GHD → The Power of Commitment	PROJECT :	Slope Stability Assesment - Warehouses and offices - Intersection of Rideau Road and Somme Street, Ottawa, ON	CLIENT :	Mr. Pierre Courteau - Consolidated Fasfrate (Ottawa) Holdings Inc.
	PROJECT NO. :	11231101	DATE :	1/26/2022
Prepared by : David Rizk				

This document was prepared by GHD to be presented to the City of Ottawa in the framework of completing the site plan application to develop the site located on the intersection of Rideau Road and Somme Street in Ottawa, Ontario. This document reviews the requirements presented in the "Slope Stability Guideline for Development Application" prepared by the City of Ottawa in lights of the documents previously prepared by GHD. These documents include :
- Geotechnical Investigation Report no 11215612-A1 dated October 27th 2021 : This field investigation was completed in 2020 prior to the update of the development plans (referred to as 2020 study).
- Supplementary geotechnical investigation report no 11231101-RPT-1 dated 2022-01-24 : This supplementary investigation was completed in order to account for the modification of the development plans provided by the client (referred to as 2021 study).
- Slope stability assessment for dynamic compaction letter no 11228236-LET-1-Rev.1 dated 2022-01-20 : This letter presents the analysis of the slope stability considering the effect of the vibrations occuring from the projected dynamic compaction work (referred to as DCC
Slope Stability letter).
- Slope stability assessment for final slopes no 11228236-LET-2-Rev.1 dated 2022-01-20 : This letter presents the analysis for the slope stability in the final projected geometry according to the civil plans (referred to as Final Slope Stability letter).

Requirements from "Slope Stability Guidelines for Development Applications"	Answer to requirement
1. Provide a scaled plan showing : A) Location of the Slope. B) Legal limits of the property. C) Significant features of the planned development.	Thisinformation may be found in the location plan presented in figure 2 of the 2021 study. For more information, the reader may consult the Grade Control and Drainage Plan prepared by Civitas/CIMA drawing No. C006A dated November 26, 2021.
2. Indicate on the plan the locations at which cross-sections of the slope geometry have been established and at which the stability of the slope has been assessed.	Refer to figue 1 of letter no 11228236-LET-1-Rev.1 for the location of the cross sections analysed for the construction period and figure 1 of letter no 11228236-LET-2-Rev.1 for the location of the cross sections analysed of the final slopes.
3. Descibe how the geometry of the existing slopes was determined.	The cross sections have been provided by the civil engineer and were created from existing survey points. Please note that the final slope geometry projected once the construction work is completed consists of a retaining wall along the north extremity of the site and that modifications will be brought to the slope along the west limit of the site before and after dynamic construction work in order to ensure slope stability during the DC work.
4. Provide cross sections showing the measured slope geometry and the geometry of the slope used for the stabilisty analyses, including any filing of table land or changes in the slope geometry.	Cross-sections of each geometry is presented with the global stability results attached to the DCC slope stability letter and to the final slope stability letter. Modification to the West slope to ensure stability during DC work is discussed in section 3.3 of the DCC slope stability letter.
5. Inidcate that the geotechnical engineer, or their representative, examined the slope and noted areas of active or previous instability; identify where active erosion of the bank/slope exists for slopes along water courses.	Initial measurement were conducted in the geotechnical investigation field work in 2020. However, excat slope geometry have been provided by the surveyors and civil engineer. Final slopes will be modified to fit the needs of the projected development and these finale geometry were analysed.
6. Indicate the geologic conditions within the slope that were used un the analayses and how those conditions were determined.	Subsurface conditions are provided in Section 5 of the 2021 supplementary investigation.
7. Indicate the groundwater conditions that were used in the analyses and how they were determined.	Subsurface conditions are provided in Section 5 of the 2021 supplementary investigation.
8. Indicate the soil strength parameters that were used in the stability analysis and how they were established.	Getechnical parameters are provided in section 3.1 of the slope stability analysis letters. The parameters were based on the information collected in the in-situ testing completed during the geotechnical investigations, laboratory testing results and experience with these type of materials.
9. Indicate the soil density used in the analyses and how they were determined.	Getechnical parameters are provided in section 3.1 of the slope stability analysis letters. The parameters were based on the information collected in the in-situ testing completed during the geotechnical investigations, laboratory testing results and experience with these type of materials.
10. Indicate the factor of safety against instability of the analyzed slopes.	The factor of safety for global stability of the north and west slopes during dynamic compaction and in the final slopes geometry are presented in sections 3.3 and 3.4 of the slope stability letters. Attached to these letters are the graphical output for each analysis.
11. Indicate whether the limit of hazard Lands considers, where appropriate, the toe erosion allowances and erosion access allowances.	No toe erosion possible on north slope since it will be replaced by a retaining wall. The west slopes analysis for the final geometry do not show a possibility for toe erosion.
12. For slopes along water courses, identify where erosion protection is required and planned.	Water course present along north slope. The planned retaining wall will be vegetalized. See Maccaferri Drawings attached to the final slope stability letter.
13. Show on a plan the location of the Limit of Hazard Lands determined by the analyses and indicate how the limit was defined.	There are no Limit of Hazard Lands since the factor of safety is higher than 1.5 in static conditions and 1.1 in pseudo-static conditions.
14. Provide details on stabilization measures, if any are required, to increase the factore of safety and provide the Limit of Hazard Lands that is reported.	There are no Limit of Hazard Lands since the factor of safety is higher than 1.5 in static conditions and 1.1 in pseudo-static conditions.
15. Where the potential for rapide drawdown of the water level agaisnt the slope exists, indicate how the potential impact of that condition on the stability of the slope and the position of the Limit of Hazard Lands has been assessed.	Not applicable.
16. For slopes in clay greater than eight meters in height, indicate the the potential for retrogressive earth flow sliding has been considered and evaluated.	Not applicable.
17. Indicate the factor of safety against instability under seismic conditions, including the potential for seismic liquefaction.	Slope stability analysis under seismic conditions were completed for the north and west slopes. A peak ground acceleration (PGA) with a 2% probability of exceedance in 50 years of 0.308 g was determined for this site using the site coordinates and the National Building Code of Canada seismic Hazard Values. For the north slope, a horizontal acceleration of 0.5 x PGA was used in the analysis after the construction of the retaining wall. A horizontal acceleration of 0.12 was used for the existing slope in order to account for vibration caused by the dynamic compaction work. For the west slope, the horizontal acceleration value used to account for vibration caused by the dynamic compaction was determined at 0.32 . For the west slope, this value is higher since the dynamic compaction work will occur nearer to the slope crest. The results for each analysis are presented in slope stability letters.