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Executive Summary

On January 1, 2010, The Barrie-Innisfil Boundary Adjustment Act, 2009 (Bill 196) extended the southern boundary of Barrie to include 2,350 hectares of land previously in the Town of Innisfil. Stantec is undertaking a Transportation Environmental Assessment as part of the Growth Development Project - Salem Secondary Plan and the study area includes two crossings of the Barrie Collingwood Railway’s Beeton Spur:

- McKay Road a level crossing located at Mile 79.17
- Lockhart Road, a road underpass located at Mile 80.13

Future plans include the addition of lanes through the McKay Road crossing area and the Lockhart Road underpass. A crossing safety assessment was completed for McKay Road which crosses the Beeton Spur at Mile 79.17, in addition safety was reviewed where Lockhart Road passes under the Beeton Spur at Mile 80.13.

The field portion of the crossing assessments of the existing conditions was undertaken on June 16, 2016.

A brief summary of the tasks that were completed for the Crossing Safety Assessment include the following:

- Collect and review background information and previous reports
- Visit site to obtain site data
- Prepare Safety Assessment Report in accordance with Transport Canada’s Canadian Road/Railway Grade Crossing Detailed Safety Assessment Field Guide and Transport Canada’s Grade Crossing Standards (GCS) document
- Review compliance with Transport Canada’s Grade Crossing Regulations and Grade Crossing Standards

McKay Road Existing

The current condition consists of a two lane road which intersects a single track at 72 degrees. The crossing is equipped with an active warning device which includes lights and bell.

The Field Guide addresses several factors at a grade crossing which are no longer included in the Grade Crossing Standards. The Table in Appendix D summarizes the crossings’ compliance with the Grade Crossing Standards.

The railway crossing was found to be generally in compliance with Transport Canada’s Grade Crossing Regulations and Standards. One item of note was brush which required clearing to allow an unobstructed view of the westbound advance warning sign.
McKay Road Future

Continued use of an expanded level crossing appears to be the most viable solution for this location. With the anticipated modifications to the roadway which includes additional lanes, modifications to the crossing warning device to provide both Front and Back Lights for each travelled lane including the Bike Lane will be required. In addition carrying a turning lane through a railway crossing is not recommended and the roadway should be tapered in on each side of the crossing to remove the turning lane from the crossing area.

Lockhart Road

Reconstructing the existing road under rail grade separation appears to be the best decision at this location.

Several potential safety hazards were noted at the Lockhart Road underpass which should be corrected when designing and constructing the new grade separation. Recommendations are as follows:

- New structure should be of sufficient length to accommodate full width lanes
- New structure should be constructed with a minimum vertical clearance of at least 5.3m
- The new bridge abutment and driveway should have sufficient separation to provide adequate visibility for a vehicle exiting the residence. Construction of a centre pier may further restrict visibility. Relocation of the driveway to a point further west may be required.
- Fencing should be installed to deter access to the rail corridor and rail carrying structure. In addition the installation of “No Trespassing” signs is recommended.
- The new structure should be constructed with trainman’s walkways equipped with handrails.

Note: The safety assessments of the grade crossings cover physical features which may affect road and rail user safety and it has sought to identify potential safety hazards. However, the auditors point out that no guarantee is made that every deficiency has been identified. Further, if all the recommendations in this assessment were to be addressed, this would not confirm that the crossing is ‘safe’; rather, adoption of the recommendations should improve the level of safety of the facilities.
Abbreviations

AADT Average Annual Daily Traffic

Active Crossing A grade crossing in which a railway crossing sign is used in conjunction with railway warning signals including as a minimum: flashing lights and bell which are programmed to provide adequate warning time for road users to clear the track and / or stop in advance of the track prior to a train entering the crossing.

BCRY Barrie Collingwood Railway

CEA Transportation Class Environmental Assessment

CTA Canadian Transportation Agency

GCR Transport Canada’s Grade Crossing Regulations SOR/2014-275

GCS Transport Canada’s Grade Crossing Standards dated February 2014

m Metre(s)

MUTCD Transportation Association of Canada’s Manual of Uniform Traffic Control Devices

Passive Crossing A grade crossing in which a railway crossing sign or a railway crossing in conjunction with a stop sign are used as crossing warning devices.

SSD Stopping Sight Distance
# Glossary

<table>
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<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Act</td>
<td>The Railway Safety Act</td>
</tr>
<tr>
<td>Grade Crossing Regulations</td>
<td>Transport Canada’s Grade Crossing Regulations SOR/2014-275</td>
</tr>
<tr>
<td>Grade Crossing Standards</td>
<td>Transport Canada’s Grade Crossing Standards date February 2014</td>
</tr>
<tr>
<td>Stantec</td>
<td>Stantec Consulting Ltd. and its project team members</td>
</tr>
<tr>
<td>The Field Guide</td>
<td>Transport Canada’s Canadian Road / Railway Grade Crossing Detailed Safety Assessment Field Guide</td>
</tr>
</tbody>
</table>
1.0 BACKGROUND

1.1 PROJECT DESCRIPTION

On January 1, 2010, The Barrie-Innisfil Boundary Adjustment Act, 2009 (Bill 196) extended the southern boundary of Barrie to include 2,350 hectares of land previously in the Town of Innisfil. Subsequently, the City of Barrie initiated the preparation of six Infrastructure Master Plans for the Salem Secondary Plan Development Area (the Development Area), which includes the newly annexed lands and lands within the previous city boundary (Appendix A). The City proposes to upgrade existing infrastructure in the Development Area, including road widenings and expansions to the sanitary sewers and trunk watermains along several existing road corridors (the Project). Stantec Consulting Ltd. (Stantec) was retained by the City of Barrie (the City) to complete a Transportation Class Environmental Assessment (CEA) for these works. The assessments performed address Phases 3 and 4 of the CEA process for the Schedule C road widenings and grade separations projects within the Development Area as required by the Environmental Assessment Act, 1990 (EAA).

The study area includes two crossings of the Barrie Collingwood Railway’s Beeton Spur:
- Mckay Road a level crossing located at Mile 79.17
- Lockhart Road, a road underpass located at Mile 80.13

Stantec is undertaking a Class Environmental Assessment as part of the Growth Development Project – Salem Secondary Plan. Future plans include the addition of lanes through the crossing area. A crossing safety assessment was completed for McKay Road which crosses the Beeton Spur at Mile 79.17. This report contains the findings.

1.2 PURPOSE

Evaluate the safety of the existing proposed railway crossings with respect to the alternative design concepts with a view to minimizing the frequency and maximizing the safety of existing and future incidents at the crossing, as they relate to all users.

Key tasks undertaken include:

1. Review of the effects of alternative design concepts on the existing and future rail crossings.

2. Review the existing and proposed crossings configuration in the field and identify and evaluate factors that may impact the safety of the crossings (to include signs and markings, sight lines, road and railway design and geometry, protection measures, pedestrian facilities, etc.).
3. Undertake a detailed safety assessment for the rail crossing. The fundamental objectives of the safety assessment is to:
   - reduce crash risk within the grade crossing environment;
   - minimize the frequency and severity of preventable crashes;
   - consider the safety of all grade crossing users;
   - verify compliance of the technical standards; and
   - ensure that all the crash mitigation measures/factors aimed to eliminate or reduce the identified safety problems are fully considered, evaluated and documented for review/action by the appropriate authorities.

4. Review relevant guidelines and standards considering the site characteristics, the existing traffic control system, and the railway and roadway operational characteristics including the types of vehicles and pedestrians using the crossing;

5. Prepare an evaluation and assessment report identifying deficiencies/issues and recommended actions.

6. Consider present and future daily rail traffic with future potential increases in speed

7. Consider the Barrie Collingwood Railway’s requirements and adherence to applicable Act, Regulations, Guidelines and Standards.

8. Contact Barrie Collingwood Railway for their review of potential impacts to their operations, engineering requirements during detail design and costs.

9. Investigate and document the cost sharing opportunities.

10. Develop an implementation plan that minimizes impacts during construction

2.0 FINDINGS

2.1 MCKAY ROAD MILE 79.17 BEETON SPUR

2.1.1 Effects of Alternate Concepts

Typical options where a road and a rail line intersect include a level crossing or the status quo, road closure or a grade separation.

Of the three options only two, a level crossing or a grade separation, will meet the needs of the users. A grade separation usually involves raising or lowering the road, and in rare cases changing the elevation of the rail line. The need for a grade separation is typically driven by the cross-product or the average number of daily vehicles multiplied by the average number of daily trains. The forecasted traffic volumes at this location are 0.57 daily trains with 6800 daily vehicles which provide a cross product of 3876. This is well below 200,000 which is the typical threshold used to warrant a grade separation.
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This leaves a level crossing as the most viable option. The proposed road configuration for McKay road through the railway crossing area is two through lanes plus a bike lane in each direction as well as a centre turning lane as the current two lane configuration will not meet future needs. The turning lane tapers down prior to the crossing with a roadway cross section through the crossing existing of one bike lane and two travelled lanes in each direction.

2.1.2 Existing and Proposed Conditions

The current condition consists of a two lane road which intersects a single track at 72 degrees. The crossing is equipped with an active warning device which includes lights and bell.

The proposed configuration expands the road to 2 lanes plus a bike lane in each direction and the crossing warning devices would be upgraded to include a cantilever structure with flashing lights for the additional lanes.

Both existing and proposed conditions were reviewed when the Detailed Safety Assessment was completed as noted in the following section.
2.1.3 Detailed Safety Assessment

2.1.3.1 Assessment Objectives

The fundamental objectives of the assessments were:

- Observe existing crossing conditions
- Reduce crash risk within the grade crossing environment
- Minimize the frequency and severity of preventable crashes
- Consider the safety of grade crossing users
- Verify compliance with appropriate technical standards
- Ensure that crash mitigation measures / factors aimed to eliminate or reduce the identified safety problems are considered, evaluated and documented for review / action by the appropriate authorities

2.1.3.2 Assessment Scope and Material


It should be noted that the Field Guide was originally developed based on the RTD10 draft standards dated 2002. Since then the Grade Crossing Standards have replaced the RTD10 with modifications to crossing requirements. In all cases the most recent standards and regulations were used.

2.1.3.3 Assessment Team and Process

The following individuals were present during the crossing assessment:

- Steve Donald – Stantec
- Basant Elkady – Stantec

2.1.3.4 Regulatory Requirement

Transport Canada’s Grade Crossing Regulations (SOR/2014-275) was registered November 11, 2014 and is now in force. These regulations reference the “Grade Crossing Standards, July 2014) and together form the guidelines and specification that the Industry follows today.

In April of 2005 Transport Canada published the “Canadian Road/Railway Grade Crossing Detailed Safety Assessment Field Guide”, TP14372. This guide was based on the Draft RTD10 Road/Railway Grade Crossings Technical Standards and Inspection, Testing and Maintenance Requirements dated October 24, 2002. These standards remained in draft status and were ultimately replaced by the Grade Crossing Standards dated July 2014 and the Grade Crossing Regulations SOR/2014-275. This resulted in several changes to crossing requirements which are not reflected in the Field Guide. Crossing assessments were completed using the Canadian
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Road/Railway Grade Crossing Detailed Safety Assessment Field Guide modified to reflect changes resulting from the new standards.

The following are excerpts from the Field Guide.

**Who conducts the detailed safety assessments?**

The railway company and road authority are required to take joint responsibility for the detailed safety assessments. It is recommended that a team of at least two (2) people (one representing each organization) conduct the assessments. Costs can be minimized if the road authority and the railway company work together to plan and execute the safety assessments. Some guidelines regarding the composition of the assessment team are provided in Appendix A (of the Field Guide). Note that a Professional Engineer is required by the Railway Safety Act (the Act) (see section 11, of the Act) to take responsibility for any engineering related work which would include these assessments.

**When are the detailed safety assessments done?**

Transport Canada’s GCR requires road authorities and railway companies to conduct detailed safety assessments at all unrestricted road / railway grade crossings every five (5) years. The period for follow-up assessments may be extended to ten (10) years if the responsible authorities agree that the safety-related conditions at, or in the vicinity, of the grade crossing will remain stable and the agreement is documented. Other circumstances may precipitate the requirement for an assessment including cessation of whistling, construction or significant operational changes, and two or more fatal collisions in five years. Details are available in section 5 through 9 of the Regulations.

**2.1.3.5 Observations**

2.1.3.5.1 General  
The crossing assessment was completed on June 16, 2016 and the railway’s permission was obtained to access the rail corridor.

For the purpose of this report the tracks will be referred to as running north/south with McKay Road crossing the tracks in an east/west direction. The location of the crossing is shown on the Site Plan in Appendix A.

Photos of the crossings can be found in Appendix B and completed Field Data Forms are in Appendix C. The Field Guide addresses several factors at a grade crossing which are no longer included in the Grade Crossing Standards. The Table in Appendix D summarizes the crossings compliance with the Grade Crossing Standards.
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2.1.3.6 Background

The surrounding land use is rural/resident. There were no schools or community centres nearby. Large trucks were observed using McKay Road, and while not observed, it is assumed dangerous goods will be carried on this route. Based on observed vehicles, a WB20 Tractor Semitrailers was selected as the design vehicle.

2.1.3.7 Collisions

There were no reported collisions at this location in the last five years.

2.1.3.8 Rail

The track is tangent through the crossing with a maximum track speed of 10 mph for all trains. Speed is further restricted by BTC12514 which requires trains to not exceed 5 mph until the crossing is occupied.

The current volume of average daily trains is 0.57 freight trains.

2.1.3.9 Road

The two lane paved road crosses the railway tracks at approximately 72 degrees with a posted speed of 80 km/h. There are no driveways or intersections within 30 metres (m) of the crossing.

2.1.3.10 Crossing Surface

The crossing surface consists of asphalt with rubber rail seal extending the full width of the crossing. The crossing surface is in fair condition.

2.1.3.11 Road Geometry

The road is tangent in both directions from the tracks.

The road grades approaching the crossing were measured as indicated in Table 2-1.

The value found in the Maximum Allowable column is the limit specified in the GCS.

<table>
<thead>
<tr>
<th>Table -1</th>
<th>McKay Road/Beeton Spur Mile 79.17 - Road Geometry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>East</td>
</tr>
<tr>
<td>Slope within 8m of rail</td>
<td>1.5%</td>
</tr>
<tr>
<td>Slope between 8m &amp; 18m of Rail</td>
<td>2.1%</td>
</tr>
<tr>
<td>General Approach Grade</td>
<td>3.4%</td>
</tr>
</tbody>
</table>
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Note: negative grade indicates road descends approaching crossing

2.1.3.12 Sightlines

All sightlines were reviewed as noted in Table 2-2.

<table>
<thead>
<tr>
<th>Table -2</th>
<th>McKay Road/Beeton Spur Mile 79.17 - Sightlines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SSD</td>
</tr>
<tr>
<td></td>
<td>Calculated</td>
</tr>
<tr>
<td>NW</td>
<td>223</td>
</tr>
<tr>
<td>NE</td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>202</td>
</tr>
<tr>
<td>SW</td>
<td></td>
</tr>
</tbody>
</table>

DSD sightlines are not required to be kept clear when a crossing is equipped with an active warning system.

2.1.3.13 Signs and Pavement Markings

2.1.3.13.1 Railway Crossing Ahead

The TAC manual indicates that the SSD for a truck with conventional braking travelling at 80 km/h is 115-140m (table 1.2.5.4). WA18 signs were located 220 m west of the crossing and 200 m east of the crossing. The sign for westbound vehicles was obstructed by brush.

2.1.3.13.2 Advisory Speed Sign

Not Required.

2.1.3.13.3 Pavement Markings

Pavement markings were generally consistent with the MUTCD manual. The stop bars are to be located 2m ahead of the warning device and an “X” is to be located 10m beyond the Railway Crossing Ahead sign, between the sign and crossing.

2.1.3.14 Warning Devices

The warning devices at the time of inspection included lights and bell.

2.1.3.15 Preemption of Traffic Signals

Not Applicable.

2.1.3.16 Trespassing

Evidence of trespassing was not noted during the site visit.
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2.1.3.17 Future Conditions

Figure 2 - Road Cross Section at McKay Road Crossing

The current crossing is compliant with Transport Canada’s grade crossing regulations and standards. Future plans for this location include widening of the road to include two lanes plus a bike lane in each direction with a centre turning lane. Carrying a turning lane through a railway crossing is not recommended and a modified arrangement should be provided in the vicinity of the crossing. Two potential options to remove the turning lanes at the crossing include tapering the lanes approaching the crossing or installation of a centre raised median on each side of the crossing. The median cannot be raised through the crossing itself and would need to end each side of the crossing proper.

Light units are required for each lane, including the bike lane, and are mounted on a cantilever structure over the roadway.

Figure 3 - Road Tapering in at McKay Road Crossing
2.1.4 Guidelines and Standards

Future users of this crossing are projected to include vehicles up to and including WB20 as well as cyclist and pedestrians. The projected AADT for McKay Road is 6800 while the volume of trains is anticipated to remain the same at an average of approximately one return trip twice a week with the possibility of a slight increase depending on customer requirements.

Transport Canada’s Grade Crossing Regulations, SOR-2014-275, specifies the requirements when there are changes to a railway crossing in Sections 86 to 91. These conditions include a requirement for the crossing surface to conform to Sections 5.1 and 6.4 of the Grade Crossing Standards and that the warning system must meet the applicable standards as set out in Articles 12 to 16 of the Grade Crossings Standards.

Other standards in effect for a railway crossing warning system include Volume 1, Section 3 of the American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications and Signals Manual of Recommended Practice.

These standards and regulations dictate the requirement for an active warning system consisting of Lights and a Bell. In addition need both Front Lights and Back Lights must be provided for each travelled lane. It should be noted that in most applications a Bike Lane is considered a travelled lane and would require their own lights. In addition if the centerlines of the sidewalks are not within 3.6m of the centerline of a warning device they would require their own set of warning lights.

2.1.5 Deficiencies and Recommendations

2.1.5.1 Existing

- Brush clearing should be completed to create clear sightlines to the westbound advance warning sign

The Field Guide addresses several factors at a grade crossing which are no longer included in the Grade Crossing Standards. The Table in Appendix D summarizes the crossings’ compliance with the Grade Crossing Standards.

2.1.5.2 Future

- The crossing warning device will need to be modified to provide both Front and Back Lights for each travelled lane including the Bike Lane
- Centre Turning Lane should not be carried over the grade crossing

Note: The safety assessments of the grade crossings cover physical features which may affect road and rail user safety and it has sought to identify potential safety hazards. However, the auditors point out that no guarantee is made that every deficiency has been identified. Further,
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if all the recommendations in this assessment were to be addressed, this would not confirm that the crossing is 'safe'; rather, adoption of the recommendations should improve the level of safety of the facilities.

2.1.6 Barrie Collingwood Railway Requirements

The Barrie Collingwood Railway currently operates 2 round trip trains per week over the McKay Road crossing serving two industrial spurs in Innisfil. Traffic is not expected to decrease and the railway hopes to increase both the number of cars delivered and the number of customers served. It is anticipated that the current single track configuration will support their future needs.

2.1.7 BCRY Potential Impacts

Potentially there could be long and short term impacts to the BCRY.

2.1.7.1 Short Term

There is the potential for several short term impacts on the railway and its operations.

These could include a requirement to supply a flagman during construction activities. Given the relatively small size of the railway this could reduce the number of people required for inspection and maintenance activities.

Another impact which will occur during construction is the requirement for track outages. The severity of the impact of track outages can be minimized by scheduling construction activities to days when trains are not operated on the Beeton Spur.

There is a possibility that the railway will be required to pay for a portion of the upgrades.

2.1.7.2 Long Term

Long term impacts would include increased maintenance requirements for the crossing warning devices as a result of the additional light units. The Canadian Transportation Agency publishes set rates for crossing maintenance which is $6,645 annually for 2016 and 2017 for a crossing with an active warning device which does not include gates. This includes direct labour rates, direct material rates, electricity costs, overhead rates, and vehicle costs. This may or may not cover the railway's costs.

2.1.8 Cost Sharing

Previous agreements and CTA rulings will have a bearing on the cost sharing requirements for modifications to an existing crossing. Board Orders for this location were requested from the CTA as Board Orders can include previous cost sharing arrangements. The CTA provided only one record which does not include cost sharing information and is included as Appendix E.
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While the CTA provides a guideline for the apportionment of costs for railway grade separations they do not provide the same for railway crossings. Typical cost sharing agreements allocate 85% of the cost of the reconstruction of a grade crossing to the party who initiated the change, in this case the road authority, with the other party paying 15%. When the parties are unable to come to an understanding the CTA can provide arbitration services.

As noted previously, the cost sharing of maintenance costs is determined by the CTA and is published in the “Guide to Railway Charges for Crossing Maintenance and Construction 2016”. These are fixed for 2016/2017 at $6,645 annually.

2.1.9 Construction Implementation

Re-construction of a crossing and crossing warning devices can have an impact on both road and rail users of the crossing. Closure of the road for a 48 hour period while there are no scheduled trains could allow complete construction of the crossing with minimal temporary works such as a road staging or temporary relocation of the existing crossing warning devices.

2.2 LOCKHART ROAD 80.13

The Lockhart Road Subway is located at Mile 80.13 on the BCRY’s Beeton Spur. The location is illustrated in the site plan which can be found in Appendix A.

2.2.1 Effects of Alternate Concepts

As noted earlier typical options where a road and a rail line intersect include a level crossing (the current condition), road closure or a grade separation.

A road closure will not meet the needs of users, and the current difference in grade between the roadway and rail line would result in a significant change in the elevation of the road. This elevation change would impact access from Lockhart Road to properties in the vicinity of the railway tracks. A detail of this option can be found in Appendix F.

This leaves a grade separation, in particular a road under rail grade separation as the most viable option.

2.2.2 Existing and Proposed Conditions

The current configuration consists of a 2 lane road with sub-standard lane widths passing under a single track. In addition the road has a restricted vertical clearance of 4.3 metres.

The proposed configuration would include 2 travelled lanes plus a bike lane in each direction with a sidewalk on both sides of the road resulting in a right-of-way width of 34 metres. The design shifts the centre roadway to the south to allow the north edge of the road to be maintained to avoid encroaching on an existing watercourse. The current design carries this
cross-section under the rail corridor. The profile of the road would be lowered to allow for, at a minimum, a vertical clearance of 5.3m as is typically required by all railways.

Figure 4 - Lockhart Road Cross Section

2.2.3 Detailed Safety Assessment

A detailed safety assessment in accordance with Transport Canada’s Canadian Road/Railway Grade Crossing Detailed Safety Assessment Field Guide”, TP14372 was not completed at this location as the current arrangement does not include a grade crossing.

The area was reviewed for other factors which may affect users of this location.

2.2.3.1 Lane Width

The current road width provides for a single lane only under the tracks as noted in the following photo. A “Yield to Oncoming Traffic” sign is provided for both eastbound and westbound traffic.
2.2.3.2 Vertical Clearance

The current vertical clearance is identified as 4.3m by a restricted clearance sign mounted on the rail carrying structure. There is a possibility that oversized vehicles could strike the structure causing harm to the operator of the vehicle or creating an unsafe condition for passing trains.

2.2.3.3 Restricted Visibility

An entrance to a residence is currently located in the northwest quadrant of the underpass. Sightlines for vehicles exiting this driveway are severely impacted by the bridge abutment on the north side of the road. A mirror is installed on the south side of the road across from the driveway as an aid to help the operator of a vehicle if it is safe to enter the travelled way.

2.2.3.4 Trespassing

Evidence of trespassing in the form of graffiti was noted on the rail carrying structure. Trespassing on a rail corridor is illegal office and presents many safety hazards. It should be noted that the graffiti observed was faded and appears to have been placed some time ago.
2.2.3.5 Handrails

The existing bridge is of sufficient width to carry a single track only and is not equipped with handrails. This can present a hazard for railway employees, in particular if they must attend to a condition on their train while it is stopped over the roadway.

2.2.4 Guidelines and Standards

Volume 2 of the AREMA Manual contains requirements for the design and construction of many types of railway carrying structures including timber (Chapter 7), concrete (Chapter 8), and steel (Chapter 15). In addition Chapter 15 presents many railways employ their own standards and will specify the minimum loading requirements typically E-80 or better.

2.2.5 Deficiencies and Recommendations

As previously noted, several safety concerns of different severity currently exist.

Recommendations to correct the deficiencies are as follows:

- New structure should be of sufficient length to accommodate full width lanes
- New structure should be constructed with a minimum vertical clearance of at least 5.3m
- The new bridge abutment and driveway should have sufficient separation to provide adequate visibility for a vehicle exiting the residence. Construction of a centre pier may further restrict visibility. Relocation of the driveway to a point further west may be required.
- Fencing should be installed to deter access to the rail corridor and rail carrying structure. In addition the installation of “No Trespassing” signs is recommended.
- The new structure should be constructed with trainman’s walkways equipped with handrails.

2.2.6 Barrie Collingwood Rail Requirements

This location has the same level of train use as the McKay Road crossing. As with McKay Road it is anticipated that the current single track configuration will support their future needs.
2.2.7 BCRY Potential Impacts

Impacts to the BCRY may both long and short term.

2.2.7.1 Short Term Impacts

During construction manpower will have to be allocated to provide flagging protection to ensure the safety of construction and train operations do not overlap and that safety is not jeopardized. This may require a representative of the railway to be present for the duration of the construction activities.

The duration of the construction of the rail carrying structure will exceed the interval between trains. To minimize the impact of the bridge replacement a temporary diversion may be required. Another alternative could involve accelerated construction which could potentially shorten the track outage such that customer service would not be impacted.

The railway is typically responsible for a portion of the construction cost. CTA’s publication “Apportionment of Cost of Grade Separations: A Resource Tool” describes the process of determine the cost sharing for the construction or reconstruction of a grade separation. It indicates that the construction costs of the basic grade separation is normally split 85% to the part who is initiating the construction and 15% to the other party.

The construction costs of the basic grade separation are normally apportioned as follows:

<table>
<thead>
<tr>
<th>On projects due primarily to road development:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 85% road authority</td>
</tr>
<tr>
<td>b) 15% railway company</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>On projects where both road and railway development have contributed largely to the need for the project:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 50% road authority</td>
</tr>
<tr>
<td>b) 50% railway company</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>On projects due primarily to railway development:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 15% road authority</td>
</tr>
<tr>
<td>b) 85% railway company</td>
</tr>
</tbody>
</table>

Figure 7 - Typical Division of Construction Cost

2.2.7.2 Long Term Impacts

The CTA document also provides guidance regarding ongoing maintenance costs.
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The maintenance costs for a subway are normally apportioned as follows:
1. the railway company pays all maintenance costs of the substructure and the superstructure of a subway; and
2. the road authority pays all other maintenance costs of a subway, including the cost of maintaining the road approaches, retaining walls, road surface, sidewalks, drainage and lighting.

**Figure 8 - Typical Division of Maintenance Cost**

While a larger structure may require more maintenance, a newer structure should provide a reduction in maintenance activities at least in the short to medium term. There may be an effect, negative or positive, on the railway's ongoing maintenance cost for this location.

**2.2.8 Cost Sharing**

Board Orders were requested for this location and the CTA indicated that no Board Orders were found on record.

As noted previously the CTA’s publication “Apportionment of Cost of Grade Separations: A Resource Tool” describes the process of determine the cost sharing for the construction or reconstruction of a grade separation. This document indicates that a typically split in construction costs would require BCry to pay 15% of the construction costs for the basic grade separation.

**2.2.9 Construction Implementation**

Construction of a new grade separation while maintaining the use of the existing road and rail line will present some challenges. There are several construction methods available as noted below and summarized in Table X.

**2.2.9.1 Temporary Diversions**

Construction of a road over rail grade separation is typically completed by building road and rail diversions to clear the footprint of the construction zone and the new structure. Construction of a road diversion at this location would not be practical given the difference in elevation between the road and rail. A rail diversion could be constructed on the east side of the current rail line and if Lockhart Road must remain open during construction a temporary bridge would need to be constructed on the diversion allowing the road to pass underneath the tracks as it does now. If a temporary road closure is permissible an embankment could be constructed to carry the rail diversion which would save the cost of the temporary spans.

**2.2.9.2 Permanent Realignment**

Another option would entail the permanent relocation of the rail line by construction of the new abutments and superstructure next to the existing bridge. This would allow the road to remain open during construction but may require additional property. An additional benefit of this
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construction method would be an increase in separation between the future structure and the existing driveway in the northwest quadrant.

2.2.9.3 Temporary Spans

Given the current rail schedule, staging of construction activities around the train schedule may allow construction of the structure without a rail diversion. This would involve the building of temporary bridge spans to allow construction of the piers beneath the rails. The superstructure could then be lifted into place during a three day track closure. This option entails considerable temporary works and is one of the more expensive options.

2.2.9.4 Track and Road Closure

Closure of both the rail and road would allow unimpeded access to the construction area with minimal temporary works. This would have a significant impact to all users for the duration of the construction. The duration could be reduced using GIGO accelerated construction techniques.

Table 3 - Construction Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Cost</th>
<th>Impact on Road</th>
<th>Impact on Rail</th>
<th>Property Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary Rail Diversion with Temporary Bridge</td>
<td>$6.0M</td>
<td>1</td>
<td>1</td>
<td>Temporary</td>
</tr>
<tr>
<td>Temporary Rail Diversion with Road Closure</td>
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<td>1</td>
<td>Temporary</td>
</tr>
<tr>
<td>Permanent Rail Relocation</td>
<td>$5.8M</td>
<td>1</td>
<td>1</td>
<td>Permanent</td>
</tr>
<tr>
<td>Temporary Spans</td>
<td>$6.7M</td>
<td>2</td>
<td>2</td>
<td>N/A</td>
</tr>
<tr>
<td>Accelerated Construction</td>
<td>$5.4M</td>
<td>3</td>
<td>3</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*Severity Rating 3 = most severe 1 = least*
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References
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3.0 REFERENCES

Apportionment of Cost of Grade Separations: A Resource Tool

AREMA Communications and Signals Manual of Recommended Practice.

AREMA Volume 2

Canadian Road / Railway Grade Crossing Detailed Safety Assessment Field Guide (April 2005)

Grade Crossing Regulations (SOR/2014-275)


Grade Crossing Standards (July 2014)

Manual of Uniform Traffic Control Devices for Canada

Railway Safety Act
Appendix A  DEVELOPMENT AREA

Lockhart Road Grade Separation

McKay Road Crossing