Appendix B

Transportation Report
Revision and Version Tracking

CP Rail Crossing at New Coronation Road Class EA Study – Transportation Study

<table>
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<tr>
<th>Version</th>
<th>Date</th>
<th>Originator</th>
<th>Checker</th>
<th>Approver</th>
<th>Description</th>
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<td>May 5, 2014</td>
<td>A. Hussain</td>
<td>G. Chartier</td>
<td>G. Chartier</td>
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<td>v90</td>
<td>May 16, 2014</td>
<td>A. Hussain</td>
<td>G. Chartier</td>
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<td>July 10, 2014</td>
<td>A. Hussain</td>
<td>G. Chartier</td>
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<td>A. Hussain</td>
<td>G. Chartier</td>
<td>G. Chartier</td>
<td>FINAL REPORT</td>
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1 Introduction

The Highway 407 East Extension Environmental Assessment (EA) identified the need for a freeway connection between Highway 401 and future Highway 407 east of Lake Ridge Road. The connection, known as the West Durham Link (WDL), is aligned parallel and to the west of Coronation Road within the Town of Whitby. North of Taunton Road and south of Rossland Road, the WDL is aligned over the existing Halls Road right-of-way.

Both the West Whitby Secondary Plan and the Whitby Transportation Master Plan (June, 2010) identified the westerly relocation of Coronation Road, referred to as New Coronation Road, and its further extension southerly to Dundas Street, as the replacement of Halls Road. It is anticipated that New Coronation Road will serve future development in the West Whitby area northeast of this corridor.

The implementation of New Coronation Road will result in a crossing of the Canadian Pacific (CP) Rail Belleville Subdivision between Taunton Road and Rossland Road. The location of the future crossing is shown in Figure 1.

![Figure 1 – Site Location and Study Area](image-url)
The Town of Whitby has initiated a Municipal Class EA Study (Schedule B) to identify a preferred solution and preliminary design for the proposed CP Rail crossing at New Coronation Road. This report documents the transportation analysis completed for the study. The objectives of the analysis are to:

1. Determine the lane requirements for New Coronation Road at the CP Rail crossing;
2. Summarize the safety considerations for an at-grade rail crossing of the roadway; and
3. Assess whether a grade-separated crossing of the railway is warranted based on the projected Road Exposure Index, which is calculated from road and rail traffic volumes.

## 2 Lane Requirements for New Coronation Road

The lane requirements for New Coronation Road at the CP Rail crossing were estimated from traffic forecasts found in Figure 10A of the draft West Whitby Transportation Study – Part 1, Road Needs Assessment, dated November 2012. The report prepared by GHD for the West Whitby Landowner Group is still under review by the Town and Durham Region, but was assumed to provide reasonable traffic projections for the purpose of this Class EA Study.

The draft West Whitby Transportation Study projected the future total traffic volumes (year 6 and beyond) for roads within the secondary plan area by adding the volumes generated by the planned residential, institutional, mixed-use commercial and industrial development to baseline 2012 traffic counts. The projected link volumes for the morning and afternoon peak hours for New Coronation Road immediately north of Rossland Road are shown in Figure 2. The link peak hour volumes shown in the figure were derived from the forecasted intersection turning movement counts and represent traffic conditions for a 2018 horizon year, assuming build out in six years from 2012.

It is noted that the volumes taken from the draft West Whitby Transportation Study may change once the report is revised to incorporate review comments received from Durham Region and the Town of Whitby. Through conversations with Town staff and GHD, the trip generation rates assumed for the draft report appear understated and are expected to increase with the next version of the analysis. This infers that the volumes presented in the draft report and applied for this analysis are likely conservative estimates of future demand.

The Town of Whitby Official Plan designates New Coronation Road as a Type B Arterial Road. According to the Official Plan, Type B arterial roads are designed to move moderate volumes of traffic at moderate speeds from one part of the Region to another. On this basis, the Durham Region Travel Forecasting Model assumes a posted speed limit of 60 km/h and a lane capacity of 700 vehicles per hour for New Coronation Road.
Figure 2 – Projected Future (2018) Total Traffic Volumes (Full Build-Out)
Source: West Whitby Transportation Study – Part 1: Road Needs Assessment (November 2012)

Table 1 summarizes the volume-to-capacity (v/c) analysis of the proposed new corridor based on the traffic volumes shown in Figure 2 and assuming one lane for New Coronation Road in each direction.

Table 1 – New Coronation Road Corridor Lane Requirements

<table>
<thead>
<tr>
<th>Peak Hour</th>
<th>Direction</th>
<th>Total Volume</th>
<th>Lane Capacity</th>
<th>v/c Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Northbound</td>
<td>871</td>
<td>700</td>
<td>1.24</td>
</tr>
<tr>
<td>AM</td>
<td>Southbound</td>
<td>736</td>
<td>700</td>
<td>1.05</td>
</tr>
<tr>
<td></td>
<td>Northbound</td>
<td>798</td>
<td>700</td>
<td>1.14</td>
</tr>
<tr>
<td>PM</td>
<td>Southbound</td>
<td>980</td>
<td>700</td>
<td>1.40</td>
</tr>
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</table>

The table indicates that New Coronation Road will operate over-capacity with single northbound and southbound lanes in both peak periods by the 2018 horizon year. Assuming that the proposed West Whitby developments build out as contemplated in the draft transportation report, a four-lane cross-section (two lanes in each direction) will be warranted for New Coronation Road at the CP Rail crossing within six years of development commencing.
3 Safety of At-Grade Rail Crossings

It is widely accepted that at-grade rail crossings pose a safety risk to the travelling public and to rail operators. According to Transport Canada, “almost half of all railway-related deaths and injuries result from accidents at crossings.”\(^1\) The Transportation Safety Board of Canada reported 189 collisions at railway crossings in Canada in 2012, resulting in 31 fatalities, and 32 serious injuries.\(^2\)

The United States Federal Highway Administration (FHWA) provides guidance for improving safety at railroad-roadway grade crossings:

> “The first alternative that should always be considered for a highway-rail at-grade crossing is elimination. The major benefits of crossing elimination include reductions in collisions, highway vehicle delay, rail traffic delay, and maintenance costs of crossing surfaces and traffic control devices.”\(^3\)

Grade-separating a rail crossing from a road has both safety and operational benefits for rail and road users:\(^4\)

- Safety benefits include eliminating vehicle, train, and pedestrian conflicts, decreasing the likelihood of a collision, and rectifying geometric limitations (such as reduced sight distance and angled crossings); and
- Operational benefits include increasing network capacity, reducing delay to road users, and eliminating the need to reduce train speed through the crossing.

Communication with CP Rail regarding the New Coronation Road crossing as part of this study expresses caution for a new at-grade road crossing:

> “CP Public Works position on new at-grade crossing proposals: Generally speaking, the railway is attempting to eliminate level crossings due to their effect on public safety and safe railway operations. Therefore, new level crossing proposals are taken quite seriously and stringently reviewed by CP’s Engineering, Operations and Legal groups.”\(^5\)

Transport Canada has an on-going Grade Crossing Closure Program, providing grants to support the closing of private and public at-grade rail crossings. Transport Canada

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\(^1\) Transport Canada, Rail Safety, Oversight and Expertise “Applicant Guide for Crossing Closures, Grade Crossing Program” (not dated)
\(^3\) http://safety.fhwa.dot.gov/xings/com_roaduser/07010/sec04a.htm
\(^4\) http://mobility.tamu.edu/mip/strategies_pdfs/added-capacity/technical-summary/grade-separation-4-pg.pdf
\(^5\) Email from CP Rail, Public Works East (Ms. Li-Lian Lui), December 24, 2013
considers the following factors to assess and prioritize crossings for funding through the program: 6

- High Exposure Index, which is defined as the annual average daily number of trains multiplied by the annual average daily road traffic volume (AADT);
- High train or road traffic speeds;
- Multiple track crossings;
- Severely restricted sightlines;
- Curved or angled approach, or nearby intersections that distract the motorist or impede the view of approaching trains; and
- A history of accidents.

If a crossing has any of the above characteristics, it is reasonable to expect a reduced safety performance at the crossing. These characteristics can also be applied in the consideration of providing a grade-separated crossing rather than an at-grade crossing.

The CP Rail crossing at New Coronation Road is a candidate for grade-separation from a safety perspective based on the above-noted criteria. The crossing will exhibit many of these characteristics, including higher speeds on both road and rail, potentially multiple track crossings in the future and a significantly angled approach. Section 4 calculates the exposure index.

4 Rail/Road Crossing Exposure Index

The Road Exposure Index is the measure typically used to assess the merit of grade separating a road and rail crossing. The index is calculated using the following formula:

\[
\text{Road Exposure Index} = A \times B
\]

where:

A = Total Number of Train Crossings per Day
B = Annual Average Daily Traffic (AADT) Volume in Passenger Car Units (pcu)

While there is no set threshold to warrant a grade-separated crossing in Canada, most municipalities and road authorities use a minimum cross-product of 200,000 as a general rule of thumb. This value has been referenced in most recent studies of this nature reviewed.

Table 2 summarizes the calculation of the Road Exposure Index for the CP Rail crossing of New Coronation Road. The analysis is based on the following assumptions:

- The projected 2018 peak hour traffic volumes used in the analysis were obtained from the draft West Whitby Transportation Study summarized in Section 2 above;

- A factor of 4% was applied to the peak hour volumes to account for heavy vehicle traffic (e.g. large trucks) not captured in the estimates. This factor was determined from existing Coronation Road volumes;

- The heavy vehicle traffic volumes were converted to Passenger Car Units by using a heavy vehicle equivalent factor of 2.5;

- A k-factor of 9 was applied to convert the peak hourly traffic volumes to AADTs. This factor was calculated from the 24-hour ATR counts collected on Lake Ridge Road south of Taunton Road on June 19, 2012, as supplied by the Town and Durham Region; and

- CP Rail provided the daily number of train crossings of 16, which reflects current rail traffic volumes on their Belleville subdivision in this vicinity. No growth in rail traffic was assumed.

Table 2 – Road Exposure Index for CP Rail Crossing at New Coronation Road

<table>
<thead>
<tr>
<th>Peak Hour</th>
<th>Roadway Peak Hour Traffic Volumes (vehicles per hour per direction)</th>
<th>Total Link Traffic Volume</th>
<th>4% Heavy Traffic</th>
<th>Heavy Traffic Equiv. (pcu)</th>
<th>AADT (pcu)</th>
<th>Trains Per Day</th>
<th>Road Exposure Index</th>
<th>Grade Separation Separation Warrant Justified (&gt;200,000)</th>
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<tbody>
<tr>
<td></td>
<td>Southbound</td>
<td>Northbound</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>871</td>
<td>736</td>
<td>1,607</td>
<td>64</td>
<td>161</td>
<td>18,927</td>
<td>16</td>
<td>302,830 YES</td>
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<tr>
<td>PM</td>
<td>980</td>
<td>798</td>
<td>1,778</td>
<td>71</td>
<td>178</td>
<td>20,941</td>
<td>16</td>
<td>335,054 YES</td>
</tr>
</tbody>
</table>

where Roadway Exposure Index is calculated as follows:

Total Link Traffic Volume
= Southbound + Northbound Roadway Peak Hour Traffic Volumes

4% Heavy Traffic = 0.04 × Total Link Traffic Volume

\[
AADT = \frac{(\text{Total Link Traffic Volume} - 4\% \text{ Heavy Traffic} + 2.5 \times 4\% \text{ Heavy Traffic})}{0.09}
\]

Roadway Exposure Index = AADT × Trains per Day
The table illustrates that the estimated Road Exposure Index exceeds the minimum threshold of 200,000 for the projected 2018 AADT volumes and current rail traffic of 16 trains per day. This indicates that a grade-separation will be warranted at the CP Rail crossing of New Coronation Road by 2018 (or within six years of the West Whitby development commencing).

5 Recommendations

Based on the information and analysis presented in this report, it is recommended that:

1. A four-lane cross-section (two lanes of traffic in each direction) be provided for New Coronation Road at the CP Rail crossing to accommodate projected traffic volumes. The provision of other cross-section features such as medians and sidewalks will be considered through the preliminary design.

2. The CP Rail crossing at New Coronation Road be grade-separated based on the following:
   - The estimated Road Exposure Index exceeds the minimum threshold of 200,000;
   - The angle of crossing between the road and rail will be severely skewed;
   - New Coronation Road will ultimately be four lanes wide;
   - There is the possibility of a second railway track, which increases the length of the crossing and exposure distance; and
   - Transport Canada and CP Rail discourage new at-grade crossings and have both embarked upon initiatives to eliminate existing at-grade crossings, where possible.