

CNR Milton Mobility Hub – Environmental Impact Statement (EIS)

EXPERT REPORT ON GEOTECHNICAL ASPECTS

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Dated: March 10, 2017

1. INTRODUCTION

We are geotechnical engineers at Amec Foster Wheeler. We have been retained by the Halton Municipalities (collectively, the Regional Municipality of Halton, the City of Burlington, the Town of Halton Hills, the Town of Milton, and the Town of Oakville) to conduct an independent review of the Technical Data Report Geotechnical Investigation (Appendix E5) (the Geotechnical Report) prepared by Stantec on behalf of Canadian National Railway Company (CN) as part of the Environmental Impact Statement (EIS) in support of the design and construction of the new satellite intermodal terminal (the Terminal) in Milton, Ontario.

The geotechnical report covers the Project Development Area (PDA) defined as the area of physical disturbance directly associated with the project footprint which covers approximately 185 hectares (ha) of CN owned property with approximate borders of Tremaine Road to the south, First Line to the north, Britannia Road to the west and Lower Base Line to the east.

1.1 Qualifications

Mehdi Mostakhdemi, Msc., P. Eng.

Mr. Mostakhdemi, P.Eng. has over 12 years of experience working as a geotechnical engineer and a structural project manager covering a variety of fields including construction, and infrastructure projects. Mr. Mostakhdemi holds a B.Sc. in Civil Engineering and a M.Sc. in Geotechnical Engineering from Tehran Polytechnic, and a M.Eng. in Geotechnical Engineering from the University of Alberta, Canada.

In his work as an engineer and consultant, he has been involved in numerous development projects and consulting engagements in the Halton area. He is therefore very familiar with the terrain and the geotechnical features found in this region.

Dan Dimitriu, PhD., P. Eng.

Mr. Dimitriu is a Geotechnical Engineer with over 45 years of experience in fieldwork, foundation design, research, and academic fields of the practice of the engineering profession. The spectrum of projects Mr. Dimitriu has been involved with include stabilization of natural and man-made slopes, design of temporary and permanent retaining structures, soil improvement by preloading, dewatering and stone columns, deep foundations for buildings, bridges, tunnels and off-shore structures, heavy foundation for large industrial and commercial projects, as well as numerous more common projects for conventional foundations, pavements, sewers, culverts and conduits.

1.2 Purpose of Review

Our scope of work for this report focused on the review of the Geotechnical Report to determine the technical validity of the information provided in the report, the methods and analysis used in preparation of the report, and the completeness of the design recommendations for the geotechnical aspects of the proposed development as they may relate to potential environmental impacts.

1.3 Materials Reviewed

As mentioned above, we reviewed the **Geotechnical Report and the geotechnically related aspects of the EIS**. We also reviewed the Guidelines for the Preparation of An Environmental Impact Statement pursuant to *Canadian Environmental Assessment Act, 2012*, Milton Logistic Hub Project, Canadian National Railway Company dated July 2015 (the “**EIS Guidelines**”).¹ Section 6.1.2 of the EIS Guidelines described the requirements relating to the geotechnical aspects.

1.4 Review and Information Requests

The EIS Guidelines indicated that the baseline information should include sufficient detail to enable the identification of how the project could affect the Valued Components (VCs) and the analysis of those effects. In our review, we found that there were a few items that appeared to be missing, and some aspects of the work that were not sufficiently detailed to permit an assessment of the significance of the effects on the VCs. We have set out our comments below. Our recommended requests for information to address these insufficiencies are summarised in the table immediately following.

- **Seismic activities:** The EIS Guidelines require a discussion of the history of seismic activities in the area. As well, a site seismic classification in accordance with applicable standards (i.e., National Building Code of Canada or Ontario Building Code) would be standard practice. However, this assessment was not provided.
- **Grade Separation at Lower Baseline Road:** The project incorporates a grade separation to be implemented at Lower Baseline Road. However, details have not been provided as to the subsurface conditions at this site, nor have geotechnical design recommendations been made for this work. If work proceeds without sufficient characterization of the subsurface conditions,

¹ Our review was conducted in accordance with the professional standards outlined in *Professional Engineers Reviewing Work Prepared by Another Professional Engineer* (PEO 2011); and *Guideline for Professional Engineers Providing Geotechnical Engineering Services* Revised 11/15/98.

significant problems related with unexpected subsurface conditions could arise, such as excavation instability and failure during construction, or disturbance of aquifers or utility lines during construction, etc. Therefore, additional geotechnical investigation should be conducted at the proposed grade separation site prior to advancement of the design.

- **Culverts:** The project incorporates several culvert replacements and extensions at the road crossings of the watercourses. The geotechnical design report will require provisions to address scour prevention, wingwall designs for the culverts, earth/backfill pressures recommendations including compaction effects, and inclusion of frost tapers (OPSD 803.030) within settlement sensitive areas to reduce the damaging effects from differential frost heave.
- **Replacement Watercourses and Storm Management Ponds:** CN proposes to relocate sections of watercourses and to create several stormwater management ponds. These works involve permanent cuts into the terrain. The geotechnical report identified groundwater and the potential of confined aquifers that pose risks of artesian conditions where the excavations approach or intersect the pressurized water layers. The excavations that encounter more pervious lenses or layers, such as sands and silts, may result in the unexpected release of previously pressurized groundwater. These factors should be considered and planned for in CN's mitigation measures.
- **Impact of Traffic Increase:** It is understood that the construction of intermodal terminals would increase the volume of traffic and number of heavy trucks in the surrounding area. This could be problematic, if the surrounding roads and infrastructure were designed to withstand lighter vehicles and/or lower traffic volumes, and accordingly may not support the increased volumes and loads that are anticipated.

The assessment of the impact of the proposed development on the surrounding roads and infrastructure was not included in scope of the geotechnical report, as the geotechnical report only focused on the PDA. The geotechnical/pavement investigation and assessment of the impacts of the proposed development on the surrounding roads and infrastructure (i.e., roads and infrastructure outside of the PDA) should be incorporated into the geotechnical analysis for further review and assessment.

Topic	Reference to CN EIS and Information Responses	Requested Information	Rationale
<p>Geotechnical</p> <p>EIS Guideline Part 2 Section 6.1.2.</p> <p>Halton Brief, Table D.3, sensitive surface and groundwater features</p>	<p>EIS App E.5</p>	<p>GT1. Seismic Activities</p> <p>Please provide a discussion of the history of seismic activities in the area of the proposed site. As well, please provide the seismic classification of the site area.</p>	<p>This information is required by the EIS Guidelines. As well, it is standard practice to consider the seismic history of the area and to determine the site seismic hazard and site seismic classification for design purposes based on geotechnical findings.</p>
<p>Geotechnical</p> <p>EIS Guideline Part 2 Section 6.1.2.</p> <p>Halton Brief, Table D.3, sensitive surface and groundwater features</p>	<p>EIS App E.5</p>	<p>GT2. Grade Separation at Lower Baseline Road</p> <p>Please review the subsurface conditions in the vicinity of the proposed grade separation at lower baseline road. Based on those conditions, please provide a proposal in terms of the geotechnical design recommendations and the design of the foundation.</p>	<p>Prior to implementing a grade separation, it is necessary to consider the existing subsurface conditions. Based on those existing conditions, geotechnical design recommendations can be made to support the geotechnical, structural and drainage design of important aspects such as the bridge foundation, earth retaining structures, drainage and subdrainage.</p>
<p>Geotechnical</p> <p>EIS Guideline Part 2 Section 6.1.2.</p> <p>Halton Brief, Table D.3, sensitive surface and groundwater features</p>	<p>EIS App E.5</p>	<p>GT3. Installation of Culverts</p> <p>In light of the proposal to install culverts in the watercourses, please explain what mitigation measures will be used to prevent scour, bank erosion, and support the design of associated retaining structures.</p> <p>Should the culverts cross underneath settlement sensitive areas, please also consider the need for frost tapers.</p>	<p>The use of culverts to bridge over portions of the existing watercourses will require measures to prevent scour and erosion consistent with the geotechnical conditions at the particular locations. As required by the EIS Guidelines, CN should address the potential for such effects including risks for stream bank erosion and the potential instability.</p> <p>Geotechnical recommendations for compacted backfill against retaining structures should address the effects of compaction effort, and sloping ground.</p> <p>As well, in the case of pavement or other settlement sensitive areas exposed to seasonal freezing, there is risk of differential frost heave. This would affect the performance of the finished works. Frost tapers should be considered to reduce the impacts of frost heave.</p>

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<p>Geotechnical</p> <p>EIS Guideline Part 2 Section 6.1.2.</p> <p>Halton Brief, Table D.3, sensitive surface and groundwater features</p>	<p>EIS App E.5</p>	<p>GT4. Replacement Watercourses and Storm Management Ponds</p> <p>To relocate sections of watercourse and to create storm management ponds, permanent and relatively deep cuts into the terrain will be required. The risk of hitting pervious lenses or developing artesian conditions should be considered, along with proposed mitigation and prevention measures.</p>	<p>Given the subsurface condition at the site revealed by the geotechnical investigation, there is a risk of hitting pervious lenses or otherwise disrupting existing aquifers. The formation of pathways for the flow of pressurized groundwater could result in significant disruption and damage, and ultimately may lead to loss of solids, subsidence and erosion, and possibly contamination of the groundwater from surface contaminants as discussed in the EIS Guidelines. These factors should therefore be considered in advance.</p>
<p>Geotechnical</p> <p>EIS Guideline Part 2 Section 6.1.2.</p> <p>Halton Brief, Table D.3, sensitive surface and groundwater features</p>	<p>EIS App E.5</p>	<p>GT5. Impact of Increased Traffic</p> <p>The increased amount of traffic from heavy trucks can have a significant impact on the subgrade and on the paved surfaces, as well on the surrounding environment. This should be factored into the geotechnical investigations and environmental assessments.</p>	<p>In addition to general environmental issues (traffic congestion, noise, dust, etc.) increased heavy truck traffic can accelerate the wear and deterioration of existing public roads. A road preconstruction condition survey would assist with a better understanding of the mechanical impacts of the added construction and operation traffic will have on the existing public roads.</p>

Signed this 10 day of March, 2017



Mehdi Mostakhdemi

Signed this 10 day of March, 2017



Dan Dimitriu

Halton Municipalities re Proposed CN Milton Intermodal Facility
Report Outline