# APPENDIX C

# GEOTECHNICAL LABORATORY ANALYSIS RESULTS

## TABLE C.1
## MOISTURE CONTENT TEST RESULTS

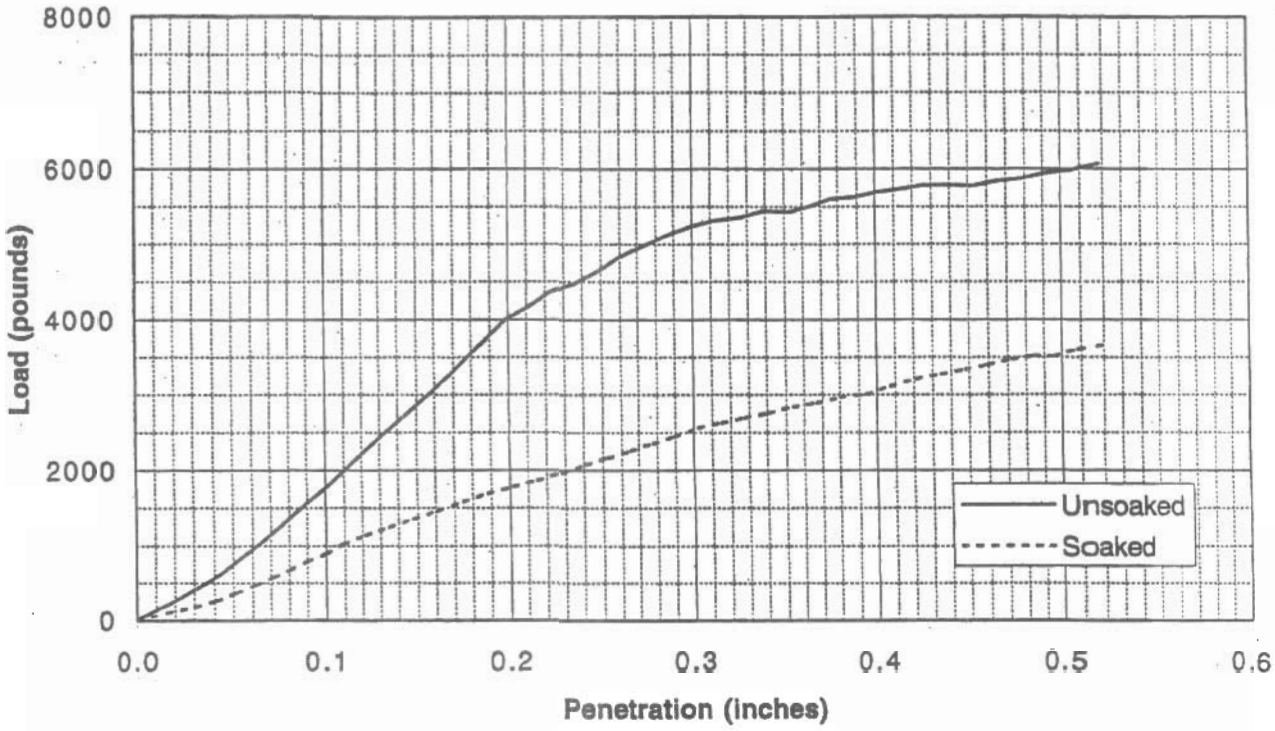
| Testpit No. | Depth (m) | Moisture Content % |
|---|---|---|
| TP 01 | 0.8 – 1.0 | 11.7 |
| TP 04 | 0.3 – 0.5 | 9.0 |
| TP 05 | 0.3 – 0.4 | 9.4 |
| TP 08 | 0.3 – 0.4 | 7.5 |
| TP 08 | 0.9 – 1.0 | 7.3 |
| TP 09 | 0.4 – 0.5 | 6.6 |
| TP 09 | 0.9 – 1.0 | 7.6 |
| TP 11 | 0.5 – 0.6 | 8.2 |
| TP 15 | 0.5 – 0.6 | 8.4 |
| TP 16 | 0.6 – 0.7 | 8.1 |
| TP 18 | 0.4 – 0.6 | 7.4 |
| TP 20 | 0.5 – 0.6 | 8.7 |
| TP 27 | 0.4 – 0.5 | 8.0 |
| TP 29 | 0.5 – 0.6 | 9.7 |
| TP 35 | 0.4 – 0.5 | 9.3 |
| TP 41 | 0.3 – 0.4 | 15.6 |
| TP 42 | 0.2 – 0.3 | 9.7 |
| TP 42 | 0.8 – 0.9 | 9.7 |

# EBA Engineering Consultants Ltd.

**CBR Test**

Project Number: 1100065.002
Date (Unsoaked): 04-09-25
Date (Soaked): 04-09-29

Sample Designation: TP01



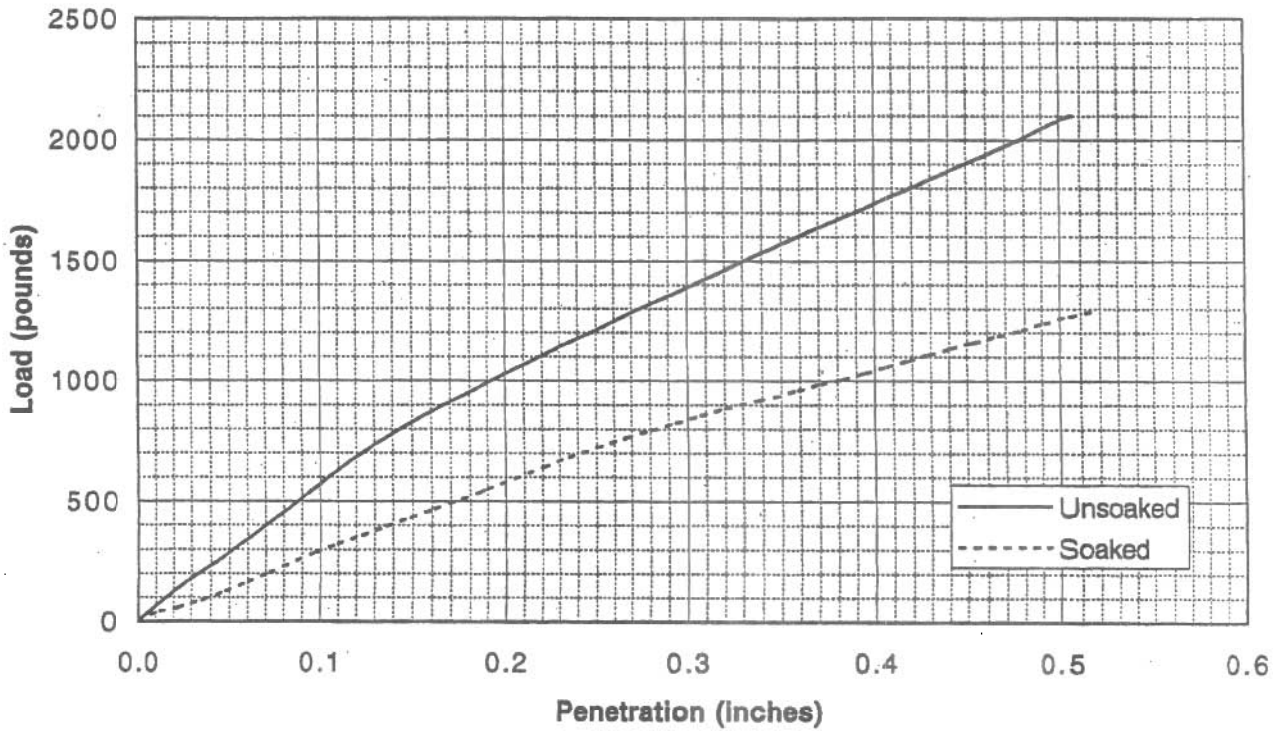

| | CBR Values (%) | |
|---|---|---|
| | Unsoaked | Soaked |
| 0.1"= | 58.8 | 30.2 |
| 0.2"= | 89.1 | 39.2 |

# EBA Engineering Consultants Ltd.

**CBR Test**

Project Number: 1100065.002
Date (Unsoaked): 04-10-01
Date (Soaked): 04-10-04

Sample Designation: TP03




| | CBR Values (%) | |
|---|---|---|
| | Unsoaked | Soaked |
| 0.1"= | 18.9 | 9.7 |
| 0.2"= | 22.8 | 12.9 |

# EBA Engineering Consultants Ltd.

## MOISTURE - DENSITY RELATIONSHIP

ASTM D698, D1557, or D2049

PROJECT: CAM-F Sarcpa Lake

PROJECT NO.: 0101-1100065.002

CLIENT: PWGSC

DESCRIPTION: SAND & GRAVEL (80mm max. crush), tr. silt, clay - brown

SAMPLE LOCATION: 0-0.6m depth

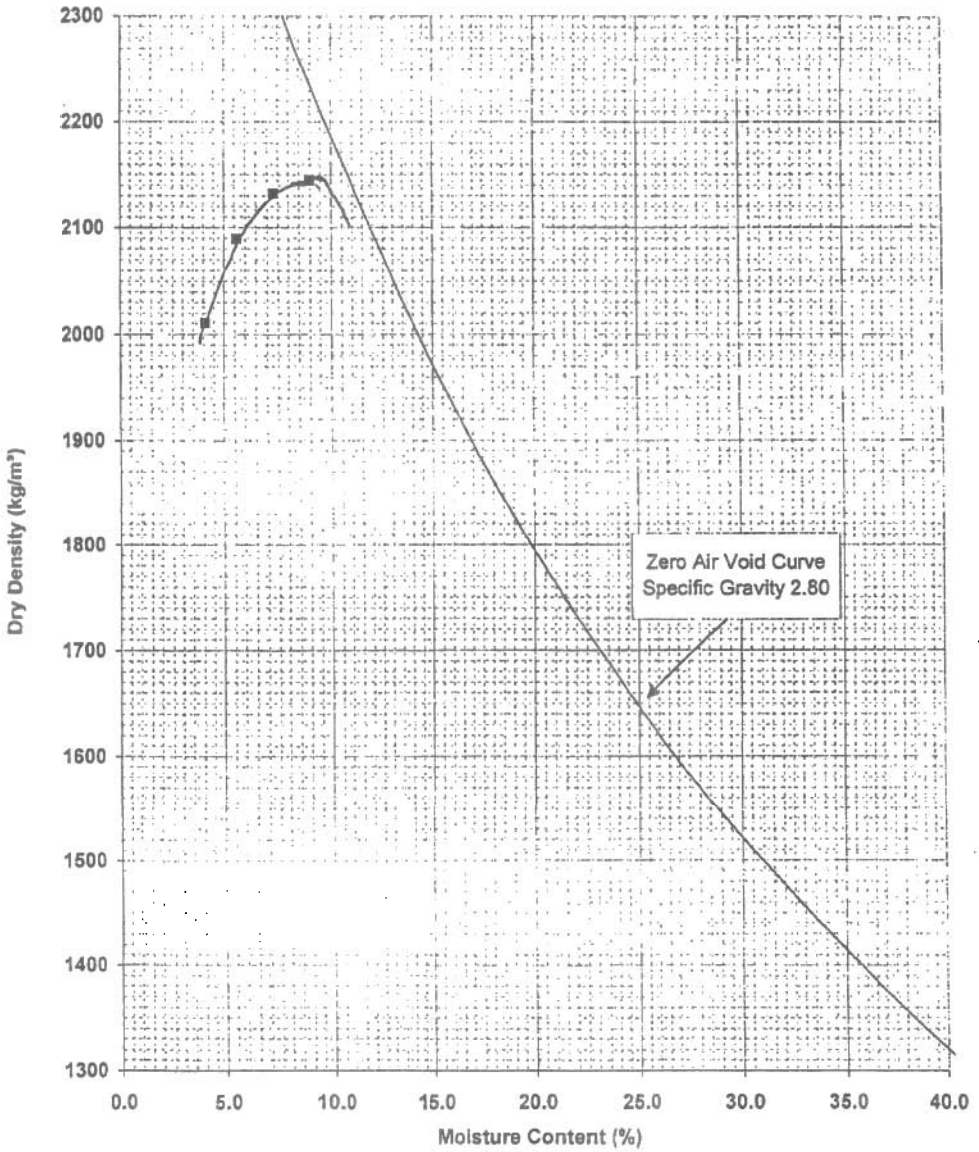
SAMPLE NUMBER: TP01

DATE TESTED: 04/09/16

MOISTURE CONTENT (as received): 5.6%

MAXIMUM DRY DENSITY: 2155 kg/m$^3$

OPTIMUM MOISTURE CONTENT: 8.0%




**STANDARD PROCTOR**
**ASTM D698**

Hammer Mass: 2.494 kg

Hammer Drop: 304.8 mm

Number of Layers: 3

Number of Blows/Layer: 56

Diameter of Mould: 152.3 mm

Height of Mould: 116.5 mm

Mould Volume: 0.00212 m3

Compactive Effort: 590.3 kJ/m3

**REVIEWED BY:**

_____ P.Eng.

**REMARKS:**

Rock correction = 19.4%+19mm

# EBA Engineering Consultants Ltd.

## MOISTURE - DENSITY RELATIONSHIP

ASTM D698, D1557, or D2049

PROJECT: CAMU-F Sarcpa Lake

SAMPLE NUMBER: TP03

PROJECT NO.: 0101-1100065.002

DATE TESTED: 04/09/20

CLIENT: PWGSC

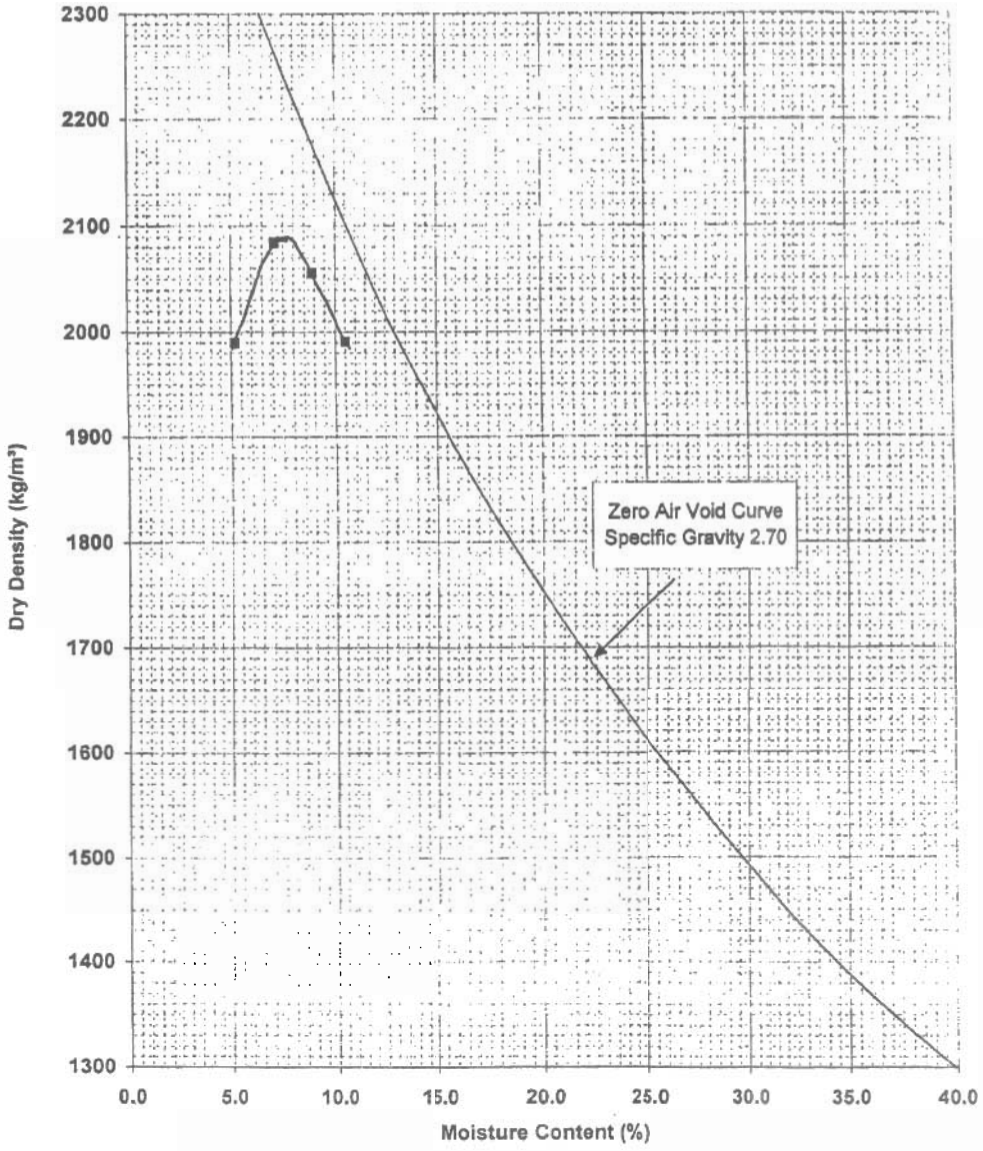
MOISTURE CONTENT (as received): 9.0%

DESCRIPTION: CLAY & GRAVEL (63mm max. crush), tr. sand, silt - grey

MAXIMUM DRY DENSITY: 2090 kg/m$^3$

SAMPLE LOCATION: 0-0.5m depth

OPTIMUM MOISTURE CONTENT: 7.7%




STANDARD PROCTOR

ASTM D698

Hammer Mass: 2.494 kg

Hammer Drop: 304.8 mm

Number of Layers: 3

Number of Blows/Layer: 56

Diameter of Mould: 152.3 mm

Height of Mould: 116.5 mm

Mould Volume: 0.00212 m3

Compactive Effort: 590.3 kJ/m3

REVIEWED BY:

P.Eng.

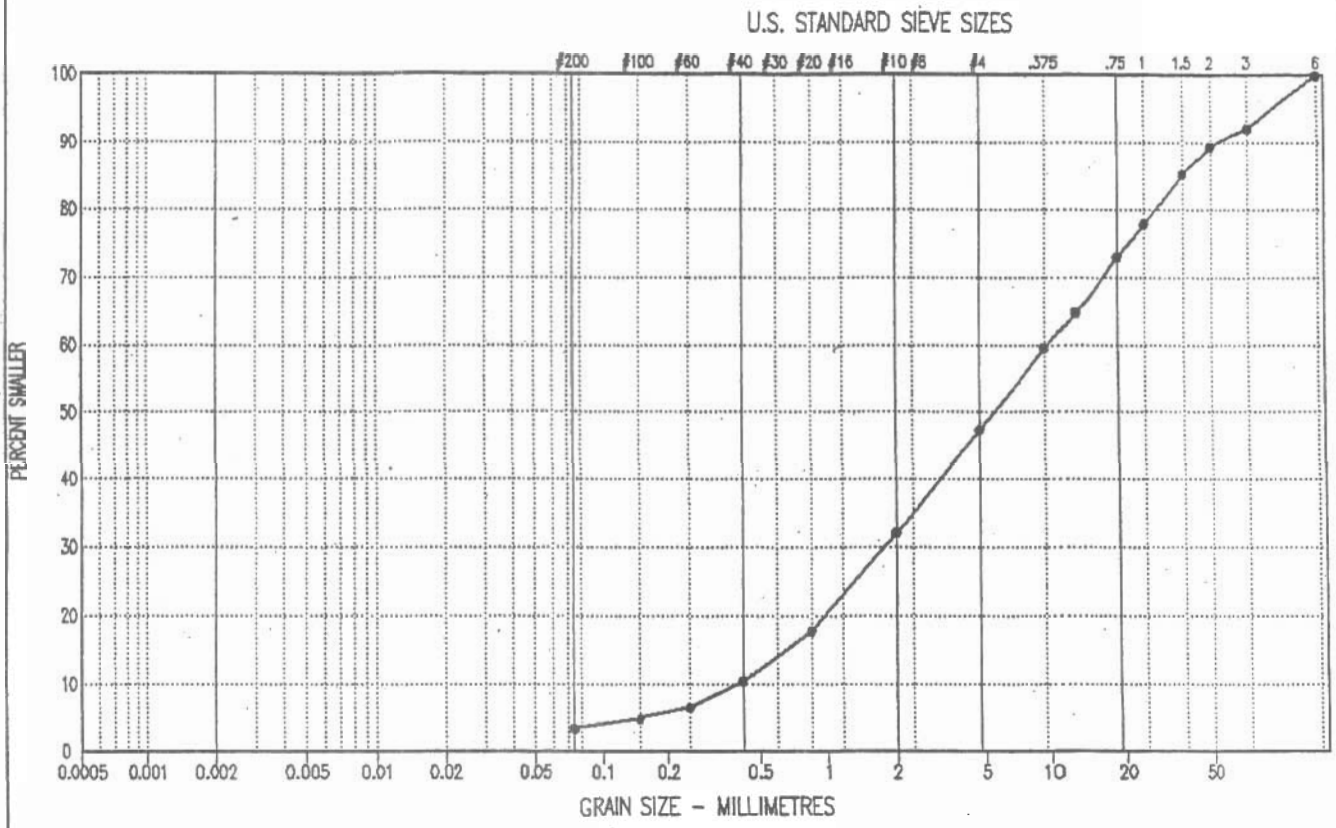
REMARKS:

Rock correction = 14.4%+19mm

# EBA Engineering

## PARTICLE SIZE – ANALYSIS OF SOILS

| CLAY | SILT | SAND | | | GRAVEL | |
|---|---|---|---|---|---|---|
| | | FINE | MEDIUM | COARSE | FINE | COARSE |




| SYMBOL | BOREHOLE NUMBER | DEPTH (m) | DESCRIPTION | | | | Cu | Cc | U.S.C |
|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY % | SILT % | SAND % | GRAVEL % | | | |
| ●——● | TP01 | 0.00 – 0.60 | --- | 3 --- | 44 | 53 | 24.0 | 0.8 | GP |

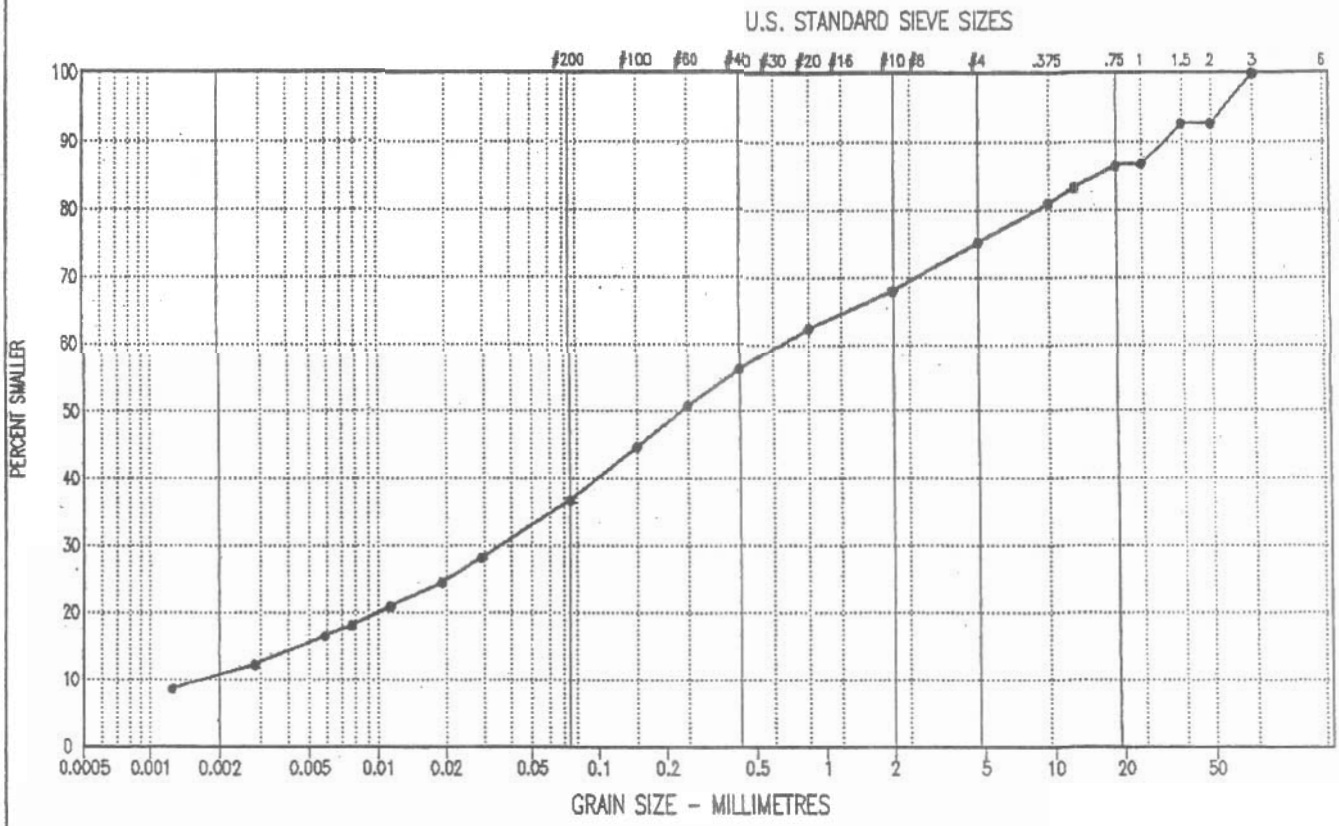
Project: 0101-1100065.002 Date Tested: 04/09/16 BY: KP

Tested in accordance with ASTM D422 unless otherwise noted.

# EBA Engineering

## PARTICLE SIZE – ANALYSIS OF SOILS

| CLAY | SILT | SAND | | | GRAVEL | |
|---|---|---|---|---|---|---|
| | | FINE | MEDIUM | COARSE | FINE | COARSE |




| SYMBOL | BOREHOLE NUMBER | DEPTH (m) | DESCRIPTION | | | | Cu | Cc | U.S.C |
|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY % | SILT % | SAND % | GRAVEL % | | | |
| ●——● | TP03 | 0.00 – 0.50 | 10.0 | 26 | 39 | 25 | – | 1.2 | SM |

Note:
Trace cobbles and some boulders in the area. Only 75 mm minus material sampled and tested.

Project: 0101-1100065.002

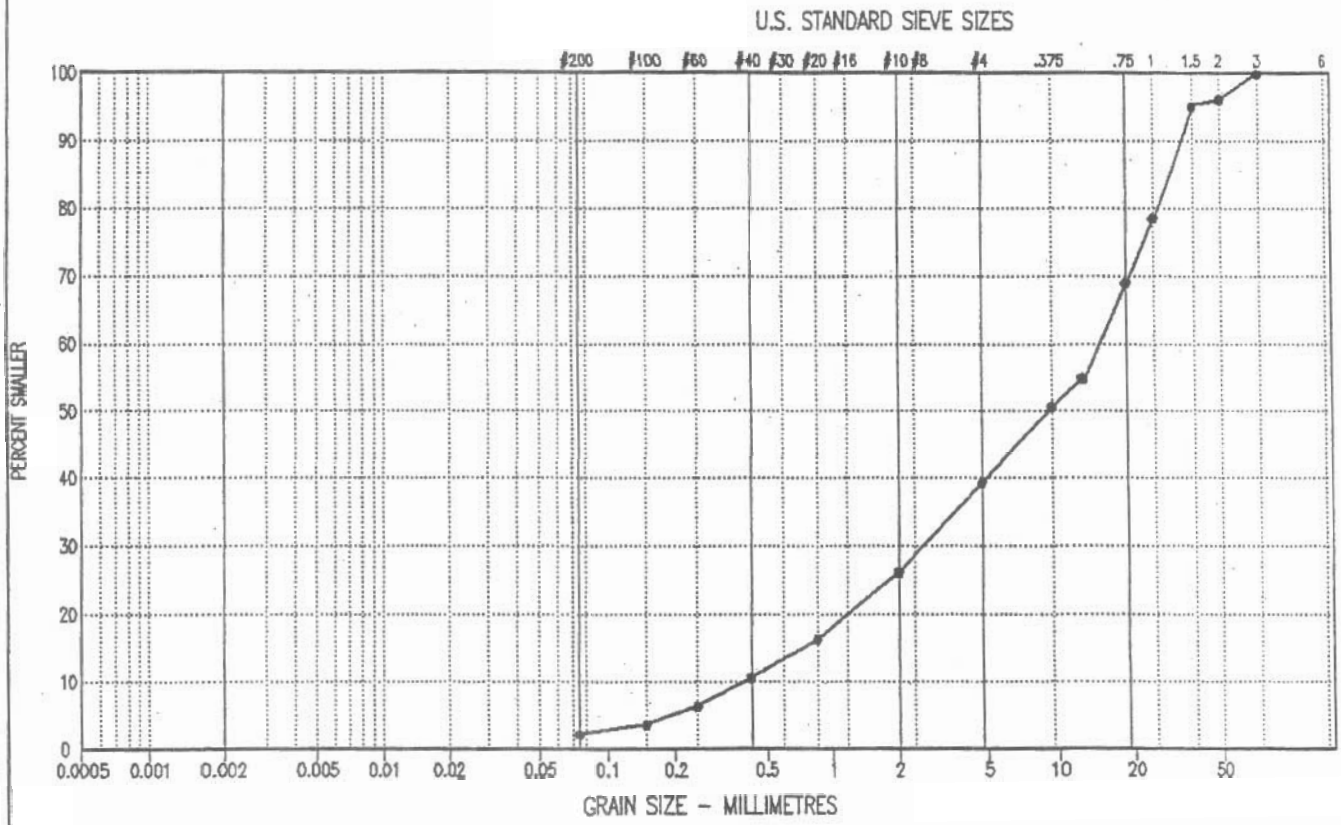
Date Tested: 04/09/15 BY: KP

Tested in accordance with ASTM D422 unless otherwise noted.

# EBA Engineering

## PARTICLE SIZE – ANALYSIS OF SOILS

| CLAY | SILT | SAND | | | GRAVEL | |
|---|---|---|---|---|---|---|
| | | FINE | MEDIUM | COARSE | FINE | COARSE |




| SYMBOL | BOREHOLE NUMBER | DEPTH (ft) | DESCRIPTION CLAY % | SILT % | SAND % | GRAVEL % | Cu | Cc | U.S.C |
|---|---|---|---|---|---|---|---|---|---|
| ●——● | EAST–BORROW (Borrow 7) | 0.00 | --- | 2 --- | 37 | 61 | 36.5 | 1.3 | GW |

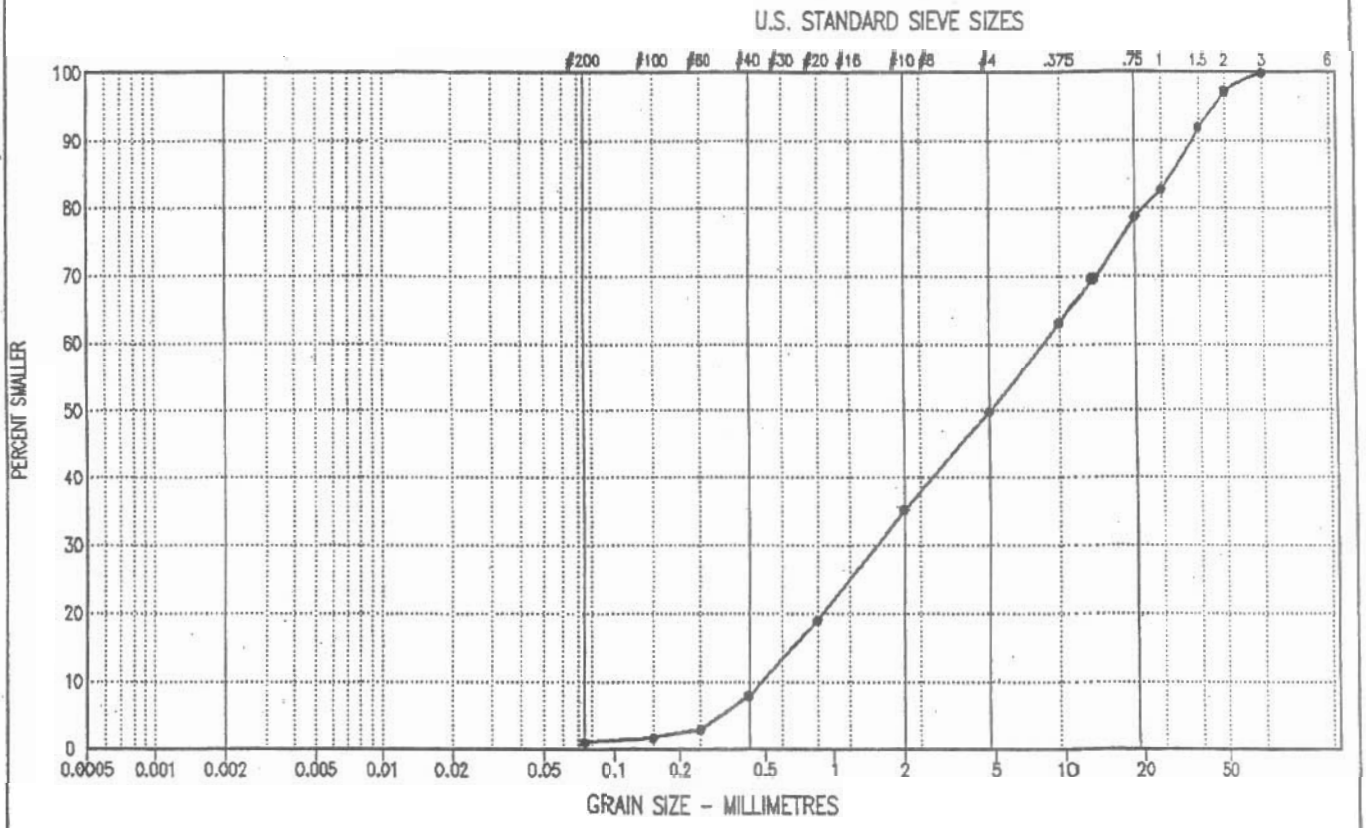
Project: 0101–1100065.002 Date Tested: 04/09/16 BY: KP

Tested in accordance with ASTM D422 unless otherwise noted.

# EBA Engineering

## PARTICLE SIZE – ANALYSIS OF SOILS

| CLAY | SILT | SAND | | | GRAVEL | |
|---|---|---|---|---|---|---|
| | | FINE | MEDIUM | COARSE | FINE | COARSE |




| SYMBOL | BOREHOLE NUMBER | DEPTH (ft) | DESCRIPTION | | | | Cu | Cc | U.S.C |
|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY % | SILT % | SAND % | GRAVEL % | | | |
| ●——● | OLD-CONST-CA (Borrow 6) | 0.00 | --- | 1 --- | 48 | 51 | 16.5 | 0.6 | GP |

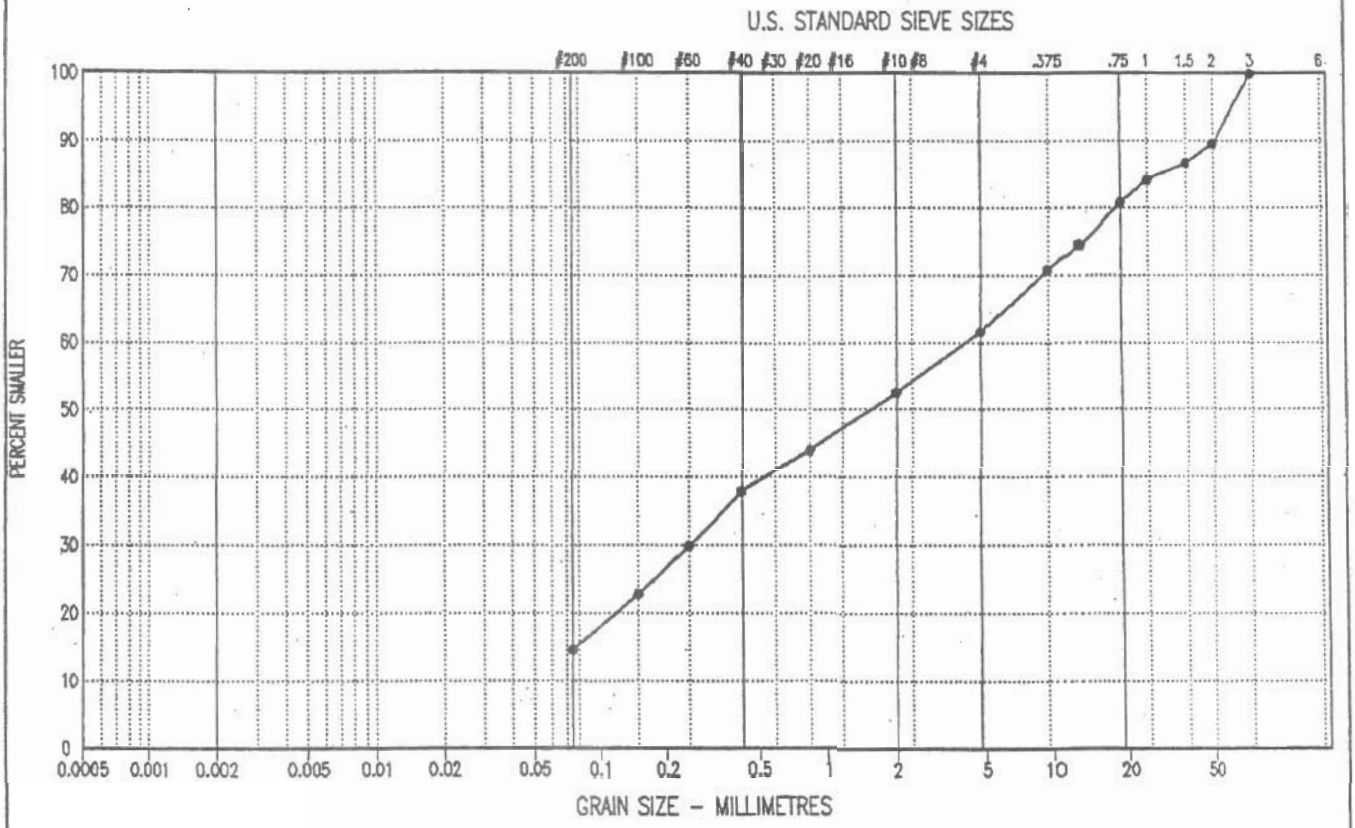
Project: 0101-1100065.002 Date Tested: 04/09/16 BY: KF

Tested in accordance with ASTM D422 unless otherwise noted.

# EBA Engineering

## PARTICLE SIZE – ANALYSIS OF SOILS

| CLAY | SILT | SAND | | | GRAVEL | |
|---|---|---|---|---|---|---|
| | | FINE | MEDIUM | COARSE | FINE | COARSE |




| SYMBOL | BOREHOLE NUMBER | DEPTH (ft) | DESCRIPTION CLAY % | SILT % | SAND % | GRAVEL % | Cu | Cc | U.S.C |
|---|---|---|---|---|---|---|---|---|---|
| ●——● | WEST–BORROW | 0.00 | --- | 15 | --- | 46 | 39 | 128.3 | 0.5 | SM |

Note:
Borrow 3 – West Borrow.
Trace to some cobbles in area and occasional boulders. Only 75 mm minus sampled and tested.

Project: 0101–1100065.002 Date Tested: 04/09/16 BY: KP

Tested in accordance with ASTM D422 unless otherwise noted.

# APPENDIX D

# GEOTECHNICAL REPORT
# GENERAL CONDITIONS

This report incorporates and is subject to these "General Conditions."

## 1. USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of EBA's client. EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA's client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.



## 2. 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. EBA 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.

## 3. LOGS OF TEST HOLES

The test hole 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.

## 4. 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. EBA 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.

## 5. SURFACE WATER AND GROUNDWATER CONDITIONS

Surface and groundwater conditions mentioned in this report are those observed at the times recorded in the report. These conditions vary with geological detail between observation sites; annual, seasonal and special meteorologic conditions; and with development activity. Interpretation of water conditions from observations and records is judgmental and constitutes an evaluation of circumstances as influenced by geology, meteorology and development activity. Deviations from these observations may occur during the course of development activities.

## 6. 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.

## 7. 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.

## 8. 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.

## 9. 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.

## 10. 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.

## 11. 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.

## 12. SAMPLES

EBA 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.

## 13. STANDARD OF CARE

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

## 14. ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, EBA 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.

## 15. ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by EBA shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancies, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by EBA shall be deemed to be the overall original for the Project.

The Client agrees that both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. The Client warrants that EBA's instruments of professional service will be used only and exactly as submitted by EBA.

The Client recognizes and agrees that electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.