEREON ARE GEODETIC AND REFER TO THE TOP OF IRON BAR, SOUTH WEST CORNER OF WELLINGTON STREET ROW.

NOTES

LEGAL SURVEY INFORMATION AND LOT DIMENSIONS SHOWN ON THIS PLAN ARE TAKEN FROM A SURVEY PLAN PREPARED BY JD BARNES LTD DATED FEBRUARY 25, 2022, WHICH MAY NOT BE FINAL AND ARE NOT GUARANTEED. THE FINAL REGISTERED PLAN SHALL BE REFERRED TO FOR CONFIRMATION OF THE DATA.

TOPOGRAPHIC INFORMATION SHOWN ON THIS PLAN IS FROM A SURVEY PREPARED BY JOETOPO SURVEYS AND CADD INC, DATED MARCH 28, 2020.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

150/160 KING STREET
THORNBURY
TOWN OF THE BLUE MOUNTAINS

PRE–DEVELOPMENT DRAINAGE PLAN

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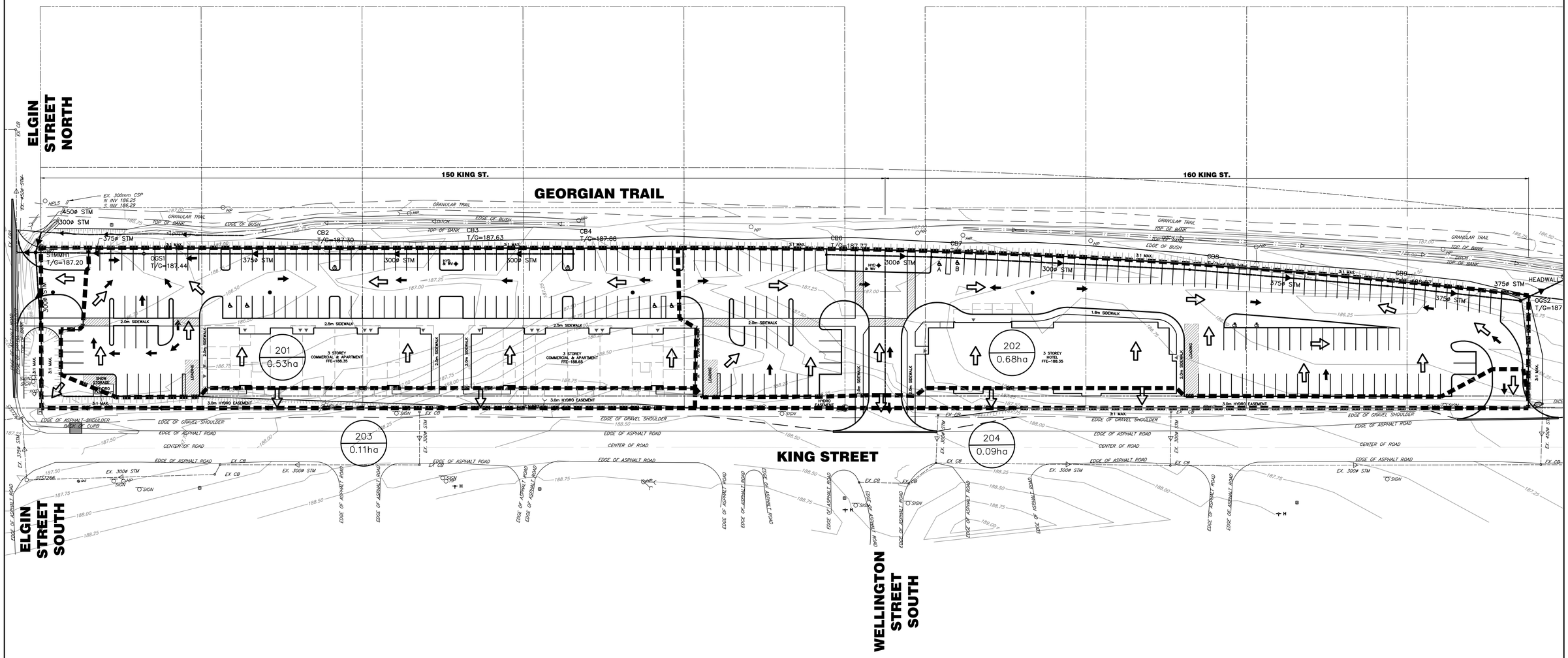
DESIGN: RD	FILE: 122030	DWG: DP-1
DRAWN: RD	DATE: APR 2022	
CHECK: RS	SCALE: 1:500	

Drawing Name: 122030-DP01.dwg, Plotted: May 30, 2022



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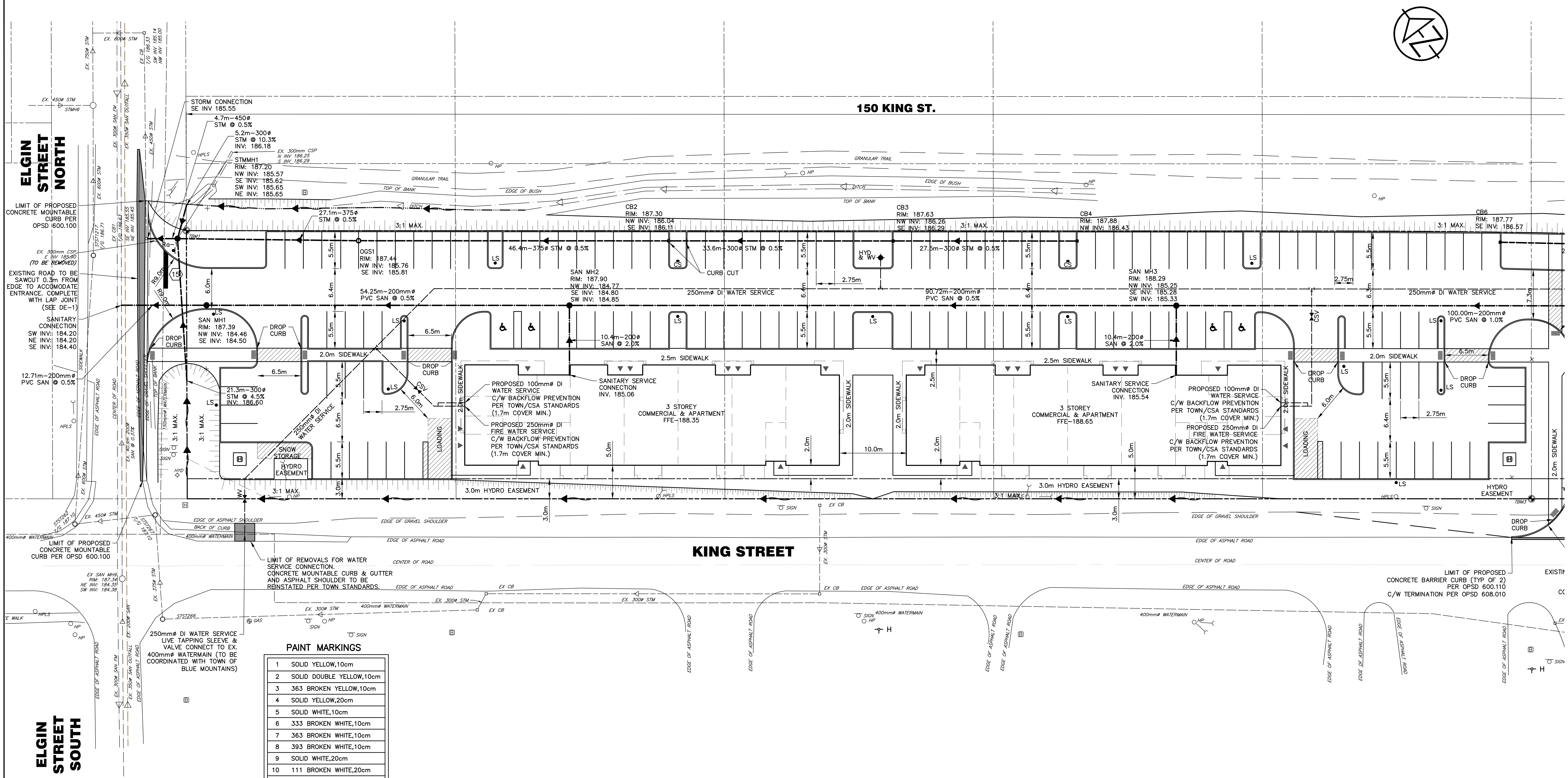
TOWN OF THE BLUE MOUNTAINS

TATHAM ENGINEERING

POST–DEVELOPMENT DRAINAGE PLAN

DESIGN: RD	FILE: 122030	DWG: DP-2
DRAWN: RD	DATE: APR 2022	
CHECK: RS	SCALE: 1:500	

Drawing Name: 122030–DP02.dwg, Plotted: May 30, 2022



PAINT MARKINGS

1	SOLID YELLOW,10cm
2	SOLID DOUBLE YELLOW,10cm
3	363 BROKEN YELLOW,10cm
4	SOLID YELLOW,20cm
5	SOLID WHITE,10cm
6	333 BROKEN WHITE,10cm
7	363 BROKEN WHITE,10cm
8	393 BROKEN WHITE,10cm
9	SOLID WHITE,20cm
10	111 BROKEN WHITE,20cm
11	333 BROKEN WHITE,20cm
12	333 BROKEN WHITE,30cm
13	SOLID WHITE,30cm
14	SOLID WHITE,45cm
15	SOLID WHITE,60cm
16	1-0.6-1 WHITE,45cm
17	1.8-1.8-1.8 WHITE,20cm
18	0.4-0.4-0.4 WHITE,40cm
20	SYMBOLS
] [	LIMITS OF MARKINGS

Ra-1

STOP

NOTES:

1. 333, 363, 393, Denotes Pavement Marking Spacing (ie., 3 m line, 3 m gap, 3 m line)
2. (1) PAVEMENT MARKING, PAINT
3. [1] PAVEMENT MARKING, TEMPORARY
4. (1) PAVEMENT MARKING, TEMPORARY-REMOVABLE
5. (1) PAVEMENT MARKING, DURABLE

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TBM2 – ELEVATION 185.37
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NOTES

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No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

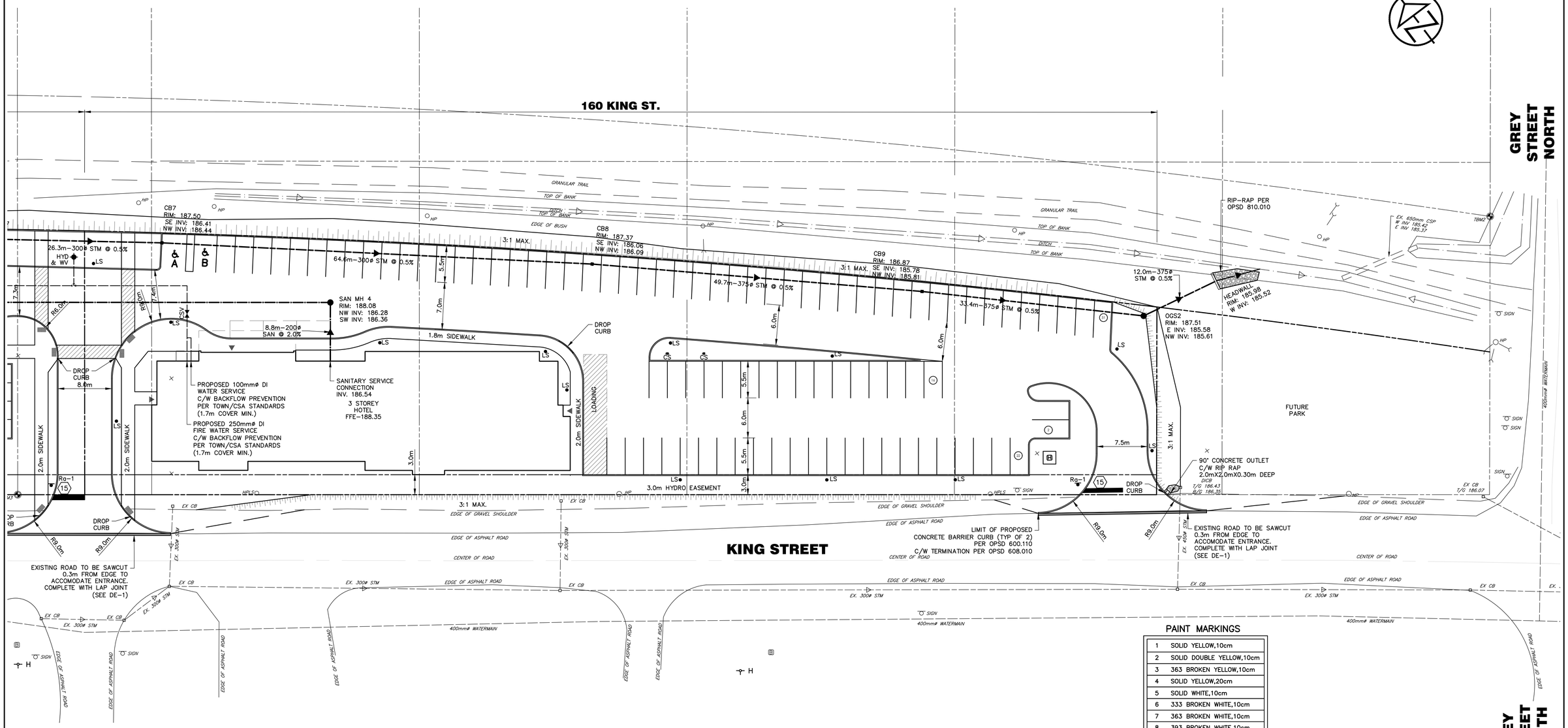
150/160 KING STREET
THORNBURY
TOWN OF THE BLUE MOUNTAINS

SITE SERVICING PLAN

TATHAM ENGINEERING

DESIGN: RD	FILE: 122030	DWG:
DRAWN: RD	DATE: APR 2022	SS-1
CHECK: RS	SCALE: 1:300	

Drawing Name: 122030-SS01.dwg, Plotted: May 30, 2022



PAINT MARKINGS

1	SOLID YELLOW,10cm
2	SOLID DOUBLE YELLOW,10cm
3	363 BROKEN YELLOW,10cm
4	SOLID YELLOW,20cm
5	SOLID WHITE,10cm
6	333 BROKEN WHITE,10cm
7	363 BROKEN WHITE,10cm
8	393 BROKEN WHITE,10cm
9	SOLID WHITE,20cm
10	111 BROKEN WHITE,20cm
11	333 BROKEN WHITE,20cm
12	333 BROKEN WHITE,30cm
13	SOLID WHITE,30cm
14	SOLID WHITE,45cm
15	SOLID WHITE,60cm
16	1–0.6–1 WHITE,45cm
17	1.8–1.8–1.8 WHITE,20cm
18	0.4–0.4–0.4 WHITE,40cm
20	SYMBOLS
] [	LIMITS OF MARKINGS

Ra–1
STOP

NOTES:
1. 333, 363, 393, Denotes Pavement Marking Spacing (ie., 3 m line, 3 m gap, 3 m line)
2. (1) PAVEMENT MARKING, PAINT
3. [1] PAVEMENT MARKING, TEMPORARY
4. ⚠1 PAVEMENT MARKING, TEMPORARY–REMOVABLE
5. (1) PAVEMENT MARKING, DURABLE

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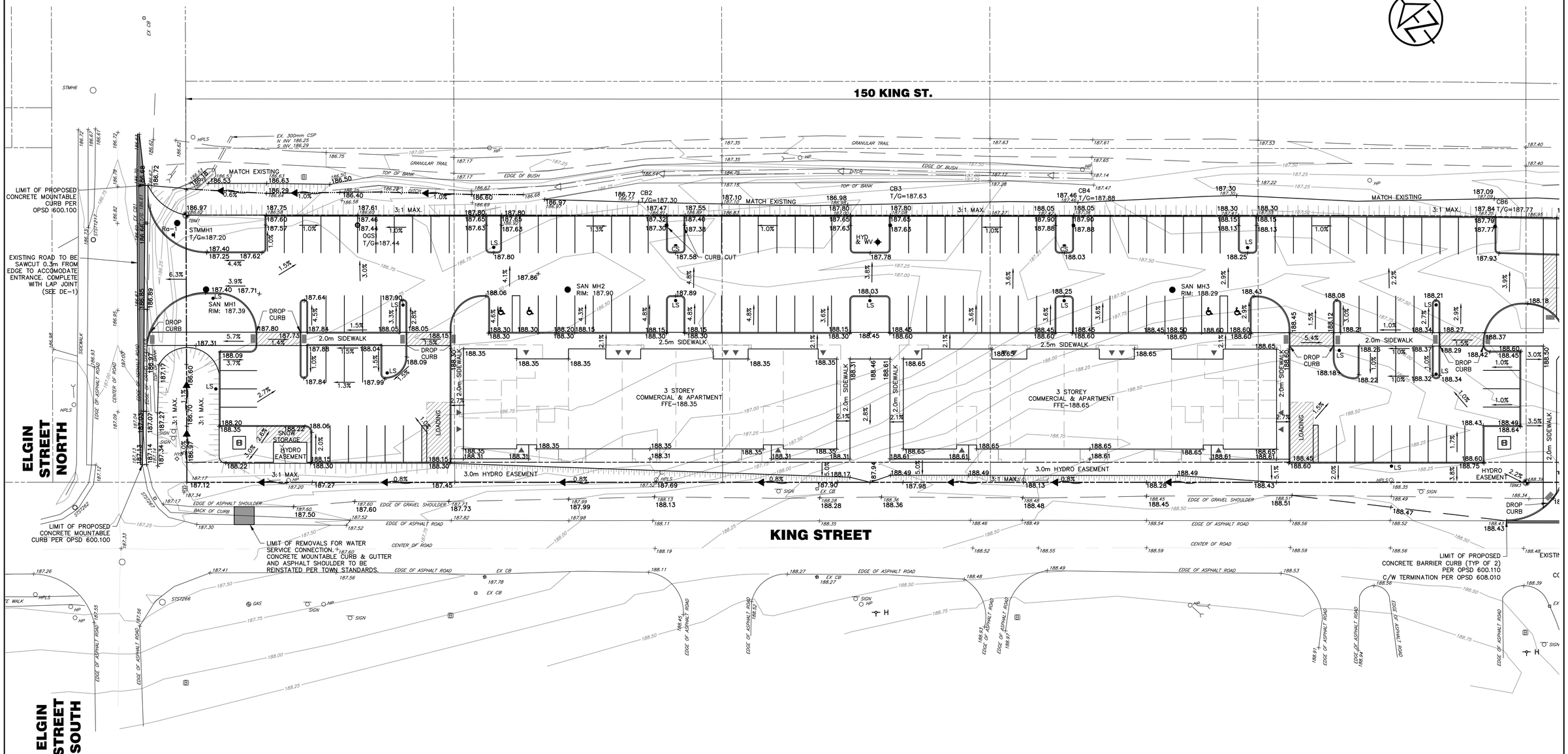
TATHAM ENGINEERING

SITE SERVICING PLAN

DESIGN: RD	FILE: 122030	DWG: SS-2
DRAWN: RD	DATE: APR 2022	
CHECK: RS	SCALE: 1:300	

Drawing Name: 122030–SS01.dwg, Plotted: May 30, 2022



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TATHAM ENGINEERING

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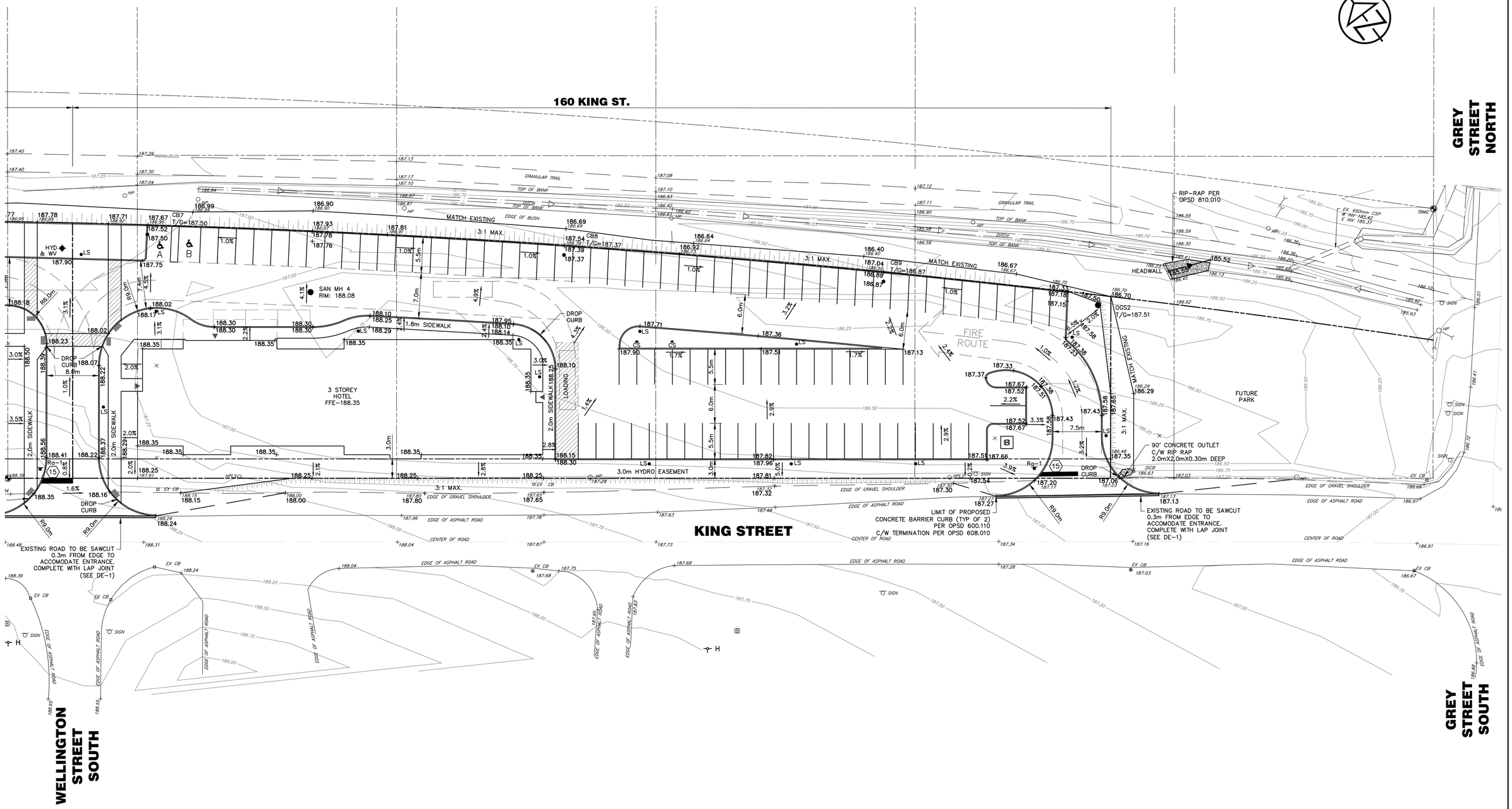
DRAWN: RD	DATE: APR 2022	
CHECK: RS	SCALE: 1:300	

Drawing Name: 122030-SG01.dwg, Plotted: May 30, 2022



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TATHAM ENGINEERING

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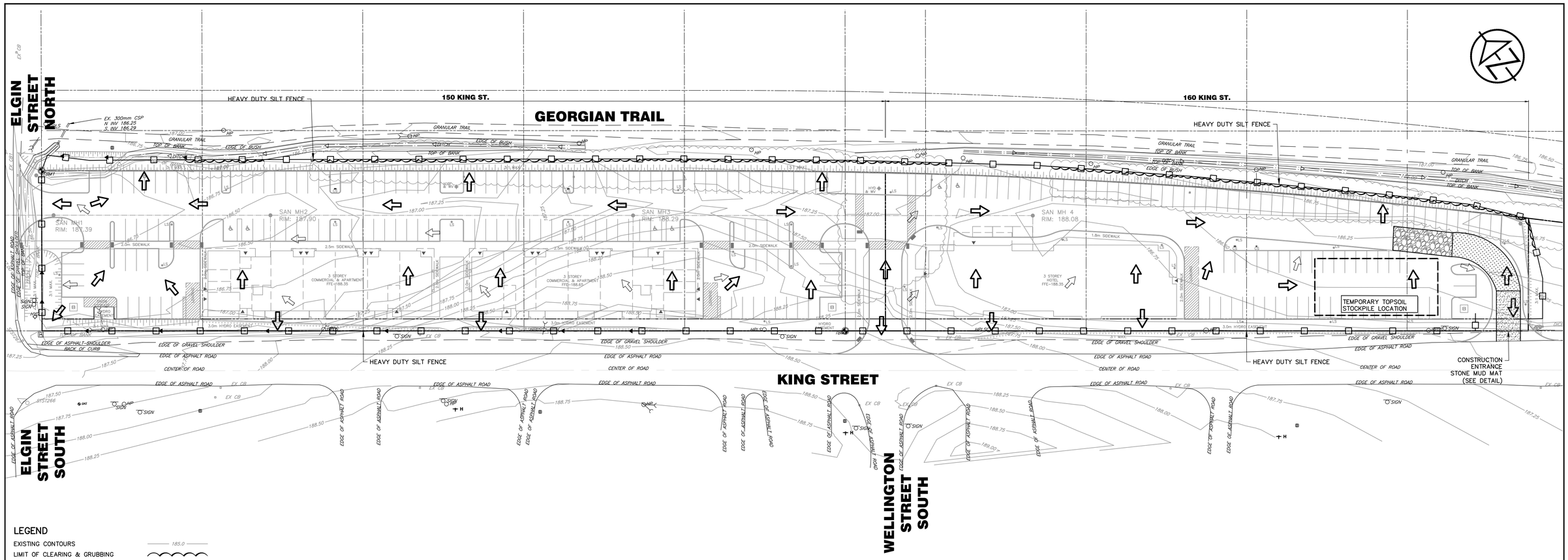
DRAWN: RD	DATE: APR 2022	
CHECK: RS	SCALE: 1:300	

Drawing Name: 122030-SG01.dwg, Plotted: May 30, 2022

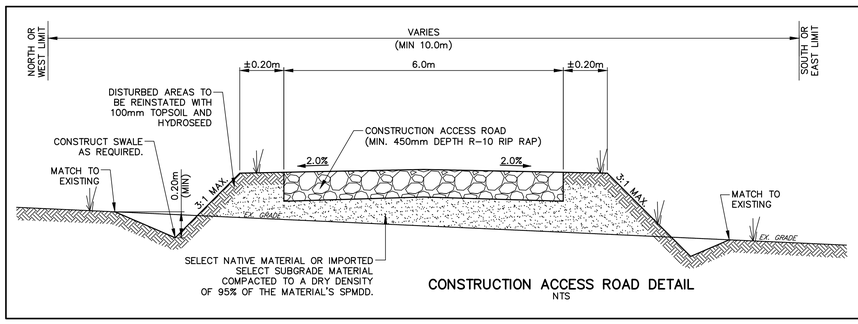


LEGEND

- EXISTING CONTOURS — 185.0
- LIMIT OF CLEARING & GRUBBING
- PROPOSED HEAVY DUTY SILT FENCE
- PROPOSED ROCK FLOW CHECK DAM — RFCD
- PROPOSED STRAW BALE FLOW CHECK DAM — SBFC
- EXISTING OVERLAND FLOW
- PROPOSED OVERLAND FLOW
- PROPOSED CONSTRUCTION ACCESS
- TEMPORARY TOPSOIL STOCKPILE LOCATION

NOTES

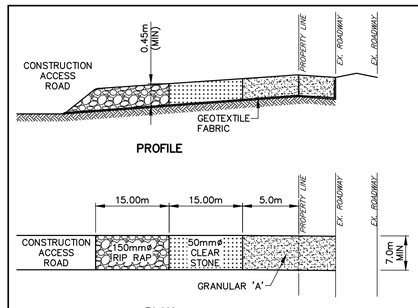
1. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. SEDIMENT AND EROSION CONTROL MEASURES THAT ARE DESIGNED TO CONTROL RUNOFF FROM SPECIFIC AREAS MUST BE INSTALLED PRIOR TO ANY DISTURBANCE OF THAT PART OF THE SITE. THE LOCATION OF ALL SILTATION AND EROSION CONTROL WORKS TO BE REVIEWED ON SITE AND MAY BE REVISED AS DIRECTED BY THE ENGINEER.
2. THE CONTRACTOR MAY CONSIDER ALTERNATIVE SEDIMENT AND EROSION CONTROL MEASURES. SUCH MEASURES MUST BE PRESENTED IN WRITING TO THE ENGINEER FOR APPROVAL OF THE TOWN AND NOTTAWASAGA VALLEY CONSERVATION AUTHORITY.
3. THE CONTRACTOR SHALL HAVE MATERIALS AVAILABLE ON SITE TO REPAIR SEDIMENT AND EROSION CONTROL MEASURES IN THE EVENT OF UNFORESEEN CONDITIONS SUCH AS HIGH WATER, EXTREME RAINFALL EVENTS, ETC.
4. ALL EROSION AND SEDIMENT CONTROL MEASURES MUST BE INSPECTED, CLEANED AND MAINTAINED BY THE CONTRACTOR AFTER EACH STORM EVENT. ALL WORKS WILL BE INSPECTED BY THE ENGINEER BI-WEEKLY AND AFTER EACH MAJOR STORM EVENT.
5. CONSTRUCTION OF ALL SILTATION AND EROSION CONTROL WORK IS TO BE IN ACCORDANCE WITH THE FOLLOWING STEPS:
   - 5.1. INSTALL NEW STONE MUD MAT AS PER DETAIL.
   - 5.2. INSTALL SILT FENCE AS PER NOTTAWASAGA VALLEY CONSERVATION AUTHORITY DRAWING BSD-23 DRAFT.
   - 5.3. INSTALL ROCK FLOW CHECK DAMS AS PER OPSD 219.211.
   - 5.4. INSTALL STRAW BALE FLOW CHECKS AS PER OPSD 219.180.
   - 5.5. INSTALL TEMPORARY CATCH BASIN SEDIMENT TRAPS ON ALL NEW AND EXISTING CATCH BASINS. SEDIMENT TRAPS TO BE RECTANGULAR GEST BY LAYFIELD OR APPROVED EQUAL. ALL CATCH BASINS TO REMAIN SCREENED UNTIL BASE COURSE ASPHALT IS PLACED AND LOT GRADING IS COMPLETE.
6. ALL CONSTRUCTION VEHICLES TO ACCESS SITE USING THE DESIGNATED CONSTRUCTION ACCESS POINTS.
7. EROSION AND SEDIMENT CONTROL MEASURES TO BE REMOVED BY THE CONTRACTOR ONCE GROUND COVER IS ESTABLISHED AND LANDSCAPING IS COMPLETE AND APPROVED BY THE ENGINEER.
8. STOCKPILE LOCATIONS ARE TO BE APPROVED BY THE ENGINEER.
9. PROVIDE FENCE OR APPROVED EQUAL ACROSS ALL CONSTRUCTION ACCESSES DURING PERIODS OF INACTIVITY.
10. CONSTRUCTION AREAS THAT EXCEED 30 DAYS OF INACTIVITY SHALL BE STABILIZED BY SEEDING IN ACCORDANCE WITH THE NOTTAWASAGA VALLEY CONSERVATION AUTHORITY'S TECHNICAL DESIGN GUIDELINES, STANDARDS AND POLICIES FOR SILTATION AND EROSION CONTROL, CONSTRUCTION CONTROL REQUIREMENTS, NOTES 1, 2 AND 3 AND/OR AS DIRECTED BY THE TOWN. THIS IS TO INCLUDE STOCKPILES OF FILL AND TOPSOIL.



CONSTRUCTION ACCESS ROAD DETAIL
NTS

NOTES:

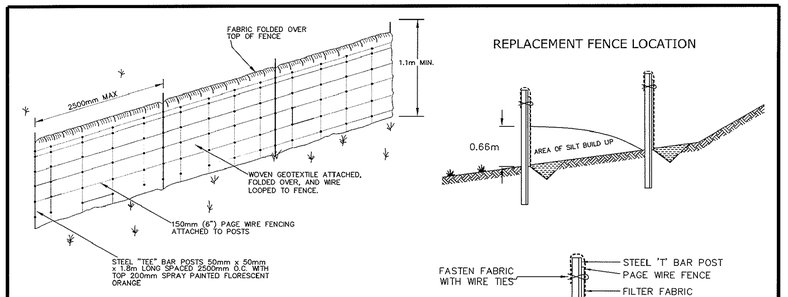
1. CLEARING AND GRUBBING TO BE COMPLETED AS REQUIRED TO CONSTRUCT THE CONSTRUCTION ACCESS ROAD, TEMPORARY SWALES, ETC. IN ACCORDANCE WITH OPSS 201 AND OPSS 180.
2. TOPSOIL TO BE STRIPPED WITHIN THE LIMITS OF THE ACCESS ROAD (MIN. 10.0 m WIDE) AND STOCKPILED IN THE APPROVED STOCKPILE LOCATIONS IN ACCORDANCE WITH OPSS 206 AND OPSS 180.
3. THE CONTRACTOR TO ENSURE POSITIVE DRAINAGE AWAY FROM CONSTRUCTION ACCESS ROAD.
4. TEMPORARY SWALES AND CULVERTS TO GENERALLY BE INSTALLED AS SHOWN ON DWG SC-1. EXACT LOCATIONS TO BE REVIEWED IN THE FIELD AND APPROVED BY ENGINEER PRIOR TO CONSTRUCTION TO ENSURE DRAINAGE IS NOT BLOCKED.
5. DISTURBED AREAS TO BE REINSTATED WITH 100 mm TOPSOIL AND HYDROSEED.

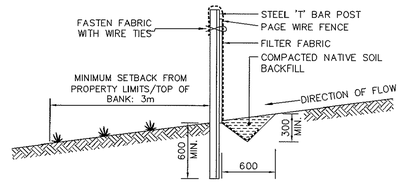


STONE MUD MAT DETAIL
NTS

NOTES

1. STONE SIZE – THE STONE PAD SHALL BE A MIN. 450 mm THICK. USE GRANULAR 'A' FOR THE FIRST 5 m FROM THE PROPERTY LINE, 50 mm ø CLEAR STONE FOR NEXT 15 m AND 150 mm ø RIP RAP FOR THE REMAINING 15 m. GRANULAR 'A' BETWEEN PROPERTY LINE AND EDGE OF PAVEMENT.
2. LENGTH – AS REQUIRED BUT NOT LESS THAN 35 m.
3. WIDTH – 7.0 m MIN. BUT NOT LESS THAN THE WIDTH AT POINTS WHERE INGRESS AND EGRESS OCCURS.
4. GEOTEXTILE FABRIC – TERRAFIX 270R OR APPROVED EQUAL TO BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.
5. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIRECTED TOWARD CONSTRUCTION ACCESS SHALL BE DIRECTED ACROSS THE ACCESS THROUGH A TEMPORARY CULVERT,
6. MAINTENANCE – THE CONTRACTOR SHALL MAINTAIN THE MUD MAT IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO THE PUBLIC RIGHT-OF-WAY. THIS MAY REQUIRE PERIODIC DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO THE PUBLIC RIGHT-OF-WAY MUST BE REMOVED IMMEDIATELY BY THE CONTRACTOR.
7. WASHING – WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ACCESS ONTO THE PUBLIC RIGHT-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
8. INSPECTION & MAINTENANCE – REQUIRED MAINTENANCE AFTER EACH RAIN EVENT SHALL BE PROVIDED BY THE CONTRACTOR.
9. REMOVAL – STONE MUD MAT TO REMAIN IN PLACE UNTIL COMMENCEMENT OF ROAD CONSTRUCTION





NOTES:

1. SILT CONTROL FENCE SHOULD BE ALIGNED WITH CONTOURS FOR SHEET OVERLAND FLOW.
2. SILT/SEDIMENT CONTROL FENCE IS TO BE LOCATED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFORM TO MTO DRAINAGE MANUAL VOLUME 2 "CHART F4-3C TOPOGRAPHIC FACTOR LS BASED ON SLOPE LENGTH AND GRADIENT."
3. SILT/SEDIMENT CONTROL FENCE SHALL BE INSTALLED WITH FILTER MEDIA FABRIC TOED INTO THE SOIL A MIN. OF 300mm BY EITHER STATIC SLICING OR TRENCH METHODS WITH COMPACTION OF TRENCH MATERIAL MEETING 95% INSITU SOIL STRENGTH.
4. STEEL 'T' BAR POSTS ARE TO BE SPACED MAX. 2500mm ON CENTER.
5. FROZEN GROUND CONDITIONS REQUIRE FILTER FABRIC TO BE BACKFILLED IN TRENCH WITH CLEAR STONE.
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
7. GEOTEXTILE FABRIC TO BE COMPRISED OF WOVEN OR NON-WOVEN U.V. STABILIZED MATERIAL. FABRIC TO BE FOLDED OVER TOP OF FENCE MIN. 300mm AND WIRE FASTENED.

Nottawasaga Valley Conservation Authority

TYPICAL DETAIL OF SILT/SEDIMENT FENCE

NO.	REVISION	APR'D	DATE

APR'D: | DATE: 03.03.06
DRAWN: A.S.C | SCALE: NTS

BSD-23 DRAFT

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TOWN OF THE BLUE MOUNTAINS

SILTATION & EROSION CONTROL PLAN

TATHAM ENGINEERING

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DRAWN: RD	DATE: APR 2022	
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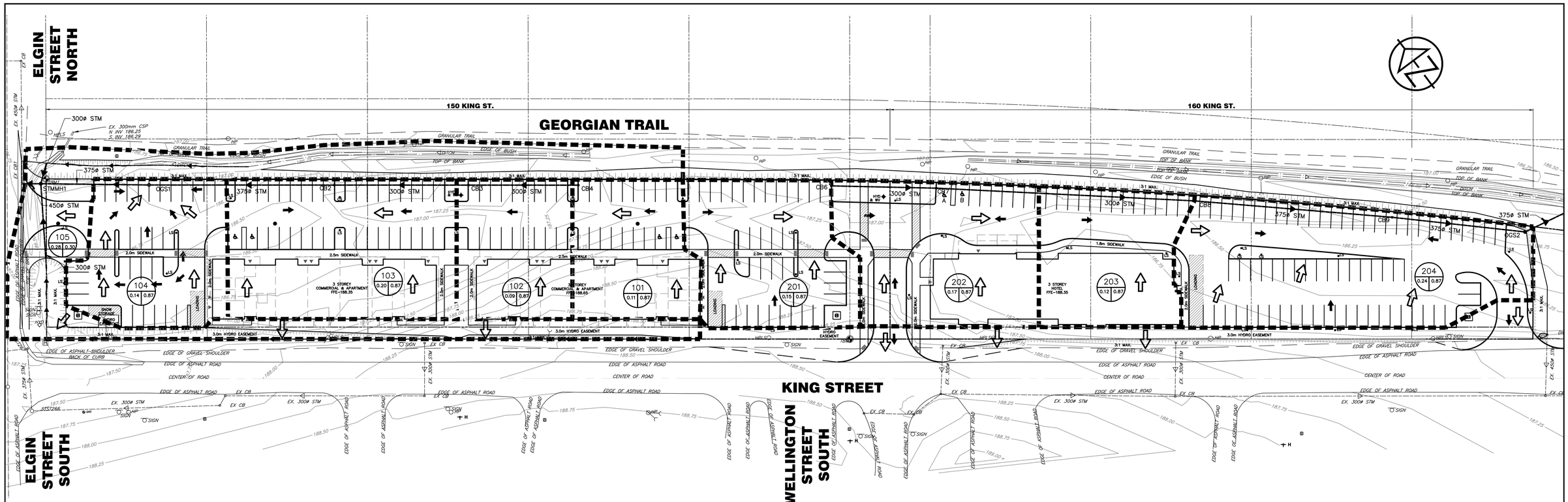

TATHAM ENGINEERING

Storm Sewer Design Sheet

Version Number: 1 **Version Date:** May 30, 2022

Project Information

150 & 160 King Street East, Thornbury	122030

Drawing Reference

SWM01	May 30-22

Prepared By

John Birchard	May 30-22

Reviewed By

Andrew Schoof	May 30-22

Municipality

Town of The Blue Mountains

Runoff Coefficient Adjustment

Year	A	B
10	0.80	0.20
25	0.70	0.30
50	0.60	0.40
100	0.50	0.50

Manning's Coefficient

Pipe	Value
CSP	0.024
Concrete	0.013
PVC	0.009

Time of Concentration

15 mins

IDF Curve Coefficients

Year	A	B	C
2	807.44	6.75	0.83
5	1135.40	7.50	0.84
10	1387.00	7.97	0.85
25	1676.20	8.30	0.86
50	1973.10	9.00	0.87
100	2193.10	9.04	0.87

Engineer Stamp

LEGEND

- CATCHMENT ID — 201
- CATCHMENT AREA (ha) — 13.6 | 0.50
- RUNOFF COEFFICIENT
- CATCHMENT BOUNDARY
- PROPOSED MINOR OVERLAND FLOW
- PROPOSED MAJOR OVERLAND FLOW
- PROPOSED GRASSED SWALE
- EXISTING CONTOUR/ELEVATION — 290.0

Street Name	Area ID / Label	Upstream Maintenance Hole	Downstream Maintenance Hole	Area (ha)	5 Year Runoff Coefficient	Design Storm (Year)	Adjusted Runoff Coefficient	Area x Runoff Coefficient	Cumulative Area (ha)	Cumulative Area x Adjusted Runoff Coefficient	Time of Concentration (min)	Rainfall Intensity (mm/hr)	Peak Flow (m^3/s)	Manning's Roughness Coefficient	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Actual Velocity (m/s)	Travel Time (min)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)	Total Time of Travel (min)
West Outlet	101	CB4	CB3	0.11	0.87	5	0.87	0.10	0.11	0.10	15.00	82.79	0.023	0.013	27.5	0.5%	300	0.97	0.068	0.81	0.57	198	33.1%	15.57
	102	CB3	CB2	0.09	0.87	5	0.87	0.08	0.20	0.18	15.57	81.07	0.040	0.013	33.6	0.5%	300	0.97	0.068	0.94	0.60	245	58.2%	16.16
	103	CB2	OGS1	0.20	0.87	5	0.87	0.17	0.40	0.35	16.16	79.35	0.077	0.013	46.4	0.5%	375	1.12	0.124	1.11	0.70	314	62.3%	16.86
	104	OGS1	STMMH1	0.14	0.87	5	0.87	0.12	0.54	0.47	16.86	77.44	0.102	0.013	27.1	0.5%	375	1.12	0.124	1.12	0.40	348	82.0%	17.26
	105	STMMH1	EXCB1	0.28	0.87	5	0.87	0.24	0.82	0.72	17.26	76.38	0.152	0.013	4.7	0.5%	450	1.27	0.202	1.27	0.06	405	75.4%	17.32
East Outlet	201	CB6	CB7	0.15	0.87	5	0.87	0.13	0.15	0.13	15.00	82.79	0.030	0.013	26.3	0.5%	300	0.97	0.068	0.87	0.50	220	43.9%	15.50
	202	CB7	CB8	0.17	0.87	5	0.87	0.15	0.32	0.28	15.50	81.26	0.063	0.013	64.6	0.5%	300	0.97	0.068	0.97	1.11	291	91.9%	16.62
	203	CB8	CB9	0.12	0.87	5	0.87	0.10	0.44	0.38	16.62	78.09	0.083	0.013	49.7	0.5%	375	1.12	0.124	1.12	0.74	323	67.0%	17.35
	204	CB9	OGS2	0.24	0.87	5	0.87	0.21	0.68	0.59	17.35	76.14	0.125	0.013	33.4	0.5%	375	1.17	0.129	1.17	0.47	370	96.7%	17.83
	-	OGS2	OUTLET	0.00	0.87	5	0.87	0.00	0.68	0.59	17.83	74.94	0.123	0.013	12.0	0.5%	375	1.12	0.124	1.12	0.18	374	99.3%	18.01

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No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

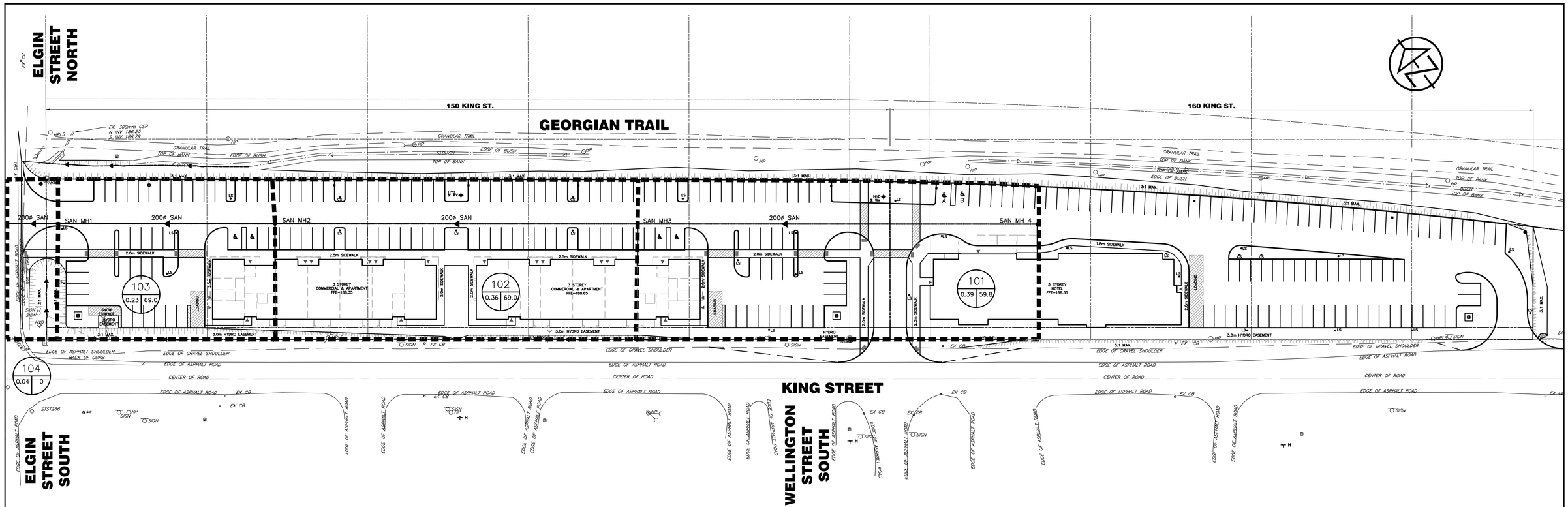
150/160 KING STREET
THORNBURY
TOWN OF THE BLUE MOUNTAINS

STORM DRAINAGE AREA PLAN

TATHAM ENGINEERING

DESIGN: RD	FILE: 122030	DWG: STM-1
DRAWN: RD	DATE: APR 2022	
CHECK: RS	SCALE: 1:500	

Drawing Name: 122030-STM01.dwg, Plotted: May 30, 2022



LEGEND

SANITARY AREA BOUNDARY

AREA IDENTIFICATION NUMBER → 101

AREA IN HECTARES → 3.36 | 57.5

POPULATION (CAP.)

TATHAM ENGINEERING

Sanitary Sewer Design Sheet

Version Number: 1 Version Date: May 30, 2022

Project Information	
150 & 160 King Street East, Thornbury	122030

Drawing Reference	
SAN01	May 30-22

Prepared By	
John Birchard	May 30-22

Reviewed By	
Andrew Schoof	May 30-22

Municipality
Town of The Blue Mountains

Population Density			
Capita per Unit	Low	Medium	High
	2.30	2.30	2.30

Infiltration	
Infiltration (L/s/ha)	0.23

Flow		
Development Type	**Average (L/cap/day)**	**Peaking Factor**
Residential	450	Harmon
Development Type	**Average (L/ha/day)**	**Peaking Factor**
Institution	-	-
Commercial	-	-
Industrial High Intensity	55,000	-
Industrial Low Intensity	20,000	-

Manning's Coefficient	
Pipe Material	**Value**
Concrete	0.013
PVC	0.013
Applied	0.013

Engineer Stamp

Area Description	Area Label/ID	Upstream Maintenance Hole	Downstream Maintenance Hole	Development Type	Population Density	Number of Units	Population (cap)	Accumulated Population (cap)	Peaking Factor	Area (ha)	Cumulative Area (ha)	Average Flow (L/s)			Peak Flow (L/s)			Proposed Sanitary Sewer							
												Development	Infiltration	Total	Development	Infiltration	Total	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Actual Velocity (m/s)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)
Hotel	101	MH4	MH3	Residential	High	26	59.8	59.8	4.30	0.39	0.39	0.31	0.09	0.40	1.34	0.09	1.43	100.0	1.0%	200	1.04	32.80	0.52	62	4.4%
East Appartment	102	MH3	MH2	Residential	High	30	69.0	128.8	4.21	0.36	0.75	0.67	0.17	0.84	2.85	0.17	3.02	90.7	0.5%	200	0.74	23.19	0.49	93	13.0%
West Appartment	103	MH2	MH1	Residential	High	30	69.0	197.8	4.15	0.23	0.98	1.03	0.23	1.26	4.34	0.23	4.57	57.3	0.5%	200	0.74	23.19	0.55	109	19.7%
None	104	MH1	MAIN	Residential	High	0	0.0	197.8	4.15	0.04	1.02	1.03	0.23	1.26	4.34	0.23	4.58	9.7	0.5%	200	0.74	23.19	0.55	109	19.7%

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

BENCHMARKS

TBM1 – ELEVATION 186.52
ELEVATIONS SHOWN HEREON ARE GEODETIC AND REFER TO THE TOP OF IRON BAR, NORTH WEST CORNER OF LOT.

TBM2 – ELEVATION 185.37
ELEVATIONS SHOWN HEREON ARE GEODETIC AND REFER TO THE TOP OF IRON BAR, NORTH EAST CORNER OF LOT.

TBM3 – ELEVATION 188.63
ELEVATIONS SHOWN HEREON ARE GEODETIC AND REFER TO THE TOP OF IRON BAR, SOUTH WEST CORNER OF WELLINGTON STREET ROW.

NOTES

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150/160 KING STREET
THORNBURY
TOWN OF THE BLUE MOUNTAINS

SANITARY DRAINAGE AREA PLAN

TATHAM ENGINEERING

DESIGN: RD	FILE: 122030	DWG: SAN-1
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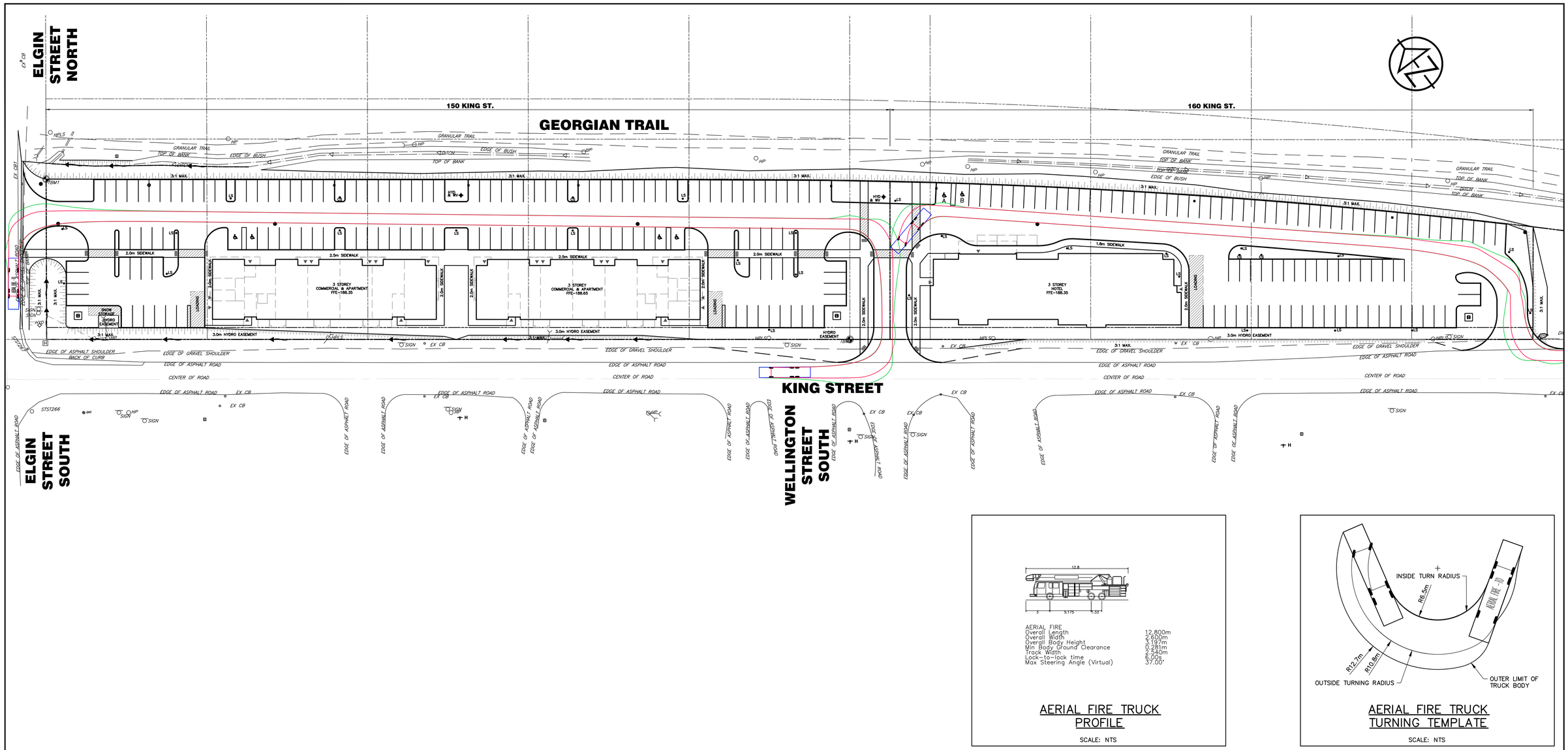
Drawing Name: 122030-SAN01.dwg, Plotted: May 30, 2022



AERIAL FIRE	
Overall Length	12,800m
Overall Width	2.600m
Overall Body Height	3.197m
Min Body Ground Clearance	0.281m
Track Width	2.540m
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	37.00°

AERIAL FIRE TRUCK PROFILE

SCALE: NTS

AERIAL FIRE TRUCK TURNING TEMPLATE

SCALE: NTS

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No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

150/160 KING STREET
THORNBURY
TOWN OF THE BLUE MOUNTAINS

TRUCK TURNING PLAN

TATHAM ENGINEERING

DESIGN: RD	FILE: 122030	DWG: TT-1
DRAWN: RD	DATE: APR 2022	
CHECK: RS	SCALE: 1:500	

Drawing Name: 122030-TT01.dwg, Plotted: May 30, 2022

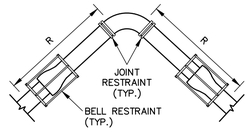


FIGURE 1
HORIZONTAL BEND

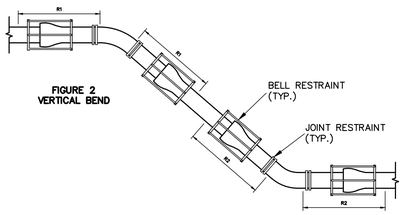


FIGURE 2
VERTICAL BEND

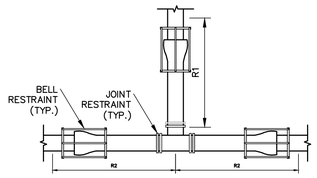


FIGURE 3
TEE

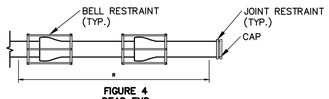


FIGURE 4
DEAD END

CHARACTERISTICS USED TO CALCULATE RESTRAINT LENGTH:

PIPE MATERIAL:	PVC
SOIL TYPE:	ML (SILTS, VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS)
SAFETY FACTOR:	1.5 TO 1
TRENCH TYPE:	5 (PIPE BEDDED IN COMPACT GRANULAR MATERIAL)
DEPTH OF BURY:	1.8m (6 ft)
TEST PRESSURE:	1035 kPa (150 p.s.i.)
PROGRAM:	SIGMA IRON – RESTRAINT LENGTH CALCULATOR 1.0

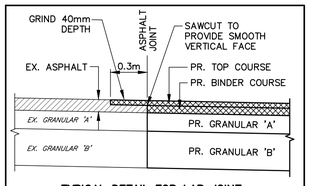
TABLE 2: PIPE RESTRAINT SCHEDULE FOR PVC TEES
(ALL JOINTS AND BELLS LOCATED WITHIN THE CALCULATED RESTRAINT LENGTH SHALL BE RESTRAINED WITH APPROVED BELL AND JOINT RESTRAINTS)

TEES			
NOMINAL PIPE DIA.	BRANCH PIPE DIA.	RESTRAINT 1 LENGTH (m)	RESTRAINT 2 LENGTH (m)
150	150	4.6	3.0
200	150	2.4	3.0
150	200	9.8	3.0
200	200	7.9	3.0
300	150	0.3	3.0
300	200	4.0	3.0
300	300	14.3	3.0

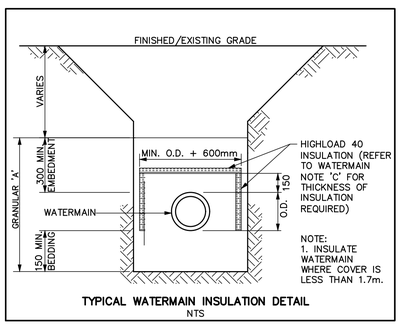
TABLE 1: PIPE RESTRAINT SCHEDULE FOR PVC PIPE
(ALL JOINTS AND BELLS LOCATED WITHIN THE CALCULATED RESTRAINT LENGTH SHALL BE RESTRAINED WITH APPROVED BELL AND JOINT RESTRAINTS)

		HORIZONTAL BEND	VERTICAL BEND		DEAD END (NO BEND ANGLE)
PIPE DIA.	BEND ANGLE	RESTRAINT LENGTH (m)	RESTRAINT 1 LENGTH (m)	RESTRAINT 2 LENGTH (m)	RESTRAINT LENGTH (m)
150ø	90°	3.7	–	–	11.6
	45°	1.6	4.9	1.5	
	22.5°	0.9	2.5	0.9	
	11°	0.6	1.3	0.6	
200ø	90°	4.6	–	–	15.0
	45°	2.2	6.1	2.2	
	22.5°	0.9	3.1	1.0	
	11°	0.6	1.6	0.6	
300ø	90°	6.4	–	–	21.4
	45°	2.8	8.9	2.8	
	22.5°	1.5	4.3	1.5	
	11°	0.9	3.4	0.9	

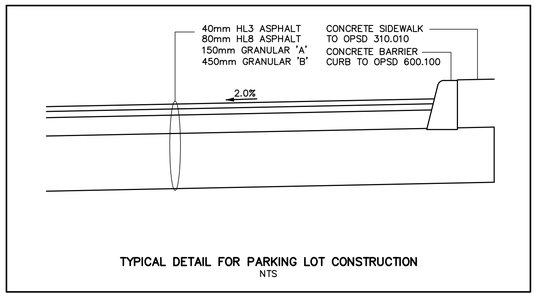
NOTES:
1. CONTRACTOR TO REPORT IN WRITING TO THE ENGINEER ANY CHANGES TO SOIL OR SITE CHARACTERISTIC THAT MAY ALTER THE PIPE RESTRAINT CALCULATION.
2. THE CONTRACTOR IS RESPONSIBLE TO CONFIRM THRUST RESTRAINT REQUIREMENTS WITH THE PIPE AND RESTRAINT MANUFACTURERS.
3. VALVES TO BE RESTRAINED AS IF THEY ARE DEAD ENDS.



TYPICAL DETAIL FOR LAP JOINT
NTS



TYPICAL WATERMAIN INSULATION DETAIL
NTS



TYPICAL DETAIL FOR PARKING LOT CONSTRUCTION
NTS

GENERAL

A. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH TOWN OF THE BLUE MOUNTAINS STANDARDS AND OPS STANDARDS. WHERE CONFLICT OCCURS, TOWN STANDARDS TO GOVERN.
B. THE CONTRACTOR MUST OBTAIN AN ENCROACHMENT PERMIT FROM THE COUNTY OF GREY FOR ALL WORKS WITHIN THE COUNTY ROAD ALLOWANCE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
C. THE OWNER'S ENGINEER SHALL PROVIDE BENCHMARK ELEVATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DETAILED LAYOUT OF THE WORK.
D. ALL PROPERTY BARS TO BE PRESERVED AND REPLACED BY AN OLS AT CONTRACTOR'S EXPENSE IF REMOVED/DISTURBED DURING CONSTRUCTION.
E. THE CONTRACTOR SHALL MAKE ARRANGEMENTS FOR THE SUPPLY OF TEMPORARY WATER AND POWER.
F. DEWATERING TO BE CARRIED OUT IN ACCORDANCE WITH OPSS.MUNI 517 AND OPSS.MUNI 518. MAINTAIN ALL TRENCHES IN A DRY CONDITION. A MOECC PERMIT TO TAKE WATER (PTTW) HAS BEEN OBTAINED FOR THIS PROJECT. THE CONTRACTOR SHALL ENSURE THAT ALL DEWATERING WORKS ARE IN ACCORDANCE WITH THE PERMIT.
G. ALL ENGINE DRIVEN PUMPS TO BE ADEQUATELY SILENCED, SUITABLE FOR OPERATION IN A RESIDENTIAL DISTRICT.
H. GENERAL INSTALLATION AND TESTING OF SEWERS, WATERMAIN AND APPURTENANCES TO BE IN ACCORDANCE WITH OPSS 407, 408, OPSS.MUNI 409, OPSS.MUNI 410, OPSS.MUNI 421 AND OPSS.MUNI 441, AND ALL SPECIFICATIONS REFERENCED WITHIN THESE SECTIONS.
I. ALL MAINTENANCE HOLES ARE 1200 mm DIAMETER, UNLESS OTHERWISE SPECIFIED.
J. ALL STRUCTURES TO BE INSTALLED WITH FROST STRAPS TO OPSD 701.100.
K. PIPE SUPPORT AT ALL STRUCTURES TO OPSD 708.020.
L. ALL MAINTENANCE HOLE AND CATCH BASIN FRAME AND GRATES TO BE SET TO FINAL COURSE ASPHALT ELEVATION IN ACCORDANCE WITH OPSD 704.010, USING CONCRETE ADJUSTMENT UNITS. MAXIMUM COMBINED HEIGHT OF ADJUSTMENT UNITS SHALL BE 450 mm.
M. TRENCH BACKFILL TO BE SELECT NATIVE MATERIAL OR IMPORTED SELECT SUBGRADE MATERIAL TO OPSS.MUNI 1010. BACKFILL TO BE PLACED IN MAXIMUM 200 mm THICK LIFTS (OR AS OTHERWISE DIRECTED BY THE GEOTECHNICAL CONSULTANT) AND COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).
N. PIPE EMBEDMENT TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S SPMDD. BACKFILL AND EMBEDMENT TO OPSD 802.010 (FLEXIBLE PIPE), GRANULAR 'A' EMBEDMENT OR OPSD 802.031 (RIGID PIPE) CLASS 'B', GRANULAR 'A' BEDDING, GRANULAR 'B' COVER (MAX. AGGREGATE SIZE 25 mm). MINIMUM BEDDING DEPTH 150 mm, MINIMUM COVER DEPTH 300 mm ON ALL PIPES. WHERE EXCESSIVELY WET OR POOR SUBGRADE IS ENCOUNTERED AT THE INVERT LEVEL, IT MAY BE NECESSARY TO INCREASE THE BEDDING THICKNESS.
O. CLEAR STONE COMPLETELY WRAPPED IN FILTER FABRIC MAY BE SUBSTITUTED FOR EMBEDMENT MATERIAL IF APPROVED BY THE ENGINEER.
P. DISTURBED AREAS TO BE REINSTATED TO PREVIOUS CONDITION OR BETTER.
Q. REINSTATEMENT OF ALL DISTURBED BOULEVARDS AND DITCHES TO INCLUDE REGRADING, PLACEMENT OF150mm TOPSOIL AND SEED/SOD IN ACCORDANCE WITH OPSS.MUNI 802 AND OPSS.MUNI 803. SOD TO BE STAKED WHERE NECESSARY TO AVOID MOVEMENT.
R. THE CONTRACTOR IS RESPONSIBLE FOR THE PRESERVATION OF ALL EXISTING INFRASTRUCTURE/FACILITIES AS WELL AS NOTIFYING ALL UTILITY COMPANIES PRIOR TO COMMENCING WORK AND CO-ORDINATE CONSTRUCTION ACCORDINGLY.
S. ALL ON-SITE MATERIAL SHALL BE PROPERLY STORED, SECURED, MONITORED AND COVERED AS REQUIRED. SPECIFICALLY, ALL PVC PIPE SHALL BE COVERED WHILE STORED ON-SITE.
T. ALL SIGNAGE TO COMPLY WITH THE TOWN OF THE BLUE MOUNTAINS SIGN BY-LAW.
U. HAZARDOUS TREE REMOVAL IS TO BE COMPLETED ALONG ANY WALKING PATHS OR TRAILS, LEANING OR BACKING ONTO INDIVIDUAL LOTS, OR ADJACENT TO ANY DITCHES OR ANY PROPOSED DITCHES TO A MINIMUM OF 6.0m FROM PROPERTY LINES, TRAILS, AND DITCHES. TREES THAT HAVE BEEN UNDERMINED OR HAVE HAD ITS ROOTS EXPOSED DURING CONSTRUCTION MAY BECOME A HAZARDOUS TREE AND MUST ALSO BE REMOVED.
V. THE MINIMUM COVER OVER ALL CULVERTS SHALL BE 0.3m IN ACCORDANCE WITH TOWN STANDARDS OR AS REQUIRED IN ACCORDANCE WITH MANUFACTURING GUIDELINES. THE GREATER SHALL GOVERN.
W. THE MINIMUM COVER OVER ALL UTILITIES SHALL BE 0.9m IN ACCORDANCE WITH TOWN STANDARDS OR AS REQUIRED BY UTILITY PROVIDER. THE GREATER SHALL GOVERN.

ROADS

A. SUBGRADE AND BOULEVARD MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S SPMDD. SUBGRADE TO BE PROOF ROLLED WITH THE TOWN AND GEOTECHNICAL REPRESENTATIVE PRESENT PRIOR TO PLACING GRANULAR 'B'.
B. LIMESTONE SCREENINGS, 150mm GRANULAR 'A' AND 400mm 'B' TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 100% OF THE MATERIAL'S RESPECTIVE SPMDD.
C. ASPHALT TO BE 40mm HL3 SURFACE, 80mm HL8 BASE TO BE COMPACTED TO A MINIMUM OF 92% OF THE MARSHALL MAXIMUM RELATIVE DENSITY (M.R.D).
D. ROADWAYS WITHIN MUNICIPAL RIGHT-OF-WAY TO BE CONSTRUCTED IN ACCORDANCE WITH THE APPLICABLE ROAD CROSS-SECTIONS.
E. JOINTS WITH EXISTING ASPHALT TO BE SAW CUT STRAIGHT PRIOR TO PLACING NEW ASPHALT. WHERE EXISTING ASPHALT IS THICKER THAN 75 mm, A 300 mm WIDE LAP JOINT SHALL BE GROUND INTO EXISTING ASPHALT PRIOR TO THE PLACEMENT OF SURFACE COURSE ASPHALT (SEE DETAIL).
F. ALL GRANULAR AND ASPHALT MATERIAL TO BE PLACED IN ACCORDANCE WITH OPSS.MUNI 310 AND OPSS.MUNI 314.
G. STOP SIGNS AND STREET SIGNS TO BE SUPPLIED AND INSTALLED PER TOWN STANDARDS.
H. TACK COAT TO BE APPLIED BETWEEN BASE AND TOP COURSE ASPHALT.
I. CONCRETE BARRIER CURB TO OPSD 600.110, AND OPSS.MUNI 353. CURB DEPRESSIONS AT SIDEWALK CROSSINGS IN ACCORDANCE WITH OPSD 310.033. DEPRESSIONS AT DRIVEWAYS IN ACCORDANCE WITH OPSD 351.010, THE MAXIMUM WIDTH SHALL BE IN ACCORDANCE WITH TOWN BYLAW 2014-48.
J. CONCRETE CURB TERMINATIONS TO BE CONSTRUCTED IN ACCORDANCE WITH OPSD 608.010.
K. CONCRETE SIDEWALK TO OPSD 310.010, CONCRETE SIDEWALK RAMPS TO OPSD 310.033 AND OPSS.MUNI 351. SUBBASE TO CONSIST OF 150 mm DEPTH GRANULAR 'A'.
L. UNPAINTED CAST IRON TACTILE WALKING SURFACE INDICATOR COMPONENTS TO BE IN ACCORDANCE WITH OPSD 310.039
M. 100 mm DIAMETER PIPE SUBDRAINS SHALL BE PROVIDED ON BOTH SIDES OF THE ROAD IN ACCORDANCE WITH OPSS.MUNI 405 AND OPSD 216.021, UNWRAPPED TRENCH, GRANULAR 'A' EMBEDMENT.
N. SUBDRAINS TO BE PERFORATED, COMPLETE WITH FILTER SOCK, OTHER THAN THE 2.0 m SECTION IMMEDIATELY UPSTREAM OF ALL STRUCTURES WHICH SHALL BE NON-PERFORATED.
O. All ROADWAY CULVERTS TO HAVE FROST TREATMENT AS PER OPSD 803.031.
P. SURFACE ASPHALT SHALL BE COMPLETED IN A SINGLE MOBILIZATION FOR THE ENTIRE PHASE.

STORM SEWER

A. MAINTENANCE HOLES AND CATCH BASIN MAINTENANCE HOLES TO OPSD 701.010, 701.011, 701.012.
B. MAINTENANCE HOLES TO BE BENCHED TO OPSD 701.021. MINIMUM BENCHING WIDTH SHALL BE 230 mm. CATCH BASIN MAINTENANCE HOLES TO HAVE A SUMP PER OPSD 701.010.
C. MAINTENANCE HOLE AND CATCH BASIN MAINTENANCE HOLE STEPS TO OPSD 405.010.
D. MAINTENANCE HOLE FRAMES AND GRATES TO OPSD 401.010 TYPE 'A' CLOSED COVER.
E. CATCH BASINS TO OPSD 705.010 AND 705.020. ROADSIDE CATCH BASINS TO HAVE A SUMP.
F. DITCH INLET CATCH BASINS TO OPSD 705.030. DITCH INLET CATCH BASIN GRATES TO OPSD 403.010, 3:1 GRATE UNLESS OTHERWISE SPECIFIED.
G. CATCH BASIN AND CATCH BASIN MAINTENANCE HOLE FRAMES AND GRATES TO OPSD 400.020. FRAME AND GRATES TO BE INSTALLED IN THE CURB LINE TO OPSS 610.010.
H. CATCH BASIN LEADS – 300 mm DIAMETER SINGLE AND 375 mm DIAMETER DOUBLE. CATCH BASIN CONNECTIONS TO OPSD 708.010 AND OPSD 708.030.
I. ALL ROADWAY CULVERTS TO HAVE FROST TREATMENT AS PER OPSD 803.031.

SANITARY SEWER

A. MAINTENANCE HOLES TO OPSD 701.010.
B. MAINTENANCE HOLES TO BE BENCHED TO OPSD 701.021 ALL CONNECTIONS TO MAINTENANCE HOLES TO INCLUDE KOR-N-SEAL RUBBER BOOT PIPE CONNECTION.
C. MAINTENANCE HOLE STEPS TO OPSD 405.010
D. MAINTENANCE HOLE FRAME AND COVER TO OPSD 401.010 TYPE 'A' CLOSED COVER. WHERE SPECIFIED, WATER TIGHT FRAME AND GRATE TO OPSD 401.050 SHALL BE USED.

WATERMAIN

A. ALL WORK ON EXISTING WATERMAIN TO BE COORDINATED WITH THE TOWN. TOWN TO BE PROVIDED WITH PRELIMINARY SCHEDULE AND 48 HOURS NOTICE.
B. FIRE SERVICE MAINS AND WATER SERVICE PIPES COMBINED WITH FIRE SERVICE MAINS ARE REQUIRED TO CONFORM WITH NFPA 24 "INSTALLATION OF PRIVATE FIRE SERVICE MAINS AND THEIR APPURTENANCES" AS PER SENTENCE 7.2.11.1(1), DIVISION 'B' OF THE ONTARIO BUILDING CODE.
C. FIRE DEPARTMENT CONNECTIONS TO INCLUDE TWO 65 mm HOSE CONNECTIONS WITH FEMALE SWIVEL HOSE COUPLINGS MOUNTED NOT LESS THAN 300 mm AND NOT MORE THAN 900 mm ABOVE GROUND LEVEL IN ACCORDANCE WITH SECTION 3.2.5.16, DIVISION 'B' OF THE ONTARIO BUILDING CODE.
D. ALL FIRE LINES AND SERVICE LINES TO INCLUDE THE INSTALLATION OF AN INDIVIDUAL PRV WITHIN EACH BUILDING. PRV TO BE SUPPLIED AND INSTALLED BY THE BUILDER DURING CONSTRUCTION.
E. MINIMUM GROUND COVER OVER WATERMAIN, SERVICE LATERALS AND HYDRANT LEADS TO BE 1.7m AT ALL POINTS, MAXIMUM GROUND COVER OVER WATERMAIN TO BE 2.5 m.
F. INSULATION TO BE INSTALLED OVER WATERMAIN OR SERVICES WITH LESS THAN 1.7m DEPTH OF COVER AS NOTED ON THE DRAWINGS OR MINIMUM AS FOLLOWS:
G. DEPTH OF COVER BETWEEN 1.4 TO 1.7m REQUIRES 50mm INSULATION.
H. DEPTH OF COVER BETWEEN 1.2 TO 1.7m REQUIRES 100mm INSULATION.
I. WATERMAIN NOT TO BE INSTALLED WITH LESS THAN 1.2 METRES DEPTH OF COVER.
J. PIPE RESTRAINTS TO BE PROVIDED AT ALL CHANGES IN PIPE DIRECTION, TERMINATIONS AND ANY LOCATION WHERE THRUST PRESSURES MAY OCCUR. WATER VALVES SHALL BE RESTRAINED ON EITHER SIDE TO THE SAME STANDARD THAT A DEAD END WOULD BE. WHERE SOIL CONDITIONS ARE SUSPECT, SUCH AS IN DISTURBED SOILS OR SOILS WITH BEARING STRENGTH OF LESS THAN 200 kPa, SIGMA SLCS SHALL BE USED. IN LIEU OF THRUST BLOCKS PIPE RESTRAINTS FOR PVC SHALL BE PER TOWN STANDARDS, INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS (SEE CHART). THREADED ROD IN JOINT RESTRAINT IS NOT PERMISSIBLE.
K. CATHODIC PROTECTION OF ALL WATERMAIN FITTINGS AND APPURTENANCES TO BE PROVIDED AS PER TOWN STANDARD (SEE CHART).
L. HYDRANTS TO BE INSTALLED TO OPSD 1105.010.
M. HYDRANTS TO BE PAINTED CHROME YELLOW AND INCLUDE A FLEXSTAKE HYDRANT MARKER MODEL FHV804, 1.2 m LONG, COLOUR YELLOW WITH REFLECTIVE GRAPHIC ON BOTH SIDES AT THE TOP OF THE MARKER. MARKER TO BE POSITIONED ON THE RIGHT PORT AS VIEWED FROM THE STREET. A FIRE HYDRANT MARKER POST AND SIGN SHALL BE INSTALLED 0.3 m BEHIND EACH HYDRANT. THE SIGN SHALL BE REFLECTIVE WITH A RED HYDRANT ON A WHITE BACKGROUND AND MEASURE 0.3 x 0.3 m (OR APPROVED EQUAL). THE SIGN SHALL BE MOUNTED 1.5 m ABOVE GRADE.
N. ALL PVC WATERMAIN AND FIRE LINES TO HAVE TRACER WIRE BETWEEN HYDRANTS AND OTHER CONDUCTING APPURTENANCES. CONTRACTOR SHALL TEST ALL TRACER WIRE TO CONFIRM CONNECTIVITY.
O. TRACER WIRE TO BE 10 GAUGE, MULTI-STRAND SHALL BE PLACED ON TOP AND ATTACHED IN TWO PLACES ON EACH LENGTH OF PVC OR PE PIPE. ALL CONNECTIONS SHALL BE MADE WITH "DRYCONN WATERPROOF CONNECTORS" OR APPROVED EQUAL.
P. VERTICAL CLEARANCE BETWEEN WATERMAINS AND SEWERS TO BE A MINIMUM OF 0.5m WHEN WATERMAIN IS BELOW THE SEWERS, HORIZONTAL CLEARANCE BETWEEN WATERMAINS AND SEWERS TO BE A MINIMUM OF 2.5m.
Q. THE COMPLETE WATER SYSTEM, INCLUDING SERVICE CONNECTIONS TO THE BULIDINGS AND HYDRANTS SHALL BE TESTED IN ACCORDANCE WITH THE TOWN'S WATERMAIN COMMISSIONING PROTOCOL. CONTRACTOR TO PROVIDE DETAILED WRITTEN WATERMAIN COMMISSIONING PROTOCOL FOR APPROVAL PRIOR TO COMMENCING TESTING OPERATIONS. CONNECTIONS TO EXISTING MAINS SHALL NOT BE MADE UNTIL WRITTEN AUTHORIZATION IS PROVIDED BY THE ENGINEER AND THE TOWN.
R. FOLLOWING TESTING, THE CONTRACTOR SHALL ARRANGE FOR OPERATION OF EACH SERVICE TO VERIFY FULL FLOW AND PRESSURE AT CURB STOP TO SATISFACTION OF THE ENGINEER.
S. EXISTING WATER SERVICES THAT ARE TO BE ABANDONED MUST BE CAPPED AT MAIN INCLUDING MAIN STOP REMOVED, PLUG INSERTED TO TOWN STANDARDS AND REINSTATEMENT OF ALL DISTURBED AREAS TO EXISTING CONDITION OR BETTER.
T. WATER VALVES TO BE OPERATED BY TOWN STAFF ONLY.
U. ALL WATER USED IN COMMISSIONING AND TESTING TO BE POTABLE AND SUPPLIED FROM THE TOWN OF THE BLUE MOUNTAINS, THE TOWN OF COLLINGWOOD OR THE MUNICIPALITY OF MEAFORD.

MATERIALS

A. ALL MATERIAL TO COMPLY WITH CSA, OPSS AND TOWN STANDARDS.
B. SANITARY SEWER – PVC DR 35.
C. SANITARY SERVICE CONNECTIONS – PVC SDR 28.
D. STORM SEWER – PVC SDR 35 OR CONCRETE 65-D. ALL SEWERS TO BE JOINED WITH A GASKETED BALL AND SPIGOT SYSTEM. NON-REINFORCED CONCRETE PIPE MAY BE USED FOR SIZES UP TO AND INCLUDING 375 mm DIA. REINFORCED CONCRETE PIPE MAY BE USED FOR ALL SIZES OF SEWER.
E. CULVERTS – GALVANIZED CORRUGATED STEEL PIPE. MIN. WALL THICKNESS 2.0 mm UNLESS OTHERWISE NOTED. ALL CULVERTS TO HAVE END PROTECTION TO OPSD 810.010 (BOTH ENDS), TYPE B – COMPLETE WITH FILTER FABRIC.
F. PERFORATED SUBDRAIN – BIG 'O' WITH GEOTEXTILE FILTER SOCK OR APPROVED EQUAL.
G. ALL CHEMICALS AND MATERIALS USED IN THE ALTERATION OR OPERATION OF THE DRINKING WATER SYSTEM THAT COME IN CONTACT WITH WATER WITHIN THE SYSTEM SHALL MEET ALL APPLICABLE STANDARDS SET BY BOTH THE AMERICAN WATER WORKS ASSOCIATION ("AWWA") AND THE AMERICAN NATIONAL STANDARDS INSTITUTE ("ANSI") SAFETY CRITERIA STANDARDS NSF/60, NSF/61 AND NSF372.
H. WATERMAIN – PVC DR 18.
I. WATER SERVICE CONNECTIONS TO BE TYPE 'K' COPPER PIPE, REHAU'S MUNICIPLEX (BLUE).
J. WATER SERVICE FITTINGS SHALL BE:
   MAIN STOP – MUELLER H25008
   CURB STOP – MUELLER H25209
   SERVICE SADDLE – ROBAR 2616
   TAPPING SADDLE – ROBAR 6906
   SERVICE BOXES – MUELLER A-726, STAINLESS STEEL RODS
K. PIPE RESTRAINERS – SIGMA C-900.
L. HYDRANTS – CLOW D51 CONCORD PREMIER, OPEN LEFT, WITH STORTZ CONNECTIONS ON ALL STEAMER PORTS. HYDRANT SETS SHALL BE INSTALLED NOT LESS THAN 0.9 m FROM THE CENTER OF THE VALVE TO THE CENTER OF THE HYDRANT. TRACER WIRE SHALL BE ATTACHED TO THE OUTSIDE OF THE VALVE BOX AND WIRE BROUGHT INTO VALVE BOX UNDER CAP.
M. LIVE TAP SADDLES TO BE EPOXY COATED COMPLETE WITH STAINLESS STEEL BOLTS.
N. MECHANICAL JOINT DUCTILE FITTINGS TO AWWA/ANSI C153/A21.53. INCLUDING PROTECTO-CAPS, CAT NO. 175P190 OR APPROVED EQUAL.
O. ISOLATION VALVES TO BE RESILIENT SEAT GATE VALVES WITH MECHANICAL JOINTS, OPEN LEFT, CLOW. VALVE BOXES TO BE 5-SL-48 SLIDING OR MUELLER MVB COMPOSITE COMPLETE WITH GUIDE PLATE AND DUCTILE ADJUSTABLE TOP AND LID OR APPROVED EQUAL. CAPS TO BE PAINTED BLUE.
P. ALL WATERMAIN FASTNERS (STAINLESS BOLTS) TO BE COMPLETE WITH ZINC CAPS.
Q. ALL SPECIFIED AGGREGATES TO OPSD 1010.
R. RIPRAP TO OPSS 1004.05.05, ON FILTER FABRIC.
S. FILTER FABRIC – TERRAFIX 270R OR APPROVED EQUAL.
T. INSULATION – STYROFOAM HIGHLOAD 40 EXTRUDED POLYSTYRENE FOAM INSULATION, 50mm THICK SHEETS.

WTM/FITTING	ANODE SIZE (kg)	SPACING
100 mm	2.3	PER LENGTH OVER 3.0 m OR FITTING OF SIMILAR SIZE
150 mm	2.3	PER LENGTH OVER 3.0 m OR FITTING OF SIMILAR SIZE
200 mm	5.5	PER LENGTH OVER 3.0 m OR FITTING OF SIMILAR SIZE
250 mm	5.5	PER LENGTH OVER 3.0 m OR FITTING OF SIMILAR SIZE
300 mm	11	PER LENGTH OVER 3.0 m OR FITTING OF SIMILAR SIZE
COPPER SERVICE	2.3	AT EACH CURBSTOP
HYDRANT	5.5	AT HYDRANT BASE
VALVE	5.5	AT EACH VALVE
SERVICE SADDLE	2.3	AT EACH SERVICE SADDLE (CONNECT WIRE TO BOLT ON SADDLE TIGHT BETWEEN 2 NUTS)
TEES, ELBOWS ETC.	2.3	ON EACH FITTING FOR 100 mm – 150 mm PIPE
TEES, ELBOWS ETC.	5.5	ON EACH FITTING FOR 200 mm – 300 mm PIPE

ANODE SIZING CHART FOR ZINC ANODES

BENCHMARKS

TBM1 – ELEVATION 186.52
ELEVATIONS SHOWN HEREON ARE GEODETIC AND REFER TO THE TOP OF IRON BAR, NORTH WEST CORNER OF LOT.

TBM2 – ELEVATION 185.37
ELEVATIONS SHOWN HEREON ARE GEODETIC AND REFER TO THE TOP OF IRON BAR, NORTH EAST CORNER OF LOT.

TBM3 – ELEVATION 188.63
ELEVATIONS SHOWN HEREON ARE GEODETIC AND REFER TO THE TOP OF IRON BAR, SOUTH WEST CORNER OF WELLINGTON STREET ROW.

NOTES

LEGAL SURVEY INFORMATION AND LOT DIMENSIONS SHOWN ON THIS PLAN ARE TAKEN FROM A SURVEY PLAN PREPARED BY JD BARNES LTD DATED FEBRUARY 25, 2022, WHICH MAY NOT BE FINAL AND ARE NOT GUARANTEED. THE FINAL REGISTERED PLAN SHALL BE REFERRED TO FOR CONFIRMATION OF THE DATA.

TOPOGRAPHIC INFORMATION SHOWN ON THIS PLAN IS FROM A SURVEY PREPARED BY JOETOPO SURVEYS AND CADD INC, DATED MARCH 28, 2020.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

150/160 KING STREET
THORNBURY
TOWN OF THE BLUE MOUNTAINS

DETAILS & NOTES

TATHAM ENGINEERING

DESIGN: RD	FILE: 122030	DWG:
DRAWN: RD	DATE: APR 2022	**DE-1**
CHECK: RS	SCALE: NTS	

Drawing Name: 122030-DE01.dwg, Plotted: May 30, 2022

Appendix A:
Sanitary and Storm Design Sheets

TATHAM ENGINEERING

Sanitary Sewer Design Sheet

Version Number: 1 **Version Date:** May 6, 2022

Project Information

150 & 160 King Street East, Thornbury	122030

Drawing Reference

SAN01	May 06/22

Prepared By

John Birchard	May 06/22

Reviewed By

Randy Simpson	May 06/22

Municipality

Town of The Blue Mountains

Population Density

Capita per Unit	Low	Medium	High
	2.30	2.30	2.30

Infiltration

Infiltration (L/s/ha)	0.23

Flow

Development Type	Average (L/cap/day)	Peaking Factor
Residential	450	Harmon
Development Type	**Average (L/ha/day)**	**Peaking Factor**
Institution	-	-
Commercial	-	-
Industrial High Intensity	55,000	-
Industrial Low Intensity	20,000	-

Manning's Coefficient

Pipe Material	Value
Concrete	0.013
PVC	0.013
Applied	0.013

Engineer Stamp

Area Name	Area Label/ID	Upstream Maintenance Hole	Downstream Maintenance Hole	Development Type	Population Density	Number of Units	Population (cap)	Accumulated Population (cap)	Peaking Factor	Area (ha)	Cumulative Area (ha)	Average Flow (L/s)			Peak Flow (L/s)			Proposed Sanitary Sewer							
												Development	Infiltration	Total	Development	Infiltration	Total	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Actual Velocity (m/s)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)
Hotel	101	MH4	MH3	Residential	High	26	59.8	59.8	4.30	0.54	0.54	0.31	0.12	0.44	1.34	0.12	1.46	100.0	1.0%	200	1.04	32.80	0.52	62	4.5%
East Appartment	102	MH3	MH2	Residential	High	30	69.0	128.8	4.21	0.45	0.99	0.67	0.23	0.90	2.85	0.23	3.08	90.7	0.5%	200	0.74	23.19	0.49	94	13.3%
West Appartment	103	MH2	MH1	Residential	High	30	69.0	197.8	4.15	0.42	1.41	1.03	0.32	1.35	4.34	0.32	4.67	57.3	0.5%	200	0.74	23.19	0.55	110	20.1%
None	104	MH1	MAIN	Residential	High	0	0.0	197.8	4.15	0.28	1.69	1.03	0.39	1.42	4.34	0.39	4.73	9.7	0.5%	200	0.74	23.19	0.55	110	20.4%

1. See Appendix B of The 150 and 160 King St Functional Servicing Report (May 2022) for Equivalent Residential Unit Clculations

TATHAM ENGINEERING

Storm Sewer Design Sheet

Version Number: 1 **Version Date:** May 30, 2022

Project Information

150 & 160 King Street East, Thornburry	122030

Drawing Reference

SWM01	May 30/22

Prepared By

John Birchard	May 30/22

Reviewed By

Andrew Schoof	May 30/22

Municipality

Town of The Blue Mountains

Runoff Coefficient Adjustment

Year	A	B
10	0.80	0.20
25	0.70	0.30
50	0.60	0.40
100	0.50	0.50

Manning's Coefficient

Pipe	Value
CSP	0.024
Concrete	0.013
PVC	0.009

Time of Concentration

15 mins

IDF Curve Coefficients

Year	A	B	C
2	807.44	6.75	0.83
5	1135.40	7.50	0.84
10	1387.00	7.97	0.85
25	1676.20	8.30	0.86
50	1973.10	9.00	0.87
100	2193.10	9.04	0.87

Engineer Stamp

Street Name	Area ID / Label	Upstream Maintenance Hole	Downstream Maintenance Hole	Area (ha)	5 Year Runoff Coefficient	Design Storm (Year)	Adjusted Runoff Coefficient	Area × Runoff Coefficient	Cumulative Area (ha)	Cumulative Area × Adjusted Runoff Coefficient	Time of Concentration (min)	Rainfall Intensity (mm/hr)	Peak Flow (m^3/s)	Manning's Roughness Coefficient	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Actual Velocity (m/s)	Travel Time (min)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)	Total Time of Travel (min)
West Outlet	101	CB4	CB3	0.11	0.87	5	0.87	0.10	0.11	0.10	15.00	82.79	0.023	0.013	27.5	0.5%	300	0.97	0.068	0.81	0.57	198	33.1%	15.57
	102	CB3	CB2	0.09	0.87	5	0.87	0.08	0.20	0.18	15.57	81.07	0.040	0.013	33.6	0.5%	300	0.97	0.068	0.94	0.60	245	58.2%	16.16
	103	CB2	OGS1	0.20	0.87	5	0.87	0.17	0.40	0.35	16.16	79.35	0.077	0.013	46.4	0.5%	375	1.12	0.124	1.11	0.70	314	62.3%	16.86
	104	OGS1	STMMH1	0.14	0.87	5	0.87	0.12	0.54	0.47	16.86	77.44	0.102	0.013	27.1	0.5%	375	1.12	0.124	1.12	0.40	348	82.0%	17.26
	105	STMMH1	EXCB1	0.28	0.87	5	0.87	0.24	0.82	0.72	17.26	76.38	0.152	0.013	4.7	0.5%	450	1.27	0.202	1.27	0.06	405	75.4%	17.32
East Outlet	201	CB6	CB7	0.15	0.87	100	0.94	0.14	0.15	0.14	15.00	137.49	0.054	0.013	26.3	0.5%	300	0.97	0.068	0.97	0.45	274	78.3%	15.45
	202	CB7	CB8	0.17	0.87	100	0.94	0.16	0.32	0.30	15.45	135.27	0.112	0.013	64.6	0.5%	375	1.12	0.124	1.12	0.96	361	90.7%	16.41
	203	CB8	CB9	0.12	0.87	100	0.94	0.11	0.44	0.41	16.41	130.82	0.149	0.013	49.7	0.5%	450	1.27	0.202	1.27	0.65	402	74.2%	17.07
	204	CB9	OGS2	0.24	0.87	100	0.94	0.22	0.68	0.64	17.07	127.96	0.226	0.013	33.4	0.5%	525	1.47	0.317	1.47	0.38	462	71.2%	17.45
	-	OGS2	OUTLET	0.00	0.87	100	0.94	0.00	0.68	0.64	17.45	126.36	0.223	0.013	12.0	0.5%	525	1.40	0.304	1.40	0.14	467	73.4%	17.59

TATHAM ENGINEERING

Storm Sewer Design Sheet

Version Number: 1 **Version Date:** May 30, 2022

Project Information

150 & 160 King Street East, Thornburry	122030

Drawing Reference

SWM01	May 30/22

Prepared By

John Birchard	May 30/22

Reviewed By

Andrew Schoof	May 30/22

Municipality

Town of The Blue Mountains

Runoff Coefficient Adjustment

Year	A	B
10	0.80	0.20
25	0.70	0.30
50	0.60	0.40
100	0.50	0.50

Manning's Coefficient

Pipe	Value
CSP	0.024
Concrete	0.013
PVC	0.009

Time of Concentration

15 mins

IDF Curve Coefficients

Year	A	B	C
2	807.44	6.75	0.83
5	1135.40	7.50	0.84
10	1387.00	7.97	0.85
25	1676.20	8.30	0.86
50	1973.10	9.00	0.87
100	2193.10	9.04	0.87

Engineer Stamp

Street Name	Area ID / Label	Upstream Maintenance Hole	Downstream Maintenance Hole	Area (ha)	5 Year Runoff Coefficient	Design Storm (Year)	Adjusted Runoff Coefficient	Area x Runoff Coefficient	Cumulative Area (ha)	Cumulative Area x Adjusted Runoff Coefficient	Time of Concentration (min)	Rainfall Intensity (mm/hr)	Peak Flow (m^3/s)	Manning's Roughness Coefficient	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Actual Velocity (m/s)	Travel Time (min)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)	Total Time of Travel (min)
West Outlet	101	CB4	CB3	0.11	0.87	100	0.94	0.11	0.11	0.11	15.00	137.49	0.040	0.013	27.5	0.5%	300	0.97	0.068	0.94	0.49	246	59.0%	15.49
	102	CB3	CB2	0.09	0.87	100	0.94	0.08	0.20	0.19	15.49	135.11	0.071	0.013	33.6	0.5%	300	0.97	0.068	0.97	0.58	305	104.2%	16.06
	103	CB2	OGS1	0.20	0.87	100	0.94	0.19	0.40	0.38	16.06	132.39	0.139	0.013	46.4	0.5%	375	1.12	0.124	1.12	0.69	391	111.8%	16.75
	104	OGS1	STMMH1	0.14	0.87	100	0.94	0.13	0.54	0.51	16.75	129.31	0.182	0.013	27.1	0.5%	375	1.12	0.124	1.12	0.40	433	147.1%	17.16
	105	STMMH1	EXCB1	0.28	0.30	100	0.65	0.18	0.82	0.69	17.16	127.58	0.244	0.013	4.7	0.5%	450	1.27	0.202	1.27	0.06	484	121.2%	17.22
East Outlet	201	CB6	CB7	0.15	0.87	100	0.94	0.14	0.15	0.14	15.00	137.49	0.054	0.013	26.3	0.5%	300	0.97	0.068	0.97	0.45	274	78.3%	15.45
	202	CB7	CB8	0.17	0.87	100	0.94	0.16	0.32	0.30	15.45	135.27	0.112	0.013	64.6	0.5%	375	1.12	0.124	1.12	0.96	361	90.7%	16.41
	203	CB8	CB9	0.12	0.87	100	0.94	0.11	0.44	0.41	16.41	130.82	0.149	0.013	49.7	0.5%	450	1.27	0.202	1.27	0.65	402	74.2%	17.07
	204	CB9	OGS2	0.24	0.87	100	0.94	0.22	0.68	0.64	17.07	127.96	0.226	0.013	33.4	0.5%	525	1.47	0.317	1.47	0.38	462	71.2%	17.45
	-	OGS2	OUTLET	0.00	0.87	100	0.94	0.00	0.68	0.64	17.45	126.36	0.223	0.013	12.0	0.5%	525	1.40	0.304	1.40	0.14	467	73.4%	17.59

Appendix B:
Water Demand Calculations

TATHAM ENGINEERING	Project: 150 & 160 King Street, Thornbury	Date: 5/30/2022
	File No.: 122030	Designed: JB
	Subject: Water Supply Calculations	Checked: AS

Design Criteria

Population Density = 2.3 ppl/unit (per Town of Blue Mountain Engineering Development Standards)

Average Daily per cap. Flow = 450 L/cap./d (per Town of Blue Mountain Engineering Development Standards)

Equivalent Units Calculation

Apartment/Commercial Buildings

Commercial
564 m²/building
5 water closets

5 L/d per 1.0 m² - OBC Table 8.2.1.3.B. Item 22 a
5 L/d * 564 m² = **2,820 L/d**

OR

1230 L/d per water closet - OBC Table 8.2.1.3.B. Item 22 b
1230 L/d * 5 water closets = **6,150 L/d**

Equivalent Residential Units = 6,150 L/d /(450 L/cap./d*2.3ppl/unit)
= 5.9 units/building
= **6.0 units/building**

Total Units = 6.0 equivalent units/building + 24 residential units/building
= **30 units/building**

Hotel Building
120 Hotel Beds

225 L/d per hotel beds (per Town of Blue Mountain Engineering Development Standards)
225 L/d * 120 hotel beds = **27,000 L/d**

Equivalent Residential Units = 27,000 L/d /(450 L/cap./d*2.3ppl/unit)
= 26.1 units
= **26 units**

Water Supply Calculations

Total Equivalent Units

30 apartment units + 30 apartment units + 26 hotel units
= **86**

Peaking factors

= 4.0 Maximum Day (MECP Design Guidelines)
6.0 Peak Hour (MECP Design Guidelines)

Average Daily Flow

= **88,992 L/d** or **1.03 L/s**
(From Sanitary Sewer Design Sheet)

Peak Hour Demand

= Average Flow * Peaking Factor
530,392 L/d or **6.14 L/s**

Maximum Day Flow

= Average Flow * Peaking Factor
352,764 L/d or **4.08 L/s**

Required Fire Flow

RFF=220*C*A^0.5 (Fire Underwriters Survey)
RFF = Require Fire Flow (L/min)
C=Construction Coefficient
A=Total Effective Floor Area m²

Apartment/Commercial Building

C = 1.5 for Type V wood Frame Construction
For a building classified with a Construction Coefficient from 1.0 to 1.5: 100% of all Floor Areas are considered in determining Total Effective Area
A=2,508 m²

Estimate RFF=220*1.5*2508^0.5
= **16,526 L/min**

Occupancy and Contents Adjustment Factor (OCAF)
Residential and Business limited combustibility = **-15%** (Fire Underwriters Survey - Table 3)

Automatic Sprinkler Protection (ASP) = **-30%** (Fire Underwriters Survey - Table 4)

Exposure Adjustment Charge (EAC)
length height value = length of exposed face (m) * number of stories
3 stories *13.5 m exposed face = 41

For Type V buildings 10 m apart with a length height value of 41
Exposure Adjustment Charge (EAC) = **+15%** (Fire Underwriters Survey - Table 6)

Actual RFF = [(Estimate RFF)*(1+OCAF)]-[(Estimate RFF)*(1+OCAF)*ASP]+[(Estimate RFF)*(1+OCAF)*EAC]
= **11,940 L/min** rounded to the nearest 1000 L/min = **12,000 L/min**

TATHAM ENGINEERING	Project: 150 & 160 King Street, Thornbury	Date: 5/30/2022
	File No.: 122030	Designed: JB
	Subject: Water Supply Calculations	Checked: AS

Hotel Building

C = 1.5 for Type V wood Frame Construction
For a building classified with a Construction Coefficient from 1.0 to 1.5: 100% of all Floor Areas are considered in determining Total Effective Area
A=3,147 m²

Estimate RFF=220*1.5*2508^0.5
= **18,512 L/min**

Occupancy and Contents Adjustment Factor (OCAF)
Residential and Business limited combustibility = **-15%** (Fire Underwriters Survey - Table 3)

Automatic Sprinkler Protection (ASP) = **-30%** (Fire Underwriters Survey - Table 4)

Exposure Adjustment Charge (EAC)
No Buildings area close enough to the proposed hotel to be an exposure risk

Actual RFF = [(estimated RFF)*(1+OCAF)]-[(estimated RFF)*(1+OCAF)*ASP]
= **13,375 L/min** rounded to the nearest 1000 L/min = **13,000 L/min**

The Maximum required Fire Flow for the project site = **13,000 L/min**
= 217 L/s

TATHAM ENGINEERING

Project:	150 & 160 King Street East
File No.:	122030
Date:	30-May-22
Design:	JB
Checked:	AS
Revision:	

Calculation of Water Flow Rates for Water Services

Hazen Williams Equation as used in this spreadsheet:

$Q = (3.763 \times 10^{-6})\ C\ D^{2.63}(DP/L)^{0.54}$

where Q is the water flow rate in m^3/hr
D is the pipe diameter in mm
L is the pipe length in m
DP is the pressure difference across pipe length L in kN/m^2

Pipe Material: PVC

Hazen Williams Coefficient, **C** = 150

Pressure drop over the pipe length, DP = 140 kN/m^2

Pipe Length (m)	**Water Flow Rate (m^3/hr) Pipe Diameter (mm)**									
	20	25	40	50	75	100	125	150	200	**250**
240	1.1	2.0	6.9	12.4	36.0	76.8	138.1	223.0	475.3	**854.7**

Max Day Water Demand (from Water Supply Calculations)	=	4.08	**L/s**
	=	**4**	**L/s**
Fire Flow Water Demand (from Water Supply Calculations)	=	13,000	L/min
	=	**217**	**L/s**
Total Demand	**=**	**221**	**L/s**
Flow rate provided by 250 mm dia. water service	=	854.7	m^3/hr
	=	**237.41**	**L/s**

Appendix C:
Oil Grit Separator Details

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

04/27/2022

Province:	Ontario
City:	Town of Blue Mountains
Nearest Rainfall Station:	OWEN SOUND MOE
Climate Station Id:	6116132
Years of Rainfall Data:	40

Site Name:	150 &160 King St West

Drainage Area (ha):	0.54
% Imperviousness:	94.00

Runoff Coefficient 'c': 0.86

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	17.62
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	150 & 160 King St West
Project Number:	122030
Designer Name:	John Birchard
Designer Company:	Tatham Engineering
Designer Email:	jbirchard@tathameng.com
Designer Phone:	705-444-2565
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	83
EFO6	92
EFO8	96
EFO10	98
EFO12	99

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 83

Water Quality Runoff Volume Capture (%): > 90

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THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

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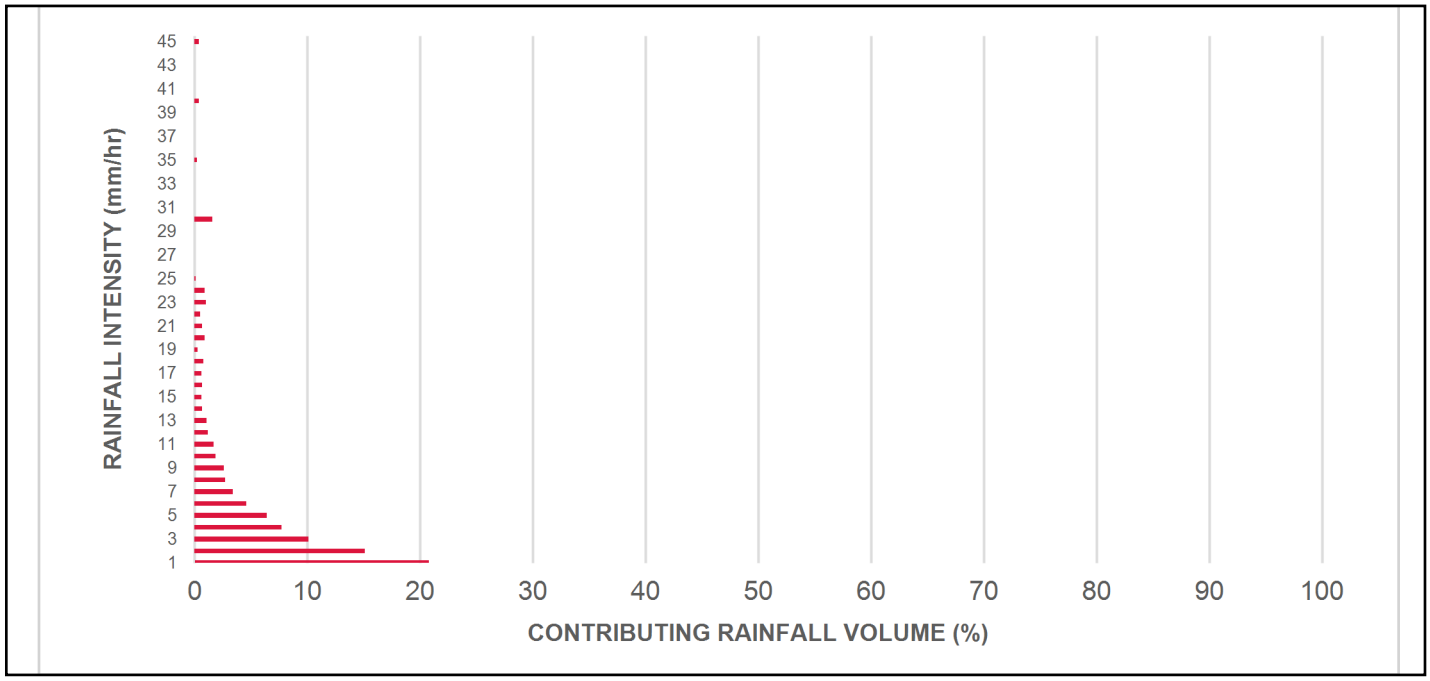
Stormceptor® EF Sizing Report

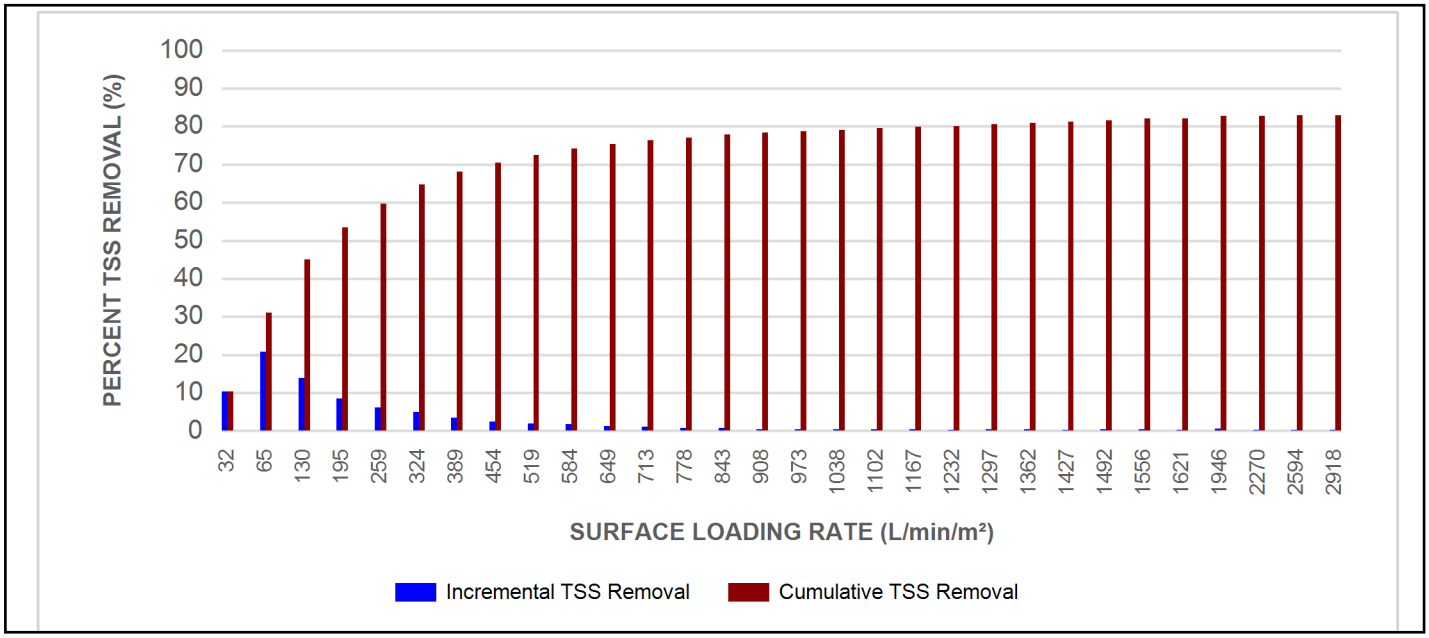
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	10.3	10.3	0.65	39.0	32.0	100	10.3	10.3
1	20.8	31.1	1.30	78.0	65.0	100	20.8	31.1
2	15.1	46.2	2.59	156.0	130.0	92	13.9	45.0
3	10.1	56.3	3.89	233.0	195.0	84	8.5	53.5
4	7.7	64.0	5.19	311.0	259.0	80	6.2	59.7
5	6.4	70.4	6.49	389.0	324.0	78	5.0	64.7
6	4.6	75.1	7.78	467.0	389.0	74	3.4	68.1
7	3.4	78.4	9.08	545.0	454.0	72	2.4	70.5
8	2.7	81.1	10.38	623.0	519.0	69	1.9	72.4
9	2.6	83.7	11.67	700.0	584.0	66	1.7	74.1
10	1.9	85.6	12.97	778.0	649.0	64	1.2	75.3
11	1.7	87.3	14.27	856.0	713.0	64	1.1	76.4
12	1.2	88.5	15.56	934.0	778.0	63	0.7	77.1
13	1.1	89.6	16.86	1012.0	843.0	63	0.7	77.8
14	0.7	90.3	18.16	1090.0	908.0	62	0.5	78.3
15	0.6	90.9	19.46	1167.0	973.0	62	0.4	78.7
16	0.7	91.6	20.75	1245.0	1038.0	61	0.4	79.1
17	0.6	92.3	22.05	1323.0	1102.0	59	0.4	79.5
18	0.8	93.0	23.35	1401.0	1167.0	58	0.4	79.9
19	0.3	93.3	24.64	1479.0	1232.0	56	0.2	80.1
20	0.9	94.2	25.94	1556.0	1297.0	55	0.5	80.6
21	0.7	94.9	27.24	1634.0	1362.0	53	0.4	80.9
22	0.5	95.3	28.53	1712.0	1427.0	52	0.2	81.2
23	1.0	96.3	29.83	1790.0	1492.0	49	0.5	81.6
24	0.9	97.2	31.13	1868.0	1556.0	47	0.4	82.1
25	0.1	97.3	32.43	1946.0	1621.0	45	0.1	82.1
30	1.6	98.9	38.91	2335.0	1946.0	38	0.6	82.7
35	0.2	99.1	45.40	2724.0	2270.0	32	0.1	82.8
40	0.4	99.5	51.88	3113.0	2594.0	28	0.1	82.9
45	0.4	99.9	58.37	3502.0	2918.0	25	0.1	83.0
Estimated Net Annual Sediment (TSS) Load Reduction =								**83 %**

Climate Station ID: 6116132 *Years of Rainfall Data*: 40

RAINFALL DATA FROM OWEN SOUND MOE RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

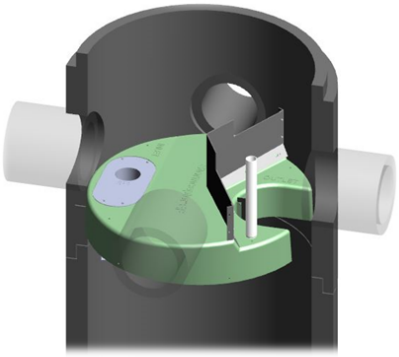
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

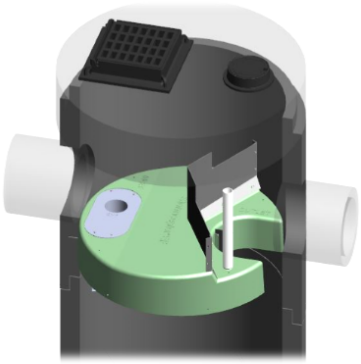
DESIGN FLEXIBILITY

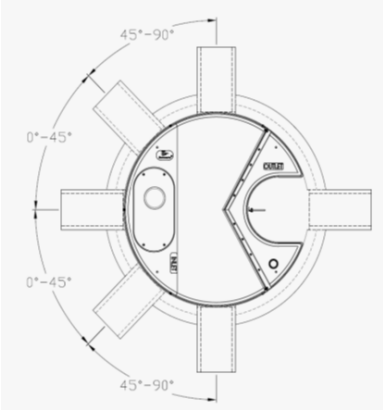
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Stormceptor®

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Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

04/27/2022

Province:	Ontario
City:	Town of Blue Mountains
Nearest Rainfall Station:	OWEN SOUND MOE
Climate Station Id:	6116132
Years of Rainfall Data:	40

Site Name:	150 &160 King St East

Drainage Area (ha):	0.68
% Imperviousness:	88.00

Runoff Coefficient 'c': 0.82

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	21.26
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	150 & 160 King St East
Project Number:	122030
Designer Name:	John Birchard
Designer Company:	Tatham Engineering
Designer Email:	jbirchard@tathameng.com
Designer Phone:	705-444-2565
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	81
EFO6	90
EFO8	94
EFO10	97
EFO12	98

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 81

Water Quality Runoff Volume Capture (%): > 90

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THIRD-PARTY TESTING AND VERIFICATION

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Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

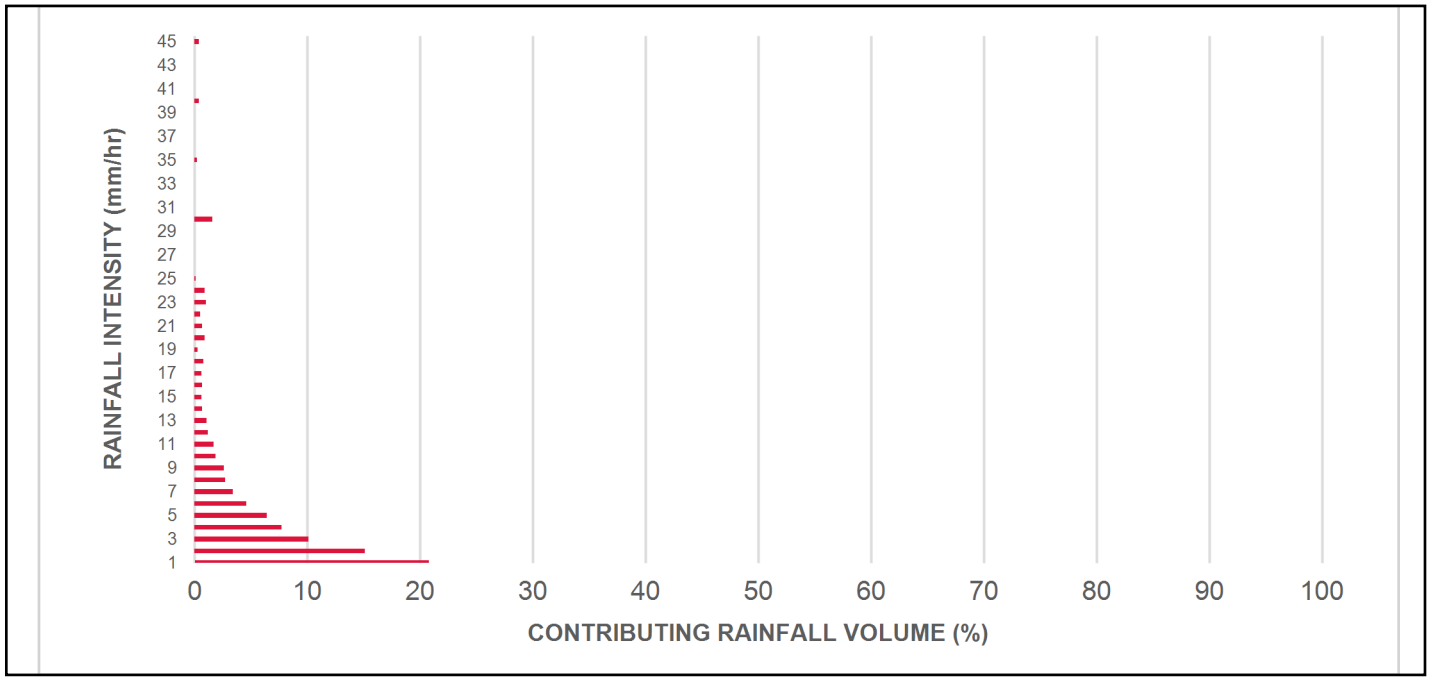
imbrium

Stormceptor® EF Sizing Report

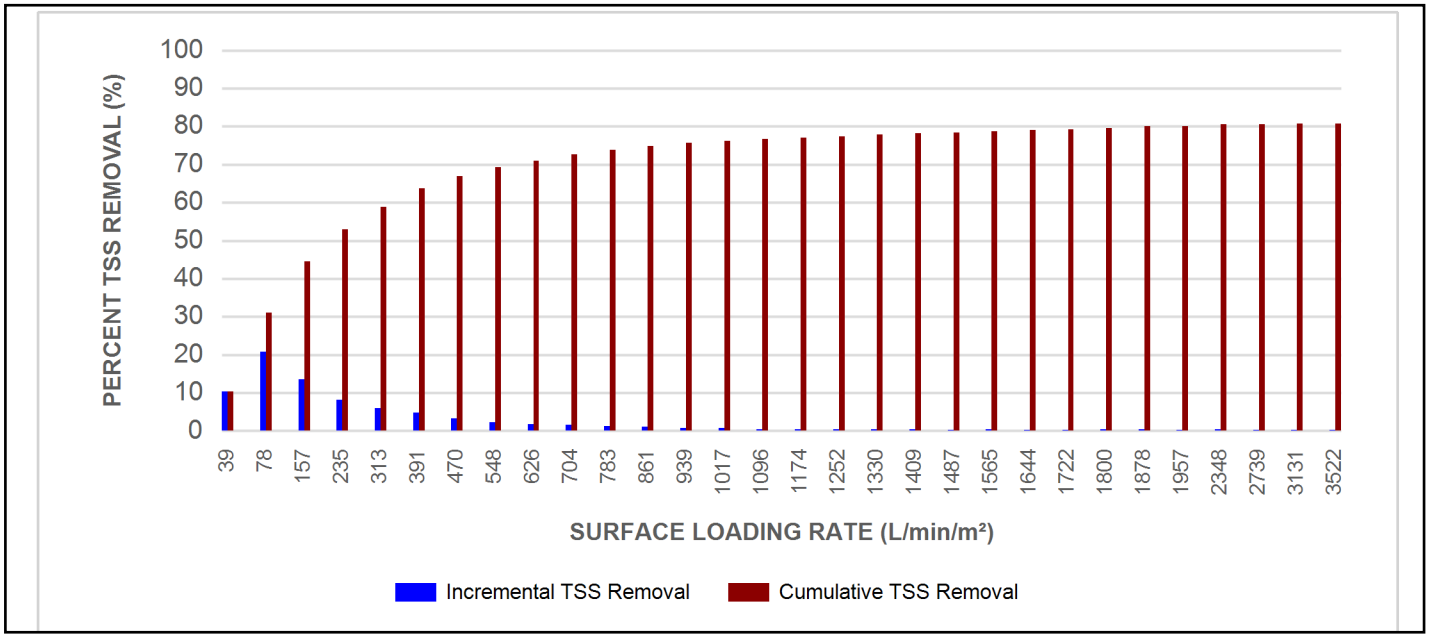
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	10.3	10.3	0.78	47.0	39.0	100	10.3	10.3
1	20.8	31.1	1.57	94.0	78.0	100	20.8	31.1
2	15.1	46.2	3.13	188.0	157.0	89	13.5	44.6
3	10.1	56.3	4.70	282.0	235.0	82	8.2	52.9
4	7.7	64.0	6.26	376.0	313.0	78	6.0	58.9
5	6.4	70.4	7.83	470.0	391.0	74	4.8	63.7
6	4.6	75.1	9.39	563.0	470.0	71	3.3	66.9
7	3.4	78.4	10.96	657.0	548.0	67	2.3	69.2
8	2.7	81.1	12.52	751.0	626.0	64	1.8	70.9
9	2.6	83.7	14.09	845.0	704.0	64	1.6	72.6
10	1.9	85.6	15.65	939.0	783.0	63	1.2	73.8
11	1.7	87.3	17.22	1033.0	861.0	63	1.1	74.8
12	1.2	88.5	18.78	1127.0	939.0	62	0.7	75.6
13	1.1	89.6	20.35	1221.0	1017.0	61	0.7	76.2
14	0.7	90.3	21.91	1315.0	1096.0	59	0.4	76.7
15	0.6	90.9	23.48	1409.0	1174.0	58	0.4	77.0
16	0.7	91.6	25.04	1503.0	1252.0	56	0.4	77.4
17	0.6	92.3	26.61	1597.0	1330.0	54	0.3	77.8
18	0.8	93.0	28.17	1690.0	1409.0	52	0.4	78.2
19	0.3	93.3	29.74	1784.0	1487.0	49	0.2	78.3
20	0.9	94.2	31.31	1878.0	1565.0	47	0.4	78.7
21	0.7	94.9	32.87	1972.0	1644.0	45	0.3	79.0
22	0.5	95.3	34.44	2066.0	1722.0	43	0.2	79.2
23	1.0	96.3	36.00	2160.0	1800.0	41	0.4	79.6
24	0.9	97.2	37.57	2254.0	1878.0	39	0.3	80.0
25	0.1	97.3	39.13	2348.0	1957.0	38	0.0	80.0
30	1.6	98.9	46.96	2817.0	2348.0	31	0.5	80.5
35	0.2	99.1	54.78	3287.0	2739.0	27	0.1	80.6
40	0.4	99.5	62.61	3757.0	3131.0	24	0.1	80.7
45	0.4	99.9	70.44	4226.0	3522.0	21	0.1	80.7
Estimated Net Annual Sediment (TSS) Load Reduction =								**81 %**

Climate Station ID: 6116132 *Years of Rainfall Data*: 40

RAINFALL DATA FROM OWEN SOUND MOE RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



imbrium

Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

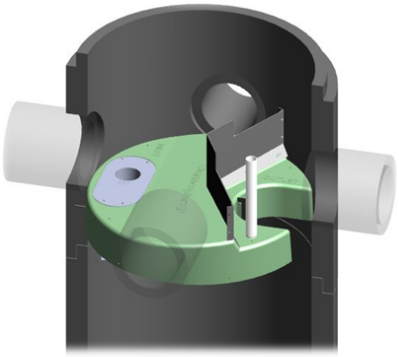
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

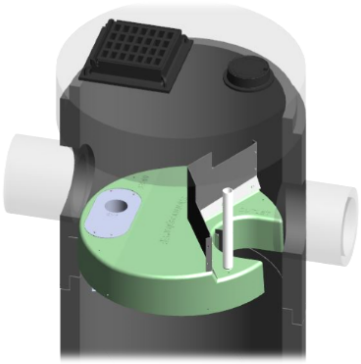
DESIGN FLEXIBILITY

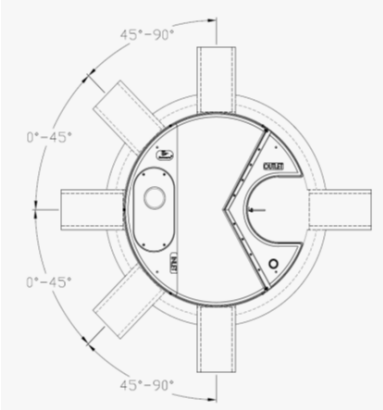
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Appendix D:
External Storm Sewer Details

TATHAM ENGINEERING

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Collingwood, Ontario L9Y 5A6

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tathameng.com

Memo

File	Recipient	Company
120164	Kevin Sansom	Tatham Engineering
	Carlos Lopez	Manorwood Homes

Date	Purpose
July 26, 2021	Applewood, Thornbury External Storm Sewer

Message

The proposed Applewood development, located at the southwest corner of Huron Street and Elgin Street, would see the additional of 42 residential units with associated access road and servicing. The storm sewer is proposed to outlet to the existing trunk storm sewer in Elgin Street.

After completing detailed analysis of the existing storm sewer system, it was found to be undersized, as demonstrated by the attached existing storm sewer design sheet. Existing catchment areas were established based on Lidar survey data, field visits and Grey County GIS. Runoff coefficients were determined following Town of Blue Mountains Engineering Standards. Catchment areas and runoff coefficients are depicted in the figure, attached.

Due to the surrounding topography, we are unable to provide an overland flow route for the 100-year storm. As such it is proposed to size the storm system to convey the 100-year storm flows. This will require several lengths of storm sewer in Elgin Street to be upsized to convey an additional 310 L/s, the 100-year flows from the Applewood development. Any flows over and above this will be conveyed overland through the adjacent park or along the Elgin Street and McAuley Street right-of-way at peak flow rates less than the existing conditions.

The proposed internal storm sewer system has been designed to convey the 100-year flows, as demonstrated on the proposed storm sewer design sheet attached. To facilitate this development, it is proposed to upsize the existing trunk storm sewer in Elgin Street extending north of the proposed development to the existing outlet at Georgian Bay. This will ensure the 100-year storm flows are conveyed safely to Georgian Bay without adversely impacting the storm sewer function or causing issues to the surrounding areas.

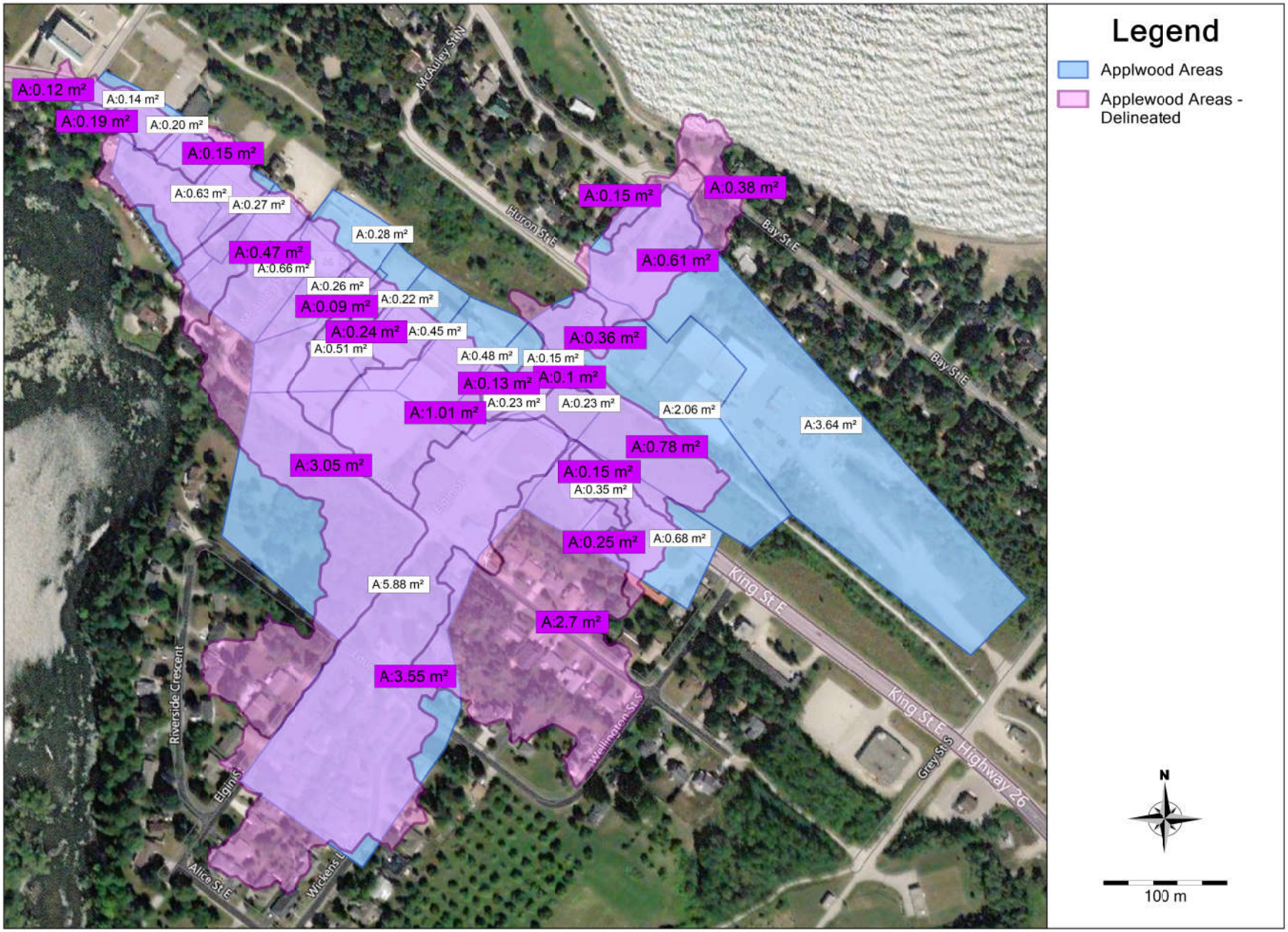
The existing 600 mm diameter storm sewer on Elgin Street is proposed to be replaced with a minimum pipe size of 750 mm diameter and a maximum pipe size of 1200mm

diameter pipes. Please see the attached Site Servicing plan for a detailed breakdown of pipe sizes, lengths, and slopes.

We trust the above is acceptable. Should you have any questions, please feel free to contact us.

Yours truly,
Daniel Twigger, P.Eng

I:\2020 Projects\120164 - Applewood Due diligence\Documents\Reports\R- SWM Memo - Applewood.docx


Legend
Applwood Areas
Applewood Areas - Delineated
A:0.12 m²
A:0.14 m²
A:0.19 m²
A:0.20 m²
A:0.15 m²
A:0.63 m²
A:0.27 m²
A:0.28 m²
A:0.47 m²
A:0.66 m²
A:0.26 m²
A:0.22 m²
A:0.09 m²
A:0.24 m²
A:0.45 m²
A:0.51 m²
A:0.48 m²
A:0.15 m²
A:0.13 m²
A:0.1 m²
A:0.23 m²
A:0.23 m²
A:1.01 m²
A:3.05 m²
A:5.88 m²
A:3.55 m²
A:0.15 m²
A:0.38 m²
A:0.61 m²
A:0.36 m²
A:2.06 m²
A:3.64 m²
A:0.78 m²
A:0.15 m²
A:0.35 m²
A:0.25 m²
A:0.68 m²
A:2.7 m²
McAuley St N
Huron St E
Bay St E
Bay St E
King St E
King St E
Highway 26
Grey St S
Wellington St S
Riverside Crescent
Elgin St
Alice St E
Wickens L
N
100 m

TATHAM ENGINEERING

Storm Sewer Design Sheet

Version Number: 1 **Version Date:** September 16, 2021

Project Information

Applewood	120164

Drawing Reference

Proposed Conditions - 1:100-Year Return Frequency Design Storm	September 16/21

Prepared By

DRT	September 16/21

Reviewed By

JM	September 16/21

Municipality

Town of The Blue Mountains

Runoff Coefficient Adjustment

Year	A	B
10	0.80	0.20
25	0.70	0.30
50	0.60	0.40
100	0.50	0.50

Manning's Coefficient

Pipe	Value
CSP	0.024
Concrete	0.013
PVC	0.009

Time of Concentration

15 mins

IDF Curve Coefficients

Year	A	B	C
2	807.44	6.75	0.83
5	1135.40	7.50	0.84
10	1387.00	7.97	0.85
25	1676.20	8.30	0.86
50	1973.10	9.00	0.87
100	2193.10	9.04	0.87

Engineer Stamp

Street Name	Area ID / Label	Upstream Maintenance Hole	Downstream Maintenance Hole	Area (ha)	5 Year Runoff Coefficient (C)	Design Storm (Year)	Adjusted Runoff Coefficient (C)	Area × Runoff Coefficient	Cumulative Area (ha)	Cumulative Area × Adjusted Runoff Coefficient	Time of Concentration (min)	Rainfall Intensity (mm/hr)	Peak Flow (m^3/s)	Manning's Roughness Coefficient	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Actual Velocity (m/s)	Travel Time (min)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)	Total Time of Travel (min)
King Street	S-STST249	STST249	STST239	0.12	0.80	100	0.90	0.11	0.12	0.11	15.00	137.49	0.041	0.013	45.8	0.7%	300	1.11	0.078	1.05	0.73	236	52.7%	15.73
King Street	S-STST239	STST239	STST241	0.19	0.65	100	0.83	0.16	0.31	0.26	15.73	133.96	0.098	0.013	42.3	1.1%	300	1.41	0.100	1.41	0.50	299	98.8%	16.23
King Street	S-STST241	STST241	STST250	0.15	0.82	100	0.91	0.13	0.46	0.40	16.23	131.65	0.146	0.013	46.3	0.9%	375	1.48	0.163	1.48	0.52	359	89.4%	16.75
King Street	S-STST250	STST250	STST252	0.68	0.81	100	0.90	0.62	1.14	1.02	16.75	129.32	0.365	0.013	41.0	0.5%	600	1.52	0.428	1.52	0.45	565	85.2%	17.20
King Street	S-STST252	STST252	STST254	0.47	0.54	100	0.77	0.36	1.61	1.38	17.20	127.38	0.488	0.013	50.5	0.6%	675	1.81	0.648	1.81	0.46	607	75.3%	17.67
King Street	S-STST254_1	STST254	STST1810	1.31	0.67	100	0.83	1.09	2.92	2.47	17.67	125.45	0.861	0.013	13.7	1.0%	750	2.49	1.100	2.49	0.09	684	78.2%	17.76
King Street	S-STST1810	STST1810	STST1546	0.51	0.82	100	0.91	0.47	3.43	2.94	17.76	125.08	1.021	0.013	11.4	0.6%	825	2.16	1.155	2.16	0.09	787	88.4%	17.85
King Street		STST1546	STST256	0.00	0.00	100	0.50	0.00	3.43	2.94	17.85	124.72	1.018	0.013	20.1	0.5%	900	1.92	1.224	1.92	0.17	840	83.2%	18.02
King Street	S-STST256	STST256	STST258	0.09	0.81	100	0.90	0.08	3.52	3.02	18.02	124.02	1.040	0.013	45.0	0.2%	975	1.41	1.051	1.41	0.53	971	98.9%	18.55
King Street	S-STST258	STST258	STST260	0.24	0.81	100	0.90	0.21	3.76	3.23	18.55	121.93	1.094	0.013	47.6	0.4%	900	1.84	1.173	1.84	0.43	876	93.2%	18.98
King Street	S-STST260	STST260	STST262	1.01	0.79	100	0.89	0.90	4.76	4.13	18.98	120.30	1.380	0.013	37.7	0.4%	975	1.89	1.414	1.89	0.33	966	97.6%	19.32
King Street	S-STST263	STST263	STST264	0.25	0.54	100	0.77	0.19	0.25	0.19	15.00	137.49	0.073	0.013	50.8	0.8%	300	1.21	0.086	1.21	0.70	282	84.6%	15.70
King Street	S-STST264	STST264	STST265	0.15	0.66	100	0.83	0.12	0.40	0.31	15.70	134.11	0.117	0.013	4.1	4.8%	300	3.01	0.212	2.91	0.02	240	55.2%	15.72
King Street	S-STST265	STST265	STST266	2.70	0.42	100	0.71	1.92	3.10	2.24	15.72	134.00	0.833	0.013	46.9	1.1%	675	2.42	0.867	2.42	0.32	665	96.0%	16.04
King Street	S-STST266	STST266	STST267	3.55	0.52	100	0.76	2.70	6.65	4.94	16.04	132.49	1.817	0.013	15.1	1.3%	900	3.28	2.084	3.28	0.08	855	87.2%	16.12
King Street	S-STST267	STST267	STST262	0.78	0.26	100	0.63	0.49	7.43	5.43	16.12	132.14	1.992	0.013	12.1	19.0%	600	9.46	2.674	9.46	0.02	537	74.5%	16.14
Elgin Street	S-STST262	STST262	STST1217	0.13	0.70	100	0.85	0.11	12.33	9.67	19.32	119.07	3.198	0.013	40.4	1.3%	1200	3.92	4.428	3.92	0.17	1062	72.2%	19.49
Elgin Street	S-STST1217	STST1217	STM MH5	0.10	0.69	100	0.85	0.08	12.42	9.75	19.49	118.44	3.208	0.013	22.0	1.2%	1200	3.84	4.341	3.84	0.10	1071	73.9%	19.58

TATHAM ENGINEERING

Storm Sewer Design Sheet

Version Number: 1 **Version Date:** September 16, 2021

Project Information

Applewood	120164

Drawing Reference

Proposed Conditions - 1:100-Year Return Frequency Design Storm	September 16/21

Prepared By

DRT	September 16/21

Reviewed By

JM	September 16/21

Municipality

Town of The Blue Mountains

Runoff Coefficient Adjustment

Year	A	B
10	0.80	0.20
25	0.70	0.30
50	0.60	0.40
100	0.50	0.50

Manning's Coefficient

Pipe	Value
CSP	0.024
Concrete	0.013
PVC	0.009

Time of Concentration

15 mins

IDF Curve Coefficients

Year	A	B	C
2	807.44	6.75	0.83
5	1135.40	7.50	0.84
10	1387.00	7.97	0.85
25	1676.20	8.30	0.86
50	1973.10	9.00	0.87
100	2193.10	9.04	0.87

Engineer Stamp

Street Name	Area ID / Label	Upstream Maintenance Hole	Downstream Maintenance Hole	Area (ha)	5 Year Runoff Coefficient (C)	Design Storm (Year)	Adjusted Runoff Coefficient (C)	Area × Runoff Coefficient	Cumulative Area (ha)	Cumulative Area × Adjusted Runoff Coefficient	Time of Concentration (min)	Rainfall Intensity (mm/hr)	Peak Flow (m^3/s)	Manning's Roughness Coefficient	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Actual Velocity (m/s)	Travel Time (min)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)	Total Time of Travel (min)
Applewood	203 + 207	CBMH1	CBMH2	0.21	0.90	100	0.95	0.20	0.21	0.20	15.00	137.49	0.076	0.013	56.5	0.5%	**300**	0.98	0.069	0.98	0.96	311	110.3%	15.96
Applewood	204 + 208	CBMH2	CBMH3	0.20	0.90	100	0.95	0.19	0.41	0.39	15.96	132.86	0.144	0.013	52.5	0.5%	**375**	1.13	0.125	1.13	0.77	395	114.8%	16.74
Applewood	205 + 209	CBMH3	CBMH4	0.24	0.90	100	0.95	0.23	0.65	0.62	16.74	129.39	0.222	0.013	92.5	0.5%	**450**	1.28	0.204	1.28	1.20	465	109.0%	17.94
Applewood	206 + 210	CBMH4	STM MH5	0.17	0.67	100	0.84	0.14	0.82	0.76	17.94	124.34	0.262	0.013	14.0	0.2%	**450**	0.80	0.128	0.80	0.29	590	205.7%	18.23
Elgin Street		STM MH5	STST1218	0.00	0.67	100	0.84	0.00	13.24	10.51	19.58	118.10	3.447	0.013	37.4	2.6%	975	4.84	3.614	4.84	0.13	958	95.4%	19.71
Elgin Street	S-STST1218	STST1218	STST1219	0.36	0.47	100	0.74	0.27	13.60	10.77	19.71	117.64	3.521	0.013	109.0	3.0%	975	5.20	3.882	5.20	0.35	940	90.7%	20.06
Elgin Street	S-STST1219	STST1219	STST1500	0.61	0.63	100	0.81	0.50	14.22	11.27	20.06	116.41	3.645	0.013	26.6	2.9%	1050	5.37	4.650	5.37	0.08	958	78.4%	20.15
Elgon Street	S-STST1500	STST1500	Outlet	0.15	0.54	100	0.77	0.11	14.36	11.39	20.15	116.12	3.673	0.013	19.8	1.0%	1200	3.45	3.899	3.45	0.10	1173	94.2%	20.24

TATHAM ENGINEERING

Storm Sewer Design Sheet

Version Number: 1 **Version Date:** May 05/22

Project Information

Applewood	120164

Drawing Reference

Proposed Conditions - 1:100-Year Return Frequency Design Storm	May 05/22

Prepared By

JB	May 05/22

Reviewed By

RS	May 05/22

Municipality

Town of The Blue Mountains

Runoff Coefficient Adjustment

Year	A	B
10	0.80	0.20
25	0.70	0.30
50	0.60	0.40
100	0.50	0.50

Manning's Coefficient

Pipe	Value
CSP	0.024
Concrete	0.013
PVC	0.009

Time of Concentration

15 mins

IDF Curve Coefficients

Year	A	B	C
2	807.44	6.75	0.83
5	1135.40	7.50	0.84
10	1387.00	7.97	0.85
25	1676.20	8.30	0.86
50	1973.10	9.00	0.87
100	2193.10	9.04	0.87

Engineer Stamp

Street Name	Area ID / Label	Upstream Maintenance Hole	Downstream Maintenance Hole	Area (ha)	5 Year Runoff Coefficient (C)	Design Storm (Year)	Adjusted Runoff Coefficient (C)	Area × Runoff Coefficient	Cumulative Area (ha)	Cumulative Area × Adjusted Runoff Coefficient	Time of Concentration (min)	Rainfall Intensity (mm/hr)	Peak Flow (m^3/s)	Manning's Roughness Coefficient	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Actual Velocity (m/s)	Travel Time (min)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)	Total Time of Travel (min)
King Street	S-STST249	STST249	STST239	0.12	0.80	100	0.90	0.11	0.12	0.11	15.00	137.49	0.041	0.013	45.8	0.7%	300	1.11	0.078	1.05	0.73	236	52.7%	15.73
King Street	S-STST239	STST239	STST241	0.19	0.65	100	0.83	0.16	0.31	0.26	15.73	133.96	0.098	0.013	42.3	1.1%	300	1.41	0.100	1.41	0.50	299	98.8%	16.23
King Street	S-STST241	STST241	STST250	0.15	0.82	100	0.91	0.13	0.46	0.40	16.23	131.65	0.146	0.013	46.3	0.9%	375	1.48	0.163	1.48	0.52	359	89.4%	16.75
King Street	S-STST250	STST250	STST252	0.68	0.81	100	0.90	0.62	1.14	1.02	16.75	129.32	0.365	0.013	41.0	0.5%	600	1.52	0.428	1.52	0.45	565	85.2%	17.20
King Street	S-STST252	STST252	STST254	0.47	0.54	100	0.77	0.36	1.61	1.38	17.20	127.38	0.488	0.013	50.5	0.6%	675	1.81	0.648	1.81	0.46	607	75.3%	17.67
King Street	S-STST254_1	STST254	STST1810	1.31	0.67	100	0.83	1.09	2.92	2.47	17.67	125.45	0.861	0.013	13.7	1.0%	750	2.49	1.100	2.49	0.09	684	78.2%	17.76
King Street	S-STST1810	STST1810	STST1546	0.51	0.82	100	0.91	0.47	3.43	2.94	17.76	125.08	1.021	0.013	11.4	0.6%	825	2.16	1.155	2.16	0.09	787	88.4%	17.85
King Street		STST1546	STST256	0.00	0.00	100	0.50	0.00	3.43	2.94	17.85	124.72	1.018	0.013	20.1	0.5%	900	1.92	1.224	1.92	0.17	840	83.2%	18.02
King Street	S-STST256	STST256	STST258	0.09	0.81	100	0.90	0.08	3.52	3.02	18.02	124.02	1.040	0.013	45.0	0.2%	975	1.41	1.051	1.41	0.53	971	98.9%	18.55
King Street	S-STST258	STST258	STST260	0.24	0.81	100	0.90	0.21	3.76	3.23	18.55	121.93	1.094	0.013	47.6	0.4%	900	1.84	1.173	1.84	0.43	876	93.2%	18.98
King Street	S-STST260	STST260	STST262	1.01	0.79	100	0.89	0.90	4.76	4.13	18.98	120.30	1.380	0.013	37.7	0.4%	975	1.89	1.414	1.89	0.33	966	97.6%	19.32
King Street	S-STST263	STST263	STST264	0.25	0.54	100	0.77	0.19	0.25	0.19	15.00	137.49	0.073	0.013	50.8	0.8%	300	1.21	0.086	1.21	0.70	282	84.6%	15.70
King Street	S-STST264	STST264	STST265	0.15	0.66	100	0.83	0.12	0.40	0.31	15.70	134.11	0.117	0.013	4.1	4.8%	300	3.01	0.212	2.91	0.02	240	55.2%	15.72
King Street	S-STST265	STST265	STST266	2.70	0.42	100	0.71	1.92	3.10	2.24	15.72	134.00	0.833	0.013	46.9	1.1%	675	2.42	0.867	2.42	0.32	665	96.0%	16.04
King Street	S-STST266	STST266	STST267	3.55	0.52	100	0.76	2.70	6.65	4.94	16.04	132.49	1.817	0.013	15.1	1.3%	900	3.28	2.084	3.28	0.08	855	87.2%	16.12
King Street	S-STST267	STST267	STST262	**0.10**	**0.80**	100	0.90	0.09	6.75	5.03	16.12	132.14	1.845	0.013	12.1	19.0%	525	8.65	1.873	8.65	0.02	522	98.5%	16.14
Elgin Street	S-STST262	STST262	STST1217	0.13	0.70	100	0.85	0.11	11.65	9.27	19.32	119.07	3.066	0.013	40.4	1.3%	1050	3.58	3.102	3.58	0.19	1045	98.8%	19.50
Elgin Street	S-STST1217	STST1217	STM MH5	**0.92**	**0.70**	100	0.85	0.78	12.57	10.05	19.50	118.38	3.305	0.013	22.0	1.2%	1200	3.84	4.341	3.84	0.10	1083	76.1%	19.60

TATHAM ENGINEERING

Storm Sewer Design Sheet

Version Number: 1 **Version Date:** May 05/22

Project Information

Applewood	120164

Drawing Reference

Proposed Conditions - 1:100-Year Return Frequency Design Storm	May 05/22

Prepared By

JB	May 05/22

Reviewed By

RS	May 05/22

Municipality

Town of The Blue Mountains

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Year	A	B
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Manning's Coefficient

Pipe	Value
CSP	0.024
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PVC	0.009

Time of Concentration

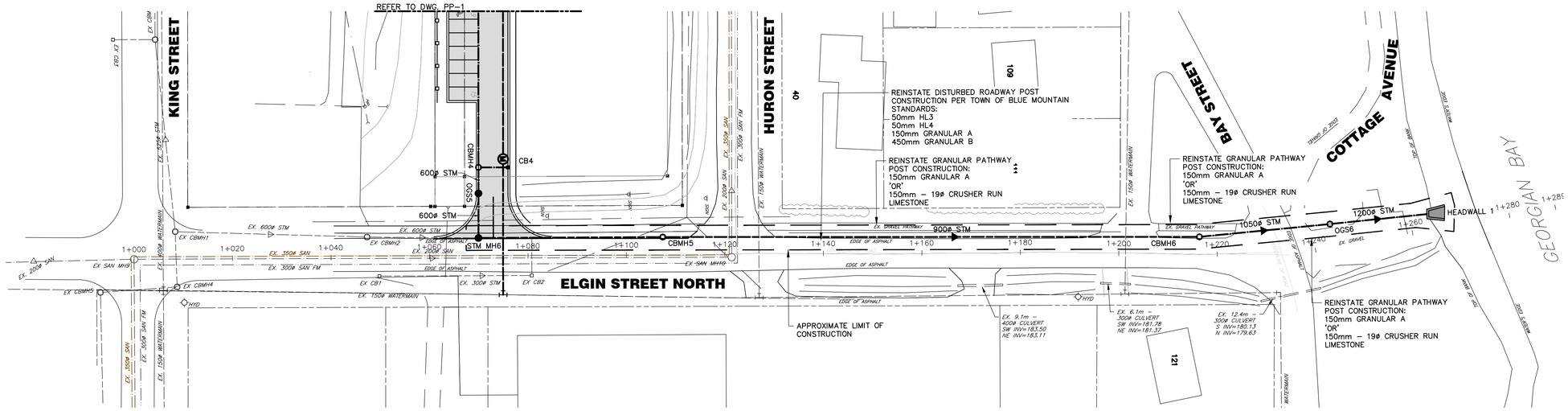
15 mins

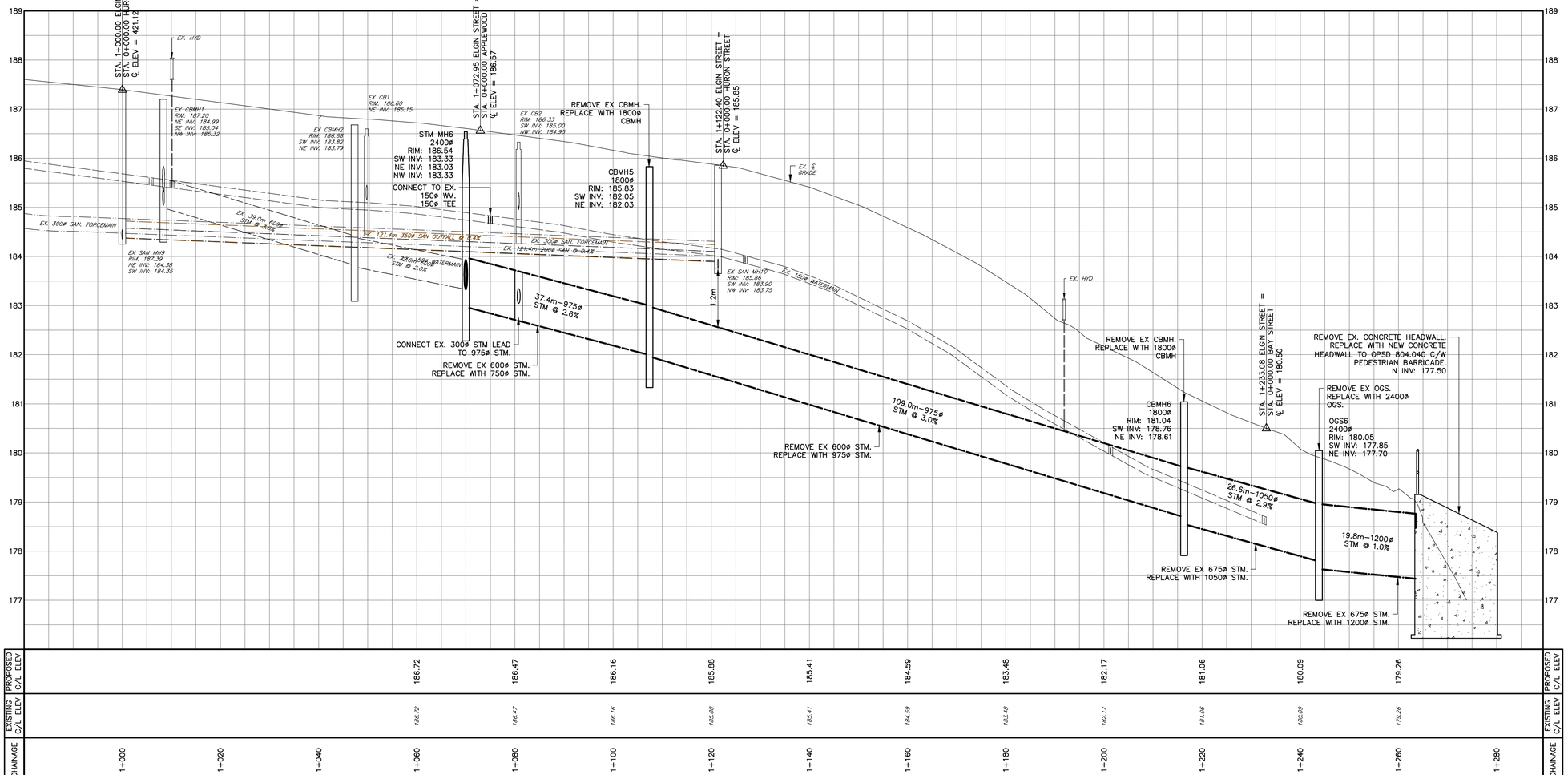
IDF Curve Coefficients

Year	A	B	C
2	807.44	6.75	0.83
5	1135.40	7.50	0.84
10	1387.00	7.97	0.85
25	1676.20	8.30	0.86
50	1973.10	9.00	0.87
100	2193.10	9.04	0.87

Engineer Stamp

Street Name	Area ID / Label	Upstream Maintenance Hole	Downstream Maintenance Hole	Area (ha)	5 Year Runoff Coefficient (C)	Design Storm (Year)	Adjusted Runoff Coefficient (C)	Area × Runoff Coefficient	Cumulative Area (ha)	Cumulative Area × Adjusted Runoff Coefficient	Time of Concentration (min)	Rainfall Intensity (mm/hr)	Peak Flow (m^3/s)	Manning's Roughness Coefficient	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Actual Velocity (m/s)	Travel Time (min)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)	Total Time of Travel (min)
Applewood	203 + 207	CBMH1	CBMH2	0.21	0.90	100	0.95	0.20	0.21	0.20	15.00	137.49	0.076	0.013	56.5	0.5%	**300**	0.98	0.069	0.98	0.96	311	110.3%	15.96
Applewood	204 + 208	CBMH2	CBMH3	0.20	0.90	100	0.95	0.19	0.41	0.39	15.96	132.86	0.144	0.013	52.5	0.5%	**375**	1.13	0.125	1.13	0.77	395	114.8%	16.74
Applewood	205 + 209	CBMH3	CBMH4	0.24	0.90	100	0.95	0.23	0.65	0.62	16.74	129.39	0.222	0.013	92.5	0.5%	**450**	1.28	0.204	1.28	1.20	465	109.0%	17.94
Applewood	206 + 210	CBMH4	STM MH5	0.17	0.67	100	0.84	0.14	0.82	0.76	17.94	124.34	0.262	0.013	14.0	0.2%	**450**	0.80	0.128	0.80	0.29	590	205.7%	18.23
Elgin Street		STM MH5	STST1218	0.00	0.67	100	0.84	0.00	13.39	10.81	19.60	118.04	3.545	0.013	37.4	2.6%	975	4.84	3.614	4.84	0.13	968	98.1%	19.73
Elgin Street	S-STST1218	STST1218	STST1219	0.36	0.47	100	0.74	0.27	13.75	11.08	19.73	117.58	3.618	0.013	109.0	3.0%	975	5.20	3.882	5.20	0.35	949	93.2%	20.08
Elgin Street	S-STST1219	STST1219	STST1500	0.61	0.63	100	0.81	0.50	14.36	11.57	20.08	116.35	3.741	0.013	26.6	2.9%	1050	5.37	4.650	5.37	0.08	967	80.4%	20.16
Elgon Street	S-STST1500	STST1500	Outlet	0.15	0.54	100	0.77	0.11	14.51	11.69	20.16	116.06	3.768	0.013	19.8	1.0%	1200	3.45	3.899	3.45	0.10	1184	96.7%	20.26





CHAINAGE	1+000	1+020	1+040	1+060	1+080	1+100	1+120	1+140	1+160	1+180	1+200	1+220	1+240	1+260	1+280
EXISTING C/L ELEV	186.72	186.47	186.16	185.88	185.41	184.59	183.48	182.17	181.06	180.09	179.26				
PROPOSED C/L ELEV	186.72	186.47	186.16	185.88	185.41	184.59	183.48	182.17	181.06	180.09	179.26				

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BENCHMARKS

TBM1 – ELEVATION 269.81
RAIL ROAD SPIKE IN SOUTH FACE OF HYDRO POLE AT NORTH-WEST CORNER OF MILL STREET AND OLD PENETANGUISHENE ROAD
TBM2 – ELEVATION 265.47
RAIL ROAD SPIKE IN SOUTH FACE OF HYDRO POLE AT INTERSECTION OF MILL STREET AND MURPHY STREET. POLE IS ON NORTH SIDE OF MILL STREET BETWEEN HOUSE 30 AND 28
TBM3 – ELEVATION 253.71
RAIL ROAD SPIKE AT NORTHWEST CORNER OF INTERSECTION OF MILL STREET AND COUNTY ROAD 93

NOTES

ALL DIMENSIONS, ELEVATIONS AND SIZES ARE IN METRIC UNITS UNLESS INDICATED. PIPE SIZES ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED. ELEVATIONS ARE IN METRES UNLESS INDICATED.

SURVEY AS PER CROZIER AND ASSOCIATES FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT DATED JULY 2013.

SERVICING AS PER CROZIER AND ASSOCIATES FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT DATED JULY 2013.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

APPLEWOOD
TOWN OF THE BLUE MOUNTAINS

PLAN & PROFILE
ELGIN STREET
1+000 – 1+289

TATHAM ENGINEERING

DESIGN: CMM/AVN	FILE: 120164	DWG: PP-2
DRAWN: EL	DATE: SEPT 2021	
CHECK: KRS	SCALE: H. 1:500 V. 1:50	

Drawing Name: 120164-PP100.dwg, Plotted: Sep 29, 2021

Culvert Report

650 mm Diameter CSP Culvert

Invert Elev Dn (m)	=	185.3700
Pipe Length (m)	=	12.0000
Slope (%)	=	0.4101
Invert Elev Up (m)	=	185.4192
Rise (mm)	=	650.0
Shape	=	Circular
Span (mm)	=	650.0
No. Barrels	=	1
n-Value	=	0.016
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

Top Elevation (m)	=	186.3500
Top Width (m)	=	3.0000
Crest Width (m)	=	12.0000

Calculations

Qmin (cms)	=	0.0000
Qmax (cms)	=	0.5000
Tailwater Elev (m)	=	(dc+D)/2

Highlighted

Qtotal (cms)	=	0.2250
Qpipe (cms)	=	0.2250
Qovertop (cms)	=	0.0000
Veloc Dn (m/s)	=	0.8664
Veloc Up (m/s)	=	1.5060
HGL Dn (m)	=	185.8448
HGL Up (m)	=	185.7188
Hw Elev (m)	=	185.8747
Hw/D (m)	=	0.7007
Flow Regime	=	Inlet Control