



January 24, 2025

Our File Ref.: 230464

Abdulla Real Estate Holdings Inc.

Box 819
Manotick, ON
K4M 1A7

Attention: Nicole Chilton-Jones

**Subject: Global Stability Analysis – Proposed Medical Building
5580 Manotick Main Street
Ottawa, Ontario**

Pursuant to your request, LRL Associates Ltd. (LRL) was retained to carry out a Global Stability Analysis on the proposed gabion stone retaining wall at the above referenced location. The purpose of this analysis was to evaluate the proposed construction of the wall, and to ensure the construction will not negatively affect the site stability in short term (undrained), long term (drained), and seismic condition.

1 SITE AND PROJECT DESCRIPTION

The site under investigation is located at 5580 Manotick Main Street, Ottawa, ON. Currently the site has an abandoned single-family dwelling, with multiple “shed-like” structures. The site is bound by Manotick Main Street to the east, 5576 Manotick Main Street to the north, 5582 Manotick Main Street to the south, and 1160 Beaverwood Road to the west. The topography of the site is sloping downwards from front to rear. The site is accessible from Manotick Main Street. The site location is presented in Figure 1 included in Appendix A.

At the time of generating this report, it is understood the development will consist of demolition of all structures onsite, and construction of a two-storey medical office building, with on-grade parking.

2 SUBSURFACE CONDITIONS

A review of local surficial geology maps provided by the Department of Energy, Mines and Resources Canada suggest that the surficial geology for this area consists of till material. The till consists of a heterogeneous mixture of material ranging from clay to large boulders, generally sandy, grades downwards into unmodified till.

The boreholes drilled onsite for the Geotechnical Investigation indicate the site is comprised of a loose to very dense glacial till material.



Groundwater was found to be at 1.9 m below ground surface.

3 SLOPE STABILITY ANALYSES

The slope modelling program, Slide 5.0 (Rocscience), was used to implement the Bishop simplified method of slices. The cross-section chosen to be ran in the modelling was considered to be the worst-case scenario (ie: the location with the highest retaining wall) obtained from a cross-section from the project's "Grading and Drainage Plan", generated by LRL. The approximate location of the cross-section (labelled A-A) that was taken and ran in the modelling is shown on the above-mentioned drawing, attached to this report. The profile was analyzed under the undrained (short-term), drained (long-term), and seismic condition. However, it shall be noted that the drained and undrained parameters for the soil encountered on this site are the same. Therefore, the drained and undrained conditions are considered to be equivalent.

The seismic analysis was performed by incorporating the seismic coefficient (k_h) into the modelling. The peak ground acceleration (PGA) for this area is equal to 0.28 for the 2% in 50 year probability of exceedance as per the NBC 2015. The value for k_h was taken as 50% of the PGA, which equates to 0.14.

The field measurements from the borehole drilling in conjunction with known published data of the materials within the region were used for selection of appropriate soil modelling parameters in the slope stability analyses.

The results of the analyses are potentially dependent on the assumption of groundwater conditions. As a conservative approach the analysis was completed assuming full saturation.

The following soil parameters were used as part of the analyses.

Soil Type	Effective cohesion (c') - KPa	Angle of internal friction (ϕ') - degrees	Bulk unit weight (γ_B) – KN/m ³
Drained/Undrained Parameters (Long/Short Term)			
Pavement Structure	1	36	22.0
Backfill Material	1	35	21.0
Glacial Till	1	37	21.5
Retaining Wall	-	-	24.0

The Factor of Safety (FoS) against slope failure for the proposed profile was determined to be 1.54. A FoS of 1.50 or greater is considered to be safe with regards to slope stability.

The FoS in the seismic condition was determined to be 1.10. The minimum FoS with regards to seismic condition is 1.10.

These results indicate that the proposed construction will not negatively affect the slope, and it will remain stable in the long and short term, and in the event of any seismic activity.

The model results are attached for your reference.

4 GENERAL COMMENTS AND LIMITATIONS OF REPORT

The conclusion and recommendations are provided in this report are based on subsoil properties at the boreholes' locations. The material reflected in this report are best judgement in

light of information obtained from localized auger holes and information available with LRL at the time of report preparation.

This report is prepared for and is intended solely for its client and authorized engineers. Unless otherwise agreed in writing, no portion of this report, or any part thereof may be used for decisions made based on it by separate entity, are the responsibility of such entity. LRL accepts no responsibility for damage, if any, suffered by any separate entity as a result of decisions made or suffered from illegal use of this report. The findings are relevant for the date of the site investigation and any changes on the ground profile or subsurface condition at later date, LRL should be retained to review and for further recommendations.

We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report or if we may be of further services to you, please do not hesitate to contact our office.

Yours truly,

LRL Associates Ltd.

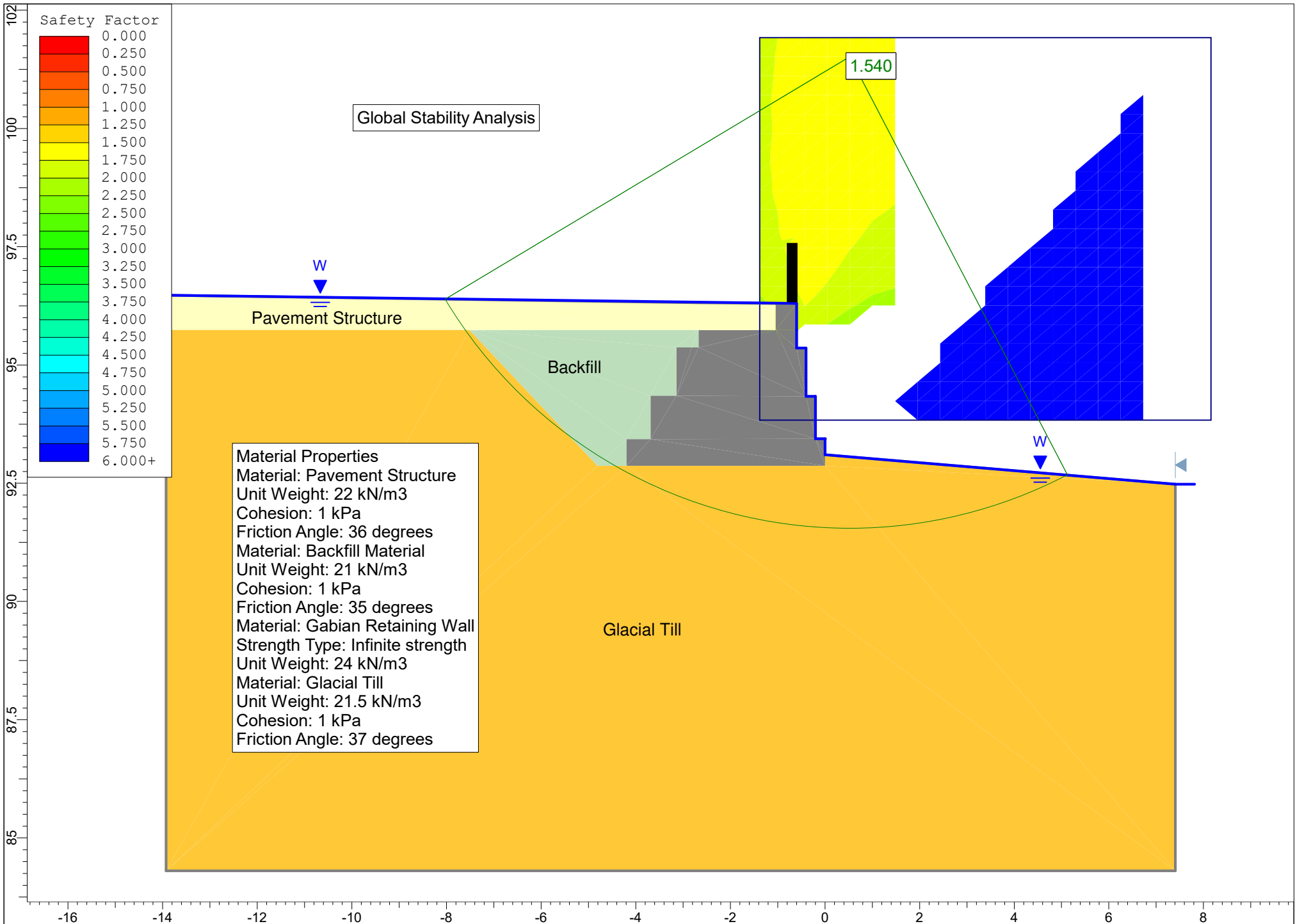


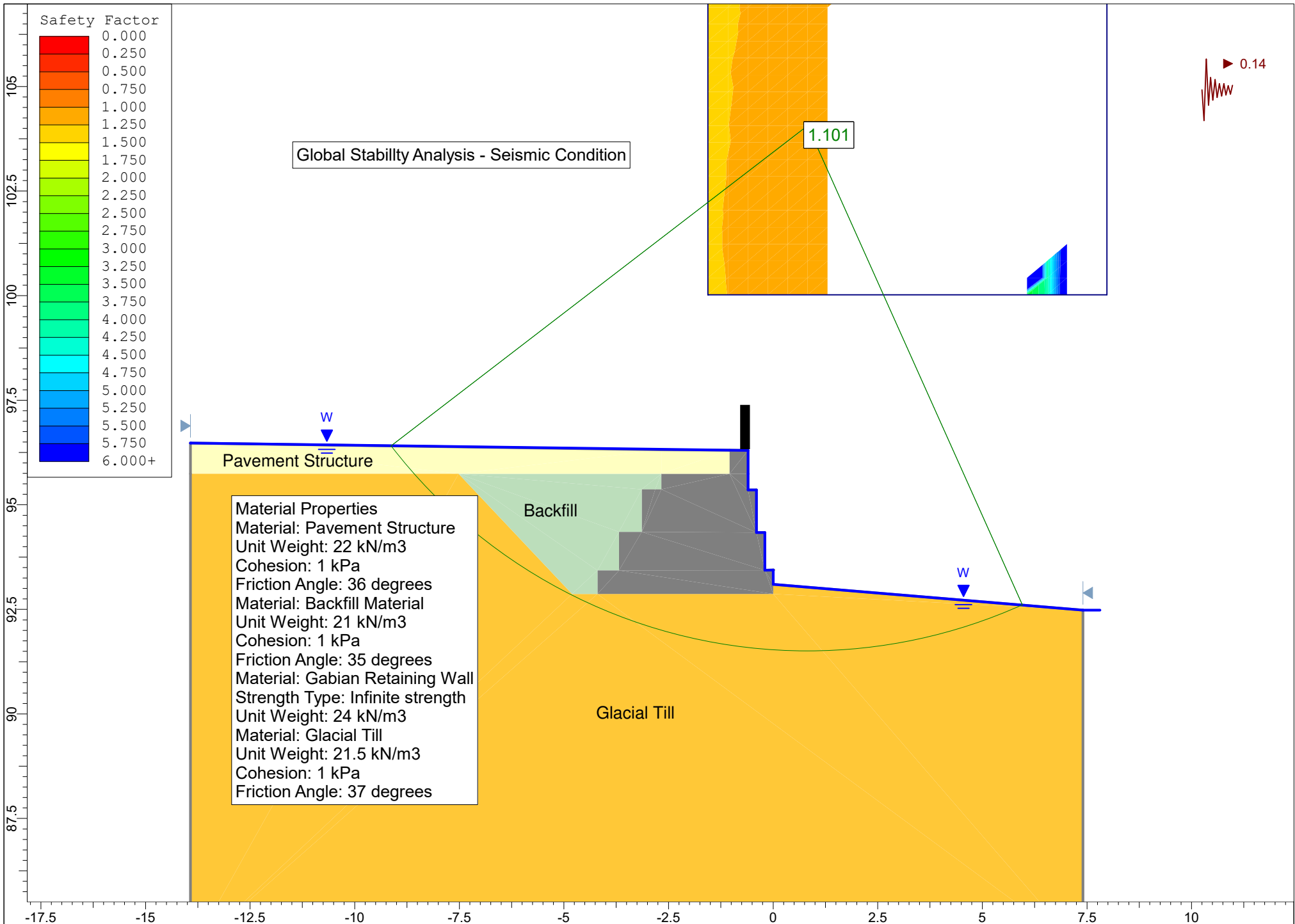
Brad Johnson, P. Eng.
Geotechnical Engineer

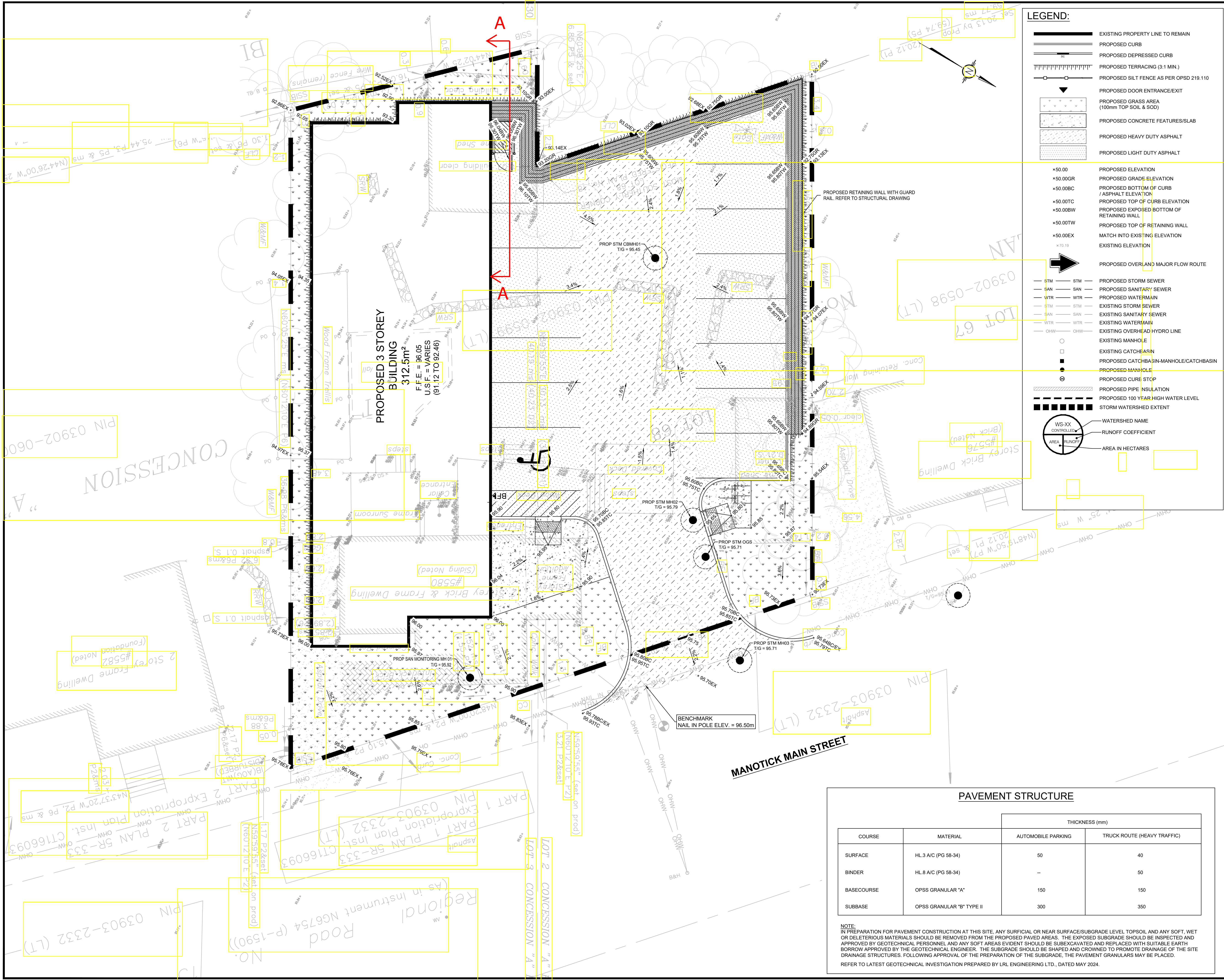


Encl. Slope Stability Analysis Results
Cross-section Location









LEGEND:

EXISTING PROPERTY LINE TO REMAIN
PROPOSED CURB
PROPOSED DEPRESSED CURB
PROPOSED TERRACING (3:1 MIN.)
PROPOSED SILT FENCE AS PER OPSD 219.110
PROPOSED DOOR ENTRANCE/EXIT
PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
PROPOSED CONCRETE FEATURES/SLAB
PROPOSED HEAVY DUTY ASPHALT
PROPOSED LIGHT DUTY ASPHALT

PROPOSED ELEVATION
PROPOSED GRADE ELEVATION
PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
PROPOSED TOP OF CURB ELEVATION
PROPOSED EXPOSED BOTTOM OF RETAINING WALL
PROPOSED TOP OF RETAINING WALL
MATCH INTO EXISTING ELEVATION
EXISTING ELEVATION

PROPOSED OVERLAND MAJOR FLOW ROUTE

PROPOSED STORM SEWER
PROPOSED SANITARY SEWER
PROPOSED WATERMAIN
EXISTING STORM SEWER
EXISTING SANITARY SEWER
EXISTING WATERMAIN
EXISTING OVERHEAD HYDRO LINE
EXISTING MANHOLE
EXISTING CATCHBASIN
PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
PROPOSED MANHOLE
PROPOSED CURE STOP
PROPOSED PIPE INSULATION
PROPOSED 100 YEAR HIGH WATER LEVEL
STORM WATERSHED EXTENT

WATERSHED NAME
RUNOFF COEFFICIENT
AREA IN HECTARES

USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE THE USE AND INTENT OF THE DRAWING. THE CONTRACT DOCUMENTS INCLUDE NOT ONLY THE DRAWINGS, BUT ALSO THE SPECIFICATIONS, AGREEMENTS, CONDITIONS OF THE CONTRACT, THE SPECIFICATIONS, AGREEMENTS, AND MODIFICATIONS ISSUED AFTER EXECUTION OF THE CONTRACT. THESE CONTRACT DOCUMENTS ARE COMPLEMENTARY, AND WHAT IS REQUIRED BY ANY ONE SHALL BE BINDING AS IF REQUIRED BY ALL. WORK NOT COMPLETELY DELINEATED HEREON SHALL BE CONSTRUCTED OF THE SAME MATERIALS AND DETAIL SHOWN AS WORK SHOWN MORE COMPLETELY ELSEWHERE IN THE CONTRACT DOCUMENTS.

BY USE OF THE DRAWINGS FOR CONSTRUCTION OF THE PROJECT, THE OWNER CONFIRMS THAT HE HAS REVIEWED AND APPROVED THE DRAWINGS. THE CONTRACTOR CONFIRMS THAT HE HAS VISITED THE SITE, FAMILIARIZED HIMSELF WITH THE LOCAL CONDITIONS, VERIFIED FIELD DIMENSIONS AND CORRELATED HIS OBSERVATIONS WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

AS INSTRUMENTS OF SERVICE, ALL DRAWINGS, SPECIFICATIONS, CAD FILES OR OTHER ELECTRONIC MEDIA AND COPIED THERE OF FURNISHED BY THE ENGINEER ARE HIS PROPERTY. THEY ARE TO BE USED ONLY FOR THIS PROJECT AND ARE NOT TO BE USED ON ANY OTHER PROJECT, INCLUDING REPEATS OF THE PROJECT. CHANGES TO THE DRAWINGS MAY ONLY BE MADE BY THE ENGINEER.

UNLESS THE REVISION TITLE IS ISSUED FOR CONSTRUCTION, THESE DRAWINGS SHALL BE CONSIDERED PRELIMINARY AND SHALL NOT BE USED AS A CONSTRUCTION DOCUMENT.

THESE DRAWINGS ILLUSTRATES THE WORK TO BE DONE. THE ENGINEER IS NOT RESPONSIBLE FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES USED TO DO THE WORK, OR THE SAFETY ASPECTS OF CONSTRUCTION, AND NOTHING ON THESE DRAWINGS EXPRESSED OR IMPLIED CHANGES THIS CONDITION. CONTRACTOR SHALL DETERMINE ALL CONDITIONS AT THE SITE AND SHALL BE RESPONSIBLE FOR KNOWING HOW THEY AFFECT THE WORK. SUBMITTALS OF A BID TO PERFORM THIS WORK IS AN ACKNOWLEDGEMENT OF THE RESPONSIBILITIES, AND THAT THEY HAVE BEEN FULLY CONSIDERED IN PLANNING OF THE WORK, AND THE BID PRICE. NO CLAIMS FOR EXTRA CHARGES DUE TO THESE CONDITIONS WILL BE FORTHCOMING.

UNAUTHORIZED CHANGES:

IN THE EVENT THE CLIENT, THE CLIENT'S CONTRACTORS OR SUBCONTRACTORS, OR ANYONE FOR WHOM THE CLIENT IS LEGALLY LIABLE MAKES OR PERMITS TO BE MADE ANY CHANGES TO ANY REPORTS, PLANS, SPECIFICATIONS OR OTHER CONSTRUCTION DOCUMENTS PREPARED BY LRL ASSOCIATES LTD. (LRL) WITHOUT OBTAINING LRL'S PRIOR WRITTEN CONSENT, THE CLIENT SHALL ASSUME FULL RESPONSIBILITY FOR THE RESULTS OF SUCH CHANGES. THEREFORE THE CLIENT AGREES TO WAIVE ANY CLAIM AGAINST LRL AND TO RELEASE LRL FROM ANY LIABILITY ARISING DIRECTLY OR INDIRECTLY FROM SUCH UNAUTHORIZED CHANGES.

IN ADDITION, THE CLIENT AGREES, TO THE FULLEST EXTENT PERMITTED BY LAW, TO INDEMNIFY AND HOLD HARMLESS LRL FROM ANY DAMAGES, LIABILITIES OR COST, INCLUDING REASONABLE ATTORNEY'S FEES AND COST OF DEFENSE, ARISING FROM SUCH CHANGES.

IN ADDITION, THE CLIENT AGREES TO INCLUDE IN ANY CONTRACTS FOR CONSTRUCTION APPROPRIATE LANGUAGE THAT PROHIBITS THE CONTRACTOR OR ANY SUBCONTRACTORS OF ANY TIER FROM MAKING ANY CHANGES OR MODIFICATIONS TO LRL'S CONSTRUCTION DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF LRL AND THAT FURTHER REQUIRES THE CONTRACTOR TO INDEMNIFY BOTH LRL AND THE CLIENT FROM ANY LIABILITY OR COST ARISING FROM SUCH CHANGES MADE WITHOUT SUCH PROPER AUTHORIZATION.

GENERAL NOTES:

EXISTING SERVICES AND UTILITIES SHOWN ON THESE DRAWINGS ARE TAKEN FROM THE BEST AVAILABLE RECORDS, BUT MAY NOT BE COMPLETE OR TO DATE. CONTRACTOR SHALL VERIFY IN FIELD FOR LOCATION AND ELEVATION OF PIPES AND CHECK WITH THE UTILITY COMPANIES BEFORE DIGGING OR PERFORMING WORK.

CONTRACTOR IS ADVISED TO COLLECT INFORMATION ON SOIL CONDITIONS BEFORE START OF CONSTRUCTION.

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

2m 0.5 1 2 4m
SCALE: 1:100

01	ISSUED FOR APPROVAL	M.L.	17 JAN 2025
No.	REVISIONS	BY	DATE

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGENIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
ABDULLA REAL ESTATE HOLDINGS INC.

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
**PROPOSED MULTI-USE BUILDING
5580 MANOTICK MAIN ST
OTTAWA, ON**

DRAWING TITLE
GRADING AND DRAINAGE PLAN

PROJECT NO.
230464 C301

PAVEMENT STRUCTURE

COURSE	MATERIAL	THICKNESS (mm)	
		AUTOMOBILE PARKING	TRUCK ROUTE (HEAVY TRAFFIC)
SURFACE	HL.3 A/C (PG 58-34)	50	40
BINDER	HL.8 A/C (PG 58-34)	--	50
BASECOURSE	OPSS GRANULAR "A"	150	150
SUBBASE	OPSS GRANULAR "B" TYPE II	300	350

NOTE:
IN PREPARATION FOR PAVEMENT CONSTRUCTION AT THIS SITE, ANY SURFICIAL OR NEAR SURFACE/SUBGRADE LEVEL TOPSOIL AND ANY SOFT, WET OR DELETERIOUS MATERIALS SHOULD BE REMOVED FROM THE PROPOSED PAVED AREAS. THE EXPOSED SUBGRADE SHOULD BE INSPECTED AND APPROVED BY GEOTECHNICAL PERSONNEL AND ANY SOFT AREAS EVIDENT SHOULD BE SUBEXCAVATED AND REPLACED WITH SUITABLE EARTH BORROW APPROVED BY THE GEOTECHNICAL ENGINEER. THE SUBGRADE SHOULD BE SHAPED AND CROWNED TO PROMOTE DRAINAGE OF THE SITE DRAINAGE STRUCTURES, FOLLOWING APPROVAL OF THE PREPARATION OF THE SUBGRADE. THE PAVEMENT GRANULARS MAY BE PLACED. REFER TO LATEST GEOTECHNICAL INVESTIGATION PREPARED BY LRL ENGINEERING LTD., DATED MAY 2024.