



October 31, 2022

Government of Yukon
Community Services
Land Development Branch C-14
Box 2703
Whitehorse, YT Y1A 2C6

ISSUED FOR USE
FILE: 704-ENG.WARC03938-01
Via Email: Hannah.McDonald@yukon.ca

Attention: Ms. Hannah McDonald, Project Manager

Subject: Lots 6 – 12; Blk 15 Residential Development
Haines Junction, Yukon

1.0 INTRODUCTION

At the request of Hannah McDonald, Project Manager, Government of Yukon – Community Services – Land Development Branch, Tetra Tech Canada Inc. (Tetra Tech) has provided geotechnical and QA testing services during the development of Lots 6 – 12; Block 15 in Haines Junction, Yukon.

Authorization to proceed was in the form of Contract Number C00064691, dated April 1, 2022.

2.0 BACKGROUND AND 2022 TASK LIST

Lots 6 – 12; Blk 15 was an undeveloped area in Haines Junction, Yukon. As part of the 2022 reconstruction work being completed in Haines Junction, sections of Bates Street and Karman Street were extended to provide access to the subject site and subsequently, infill site grading was completed. Prior to 2022, this area was a low-lying area and there were stockpiles of uncontrolled fill throughout. Upon completion, roadway construction, including the extension of Karman Street and Bates Street, along with deep utility construction and the servicing of lots 6 – 12 has prepared the site for residential lot sales. Throughout the 2022 construction season, Tetra Tech provided the following services:

- An initial assessment of the stockpiled soil was completed to ensure there was not excess debris and/or organics under the stockpiles, as well as determining relative density and suitability for reuse. On June 4, 2022, the site was visited by Brayden Klassen of Tetra Tech's Whitehorse office and 6 testpits were excavated throughout the area where the fill materials had been stockpiled. A Field Inspection Report was generated on June 14 and is attached to this letter report.
- The main take-away from the June 4, 2022, evaluation was that an area of concern was noted close to the corner where Karman Street meets Bates Street. The delineated area was subexcavated to remove all organics and site grading commenced from that elevation.
- Monitoring the quality of the materials placed throughout the site was on-going throughout the 2022 construction season.
- Performing compaction testing during site grading was also ongoing and compaction test results are attached.

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3.0 PHOTO DOCUMENTATION



Lot Fill and Debris Removed From Lift



On-Going Site Grading and Debris Removal



Services Being Installed



Serviced Lots – September 4th, 2022



Inside Corner of Karman Street and Bates Street – September 4, 2022

4.0 AS-BUILT SITE CONDITIONS

4.1 Site Grades & Drainage

The infill area slopes downward towards the ditch running along the Bates Street extension. The slopes are very gentle (less than 5%) but enough to promote positive drainage.

4.2 As-Built Geotechnical Conditions

Regrading of the area was completed with materials imported from other areas of Haines Junction where reconstruction was ongoing. The materials imported were typically silt with varying sand and gravel contents.

Construction included lot infill and the target compaction levels for this task was 98% of Standard Proctor maximum dry density (conductive to residential foundation construction). For the roadway construction and deep utilities installation, 95% of Standard Proctor maximum dry density was specified for backfill placed below 1.0 m of final grades and for the final metre, 98% of Standard Proctor maximum dry density was targeted.

Due to the amount of work ongoing in Haines Junction, it is likely that some lifts placed throughout the subject site did not get tested (or retested after low test results were recorded) but review of the attached compaction test results suggest that placement and compaction of backfill along with the removal of debris and deleterious materials was adequate.

5.0 RESIDENTIAL FOUNDATION RECOMMENDATIONS

Residential foundation construction is considered feasible for this infill area. Shallow foundation systems which will be conducive to the as-built site conditions include strip and spread footings with foundation walls or thickened monolithic slab-on-grade foundations. Other options include ICF walls on strip footings or helical pile foundations.

Builders and developers should follow appropriate drainage standards for building foundations. The various requirements for drain rock layers, perimeter drainage systems and sump construction based on the prescriptive measures presented in the applicable CSA and NBC specifications is summarized in the following sections.

5.1 Preserved Wood Foundations

For strip and spread footing systems, it is common for builders to use preserved wood for foundation wall construction. For this foundation system, if non-free draining soil exists throughout the base of the foundation excavation (which will be the case throughout the subject site), a granular drainage layer will be required beneath all footings and basement slabs (in accordance with CAN-CSA S406).

The granular drainage layer should be constructed using a clean crushed stone or screened drain rock material of maximum particle size 40 mm and having less than 10% sand (passing the 5 mm sieve). This layer shall be at least 125 mm thick and shall extend at least 300 mm beyond the footing perimeter. The granular drainage layer shall drain to a sump which, in turn, will direct water to a point of final disposal beyond the building's footprint.

In accordance with CAN-CSA S406, the use of perimeter drainage (weeping) tile or pipe is not recommended with preserved wood foundations.

The design life of a preserved wood foundation system relies on keeping water away from the preserved wood foundation elements, so waterproofing of the foundation wall and the proper construction of the granular drainage layer is critical. As well, to provide additional protection of the waterproofing on the exterior face of the foundation walls, backfill material placed shall be free of deleterious debris, frozen materials, and large and/or angular pieces.

5.2 Concrete Foundation Recommendations

If the use of concrete foundations is desired, the drainage (weeping) tile and pipe, granular drainage layers, drainage disposal and surface drainage specifications as per NBC 2015, Section 9.14 "Drainage" must be followed.

Full depth concrete foundations with concrete footings are required to have a perimeter drainage tile system which terminates in a sump pit. Also, in accordance with the standard, a sump pit is to be installed for each lot to assist in the removal of water from the foundation area (should water accumulation in the sump pit warrant it).

5.3 Perimeter Insulation and Lot Grading

For frost heave to occur, there must be sub-zero temperatures and frost susceptible soils that have been allowed to become wet to saturated. Since the Yukon experiences sub-zero temperatures through the fall and winter months, and the subject site is underlain with frost susceptible silt fill soils, the best way to mitigate potential for frost heave is to prevent surface water infiltration into the soils under the footings and to reduce seasonal frost penetration by installing adequate perimeter insulation around the foundation walls.

Tetra Tech typically recommends an equivalent of 2.5 m of equivalent frost protection. Therefore, additional perimeter insulation will be required where there is less than 2.5 m of foundation wall backfill. For example, if strip footings are constructed at 1.2 m below finished site elevations, additional perimeter insulation will be required. Tetra Tech uses a “rule of thumb” determination, where 25 mm (1”) of moisture resistant, backfillable, rigid insulation is the equivalent of 300 mm (1’) of soil cover; therefore, an additional 100 mm (4”) of insulation will be required to satisfy the 2.5 m minimum if the footings are founded at a depth of 1.2 m.

Attached or detached garages along with spread footings supporting 2nd story decks or entrance overhangs are often problematic, as they are typically constructed on near surface spread footings or a thickened monolithic slab-on-grade foundation. Since temperatures in garage structures are often kept much cooler than the adjoining residence and deck foundations are totally unprotected, additional perimeter insulation is required. For example, using a footing depth of 300 mm, along with 300 mm of non-frost susceptible granular structure beneath the perimeter strip footing thickenings or spread footings, an additional 150 mm of perimeter insulation would be required to mitigate potential for movement and damage caused by seasonal frost.

To ensure that the foundation is adequately protected, it is recommended that builders contact Tetra Tech so that site specific perimeter insulation solutions can be provided.

For the Bates Street/Karman Street area of Haines Junction, it is recommended that perimeter insulation extend 1.2 m (4’) out from the building’s perimeter. To accommodate this recommendation, builders should be aware that this requirement may affect the setback distance from the foundation to the lot line.

Along with perimeter insulation, it is important that final lot grades direct surface water away from all foundation elements. Lot lines acting as swales is a good option but most importantly, structures should have functioning rain gutters and downspouts installed to minimize potential for water to make its way down along the foundation wall and under the footings.

6.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of the Government of Yukon, Community Services – Land Development Branch and their agents. Tetra Tech Canada Inc. (operating as Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than the Government of Yukon, Land Development Branch, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.

7.0 CLOSURE

We trust this document meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

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2022-11-01

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SIGNATURE	
Date	2022-11-01
PERMIT NUMBER PP003 Association of Professional Engineers of Yukon	

APPENDIX A

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOTECHNICAL

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Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by persons other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this report, at or on the development proposed as of the date of the Professional Document requires a supplementary investigation and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, TETRA TECH has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

1.8 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. TETRA TECH does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

1.9 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

1.10 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. TETRA TECH does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

1.11 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

1.12 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

1.13 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

1.14 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

1.15 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

1.16 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

1.17 SAMPLES

TETRA TECH will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

APPENDIX B

JUNE 4, 2022 FIELD OBSERVATION REPORT & 2022 CONSTRUCTION SEASON COMPACTION TEST RESULT REPORT FORMS



Project:	<u>Haines Junction Ph. 3 Upgrades</u>	Date:	<u>June 14, 2022</u>
Location:	<u>Haines Junction, Yukon</u>	Contractor:	<u>Castle Rock Enterprises</u>
Client:	<u>Associated Engineering</u>	Contractor's Rep:	<u>Josh Smith</u>
Contact:	<u>Steven Bartsch</u>	Contractor's Email:	<u>josh@castlerockent.com</u>
Weather:	<u>Sunny +20 deg. C.</u>	Tetra Tech Representative:	<u>Brayden Klassen, Technician</u> <u>Ian MacIntyre, P. Eng.</u>
File:	<u>704-ENG.WARC04066-01.001</u>	Status:	<u>Issued for Use</u>

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was requested by Associated Engineering (AE) to complete a testpitting program to determine existing soils, soil suitability and relative density of previously stockpiled materials at the east end of Bates Street, as part of the Phase 3 upgrades work being completed by Castle Rock Enterprises (CRE) in Haines Junction, YT. Until this point, this stockpiled material has been considered uncontrolled fill, and its contents, suitability, and relative density have not been determined. Tetra Tech understands that provided the in-situ material is suitable (e.g., does not contain organics, garbage, or other deleterious materials) and its relative density exceeds that required by the project specifications (i.e., 98% standard proctor maximum dry density, SPMDD), CRE would like to forgo its removal and replacement and compaction for lot fill.

This field inspection report summarizes observed site activities and conditions, includes select photographs, and provides recommendations and commentary related to addressing the suitability of the stockpiled material. Brayden Klassen of Tetra Tech’s Whitehorse office conducted a site visit for field review June 4, 2022. CRE assisted with test pitting by providing a CAT 336F excavator and operator to dig and fill test pits.

2.0 ACTIVITIES AND OBSERVATIONS

Figure 1 below shows the approximate locations of the testpits excavated on June 4, 2022.

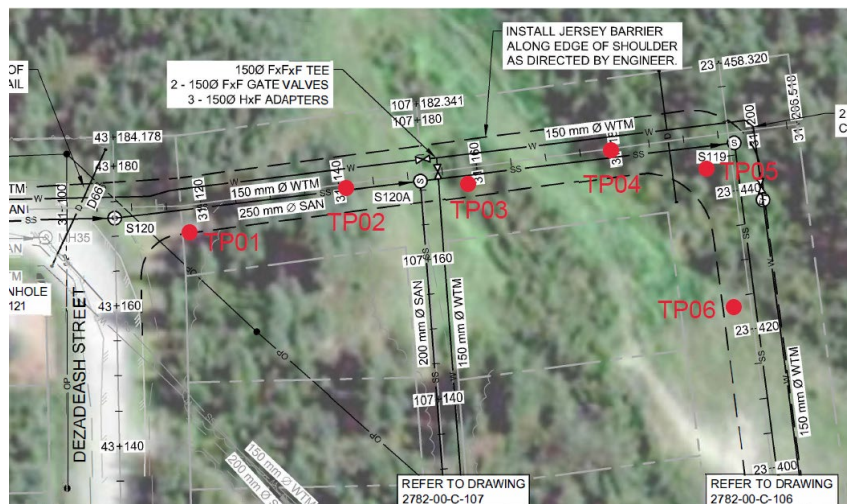


Figure 1 – Approximate Testpit Locations

The following observations were noted:

1. Test Pit (TP) 01: Soils throughout the depth of TP01 were characterized as SILT- some gravel, some sand. An organic layer was encountered approximately 1.0m from surface. The organic layer was approximately 50-75 mm thick and consisted of organic soils and woody debris. Based on effort from excavator the ground appeared to be adequately consolidated. Due to shallow depth of organics, and plan to strip the top 700 mm, TP01 was not tested using nuclear densometer.
2. TP02: Soils at TP02 were characterized as SILT- gravelly, some sand. An organic layer was encountered at approximately 3.0-3.5 m from surface. The organic layer was approximately 50-75 mm thick and consisted of organic soils and woody debris. Based on effort from excavator the ground appeared to be adequately consolidated. Due to the proximity to TP03 and with each sharing very similar soil conditions, it was not tested using the nuclear densometer.
3. TP03: Soils at TP03 were noted to consist of SILT- gravelly, some sand. An organic layer was encountered approximately 3.0-3.5 m from surface. The organic layer was approximately 50-75 mm thick and consisted of organic soils and woody debris. Based on effort from excavator the ground appeared to be adequately consolidated. A bench was cut at approximately 2.0m from surface and a density of approximately 1900 kg/m³ was recorded. Using a robotic compactor (3170 lbs Ammann 1575) 9-10 passes were made with high vibe over the entirety of the bench. Once compaction was complete, follow up density testing indicated a very minimal to negligible change in the in-situ density.
4. TP04: Soils at TP04 were characterized as SILT- gravelly, some sand. An organic layer was encountered approximately 3.0-3.5 m from surface. The organic layer was approximately 100-150mm thick and consisted of organic soils and woody debris. Based on digging effort from excavator, and that the organic layer did not appear to be compressed from pre-load, the area around TP04 does not appear to be adequately consolidated. Tetra Tech, CRE representative, Josh Smith, as well as the AE site representative, Tamara Selmer, agreed this area was of concern and would need to be sub-excavated, the organic layer removed, and material replaced and compacted per project specifications.
5. TP05: Soils at TP05 were characterized as SILT- gravelly, some sand. An organic layer was not encountered at TP05. Approximately 2.0-2.5 m from surface the ground became too hard to continue digging with a clean-up bucket. Based on the material temperature removed from the TP, and lack of ice in material removed from TP, Tetra Tech does not believe the cause was from frozen ground. Increase in soil density was likely caused by increase in gravel and cobble content as well as increased consolidation at depth, possibly due to preloading by the weight of the stockpile.
6. TP06: Soils at TP06 were characterized as SILT- some sand, some gravel. An organic layer was encountered approximately 3.0-3.5 m from surface. The organic layer was approximately 25-50 mm thick and consisted of organic soils. Based on effort from excavator the ground appeared to be adequately consolidated. Like TP03, a bench was cut at approximately 1.5-2.0m from surface. The initial density reading was approximately 1620 kg/m³. After 9-10 passes with the robot packer, a negligible change in material density was noted.

3.0 DISCUSSION AND RECOMMENDATIONS

1. Based on Tetra Tech's interpretation of these results, it is our opinion that most soils encountered meet the project specifications related to material suitability and compaction, except for soils encountered at TP01 and TP04.

2. However, as soils encountered in all testpits within the upper 750 mm were noted to be relatively softer, Tetra Tech recommends the subexcavation of at least 750 mm from the existing grade, compaction of the surface at this depth, then the continuation of material placement and compaction to final grade, per project specifications.
3. In the areas of TP01 and TP04, the soil is to be removed and stockpiled for later placement and the organic layer removed. This subexcavation and organics layer removal should extend laterally until the organic layer encountered is similar to that observed in the other testpits (i.e., compressed to less than 50 mm), at which point backfill can commence.

4.0 SELECT PHOTOGRAPHS

The following are select photographs taken during the field inspections. Additional photographs are being stored in the project folder and are available on request.



Photo 1: Ammann 1575 Robotic Trench Packer in TP03



Photo 2: TP04 showing unconsolidated soil condition.



Photo 3: TP01 layer of organic soils and woody debris



Photo 4: TP02 profile shows increased consolidation at depth of approximately 1.0m

5.0 LIMITATIONS OF REPORT

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We trust this field report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

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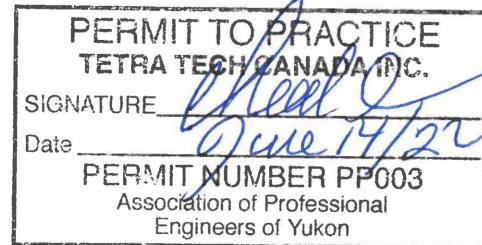


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APPENDIX A

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1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this document, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, TETRA TECH has not been retained to explore, address or consider and has not explored, addressed or considered any environmental or regulatory issues associated with development on the subject site.

1.8 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems, methods and standards employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. TETRA TECH does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

1.9 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

1.10 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historical environment. TETRA TECH does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional exploration and review may be necessary.

1.11 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

1.12 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

1.13 INFLUENCE OF CONSTRUCTION ACTIVITY

Construction activity can impact structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques, and construction sequence are known.

1.14 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, and the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

1.15 DRAINAGE SYSTEMS

Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function. Where temporary or permanent drainage systems are installed within or around a structure, these systems must protect the structure from loss of ground due to mechanisms such as internal erosion and must be designed so as to assure continued satisfactory performance of the drains. Specific design details regarding the geotechnical aspects of such systems (e.g. bedding material, surrounding soil, soil cover, geotextile type) should be reviewed by the geotechnical engineer to confirm the performance of the system is consistent with the conditions used in the geotechnical design.

1.16 DESIGN PARAMETERS

Bearing capacities for Limit States or Allowable Stress Design, strength/stiffness properties and similar geotechnical design parameters quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition used in this report. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions considered in this report in fact exist at the site.

1.17 SAMPLES

TETRA TECH will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

1.18 APPLICABLE CODES, STANDARDS, GUIDELINES & BEST PRACTICE

This document has been prepared based on the applicable codes, standards, guidelines or best practice as identified in the report. Some mandated codes, standards and guidelines (such as ASTM, AASHTO Bridge Design/Construction Codes, Canadian Highway Bridge Design Code, National/Provincial Building Codes) are routinely updated and corrections made. TETRA TECH cannot predict nor be held liable for any such future changes, amendments, errors or omissions in these documents that may have a bearing on the assessment, design or analyses included in this report.

FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): TN

Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]
Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-sandy, gravelly : 2050kg/m³ @12.0 : Est
- o SILT-gravelly, some sand : 1850kg/m³ @14.0 : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
1	May 31, 2022	31 + 180, 60m W of CL	-2.80	300	2109	9.1	2050 (Est)	12.0	10.0 14.0	102.9
2	May 31, 2022	31 + 180, 60m W of CL	-2.50	300	1976	11.1	2050 (Est)	12.0	10.0 14.0	96.4
3	May 31, 2022	31 + 190, 30m W of CL	-2.50	300	1756	11.1	2050 (Est)	12.0	10.0 14.0	85.7
4	May 31, 2022	31 + 190, 30m W of CL	-2.20	300	2012	10.3	2050 (Est)	12.0	10.0 14.0	98.1
5	May 31, 2022	31 + 165, 45m W of CL	-2.20	300	1952	10.7	2050 (Est)	12.0	10.0 14.0	95.2
6	May 31, 2022	31 + 180, 60m W of CL	-1.90	300	1959	8.7	2050 (Est)	12.0	10.0 14.0	95.6
7	May 31, 2022	31 + 185, 45m W of CL	-1.90	300	2000	8.1	2050 (Est)	12.0	10.0 14.0	97.6
8	May 31, 2022	31 + 190, 30 m W of CL	-1.60	300	2045	9.7	1850 (Est)	14.0	12.0 16.0	110.5
9	May 31, 2022	31 + 180, 60m W of CL	-1.60	300	1975	11.1	2050 (Est)	12.0	10.0 14.0	96.3
10	May 31, 2022	31 + 185, 45m W of CL	-1.60	300	1982	11.7	2050 (Est)	12.0	10.0 14.0	96.7

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): TN

Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]

Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-sandy, gravelly : 2050kg/m3 @12.0 : Est
- o SILT-gravelly, some sand : 1850kg/m3 @14.0 : Est
- o SILT-gravelly, some sand : 2040kg/m3 @12.0 : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
11	May 31, 2022	31 + 190, 30m W of CL	-1.30	300	2049	11.6	2050 (Est)	12.0	10.0 14.0	100.0
12	May 31, 2022	31 + 185, 45m W of CL	-1.30	300	2012	12.5	2050 (Est)	12.0	10.0 14.0	98.1
13	May 31, 2022	31 + 180, 60m W of CL	-1.30	300	1713	13.3	1850 (Est)	14.0	12.0 16.0	92.6
14	May 31, 2022	31 + 180, 60m W of CL	-3.10	300	1915	12.7	2040 (Est)	12.0	10.0 14.0	93.9
15	May 31, 2022	31 + 170, 45m W of CL	-3.80	300	2031	10.3	2040 (Est)	12.0	10.0 14.0	99.6
16	May 31, 2022	31 + 170, 60m W of CL	-3.80	300	2042	11.3	2040 (Est)	12.0	10.0 14.0	100.1
17	May 31, 2022	31 + 175, 30m W of CL	-3.80	300	2017	9.0	2040 (Est)	12.0	10.0 14.0	98.9
18	Jun 04, 2022	31 + 180, 45M W	-1.30	300	2041	10.9	2040 (Est)	12.0	10.0 14.0	100.0
19	Jun 04, 2022	31 + 180, 45m W	-1.20	300	2075	10.5	2040 (Est)	12.0	10.0 14.0	101.7
20	Jun 04, 2022	31 + 180, 45m W	-0.90	300	2077	10.5	2040 (Est)	12.0	10.0 14.0	101.8

Remarks:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): TN

Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]

Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-sandy , some gravel : 1940kg/m3 @12.5
- o SILT-gravelly, some sand : 1850kg/m3 @14.0 : Est
- o SILT-gravelly, some sand : 2040kg/m3 @12.0 : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
21	Jun 04, 2022	31 + 180, 50m W	-0.60	300	2010	11.9	2040 (Est)	12.0	10.0 14.0	98.5
22	Jun 04, 2022	31 + 180, 45m W	-0.30	300	1941	12.5	1940	12.5	10.5 14.5	100.1
23	Jun 04, 2022	31 + 180, 40m W	0.00	300	2013	10.8	2040 (Est)	12.0	10.0 14.0	98.7
24	Jun 04, 2022	31 + 170, 10m W	-3.00	300	1920	14.0	1940	12.5	10.5 14.5	99.0
25	Jun 04, 2022	31 + 165, 10m W	-1.00	300	1915	12.1	1940	12.5	10.5 14.5	98.7
26	Jun 04, 2022	31 + 168, 10m W	-3.00	300	1930	10.5	1940	12.5	10.5 14.5	99.5
27	Jun 04, 2022	31 + 165, 10m W	-0.80	300	1910	14.7	1940	12.5	10.5 14.5	98.5
28	Jun 04, 2022	31 + 165, 10m W	-2.00	300	2004	10.5	1940	12.5	10.5 14.5	103.3
29	Jun 04, 2022	31 + 168, 10m W	-0.50	300	1918	10.2	1940	12.5	10.5 14.5	98.9
30	Jun 05, 2022	31 + 120, 3m S	-6.00	300	1845	12.6	1850 (Est)	14.0	12.0 16.0	99.7

Remarks:

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Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): TN

Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]

Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-sandy, gravelly : 2050kg/m3 @12.0 : Est
- o SILT-sandy , some gravel : 1940kg/m3 @12.5
- o SILT-gravelly, some sand : 1850kg/m3 @14.0 : Est
- o SILT-gravelly, some sand : 2040kg/m3 @12.0 : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
31	Jun 05, 2022	31 + 160, on CL	-5.70	300	2027	10.9	2050 (Est)	12.0	10.0 14.0	98.9
32	Jun 05, 2022	31 + 170, on CL	-5.70	300	2060	11.0	2050 (Est)	12.0	10.0 14.0	100.5
33	Jun 05, 2022	31 + 180, on CL	-5.50	300	1975	10.7	1940	12.5	10.5 14.5	101.8
34	Jun 05, 2022	31 + 160, on CL	-5.50	300	1975	10.7	1940	12.5	10.5 14.5	101.8
35	Jun 05, 2022	31 + 160, on CL	-5.20	300	2058	13.7	2050 (Est)	12.0	10.0 14.0	100.4
36	Jun 05, 2022	31 + 160, on CL	-5.20	300	1913	12.2	1940	12.5	10.5 14.5	98.6
37	Jun 06, 2022	31 + 160, on CL	-4.30	300	1886	12.3	1940	12.5	10.5 14.5	97.2
38	Jun 06, 2022	31 + 180, on CL	-1.10	300	2014	10.4	2040 (Est)	12.0	10.0 14.0	98.7
39	Jun 06, 2022	31 + 170, on CL	-1.20	300	2005	11.1	2040 (Est)	12.0	10.0 14.0	98.3
40	Jun 06, 2022	31 + 130, on CL	-5.70	300	1831	16.5	1850 (Est)	14.0	12.0 16.0	99.0

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): MD, TN

Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]

Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-sandy, gravelly : 2050kg/m3 @12.0 : Est
- o SILT-sandy , some gravel : 1940kg/m3 @12.5
- o SILT-gravelly, some sand : 1850kg/m3 @14.0 : Est
- o SILT-some gravel : 1950kg/m3 @10.0

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Compct. (%)
41	Jun 06, 2022	31 + 120, on CL	-5.40	300	1800	16.1	1850 (Est)	14.0	12.0 16.0	97.3
42	Jun 07, 2022	31 + 125, on CL	-6.00	300	1767	17.5	1850 (Est)	14.0	12.0 16.0	95.5
43	Jun 08, 2022	C of Lot 12, Block 15	-0.30	300	2024	8.7	2050 (Est)	12.0	10.0 14.0	98.7
44	Jun 08, 2022	C of Lot 11, Block 15	-0.30	300	2031	8.2	2050 (Est)	12.0	10.0 14.0	99.1
45	Jun 08, 2022	C of Lot 11, Block 15	-0.30	300	2020	9.5	2050 (Est)	12.0	10.0 14.0	98.5
46	Jun 08, 2022	0.6m N of Lot 8 CC, Block 15	-1.80	300	1921	11.5	1950	10.0	8.0 12.0	98.5
47	Jun 10, 2022	31 + 180, on CL + 15m NE	-2.00	300	1900	13.6	1940	12.5	10.5 14.5	97.9
48	Jun 10, 2022	31 + 160, on CL + 15m NE	-2.00	300	1944	11.5	1940	12.5	10.5 14.5	100.2
49	Jun 13, 2022	23 + 432, 6m S of CL	-1.70	300	1883	9.3	1940	12.5	10.5 14.5	97.1
50	Jun 13, 2022	23 +439, 6m S of CL	-1.80	300	1895	9.7	1940	12.5	10.5 14.5	97.7

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): MD

Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]

Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-sandy , some gravel : 1940kg/m3 @12.5
- o SILT-gravelly, some sand : 1850kg/m3 @14.0 : Est
- o SILT-gravelly, some sand : 2040kg/m3 @12.0 : Est
- o Bedding Sand : 2180kg/m3 @6.0% : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
51	Jun 13, 2022	23 + 435, 7m S of CL	-0.90	300	1919	10.2	1940	12.5	10.5 14.5	98.9
52	Jun 14, 2022	23 + 437, 2m S of CL	-2.10	300	1899	10.9	1940	12.5	10.5 14.5	97.9
53	Jun 14, 2022	23 + 426, 1m N of CL	-1.60	300	1911	9.3	1940	12.5	10.5 14.5	98.5
54	Jun 14, 2022	23 + 416, on CL	-1.80	250	2086	4.8	2180 (Est)	6.0	4.0 8.0	95.7
55	Jun 14, 2022	23 + 419, on CL	-1.30	300	1860	11.3	1940	12.5	10.5 14.5	95.9
56	Jun 15, 2022	31 + 161, 2m E of CL	-1.40	300	1991	10.6	2040 (Est)	12.0	10.0 14.0	97.6
57	Jun 15, 2022	31 + 153, 3m E of CL	-1.10	300	2030	8.7	2040 (Est)	12.0	10.0 14.0	99.5
58	Jun 15, 2022	31 + 176, 1m E of CL	-0.90	300	2003	8.7	2040 (Est)	12.0	10.0 14.0	98.2
59	Jun 16, 2022	31 + 133, 1m N of CL	-0.80	300	1915	11.3	1940	12.5	10.5 14.5	98.7
60	Jun 20, 2022	STA: 31 + 170, 11m W of CL	-1.20	300	1793	13.3	1850 (Est)	14.0	12.0 16.0	96.9

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): MD

Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]
Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-gravelly, some sand : 1850kg/m³ @14.0 : Est
- o SAND, Silty, gravelly : 1750kg/m³ @12.0 : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
61	Jun 20, 2022	STA: 31 + 127, 16m W of CL	-1.40	300	1798	12.5	1850 (Est)	14.0	12.0 16.0	97.2
62	Jun 23, 2022	STA: 31 + 190, 3m W of CL	-0.50	300	1878	14.6	1850 (Est)	14.0	12.0 16.0	101.5
63	Jun 30, 2022	107 + 122, 17m N of CL	-2.80	300	1744	9.9	1750 (Est)	12.0	10.0 14.0	99.7
64	Jun 30, 2022	107 + 146, 3.5m N of CL	-2.90	250	1757	13.1	1750 (Est)	12.0	10.0 14.0	100.4
65	Jun 30, 2022	107 + 133, 26m N of CL	-2.50	300	1729	14.6	1750 (Est)	12.0	10.0 14.0	98.8
66	Jun 30, 2022	107 + 126, 19m N of CL	-2.10	300	1738	10.6	1750 (Est)	12.0	10.0 14.0	99.3
67	Jun 30, 2022	107 + 151, 37m N of CL	-2.00	300	1741	12.4	1750 (Est)	12.0	10.0 14.0	99.5
68	Jun 30, 2022	107 + 114, 8m N of CL	-1.70	300	1726	13.1	1750 (Est)	12.0	10.0 14.0	98.6
69	Jun 30, 2022	107 + 131, 24m N of CL	-1.50	300	1752	12.1	1750 (Est)	12.0	10.0 14.0	100.1
70	Jun 30, 2022	107 + 148, 35m N of CL	-1.50	300	1764	14.0	1750 (Est)	12.0	10.0 14.0	100.8

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): MD, WM
Densometer(s): -- Unknown --, 63325
Report #:

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]

Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-gravelly, some sand : 1850kg/m3 @14.0 : Est
- o SILT-gravelly, some sand : 2040kg/m3 @12.0 : Est
- o SILT-some gravel : 1950kg/m3 @10.0
- o SAND, Silty, gravelly : 1750kg/m3 @12.0 : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
71	Jul 04, 2022	Block 15, 107 + 115, 34m N of CL	0.00	300	1841	9.1	1850 (Est)	14.0	12.0 16.0	99.5
72	Jul 04, 2022	107 + 145, 31m N of CL	0.00	300	1819	8.4	1850 (Est)	14.0	12.0 16.0	98.3
73	Jul 08, 2022	Lot Fill, 107 + 168, 26m S of CL	-0.70	300	2022	10.3	2040 (Est)	12.0	10.0 14.0	99.1
74	Jul 08, 2022	Lot Fill, 1-7 +134, 23m S of CL	-0.70	300	2038	11.2	2040 (Est)	12.0	10.0 14.0	99.9
75	Jul 08, 2022	Lot Fill, 107 + 151, 14m S of CL	-0.80	100	2016	10.7	2040 (Est)	12.0	10.0 14.0	98.8
76	Jul 27, 2022	3m S of Lot 2 CC, Block 15	-1.00	300	1824	11.1	1850 (Est)	14.0	12.0 16.0	98.6
77	Jul 27, 2022	3m S of Lot 2 CC, Block 15	-0.70	300	1714	15.0	1750 (Est)	12.0	10.0 14.0	97.9
78	Jul 27, 2022	C of Lot 12, Block 15	-0.20	300	1915	12.5	1950	10.0	8.0 12.0	98.2
79	Jul 27, 2022	W/C Lof Lot 10, Block 15	-0.30	300	1950	11.0	1950	10.0	8.0 12.0	100.0
80	Jul 27, 2022	1.2m S of Lot 17 CC, Block 15	-0.70	300	1826	17.4	1850 (Est)	14.0	12.0 16.0	98.7

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): WM
Densometer(s): 63325
Report #:

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]

Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-gravelly, some sand : 1850kg/m³ @14.0 : Est
- o SILT-some gravel : 1950kg/m³ @10.0
- o SAND-gravelly, silty : 2100kg/m³ @8.0% : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
81	Jul 27, 2022	2.5m N of Lot 2 CC, Block 15	-0.15	300	1814	14.0	1850 (Est)	14.0	12.0 16.0	98.1
82	Jul 27, 2022	0.8m S of Lot 17 CC, Block 15	-0.30	300	1818	15.2	1850 (Est)	14.0	12.0 16.0	98.3
83	Jul 28, 2022	1m N of Lot 15 CC, Block 15	-1.80	250	1892	12.0	1950	10.0	8.0 12.0	97.0
84	Jul 28, 2022	1.2m N of Lot 15 CC, Block 15	-1.50	300	1912	13.7	1950	10.0	8.0 12.0	98.1
85	Jul 28, 2022	0.5m N of Lot 15 CC, Block 15	-1.20	300	1778	11.5	1850 (Est)	14.0	12.0 16.0	96.1
86	Jul 28, 2022	1.2m N of Lot 15 CC, Block 15	-0.60	300	1842	9.0	1950	10.0	8.0 12.0	94.5
87	Jul 29, 2022	2.5m S of Lot 4 CC, Block 15	-1.20	300	1929	11.7	1950	10.0	8.0 12.0	98.9
88	Jul 29, 2022	2.5m S of Lot 4 CC, Block 15	-0.90	300	1911	14.0	1950	10.0	8.0 12.0	98.0
89	Jul 29, 2022	C of Lot 9, Block 15	0.00	300	2079	7.9	2100 (Est)	8.0	6.0 10.0	99.0
90	Jul 29, 2022	N/C of Lot 8, Block 15	0.00	300	2079	9.4	2100 (Est)	8.0	6.0 10.0	99.0

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): WM
Densometer(s): 63325
Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]

Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-gravelly, some sand : 1850kg/m3 @14.0 : Est
- o SILT-some gravel : 1950kg/m3 @10.0
- o SAND-gravelly, silty : 2100kg/m3 @8.0% : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
91	Jul 29, 2022	S/C of Lot 7, Block 15	0.00	250	2072	9.4	2100 (Est)	8.0	6.0 10.0	98.7
92	Jul 29, 2022	C of Lot 6, Block 15	0.00	250	2058	9.9	2100 (Est)	8.0	6.0 10.0	98.0
93	Jul 29, 2022	Lot 5, Block 15: 3.3m NW of MH34	-0.30	300	1925	10.3	1950	10.0	8.0 12.0	98.7
94	Jul 30, 2022	E/C of Lot 10, Block 15	-0.30	300	2088	5.8	2100 (Est)	8.0	6.0 10.0	99.4
95	Jul 30, 2022	SE corner of Lot 9, Block 15	-0.30	250	2058	8.2	2100 (Est)	8.0	6.0 10.0	98.0
96	Jul 30, 2022	Lot 19, Block 15: 2m S of CC	-1.00	300	1915	9.3	1950	10.0	8.0 12.0	98.2
97	Jul 30, 2022	Lot 5, Block 15: 4m NW of MH34	-0.30	300	1926	10.3	1950	10.0	8.0 12.0	98.8
98	Jul 30, 2022	Lot 19, Block 15: 2.2m S of CC	-0.70	300	1955	8.5	1950	10.0	8.0 12.0	100.3
99	Jul 30, 2022	Lot 5, Block 15: 4m NW of MH34	-0.20	300	1928	9.3	1950	10.0	8.0 12.0	98.9
100	Jul 30, 2022	Lot 19, Block 15: 1.9m S of CC	-0.50	300	1830	10.9	1850 (Est)	14.0	12.0 16.0	98.9

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): WM
Densometer(s): 63325
Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]

Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-sandy, gravelly : 2050kg/m3 @12.0 : Est
- o SILT-gravelly, some sand : 1850kg/m3 @14.0 : Est
- o SILT-some gravel : 1950kg/m3 @10.0
- o SAND-gravelly, silty : 2100kg/m3 @8.0% : Est
- o SAND- some gravel, trace silt : 2080kg/m3 @8.0%

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
101	Jul 30, 2022	Lot 5, Block 15: 5m NW of MH34	-0.10	300	1835	10.2	1850 (Est)	14.0	12.0 16.0	99.2
102	Jul 30, 2022	Lot 19, Block 15: 1.2m SE of CC	-0.20	300	1833	11.6	1850 (Est)	14.0	12.0 16.0	99.1
103	Jul 30, 2022	C of Lot 6	-0.20	200	2087	7.3	2100 (Est)	8.0	6.0 10.0	99.4
104	Jul 30, 2022	N/C of Lot 7	0.00	300	2074	9.2	2100 (Est)	8.0	6.0 10.0	98.8
105	Jul 30, 2022	S/C of Lot 8	0.00	300	2118	8.9	2100 (Est)	8.0	6.0 10.0	100.9
106	Jul 30, 2022	C of Lot 9	0.00	300	2079	9.2	2100 (Est)	8.0	6.0 10.0	99.0
107	Jul 31, 2022	S/C of Lot 7, Block 15	-0.20	300	1919	13.5	1950	10.0	8.0 12.0	98.4
108	Jul 31, 2022	5m W of Lot 18 CC, Block 15	-0.65	300	2021	13.4	2050 (Est)	12.0	10.0 14.0	98.6
109	Aug 02, 2022	Lot 18, Block 15: 1m E of Dalton Road CL	-0.90	300	2073	8.0	2080	8.0	6.0 10.0	99.7
110	Aug 02, 2022	Lot 9 and 10, Block 15: 1m SW of Lot 10 CC	-1.30	300	1833	11.3	1850 (Est)	14.0	12.0 16.0	99.1

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): WM
Densometer(s): 63325
Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]

Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-sandy, gravelly : 2050kg/m3 @12.0 : Est
- o SILT-gravelly, some sand : 1850kg/m3 @14.0 : Est
- o SILT-some gravel : 1950kg/m3 @10.0
- o SAND, Silty, gravelly : 1750kg/m3 @12.0 : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
111	Aug 02, 2022	Lot 9 and 10, Block 15: 1m E of Lot 9 CC	-0.90	300	1845	10.7	1850 (Est)	14.0	12.0 16.0	99.7
112	Aug 02, 2022	Lot 9 and 10, Block 15: 2m N of Lot 9 CC	-0.30	300	1860	12.7	1850 (Est)	14.0	12.0 16.0	100.5
113	Aug 06, 2022	E/C of Lot 6, Block 15	0.00	300	2022	8.8	2050 (Est)	12.0	10.0 14.0	98.6
114	Aug 06, 2022	N/C of Lot 8, Block 15	0.00	250	2199	7.3	2050 (Est)	12.0	10.0 14.0	107.3
115	Aug 06, 2022	C of Lot 8, Block 15	0.00	300	2032	9.6	2050 (Est)	12.0	10.0 14.0	99.1
116	Aug 06, 2022	S/C of Lot 9, Block 15	0.00	300	2016	9.4	2050 (Est)	12.0	10.0 14.0	98.3
117	Aug 07, 2022	2m SE of Lot 8 CC, Block 15	-1.50	300	1784	10.7	1850 (Est)	14.0	12.0 16.0	96.4
118	Aug 07, 2022	2.5m NW of Lot 11 CC, Block 15	-1.40	300	1720	12.8	1750 (Est)	12.0	10.0 14.0	98.3
119	Aug 07, 2022	2m NW of Lot 8 CC, Block 15	-1.40	300	1910	10.2	1950	10.0	8.0 12.0	97.9
120	Aug 07, 2022	1m S of Lot 11 CC, Block 15	-1.00	300	1830	9.8	1850 (Est)	14.0	12.0 16.0	98.9

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): WM
Densometer(s): 63325
Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]
Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-gravelly, some sand : 1850kg/m3 @14.0 : Est
- o SILT-some gravel : 1950kg/m3 @10.0
- o SAND, Silty, gravelly : 1750kg/m3 @12.0 : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
121	Aug 07, 2022	2.5m N of Lot 11 CC, Block 15	-0.90	300	1720	13.6	1750 (Est)	12.0	10.0 14.0	98.3
122	Aug 08, 2022	2m NW of Lot 8 CC, Block 15	-0.70	300	1824	10.8	1850 (Est)	14.0	12.0 16.0	98.6
123	Aug 08, 2022	2.5m N of Lot 11 CC, Block 15	-0.65	300	1942	8.7	1950	10.0	8.0 12.0	99.6
124	Aug 08, 2022	1.8m SE of Lot 11 CC, Block 15	-0.70	300	1841	9.3	1850 (Est)	14.0	12.0 16.0	99.5
125	Aug 08, 2022	2m S of Lot 7 CC, Block 15	-1.80	300	1784	14.4	1850 (Est)	14.0	12.0 16.0	96.4
126	Aug 08, 2022	2m S of Lot 12 CC, Block 15	-1.50	300	1825	10.6	1850 (Est)	14.0	12.0 16.0	98.6
127	Aug 08, 2022	2.2m N of Lot 7 CC, Block 15	-1.80	300	1856	11.8	1750 (Est)	12.0	10.0 14.0	106.1
128	Aug 08, 2022	1.5m S of Lot 7 CC, Block 15	-1.50	300	1856	11.8	1950	10.0	8.0 12.0	95.2
129	Aug 08, 2022	1m N of Lot 7 CC, Block 15	-1.50	200	1827	12.2	1850 (Est)	14.0	12.0 16.0	98.8
130	Aug 08, 2022	1.2m S of Lot 12 CC, Block 15	-1.10	300	1823	12.5	1850 (Est)	14.0	12.0 16.0	98.5

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): WM
Densometer(s): 63325
Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]
Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-gravelly, some sand : 1850kg/m³ @14.0 : Est
- o SILT-some gravel : 1950kg/m³ @10.0
- o SAND, Silty, gravelly : 1750kg/m³ @12.0 : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
131	Aug 08, 2022	2m S of Lot 12 CC, Block 15	-0.80	300	1828	11.3	1850 (Est)	14.0	12.0 16.0	98.8
132	Aug 08, 2022	2.5m N of Lot 7 CC, Block 15	-1.20	300	1727	14.3	1750 (Est)	12.0	10.0 14.0	98.7
133	Aug 08, 2022	2m S of Lot 7 CC, Block 15	-1.20	300	1921	11.8	1950	10.0	8.0 12.0	98.5
134	Aug 08, 2022	2.2m N of Lot 7 CC, Block 15	-0.80	300	1930	9.8	1950	10.0	8.0 12.0	99.0
135	Aug 08, 2022	2m S of Lot 12 CC, Block 15	-0.60	300	1850	12.3	1850 (Est)	14.0	12.0 16.0	100.0
136	Aug 08, 2022	1.5m NW of Lot 12 CC, Block 15	-0.70	300	1816	12.7	1850 (Est)	14.0	12.0 16.0	98.2
137	Aug 09, 2022	1.8m S of Lot 6 CC, Block 15 Sani	-2.20	300	1822	13.5	1850 (Est)	14.0	12.0 16.0	98.5
138	Aug 09, 2022	1.5m S of Lot 6 CC, Block 15 Sani	-2.00	300	1774	14.9	1750 (Est)	12.0	10.0 14.0	101.4
139	Aug 09, 2022	3m SW of Lot 6 CC, Block 15	-1.70	300	1862	13.8	1850 (Est)	14.0	12.0 16.0	100.6
140	Aug 09, 2022	2.5m S o lot 6 CC, Block 15	-1.50	300	1843	14.0	1850 (Est)	14.0	12.0 16.0	99.6

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): WM
Densometer(s): 63325
Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises

Standard Area Name: [Other Info]

Site Grading

Proctor Type: Standard (ASTM D698)

Soil Description(s):

- o SILT-sandy, gravelly : 2050kg/m3 @12.0 : Est
- o SILT-gravelly, some sand : 1850kg/m3 @14.0 : Est
- o SILT-some gravel : 1950kg/m3 @10.0

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Cmpct. (%)
141	Aug 09, 2022	3m S of ot 6 CC, Block 15	-1.10	300	1926	12.8	1950	10.0	8.0 12.0	98.8
142	Aug 09, 2022	2.5m S of Lot 6 CC, Block 15	-0.80	300	1844	13.1	1850 (Est)	14.0	12.0 16.0	99.7
143	Aug 09, 2022	1m N of Lot 6 CC, Block 15	-0.80	300	1860	13.3	1850 (Est)	14.0	12.0 16.0	100.5
144	Aug 09, 2022	3m Sof Lot 6 CC, Block 15	-0.60	300	1830	12.6	1850 (Est)	14.0	12.0 16.0	98.9
145	Aug 09, 2022	1.5m N of Lot 6 CC, Block 15	-0.60	300	1825	13.6	1850 (Est)	14.0	12.0 16.0	98.6
146	Aug 19, 2022	E/C Lot 7, Block 15	0.00	150	2017	11.9	2050 (Est)	12.0	10.0 14.0	98.4
147	Aug 19, 2022	C Lot 8, Block 15	0.00	150	2069	11.3	2050 (Est)	12.0	10.0 14.0	100.9
148	Aug 22, 2022	NE corner of Lot 10, Block 15	-0.20	300	2025	9.7	2050 (Est)	12.0	10.0 14.0	98.8
149	Aug 22, 2022	C of Lot 11, Block 15	-0.10	300	1924	10.8	1950	10.0	8.0 12.0	98.7
150	Aug 22, 2022	SE corner of Lot 12, Block 15	0.00	300	2043	10.9	2050 (Est)	12.0	10.0 14.0	99.7

Remarks:

cc:

Reviewed By:



Name:

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FIELD DENSITY TEST SUMMARY REPORT

ASTM D6938

PROJECT INFORMATION

Project Number: 704-ENG.WARC03938-21
Project: Karmon Street and Bates Street Lot Infill
Client: Government of Yukon
 Whitehorse Yukon

Attention:

Site: Lot Infill
Tech(s): WM
Densometer(s): 63325
Report #: 1

TEST INFORMATION

Contractor: Castle Rock Enterprises
Standard Area Name: [Other Info]
Site Grading
Proctor Type: Standard (ASTM D698)
Soil Description(s):


o SILT-sandy, gravelly : 2050kg/m³ @12.0 : Est

Specified Compaction (%): 98.0

Test #	Date	Location	Grade Depth (m)	Probe Depth (mm)	Dry Density (kg/m ³)	MC (%)	Proctor Density (kg/m ³)	MC Opt (%)	MC Range (%)	Compct. (%)
151	Aug 24, 2022	N/C Lot 12, Block 15	-0.10	200	2048	10.9	2050 (Est)	12.0	10.0 14.0	99.9
152	Aug 24, 2022	N/C Lot 10, Block 15	0.00	300	2012	10.8	2050 (Est)	12.0	10.0 14.0	98.1

Remarks:

cc:

Reviewed By:

Name:

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