

MAY 12, 2022

PROJECT NO: 903-3780

**SENT VIA: EMAIL
MPOTTER@MEAFORD.CA**

Municipality of Meaford
21 Trowbridge Street West
Meaford, ON N4L 1Y1

**Attention: Margaret Potter
Senior Planner**

**RE: SUPPLEMENTARY INFORMATION - CONCEPTUAL ONSITE SEWAGE SYSTEM DESIGN
LEITH-BAYSHORE ROAD – SEVERANCE APPLICATION
CONCESSION BF, PART LOT 2, R. PLAN 16R-4635, PART 2,
ROLL #42-10510-004-07110-000
MUNICIPALITY OF MEAFORD**

Dear Margaret,

C.F. Crozier & Associates Inc. (Crozier) was retained by Don and Daphne McCullough (Owner) to support a Severance Application on a parcel of land located along the Bayshore Road (Roll # 42-10510-004-07110-000), located in the Municipality of Meaford (Site), to create five (5) independently serviced and graded lots. The purpose of this letter is to summarize supplementary information collected and analysis in support of the conceptual onsite sewage system design to service the proposed lots.

Site Soils Investigation

GM Blue Plan was retained to complete an initial soils investigation for the proposed residential development. Twelve (12) testholes were excavated across the property on February 18, 2022 to depths of approximately 1.2 to 2.8 meters below ground surface (mbgs). Test holes (TH) #1, #2, #3, #6, and #9 were excavated in the vicinity of the proposed leaching beds; TH #10 and TH#11 were excavated in the vicinity of the proposed infiltration feature, and the remainder of the test holes were excavated across the property. A copy of the initial soil's investigation report is attached.

In general, the soil stratigraphy observed consisted of a surficial layer of topsoil and organic material (100 mm to 650 mm thick), underlain by stiff, brown clayey silt till with some gravel. The clayey silt till extended from the topsoil to the base of the testhole, with the exception of TH #1, #2, #3, #7, #9, #10, and #12, where a hard, grey, clayey silt was observed between approximately 1 mbgs to 2.6 mbgs. At TH #1, a layer of silty sand and gravel was observed below the clayey silt till between approximately 1 and 2 mbgs, followed by the hard, grey clayey silt.

The clayey silt till is expected to be the receiving soils for the proposed onsite sewage systems based on the observed soil stratigraphy and their relative elevations. According to the particle size analysis charts, the clayey silt till is considered an "SC" soil, which has a T-time ranging from 12 – 50 min/cm per Table 2 of Supplementary Standard SB-6 in the Ontario Building Code. However, GM Blue Plan is recommending that a T-time greater than 50 min/cm should be used for sewage system sizing purposes.

As presented in the Functional Servicing & Stormwater Management Report from Crozier dated November 2021, each lot was proposed to be serviced with an onsite sewage system consisting of a septic tank and a conventional raised filter bed. The preliminary designs assumed a T-time between 35 – 50 min/cm, which is consistent with an SC soil. However, based on the recommendations of GM Blue Plan, we have updated the filter bed sizing to reflect a maximum loading rate of 4 L/ m²/day, as applicable for soils with a T-time of greater than 50 min/cm. As a result, a minimum footprint of 950 m² for a conventional raised filter bed is required for each lot. The revised calculations are attached.

Each of the five lots is able to accommodate the larger footprint required; however, future property owners may prefer to have a reduced footprint to preserve usable space for amenity purposes. Therefore, a Type A dispersal bed has also been sized for these lots, with a minimum footprint of 475 m². It should be noted that a Level IV treatment unit, meeting the CAN/BNQ 3680-600 standard, will be required prior to discharge to the Type A dispersal bed. Refer to the attached calculations.

D-5-4 Assessment

A D-5-4 analysis evaluates the cumulative impact of the proposed sewage systems to the local groundwater regime. The potential for impacts to occur depends on the local hydrogeological setting, the volume of effluent discharged as well as the concentration of nutrients discharged in the effluent. The nutrient of concern is typically nitrate-nitrogen.

Crozier has completed a mass balance calculation to predict the concentration of nitrate-nitrogen at the development boundary, using the following general assumptions, per D-5-4 guidelines:

- The concentration of nitrate in the effluent is 40 mg/L, typical for conventional systems.
- The average volume of effluent generated by each residence is approximately 1,000 L/day.
- The only dilution mechanism is by infiltration of surface precipitation. An infiltration value of 200 mm/year has been assigned based on the soils encountered on the Site (silt).
- Based on the assumption that the entire property area is available for dilution purposes, a background concentration of nitrogen (as N) in the groundwater was assumed to be 0 mg/L in the absence of groundwater analytical results. This is consistent with the MECP Chapter 22 Reasonable Use approach.

Using this approach, the resulting concentration of theoretical total nitrogen at the Site boundary is predicted to be 9.08 mg/L, which is below the maximum allowable concentration of 10 mg/L. The detailed D-5-4 Impact Assessment calculations are attached.

Based on the foregoing, we can confirm that the proposed lots can be serviced by conventional onsite sewage systems. The D-5-4 analysis shows that the lots are sufficiently sized to meet provincial policy objectives with respect to nitrate nitrogen at the development boundary. Where available space for the leaching bed is constrained due to lot features or the desire for additional amenity space an advanced treatment system with a Type A dispersal bed may be considered. If the advanced treatment system incorporates some recirculation, additional nitrogen removal will be achieved but it is not necessary to satisfy D-5-4.

We trust this information meets your requirements. Should you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

C.F. CROZIER & ASSOCIATES INC.



Katherine Rentsch, P.Eng.
Senior Project Manager

KR/cj

C.C.

Enclosure: Initial Soils Investigation (GM Blue Plan, 2022)
Onsite Sewage System Calculations
D-5-4 Impact Assessment Calculations

J:\900\903 - McCullough\3780 - Leith Bayshore Rd\Letters\OSS Comments\2022.05.12_(0903-3780)_Updated Conceptual Onsite Sewage System Design Ltr.docx

March 17, 2022
Our File: 222042

Via Email: gcooper@cfcrozier.ca

Don McCullough
53 Georgian Meadows Drive
Collingwood, ON L9y 5H4

C/o George Cooper – Crozier Consulting Engineers

Re: Initial Soils Investigation
Proposed Severances – Sideroad 23
343019 Side Road 23
Municipality of Meaford

Dear Mr. McCullough,

It is understood that you are proposing a residential development within the Municipality of Meaford. The site is located along Bayshore Road, north of the community of Leith.

The conceptual drawings provided from Crozier Consulting Engineers indicate the development will be comprised of five lots with individual drilled wells and sewage systems. The lots will be accessed by an internal street (McCullough Way) from Sideroad 23.

This letter report is to provide a summary of the soil conditions observed during the testhole excavation and recommendations with regards to the soil conditions for septic and infiltration features and the roadway construction and general comments on the foundation construction for the proposed residential development.

Site Setting

The site is located along Bayshore Road and will be accessed from Sideroad 23. An existing easement from Sideroad 23 exists and runs along the east side of 343011 Sideroad 23. Bayshore Road is considered to run in a north-south direction. Currently, the site is undeveloped and features a rolling terrain within the development area. Generally, the site slopes from east to west, from the open fields upgradient down towards Bayshore Road. The west side of the property is bordered with a treed area between the proposed development and Bayshore Road. Within the treed area there is a "bluff" and the grade changes rapidly towards Bayshore Road. There are four (4) existing drainage features that drain surface water from the upgradient lands to the east, through the site and west to the ditch that runs along the east side of Bayshore Road.

Site Investigation

A initial site visit was conducted on February 4, 2022 to layout the testholes and verify the access of the excavator to the site from the neighboring property. This testhole layout was provided to Crozier for review prior to conducting the site investigation. The excavation of the testholes was undertaken on February 18, 2022 and included twelve (12) testholes across the development area. A CAT 350 excavator provided and operated by R.F. King Excavating was utilized for the excavation of the testholes. The locations were selected to cover the general area of each proposed

septic bed area, infiltration feature and for general spatial coverage. The testhole locations were surveyed and tied into the site datum provided by Crozier and the locations are shown on the appended Figure No. 1.

The soil stratigraphy was observed, the overburden soils probed to infer the relative density, and the groundwater observations were noted. The testhole logs describing the soil stratigraphy are appended to this letter.

In general, the subsurface consisted of a surficial layer of topsoil and organic material, underlain by clayey silt till with some gravel. Some of the testholes intercepted a hard grey clay layer. In the area of TH-1, a sand with a little silt and gravel was encountered.

Foundation Loading

Since the proposed development is still in a conceptual phase, final floor elevations for the houses have not been finalized. Frost protected foundations are to be extended down to suitable inorganic bearing soil. For the Owen Sound area, frost penetration is considered to be 1.2 mbgs. Based on the anticipated lot grading, the houses are expected to be founded on the native undisturbed clayey silt till with sand and some gravel.

Conventional foundations governed by the Ontario Building Code are expected. Therefore, recommended design bearing capacities are 75 kPa at SLS and 100 kPa at ULS. The maximum total and differential settlements of footings which are designed based on the above noted capacities are expected to be less than 25mm and 15mm respectively

Slab-on-Grade Construction

Where a conventional slab-on-grade construction element is proposed, all topsoil and organics must be removed down to suitable underlying inorganic subgrade soils. The underlying clayey silt soils would generally be considered suitable. A proof-roll with compaction equipment can be performed to confirm suitability. A minimum 150mm lift of compacted Granular A, meeting the OPSS 1010 specifications and compacted to 100% of the material's SPMD, is to be placed below the proposed concrete slab-on-grade. Where greater depth of backfill is required, imported sand or Granular "B" is recommended with a minimum compaction of 95% SPMD.

Excavations and Dewatering

Excavations for the foundations will terminate in the native clayey silt soil. Temporary excavations must comply with Ontario Occupational Health and Safety Act for Construction Projects (O.Reg. 213/91). The overburden soils fall into the Type 2 as defined in the regulation and therefore, temporary side slopes in Type 2 soils must be sloped to 1.2 metres or less from its bottom at an inclination of 1 horizontal to 1 vertical (exclusive to groundwater effects).

During the excavation of the testholes, minor shallow groundwater infiltration was noted at some of the locations. The water was found to infiltrate between 1.0m to 1.6m below ground surface. These shallow ground water conditions can be attributed to the recent fluctuations in temperature causing snow melt. At the location of TH-10, towards the west end of infiltration trench #3, significant groundwater infiltration was noted at a depth of 1.4m.

Since there are predominately fine-grained soils located across the site, perched groundwater conditions are likely to develop during the wetter seasons. Temporary dewatering with conventional sump pumps at excavated low points may be necessary to control the seepage of water from the layers of till during construction.

Septic Design

The five lots are proposed to have their own individual septic systems located to the rear of the lots (west side) and typically downgradient of the dwelling. A testhole was excavated within each proposed septic bed area, with a subgrade soil being generally consistent for 4 of the 5 septic areas. For Lots 1, 2, 3, and 5, the encountered subgrade soils in the area of the septic bed was clayey silt till with sand and some to trace gravel. A representative sample collected from TH-6 was selected for grain-size analysis and yielded 21.4% gravel, 35.5% sand, 33.6% silt and 17.5% clay. Therefore, the estimated coefficient of permeability for this material is 1.6×10^{-7} cm/sec which translates to a "T" Time for the bed greater than 50 mins/cm. Based on this result, it is not feasible to construct "in-ground" septic beds for these lots, and the design should feature a raised bed constructed of approved imported material.

The excavation of TH-1, located within the proposed septic area for Lot 4, encountered below the till and at a depth of 1.0 m, a sandier soil with silt, gravel, and clay still present. A sample collected from TH-1 was analyzed for grain-size distribution and yielded 15.0% gravel, 63.9% sand, 16.6% silt and 4.5% clay. The estimated coefficient of permeability for this sample is 1.6×10^{-3} cm/sec and a "T" Time of 12 to 15 mins/cm. While this soil would be somewhat more conducive to a "in-ground" septic bed, the consistent clay and silt subgrade findings above and below the minor sandy layer in this testhole and the clay and silt from the other testholes would impact the performance of the septic bed and therefore raised beds are recommended. In addition, diverting surface water away from the raised system will be critical to reduce potential saturation of the imported sand, utilized to construct the onsite systems.

Stormwater Management

As shown on the conceptual design for the development, several infiltration trenches are included to manage the stormwater on site. There are four (4) existing drainage features identified on the site that drain surface water from the upgradient lands to the east, through the site west to the ditch that runs along the east side of Bayshore Road.

The proposed construction includes ditches on either side of McCullough Way, that direct the surface water towards infiltration trenches located along the existing drainage features. TH-4 was excavated within the area of infiltration trench #4 near drainage feature 1, located on Lot 2. TH-10 and TH-11 were located along the area of infiltration trench #3 located between Lots 4 and 5. TH-12 is located near infiltration trenches #1 and #2, near drainage feature 3. The fourth drainage feature is located towards the south end of McCullough Way.

The findings of the testholes at these areas was relatively consistent, with surficial topsoil and organics underlain by the clayey silt till with sand and some gravel. Samples from TH-4, TH-10 were selected for grain-size analysis to determine estimated infiltration rates of the soil. The sample collected from TH-4 yielded a grain-size distribution of 11.8% gravel, 37.1% sand, 33.6% silt and 17.5% clay. The sample collected from TH-10 yielded a grain-size distribution of 5.0% gravel, 41.5% sand, 40.4% silt and 13.1% clay. The estimated coefficient of permeability for the samples from TH-4 and TH-10 are 1.0×10^{-8} cm/sec and 1.6×10^{-7} cm/sec respectively.

During the excavation of the testholes, the inferred density of the material was estimated from probing the soils with a steel rod. The clayey silt till was noted to be stiff to very stiff when probed. Combining this with the low estimated coefficient of permeability and low infiltration rates, it is interpreted that the infiltration of stormwater would be very low and should be considered negligible as part of the stormwater design.

Roadway Construction

The five lots will front on McCullough Way, which will be a private roadway which is proposed to be constructed to connect the lots to Sideroad 23. The subgrade for the roadway will likely be the clayey silt till with sand and some gravel. Depending on the time of year, the moisture conditions at the time of construction, and the quality of the soils, surplus harvested materials may be able to be used as subgrade material.

It is recommended the final subgrade surface be proof rolled to determine any loose, soft, or unstable areas of the subgrade. Any areas which reveal unsuitable conditions should be sub-excavated and backfilled using suitable materials such as imported Granular "B" which must be compacted to at least 95% of the material's SPMD at the subgrade level. The recommended road structure is outlined in the table below.

Internal Roadways	Component Thickness (mm)	Specified Compaction (%)
OPSS Granular "A"	200	100% SPMD
OPSS Granular "B"	350	100% SPMD
Subgrade Fill	Varies	95 to 98% SPMD

STATEMENT OF LIMITATIONS

The discussion and recommendations in this report are based upon information gathered at the testhole locations and available geological and physiographical information of general nature for the area. Sub-surface and groundwater conditions are variable and will differ in area beyond the investigated testholes. As a result, conditions may become apparent during further investigation or construction, which would not be detected or anticipated at the time the site investigation was performed and when this report was prepared.

The information in this report is intended for the sole use of Mr. Don McCullough and his agents. GM BluePlan Engineering Limited accepts no liability for use of this information by third parties on the basis of the interpretation of the information provided in this preliminary report are made at the sole risk of the third parties.

The final shape and location of the proposed site developments have not been confirmed and therefore, comments made within this report are made in general only to assist the owner and designers involved with the project in question. Furthermore, the number of testholes may not be sufficient to determine all the factors that may affect the design, construction methods and costs. Additional investigation would be necessary to increase the confidence level. For this reason, Contractors bidding on this project or undertaking the construction should make their own interpretation of the factual information presented within this report and then draw their own conclusion on the sub-surface conditions and how it will affect the methods and cost of construction.

We recommend that we be retained to provide comment for the selected roadway design and during construction to ensure that all the necessary stripping, sub-grade preparation, and compaction requirements are met, and to be available to confirm that the soil conditions do not deviate from those presented within this report

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED

Per:

A handwritten signature in blue ink, reading 'Ethan Webb'.

Ethan C.J. Webb, P.Eng.
EW/md

Encl.

cc: File No. 222042

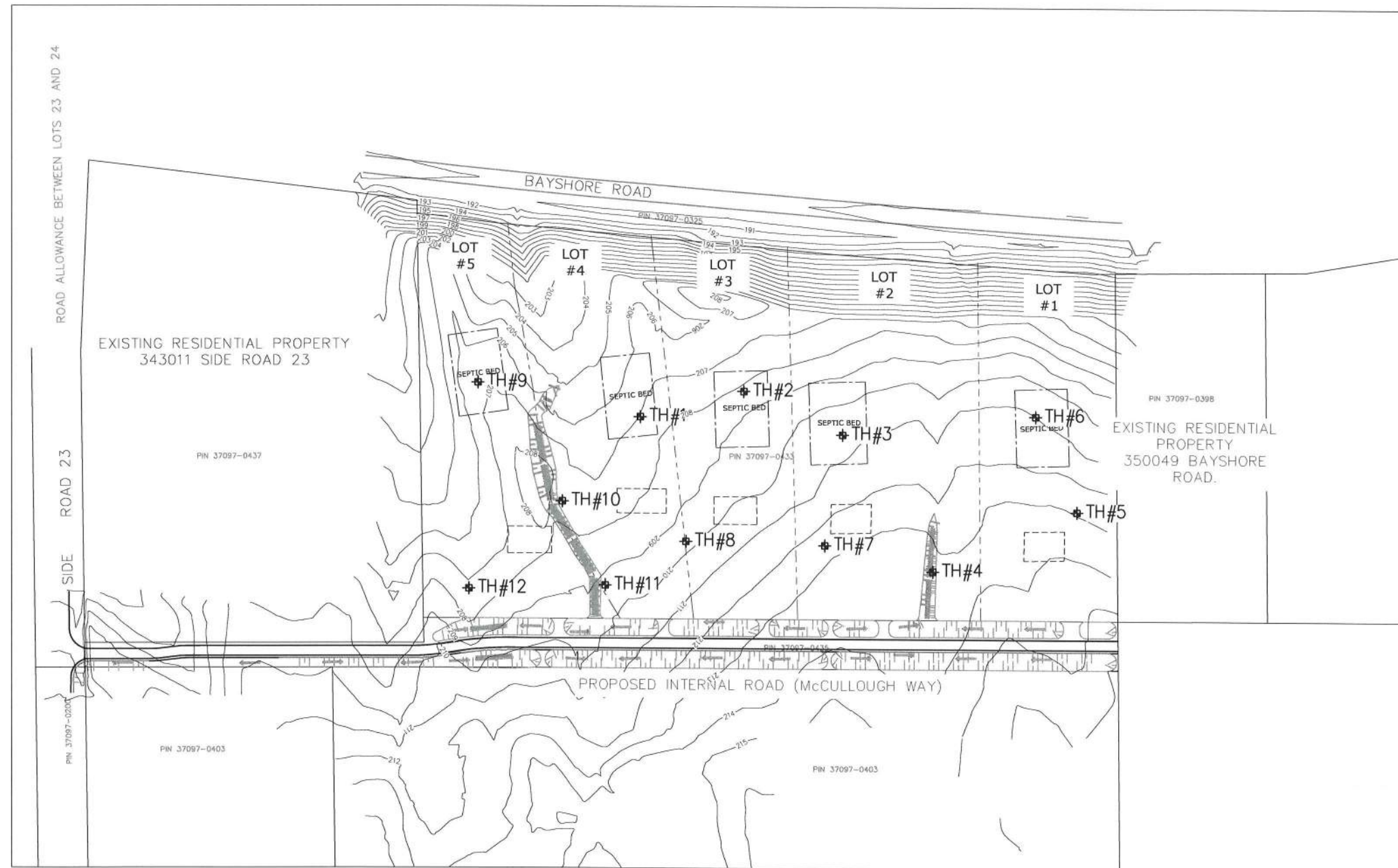
Reviewed by:

A handwritten signature in blue ink, reading 'Wm. E. Dubeau'.

Wm. E. Dubeau, P.Eng.



FILE:W:\OwenSound\2022\222042 Soils Investigation - Proposed Severance - Sideroad 23, Meaford\SURVEY DATA\Temp\222042b.dwg LAYOUT:11X17
LAST SAVED BY: Tjahne, 3/9/2022 4:20:16 PM PLOTTED BY: Tyler Jahnke - GM BluePlan 3/10/2022 9:44:46 AM



222042
SOILS INVESTIGATION
PROPOSED SEVERANCE
SIDEROAD 23, MEAFORD



LEGEND

-  PROPOSED TESTHOLE
-  CONCEPTUAL LOCATION OF RESIDENCE
-  CONCEPTUAL LOCATION OF SEPTIC BED

SCALE = 1:2000
FEBRUARY 2022

TESTHOLE LOCATIONS

Mr. Don McCullough
Municipality of Meaford

Figure No. 1

Project No: 222042

Log of Testhole: 1

Project: Sideroad 23 - Severences

Excavation Date: February 18, 2022

Client: Mr. Don McCullough

Field Technician: E. Webb.

Location: Municipality of Meaford

Excavation Company: R.F. King Excavating

SUBSURFACE PROFILE				PROPERTIES	HYDROLOGY
Depth	Elevation	Symbol	Description	% Moisture 5 15 25	Ground Water and Sampling Details
0	206.96		Ground Surface		
1	206.56		Black topsoil and organics.		
2			Brown Clayey Silt Till with a some Gravel. Grey Mottled. Moist and Stiff when probed with a steel rod.		
3	205.96				
4			Silty Sand and Gravel. Moist and Compact when probed with a steel rod.		Minor Infiltration @ 1.1m
5					Sample Collected @ 1.4m
6					Minor Infiltration @ 1.6m
7	204.96				
8	204.76		Grey Clayey Silt Till. Moist and Hard from resistance in excavation.		
9					
10					
11					
12					
13					
14					
15					
16					

Notes:

GM BluePlan Engineering Limited
Guelph, Owen Sound, Listowel, Kitchener, Exeter, Hamilton, GTA
1260 Second Ave East, Unit 1, Owen Sound, ON N4K 2J3
519-376-1805 Fax 519-376-8977 www.gmbblueplan.ca



Equipment: CAT 350 Excavator

Project No: 222042

Log of Testhole: 2

Project: Sideroad 23 - Severences

Excavation Date: February 18, 2022

Client: Mr. Don McCullough

Field Technician: E. Webb.

Location: Municipality of Meaford

Excavation Company: R.F. King Excavating

SUBSURFACE PROFILE				PROPERTIES	HYDROLOGY
Depth	Elevation	Symbol	Description	% Moisture 5 15 25	Ground Water and Sampling Details
ft m	208.22		Ground Surface		
0	208.02		Black topsoil and organics.		
1			Brown Clayey Silt Till with a some Gravel. Grey Mottled. Moist and Stiff when probed with a steel rod.		
2					
3					
4					
5					
6					
7	206.12				
8	205.92		Grey Clayey Silt Till. Moist and Hard from resistance in excavation.		
9					
10					
11					
12					
13					
14					
15					
16					

Notes:

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Equipment: CAT 350 Excavator

Project No: 222042

Log of Testhole: 3

Project: Sideroad 23 - Severences

Excavation Date: February 18, 2022

Client: Mr. Don McCullough

Field Technician: E. Webb.

Location: Municipality of Meaford

Excavation Company: R.F. King Excavating

SUBSURFACE PROFILE				PROPERTIES	HYDROLOGY
Depth	Elevation	Symbol	Description	% Moisture 5 15 25	Ground Water and Sampling Details
0	210.52		Ground Surface		
0	210.32		Black topsoil and organics.		
1			Brown Clayey Silt Till with a some Gravel. Grey Mottled. Moist and Stiff when probed with a steel rod.		
2					
3					
4					
5					
6					
7	208.42				
7	208.22		Grey Clayey Silt Till. Moist and Hard from resistance in excavation.		
8					
9					
10					
11					
12					
13					
14					
15					
16					

Notes:

Equipment: CAT 350 Excavator

GM BluePlan Engineering Limited
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Project No: 222042

Log of Testhole: 4

Project: Sideroad 23 - Severences

Excavation Date: February 18, 2022

Client: Mr. Don McCullough

Field Technician: E. Webb.

Location: Municipality of Meaford

Excavation Company: R.F. King Excavating

SUBSURFACE PROFILE				PROPERTIES	HYDROLOGY
Depth	Elevation	Symbol	Description	% Moisture 5 15 25	Ground Water and Sampling Details
0	213.27		Ground Surface		
0	213.07		Black topsoil and organics.		
1			Brown Clayey Silt Till with a some Gravel. Grey Mottled. Moist and Stiff when probed with a steel rod.		
2					
3					
4					
5					
6					
7					
8	210.97				
9					
10					
11					
12					
13					
14					
15					
16					

Notes:

Equipment: CAT 350 Excavator

GM BluePlan Engineering Limited
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Project No: 222042

Log of Testhole: 5

Project: Sideroad 23 - Severences

Excavation Date: February 18, 2022

Client: Mr. Don McCullough

Field Technician: E. Webb.

Location: Municipality of Meaford

Excavation Company: R.F. King Excavating

SUBSURFACE PROFILE				PROPERTIES	HYDROLOGY
Depth	Elevation	Symbol	Description	% Moisture 5 15 25	Ground Water and Sampling Details
0	217.87		Ground Surface		
0	217.67		Black topsoil and organics.		
1			Brown Clayey Silt Till with a some Gravel. Grey Mottled. Moist and Stiff when probed with a steel rod.		
2					
3					
4					
5					
6	215.97				
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

Notes:

Equipment: CAT 350 Excavator

GM BluePlan Engineering Limited
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Project No: 222042

Log of Testhole: 6

Project: Sideroad 23 - Severences

Excavation Date: February 18, 2022

Client: Mr. Don McCullough

Field Technician: E. Webb.

Location: Municipality of Meaford

Excavation Company: R.F. King Excavating

SUBSURFACE PROFILE				PROPERTIES	HYDROLOGY
Depth	Elevation	Symbol	Description	% Moisture 5 15 25	Ground Water and Sampling Details
ft m 0 0	210.97		Ground Surface		
1	210.77		Black topsoil and organics.		
2			Brown Clayey Silt Till with a some Gravel. Grey Mottled. Moist and Stiff when probed with a steel rod.		
3					
4					
5					
6					
7					
8	208.67				
9					
10					
11					
12					
13					
14					
15					
16					

Notes:

Equipment: CAT 350 Excavator

GM BluePlan Engineering Limited
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Project No: 222042

Log of Testhole: 7

Project: Sideroad 23 - Severences

Excavation Date: February 18, 2022

Client: Mr. Don McCullough

Field Technician: E. Webb.

Location: Municipality of Meaford

Excavation Company: R.F. King Excavating

SUBSURFACE PROFILE				PROPERTIES	HYDROLOGY
Depth	Elevation	Symbol	Description	% Moisture 5 15 25	Ground Water and Sampling Details
0	210.97		Ground Surface		
0	210.82		Black topsoil and organics.		
1			Brown Clayey Silt Till with a some Gravel. Grey Mottled. Moist and Stiff when probed with a steel rod.		
2					
3					
4					
5					
6					
7					
8	208.47				
9	208.17		Grey Clayey Silt Till. Moist and Hard from resistance in excavation.		
10					
11					
12					
13					
14					
15					
16					

Notes:

GM BluePlan Engineering Limited
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Equipment: CAT 350 Excavator

Project No: 222042

Log of Testhole: 8

Project: Sideroad 23 - Severences

Excavation Date: February 18, 2022

Client: Mr. Don McCullough

Field Technician: E. Webb.

Location: Municipality of Meaford

Excavation Company: R.F. King Excavating

SUBSURFACE PROFILE				PROPERTIES	HYDROLOGY
Depth	Elevation	Symbol	Description	% Moisture 5 15 25	Ground Water and Sampling Details
0	209.62		Ground Surface		
1	209.32		Black topsoil and organics.		
2			Brown Clayey Silt Till with a some Gravel. Grey Mottled. Moist and Stiff when probed with a steel rod.		
3					
4					
5					
6					
7	207.32				
8					
9					
10					
11					
12					
13					
14					
15					
16					

Notes:

GM BluePlan Engineering Limited
Guelph, Owen Sound, Listowel, Kitchener, Exeter, Hamilton, GTA
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519-376-1805 Fax 519-376-8977 www.gmblueplan.ca



Equipment: CAT 350 Excavator

Project No: 222042

Log of Testhole: 9

Project: Sideroad 23 - Severences

Excavation Date: February 18, 2022

Client: Mr. Don McCullough

Field Technician: E. Webb.

Location: Municipality of Meaford

Excavation Company: R.F. King Excavating

SUBSURFACE PROFILE				PROPERTIES	HYDROLOGY
Depth	Elevation	Symbol	Description	% Moisture 5 15 25	Ground Water and Sampling Details
ft m	206.81		Ground Surface		
0	206.66		Black topsoil and organics.		
1			Brown Clayey Silt Till with a some Gravel. Grey Mottled. Moist and Stiff when probed with a steel rod.		
2					
3					
4					
5					
6					
7					
8					
9	204.11				
10	203.91		Grey Clayey Silt Till. Moist and Hard from resistance in excavation.		
11					
12					
13					
14					
15					
16					

Notes:

GM BluePlan Engineering Limited
Guelph, Owen Sound, Listowel, Kitchener, Exeter, Hamilton, GTA
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Equipment: CAT 350 Excavator

Project No: 222042

Log of Testhole: 10

Project: Sideroad 23 - Severences

Excavation Date: February 18, 2022

Client: Mr. Don McCullough

Field Technician: E. Webb.

Location: Municipality of Meaford

Excavation Company: R.F. King Excavating

SUBSURFACE PROFILE				PROPERTIES	HYDROLOGY
Depth	Elevation	Symbol	Description	% Moisture 5 15 25	Ground Water and Sampling Details
0	207.80		Ground Surface		
1	207.40		Black topsoil and organics.		
2			Sandy Silt with a little Clay. Moist and Loose to Compact when probed with a steel rod.		Sample Collected @ 1.0m
3					Major Infiltration @ 1.4m
4	205.70				
5	205.40		Grey Clayey Silt Till. Moist and Hard from resistance in excavation.		
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

Notes:

Equipment: CAT 350 Excavator

GM BluePlan Engineering Limited
Guelph, Owen Sound, Listowel, Kitchener, Exeter, Hamilton, GTA
1260 Second Ave East, Unit 1, Owen Sound, ON N4K 2J3
519-376-1805 Fax 519-376-8977 www.gmblueplan.ca



Project No: 222042

Log of Testhole: 11

Project: Sideroad 23 - Severences

Excavation Date: February 18, 2022

Client: Mr. Don McCullough

Field Technician: E. Webb.

Location: Municipality of Meaford

Excavation Company: R.F. King Excavating

SUBSURFACE PROFILE				PROPERTIES	HYDROLOGY
Depth	Elevation	Symbol	Description	% Moisture 5 15 25	Ground Water and Sampling Details
0	209.17		Ground Surface		
0			Black topsoil and organics.		
1			Brown Clayey Silt Till with a some Gravel. Grey Mottled. Moist and Stiff when probed with a steel rod.		
2					
3					
4					
5					
6					
7	207.07				
8					
9					
10					
11					
12					
13					
14					
15					
16					

Major Infiltration @ 1.4m

Notes:

GM BluePlan Engineering Limited
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1260 Second Ave East, Unit 1, Owen Sound, ON N4K 2J3
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Equipment: CAT 350 Excavator

Project No: 222042

Log of Testhole: 12

Project: Sideroad 23 - Severences

Excavation Date: February 18, 2022

Client: Mr. Don McCullough

Field Technician: E. Webb.

Location: Municipality of Meaford

Excavation Company: R.F. King Excavating

SUBSURFACE PROFILE				PROPERTIES	HYDROLOGY
Depth	Elevation	Symbol	Description	% Moisture 5 15 25	Ground Water and Sampling Details
0	207.20		Ground Surface		
1	206.85		Black topsoil and organics.		
2			Brown Clayey Silt Till with a some Gravel. Grey Mottled. Moist and Stiff when probed with a steel rod.		
3	206.10				Minor Infiltration @ 1.0m
4	205.90		Grey Clayey Silt Till. Moist and Hard from resistance in excavation.		
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

Notes:

GM BluePlan Engineering Limited
Guelph, Owen Sound, Listowel, Kitchener, Exeter, Hamilton, GTA
1260 Second Ave East, Unit 1, Owen Sound, ON N4K 2J3
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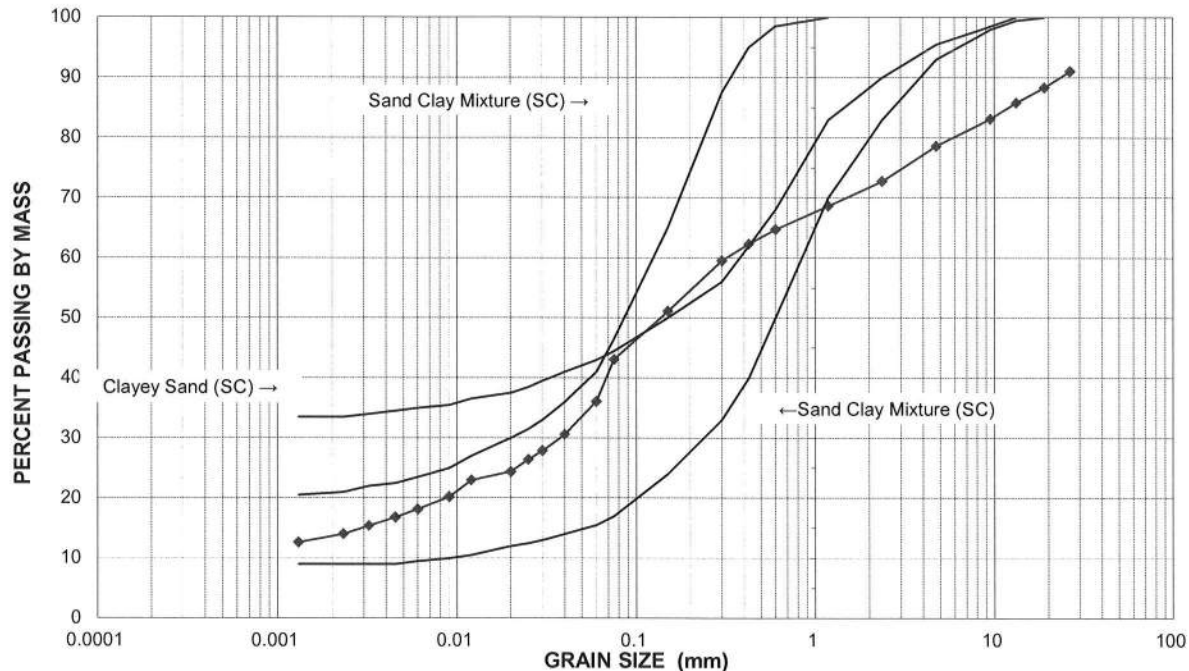
Equipment: CAT 350 Excavator

PARTICLE SIZE ANALYSIS

PROJECT: Soils Investigation - Proposed Severance - Sideroad 23
LOCATION: Municipality of Meaford
CLIENT : Don McCullough
SOIL TYPE: Clayey Silt with Sand and some Gravel
GRAPH # : 8 - Clayey Sands, Sand-Clay Mixtures

FILE NO.: 222042
LAB SAMPLE NO.: S-4445 (RCVD Feb 18)
SAMPLE DATE: February 18, 2022
SAMPLED BY: EW
SOURCE: TH-6 @ 1.2m

PARTICLE SIZE DISTRIBUTION



←		FINE		MEDIUM	COARSE	FINE		COARSE
CLAY		SILT		SAND		GRAVEL		
SIEVE SIZE PARTICLE DIA. (mm)	PERCENT PASSING SAMPLE	HYDROMETER PARTICLE DIA. (mm)		PERCENT PASSING SAMPLE				
26.5	91.0	0.0600		36.1				
19	88.4	0.0400		30.6				
13.2	85.8	0.0300		27.8				
9.5	83.1	0.0250		26.4				
4.75	78.6	0.0200		24.4				
2.36	72.7	0.0120		23.0				
1.180	68.6	0.0090		20.2				
0.600	64.7	0.0060		18.2				
0.425	62.4	0.0045		16.8				
0.300	59.5	0.0032		15.4				
0.150	51.1	0.0023		14.0				
0.075	43.1	0.0013		12.6				

D₁₀ : 0.0004 mm **D₆₀ :** 0.32 mm **Cu :** 800

Coefficient of Permeability: 1.6×10^{-7} cm/sec **"T" Time :** > 50 mins/cm

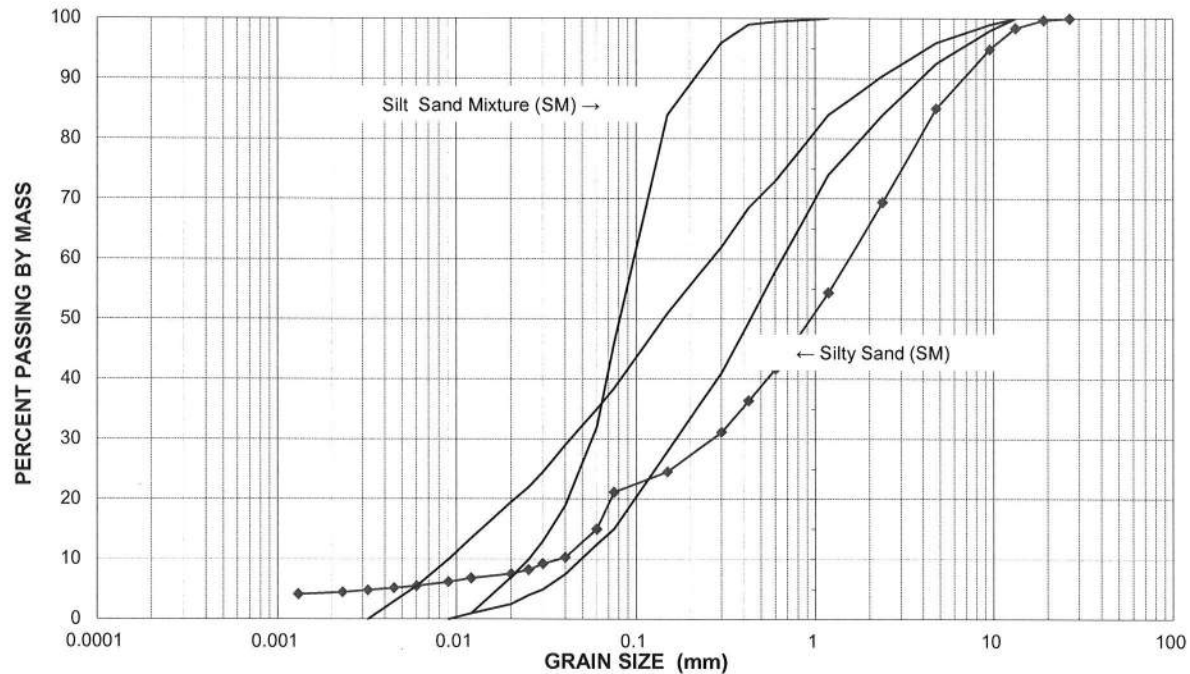
Comments: D10 is extrapolated.

PARTICLE SIZE ANALYSIS

PROJECT: Soils Investigation - Propose Severance - Sideroad 23
LOCATION: Municipality of Meaford
CLIENT: Don McCullough
SOIL TYPE: Sand with a little Silt and Gravel and a trace of Clay
GRAPH #: 7 - Silty Sands, Sand-Silt Mixture

FILE NO.: 222042
LAB SAMPLE NO.: S-4446 (RCVD Feb 18)
SAMPLE DATE: February 18, 2022
SAMPLED BY: EW
SOURCE: TH-1 @ 1.4m

PARTICLE SIZE DISTRIBUTION



←		FINE		MEDIUM	COARSE	FINE		COARSE
CLAY		SILT		SAND		GRAVEL		
SIEVE SIZE PARTICLE DIA. (mm)	PERCENT PASSING SAMPLE	HYDROMETER PARTICLE DIA. (mm)		PERCENT PASSING SAMPLE				
26.5	100.0	0.0600		15.0				
19	99.7	0.0400		10.3				
13.2	98.4	0.0300		9.2				
9.5	94.9	0.0250		8.2				
4.75	85.0	0.0200		7.6				
2.36	69.4	0.0120		6.9				
1.180	54.4	0.0090		6.2				
0.600	41.7	0.0060		5.5				
0.425	36.4	0.0045		5.2				
0.300	31.1	0.0032		4.8				
0.150	24.6	0.0023		4.5				
0.075	21.1	0.0013		4.2				

D₁₀ : 0.04 mm **D₆₀ :** 1.62 mm **Cu :** 40.5

Coefficient of Permeability: 1.6 x 10⁻³ cm/sec **"T" Time :** 12 to 15 mins/cm

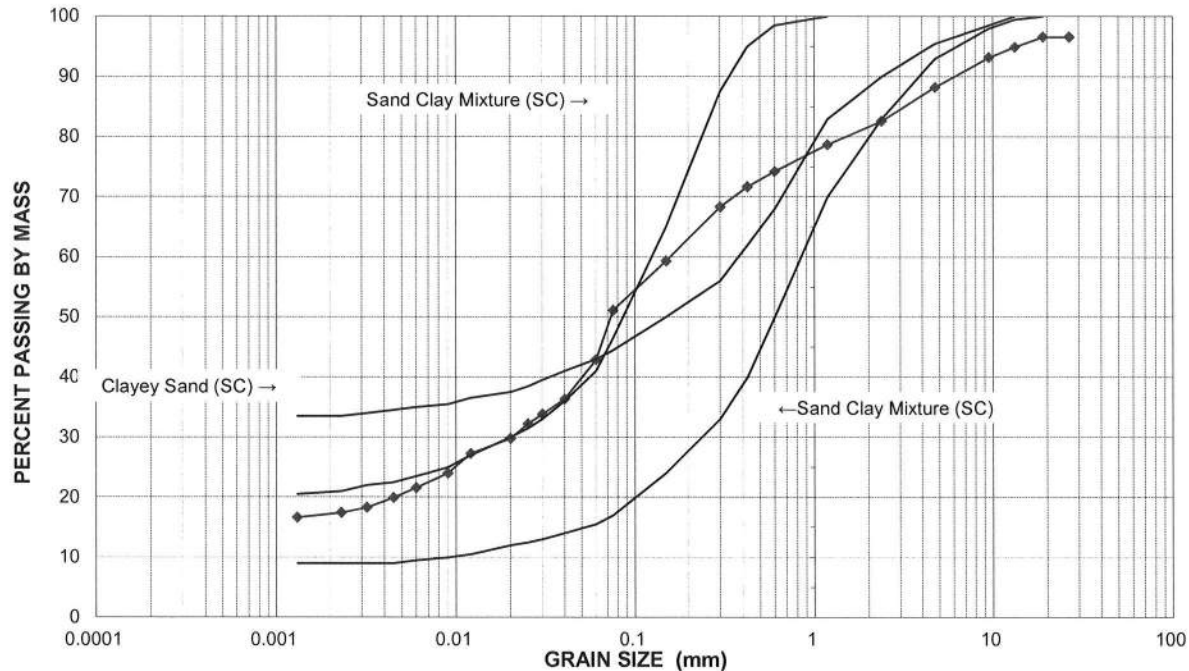
Comments:

PARTICLE SIZE ANALYSIS

PROJECT: Soils Investigation - Proposed Severance - Sideroad 23
LOCATION: Municipality of Meaford
CLIENT: Don McCullough
SOIL TYPE: Clayey Silt with Sand and a little Gravel
GRAPH #: 8 - Clayey Sands, Sand-Clay Mixtures

FILE NO.: 222042
LAB SAMPLE NO.: S-4447 (RCVD Feb 18)
SAMPLE DATE: February 18, 2022
SAMPLED BY: EW
SOURCE: TH-4 @ 1.2m

PARTICLE SIZE DISTRIBUTION



←		FINE	MEDIUM	COARSE	FINE	COARSE
CLAY		SILT		SAND		GRAVEL
SIEVE SIZE PARTICLE DIA. (mm)	PERCENT PASSING SAMPLE	HYDROMETER PARTICLE DIA. (mm)		PERCENT PASSING SAMPLE		
26.5	96.6	0.0600		42.9		
19	96.6	0.0400		36.3		
13.2	94.9	0.0300		33.9		
9.5	93.2	0.0250		32.2		
4.75	88.2	0.0200		29.8		
2.36	82.6	0.0120		27.3		
1.180	78.7	0.0090		24.0		
0.600	74.2	0.0060		21.6		
0.425	71.7	0.0045		19.9		
0.300	68.3	0.0032		18.3		
0.150	59.3	0.0023		17.5		
0.075	51.1	0.0013		16.6		

D₁₀ : 0.0001 mm **D₆₀ :** 0.16 mm **Cu :** 1600

Coefficient of Permeability: 1.0 x 10⁻⁸ cm/sec **"T" Time :** > 50 mins/cm

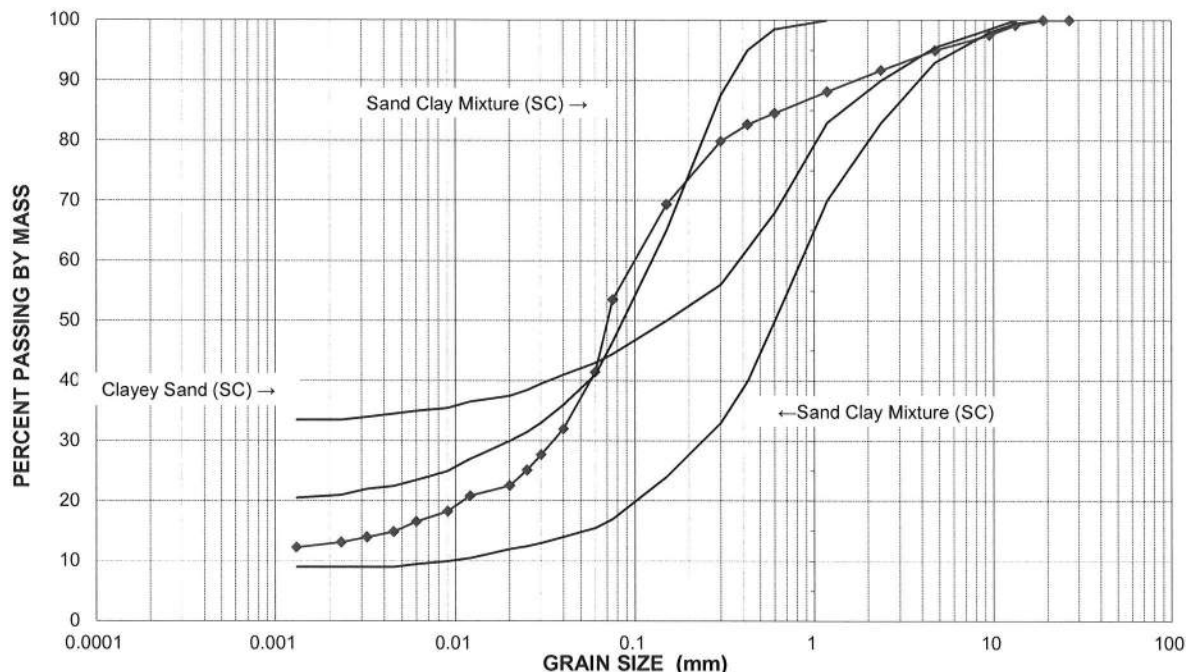
Comments: D10 is extrapolated.

PARTICLE SIZE ANALYSIS

PROJECT: Soils Investigation - Proposed Severance - Sideroad 23
LOCATION: Municipality of Meaford
CLIENT : Don McCullough
SOIL TYPE: Silty Sand with a little Clay and trace of Gravel
GRAPH # : 8 - Clayey Sands, Sand-Clay Mixtures

FILE NO.: 222042
LAB SAMPLE NO.: S-4448 (RCVD Feb 18)
SAMPLE DATE: February 18, 2022
SAMPLED BY: EW
SOURCE: TH-10 @ 1.0m

PARTICLE SIZE DISTRIBUTION

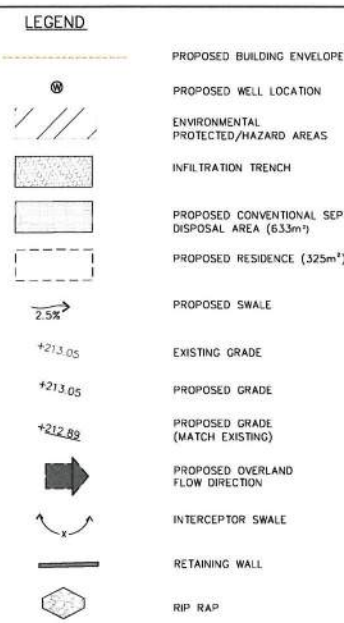
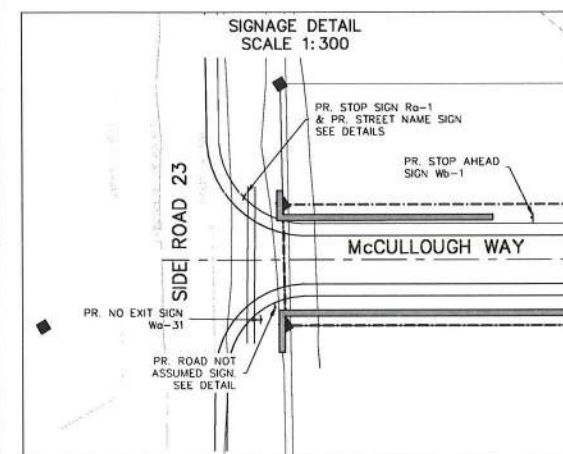


←		FINE	MEDIUM	COARSE	FINE	COARSE
CLAY		SILT			SAND	
SIEVE SIZE PARTICLE DIA. (mm)		PERCENT PASSING		HYDROMETER PARTICLE DIA. (mm)		PERCENT PASSING
		SAMPLE				SAMPLE
26.5		100.0		0.0600		41.5
19		100.0		0.0400		32.0
13.2		99.2		0.0300		27.7
9.5		97.5		0.0250		25.1
4.75		95.0		0.0200		22.6
2.36		91.7		0.0120		20.9
1.180		88.2		0.0090		18.3
0.600		84.6		0.0060		16.6
0.425		82.7		0.0045		14.8
0.300		79.9		0.0032		14.0
0.150		69.4		0.0023		13.1
0.075		53.5		0.0013		12.3

D₁₀ : 0.0004 mm **D₆₀ :** 0.11 mm **Cu :** 275

Coefficient of Permeability: 1.6×10^{-7} cm/sec **"T" Time :** > 50 mins/cm

Comments: D10 is extrapolated.



SIGN DETAILS



60cmx60cm
Ra-1 STOP SIGN



75cmx75cm
Wb-1 STOP AHEAD SIGN



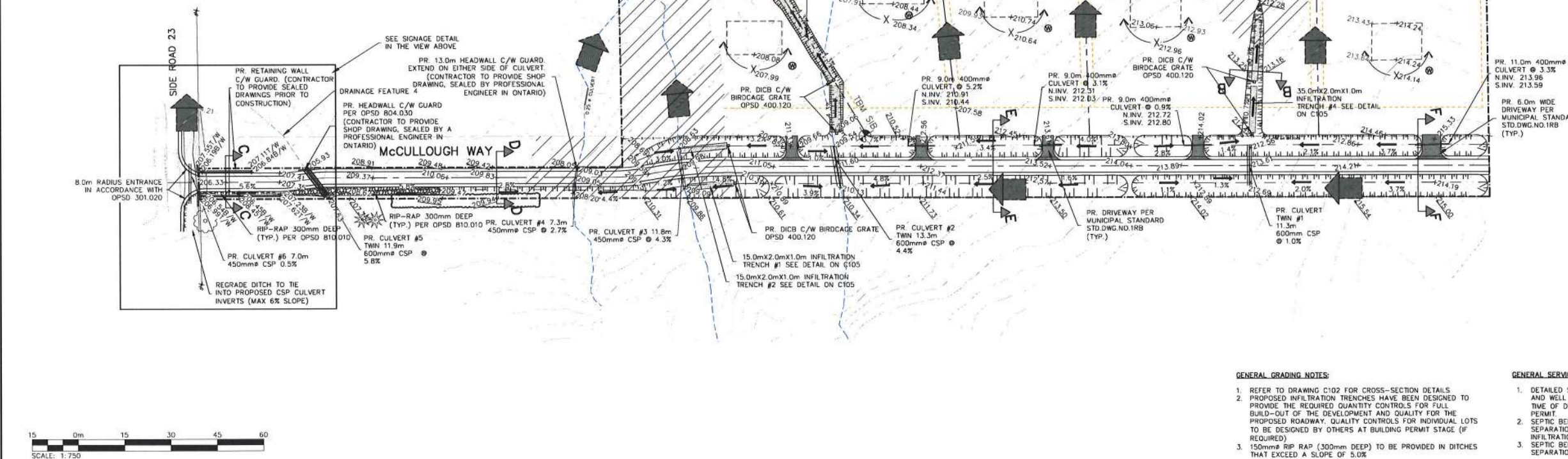
45cmx45cm
Wa-31 NO EXIT SIGN

ROAD NOT ASSUMED SIGN

Roadway St.
STREET NAME SIGN



45cmx45cm
Wa-31 NO EXIT SIGN



GENERAL GRADING NOTES:

1. REFER TO DRAWING C102 FOR CROSS-SECTION DETAILS.
2. PROPOSED INFILTRATION TRENCHES HAVE BEEN DESIGNED TO PROVIDE THE REQUIRED QUANTITY CONTROLS FOR FULL BUILD-OUT OF THE DEVELOPMENT AND QUALITY FOR THE PROPOSED ROADWAY. QUALITY CONTROLS FOR INDIVIDUAL LOTS TO BE DESIGNED BY OTHERS AT BUILDING PERMIT STAGE (IF REQUIRED).
3. 150mm RIP RAP (300mm DEEP) TO BE PROVIDED IN DITCHES THAT EXCEED A SLOPE OF 5.0%.

GENERAL SERVICING NOTES:

1. DETAILED SEPTIC DESIGN AND LOCATION, AND WELL LOCATION TO BE CONFIRMED AT TIME OF DETAILED LOT DESIGN/BUILDING PERMIT.
2. SEPTIC BEDS TO MAINTAIN MINIMUM 15m SEPARATION FROM PROPOSED WELLS AND INFILTRATION FACILITIES.
3. SEPTIC BEDS TO MAINTAIN MINIMUM 3m SEPARATION FROM PROPERTY LINES.

1. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED. 2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION. 3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. 4. DO NOT SCALE THE DRAWINGS. 5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.	TEMPORARY BENCHMARKS TBM#1 – SQUARE IRON BAR (SIB), ELEVATION = 210.299 SURVEY COMPLETED BY VAN HARTEN ON JANUARY 29TH 2019	Town	<table><tr><th>No.</th><th>ISSUE</th><th>DATE: MM/DD/YYYY</th></tr><tr><td>0</td><td>ISSUED FOR CLIENT REVIEW</td><td>07/28/2020</td></tr><tr><td>1</td><td>RE-ISSUED FOR CLIENT REVIEW</td><td>08/18/2021</td></tr><tr><td>2</td><td>ISSUED FOR SECOND SUBMISSION</td><td>11/18/2021</td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr></table>	No.	ISSUE	DATE: MM/DD/YYYY	0	ISSUED FOR CLIENT REVIEW	07/28/2020	1	RE-ISSUED FOR CLIENT REVIEW	08/18/2021	2	ISSUED FOR SECOND SUBMISSION	11/18/2021																			Engineer	Engineer	Project LEITH–BAYSHORE ROAD MUNICIPALITY OF MEAFORD  CROZIER CONSULTING ENGINEERS ADMIRAL BUILDING 1 FIRST STREET, SUITE 200 COLLINGSWOOD, ON, L9Y 1A1 705-446-3510 T 705-446-3520 F www.ccrozier.ca info@ccrozier.ca Drawing MASTER SERVICING & GRADING PLAN	<table><tr><td>Drawn By</td><td>N.L.</td><td>Design By</td><td>N.L./G.C.</td><td>Project</td><td>903–3780</td></tr><tr><td>Check By</td><td>G.C.</td><td>Check By</td><td>R.A.</td><td>Scale</td><td>1:750</td></tr><tr><td></td><td></td><td></td><td></td><td>Drawing</td><td>C101</td></tr></table>	Drawn By	N.L.	Design By	N.L./G.C.	Project	903–3780	Check By	G.C.	Check By	R.A.	Scale	1:750					Drawing	C101
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 CROZIER & ASSOCIATES Consulting Engineers		ONSITE SEWAGE SYSTEM RESIDENTIAL CALCULATION SHEET																																																
		Project Name: McCullough Project Number: 903-3780		Date: 29-Apr-22 Designed By: GC/JD Checked By: KR																																														
House Details: 5 bedroom 325 m2 <table border="1"> <thead> <tr> <th>Description</th> <th>Number of Units</th> <th>Additional Flow per Unit (L)</th> <th>Total Flow (L/day)</th> </tr> </thead> <tbody> <tr> <td>Base Flow</td> <td></td> <td></td> <td>2500</td> </tr> <tr> <td>Additional Flow</td> <td></td> <td></td> <td></td> </tr> <tr> <td>i) Each bedroom over 5</td> <td>0</td> <td>500</td> <td>0</td> </tr> <tr> <td>ii) Area over 200m²</td> <td></td> <td></td> <td></td> </tr> <tr> <td>A) Each 10m² over 200m² to 400m²</td> <td>13</td> <td>100</td> <td>1300</td> </tr> <tr> <td>B) Each 10m² over 400m² to 600m²</td> <td>0</td> <td>75</td> <td>0</td> </tr> <tr> <td>C) Each 10m² over 600m²</td> <td>0</td> <td>50</td> <td>0</td> </tr> <tr> <td colspan="3">Total Additional Sewage Flow from Area</td> <td>1300</td> </tr> <tr> <td>iii) Fixture Units over 20</td> <td>15</td> <td>50</td> <td>750</td> </tr> <tr> <td colspan="3">Addition flow (greatest of i,ii,iii)</td> <td>1300</td> </tr> <tr> <td colspan="3">Total Daily Design Sanitary Sewage Flow (L/day):</td> <td>3800</td> </tr> </tbody> </table>	Description	Number of Units	Additional Flow per Unit (L)	Total Flow (L/day)	Base Flow			2500	Additional Flow				i) Each bedroom over 5	0	500	0	ii) Area over 200m ²				A) Each 10m ² over 200m ² to 400m ²	13	100	1300	B) Each 10m ² over 400m ² to 600m ²	0	75	0	C) Each 10m ² over 600m ²	0	50	0	Total Additional Sewage Flow from Area			1300	iii) Fixture Units over 20	15	50	750	Addition flow (greatest of i,ii,iii)			1300	Total Daily Design Sanitary Sewage Flow (L/day):			3800	##### input required	References
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	Total Daily Design Sanitary Sewage Flow (L/day):			3800																																														
	Pre-Treatment Options			*Y if Type A dispersal bed selected																																														
	Required septic tank size = 7600 L minimum																																																	
	Propose Level IV Treatment (Y/N):* N																																																	
	Native Percolation time, T = 50 min/cm																																																	
	Imported Sand Percolation time = 10 min/cm																																																	
Option #1 - In Ground Absorption Trench																																																		
Length of distribution pipe required = 950.0 m 1520 m ²																																																		
Length of runs = 50 m																																																		
Number of runs = 19 runs																																																		
Length of distribution pipe provided = 950 m																																																		
Option #2 -Raised Absorption Trench																																																		
Length of distribution pipe required = 190.0 m																																																		
Length of runs = 50 m																																																		
Number of runs = 4 runs																																																		
Length of distribution pipe provided = 200 m																																																		
Maximum loading rate = 4 L/m ² /day																																																		
Minimum loading area = 950 m ²																																																		

Option #3 - Filter Bed			
Minimum required contact area =	76 m ²		
Required extended contact area =	224 m ²		
Maximum loading rate =	4 L/m ² /day		
Minimum loading area =	950 m ²		
Option #3 - Type A Dispersal Bed			
Stone area required =	76 m ²		
Sand area required =	475 m ²		
Option #5 - Shallow Buried Trench			
Length of distribution pipe required =	76 m	152 m ²	
Length of runs =	20 m		
Number of runs =	4 runs		
Length of distribution pipe provided =	80 m		

D-5-4 Impact Assessment

Project Name: McCullough/Leith-Bayshore Road - Severance Application
Project Number: 903-3780
Date: 2022-04-29
Designed By: JD
Checked By: KR

D-5-4 IMPACT ASSESSMENT

Calculate the Nitrate Concentration at a Boundary (Property or Surface Water)

Parameter	Value	Unit	Notes
Infiltration Volume			
			= Manual Data Entry
Area of Dilution =	4.97	ha	Total area of site
Background Nitrate Quality in Groundwater =	0.00	mg/L	
Annual Infiltration Rate =	125	mm/m ² /yr	MECP infiltration rate for silt
	3,424.66	L/ha/day	
Annual Infiltration Volume =	6,213	m ³ /year	
Total Average Background Nitrate =	0	mg/day	
Sewage Effluent Volume			
Proposed Number of Lots	5		
Average Daily Volume of Sewage Effluent =	1,000	L/day	For residential, 1000 L/home/day
Number of Days of Operation/Use =	365	days/year	
Annual Volume of Sewage Effluent =	1,825	m ³ /year	
Nitrate Concentration in wastewater =	40.0	mg/L	MECP standard effluent for conventional systems = 40 mg/L
Total Average Nitrate Loading =	200,000	mg/day	
Totals			
Total Dilutant = wastewater V + infiltration V =	8,038	m ³ /year	
Nitrate Concentration in Percolate =	9.08	mg/L	Less than 10 mg/L, sufficient for D-5-4 Impact Assessment