

### TRANSMITTAL MEMO

| CLIENT:  | VANCOUVER FRAISER PORT AUTHORITY (VFPA)       |
|----------|---|
| PROJECT: | VFPA FSPL TRANSPORTATION IMPROVEMENTS PROJECT |
| SUBJECT: | RAILWAY CROSSING SAFETYASSESSMENTS - SUMMARY  |
| DATE:    | FEBRUARY 9th, 2021                            |

WSP Canada Group Limited (WSP) has been contracted as part of the Vancouver Fraser Port Authority – Transportation Improvements Project, to complete a Railway Crossing Safety Assessment on eight (8) grade crossing within the Fraser Surrey Docklands. The crossings are owned by Vancouver Frasier Port Authority (VFPA) and Southern Railway of BC (SRY). The crossings are located along the Canadian National (CN) Brownsville Spur which comes off Mile 117 of the Yale Subdivision.

The Railway Crossing Field Safety Assessments were undertaken on the 22<sup>nd</sup> and 23<sup>rd</sup> of July 2020 and updates the previous Railway Crossing Assessments undertaken by WSP (formally MMM Group) on the 5<sup>th</sup> of May 2015. The Railway Crossing Assessments were conducted following the guidelines of applicable requirements identified in the most recent edition of Transport Canada's Grade Crossing Regulations (GCR) and Grade Crossing Standards (GCS).

Below is a summary of the eights Railway Crossing Safety Assessments. Table 1, outlines the existing crossing warning systems, the recommended crossing warning systems and significant cost items for crossing upgrades.

| Cro | ossing  | Existing<br>Warning<br>System | Recommended<br>Warning<br>System | Recommendation<br>Reasoning                                    | Other Significant<br>Cost Items  | Total<br>Estimated<br>Cost | Next Steps  |
|-----|---|-------------------------------|----------------------------------|--|--|----------------------------|---|
| 00  | Timberland<br>Wye                               | FLB                           | FLBG                             | • Vehicles cross the crossing at an angle less then 70 degrees | • None   | \$606,800                  | Prepare and<br>submit E4 for<br>review by railway |
| 01  | Mile 117.63<br>Spur 22.82,<br>75 Robson<br>Road | SRCS                          | FLBG                             | <ul><li>Cross product</li><li>Sightlines not met</li></ul>     | <ul> <li>Crossing Surface<br/>Extension</li> <li>Mitigate Sightline<br/>Non-Compliance</li> </ul>  | \$617,800                  | Prepare and<br>submit E4 for<br>review by railway |
| 02  | Mile 117.63<br>Spur 0.04, 65<br>Robson Road     | SRCS                          | FLBG                             | <ul><li>Cross product</li><li>Crossing angle</li></ul>         | <ul> <li>Crossing Surface<br/>Extension</li> <li>Mitigate Sightline<br/>Non-Compliance</li> <li>Repaving Crossing<br/>Surface</li> </ul> | \$637,050                  | Prepare and<br>submit E4 for<br>review by railway |

#### Table 1: Crossing Summary Table (See Rail Map on Next Page for Crossing Numbers)



| 03 | 10203, 59<br>Timberland<br>Road | SRCS | SRCS | • AADT and rail traffic reduced from 2015 | Mitigate Sightline     Non-Compliance   | \$501,300* | Address priority<br>safety issues<br>(sightline non-<br>compliance) |
|----|---------------------------------|------|------|---|---|------------|---|
| 04 | 10203, 57<br>Timberland<br>Road | SRCS | FLB  | Sightlines not met                        | <ul> <li>Crossing Surface<br/>Extension</li> <li>Mitigate Sightline<br/>Non-Compliance</li> </ul> | \$518,350  | Prepare and<br>submit E4 for<br>review by railway                   |
| 05 | 10550<br>Timberland<br>Road     | SRCS | FLB  | Sightlines not met                        | Mitigate Sightline     Non-Compliance   | \$520,750  | Prepare and<br>submit E4 for<br>review by railway                   |
| 06 | 357 Dock<br>Road                | SRCS | SRCS | • No rail traffic on spur                 | • None  | \$3,100    | Address priority<br>safety issues<br>(signage)                      |
| 07 | 10610<br>Timberland<br>Road     | SRCS | SRCS | • No rail traffic on spur                 | • None  | \$ -       | None  |

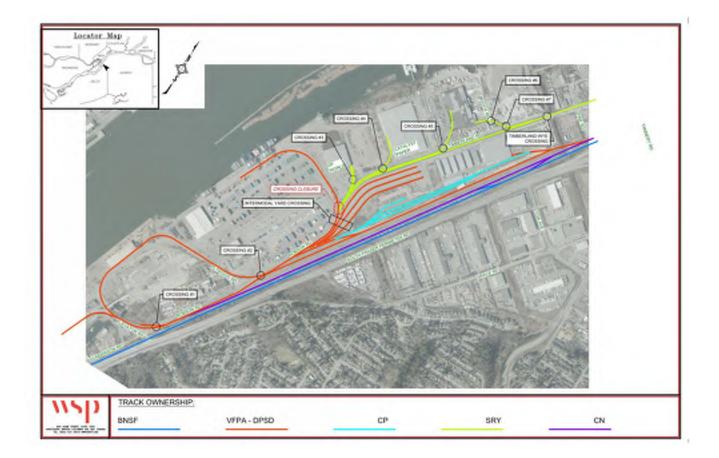
SRCS = Standardizes Reflective Crossing Sign

FLB = Flashing Lights & Bell

FLBG = Flashing Lights, Bells & Gates

AADT = Average Annual Daily Traffic

\* This cost assumes for warning systems with gate if the sightlines cannot be met by removing fencing or obstructions then gates are required. However, manual flagging can be discussed with SRY as cost-effective solution.



For further information on the assessed crossings, see the corresponding Railway Crossing Safety Assessment Reports and Field Assessment Reports for details.



As all of the assessed crossing are federally regulated and are governed by Transport Canada's Grade Crossing Regulations (GCR) and Grade Crossings Standards (GCS), the next steps for the crossings that require active warning protection, is to complete an E4 grade crossing drawing. The E4 grade crossing drawing to be submitted to the applicable railway and the Canadian Transportation Agency.

Patrick McCabe, CPEng (Aus), NER, APEC Engineer, IntPE(Aus) Track Designer, Rail & Transit VFPA REPORT NUMBER: 20-0173

## VFPA FSPL TRANSPORTATION IMPROVEMENTS PROJECT 00 - MILE X.XX, TIMBERLANDS WYE, CROSSING ASSESSMENT REPORT

#### FEBRUARY 09, 2021



# REVISION HISTORY

FINAL ISSUE

| 2020/09/03                   | FIRST DRAFT                           |                                       |  |
|------------------------------|---------------------------------------|---------------------------------------|--|
| Prepared by                  | Reviewed by                           |                                       |  |
| P. McCabe, Track<br>Designer | R. Sewell, Senior<br>Project Engineer |                                       |  |
| 2020/10/21                   | SECOND DRAFT                          |                                       |  |
| Prepared by                  | Reviewed by                           |                                       |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer  |                                       |  |
| 2021/02/09                   | FINAL                                 |                                       |  |
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PREPARED BY

09/02/2021

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Date



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Date

09/02/2021

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# **NSD**

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# **1 CROSSING OVERVIEW**

WSP Canada Group Limited (WSP) has been contracted as part of the Fraser Surrey Port Lands – Transportation Improvements Preliminary Design Services project, to complete a Railway Crossing Safety Assessment on the 10619 Timberland Road grade crossing (also known as the "Timberland Wye"). The SRY owned crossing is located within the Vancouver Fraser Port Authority (VFPA), Fraser Surrey Docklands adjacent to the Canadian National (CN) Brownsville Spur which comes off Mile 117 of the Yale Subdivision.

A Railway Crossing Field Safety Assessment was undertaken on the 23rd of July 2020 and updates the previous Railway Crossing Assessment undertaken WSP (formally MMM Group) on the 5<sup>th</sup> of May 2015. The Railway Crossing Assessment as conducted follows the guidelines of applicable requirements identified in the most recent edition of Transport Canada's Grade Crossing Regulations (GCR) and Grade Crossing Standards (GCS).

The crossing is an active crossing (FLB), equipped with two RAILWAY CROSSING, STOP signs and flashing lights, located within an industrial area. A Tractor Trailer (WB-20) is the design vehicle used to represent daily traffic on port property. The Railway traffic volumes were provided by the SRY while the Average Annual Daily Traffic (AADT) was calculated based on the realigned infrastructure.

This report aims to identify the modifications to the grade crossing since the previous inspection completed by MMM Group in 2015, as well as highlight any new or previously identified non-compliances still relevant to this crossing.

## 1.1 LOCATION

The Timberland Wye grade crossing is located within Fraser Surrey Docks jurisdiction at 10619 Timberland Road and crosses the SRY Fraser Surrey Docks spur track. The crossing is located at the latitude and longitude of 49°11'44" and 112°53'53" respectfully. Figure 1, below shows the location of the crossing.

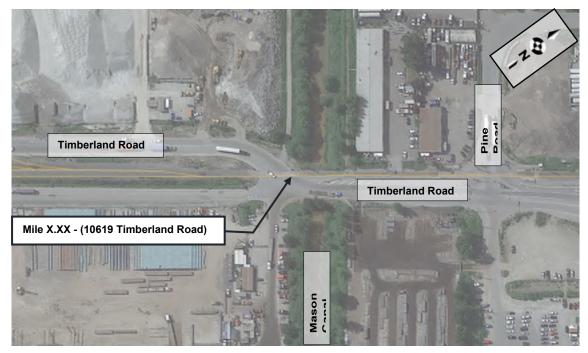


Figure 1: Crossing Location (source: Google Earth, 2020)

# 2 SAFETY ASSESSMENT

## 2.1 PREVIOUS ASSESSMENT (2015)

A previous crossing assessment was undertaken in 2015 by WSP for the Timberland Wye crossing. The objective of the assessment was 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 referred to in the Railway Safety Act / Grade Crossing Regulations and contained in the Grade Crossing Standards.
- 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.

The outcome of the 2015 assessment offered recommendations for consideration by the VFPA. Table 1: Previous Non-Compliances illustrates the non-compliances and recommendations offered within the 2015 report. The recommendations were categorised within the three priority levels;

- Low implement the measures as soon as practicable
- Medium implement the measures by Transport Canada GCS & GCR November 2021 deadline.
- High implement the measures forthwith

#### **Table 1: Previous Non-Compliances**

|     | Observations   | Suggested Actions  | Priority | Addressed?  |
|-----|--|--|----------|---|
| GCS | S Section 4 – Railway Crossing and Number of 1   | Fracks Sign (Basic Requirement)  |          |   |
| a.  | RAILWAY CROSSING sign on the east<br>approach is located too close to the nearest<br>railway and too far from the edge of travelled<br>way. Sign is damaged and in poor condition.   | Replace RAILWAY CROSSING sign on the east approach as per GCS Section 4.1.   |          |   |
| b.  | RAILWAY CROSSING sign on the west approach is located too far from the curb.   | Relocate RAILWAY CROSSING sign on the west approach as per GCS Section 4.1.  | High     | Yes – New RAILWAY CROSSING Sign<br>orientation adjusted                               |
| GCS | S Section 7 – Sightlines   |  | I        |   |
| a.  | Clear sightline areas where drivers stopped at<br>the crossing (D <sub>STOPPED-VEH</sub> ) cannot be provided<br>or maintained due to the Port Metro Vancouver<br>Surrey Properties sign on the northwest corner<br>of the crossing. | STOPPED-VEH) cannot be provided         cannot be provided and maintained.           ue to the Port Metro Vancouver         cannot be provided and maintained. |          | Yes – Port of Vancouver Sign removed.<br>Flashing light installed above STOP<br>signs |
| GCS | S Section 8 – Signs  |  |          |   |
| a.  | RAILWAY CROSSING AHEAD signs are not<br>present on either approach of the crossing.  | Install RAILWAY CROSSING AHEAD signs 45m +/-<br>10m in advance of the stopping location on both<br>approaches.   | Medium   | Yes – RAILWAY CROSSING AHEAD<br>signs installed                                       |
| b.  | STOP signs are not present on both approaches  | Install STOP signs on both approaches as per GCS Section 8.  | Medium   | Yes – STOP signs installed on all approaches  |
| a.  | EMERGENCY NOTIFICATION signs are not<br>present on both approaches.  | Install EMERGENCY NOTIFICATION sign on both approaches as per GCS Section 8.5.   | Medium   | No  |

| b.  | Double stop bars are not present on either approach to the crossing for vehicles.                                | Paint double stop bars on both road approaches as per MUTCD Fig.C1-6 (Jan. 2014).   | High   | Yes – double stop bars painted (now faded)  |
|-----|--|---|--------|---|
| C.  | RAILWAY CROSSING symbol pavement<br>markings are not present on either approach to<br>the crossing for vehicles. | Paint RAILWAY CROSSING symbol on both road approaches as per MUTCD Fig.C1-6 (Jan. 2014).  | Medium | No  |
| d.  | No stopping or parking restrictions are observed along the railway right-of-way.                                 | Install NO STOPPING signs within the railway right-of-<br>way.  | Low    | Yes – DO NOT STOP ON TRACK<br>installed under both RAILWAY<br>CROSSING AHEAD signs  |
| GCS | S Sections 9, 12 to 17 – Warning System Design   |   |        |   |
| a.  | An active warning system without gates is warranted based on cross-product.                                      | Install active warning system without gates. However,<br>Transport Canada indicated that the crossing could<br>stay passive indefinitely unless the sightline<br>requirements could not be met. | Low    | Partial – A FLASHING LIGHT has been<br>installed above the RAILWAY<br>CROSSING sign |

## 2.2 CROSSING MODIFICATIONS

As shown in Appendix A: Site Photographs, a number of changes have occurred at the crossing between inspections. Most changes were based on recommendations outlined in the 2015 inspection. Table 1, shows what changes have been made based on the 2015 recommendations. Below is a summarised list of all the changes observed from the site inspection:

- New grade crossing signage, including;
  - o RAILWAY CROSSING Signs
  - STOP Signs
  - o RAILWAY CROSSING AHEAD signs
  - o DO NOT STP ON TRACKS Sign
  - o SPEED ADVISORY TAB Sign
  - o NO STOPPING Sign
  - 4-WAY Intersection Sign
- New FLASHING LIGHT installed above RAILWAY CROSSING Signs.
- Removal of Port of Vancouver Sign
- Asphalt resurfaced either side of concrete crossing panels.
- New concrete crossing panels.
- New MUTCD compliant pavement markings.
- New concrete barriers installed on the south side of the railway crossing and north side of the Timberland intersection on both sides adjacent to the SRY tracks to stop vehicles cutting across the crossing.

## 2.3 ASSESSMENT AND RECOMMENDATIONS

An updated Grade Crossing Safety Assessment was undertaken for the proposed realignment of the port road access and to determine any required crossing upgrades to ensure compliance with the GCR & GCS. **Appendix B: Site Inspection Report** provides details of the observations made during the site inspection. The inspection report also outlines outstanding safety issues, along with recommended remediations. Table 2: 2020 Crossing Recommendations, summarizes the updated recommendations from the field investigation. Lack of sightlines is a warrant in the GSR and GCS to require installation of automatic gated crossing protection. The client needs to insure that the crossing design plans, fully completed crossing plans (E-4) and full crossing safety assessment, which comply with requirements of the GCR and GCS, have been completed and filed with Canadian Transportation Agency and applicable railway.

#### Table 2: 2020 Crossing Recommendations

|          | Observations   | Suggested Actions  | Priority | Order of<br>Magnitude Cost |
|----------|--|--|----------|----------------------------|
| GCS Sect | tion 5 – Crossing Surface  |  |          |                            |
| a.       | Vertical movement of rails with in the Crossing Surface when vehicles cross.                         | Undertake appropriate maintenance of the substructure of the crossing surface.     | High     | \$5000                     |
| GCS Sect | tion 8 – Signs   |  | 1        |                            |
| a.       | EMERGENCY NOTIFICATION signs are not present on both approaches.                                     | Install EMERGENCY NOTIFICATION sign on both approaches.                            | Medium   | \$800                      |
| b.       | RAILWAY CROSSING symbol pavement markings are faded on either approach to the crossing for vehicles. | Paint RAILWAY CROSSING symbol on both road approaches (including "X") as per MUTCD | Medium   | \$1000                     |
| GCS Sect | tions 9, 12 to 17 – Warning System Design  |  | 1        |                            |
| a.       | An active warning system with gates is warranted based<br>on crossing angle being below 70°.         | Install active warning system <u>with</u> gates.                                   | Low      | \$600,000                  |



# A SITE PHOTOGRAPHS





**D** - West Approach Drivers View Left

E - West Approach

F - West Approach Drivers View Right

# **APPENDIX**



G – East Approach Driver View Left (At Stopped Position)



- H East Approach (At Stopped Position)
- - I East Approach Drivers View Right (At Stopped Position)



J- West Approach Drivers View Left (At Stopped Position)



K - West Approach (At Stopped Position)



L - West Approach Drivers View Right (At Stopped Position)

# **APPENDIX**



M – North Facing Crossing Surface

N – General Crossing Photo

O – South Facing Crossing Surface



# B SITE INSPECTION REPORT

CANADIAN ROAD / RAILWAY GRADE CROSSING DETAILED SAFETY ASSESSMENT FIELD GUIDE (2005)\*

Appendix C2: Field Data Forms

×

Passive & Active Crossings

MileX.XX (10619 Timberland Road),SRY Rail Surrey, British Columbia For Vancouver Fraser Port Authority

|           | Legend: |   |
|-----------|---------|---|
| calculate | Formula | Spreadsheet cell has formula  |
| look up   |         | User to look up value in table or chart.  |
|           |         | User to input value here for conditional formatting or formulas in other cells to function                |
|           |         | Warning! Value beyond acceptable limits.  |
|           |         | Warning! Value beyond acceptable limits for certain conditions (i.e. for people using assistive devices). |
|           | Rail    | Information to be provided by Railway Company   |
|           | Road    | Information to be provided by Roadway Authority   |
| measure   | observe | Information to be obtained during Site Investigation  |
|           | ٧       | Information provided by others to be verified in the field  |

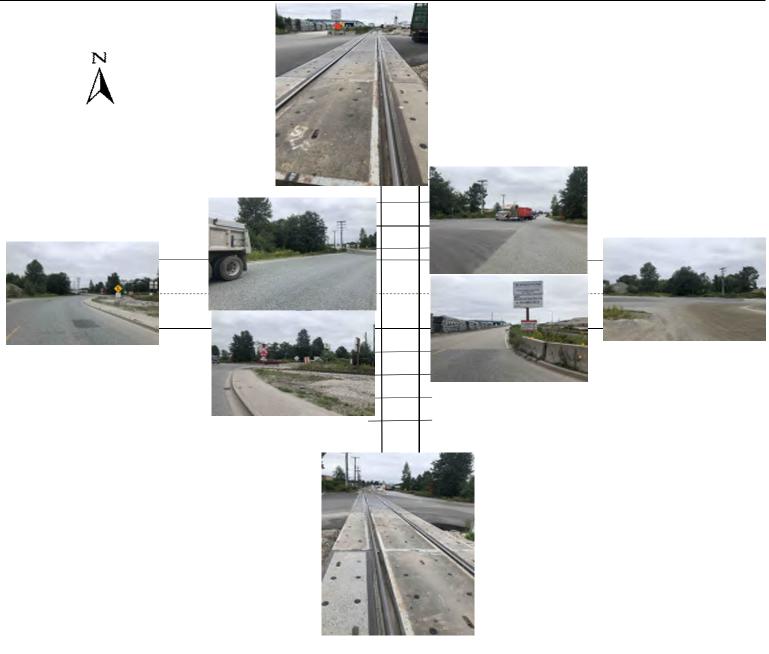
\* Updated to reflect Transport Canada's Grade Crossing Standards (GCS) July 2014 and Grade Crossing Regulations (GCR)(SOR-2014-275 Feb 2016)

| Sheet 1                 |                                       |                              | Grade Crossir        | ng Safety Assessm      | ent  |                                | Passive Crossings |
|-------------------------|---------------------------------------|------------------------------|----------------------|------------------------|--|--------------------------------|-------------------|
| Date of Assessment:     |                                       | 23-Jul-2                     | 0 Site Investigation |                        |  |                                |                   |
| Assessment Team Me      | embers & Affiliations:                | Patrick McCabe<br>Rob Sewell |                      |                        |  |                                |                   |
| Reason for Assessme     | nt: New Proposed                      | Pedestrian Crossing          |                      |                        |  |                                |                   |
|                         | periodic assessment                   | Х                            | significant change   | in infrastructure      |  | significant change in road o   | r rail volumes    |
|                         | cessation of whistling                |                              | significant change   | in train operations    |  | significant change in road o   | r rail speeds     |
|                         | change in vehicle types               |                              | 2+ fatal collisions  | in 5yr. Period         |  | other collision experience (s  | see below)        |
| Railway Authority:      | Southern Railway of British Columb    | bia (SRY)                    |                      |                        | Road Authority:                                    | Vancouver Fraser Port Auth     | hority (VFPA)     |
| Crossing Location:      | 10619 Tmberland Road                  |                              |                      |                        | Road Name/Number:                                  | 10619 Timberland Road          |                   |
| Location Number:        | N/A                                   |                              |                      |                        | Province:  | British Columbia               |                   |
| Municipality:           | City of Surrey, BC                    |                              |                      |                        | Location Reference (cont                           | rol section, etc.):            | DP Surrey Docks   |
| Railway: SRY            |                                       | Mile:                        | N/A                  |                        | Road Classification:                               |                                |                   |
| Cub division.           | N/A                                   | Course                       | NI/A                 |                        | (freeway/expressway art                            | erial, collector, local, etc): | ULU               |
| Sub-division:           | N/A                                   | Spur:                        | N/A                  |                        | Roadway East/West (yes                             | ( = = )                        |                   |
| Type of Grade Crossi    | ng [private/public; warning devices]: | SRSC                         |                      |                        | Roadway East/ West (yes,<br>Roadway North/ South ( |                                |                   |
|                         |                                       |                              |                      |                        |  |                                |                   |
| Track Type: [mainline   | e, etc.]                              |                              | Yard                 |                        |  |                                |                   |
|                         |                                       |                              |                      |                        | *Urban Local Undivided                             |                                |                   |
| Collision History (5-ye | ear period): No record of ac          | ccitents at the subject      | t railway crossing v | vithin the past five y | rears  |                                |                   |
|                         |                                       |                              |                      |                        |  |                                |                   |
|                         | Damage collisions:                    |                              | NIL                  |                        |  |                                |                   |
|                         | al Injury collisions:                 |                              | NIL                  |                        | of Persons Injured:                                | NIL                            |                   |
|                         | jury Collisions:                      |                              | NIL                  | Number o               | of Persons Killed:                                 | NIL                            |                   |
| = Total C               | ollisions in last 5 year period:      |                              | NIL                  |                        |  |                                |                   |

Provide Details of the collisions if available: Sources:

Sheet 2a

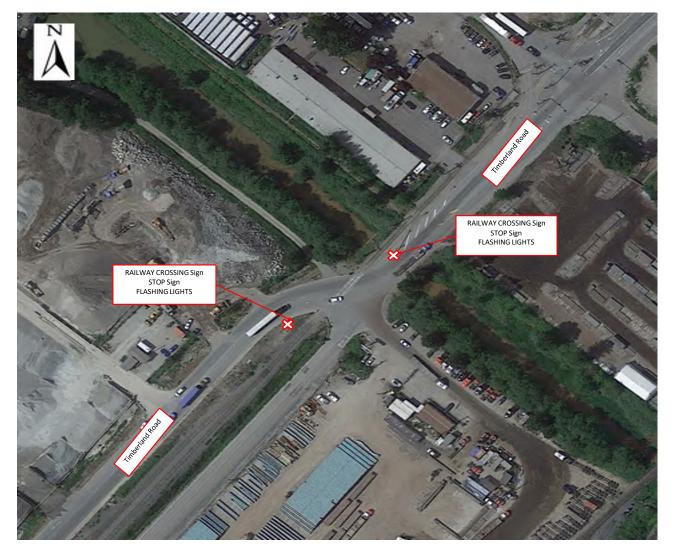
SCENE PHOTOGRAPHS



Sheet 2b

SCENE SKETCH

NOTE: All references to direction in this safety review are keyed to this diagram.



Images from Google Earth Notes:

- Include: - directions to nearby municipalities for both road & rail approaches (use arrows)
  - adjacent intersections
  - relevant road signs/signals
  - signal warning systems hardware
- landmarks - crosswalks/paths

- geographical features - bus stops, etc.

#### GENERAL INFORMATION

| Source  | ltem   |      |            |   |  |
|---------|--|------|------------|---|--|
| Rail    | Maximum Railway Operating Speed, V <sub>T</sub>            | =    | 10         | (mph)   |  |
| Rail    | Daily Train Volume:  | =    | 3          | (freight trains/day)                                |  |
| Nali    |  | =    | 0          | (passenger trains/day)                              |  |
| Rail    | Switching during daytime? Y/N                              | No   |            | nighttime? Y/N No                                   |  |
| Road    | Avg. Annual Daily Traffic, AADT:                           | =    | 3000       | (vpd) Year of count: 2020                           |  |
| Road    | High seasonal fluctuation in volumes?                      |      | No         |   |  |
| Road    | Pedestrian Volumes   | =    | 0          | (ped./day)  |  |
| Road √  | Is crossing on a School Bus route?                         |      | No         |   |  |
| Road √  | Do Dangerous Goods trucks use this roadway?                |      | Yes        |   |  |
| Road    | Cyclist Volumes  | =    | 0          | (cyclists/day) Cyclist not anticipated              |  |
| Road √  | Regular use of crossing by persons with Assistive Devices? | )    |            | Pedestrians using Assistive Devices not anticipated |  |
| Road √  | Other special road users?                                  | type | e Unknown  | daily volume None                                   |  |
| Road    | Forecasted AADT <sup>2</sup>                               | =    | 1,170      | (vpd) Forecasted Year: 2022                         |  |
|         | Design Speed:  |      | 50         | km/h Posted Speed: 50 km/h                          |  |
| Road √  | Maximum Operating Speed:                                   |      | 50         | km/h  |  |
|         | note: provide details if all approaches are not the same   |      |            | -   |  |
| Road √  | Road Surface Type (asphalt, concrete, gravel, etc.):       |      | Asphalt    |   |  |
| observe | Surrounding Land Use (urban/rural)?:                       |      | Industrial |   |  |
| observe | Any schools, retirement homes, etc. nearby?                |      | No         |   |  |

#### Notes:

Sheet 3

1. Road Authority should provided plans if available.

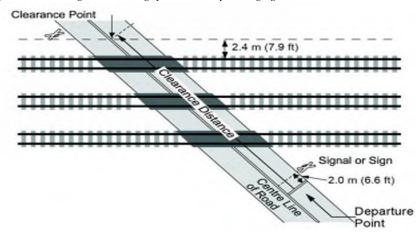
2. AADT is based upon modelled future traffic counts for the Realigned infrastrucutre.

#### From GCS Section 7.1.2:

| Column 1       | Column 2   | Column 3   |
|----------------|--|--|
| Class of Track | The maximum<br>allowable operating<br>speed for freight trains<br>is - | The maximum<br>allowable operating<br>speed for passenger<br>trains is - |
| Class 1 track  | 17 km/h (10 mph)   | 25 km/h (15 mph)   |
| Class 2 track  | 41 km/h (25 mph)   | 49 km/h (30 mph)   |
| Class 3 track  | 65 km/h (40 mph)   | 97 km/h (60 mph)   |
| Class 4 track  | 97 km/h (60 mph)   | 129 km/h (80 mph)  |
| Class 5 track  | 129 km/h (80 mph)  | 153 km/h (95 mph)  |

Figure 10-1 - Clearance Distance (cd) for Grade Crossings

(a) For Grade Crossings with a Warning System or Railway Crossing Sign

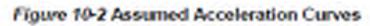


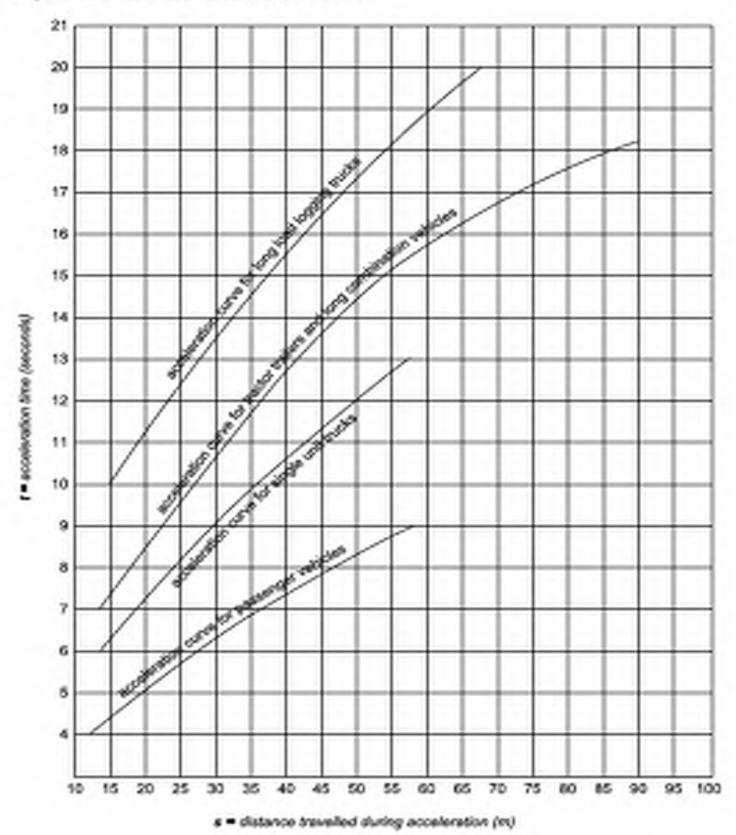
#### Grade Crossings Standards, July 2014

Table 10-1 Ratios of Acceleration Times on Grades

| Design Vehicle            | Road Grade (%) |     |     |     |     |  |  |  |  |  |  |
|---------------------------|----------------|-----|-----|-----|-----|--|--|--|--|--|--|
|                           | -4             | -2  | 0   | +2  | +4  |  |  |  |  |  |  |
| Passenger Car             | 0.7            | 0.9 | 1.0 | 1.1 | 1,3 |  |  |  |  |  |  |
| Single Unit Truck & Buses | 0.8            | 0.9 | 1.0 | 1.1 | 1.3 |  |  |  |  |  |  |
| Tractor-Semitrailer       | 0.8            | 0.9 | 1.0 | 1.2 | 1.7 |  |  |  |  |  |  |

Source: Geometric Design Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999





DESIGN CONSIDERATIONS

| Source    |  |  |                           |                   | Item                    |            |            |     |           |     | Reference       |
|-----------|--|--|---------------------------|-------------------|-------------------------|------------|------------|-----|-----------|-----|-----------------|
|           | Design Vehicle                         |  |                           |                   |                         |            |            |     |           |     |                 |
| Road      | Туре:                                  | 6                                      | WB-20 Tractor-S           | Semitrailers (W   | /B-20)                  |            |            |     |           |     | Table 1* SOR 57 |
| look-up   | Length, L:                             |  | 22.7                      | m                 |                         |            | EB Approac | h   | WB Approa | ach | Table 1*        |
| look-up   | Stopping Sight Distance, SSD           | )                                      | 109                       | m (round to       | 1.0% of grade)          | =          | 10         | m   | 109       | m   | Table 3*        |
| measure   | Clearance Distance, cd                 |  |                           |                   |                         | =          | 11.5       | m   | 11.5      | m   | GCS 16.1.1      |
| calculate | Vehicle Travel Distance, S             |  | S= L+cd                   | 34.2              | max <                   | =          | 34.2       | m   | 34.2      | m   |                 |
| look-up   | Vehicle Departure Time, t              |  |                           |                   |                         | =          | 11.7       | sec | 11.7      | sec | GCS Figure 10-2 |
| Road √    | Road Grade Effect:                     | maximum approa                         | ch grade within 'S        | i':               |                         | =          | 0.00       | %   | 0.50      | %   | Sheet 7         |
| look-up   | grade adjustment factor (anto ca       | alc assumes Truck)( ma                 | anual input from Tab      | le 10-1 if other) |                         | =          | 1.00       |     | 1.02      |     | GCS Table 10-1  |
| calculate |  | T= t x adjustment                      | factor                    |                   |                         | =          | 11.7       | sec | 11.9      | sec |                 |
|           | Design Vehicle Departure Tir           | me, T <sub>D</sub> = J + T (when       | re J = 2 sec (min.) perce | ption & reaction) |                         |            | 2.0        | sec | 2.0       | sec |                 |
| calculate |  | T <sub>G stop</sub> = T <sub>D</sub> = | 13.9                      | sec               |                         | <-         | 13.7       | sec | 13.9      | sec | GCS 10.3.2      |
| observe   | Do field acceleration times exce       | ed T <sub>D</sub> ?                    | Acceleration me           | easurement be     | yond the scope o        | f this ass | sessment.  |     |           |     |                 |
| measure   | Pedestrian, cyclist & Assistiv         | ve Devices Depar                       | ture Time                 | pedest            | rian <b>cd</b> distance | =          | 11.5       | m   | 11.5      | m   | 666 10 2 2      |
| calculate | walking speed 1.22m/s max.             | Т <sub>Р</sub> =                       | 11.5                      | sec               | (1.0m/s used)           | <-         | 11.5       | sec | 11.5      | sec | GCS 10.3.3      |
| calculate | T <sub>SSD</sub> = (SSD+cd+L)/(0.27783 | 7 x V <sub>road design</sub> ) =       | 10.3                      | sec               |                         |            |            |     |           |     |                 |
| calculate |  |  | -                         |                   | (1.011/3 0360)          |            | 11.5       | 300 | 11.5      | 360 |                 |

Comments Following Site Visit:

Sheet 4

#### Table 1 - Design vehicle Lengths/Class

| General Vehicle Descriptions            | Length (m) |
|---|------------|
| 1. Passenger Cars, Vans and Pickups (P) | 5.6        |
| 2. Light Single-unit Trucks (LSU)       | 6.4        |
| 3. Medium Single-unit Trucks (MSU)      | 10.0       |
| 4. Heavy Single-unit Trucks (HSU)       | 11.5       |
| 5. WB-19 Tractor-Semitrailers (WB-19)   | 20.7       |
| 6. WB-20 Tractor-Semitrailers (WB-20)   | 22.7       |
| 7. A-Train Doubles (ATD)                | 24.5       |
| 8. B-Train Doubles (BTD)                | 25.0       |
| 9. Standard Single-Unit Buses (8-12)    | 12.2       |
| 10. Articulated Buses (A-BUS)           | 18.3       |
| 11. Intercity Buses (I-BUS)             | 14.0       |

Table 6 - Minimum Sightlines along the Rail Line (D<sub>steped</sub>) (as illustrated in Figure 3)

| Railway Design<br>Speed V,                  |            | 1   |     | Depart | ture Tim  | ie (grea         | ter of T <sub>d</sub> | or T <sub>p</sub> ) ( | seconds |     |     | If creater of T, or T >  |  |
|---|------------|-----|-----|--------|-----------|------------------|-----------------------|-----------------------|---------|-----|-----|--------------------------|--|
| (mph)                                       | <u>≤10</u> |     |     |        |           |                  |                       |                       |         |     | 20  | 20 sec., add for each    |  |
| WARNING:<br>Railway design<br>speed in mph! |            |     |     | Minima | m Sightli | nes along<br>(m) | Rail Line             | 19)                   |         |     |     | additional second<br>(m) |  |
| STOP  | 30         | 30  | 30  | 30     | 30        | 30               | 30                    | 30                    | 30      | 30  | 30  | +0                       |  |
| 1-10  | 45         | 50  | 55  | 60     | - 65      | 70               | 72                    | 76                    | 80      | 85  | 90  | +5                       |  |
| 11-20                                       | 90         | 100 | 130 | 120    | 125       | 135              | 145                   | 155                   | 165     | 130 | 183 | +10                      |  |
| 21-30                                       | 135        | 150 | 165 | 175    | 190       | 205              | 215                   | 230                   | 245     | 255 | 270 | +15                      |  |
| 31-40                                       | 180        | 200 | 220 | 235    | 250       | 270              | 285                   | 305                   | 325     | 340 | 360 | +20                      |  |
| 41-50                                       | 225        | 250 | 270 | 290    | 315       | 335              | 360                   | 380                   | 405     | 425 | 450 | +25                      |  |
| 51-60                                       | 270        | 300 | 325 | 350    | 380       | 405              | -60                   | 460                   | 485     | 510 | 540 | +30                      |  |
| 61-76                                       | 315        | 350 | 380 | 415    | 445       | 470              | 505                   | 535                   | 565     | 595 | 630 | +35                      |  |
| 71-80                                       | 360        | 395 | 435 | 465    | 505       | 540              | 580                   | 610                   | 650     | 680 | 720 | +40                      |  |
| #1-90                                       | 405        | 46  | 490 | 535    | 530       | 605              | 650                   | 685                   | 730     | 765 | 810 | +45                      |  |
| 91-100                                      | 450        | 500 | 540 | 580    | 630       | 670              | 715                   | 760                   | 805     | 850 | 895 | +50                      |  |

Source: Geometric Design Guide for Canadian Roads, TAC; September 1999.

#### Table 3 – Determine SSD for Truck Class

| Road<br>Crossing<br>Design |      |                        |     |     |     |     |     | St  | oppir | Tru<br>1g Sig | ick Cla<br>ht Di<br>(m) |     | e (SSI | D)  |     |     |     |     |     |     |     |
|----------------------------|------|------------------------|-----|-----|-----|-----|-----|-----|-------|---------------|-------------------------|-----|--------|-----|-----|-----|-----|-----|-----|-----|-----|
| Speed V<br>(km/hr)         |      | Road Approach Gradient |     |     |     |     |     |     |       |               |                         |     |        |     |     |     |     |     |     |     |     |
| (MII/III)                  | -10% | -9%                    | -8% | -7% | -6% | -5% | -4% | -3% | -2%   | -1%           | 0%                      | 196 | 2%     | 3%  | 4%  | 5%  | 6%  | 7%  | 8%  | 996 | 10% |
| 10                         | 10   | 10                     | 10  | 10  | 10  | 10  | 10  | 10  | 10    | 10            | 10                      | 10  | 10     | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  |
| 20                         | 26   | 26                     | 26  | 26  | 26  | 26  | 25  | 25  | 25    | 25            | 25                      | 25  | 25     | 25  | 25  | 25  | 24  | 24  | 24  | 24  | 24  |
| 30                         | 48   | 48                     | 47  | 47  | 47  | 46  | 46  | 46  | 45    | 45            | 45                      | 45  | 45     | 44  | 44  | 44  | 44  | 44  | 44  | 43  | 43  |
| 40                         | 76   | 75                     | 74  | 74  | 73  | 73  | 72  | 71  | 71    | 70            | 70                      | 70  | 69     | 69  | 68  | 68  | 68  | 67  | 67  | 67  | 67  |
| 50                         | 121  | 120                    | 118 | 117 | 116 | 115 | 114 | 113 | 112   | 111           | 110                     | 109 | 108    | 108 | 107 | 106 | 106 | 105 | 105 | 104 | 104 |
| 60                         | 149  | 146                    | 144 | 142 | 140 | 138 | 136 | 134 | 133   | 131           | 130                     | 129 | 128    | 126 | 125 | 124 | 123 | 122 | 122 | 121 | 120 |
| 70                         | 210  | 205                    | 202 | 198 | 195 | 192 | 189 | 187 | 184   | 182           | 180                     | 178 | 176    | 175 | 173 | 171 | 170 | 169 | 167 | 166 | 165 |
| 80                         | 252  | 246                    | 241 | 236 | 231 | 227 | 223 | 219 | 216   | 213           | 210                     | 207 | 205    | 202 | 200 | 198 | 196 | 194 | 192 | 191 | 189 |
| 90                         | 318  | 311                    | 304 | 297 | 292 | 286 | 281 | 277 | 273   | 269           | 265                     | 262 | 258    | 255 | 252 | 250 | 247 | 245 | 243 | 240 | 238 |
| 100                        | 401  | 391                    | 382 | 373 | 365 | 358 | 352 | 346 | 340   | 335           | 330                     | 325 | 321    | 317 | 314 | 310 | 307 | 304 | 301 | 298 | 295 |
| 110                        | 455  | 441                    | 428 | 417 | 406 | 397 | 388 | 380 | 373   | 366           | 360                     | 354 | 349    | 344 | 339 | 334 | 330 | 326 | 322 | 319 | 315 |

\* Source: Transport Canada's "Determining Minimum Sightlines at Grade Crossings: A Guide for Road Authorities and Railway Companies"

### MileX.XX (10619 Timberland Road),SRY Rail

Surrey, British Columbia

LOCATION of GRADE CROSSING

| Source  | Item   | Reference       |
|---------|--|-----------------|
|         |  |                 |
| observe | "D" should not be less than 30m for either approach if the train speed exceeds 15 mph.                                     |                 |
|         | D = 5.8m   | GCS Section 9.1 |
| observe | Are there pedestrian crossings on either road approach that could cause vehicles to queue back to the tracks?              |                 |
| Observe | No   |                 |
| observe | Is "D" insufficient such that road vehicles might queue onto the rail tracks? No   |                 |
|         | Is "D" insufficient such that road vehicles turning from a side street might not see warning devices for the crossing? Yes |                 |

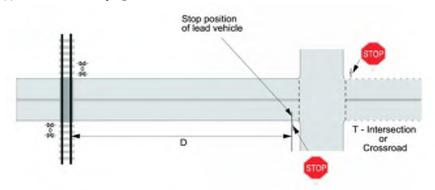
Comments Following Site Visit:

Crossing is located on a 4-way intersection . The minimum "D" diminsion to the 4-way intersection is measured on the east approach. The western "D" is 21.3m RAILWAY CROSSING AHEAD sign installed from previous inspection (2015)

- Railwayspeed = 10mph

Sheet 5

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

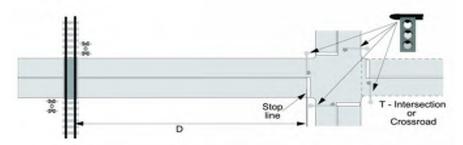
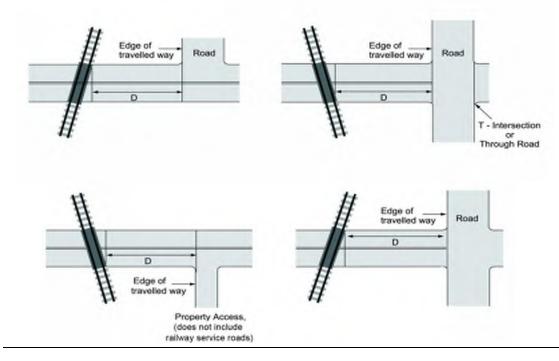


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings



#### GRADE CROSSING SURFACE

|  |   | I   | tem   |  |  |  |   | Referen  |
|--|---|---|---|--|--|--|---|--|
| ve Is the  | crossing smooth enough to allow road vehicles, pedestrians, cyclis  | sts, and other ro   | oad users to c  | ross at their  | r normal speed   | without con  | sequence?   | SOR 60; G0   |
| ve   | Crossing Surface Material: Concrete Panels  |   |   |  |  |  |   | SOR 60; G  |
|  | Crossing Surface Condition:     Good       ach Road Surface Type:     Ashpalt   |   |   |  |  |  |   |  |
|  | ach Road Surface Type: Ashpait<br>ach Road Surface Condition: Good - Resurface  | d since last cro  | ssing inspect   | ion  |  |  |   | SOR 60; G  |
|  | vay Illumination?: No   | a since last cro  | ssing inspect   |  |  |  |   | 501 00, d  |
|  |   | EB Approach   |   |  | WB Approa  | ch   |   |  |
| re Road S  | Surface crossing width (perp. C.L. min. = 8.0m) Not installed   |   | 22.8  | m  |  |  |   | GCS 5.2  |
|  | Surface extension beyond travel lanes (min. = 0.5m)   | 0.5   | m   |  | 2.5  | m  |   | GCS 5.2  |
| re Sidew   | alk/Path/Trail crossing width (min. = 1.5m)   | •   | NA  | m  | 1.5  | m  | Crosswalk on WB only  | GCS 5.1  |
| re Sidew   | alk/Path/Trail extension beyond sidewalk (min. = 0.5m)  | NA  | m   |  | 2.5  | m  | Crosswalk on WB only  | GCS 5.   |
| ire Distan   | ce Between Travel Lane and C.L. of Trail  |   | 0.8   | m  | -  |  |   |  |
| Cross-   | Section:  |   | South (Rig  | ht) Rail:  |  | North (Lei   | ft) Rail:   | GCS Table  |
| ire Flange   | eway width (min. = 65mm; max.= 120mm or 75mm <sup>1</sup> )   |   | 75  | mm   |  | 75   | mm  | GCS Table  |
| re Flange  | eway depth (min. = 50mm; max.= no limit or 75mm <sup>1</sup> )  |   | 55  | mm   |  | 55   | mm  | GCS Table  |
| Rural  | Field Side Gap:   |   |   | _  |  |  |   | GCS Table  |
| ire Side G   | ap width (max.= 120mm or 0 <sup>1</sup> )   |   | 10  | mm   |  | 10   | mm  | GCS Table  |
|  | ap depth (max.= no limit or 0 <sup>1</sup> )  |   | 0   | mm   |  | 0  | mm  | GCS Table  |
| Wear   |   |   |   | _  |  | _  |   | GCS Table  |
|  | ion of Top Rail above road surface (max. = 13mm <sup>1</sup> , 25mm, or 50mm)   |   | 5   | mm   |  | 5  | mm  | GCS Table  |
|  | ion of Top Rail below road surface (min. = -7mm <sup>1</sup> ,-25mm, or -50mm)  |   | 0   | mm   |  | 0  | mm  | GCS Table  |
|  | by persons using assistive devices ving Site Visit:   |   |   |  |  |  |   |  |
| e Crossing   | crossing surface has been installed. Along with some concreto<br>loose timbers, etc difference between road grade and rail supere<br>ngs Standards, July 2014<br>de Crossing Surface – Cross Section  | • ·   |   | Figure   |  | Crossing S   | -photos<br>urface Dimensions  |  |
| e Crossi<br>6-1 – Gra  | loose timbers, etc difference between road grade and rail supere<br>ngs Standards, July 2014<br>de Crossing Surface – Cross Section   | • ·   | els(a)  | Figure   |  | Crossing S   | urface Dimensions   |  |
| e Crossin<br>5-1 – Gra<br>a) Flange  | loose timbers, etc difference between road grade and rail supere<br>ngs Standards, July 2014<br>de Crossing Surface – Cross Section   | elevation   | (a)   | Figure   | 5-1 - Grade (  | Crossing S   | urface Dimensions   | -  |
| e Crossin<br>5-1 – Gra<br>a) Flange  | loose timbers, etc difference between road grade and rail supere<br>ngs Standards, July 2014<br>de Crossing Surface - Cross Section<br>maay:<br>Nidh Minimum  | • ·   | (a)<br>Edge (   | Figure :<br>Road, in   | 5-1 - Grade (  | Crossing S   | Edge of<br>travelled way  |  |
| e Crossin<br>5-1 – Gra<br>a) Flange  | Loose timbers, etc difference between road grade and rail supere<br>ngs Standards, July 2014<br>de Crossing Surface - Cross Section<br>way:<br>Midh Minimum<br>Maximum for:   | elevation   | (a)<br>Edge (   | Figure :   | 5-1 - Grade (  | Crossing S   | Edge of<br>travelled way<br>0.5 m or more beyond  |  |
| e Crossin<br>5-1 – Gra<br>a) Flange  | loose timbers, etc difference between road grade and rail supere<br>ngs Standards, July 2014<br>de Crossing Surface - Cross Section<br>maay:<br>Nidh Minimum  | elevation<br>65 mm  | (a)<br>Edge (   | Figure :<br>Road, in   | 5-1 - Grade (  | Crossing S   | Edge of<br>travelled way  |  |
| e Crossin<br>5-1 – Gra<br>a) Flange  | Loose timbers, etc difference between road grade and rail supere<br>ngs Standards, July 2014<br>de Crossing Surface – Cross Section<br>way:<br>Nidh Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road   | elevation   | (a)<br>Edge (   | Figure :<br>Road, in   | 5-1 - Grade (  | Crossing S   | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where   |  |
| e Crossin<br>5-1 – Gra<br>a) Flange<br>W   | Loose timbers, etc difference between road grade and rail supercents and a supercent of the supercent of    | 65 mm<br>75 mm<br>120 mm  | (a)<br>Edge o<br>End of   | Figure :<br>Road, in<br>of shoulder<br>(railway tie<br>or more   | 5-1 - Grade (  | Crossing S   | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where   |  |
| e Crossin<br>5-1 – Gra<br>a) Flange<br>W   | Loose timbers, etc difference between road grade and rail supere<br>ngs Standards, July 2014<br>de Crossing Surface – Cross Section<br>maay:<br>Width Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices   | elevation<br>65 mm<br>75 mm   | (a)<br>Edge o<br>End of<br>0.5 m o  | Figure :<br>Road, in<br>of shoulder<br>railway tie<br>or more<br>d shoulder  | 5-1 - Grade (  | Crossing S   | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder  |  |
| e Crossin<br>5-1 – Gra<br>a) Flange<br>W   | Loose timbers, etc difference between road grade and rail supere<br>ngs Standards, July 2014<br>de Crossing Surface – Cross Section<br>maay:<br>Width Minimum<br>Masimum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Public Minimum<br>Maximum for:  | 65 mm<br>75 mm<br>120 mm  | (a)<br>Edge o<br>End of   | Figure :<br>Road, in<br>of shoulder<br>railway tie<br>or more<br>d shoulder  | 5-1 - Grade (  | Crossing S   | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder  |  |
| e Crossin<br>5-1 – Gra<br>a) Flange<br>W   | Loose timbers, etc difference between road grade and rail supere<br>ngs Standards, July 2014<br>de Crossing Surface – Cross Section<br>maay:<br>Width Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>• pth: Minimum  | 65 mm<br>75 mm<br>120 mm  | (a)<br>Edge o<br>End of<br>0.5 m o  | Figure :<br>Road, in<br>of shoulder<br>railway tie<br>or more<br>d shoulder  | 5-1 - Grade (  | Crossing Si  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder  |  |
| ssing surface,<br>e Crossin<br>5-1 - Gra<br>a) Flange<br>W   | Ioose timbers, etc.  Idiference between road grade and rail supercents Ioose timbers, etc.  Idiference between road grade and rail supercents Ioose timbers, July 2014 Idiference between road grade and rail supercents Ioose timbers, July 2014 Idiference between road grade and rails designated by the road Ioose timbers, Ioose Iioose Ioose Io | 65 mm<br>75 mm<br>120 mm<br>50 mm   | (a)<br>Edge o<br>End of<br>0.5 m o  | Figure :<br>Road, in<br>of shoulder<br>railway tie<br>or more<br>d shoulder  | 5-1 - Grade (  | Crossing Si  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface  |  |
| e Crossin<br>5-1 - Gra<br>a) Flange<br>W<br>(b) Field<br>A space   | Ioose timbers, etc.  Ioose timbers, etc. Ioose timbers, etc.  Ioose timbers, etc.  Ioose timbers, etc.  Ioose timbers, etc.  Ioose timbers, etc.  Ioose timbers, etc.  Ioose timbers, etc.  Ioose tim | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public   | (a)<br>Edge o<br>End of<br>0.5 m o  | Figure :<br>Road, in<br>of shoulder<br>railway tie<br>or more<br>d shoulder  | 5-1 - Grade (  | Crossing Si  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder  |  |
| e Crossie<br>6-1 - Gra<br>a) Flange<br>V<br>(b) Field<br>A space i<br>sidewalk   | Ioose timbers, etc.  Ioose timbers, etc. Ioose timbers, etc.  Ioose timbers, etc.  Ioose timbers, etc.  Ioose timbers, etc.  Ioose timbers, etc.  Ioose timbers, etc.  Ioose timbers, etc.  Ioose tim | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public   | (a)<br>Edge o<br>End of<br>0.5 m o  | Figure :<br>Road, in<br>of shoulder<br>railway tie<br>or more<br>d shoulder  | 5-1 - Grade (  | Crossing Si  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface  |  |
| e Crossie<br>6-1 - Gra<br>a) Flange<br>V<br>(b) Field<br>A space i<br>sidewalk   | Ioose timbers, etc.  Idiference between road grade and rail superer  Ings Standards, July 2014 Ide Crossing Surface – Cross Section  Invay: Idth Minimum Maximum for:  Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices Id other grade crossings Identify for use by persons using assistive devices All other grade crossings Identify for use by persons using assistive devices I | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ne ublic   | (a)<br>Edge o<br>End of<br>0.5 m o  | Figure :<br>Road, in<br>of shoulder<br>railway tie<br>or more<br>d shoulder  | 5-1 - Grade (  | Crossing Si  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface  |  |
| e Crossie<br>5-1 – Gra<br>a) Flange<br>V<br>(b) Field<br>(b) Field<br>A space<br>(c) Eleva<br>The top o  | Ioose timbers, etc. difference between road grade and rail supers rigis Standards, July 2014 de Crossing Surface – Cross Section  way: Width Minimum Masimum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  side gap is permitted on the outer side of the rail at rural locations, except 6 s, paths or trails designated by the road authority for use by person Maximum width   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>rs using<br>120 mm<br>No limit   | (a)<br>Edge o<br>End of<br>0.5 m o  | Figure :<br>P Road, in<br>of shoulder<br>f railway be<br>or more<br>d shoulder<br>s one  | 5-1 - Grade (<br>scluding a path   | Crossing Si<br>h or trail<br>Width                                     | Eidge of<br>travelied way<br>0.5 m or more beyond<br>traveled surface where<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign             |  |
| e Crossie<br>5-1 – Gra<br>a) Flange<br>V<br>(b) Field<br>(b) Field<br>A space<br>(c) Eleva<br>The top o  | Ioose timbers, etc. difference between road grade and rail supers rigs Standards, July 2014 de Crossing Surface – Cross Section  way: Width Maimum Masimum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  side gap  is permitted on the outer side of the rail at rural locations, except if s, paths or trails designated by the road authority for use by person Maximum width Maximum depth tion of the top of the rail with respect to the crossing surface in the wear limits below:  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>rs using<br>120 mm<br>No limit   | (a)<br>Edge o<br>End of<br>0.5 m o  | Figure :<br>P Road, in<br>of shoulder<br>f railway be<br>or more<br>d shoulder<br>s one  | 5-1 - Grade (<br>scluding a path   | Crossing S<br>h or trail   | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign<br>g a road |  |
| ssing surface,<br>e Crossin<br>5-1 - Gra<br>a) Flange<br>W<br>V<br>De<br>(b) Field<br>A space<br>sidewalk<br>assudve<br>(c) Eleva<br>The top o<br>The top o<br>The top o                         | Ioose timbers, etc.  Idiference between road grade and rail superer  Idiference between road grade and rails designated by the road authority for use by persons using assistive devices  All other grade crossings  Idiference between road authority for use by persons using assistive devices  Idiference between road authority for use by persons using assistive devices  Maximum width Maximum width Idia roasing surface must be installed as close as possible to the row runts below:  Idiference between road authority for use by persons  Idiference between road authority for use by persons  Idiference between road authority for use by persons  Idiference between road authority for use by person  Idiference between r | elevation<br>65 mm<br>75 mm<br>120 mm<br>50 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the     | (a)<br>Edge 4<br>End of<br>Deyond<br>there is                               | Figure :<br>) Road, in<br>of shoulder<br>(railway be<br>d shoulder<br>f railway be<br>d shoulder<br>s one<br>(b) S<br>m or more  | 5-1 - Grade (<br>scluding a path   | Crossing S<br>h or trail<br>Width<br>. or trail alon<br>walk, path, o  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign<br>g a road | or of of other   |
| e Crossin<br>5-1 - Gra<br>a) Flange<br>W<br>(b) Field<br>(b) Field<br>(b) Field<br>(c) Eleva<br>The top o<br>rad within<br>Public so   | Ioose timbers, etc.  Idiference between road grade and rail superer  Idiference between road grade and rails designated by the road authority for use by persons using assistive devices  All other grade crossings  Idiference between road authority for use by persons using assistive devices  Idiference between road authority for use by persons using assistive devices  Maximum width Maximum width Idia roasing surface must be installed as close as possible to the row runts below:  Idiference between road authority for use by persons  Idiference between road authority for use by persons  Idiference between road authority for use by persons  Idiference between road authority for use by person  Idiference between r | elevation<br>65 mm<br>75 mm<br>120 mm<br>50 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the     | (a)<br>Edge d<br>End of<br>biryonic<br>there is<br>2: 0.5<br>of b           | Figure :<br>) Road, in<br>of shoulder<br>(railway be<br>d shoulder<br>f railway be<br>d shoulder<br>s one<br>(b) S<br>m or more  | 5-1 - Grade (<br>scluding a path<br>s<br>where<br>idewalk, path,<br>1- Sidew<br>beyond sidew                     | Crossing S<br>h or trail<br>Width<br>. or trail alon<br>walk, path, o  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign<br>g a road | Sidewalk, path, o  |
| e Crossin<br>5-1 - Gra<br>a) Flange<br>W<br>(b) Field<br>(b) Field<br>(b) Field<br>(c) Eleva<br>The top o<br>rad within<br>Public so   | Index Crossing Standards, July 2014  Index Crossing Surface – Cross Section  Invag:  Index Crossing Surface – Cross Section  Invag:  Index Maximum for:  Puble sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings  Inter gr | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>te top of the<br>recons using | (a)<br>Edge of<br>End of<br>biryonic<br>there is<br>2- 0.5<br>of b<br>there | Figure :<br>Proved, in<br>of shoulder<br>railway tie<br>or more<br>d shoulder<br>f railway tie<br>or more<br>d shoulder<br>s one<br>(b) S<br>m or more<br>series che<br>S-Crossing | 5-1 - Grade (<br>scluding a path<br>s<br>s<br>where<br>idewalk, path.<br>1- Siden<br>boyond sidew<br>udder where | Crossing Si<br>h or trail<br>Width<br>. or trail alon<br>malk, peth, o | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign<br>g a road | Sidewalk, path, o  |
| e Crossin<br>5-1 – Gra<br>a) Flange<br>V<br>De<br>(b) Field<br>A space i<br>sidewalk<br>assistive<br>(c) Eleva<br>The top of<br>rad within<br>Wear lim<br>Public sid<br>assistive<br>All other i | Ioose timbers, etc. Idifference between road grade and rail supers Ings Standards, July 2014 Ide Crossing Surface – Cross Section Invay: Indth Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings Ide authority for use by persons using assistive devices All other grade crossings Ide authority for use by persons using assistive devices All other grade crossings Ide authority for use by persons using assistive devices All other grade crossings Ide authority for use by persons using assistive devices All other grade crossings Ide authority for use by persons using assistive devices All other grade crossings Ide authority for use by persons using assistive devices All other grade crossings Ide authority for use by persons using assistive devices All other grade crossings Ide authority for use by persons using assistive devices All other grade crossings Ide authority for use by persons using assistive devices All other grade crossings Ide authority for use by persons using assistive devices All other grade crossings Ide authority for use by persons using assistive devices All other grade crossings Ide authority for use by persons using assistive devices All other grade crossings Ide authority for use by person devices All other grade crossing using a subset of the road authority for use by person devices Maximum distance of the top of the rail above crossing Inface Idea authority for use top of the rail above crossing Inface Idea authority for use top of the rail below crossing Inface Idea authority for use top of the rail above crossing Inface Idea authority for use top of the rail below crossing Inface Idea authority for the top of the rail below crossing Inface Idea Authority Idea Authority Idea Authority Idea Idea Authori | elevation   | (a)<br>Edge of<br>End of<br>biryonic<br>there is<br>2- 0.5<br>of b<br>there | (b) S<br>(b) S<br>(c) S<br>(c) S<br>(c) S<br>(c) S   | 5-1 - Grade (<br>actuding a path<br>s<br>s<br>where<br>idewalk, path,<br>1- Sides<br>boyond sidew,               | Crossing Si<br>h or trail<br>Width                                     | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign<br>g a road | or was<br>sidewalk, parth, o<br>0.5 m or more be<br>sidewalk |

Sheet 7

#### ROAD GEOMETRY

| Source        |  |  | lt                  | em   |         |      |                |       | Reference           |  |  |  |
|---------------|--|--|---------------------|------|---------|------|----------------|-------|---------------------|--|--|--|
| observe       | Are horizontal and vertical alignments smooth and  | continuous throug  | ghout SSD?          |      |         |      |                |       | Sheet 4             |  |  |  |
| Observe       | WB Approach: Yes   |  | EB Approach:        | Yes  |         |      |                |       | Sileet 4            |  |  |  |
| observe       | Is horizontal alignment straight beyond rails for a di   | stance ≥ design ve   | ehicle length, L?   |      |         |      |                |       | Sheet 4             |  |  |  |
| Observe       | WB Approach: No  |  | EB Approach:        | No   |         |      |                |       | Sileet 4            |  |  |  |
| observe       | Are the road lanes at least the same width on the ci   | ossing as on the r   | oad approaches      | ?    |         |      |                |       |                     |  |  |  |
| Observe       | WB Approach: Yes   |  |                     |      |         |      |                |       |                     |  |  |  |
|               | Grades   | irades EB Approach WB Approach Difference: rail e & rd grade (GCS 6.1) |                     |      |         |      |                |       |                     |  |  |  |
| measure       | Slope within 8m of nearest rail (max. = 2%)  |  | 6.00                | %    | 0.70    | %    | <b>3.00%</b> % | 0.35% | Diff in Grade Max   |  |  |  |
| measure       | Slope between 8m & 18m of nearest rail (max. = 5%) 0.00 % 0.50 %   |  |                     |      |         |      |                |       |                     |  |  |  |
|               | If crossing is only for pedestrians, cyclists, or persons using assistive devices (max. = 1 <sup>1</sup> or 2%): |  |                     |      |         |      |                |       |                     |  |  |  |
| measure       | slope within 5m of nearest rail =  |  | N/A                 | %    | N/A     | %    |                |       |                     |  |  |  |
| Road √        | General approach grade (max. = +/- 5%)   |  | 3.00                | %    | 0.70    | %    |                |       |                     |  |  |  |
| KOAU V        | measured over the SSD distance of:   |  | 10                  | m    | 109     | m    |                |       | Sheet 4             |  |  |  |
| Rail √        | Are rail tracks super-elevated?  | No   | Rate of s/e:        | 0.00 | m/m Sdg | 0.00 | m/m ML         |       | GCS Sect. 6.1 & 6.2 |  |  |  |
| Decided       | If train speeds exceed 15mph (70° minimum w/o warning  | system; 30° minimum v  | with warning system | :    |         |      |                |       |                     |  |  |  |
| Road √        | What is the angle between the crossing and the roa   | dway?  | =                   | 60.0 | degrees |      |                |       |                     |  |  |  |
| absarsia      | Condition of Road Approaches:  | Fair   |                     |      |         |      |                |       | SOR 60              |  |  |  |
| observe       | (e.g., anything that might affect stopping or acceleration)  |  |                     |      |         |      |                |       |                     |  |  |  |
| observe       |  |  |                     |      |         |      |                |       |                     |  |  |  |
| 1. If frequer | nt use by persons using assistive devices  |  |                     |      |         |      |                |       |                     |  |  |  |

**Comments Following Site Visit:** 

"Legen Urban

- Crossing located on the west of a 4-way intersection.

The road approach at the crossing has been resurfaced since last inspection.

Main route is north to west across the 4-way intersection and over crossing. Crossing Angle taken from main route.

Road barriers have been installed on the East approach (north & south ends of crossing) to stoptraffic from cutting corner of crossing (trucks still cut corner).

Undivided (U)

Grade Crossings Standards, July 2014

Table 6-1 - Difference in Gradient

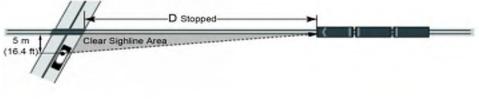
| Ch | ssification | Differe        | nce in Gradient (% |
|----|-------------|----------------|--------------------|
|    | RLU         |                | 2                  |
| 1  | RCU         |                | 1                  |
|    | RCD         |                | 1                  |
|    | RAU         |                | 0                  |
|    | RAD         |                | 0                  |
|    | RFD         |                | -                  |
|    | ULU         |                | 3                  |
|    | UCU         |                | 2                  |
|    | UCD         |                | 2                  |
|    | UMU         |                | 0                  |
|    |             | and the second | Arterial(A) Ex     |

Divided (D)

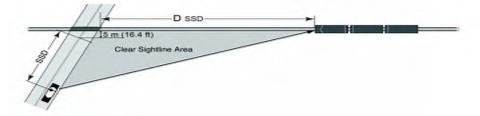
Source: Geometric Derign Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999

#### Figure 7-1 - Minimum Sightlines - Grade Crossings

(a) Sightlines for Users Stopped at a Grade Crossing (applicable to all quadrants)



(b) Sightlines for Users Approaching Grade Crossing (applicable to all quadrants)



#### Sheet 8

#### SIGHTLINES

| Driver Eye Height | = | 1.05m | passenger vehicles, pedestrians, cyclists & assistive devices |
|-------------------|---|-------|---|
|                   | = | 1.80m | buses & straight trucks                                       |
|                   | = | 2.10m | large trucks & tractor-trailers                               |
| Target Height     | = | 1.20m | above rails   |

| Source    |  | Ite   | m           |                     |                       |               | Reference                   |
|-----------|--|---|-------------|---------------------|-----------------------|---------------|-----------------------------|
| observe   | Are sightlines within the rail R.O.W. clear of bush  | es/vegetation; 15 m on each side of t                 | he track an | d, 30 m along the t | rack, on each side of | the crossing? |                             |
| observe   | -if no, detail the location Yes  |   |             |                     |                       |               |                             |
| observe   | Are sightlines on the road R.O.W. within 15m of t  | he rail crossing clear of bushes/veget                | ation?      |                     |                       |               |                             |
| Observe   | -if no, detail the location Yes  |   |             |                     |                       |               |                             |
|           |  |   | EB Approa   | :h                  | WB Approad            | h             |                             |
| look-up   | SSD minimum =  |   | 10          | m                   | 109                   | m             | Sheet 4                     |
| measure   | SSD Actual (not including turning movements):  |   | 100.0       | m                   | 260                   | m             |                             |
| calculate | D <sub>SSD</sub> =   | 0.277837 x V <sub>train km/h</sub> x T <sub>SSD</sub> | 46          | m                   | 46                    | m             | 1.609 convert mph to km/h   |
| calculate | D <sub>STOPPED</sub> minimum (m) =   | 0.277837 x V <sub>train km/h</sub> x T <sub>D</sub> = | 61          | m                   | 62                    | m             | T <sub>D</sub> from Sheet 4 |
| measure   | D <sub>STOPPED</sub> Actual:   | Driver looking LEFT                                   | 300         | m (ne)              | 70                    | m (sw)        |                             |
| measure   |  | Driver looking RIGHT                                  | 70          | m (nw)              | 300                   | m (se)        |                             |
| calculate | Ped./Cyclist D <sub>STOPPED</sub> (m)  |   | 52          | m                   | 52                    | m             | T <sub>P</sub> from Sheet 4 |
|           | Ped./Cyclist D <sub>STOPPED</sub> Actual:  | Person looking LEFT                                   | N/A         | m                   | N/A                   | m             |                             |
| measure   | note: measured from a point 2m in advance of sign/signals                                    | Person looking RIGHT                                  | N/A         | m                   | N/A                   | m             |                             |
| observe   | Are there any obstacles within the sight triangles<br>Minor vegetatin in all sighttriangles. | • • • • •   | -           |                     |                       |               |                             |

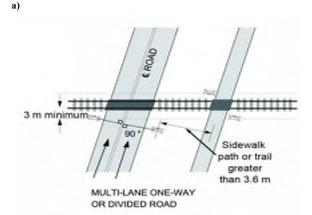
Comments Following Site Visit:

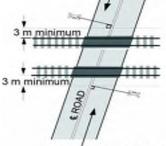
- Minor vegetation in all sight trianlges. Construction debris located in south west quadrant. Signs and barriers obstruct view in South East quadrant.

SSD on East approach limited by 4-way intersection, West approach road geometry

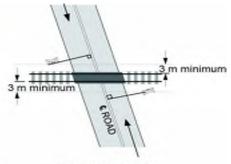
Port Property sign removed from 2015 inspection (northwest quadrant)

Figure 8-3 - Location of Railway Crossing Signs and Number of Tracks Signs (public grade crossings without warning systems) a) b)



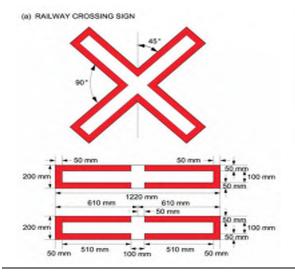


ANGLE GREATER THAN 90\*

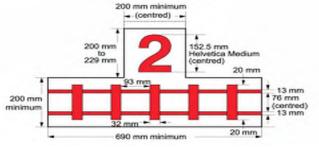


ANGLE 90° OR LESS

#### Figure 8-1 - Railway Crossing Sign and Number of Tracks Sign







SIGNS AND PAVEMENT MARKINGS

| Source          |   |   | I                     | Item             |                       |             |     |  | Reference |  |  |
|-----------------|---|---|-----------------------|------------------|-----------------------|-------------|-----|--|-----------|--|--|
|                 | Railway Crossing Sign   | ailway Crossing Sign These signs will be required |                       |                  |                       |             |     |  |           |  |  |
|                 |   | EB Approach                                       |                       | WB Approad       | h                     |             |     |  |           |  |  |
| measure         | distance from nearest rail:   | 3.2   | m                     | 18.3             | m                     |             |     |  |           |  |  |
| measure         | distance from edge of road:   | 2.7   | m                     | 3.6              | m                     |             |     |  |           |  |  |
| measure         | height of centre of crossbucks:   | 2.2   | m                     | 2.5              | m                     |             |     |  |           |  |  |
| measure         | retroreflectivity readings:   | n/a   | cd/lux/m <sup>2</sup> | n/a              | cd/lux/m <sup>2</sup> |             |     |  |           |  |  |
| observe         | Number of Tracks sign? No   |   |                       |                  | -                     |             |     |  |           |  |  |
| observe         | A Stop Sign must be installed at grade crossing without a wa  | rning system if the r                             | road design speed     | is less than 15m | ph                    | Yes/ No/ NA | Yes |  | SOR 64    |  |  |
| observe         | A Stop Ahead sign must be installed if the Stop Sigh  | is not clearly visi                               | ble within the S      | Stopping Dista   | nce                   | Yes/ No/ NA | NA  |  | SOR 65    |  |  |
| Comments        | Following Site Visit:   |   |                       |                  |                       |             |     |  |           |  |  |
| - New RAIL      | RAILWAY CROSSING signs installed in 2015. Flashing lights have also been installed on top of the RAILWAY CROSSING Signs and STOP signs. |   |                       |                  |                       |             |     |  |           |  |  |
| - The back      | e back of poles and signs only have partial reflective strips (reflectivity not measured).  |   |                       |                  |                       |             |     |  |           |  |  |
| - NUMBER        | NUMBER OF TRACKS Sign not required as only 1 track.   |   |                       |                  |                       |             |     |  |           |  |  |
| -general condit | tion -clear sightlines to the si  | gn  |                       | -posts           | -photos               |             |     |  |           |  |  |

| Source  | Item   | 1   | Reference |
|---------|--|-----|-----------|
|         | DO NOT STOP ON TRACKS  |     | MUTCD     |
| Road √  | Does queued traffic routinely encroach closer than 5m from the crossing surface? | No  |           |
| observe | Are these signs present on either approach?                                      | Yes |           |

Comments Following Site Visit:

Sheet 9a

<sup>-</sup>general condition -posts

| Source  |   | Item |              |     |               |  | Reference      |
|---------|---|------|--------------|-----|---------------|--|----------------|
|         | Railway Crossing Ahead Sign (WA 18-20)            | UL 1 | NA-18R       |     |               |  | MUTCD & SOR 66 |
| look-up | Is AADT > 100? Yes                                |      | EB Appro     | ach | WB Approach   |  | Sheet 3        |
| observe | Is area urban such that WA 18-20 is not required? |      | Yes          |     | Yes           |  |                |
| measure | Distance from nearest rail to sign                | =    | 38           | m   | <b>34.0</b> m |  | MUTCD          |
| observe | height:   |      | <b>2.2</b> m |     | <b>2.2</b> m  |  |                |
| observe | appropriate orientation of symbol                 |      | Yes          |     | Yes           |  |                |

#### **Comments Following Site Visit:**

|                    | ign has been installed since the previous inspectio<br>ign installed Min. Approx 38m from crossing | n.     |                        |         |  |
|--------------------|--|--------|------------------------|---------|--|
| -general condition | -clear sightlines to the sign  | -posts | -aligned to the driver | -photos |  |
| 0                  |  |        | 0                      | 1       |  |

-photos

| Source  |   |          | Item       | Reference              |
|---------|---|----------|------------|------------------------|
|         | ADVISORY SPEED SIGN   |          | 30<br>km/h | MUTCD & SOR 66 (2)     |
|         |   |          |            |                        |
| observe | Are they present on both approaches?<br>Posted speed limit? | No<br>50 | km/h       |                        |
| look-up | Are they required on either approach?                       | No       |            | check SSD<br>(Sheet 8) |
| -       |   |          |            |                        |

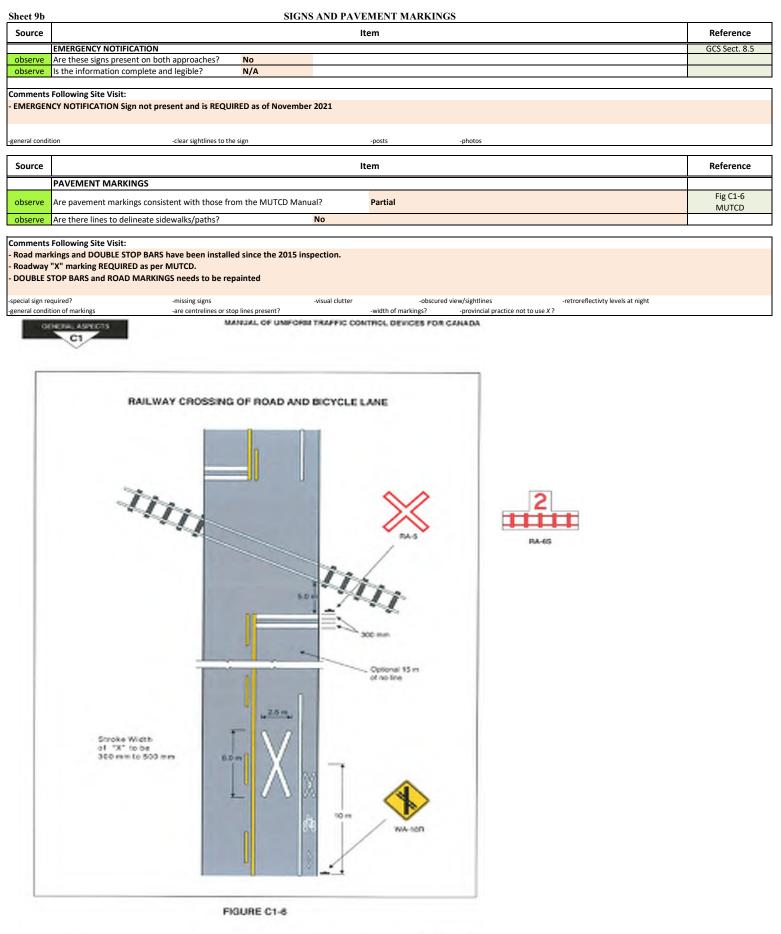
Comments Following Site Visit:

| <ul> <li>ADVISORY SPEED Sign inst</li> </ul> | alled on the North side of the roa | d intersection only (East Approach) |
|--|------------------------------------|-------------------------------------|
|--|------------------------------------|-------------------------------------|

-posts

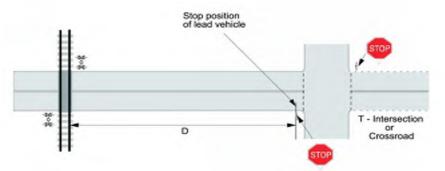
-general condition

<sup>-</sup> DO NOT STOP ON TRACKS Sign not required but are installed.



JANUARY 2014

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

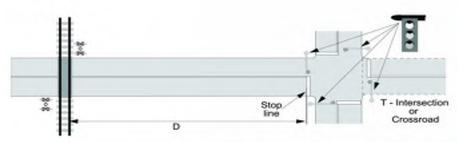
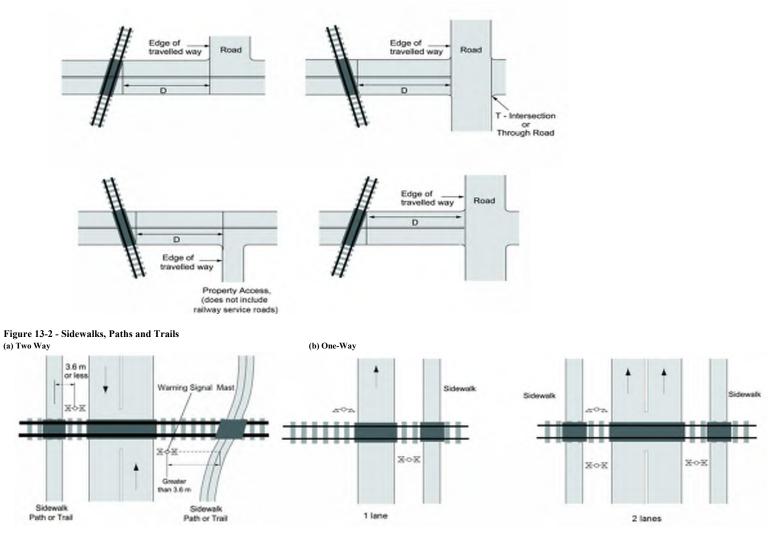


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings





| Sheet 11  |   | GRADE C               | CROSSING WARNING SYST                        | EMS            |  | ń.   |                              | GCS Section 9     |
|-----------|---|-----------------------|--|----------------|--|--|------------------------------|-------------------|
| Source    | Item is not required.   |                       |  |                |  |  | Reference                    |                   |
|           | Warning System Warrants<br>if any of A through E below are met, then a warnir | g system is warranted | d  |                |  |  |                              |                   |
|           |   | Question              |  |                | Warrant fo   | r Warning Sy   | vstem                        |                   |
| look-up   | Existing AADT = 3,000   | Forecast AADT =       | 1,170  |                |  |  |                              | Sheet 3           |
| look-up   | Daily Train Volume = 3.0  |                       | train  | S              |  |  |                              | Sheet 3           |
| calculate | A. Cross-Product = 3,510  |                       |  | > 2,000 FLB    | req'd  | > 50,000 req   | uires gates                  |                   |
| look-up   | B. Maximum Rail Operating Speed =   | 10                    | mph  | (max = 80m     | oh or 50 mph w                                       | ith crosswalk  | <)                           | Sheet 3           |
| D-1       | C. Number of Tracks =   | 1                     |  |                |  |  |                              |                   |
| Rail      | if ≥ 2, can trains pass one another?  | N/A                   |  | if ≥ 2 and tra | ins can pass or                                      | ne another ->  | FLB req'd                    |                   |
| look-up   | D. Are Sightlines obscured?   | No                    |  | if "Yes" -> FL | B req'd: If Fig 7                                    | '.1 applies>   | add G                        | Sheet 8 & Fig 7.1 |
| observe   | E. Are any proximity conditions met?  | N/A                   |  | if "Yes" -> FL | B required.  |  |                              | GCS Sect 9 & 11   |
| look-up   | Is a Warning System warranted?  | No                    |  | If any of A th | nrough E above                                       | meet the Wa  | arrant                       |                   |
|           | Field Visit Present? (Y/N)  | Condition / Alignme   | ent:   |                |  |  |                              | GCS 13            |
| observe   | Light Units, N  |                       |  |                |  |  |                              | GCS 13            |
| observe   | Bells, N  |                       |  |                |  |  |                              | GCS 13            |
| observe   | Gates, N  |                       |  |                |  |  |                              | GCS 13            |
| observe   | Cantilever Lights, N  |                       |  |                |  |  |                              | GCS 13            |
| observe   | Check that warning signal assemblies and cantileve                            | ers are in accordance | with GCS Figures.                            |                |  |  |                              | GCS Sect. 12      |
| observe   | Is warning system housing at least 9m from travel                             | ed way of the road an | d 8m from the nearest rail?                  |                |  |  |                              |                   |
| observe   | If there is a sidewalk, is a bell on the adjacent asse                        | mbly?                 |  |                |  |  |                              |                   |
| Rail √    | Have all light units been aligned?  | NA D                  | Date? NA                                     |                |  |  |                              |                   |
| Rail      | Design Approach Warning Time (greatest of):                                   |                       | 20sec OR<br>[20+((cd-11)/3)] Td<br>if cd>11m | Тр             | Gate Clearance<br>Time + Descent<br>Time + 5 seconds | Traffic Signal<br>Clearance Time<br>(=0 if no traffic<br>signal) | (SSD + cd + L)/(0.277837xVv) |                   |
|           | EB Approach   | <b>30.9</b> s         | ec 20.2 13.7                                 | 11.5           | 30.9   | 0.0  | 3.2                          |                   |
|           | WB Approach   |                       | ec 20.2 13.9                                 |                | 30.9   | 0.0  | 10.3                         |                   |
| observe   | Is warning time less than 35 sec (without gates) or                           | 55 sec (with gates)   | N/A  |                |  |  |                              |                   |

#### **Comments Following Site Visit:**

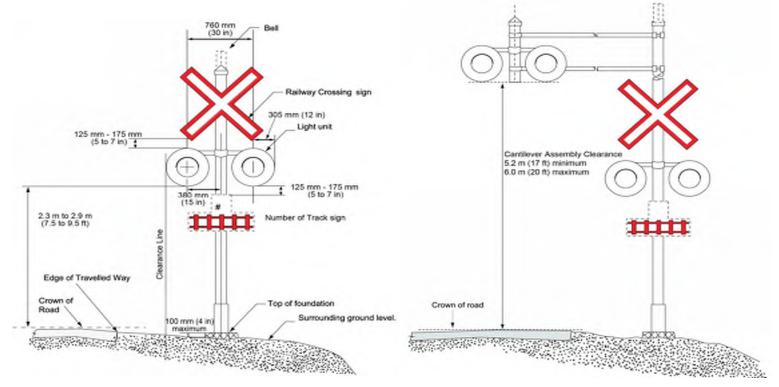
As the Existing AADT will decrease, the cross product will still exceeds 2000 and the minimum distance between intersection exceeds 30m an active warning System is warrented for this crossing.

-extraordinary conditions why warning system should be installed

-is warning system present but not warranted?

#### Figure 12-1 - Warning Signal Assemblies

#### Figure 12-3 - Cantilevers



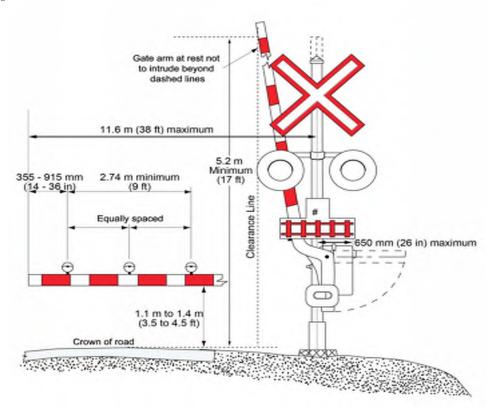


#### GATES FOR GRADE CROSSING WARNING SYSTEMS

GCS Section 9

| Source         |   |                    | ltem  |             |   |                 |             | Reference      |
|----------------|---|--------------------|---|-------------|---|-----------------|-------------|----------------|
|                | Warning System Warrants   |                    |   |             |   |                 |             |                |
|                | -if any of A through E below are met t                                    | hen a warning sys  | tem with gates is warranted.  | Not req     | uired as qwarning system                | is not necessar | у           |                |
| calculate      | A. Cross-Product =  | 3510               | (50,000 min)  |             |   |                 |             |                |
| look-up        | B. Maximum Rail Operating Speed =   | 10                 | mph (max = 50mp   | h)          |   |                 |             | Sheet 3        |
| Rail √         | C. Number of Tracks =   | 1                  |   |             |   |                 |             |                |
|                | if ≥ 2, can trains pass one another?                                      | N/A                |   |             |   |                 |             |                |
| look-up        | D. Is D <sub>STOPPED</sub> Insufficient?                                  | No                 |   |             |   |                 |             | Sheet 8        |
| observe        | E. Are any proximity conditions met?                                      | N/A                |   |             |   |                 |             |                |
| calculate      | Gate clearance distance: eq 10.4b   | 24.7               | m cd <sub>G stop</sub>  | 34.7        | m cd ssd EB                             | 133.7           | m cd ssd WB |                |
| look-up        | travel time =   | 13.9               | sec <sub>G stop</sub>   |             |   |                 |             |                |
|                | Gate arm clearance times:   | 13.7               | sec EB from stop T <sub>G ssd</sub> =   | 2.5         | sec EB from SSD                         |                 |             |                |
| calculate      |   | 13.9               | sec WB from stop T G ssd =  | 9.6         | sec WB from SSD                         |                 |             | GCS Sect. 10.4 |
| look-up        | Gate arm delay time: 13.9   | sec (greatest val  | ue from above)  |             |   |                 |             | 000 5000. 10.4 |
| calculate      | effect of grade =   | 0.0                | sec (SB from Stop)  | -7.1        | sec EB from SSD                         |                 |             |                |
| calculate      |   | 0.3                | sec (NB from Stop)  | 0.0         | sec WB from SSD                         |                 |             |                |
| measure        | Measure gate arm delay and compare with above                             | :                  | N/A   |             |   |                 |             |                |
| observe        | Do gates conform to standards depicted in GCS Fig                         | gures?             | N/A   |             |   |                 |             |                |
| observe        | Check gate descent (10 to 15 sec) and ascent (6 to                        | ,                  | N/A   |             |   |                 |             |                |
| observe        | Is gate striping vertical as depicted in GCS Figures                      |                    | N/A   |             |   |                 | -           |                |
| observe        | Where railway equipment regularly stops, or railway equipmen<br>control f |                    | n the activating limits of a warning system<br>operation of the warning system. | n, the warn | ing system must be equipped with        | a<br>Yes/No/NA  | NA          | GCS 16.3.1     |
| Comments       | Following Site Visit:   |                    |   |             |   |                 |             |                |
| - Warning S    | system with Gates is required due to the crossing                         | angle being less t | hen 70d.  |             |   |                 |             |                |
| -extraordinary | conditions why warning system should be installed                         |                    |   | is warning  | system present but <u>not</u> warranted | ? <b>No</b>     |             |                |

#### Figure 12-2 - Gates



Sheet 13

#### FLASHING LIGHT UNITS

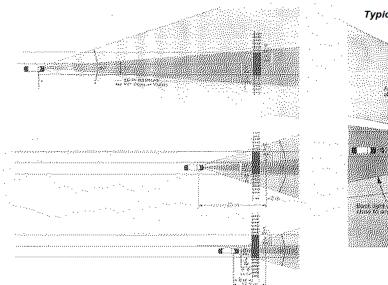
Note: Driver's cone of vision is  $\pm\,5^\circ$  horizontally; limited by top of windshield vertically.

| Source  |                                    |                      | Item is not required as warning system is            | s not required.       |               |                                 | u |
|---------|------------------------------------|----------------------|--|-----------------------|---------------|---------------------------------|---|
|         | Number and Location                |                      |  |                       |               |                                 |   |
| look-up | Minimum Distance for Primary       | Light Units (SSD) =  |  | 109.0                 | m             |                                 |   |
| look-up | Recommended Distance for Prin      | mary Light Units =   |  | 133.7                 | m             |                                 |   |
|         | Are flashing light units located v | vithin 5° horizonta  | Ily of the centerline of the road (throughout the ap | proach distance abov  | /e)?          |                                 |   |
| observe |                                    |                      |  |                       | Yes (c        | overed by front and back units) |   |
|         | Does horizontal/vertical curvatu   | ure necessitate su   | oplemental units?                                    |                       |               | N/A                             |   |
| observe | Can back lights be seen by all st  | opped drivers?       |  |                       |               | N/A                             |   |
| observe | Are lights obscured by vehicles    | stopped on adjace    | nt intersections?                                    |                       |               | N/A                             |   |
| observe | Are additional light units require | ed for drivers as th | ey begin to turn onto an approach road from an in    | tersecting road/lane/ | pkg lot?      | N/A                             |   |
|         | Cantilevered Light Units           |                      |  |                       |               |                                 |   |
| measure | Does D <sub>R</sub> exceed 7.7m?   | N/A                  |  |                       |               |                                 |   |
| measure | Does D <sub>L</sub> exceed 8.7m?   | N/A                  | (Assumes signal poles on both sides of road align    | ment, approach side c | of rail)      |                                 |   |
|         | Multiple Lanes                     | •                    |  |                       |               |                                 |   |
| observe | Can front light units be seen by   | drivers in all lanes | (would T/T obscure?)?                                | N/A                   |               |                                 |   |
| observe | Can back light units be seen by    | all stopped drivers  | in all lanes?  | N/A                   |               |                                 |   |
|         | Sidewalks, paths, trails, etc.     |                      |  |                       |               |                                 |   |
| measure | Distance from path centerline to   | o signal mast =      |  | N/A                   | m (max.=3.6m) |                                 |   |
| observe | Are separate light units required  | d?                   |  | N/A                   |               |                                 |   |

Comments Following Site Visit:

Crossing currently regulated by a passive warning system.

#### Horizontal Cone of Vision



Typical Light Unit Arrangement for an Adjacent Intersection

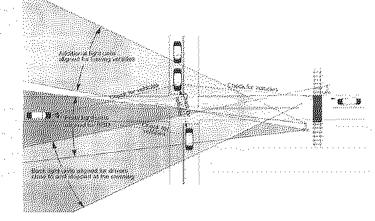
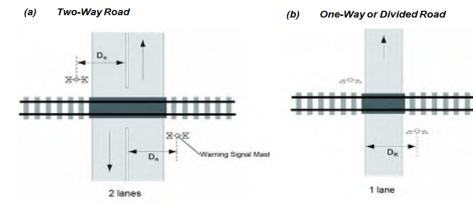
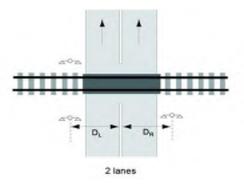


Figure 13-1 – Warning Signal Offsets Requiring Cantilevered Light Units





GCS Sections 12-14





GCS Sections 13 and 14

#### PREPARE TO STOP AT RAILWAY CROSSING SIGN

| Source  |  | Item NA         |  |                  |                      |                                     |  |  |
|---------|--|-----------------|--|------------------|----------------------|-------------------------------------|--|--|
| observe | Are signs present?                     | No<br>No        | EB approach<br>WB approach                                   |                  |                      | SOR 67 (1), (2)<br>GCS 18.21 & 18.2 |  |  |
| look-up | Minimum Distance for Primary Light     | Units (SSD)     |  | N/A              | m                    | Sheet 13                            |  |  |
| look-up | Recommended distance for Primary       | Light Units     |  | N/A              | m                    | Sheet 13                            |  |  |
|         | Warrants                               |                 |  |                  |                      |                                     |  |  |
| observe | Are all front light units obscured wit | hin minimum     | distance above?  | N/A              |                      |                                     |  |  |
| look-up | Is the facility designated a "freeway" | or "expressv    | ay"?   | N/A              |                      | Sheet 3                             |  |  |
| observe | Do environmental conditions freque     | ntly obscure :  | ignal visibility?  | N/A              |                      |                                     |  |  |
|         | Considering maximum prevailing sp      | eeds, geome     | try, and traffic composition, checkthe following:            |                  |                      |                                     |  |  |
| observe | Does sign flash during operation of g  | rade crossing   | warning system?  | N/A              |                      |                                     |  |  |
| measure | Distance from the sign to 2.4m beyo    | nd the furthe   | st rail =  | N/A              |                      |                                     |  |  |
| observe | Does the sign flash before the actual  | tion of the cro | ssing warning system by the time required to travel from the | ne sign to clea  | r the crossing? N/A  |                                     |  |  |
| measure | Distance from the sign to the closest  | : gate =        |  | N/A              | m                    |                                     |  |  |
| observe | Does the flashing sign precede actua   | tion of the de  | scent of the gate arms by the time required to travel from t | the sign to clea | ar closest gate? N/A |                                     |  |  |
| measure | Time required for all queued vehicle   | s to resume t   | o maximum road operating speed =                             | N/A              | sec                  |                                     |  |  |

#### **Comments Following Site Visit:**

- Flashing lights located on top of STOP Signs. No measurement were taken . The lights were observed to be clear and aligned correctly.

-general condition

Sheet 15

Sheet 14

-placement/orientation of signs

-functions as intended



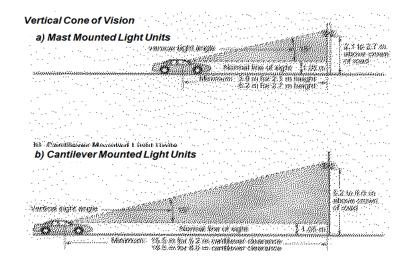
PREEMPTION OF TRAFFIC SIGNALS

| Source  | Item NA   | Item NA |  |  |  |  |  |  |
|---------|---|---------|--|--|--|--|--|--|
| Road √  | Are adjacent traffic signals preempted by a grade crossing warning system?                                | N/A     |  |  |  |  |  |  |
| Rail √  | note: provide timing plan if preemption.  |         |  |  |  |  |  |  |
| Road    | Date of last preemption check? n/a  |         |  |  |  |  |  |  |
| Rail    |   |         |  |  |  |  |  |  |
|         | Warrants  |         |  |  |  |  |  |  |
| measure | Less than 60m between stop line at traffic signal and nearest rail?                                       | N/A     |  |  |  |  |  |  |
| observe | Do vehicles queued for traffic signal regularly encroach closer than 2.4m to the nearest rail?            | N/A     |  |  |  |  |  |  |
|         | Field Checks:   |         |  |  |  |  |  |  |
| observe | Does preemption provide adequate time to clear traffic from grade crossing before train's arrival?        | N/A     |  |  |  |  |  |  |
| observe | Does preemption prohibit road traffic from moving from the street intersection toward the grade crossing? | N/A     |  |  |  |  |  |  |
| observe | Any known queuing problems on the tracks?   | N/A     |  |  |  |  |  |  |
| observe | Are pedestrians accommodated during preemption?   | N/A     |  |  |  |  |  |  |
| observe | Have longer/slower vehicles been considered?  | N/A     |  |  |  |  |  |  |
| observe | Are supplemental signs needed for motorists (no right turn on red light, etc)?                            | N/A     |  |  |  |  |  |  |

**Comments Following Site Visit:** 

No Traffic Signals located at crossing

-functions as intended



#### AREAS WITHOUT TRAIN WHISTLING

Sheet 16

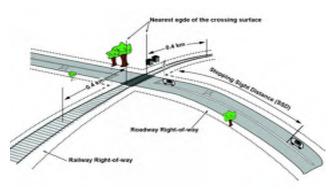
#### Grade Crossings Standards, July 2014

#### APPENDIX D - WHISTLING CESSATION

#### Table D-1 – Requirements for Warning Systems at Public Grade Crossings within an Area without Whistling

## Figure D-1 - prescribed area for whistling cessation as per article 23.1 of the RSA

|                               | (             | Column A           | Column B                            |   |  |  |
|-------------------------------|---------------|--------------------|-------------------------------------|---|--|--|
| Railway<br>Design Speed       | Grade Crossin | gs for Vehicle Use | Paths, or Trails                    | s For Sidewalks,<br>with the centreline<br>3.6 m (12 ft) to a<br>for vehicles |  |  |
|                               | No            | o. of Tracks       | No. of Tracks                       |   |  |  |
|                               | 1             | 2 or more          | 1                                   | 2 or more   |  |  |
| Column 1                      | Column 2      | Column 3           | Column 4                            | Column 5  |  |  |
| 1 – 25 km/h (15 mph)          | FLB           | FLB                | No warning<br>system<br>requirement | No warning<br>system<br>requirements  |  |  |
| 25 – 81 km/h<br>(16 – 50 mph) | FLB           | FLB & G            | FLB                                 | FLB & G   |  |  |
| Over 81 km/h (50 mph)         | FLB & G       | FLB & G            | FLB & G                             | FLB & G   |  |  |



RSA = Railway Safety Act of Canada

#### Legend :

FLB is a warning system consisting of flashing lights and a bell.

FLB & G is a warning system consisting of flashing lights, a bell and gates

| Source  | urce Item  |    |           |    |  |  |
|---------|--|----|-----------|----|--|--|
| Rail    | Is train whistling prohibited at this crossing?  | No | 24 hours? | No |  |  |
| observe | bserve Is there evidence of routine unauthorized access (trespassing) on the rail line in the area of the crossing? No |    |           |    |  |  |
| observe | Are the requirements of Table D-1 met?   | No |           |    |  |  |

#### Comments Following Site Visit:

Whistle Cessation not required

#### Additional Prompt Lists

#### **Human Factors:**

- \* Control device visibility / background visual clutter.
- <sup>o</sup> Driver workload through this area (i.e., are there numerous factors that simultaneously require the driver's attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.).
- attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.), <sup>o</sup> Driver expectancy of the environment (i.e., are the control measures in keeping with the design levels of the road system and adjacent environment).
- \* Need for positive guidance.
- " Conflicts between road and railway signs and signals.

#### **Environmental Factors:**

- " Extreme weather conditions.
- \* Lighting issues (night, dawn/dusk, tunnels, adjacent facilities, headlight or sunlight glare, etc.)
- \* Landscaping or vegetation.
- " Integration w/ surrounding land use (e.g., parked vehicles blocking sightlines, merging traffic lanes, etc.)

#### All Road Users:

Λ.

| nan | -reedes of the following been met:<br>-pedestrians (including strollers, baby carriages, and blind persons) |     |
|-----|---|-----|
|     | -children / elderty   |     |
|     | -assistive devices (wheelchairs, scooters, walkers, etc)  |     |
|     | -bicyclists   |     |
|     | -motorcyclists  |     |
|     | -over-sized trucks  | · · |
|     | -buses  |     |
|     | -recreational vehicles  |     |
|     | -goifearts  |     |
|     | -hazardous materials  |     |

(mage barriers/guide fencing, additional pedestrian bell, pedestrian gates, sign indicating potential presence of 2<sup>nd</sup> train at a multi track crossing, etc)

#### Other:

Should closure of the crossing be considered due to inactivity, presence of nearby adjacent crossings, etc.

Commente Following Site Visit:

VFPA REPORT NUMBER: 20-0173

# VFPA FSPL TRANSPORTATION IMPROVEMENTS PROJECT 01 – MILE 117.63 SPUR 2.82, 75 ROBSON ROAD,

FEBRUARY 09, 2021



## REVISION HISTORY

FINAL ISSUE

| 2020/09/03                   | FIRST DRAFT                          |                                       |  |
|------------------------------|--------------------------------------|---------------------------------------|--|
| Prepared by                  | Reviewed by                          |                                       |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer |                                       |  |
| 2020/10/21                   | SECOND DRAFT                         |                                       |  |
| Prepared by                  | Reviewed by                          |                                       |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer |                                       |  |
| 2021/02/09                   | FINAL                                | -                                     |  |
| Prepared by                  | Reviewed by                          | Approved By                           |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer | R. Sewell, Senior<br>Project Engineer |  |

## SIGNATURES

PREPARED BY

09/02/2021

09/02/2021

Patrick McCabe, CPEng (Aus), APEC Eng Track Designer Date



Robert Sewell, P.Eng Senior Project Engineer

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## **NSD**

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| 2.2 | Crossing Modifications         | 3 |
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## **1 CROSSING OVERVIEW**

WSP Canada Group Limited (WSP) has been contracted as part of the Fraser Surrey Port Lands – Transportation Improvements Preliminary Design Services project, to complete a Railway Crossing Safety Assessment on the 75 Robson Road grade crossing. The crossing is located within the Vancouver Fraser Port Authority (VFPA), Fraser Surrey Docklands. The crossing is located along the Canadian National (CN) Brownsville Spur which comes off Mile 117 of the Yale Subdivision.

A Railway Crossing Field Safety Assessment was undertaken on the 23rd of July 2020 and updates the previous Railway Crossing Assessment undertaken by WSP (formally MMM Group) on the 5<sup>th</sup> of May 2015. The Railway Crossing Assessment as conducted follows the guidelines of applicable requirements identified in the most recent edition of Transport Canada's Grade Crossing Regulations (GCR) and Grade Crossing Standards (GCS).

The crossing is a passive protected crossing (SRCS), equipped with two RAILWAY CROSSING and STOP signs, located within an industrial area. The crossing is a two-track crossing with the newest track being installed on the north approach earlier this year. The Southern crossing track was inspected as part of the 2015 inspections. A Tractor Trailer (WB-20) is the design vehicle used to represent daily traffic on port property. The railway traffic volumes were provided by the VFPA while the Average Annual Daily Traffic (AADT) was calculated based on the realigned infrastructure.

This report aims to identify the modifications to the grade crossing since the previous inspection completed by MMM Group in 2015, as well as highlight any new or previously identified non-compliances still relevant to this crossing.

## 1.1 LOCATION

The Robson Road grade crossing is located within Fraser Surrey Docks jurisdiction at 75 Robson Road and crosses the VFPA spur track. The crossing is located at the latitude and longitude of 49°10'42" and 112°54'47" respectfully. Figure 1, below shows the location of the crossing.

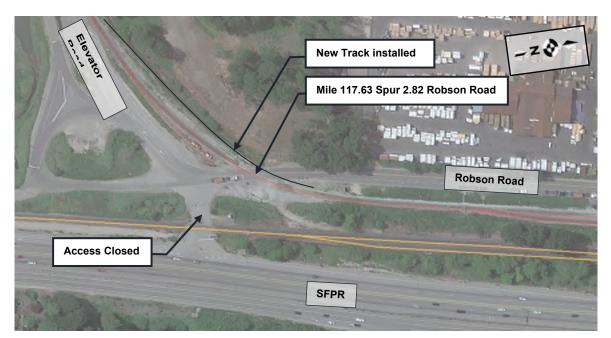


Figure 1: Crossing Location (source: Google Earth, 2020)

## 2 SAFETY ASSESSMENT

## 2.1 PREVIOUS ASSESSMENT (2015)

A previous crossing assessment was undertaken in 2015 by WSP for the 75 Robson Road crossing. The objective of the assessment was 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 referred to in the Railway Safety Act / Grade Crossing Regulations and contained in the Grade Crossing Standards.
- 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.

The outcome of the 2015 assessment offered recommendations for consideration by the VFPA. Table 1: Previous Non-Compliances, illustrates the non-compliances and recommendations offered within the 2015 report. The recommendations were categorised within the three priority levels;

- Low implement the measures as soon as practicable
- Medium implement the measures by Transport Canada GCS & GCR November 2021 deadline.
- High implement the measures forthwith

Table 1: Previous Non-Compliances

#### **Table 1: Previous Non-Compliances**

|     | Observations  | Suggested Actions   | Priority | Addressed?  |
|-----|---|---|----------|---|
| GCS | Section 3 – Crossing Surface (Basic Requirem  | ent)  |          |   |
| a.  | Railway crossing surface does not extend at least 0.5m beyond the edge of the travelled way on either approach.   | Extend railway crossing surface to extend at least 0.5m beyond the edge of the travelled way.   | High     | No – Concrete panels have been<br>installed since 2015 inspection.<br>Minimum edge of concrete panel not<br>0.5m from (unmarked) traveled way |
| GCS | Section 4 – Railway Crossing and Number of T  | racks Sign (Basic Requirement)  |          |   |
| a.  | RAILWAY CROSSING sign not present on south approach.  | Install RAILWAY CROSSING sign on south approach<br>as per GCS Section 8.1   | High     | Yes – New RAILWAY CROSSING<br>Signs installed   |
| b.  | North approach RAILWAY CROSSING sign<br>location from edge of travelled way does not<br>meet requirement  | Relocate sign as per GCS Section 4.1.   | High     | Yes – New RAILWAY CROSSING<br>Signs installed for new crossing track  |
| GCS | Section 7 – Sightlines  |   |          |   |
| a.  | Clear sightline areas where drivers stopped at the crossing ( $D_{\text{STOPPED-VEH}}$ ) cannot be provided or maintained due to vegetation on the northwest corner of the crossing | If minimum sightlines cannot be provided and maintained, then a warning system with gates is required   | Medium   | No – New crossing track installed clear<br>embankment on north side. However,<br>the sightlines are not met                                   |
| GCS | Section 8 – Signs   |   |          |   |
| a.  | Retroreflective strips are not provided for the<br>back of the RAILWAY CROSSING sign and<br>both sides of the sign supporting post for the<br>north approach                        | Install retroreflective strips on the back of the RAILWAY<br>CROSSING sign and both sides of the sign supporting<br>post for the north approach | Medium   | Yes – New compliant RAILWAY<br>CROSSING Signs have been installed   |

| b. | RAILWAY CROSSING AHEAD sign is not   | Install RAILWAY CROSSING AHEAD signs on the  | Medium | Yes – New RAILWAY CROSSING   |
|----|--|--|--------|--|
| ~. | present on the south approach of the crossing  | south approach of Robson Road as per BCMoT's Signage and Pavement Manual (2000).   | modum  | AHEAD signs installed on south<br>approach   |
| C. | RAILWAY CROSSING AHEAD sign for the<br>north approach is not standard size for vehicle<br>and placed too close to the railway crossing   | Remove existing RAILWAY CROSSING AHEAD sign<br>and install vehicle RAILWAY CROSSING AHEAD<br>signs on the north approach of Robson Road as per<br>BCMoT's Signage and Pavement Manual (2000).  | Medium | Yes – New RAILWAY CROSSING<br>AHEAD signs installed on north<br>approach                                   |
| d. | STOP signs are not present on either approach of the crossing.   | Install STOP signs on same post as RAILWAY CROSSING signs as per GCS Section 8.4   | High   | Yes – STOP Signs installed below<br>RAILWAY CROSSING Sign on both<br>approaches                            |
| e. | DO NOT STOP ON TRACKS signs are not<br>present on either approach of the crossing  | Install DO NOT STOP ON TRACKS signs as per<br>MUTCDC A2.8.4  | Low    | Yes – DO NOT STOP ON TRACK<br>signs installed below RAILWAY<br>CROSSING AHEAD Signs on both<br>approaches. |
| f. | EMERGENCY NOTIFICATION signs are not<br>present on either approach of the crossing   | Install EMERGENCY NOTIFICATION sign on both approaches as per GCS Section 8.5  | Medium | Yes – Installed below STOP Sign in both approaches.  |
| g. | Double stop bars are not present on the south<br>approach and RAILWAY CROSSING symbol<br>pavement markings are not present on either<br>approach to the crossing for vehicles. | Paint double stop bars on the south approach and RAILWAY CROSSING symbol pavement markings on both road approaches.  | Low    | Yes – Compliant PAVEMENT<br>MARKINGS have been installed on<br>both approaches.                            |
| h. | Double stop bars are faded on the north approach   | Repaint double stop bars on the north approach   | Low    | Yes – Painted with new track crossing  |
| i. | Stopping or parking restriction is not observed within the railway right-of-way  | Install NO STOPPING signs within the railway right-of-<br>way  | Low    | No   |
| GC | S Sections 9, 12 to 17 – Warning Syste   | em Design  |        |  |
| a. | An active warning system without gates is warranted based on cross-product   | Install active warning system without gates. However,<br>Transport Canada indicated that the crossing could<br>stay passive indefinitely unless the sightline<br>requirements could not be met | Low    | No   |

## 2.2 CROSSING MODIFICATIONS

As shown in Appendix A: Site Photographs, a number of changes have occurred at the crossing between inspections. Most changes were based on recommendations outlined in the 2015 inspection. Table 1, shows what changes have been made based on the 2015 recommendations. Below is a summarised list of all the changes observed from the site inspection:

- New track crossing installed on the North approach, which includes;
  - New crossing surface
  - o New track in Northwest and Northeast quadrants
  - New grade crossing signage, including;
    - RAILWAY CROSSING Signs
    - o STOP Signs

•

- o EMERGECNY NOTIFACATION Signs
- RAILWAY CROSSING AHEAD signs
- DO NOT STOP ON TRACKS Signs
- NUMBER OF TRACKS Sign

- New MUTCD compliant pavement marking
- Replacement of exiting crossing surface (Asphalt to concrete panels)
- Removal of road intersection to SFPR on south approach
- Removal of signage in Northeast quadrant obstructing sightlines

## 2.3 ASSESSMENT AND RECOMMENDATIONS

An updated Grade Crossing Safety Assessment was undertaken for the proposed realignment of the port road access and to determine any required crossing upgrades to ensure compliance with the GCR & GCS. **Appendix B: Site Inspection Report** provides details of the observations made during the site inspection. The inspection report also outlines outstanding safety issues, along with recommended remediations. Table 2: 2020 Crossing Recommendations, summarizes the recommendations from the field investigation.

The installation of the new track activates a warrant in the GSR and GCS to immediately comply with all requirements of the GCR and the GCS. Any grandfathered crossing rights become revoked upon completion of the track works. The client needs to insure that the crossing design plans, fully completed crossing plans (E-4) and full crossing safety assessment, which comply with the full requirements of the GCR and GCS, have been completed and filed with Canadian Transportation Agency and applicable railway.

#### **Table 2: 2020 Crossing Recommendations**

|          | Observations  | Suggested Actions   | Priority | Order of<br>Magnitude Cost |
|----------|---|---|----------|----------------------------|
| GCS Sect | ion 3 – Crossing Surface (Basic Requirement)  |   |          |                            |
| a.       | Flangeway depth impeded due to debris   | Clean debris from the flangeway.  | Low      | \$500                      |
| b.       | Railway crossing surface does not extend at least 0.5m beyond the edge of the travelled way on both approaches.   | Extend railway crossing surface to extend at least 0.5m beyond the edge of the travelled way  | High     | \$750                      |
| GCS Sect | tion 7 – Sightlines   |   |          |                            |
| a.       | Clear sightline areas where drivers stopped at the crossing ( $D_{\text{STOPPED-VEH}}$ ) cannot be provided or maintained due to vegetation on the northwest corner of the crossing | Clear sightline areas where drivers stopped at the crossing ( $D_{\text{STOPPED-VEH}}$ ) cannot be provided or maintained due to vegetation on the northwest corner of the crossing | High     | \$15,000                   |
| GCS Sect | ion 8 – Signs   |   |          |                            |
| a.       | Pavement markings are faded on north and south approach and require repainting  | Repaint double stop bars and RAILWAY CROSSING symbol<br>pavement markings and all line work on north and south road<br>approaches.  | Low      | \$800                      |
| b.       | No pavement markings are located within the crossing surface.   | Paint MUTCD compliant pavement markings across the crossing surface.  | Low      | \$750                      |
| GCS Sect | tions 9, 12 to 17 – Warning System Design   |   | 1        |                            |
| a.       | An active warning system with gates is warranted<br>based on cross-product and sightlines   | Install active warning system with gates as soon as possible.   | High     | \$600,000                  |



# A SITE PHOTOGRAPHS







D - South Approach Drivers View Left

**E** - South Approach

F - South Approach Drivers View Right

## **APPENDIX**



J- South Approach Drivers View Left (At Stopped Position)



L - South Approach Drivers View Right (At Stopped Position)

## **APPENDIX**





# B SITE INSPECTION REPORT

CANADIAN ROAD / RAILWAY GRADE CROSSING DETAILED SAFETY ASSESSMENT FIELD GUIDE (2005)\*

Appendix C2: Field Data Forms

×

Passive & Active Crossings

Mile117.63 Spur 2.82 (75 Robson Road), VFPA/ BNFS Surrey, British Columbia For Vancouver Fraser Port Authority

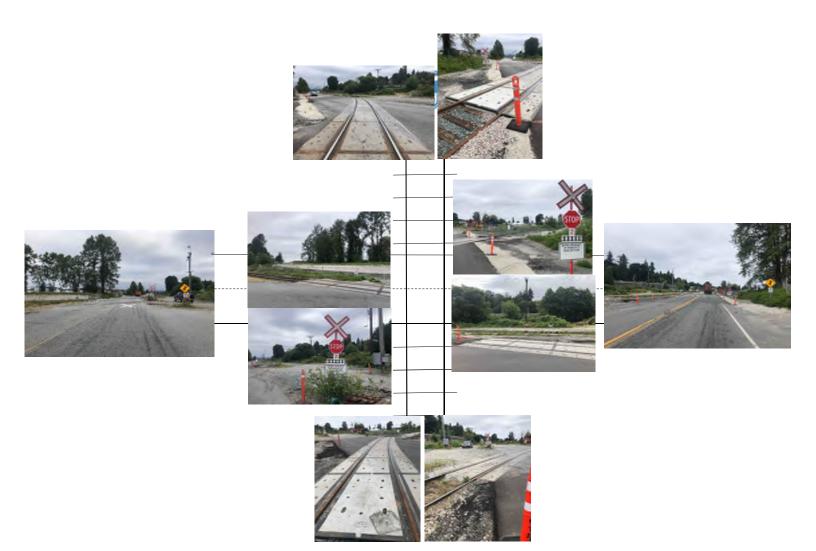
|     |         | Legend: |   |
|-----|---------|---------|---|
| cal | lculate | Formula | Spreadsheet cell has formula  |
| lo  | ok up   |         | User to look up value in table or chart.  |
|     |         |         | User to input value here for conditional formatting or formulas in other cells to function                |
|     |         |         | Warning! Value beyond acceptable limits.  |
|     |         |         | Warning! Value beyond acceptable limits for certain conditions (i.e. for people using assistive devices). |
|     |         | Rail    | Information to be provided by Railway Company   |
|     |         | Road    | Information to be provided by Roadway Authority   |
| me  | easure  | observe | Information to be obtained during Site Investigation  |
|     |         | V       | Information provided by others to be verified in the field  |
|     |         |         |   |

\* Updated to reflect Transport Canada's Grade Crossing Standards (GCS) July 2014 and Grade Crossing Regulations (GCR)( SOR-2014-275 Feb 2016)

|                   |  |   |                              | Surrey, E                |  | u  |  |                   |
|-------------------|--|---|------------------------------|--------------------------|--|--|--|-------------------|
| Sheet 1           |  |   |                              | Grade Cros               | ssing Safety Assessm   | ent  |  | Passive Crossings |
| Date of Asses     | sment:                                 |   | 23-Jul-20                    | Site Investigati         | on   |  |  |                   |
| Assessment T      | eam Mem                                | bers & Affiliations:  | Patrick McCabe<br>Rob Sewell |                          |  |  |  |                   |
| Reason for As<br> |  | New Proposed F<br>periodic assessment<br>cessation of whistling<br>change in vehicle types                            | edestrian Crossing<br>X      | significant char         | nge in infrastructure<br>nge in train operations<br>ıns in 5yr. Period |  | _significant change in road or rai<br>_significant change in road or rai<br>_other collision experience (see b | l speeds          |
| Railway Autho     | ority:                                 | Vancouver Frasier Port Authority (V   | FPA)/ BNFS Railway           |                          |  | Road Authority:                                  | City of Surrey   |                   |
| Crossing Loca     | tion:                                  | Robson Road and Elevator Road   |                              |                          |  | Road Name/Number:                                | Robson Road and Elevator Roa   | d                 |
| Location Num      | nber:                                  | N/A   |                              |                          |  | Province:  | British Columbia   |                   |
| Municipality:     |  | City of Surrey, BC  |                              |                          |  | Location Reference (contro                       | ol section, etc.):   | DP Surrey Docks   |
| Railway: V        | FPA/ BNF                               | S   | Mile:                        | 117.63                   |  | Road Classification:<br>(freeway/expressway arte | rial, collector, local, etc):  | ULU               |
| Sub-division:     |  | Yale Sub/ Brownsville Spur  | Spur:                        | 2.82                     |  | Roadway East/West (yes/                          | · · · ·  |                   |
| Type of Grade     | e Crossing                             | [private/public; warning devices]:  | SRSC                         |                          |  | Roadway North/ South (yes)                       |  |                   |
| Track Type: [r    | mainline, e                            | etc.]   |                              | Yard                     |  | *Urban Local Undivided                           |  |                   |
| Collision Histo   | ory (5-yeai                            | r period):  |                              |                          |  |  |  |                   |
| +<br>+<br>=       | Personal I<br>Fatal Inju<br>Total Coll | amage collisions:<br>Injury collisions:<br>ry Collisions:<br>isions in last 5 year period:<br>ollisions if available: |                              | 1<br>UNKNOWN<br>NIL<br>1 |  | of Persons Injured:<br>of Persons Killed:        | UNKNOWN<br>NIL   |                   |
|                   | FPA                                    |   |                              |                          |  |  |  |                   |
| 0                 | )ne truck/t                            | train accident on Robson Rd/ Elevator   | Road crossing. The i         | ncident likely to        | ok place 2016-2017 due   | e to a truck stalling on the ra                  | ilway crossing   |                   |
| - identify mai    | n contribu                             | iting factors   |                              |                          | - attach collision diagra  | ams if available                                 |  |                   |

Sheet 2a

SCENE PHOTOGRAPHS



For the full set of photos taken, see the Appendix to the Safety Assessment Report.

Sheet 2b

SCENE SKETCH

NOTE: All references to direction in this safety review are keyed to this diagram.



Notes: Images from Google Earth

Include: - directions to nearby municipalities for both road & rail approaches (use arrows)

- adjacent intersections

- relevant road signs/signals

- signal warning systems hardware

- landmarks - crosswalks/paths - geographical features

- bus stops, etc.

#### GENERAL INFORMATION

| Source  |   |    | I          | tem   | Reference |
|---------|---|----|------------|---|-----------|
| Rail    | Maximum Railway Operating Speed, V <sub>T</sub>           | =  | 10         | (mph)   |           |
| Rail    | Daily Train Volume:                                       | =  | 30         | (freight trains/day)                                |           |
| Kall    |   | =  | 0          | (passenger trains/day)                              |           |
| Rail    | Switching during daytime? Y/N                             | No |            | nighttime? Y/N No                                   |           |
| Road    | Avg. Annual Daily Traffic, AADT:                          | =  | 1,780      | (vpd) Year of count: 2020                           |           |
| Road    | High seasonal fluctuation in volumes?                     |    | No         |   |           |
| Road    | Pedestrian Volumes  | =  | 0          | (ped./day)  |           |
| Road √  | Is crossing on a School Bus route?                        |    | No         |   |           |
| Road √  | Do Dangerous Goods trucks use this roadway?               |    | Yes        |   |           |
| Road    | Cyclist Volumes   | =  | 0          | (cyclists/day) Cyclist not anticipated              |           |
| Road √  | Regular use of crossing by persons with Assistive Devices | ?  |            | Pedestrians using Assistive Devices not anticipated |           |
| Road √  | Other special road users?                                 | ty | e Unknown  | daily volume None                                   |           |
| Road    | Forecasted AADT <sup>2</sup>                              | =  | 980        | (vpd) Forecasted Year: 2022                         |           |
|         | Design Speed:   |    | 30         | km/h Posted Speed: <b>30</b> km/h                   |           |
| Road √  | Maximum Operating Speed:                                  |    | 30         | km/h  |           |
|         | note: provide details if all approaches are not the same  |    |            | -   |           |
| Road √  | Road Surface Type (asphalt, concrete, gravel, etc.):      |    | Asphalt    |   |           |
| observe | Surrounding Land Use (urban/rural)?:                      |    | Industrial |   |           |
| observe | Any schools, retirement homes, etc. nearby?               |    | No         |   |           |

#### Notes:

Sheet 3

1. Road Authority should provided plans if available.

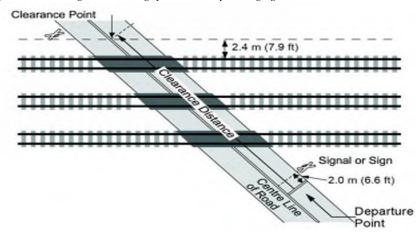
2. AADT is based upon modelled future traffic counts for the Realigned infrastrucutre.

#### From GCS Section 7.1.2:

| Column 1       | Column 2   | Column 3   |
|----------------|--|--|
| Class of Track | The maximum<br>allowable operating<br>speed for freight trains<br>is - | The maximum<br>allowable operating<br>speed for passenger<br>trains is - |
| Class 1 track  | 17 km/h (10 mph)   | 25 km/h (15 mph)   |
| Class 2 track  | 41 km/h (25 mph)   | 49 km/h (30 mph)   |
| Class 3 track  | 65 km/h (40 mph)   | 97 km/h (60 mph)   |
| Class 4 track  | 97 km/h (60 mph)   | 129 km/h (80 mph)  |
| Class 5 track  | 129 km/h (80 mph)  | 153 km/h (95 mph)  |

Figure 10-1 - Clearance Distance (cd) for Grade Crossings

(a) For Grade Crossings with a Warning System or Railway Crossing Sign

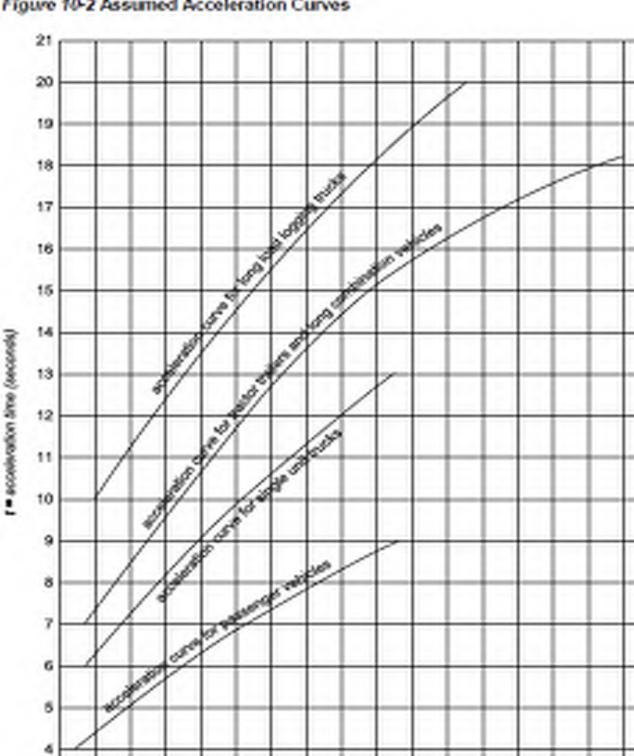


#### Grade Crossings Standards, July 2014

Table 10-1 Ratios of Acceleration Times on Grades

| Design Vehicle            |     | Ro  | ad Grade | (%) |     |
|---------------------------|-----|-----|----------|-----|-----|
|                           | -4  | -2  | 0        | +2  | +4  |
| Passenger Car             | 0.7 | 0.9 | 1.0      | 1.1 | 1,3 |
| Single Unit Truck & Buses | 0.8 | 0.9 | 1.0      | 1.1 | 1.3 |
| Tractor-Semitrailer       | 0.8 | 0.9 | 1.0      | 1.2 | 1.7 |

Source: Geometric Design Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999



s = distance travelled during acceleration (m)

Figure 10-2 Assumed Acceleration Curves

DESIGN CONSIDERATIONS

| Source    |  |  |                            |                  | Item                        |             |            |     |           |     | Reference       |
|-----------|--|--|----------------------------|------------------|-----------------------------|-------------|------------|-----|-----------|-----|-----------------|
|           | Design Vehicle                         |  |                            |                  |                             |             |            |     |           |     |                 |
| Road      | Type:                                  | 6                                      | WB-20 Tractor-S            | emitrailers      | ; (WB-20)                   |             |            |     |           |     | Table 1* SOR 57 |
| look-up   | Length, L:                             |  | 22.7                       | m                |                             |             | SB Approad | h   | NB Approa | ch  | Table 1*        |
| look-up   | Stopping Sight Distance, SSD           |  | 45                         | m (round         | l to 1.0% of grade)         | =           | 10         | m   | 45        | m   | Table 3*        |
| measure   | Clearance Distance, cd                 |  |                            |                  |                             | =           | 50.3       | m   | 50.3      | m   | GCS 16.1.1      |
| calculate | Vehicle Travel Distance, S             |  | S= L+cd                    | 73.              | 0 max <                     | =           | 73.0       | m   | 73.0      | m   |                 |
| look-up   | Vehicle Departure Time, t              |  |                            |                  |                             | =           | 17.3       | sec | 17.3      | sec | GCS Figure 10-2 |
| Road √    | Road Grade Effect:                     | maximum approa                         | ach grade within 'S        | ':               |                             | =           | 0.00       | %   | 1.30      | %   | Sheet 7         |
| look-up   | grade adjustment factor (anto ca       | lc assumes Truck)( m                   | anual input from Tab       | le 10-1 if othe  | er)                         | =           | 1.00       |     | 1.10      |     | GCS Table 10-1  |
| calculate |  | T= t x adjustment                      | factor                     |                  |                             | =           | 17.3       | sec | 19.0      | sec |                 |
|           | Design Vehicle Departure Tir           | <b>ne, T<sub>D</sub> =</b> J + T (whe  | ere J = 2 sec (min.) perce | ption & reaction | on)                         |             | 2.0        | sec | 2.0       | sec |                 |
| calculate |  | T <sub>G stop</sub> = T <sub>D</sub> = | 21.0                       | sec              |                             | <-          | 19.3       | sec | 21.0      | sec | GCS 10.3.2      |
| observe   | Do field acceleration times exce       | ed T <sub>D</sub> ?                    | Acceleration me            | asurement        | beyond the scope of         | of this ass | sessment.  |     |           |     |                 |
| measure   | Pedestrian, cyclist & Assistiv         | e Devices Depai                        | rture Time                 | pec              | lestrian <b>cd</b> distance | =           | 0.0        | m   | 0.0       | m   | GCS 10.3.3      |
| calculate | walking speed 1.22m/s max.             | T <sub>P</sub> =                       | 0.0                        | sec              | (1.0m/s used)               | <-          | 0.0        | sec | 0.0       | sec | 603 10.3.3      |
| calculate | T <sub>SSD</sub> = (SSD+cd+L)/(0.27783 | 7 x V <sub>road design</sub> ) =       | 14.2                       | sec              |                             |             |            |     |           |     |                 |

Comments Following Site Visit:

New crossing track installed recently on North approach (Turnout is still to be connected to track in Norhteast quadrant).

- Crossing now a 2 track crossing.

#### Table 1 - Design vehicle Lengths/Class

| General Vehicle Descriptions            | Length (m) |
|---|------------|
| 1. Passenger Cars, Vans and Pickups (P) | 5.6        |
| 2. Light Single-unit Trucks (LSU)       | 6.4        |
| 3. Medium Single-unit Trucks (MSU)      | 10.0       |
| 4. Heavy Single-unit Trucks (HSU)       | 11.5       |
| 5. WB-19 Tractor-Semitrailers (WB-19)   | 20.7       |
| 6. WB-20 Tractor-Semitrailers (WB-20)   | 22.7       |
| 7. A-Train Doubles (ATD)                | 24.5       |
| 8. B-Train Doubles (BTD)                | 25.0       |
| 9. Standard Single-Unit Buses (8-12)    | 12.2       |
| 10. Articulated Buses (A-BUS)           | 18.3       |
| 11. Intercity Buses (I-BUS)             | 14.0       |

#### $\textbf{Table 6} - \textbf{Minimum Sightlines along the Rail Line (D_{maped}) (as illustrated in Figure 3)}$

| Railway Design<br>Speed V,                  |     | T <sub>stoppet</sub> = Departure Time (greater of T <sub>s</sub> or T <sub>p</sub> ) (seconds) |     |     |      |     |      |     |     |     |     |                       |  |  |
|---|-----|--|-----|-----|------|-----|------|-----|-----|-----|-----|-----------------------|--|--|
| [mph]                                       | ≤10 | 11   | 12  | 13  | 14   | 15  | 16   | 17  | 18  | 19  | 20  | 20 sec., add for each |  |  |
| WARNING:<br>Railway design<br>speed in mph! |     | Minimum Sightlines along Rail Line (D <sub>maper</sub> )<br>(m)                                |     |     |      |     |      |     |     |     |     |                       |  |  |
| STOP  | 300 | 30   | 30  | 30  | 30   | 30  | 30   | 30  | 30  | 30  | 30  | +0                    |  |  |
| 1-10  | -45 | 50   | 55  | 60  | - 65 | 70  | 72   | 76  | 80  | 85  | 90  | +5                    |  |  |
| 11-20                                       | 90  | 100  | 110 | 120 | 125  | 135 | 145  | 155 | 165 | 170 | 183 | +10                   |  |  |
| 21-30                                       | 135 | 150  | 165 | 175 | 190  | 205 | 215  | 230 | 245 | 255 | 270 | +15                   |  |  |
| 31-40                                       | 180 | 200  | 220 | 235 | 250  | 270 | 285  | 305 | 325 | 340 | 360 | +20                   |  |  |
| 41-50                                       | 225 | 250  | 270 | 290 | 315  | 335 | 360  | 380 | 405 | -05 | 450 | +25                   |  |  |
| 51-60                                       | 270 | 300  | 325 | 350 | 380  | 405 | -180 | 460 | 485 | 510 | 540 | +30                   |  |  |
| 61-70                                       | 315 | 350  | 380 | 415 | 445  | 470 | 505  | 535 | 565 | 595 | 630 | +35                   |  |  |
| 71-80                                       | 360 | 395  | 435 | 465 | 505  | 540 | 580  | 610 | 650 | 680 | 720 | +40                   |  |  |
| 11-90                                       | 405 | 445  | 490 | 535 | 530  | 605 | 650  | 685 | 730 | 765 | 810 | +45                   |  |  |
| 91-100                                      | 450 | 500  | 540 | 580 | 630  | 670 | 715  | 760 | 805 | 850 | 895 | +50                   |  |  |

Source: Geometric Design Guide for Canadian Roads, TAC; September 1999.

#### Table 3 – Determine SSD for Truck Class

| Road<br>Truck Class<br>Stopping Sight Distance (SSD)<br>Design (m) |      |     |     |     |     |     |     |     |     |        |       |        |     |     |     |     |     |     |     |     |     |
|--|------|-----|-----|-----|-----|-----|-----|-----|-----|--------|-------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Speed V<br>(km/hr)   |      |     |     |     |     |     |     |     | Ro  | ad App | roach | Gradie | nt  |     |     |     |     |     |     |     |     |
| (MIUIII)   | -10% | -9% | -8% | -7% | -6% | -5% | -4% | -3% | -2% | -1%    | 0%    | 196    | 2%  | 3%  | 4%  | 5%  | 6%  | 7%  | 8%  | 9%  | 10% |
| 10   | 10   | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10     | 10    | 10     | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  |
| 20   | 26   | 26  | 26  | 26  | 26  | 26  | 25  | 25  | 25  | 25     | 25    | 25     | 25  | 25  | 25  | 25  | 24  | 24  | 24  | 24  | 24  |
| 30   | 48   | 48  | 47  | 47  | 47  | 46  | 46  | 46  | 45  | 45     | 45    | 45     | 45  | 44  | 44  | 44  | 44  | 44  | 44  | 43  | 43  |
| 40   | 76   | 75  | 74  | 74  | 73  | 73  | 72  | 71  | 71  | 70     | 70    | 70     | 69  | 69  | 68  | 68  | 68  | 67  | 67  | 67  | 67  |
| 50   | 121  | 120 | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 111    | 110   | 109    | 108 | 108 | 107 | 106 | 106 | 105 | 105 | 104 | 104 |
| 60   | 149  | 146 | 144 | 142 | 140 | 138 | 136 | 134 | 133 | 131    | 130   | 129    | 128 | 126 | 125 | 124 | 123 | 122 | 122 | 121 | 120 |
| 70   | 210  | 205 | 202 | 198 | 195 | 192 | 189 | 187 | 184 | 182    | 180   | 178    | 176 | 175 | 173 | 171 | 170 | 169 | 167 | 166 | 165 |
| 80   | 252  | 246 | 241 | 236 | 231 | 227 | 223 | 219 | 216 | 213    | 210   | 207    | 205 | 202 | 200 | 198 | 196 | 194 | 192 | 191 | 189 |
| 90   | 318  | 311 | 304 | 297 | 292 | 286 | 281 | 277 | 273 | 269    | 265   | 262    | 258 | 255 | 252 | 250 | 247 | 245 | 243 | 240 | 238 |
| 100  | 401  | 391 | 382 | 373 | 365 | 358 | 352 | 346 | 340 | 335    | 330   | 325    | 321 | 317 | 314 | 310 | 307 | 304 | 301 | 298 | 295 |
| 110  | 455  | 441 | 428 | 417 | 406 | 397 | 388 | 380 | 373 | 366    | 360   | 354    | 349 | 344 | 339 | 334 | 330 | 326 | 322 | 319 | 315 |

\* Source: Transport Canada's "Determining Minimum Sightlines at Grade Crossings: A Guide for Road Authorities and Railway Companies"

Sheet 4

#### Mile117.63 Spur 2.82 (75 Robson Road), VFPA/ BNFS

Surrey, British Columbia

LOCATION of GRADE CROSSING

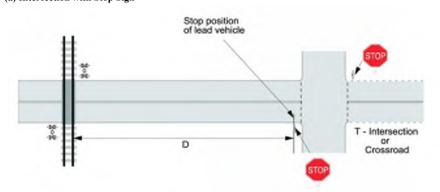
| Source   | Item   |     | Reference       |
|----------|--|-----|-----------------|
|          |  |     |                 |
| observe  | "D" should not be less than 30m for either approach if the train speed exceeds 15 mph.                                 |     |                 |
|          | D = 24.4m,   |     | GCS Section 9.1 |
| observe  | Are there pedestrian crossings on either road approach that could cause vehicles to queue back to the tracks?          |     |                 |
| observe  |  | No  |                 |
| observe  | Is "D" insufficient such that road vehicles might queue onto the rail tracks?  | Yes |                 |
|          | Is "D" insufficient such that road vehicles turning from a side street might not see warning devices for the crossing? | No  |                 |
|          |  |     | •               |
| Comments | Following Site Visit:  |     |                 |
|          |  |     |                 |

- The minimum "D" diminsion to the edge of Elevator Road. The Northern "D" is 25.9m.

- RAILWAY CROSSING AHEAD sign installed from previous inspection (2015)

Railwayspeed = 10mph - Access to the SFPR in now blocked (south east of crossing)

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

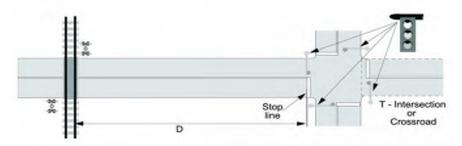
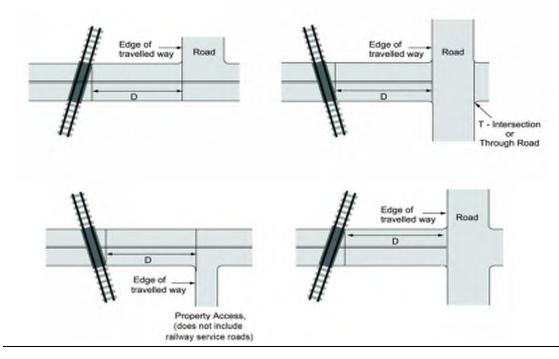


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings



Sheet 5

#### GRADE CROSSING SURFACE

| e  |   | It  | em  |   |  |  |   | Referen                                   |
|--|---|---|---|---|--|--|---|---|
| ls the cros  | sing smooth enough to allow road vehicles, pedestrians, cycli   | sts, and other ro   | ad users to cr  | oss at their r  | normal speed   | without cons   | equence?  | SOR 60; GC                                |
| Crad-C   | Yes Concrete Danale   |   |   |   |  |  |   |   |
| /e   | ssing Surface Material: Concrete Panels<br>ssing Surface Condition: Good  |   |   |   |  |  |   | SOR 60; G                                 |
|  | Road Surface Type: Ashpalt  |   |   |   |  |  |   |   |
|  | Road Surface Condition: Fair to Good  |   |   |   |  |  |   | SOR 60; G0                                |
|  | Illumination?: No   |   |   |   |  |  |   |   |
|  |   | SB Approach   |   |   | NB Approa  | ch   |   |   |
| re Road Sur  | ace crossing width (perp. C.L. min. = 8.0m)   |   | 9.8   | m   |  |  |   | GCS 5.1                                   |
| re Road Sur  | ace extension beyond travel lanes (min. = 0.5m)   | 0.0   | m   |   | 0.0  | m  | Panels End within Road surface  | GCS 5.1                                   |
|  | Path/Trail crossing width (min. = 1.5m)   |   | NA  | m   | NA   | m  |   | GCS 5.1                                   |
|  | Path/Trail extension beyond sidewalk (min. = 0.5m)  | NA  | m   |   | NA   | m  |   | GCS 5.1                                   |
|  | Between Travel Lane and C.L. of Trail   |   | NA  | m   |  |  |   |   |
| Cross-Sec  |   |   | South (Righ   | -   |  | North (Lef   |   | GCS Table                                 |
|  | y width (min. = 65mm; max.= 120mm or 75mm <sup>1</sup> )  |   | 75  | mm  |  | 70   | mm  | GCS Table                                 |
| -  | y depth (min. = 50mm; max.= no limit or 75mm <sup>1</sup> )   |   | 40  | mm  |  | 25   | mm  | GCS Table                                 |
|  | d Side Gap:   |   | •   | <b>m</b> m  |  | 0  | mm  | GCS Table                                 |
|  | width (max.= 120mm or $0^1$ )   |   | 0   | mm  |  | 0  | mm<br>mm  | GCS Table                                 |
| re Side Gap<br>Wear Lim  | depth (max.= no limit or 0 <sup>1</sup> )<br>its:   |   | U   | mm  |  | U  |   | GCS Table<br>GCS Table                    |
|  | of Top Rail above road surface (max. = 13mm <sup>1</sup> , 25mm, or 50mm)   |   | 0   | mm  |  | 0  | mm  | GCS Table                                 |
|  | of Top Rail below road surface (min. = -7mm <sup>1</sup> ,-25mm, or -50mm)  |   | 0   | mm  |  | 0  | mm  | GCS Table                                 |
|  | ersons using assistive devices  |   | v   |   |  | , v  |   |   |
| ssing surface, loos  | Standards, July 2014  | elevation   | 1   |   | ess of roadway a<br>-1 - Grade (                           |  | -photos   |   |
| ssing surface, loos  | e timbers, etc difference between road grade and rail super   | elevation   | (a)   | Figure 5-   | -1 - Grade   | Crossing Su  | ·   |   |
| ssing surface, loos  | e timbers, etc difference between road grade and rail super<br>Standards, July 2014<br>Crossing Surface – Cross Section   | elevation   |   | Figure 5-   |  | Crossing Su  | rface Dimensions  |   |
| ssing surface, loos<br>Crossing<br>5-1 – Grade   | e timbers, etc difference between road grade and rail super<br>Standards, July 2014<br>Crossing Surface – Cross Section   | elevation<br>65 mm  |   | Figure 5-   | -1 - Grade   | Crossing Su  | rface Dimensions  |   |
| ssing surface, loo:<br>e Crossing:<br>5-1 – Grade<br>a) Flangewa   | e timbers, etc difference between road grade and rail super<br>Standards, July 2014<br>Crossing Surface – Cross Section   |   | Edge  | Figure 5-   | -1 - Grade (   | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond  |   |
| ssing surface, loo:<br>e Crossing:<br>5-1 – Grade<br>a) Flangewa   | e timbers, etc difference between road grade and rail supers standards, July 2014 Crossing Surface – Cross Section y: Minimum Maximum for: Public sidewalks, paths or trails designated by the road   | 65 mm   | Edge  | Figure 5-<br>Road, inc  | -1 - Grade (   | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where   |   |
| ssing surface, loo:<br>e Crossing:<br>5-1 – Grade<br>a) Flangewa   | e timbers, etc difference between road grade and rail supers Standards, July 2014 Crossing Surface – Cross Section  | 65 mm   | Edge  | Figure 5-<br>Road, inc  | -1 - Grade (   | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond  |   |
| ssing surface, loor<br>e Crossing:<br>5-1 – Grade<br>3) Flangewa<br>Widt   | e timbers, etc difference between road grade and rail supers standards, July 2014 Crossing Surface – Cross Section  y: Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings   | 65 mm<br>75 mm<br>120 mm  | Edge of   | Figure 5<br>Road, inc<br>of shoulder<br>railway ties  | -1 - Grade (   | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder  |   |
| ssing surface, loo:<br>e Crossing:<br>5-1 – Grade<br>a) Flangewa   | e timbers, etc difference between road grade and rail super<br>standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum  | 65 mm   | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5.<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (   | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where   |   |
| ssing surface, loor<br>e Crossing:<br>5-1 – Grade<br>3) Flangewa<br>Widt   | e timbers, etcdifference between road grade and rail super-<br>s Standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:  | 65 mm<br>75 mm<br>120 mm  | Edge of<br>End of   | Figure 5.<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (   | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder  |   |
| ssing surface, loor<br>e Crossing:<br>5-1 – Grade<br>3) Flangewa<br>Widt   | e timbers, etc difference between road grade and rail supers Standards, July 2014 Crossing Surface – Cross Section  | 65 mm<br>75 mm<br>120 mm  | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5.<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (   | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder  |   |
| ssing surface, loor<br>e Crossing:<br>5-1 – Grade<br>3) Flangewa<br>Widt   | e timbers, etc difference between road grade and rail super<br>standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road   | 65 mm<br>75 mm<br>120 mm<br>50 mm   | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5.<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (   | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface  | ~8~                                       |
| ssing surface, loor<br>e Crossing:<br>5-1 - Grade<br>a) Flangewa<br>Windt<br>Depti<br>(b) Field sid<br>A space is p<br>sidewaks p  | e timbers, etcdifference between road grade and rail super-<br>s Standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public   | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5.<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (   | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder  |   |
| ssing surface, loor<br>e Crossing:<br>5-1 – Grade<br>a) Flangewa<br>Widt<br>Depti<br>(b) Field sid<br>A space is p   | e timbers, etcdifference between road grade and rail super-<br>s Standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>authority for use by persons using assistive devices<br>All other grade crossings  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using   | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5.<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (   | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Raiway  |   |
| ssing surface, loor<br>e Crossing:<br>5-1 - Grade<br>a) Flangewa<br>Windt<br>Depti<br>(b) Field sid<br>A space is p<br>sidewaks p  | e timbers, etcdifference between road grade and rail super-<br>s Standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>authority for use by persons using assistive devices<br>All other grade crossings<br>authority for use by persons using assistive devices<br>All other grade crossings   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public   | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5.<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (   | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Raiway  |   |
| ssing surface, loor<br>a Crossing:<br>5-1 - Grade<br>a) Flangewa<br>Widt<br>Depti<br>(b) Field sid<br>A space is p<br>assistive dev<br>(c) Elevation<br>The top of th  | e timbers, etcdifference between road grade and rail super-<br>s Standards, July 2014<br>Crossing Surface – Cross Section   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit   | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5-<br>Road, inc<br>shoulder<br>railway 5es<br>or more<br>shoulder w<br>i one   | -1 - Grade of  | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>Sign or  |   |
| (e) Elevation<br>(c) Elevation   | e timbers, etc difference between road grade and rail super-<br>s Standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>e gap<br>minited on the outer side of the rail at rural locations, except fi<br>this or trails designated by the road authority for use by person<br>loss<br>Maximum width<br>Maximum depth<br>of the top of the rail with respect to the crossing surface   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit   | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5-<br>Road, inc<br>shoulder<br>railway 5es<br>or more<br>shoulder w<br>i one   | devolk, path.  | Crossing Su<br>h or trail                                      | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign or<br>a road  |   |
| (b) Field sid<br>A space is p<br>sidewalks, p<br>assidive dev<br>(c) Elevation<br>The top of th<br>real within the<br>Wear limits:   | e timbers, etcdifference between road grade and rail super-<br>s Standards, July 2014<br>Crossing Surface – Cross Section   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>120 mm<br>No limit<br>e top of the  | Edge o<br>End of<br>0.5 m o<br>beyond<br>there is                               | Figure 5-<br>Road, inc<br>shoulder<br>railway tes<br>or more<br>shoulder w<br>sone  | fewalk, path.  | Vieth<br>or trail<br>Width<br>or trail along<br>walk, peth, or | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Crossing surface<br>Sign Crossing Surface | ewalk, path, o                            |
| (b) Field sid<br>A space is p<br>sidewalks, p<br>assidive dev<br>(c) Elevation<br>The top of th<br>real within the<br>Wear limits:   | e timbers, etcdifference between road grade and rail super-<br>s Standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>All other grade crossings<br>All other grade crossings<br>All other grade crossings<br>All other grade crossings<br>Maximum width<br>Maximum width<br>Maximum depth<br>of the top of the rail with respect to the crossing surface<br>a crossing surface must be installed as close as possible to th<br>wear limits below.  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the<br>micons using                   | Edge of<br>End of<br>0.5 m of<br>beyond<br>there is<br>2 - 0.5<br>or b          | Figure 5-<br>Road, inc<br>d shoulder -<br>railway tes<br>or more<br>t shoulder w<br>i one<br>(b) Sid  | dewalk, path.<br>1- Sides                                  | Vieth<br>or trail<br>Width<br>or trail along<br>walk, peth, or | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Crossing surface<br>Railway<br>Crossing<br>sign or<br>a road  | ewalk, path, o                            |
| ssing surface, loor<br>a Crossing:<br>5-1 - Grade<br>a) Flangewa<br>Widt<br>Depti<br>(b) Field sid<br>A space is p<br>sidewalks, p<br>assistive dev<br>(c) Elevation<br>The top of th<br>rad within thy<br>Wear limits:<br>Public sidew  | e timbers, etcdifference between road grade and rail super-<br>s Standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Maimum<br>Masimum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Masimum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Masimum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>authority for use by persons using assistive devices<br>All other grade crossings<br>authority for use by persons using assistive devices<br>All other grade crossings<br>authority for use by persons using assistive devices<br>All other grade crossings<br>authority for use by persons using assistive devices<br>All other grade crossings<br>devices<br>Maximum width<br>Maximum depth<br>of the top of the rail with respect to the crossing surface<br>a crossing surface must be installed as close as possible to the<br>wear limits below.<br>Maximum distance of the top of the rail above crossing<br>surface | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the<br>risons using<br>13 mm | Edge of<br>End of<br>0.5 m of<br>beyond<br>there is<br>2 - 0.5<br>or b          | Figure 5-<br>Road, inc<br>of shoulder -<br>railway ties<br>or more<br>i shoulder w<br>i one<br>(b) Sid  | dewalk, path.<br>1- Sides                                  | Vieth<br>or trail<br>Width<br>or trail along<br>walk, peth, or | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Crossing surface<br>Railway<br>Crossing<br>sign or<br>a road  | ewalk, path, or                           |
| ssing surface, loov<br>a Crossing:<br>5-1 - Grade<br>a) Flangewa<br>Widt<br>Depti<br>(b) Field sid<br>A spece is, p<br>assistive dev<br>(c) Elevation<br>The top of th<br>rail within the<br>Wear limits:<br>Public sidew<br>assistive dev   |   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the<br>micons using                   | Edge of<br>End of<br>0.5 m of<br>beyond<br>there is<br>2 - 0.5<br>or b<br>there | Figure 5-<br>Road, inc<br>of shoulder -<br>railway ties<br>or more -<br>i shoulder w<br>s one<br>(b) Sid<br>m or more b<br>eyond shou<br>e is one | dewalk, path.<br>1- Sides                                  | Vidth  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Crossing surface<br>Railway<br>Crossing<br>sign or<br>a road  | ewalk, path, or                           |
| <ul> <li>ssing surface, loop</li> <li>Crossing:</li> <li>5-1 - Grade</li> <li>a) Flangewa</li> <li>Wide</li> <li>Depti</li> <li>(b) Field sid</li> <li>A space is p</li> <li>sidewalks, p</li> <li>assistive des</li> <li>(c) Elevation</li> <li>The top of th</li> <li>rail within the</li> <li>Wear limits:</li> <li>Public sidew</li> <li>All other public</li> </ul> |   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the<br>risons using<br>13 mm | Edge of<br>End of<br>0.5 m of<br>beyond<br>there is<br>2 - 0.5<br>or b<br>there | Figure 5-<br>Road, inc<br>d shoulder -<br>railway ties<br>or more -<br>i shoulder w<br>s one<br>(b) Sid<br>m or more b<br>eyond shou<br>e is cone | dewalk, path.<br>1 - Siden<br>beyond sidew<br>surfaces may | Crossing Su<br>h or trail<br>Width                             | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface<br>Crossing surface<br>Railway<br>Crossing<br>sign or<br>a road  | wath, path, or<br>m or more be;<br>exails |

Sheet 7

#### **ROAD GEOMETRY**

| Source       |  |                     | It                               | em      |          |      |             |                   |             | Reference           |
|--------------|--|---------------------|----------------------------------|---------|----------|------|-------------|-------------------|-------------|---------------------|
| observe      | Are horizontal and vertical alignments smooth and  | continuous throu    | ighout SSD?                      |         |          |      |             |                   |             | Sheet 4             |
| Observe      | WB Approach: Yes   |                     | Sileet 4                         |         |          |      |             |                   |             |                     |
| observe      | is horizontal alignment straight beyond rails for a distance ≥ design vehicle length, L? |                     |                                  |         |          |      |             |                   |             | Sheet 4             |
| Observe      | WB Approach: Yes   |                     | EB Approach                      | : Yes   |          |      |             |                   |             | Sileet 4            |
| observe      | Are the road lanes at least the same width on the c                                      | rossing as on the   | road approaches                  | s?      |          |      |             |                   |             |                     |
| Observe      | WB Approach: Yes   |                     | EB Approach                      | : Yes   |          |      |             |                   |             |                     |
|              | Grades   |                     | SB Approach                      |         | NB Appro | ach  | Difference: | rail e & rd grade | e (GCS 6.1) | GCS Sect. 6         |
| measure      | Slope within 8m of nearest rail (max. = 2%)  |                     | 0.80                             | %       | 1.40     | %    | 0.40%       | %                 | 0.70%       | Diff in Grade Max   |
| measure      | Slope between 8m & 18m of nearest rail (max. = 5%)                                       |                     | 0.00                             | %       | 1.30     | %    |             |                   |             | 3%                  |
|              | If crossing is only for pedestrians, cyclists, or persor                                 | ns using assistive  | devices (max. = 1 <sup>1</sup> d | or 2%): |          | -    |             |                   |             |                     |
| measure      | slope within 5m of nearest rail =  |                     | N/A                              | %       | N/A      | %    |             |                   |             |                     |
| Road √       | General approach grade (max. = +/- 5%)   |                     | 0.50                             | %       | 1.30     | %    |             |                   |             |                     |
| NUdu V       | measured over the SSD distance of:   |                     | 10                               | m       | 45       | m    |             |                   |             | Sheet 4             |
| Rail √       | Are rail tracks super-elevated?  | No                  | Rate of s/e:                     | 0.00    | m/m Sdg  | 0.00 | m/m ML      |                   |             | GCS Sect. 6.1 & 6.2 |
|              | If train speeds exceed 15mph (70° minimum w/o warning                                    | system; 30° minimum | with warning system              | ):      |          |      |             |                   |             |                     |
| Road √       | What is the angle between the crossing and the roa                                       | adway?              | =                                | 154.0   | degrees  |      |             |                   |             |                     |
| observe      | Condition of Road Approaches:  | Fair to Good        |                                  |         |          |      |             |                   |             | SOR 60              |
| observe      | (e.g., anything that might affect stopping or acceleration)                              |                     |                                  |         |          |      |             |                   |             |                     |
| observe      | NA   |                     |                                  |         |          |      |             |                   |             |                     |
| 1. If freque | nt use by persons using assistive devices  |                     |                                  |         |          |      |             |                   |             |                     |
| Comments     | Following Site Visit:  |                     |                                  |         |          |      |             |                   |             |                     |

- New track crossing has been install on north approach.

New asphalt surface has been installed between crossings and north approach.

#### Grade Crossings Standards, July 2014 T

| able 6-1 - | Difference | in Gradient |
|------------|------------|-------------|
|------------|------------|-------------|

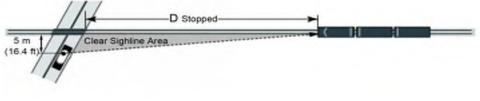
|              | Classification      | Difference in Gradi       | ent (%)               |
|--------------|---------------------|---------------------------|-----------------------|
|              | RLU                 | 2                         |                       |
|              | RCU                 | 1                         |                       |
|              | RCD                 | 1                         |                       |
|              | RAU                 | 0                         |                       |
|              | RAD                 | 0                         |                       |
|              | RFD                 |                           |                       |
|              | ULU                 | 3                         |                       |
|              | UCU                 | 2                         |                       |
|              | UCD                 | 2                         |                       |
|              | UAU                 | 0                         |                       |
| end<br>n (U) | Devel (D) Level (L) | Collector (C) Arterial(A) | E-manual (E) E-manual |

Urba

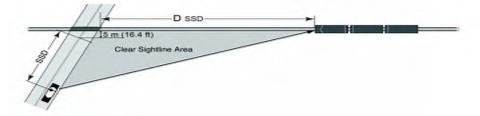
Source: Geometric Darign Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999

#### Figure 7-1 - Minimum Sightlines - Grade Crossings

(a) Sightlines for Users Stopped at a Grade Crossing (applicable to all quadrants)



(b) Sightlines for Users Approaching Grade Crossing (applicable to all quadrants)



#### Sheet 8

#### SIGHTLINES

| Driver Eye Height | = | 1.05m | passenger vehicles, pedestrians, cyclists & assistive devices |
|-------------------|---|-------|---|
|                   | = | 1.80m | buses & straight trucks                                       |
|                   | = | 2.10m | large trucks & tractor-trailers                               |
|                   |   |       |   |
| Target Height     | = | 1.20m | above rails   |

| Source    |   | Ite   | m           |                    |                       |                 | Reference                   |
|-----------|---|---|-------------|--------------------|-----------------------|-----------------|-----------------------------|
| observe   | Are sightlines within the rail R.O.W. clear of b          | ushes/vegetation; 15 m on each side of t              | he track an | id, 30 m along the | track, on each side o | f the crossing? |                             |
| observe   | -if no, detail the location Yes                           |   |             |                    |                       |                 |                             |
| observe   | Are sightlines on the road R.O.W. within 15m              | of the rail crossing clear of bushes/veget            | tation?     |                    |                       |                 |                             |
| observe   | -if no, detail the location Yes                           |   |             |                    |                       |                 |                             |
|           |   |   | SB Approa   | ch                 | NB Approa             | ch              |                             |
| look-up   | SSD minimum =   |   | 10          | m                  | 45                    | m               | Sheet 4                     |
| measure   | SSD Actual (not including turning movements):             |   | 250.0       | m                  | 60.0                  | m               |                             |
| calculate | D <sub>SSD</sub> =  | 0.277837 x V <sub>train km/h</sub> x T <sub>SSD</sub> | 63          | m                  | 63                    | m               | 1.609 convert mph to km/h   |
| calculate | D <sub>STOPPED</sub> minimum (m) =                        | 0.277837 x V <sub>train km/h</sub> x T <sub>D</sub> = | 86          | m                  | 94                    | m               | T <sub>D</sub> from Sheet 4 |
| measure   | D <sub>STOPPED</sub> Actual:                              | Driver looking LEFT                                   | 200         | m (ne)             | 175                   | m (sw)          |                             |
| measure   |   | Driver looking RIGHT                                  | 30          | m (nw)             | 110                   | m (se)          |                             |
| calculate | Ped./Cyclist D <sub>STOPPED</sub> (m)                     |   | 0           | m                  | 0                     | m               | T <sub>P</sub> from Sheet 4 |
|           | Ped./Cyclist D <sub>STOPPED</sub> Actual:                 | Person looking LEFT                                   | N/A         | m                  | N/A                   | m               |                             |
| measure   | note: measured from a point 2m in advance of sign/signals | Person looking RIGHT                                  | N/A         | m                  | N/A                   | m               |                             |
| observe   | Are there any obstacles within the sight triang           | gles other than traffic signs/utility poles t         | hat might a | affect visibility? |                       |                 |                             |
| observe   | Minor vegetatin. Construction m                           | aterial located within new northern cro               | ssing.      |                    |                       |                 |                             |

**Comments Following Site Visit:** 

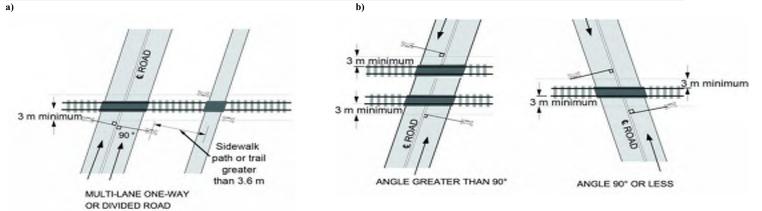
Minor vegetatin in all sight trianlges.

Northwest Quadrent impacted by embankment and vegetation

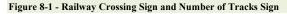
East sightlines clear down yard tracks.

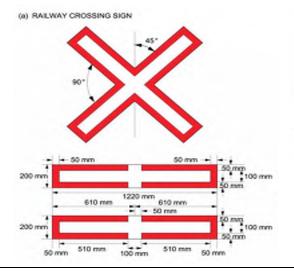
-can sightlines be maintained on an ongoing basis? (snow)

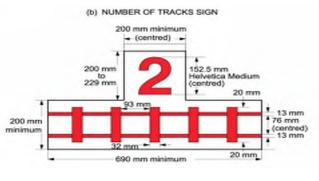
Figure 8-3 - Location of Railway Crossing Signs and Number of Tracks Signs (public grade crossings without warning systems)



-photos







SIGNS AND PAVEMENT MARKINGS

| Source          |  |                       | It                    | em              |                       |             |     | Reference |
|-----------------|--|-----------------------|-----------------------|-----------------|-----------------------|-------------|-----|-----------|
|                 | Railway Crossing Sign  |                       | $\times$              | These s         | igns will be required |             |     | MUTCD     |
|                 |  | SB Approach           |                       | NB Approad      | h                     |             |     |           |
| measure         | distance from nearest rail:                                  | 12.8                  | m                     | 6.4             | m                     |             |     |           |
| measure         | distance from edge of road:                                  | 1.6                   | m                     | 2.0             | m                     |             |     |           |
| measure         | height of centre of crossbucks:                              | 2.5                   | m                     | 2.5             | m                     |             |     |           |
| measure         | retroreflectivity readings:                                  | N/A                   | cd/lux/m <sup>2</sup> | N/A             | cd/lux/m <sup>2</sup> |             |     |           |
| observe         | Number of Tracks sign? Yes                                   |                       | <u> </u>              |                 |                       |             |     |           |
| observe         | A Stop Sign must be installed at grade crossing without a wa | rning system if the r | oad design speed i    | s less than 15m | iph                   | Yes/ No/ NA | Yes | SOR 64    |
| observe         | A Stop Ahead sign must be installed if the Stop Sigh         | is not clearly cvis   | able within the       | Stopping Dist   | ance                  | Yes/ No/ NA | N/A | SOR 65    |
| Comments        | Following Site Visit:  |                       |                       |                 |                       |             |     |           |
| - New RAIL      | WAY CROSSING signs installed in 2015.                        |                       |                       |                 |                       |             |     |           |
| - The back      | of poles and signs have reflective strips (reflective        | ty not measured)      |                       |                 |                       |             |     |           |
| - NUMBER        | OF TRACKS Sign not required as only 1 track.                 |                       |                       |                 |                       |             |     |           |
| -general condit | tion -clear sightlines to the si                             | gn                    |                       | -posts          | -photos               |             |     |           |

-general condition -clear sightlines to the sign

| Source  | Iten   | n  | Reference |
|---------|--|----|-----------|
|         | DO NOT STOP ON TRACKS  |    | MUTCD     |
| Road √  | Does queued traffic routinely encroach closer than 5m from the crossing surface? | No |           |
| observe | Are these signs present on either approach?                                      | No |           |

**Comments Following Site Visit:** 

Sheet 9a

- DO NOT STOP ON TRACKS Sign installed below RAILWAY CROSSING AHEAD sign.

| -general condition | -posts | -photos |
|--------------------|--------|---------|
|                    |        |         |

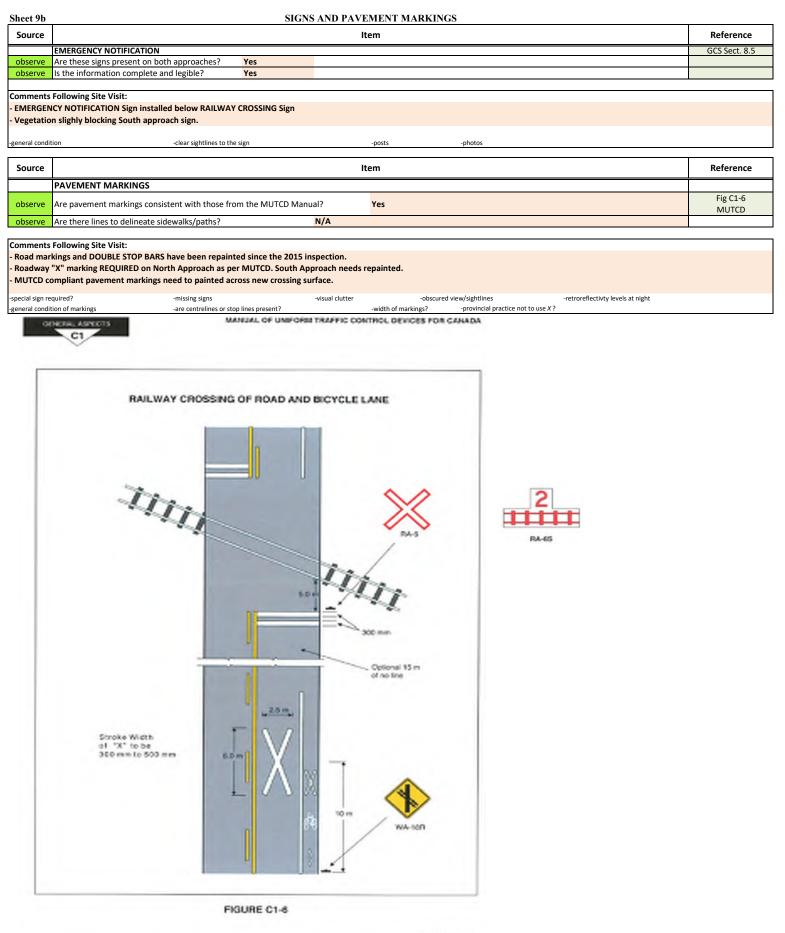
| Source  |   |   | ltem   |        |             | Reference      |
|---------|---|---|--------|--------|-------------|----------------|
|         | Railway Crossing Ahead Sign (WA 18-20)            |   | NA-188 |        |             | MUTCD & SOR 66 |
| look-up | Is AADT > 100? Yes                                |   | SB App | oroach | NB Approach | Sheet 3        |
| observe | Is area urban such that WA 18-20 is not required? | ١ | /es    |        | Yes         |                |
| measure | Distance from nearest rail to sign                | = | 29.7   | m      | 50+ m       | MUTCD          |
| observe | height:   |   | 2.2    |        | 2.2         |                |
| observe | appropriate orientation of symbol                 | ١ | /es    |        | Yes         |                |

**Comments Following Site Visit:** 

| BAILWAY CROSSING AHEAD S   | ign has been installed correctly since the previou | c increation   |   |         |   |
|----------------------------|--|----------------|---|---------|---|
| - RAILWAT CRUSSING AREAD S | gir has been installed correctly since the previou | is inspection. |   |         |   |
|                            |  |                |   |         |   |
| 1                          |  |                | 15 14 14 14                               |         |   |
| -general condition         | -clear sightlines to the sign                      | -posts         | <ul> <li>aligned to the driver</li> </ul> | -photos |   |
|                            |  |                |   |         |   |
|                            |  |                |   |         | - |

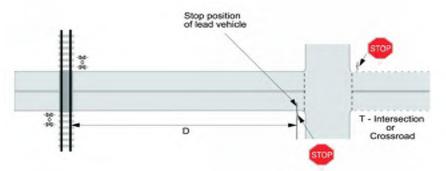
| Source    | Item   | Reference              |
|-----------|--|------------------------|
|           | ADVISORY SPEED SIGN  | MUTCD & SOR 66 (2)     |
|           |  |                        |
| observe   | Are they present on both approaches?     Yes       Posted speed limit?     30       km/h |                        |
| look-up   | Are they required on either approach? No   | check SSD<br>(Sheet 8) |
|           |  |                        |
| Comments  | Following Site Visit:  |                        |
| - ADVISOR | / SPEED Sign installed on the North approach   |                        |

-general condition -posts -photos



JANUARY 2016

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

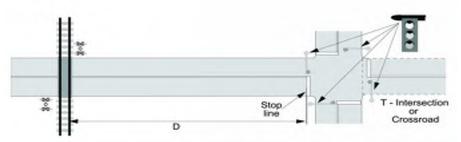
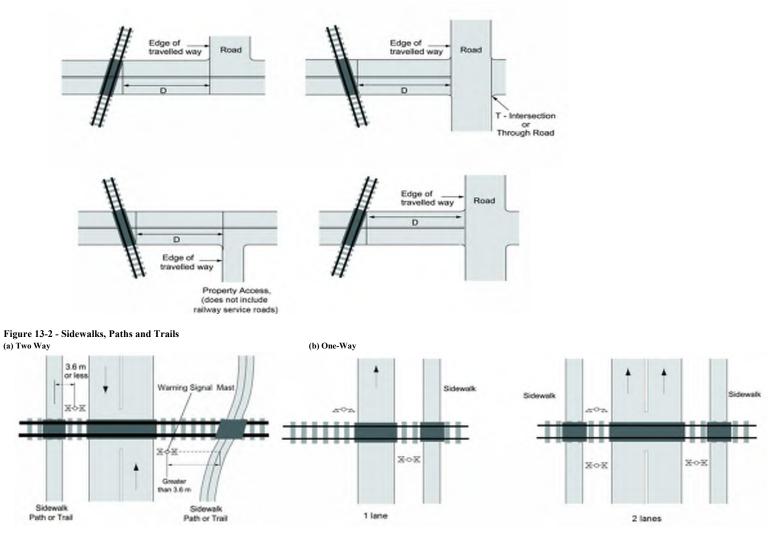


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings





| Sheet 11  |  |                      | GRAD               | E CROSSI     | NG WARNING S                              | SYSTEM | 48                 |  | 11                |                              | GCS Section 9     |
|-----------|--|----------------------|--------------------|--------------|---|--------|--------------------|--|-------------------|------------------------------|-------------------|
| Source    | Item is not required.  |                      |                    |              |   |        |                    | Reference  |                   |                              |                   |
|           | Warning System Warrants<br>if any of A through E below are         | met, then a warnir   | ıg system is warra | nted         |   |        |                    |  |                   |                              |                   |
|           |  |                      | Question           |              |   |        |                    | Warrant fo   | or Warning Sy     | stem                         |                   |
| look-up   | Existing AADT =  | 1,780                | Forecast AADT =    |              | 980                                       |        |                    |  |                   |                              | Sheet 3           |
| look-up   | Daily Train Volume =   | 30                   |                    |              |   | trains |                    |  |                   |                              | Sheet 3           |
| calculate | A. Cross-Product =   | 29,400               |                    |              |   |        | > 2,000 FLB        | req'd  | > 50,000 req      | uires gates                  |                   |
| look-up   | B. Maximum Rail Operating Spo                                      | eed =                | 10                 |              | r   | nph    | (max = 80m         | nph or 50 mph v                                      | vith crosswalk    | <)                           | Sheet 3           |
| Rail      | C. Number of Tracks =  |                      | 2                  |              |   |        |                    |  |                   |                              |                   |
| Kdll      | if ≥ 2, can trains pass one anoth                                  | er?                  | Yes                |              |   |        | if $\geq$ 2 and tr | ains can pass or                                     | ne another ->     | FLB req'd                    |                   |
| look-up   | D. Are Sightlines obscured?  |                      | Yes                |              |   |        | if "Yes" -> F      | LB req'd: If Fig 7                                   | 7.1 applies>      | add G                        | Sheet 8 & Fig 7.1 |
| observe   | E. Are any proximity conditions met? Yes if "Yes" -> FLB required. |                      |                    |              | GCS Sect 9 & 11                           |        |                    |  |                   |                              |                   |
| look-up   | Is a Warning System warranted                                      | ?                    | Yes                |              |   |        | If any of A t      | hrough E above                                       | e meet the Wa     | arrant                       |                   |
|           | Field Visit  | Present? (Y/N)       | Condition / Alig   | nment:       |   |        |                    |  |                   |                              | GCS 13            |
| observe   | Light Units,   | N                    |                    |              |   |        |                    |  |                   |                              | GCS 13            |
| observe   | Bells,   | N                    |                    |              |   |        |                    |  |                   |                              | GCS 13            |
| observe   | Gates,   | N                    |                    |              |   |        |                    |  |                   |                              | GCS 13            |
| observe   | Cantilever Lights,   | N                    |                    |              |   |        |                    |  |                   |                              | GCS 13            |
| observe   | Check that warning signal assem                                    | nblies and cantileve | ers are in accorda | nce with GCS | Figures.                                  |        |                    |  |                   |                              | GCS Sect. 12      |
| observe   | Is warning system housing at lea                                   | ast 9m from travele  | ed way of the road | d and 8m fro | m the nearest rail?                       |        |                    |  |                   |                              |                   |
| observe   | If there is a sidewalk, is a bell on                               | n the adjacent asse  | mbly?              |              |   |        |                    |  |                   |                              |                   |
| Rail √    | Have all light units been aligned                                  | ?                    | NA                 | Date?        | NA  |        |                    |  |                   |                              |                   |
| Rail      | Design Approach Warning Time                                       | (greatest of):       |                    |              | 20sec OR<br>[20+((cd-11)/3)]<br>if cd>11m | Td     | Тр                 | Gate Clearance<br>Time + Descent<br>Time + 5 seconds | (=0 if no traffic | (SSD + cd + L)/(0.277837xVv) |                   |
|           | SB Approach  |                      | 38.0               | sec          | 33.1                                      | 19.3   | 0.0                | 38.0   | 0.0               | 10.0                         |                   |
|           | NB Approach  |                      | 38.0               | sec          | 33.1                                      | 21.0   | 0.0                | 38.0   | 0.0               | 14.2                         |                   |

**Comments Following Site Visit:** 

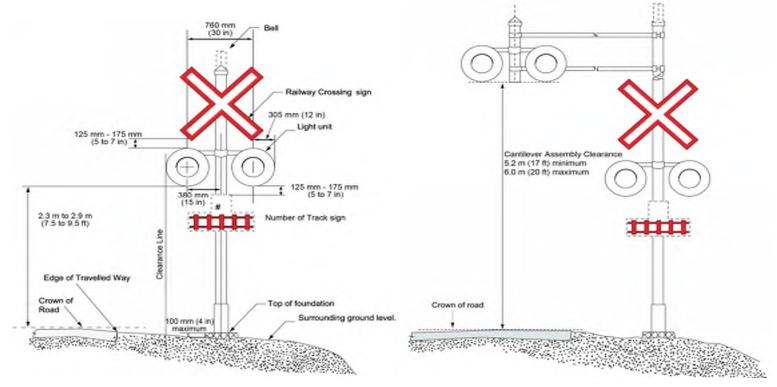
Based on the AADT, Rail traffic volumes and sightlines an active warning system with gates is required for this crossing.

extraordinary conditions why warning system should be installed

-is warning system present but not warranted?

#### Figure 12-1 - Warning Signal Assemblies

#### Figure 12-3 - Cantilevers



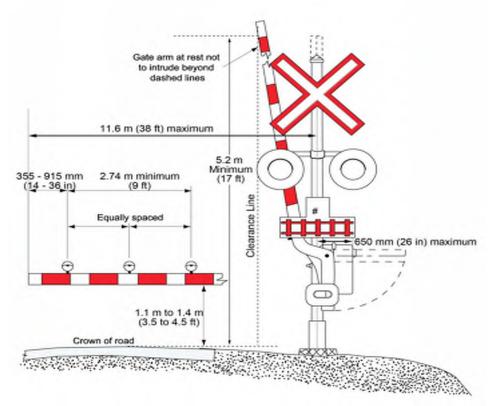


#### GATES FOR GRADE CROSSING WARNING SYSTEMS

GCS Section 9

| Source  |   |                    | Item  |             |                                  |                  |             | Reference      |
|---|---|--------------------|---|-------------|----------------------------------|------------------|-------------|----------------|
|   | Warning System Warrants   |                    |   |             |                                  |                  |             |                |
|   | -if any of A through E below are met th                                     | en a warning syste | em with gates is warranted.   | Not req     | uired as qwarning system         | is not necessary | /           |                |
| calculate   | A. Cross-Product =  | 29400              | (50,000 min)  |             |                                  |                  |             |                |
| look-up   | B. Maximum Rail Operating Speed =   | 10                 | mph (max = 50mpl  | า)          |                                  |                  |             | Sheet 3        |
| Rail √  | C. Number of Tracks =   | 2                  |   |             |                                  |                  |             |                |
| i tuni v  | if $\geq 2$ , can trains pass one another?                                  | N/A                |   |             |                                  |                  |             |                |
| look-up   | D. Is D <sub>STOPPED</sub> Insufficient?                                    | Yes                | Minor vegetation work requ  | uired on    | Northwest and Southwest          | t quadrants.     |             | Sheet 8        |
| observe   | E. Are any proximity conditions met?  | Yes                |   |             |                                  |                  |             |                |
| calculate   | Gate clearance distance: eq 10.4b   | 24.7               | m cd <sub>G stop</sub>  | 34.7        | m cd SSD SB                      | 69.7             | m cd SSD NB |                |
| look-up   | travel time =   | 21.0               | sec <sub>G stop</sub>   |             |                                  |                  |             |                |
|   | Gate arm clearance times:   | 19.3               | sec SB from stop T <sub>G ssd</sub> =   | 4.2         | sec SB from SSD                  |                  |             |                |
| calculate   |   | 21.0               | sec NB from stop T <sub>G ssd</sub> =   | 8.4         | sec NB from SSD                  |                  |             | GCS Sect. 10.4 |
| look-up   | Gate arm delay time: 21.0   | sec (greatest valu | e from above)   |             |                                  |                  |             |                |
| calculate   | effect of grade =   | 0.0                | sec (SB from Stop)  | -4.2        | sec SB from SSD                  |                  |             |                |
| culculate   |   | 2.0                | sec (NB from Stop)  | 0.0         | sec NB from SSD                  |                  |             |                |
| measure   | Measure gate arm delay and compare with above:                              |                    | N/A   |             |                                  |                  |             |                |
| observe   | Do gates conform to standards depicted in GCS Fig                           | ures?              | N/A   |             |                                  |                  |             |                |
| observe   | Check gate descent (10 to 15 sec) and ascent (6 to 2                        | 12 sec)            | N/A   |             |                                  |                  |             |                |
| observe   | Is gate striping vertical as depicted in GCS Figures?                       |                    | N/A   |             |                                  |                  |             |                |
| observe   | Where railway equipment regularly stops, or railway equipment<br>control fe |                    | the activating limits of a warning system<br>operation of the warning system. | i, the warn | ing system must be equipped with | a<br>Yes/No/NA   | NA          | GCS 16.3.1     |
| Comments  | Following Site Visit:   |                    |   |             |                                  |                  | •           |                |
| - An active   | warning system with gates is required ate this cros                         | ssing.             |   |             |                                  |                  |             |                |
| -extraordinary conditions why warning system should be installed -is warning system present but <u>not</u> warranted? <b>No</b> |   |                    |   |             |                                  |                  |             |                |

#### Figure 12-2 - Gates



Sheet 13

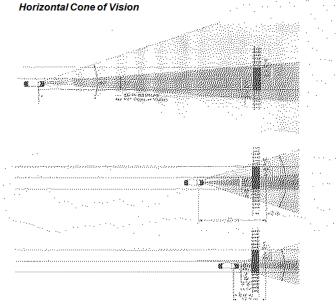
#### FLASHING LIGHT UNITS

Note: Driver's cone of vision is  $\pm\,5^\circ$  horizontally; limited by top of windshield vertically.

| Source   |                                    |  | Item is not required as warning system            | is not required.        |                     |                     | u |  |
|----------|------------------------------------|--|---|-------------------------|---------------------|---------------------|---|--|
|          | Number and Location                |  |   |                         |                     |                     |   |  |
| look-up  | Minimum Distance for Primary I     | Light Units (SSD) =  |   | 45.0                    | m                   |                     |   |  |
| look-up  | Recommended Distance for Prin      | nary Light Units =   |   | 69.7                    | m                   |                     |   |  |
|          | Are flashing light units located w | vithin 5° horizonta  | lly of the centerline of the road (throughout the | approach distance abov  | ve)?                |                     |   |  |
| observe  |                                    |  |   |                         | Yes (covered by fro | ont and back units) |   |  |
|          | Does horizontal/vertical curvatu   | ire necessitate sup  | plemental units?                                  |                         |                     | N/A                 |   |  |
| observe  | Can back lights be seen by all sto | opped drivers?   |   |                         |                     | N/A                 |   |  |
| observe  | Are lights obscured by vehicles s  | Are lights obscured by vehicles stopped on adjacent intersections? N/A |   |                         |                     |                     |   |  |
| observe  | Are additional light units require | ed for drivers as th   | ey begin to turn onto an approach road from an    | intersecting road/lane/ | /pkg lot?           | N/A                 |   |  |
|          | Cantilevered Light Units           |  |   |                         |                     |                     |   |  |
| measure  | Does D <sub>R</sub> exceed 7.7m?   | N/A  |   |                         |                     |                     |   |  |
| measure  | Does D <sub>L</sub> exceed 8.7m?   | N/A  | (Assumes signal poles on both sides of road ali   | gnment, approach side o | of rail)            |                     |   |  |
|          | Multiple Lanes                     |  |   |                         |                     |                     |   |  |
| observe  | Can front light units be seen by   | drivers in all lanes   | (would T/T obscure?)?                             | N/A                     |                     |                     |   |  |
| observe  | Can back light units be seen by a  | all stopped drivers  | in all lanes?                                     | N/A                     |                     |                     |   |  |
|          | Sidewalks, paths, trails, etc.     |  |   |                         |                     |                     |   |  |
| measure  | Distance from path centerline to   | o signal mast =  |   | N/A                     | m (max.=3.6m)       |                     |   |  |
| observe  | Are separate light units required  | 1?   |   | N/A                     |                     |                     |   |  |
|          | •                                  |  |   |                         |                     | •                   |   |  |
| Comments | Following Site Visit:              |  |   |                         |                     |                     |   |  |

- FLASHING LIGHTS were not observed at the crossing.





Typical Light Unit Arrangement for an Adjacent Intersection

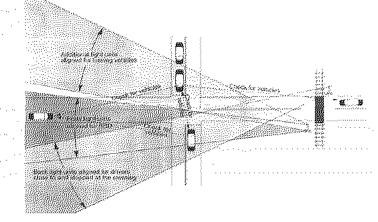
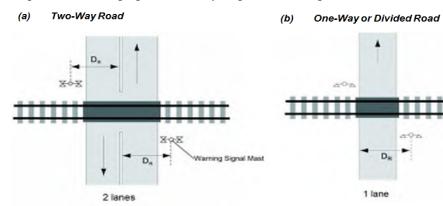
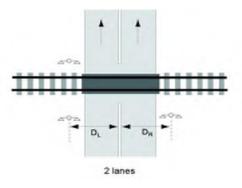


Figure 13-1 – Warning Signal Offsets Requiring Cantilevered Light Units





GCS Sections 12-14





GCS Sections 13 and 14

| PREPARE TO STOP A | RAILWAY CROSSING SIGN |
|-------------------|-----------------------|
|-------------------|-----------------------|

| Source  | Item NA   |   |  |                 |                      |                                     |  |  |
|---------|---|---|--|-----------------|----------------------|-------------------------------------|--|--|
| observe | Are signs present?                                      | No<br>No  | EB approach<br>WB approach                                   |                 |                      | SOR 67 (1), (2)<br>GCS 18.21 & 18.2 |  |  |
| look-up | Minimum Distance for Primary Light Ur                   | nits (SSD)  |  | N/A             | m                    | Sheet 13                            |  |  |
| look-up | Recommended distance for Primary Lig                    | ght Units   |  | N/A             | m                    | Sheet 13                            |  |  |
|         | Warrants  |   |  |                 |                      |                                     |  |  |
| observe | Are all front light units obscured within               | Are all front light units obscured within minimum distance above? |  |                 |                      |                                     |  |  |
| look-up | Is the facility designated a "freeway" or "expressway"? |   |  |                 |                      | Sheet 3                             |  |  |
| observe | Do environmental conditions frequentl                   | y obscure :   | ignal visibility?  | N/A             |                      |                                     |  |  |
|         | Considering maximum prevailing spee                     | ds, geome   | try, and traffic composition, checkthe following:            |                 |                      |                                     |  |  |
| observe | Does sign flash during operation of grad                | de crossing   | warning system?  | N/A             |                      |                                     |  |  |
| measure | Distance from the sign to 2.4m beyond                   | the furthe  | st rail =  | N/A             |                      |                                     |  |  |
| observe | Does the sign flash before the actuation                | n of the cro  | ssing warning system by the time required to travel from the | ne sign to clea | r the crossing? N/A  |                                     |  |  |
| measure | Distance from the sign to the closest ga                | ate =   |  | N/A             | m                    |                                     |  |  |
| observe | Does the flashing sign precede actuation                | on of the de  | scent of the gate arms by the time required to travel from t | he sign to cle  | ar closest gate? N/A |                                     |  |  |
| measure | Time required for all queued vehicles to                | o resume t  | o maximum road operating speed =                             | N/A             | sec                  |                                     |  |  |

Comments Following Site Visit:

#### No PREPARE TO STOP AT RAILWAY CROSSING Signs were observed at crossing.

-general condition

Sheet 15

Sheet 14





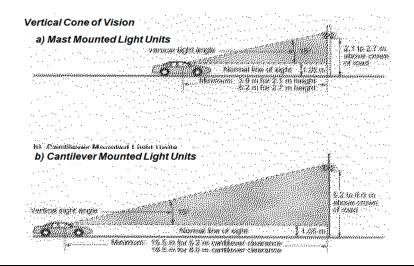
-functions as intended



| Source       | Item NA   |     |  |  |  |  |  |  |
|--------------|---|-----|--|--|--|--|--|--|
| Road √       | Are adjacent traffic signals preempted by a grade crossing warning system?                                | N/A |  |  |  |  |  |  |
| Rail √       | note: provide timing plan if preemption.  |     |  |  |  |  |  |  |
| Road<br>Rail | Date of last preemption check? n/a  |     |  |  |  |  |  |  |
|              | Warrants  |     |  |  |  |  |  |  |
| measure      | Less than 60m between stop line at traffic signal and nearest rail?                                       | N/A |  |  |  |  |  |  |
| observe      | Do vehicles queued for traffic signal regularly encroach closer than 2.4m to the nearest rail?            | N/A |  |  |  |  |  |  |
|              | Field Checks:   |     |  |  |  |  |  |  |
| observe      | Does preemption provide adequate time to clear traffic from grade crossing before train's arrival?        | N/A |  |  |  |  |  |  |
| observe      | Does preemption prohibit road traffic from moving from the street intersection toward the grade crossing? | N/A |  |  |  |  |  |  |
| observe      | Any known queuing problems on the tracks?   | N/A |  |  |  |  |  |  |
| observe      | Are pedestrians accommodated during preemption?   | N/A |  |  |  |  |  |  |
| observe      | Have longer/slower vehicles been considered?  | N/A |  |  |  |  |  |  |
| observe      | Are supplemental signs needed for motorists (no right turn on red light, etc)?                            | N/A |  |  |  |  |  |  |

**Comments Following Site Visit:** 

-functions as intended



#### AREAS WITHOUT TRAIN WHISTLING

Sheet 16

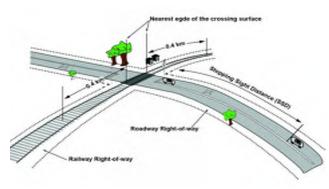
Grade Crossings Standards, July 2014

#### APPENDIX D - WHISTLING CESSATION

#### Table D-1 – Requirements for Warning Systems at Public Grade Crossings within an Area without Whistling

### Figure D-1 - prescribed area for whistling cessation as per article 23.1 of the RSA

|                               | 0             | Column A           | Column B<br>Grade Crossings For Sidewalks,<br>Paths, or Trails with the centreline<br>no closer than 3.6 m (12 ft) to a<br>warning signal for vehicles<br>No. of Tracks |                                      |  |  |
|-------------------------------|---------------|--------------------|---|--------------------------------------|--|--|
| Railway<br>Design Speed       | Grade Crossin | gs for Vehicle Use |   |                                      |  |  |
|                               | No            | . of Tracks        |   |                                      |  |  |
|                               | 1             | 2 or more          | 1   | 2 or more                            |  |  |
| Column 1                      | Column 2      | Column 3           | Column 4  | Column 5                             |  |  |
| 1 – 25 km/h (15 mph)          | FLB           | FLB                | No warning<br>system<br>requirement   | No warning<br>system<br>requirements |  |  |
| 25 – 81 km/h<br>(16 – 50 mph) | FLB           | FLB & G            | FLB   | FLB & G                              |  |  |
| Over 81 km/h (50 mph)         | FLB & G       | FLB&G              | FLB & G   | FLB & G                              |  |  |



RSA = Railway Safety Act of Canada

#### Legend :

FLB is a warning system consisting of flashing lights and a bell.

FLB & G is a warning system consisting of flashing lights, a bell and gates

| Source  | e Item  |    |           |    |  |  |  |  |
|---------|---|----|-----------|----|--|--|--|--|
| Rail    | Is train whistling prohibited at this crossing?     | No | 24 hours? | No |  |  |  |  |
| observe | Is there evidence of routine unauthorized access (t | No |           |    |  |  |  |  |
| observe | Are the requirements of Table D-1 met?              | No |           |    |  |  |  |  |

#### Comments Following Site Visit:

Whistle Cessation not required

#### Additional Prompt Lists

#### **Human Factors:**

- \* Control device visibility / background visual clutter.
- <sup>o</sup> Driver workload through this area (i.e., are there numerous factors that simultaneously require the driver's attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.).
- attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.).
  <sup>9</sup> Driver expectancy of the environment (i.e., are the control measures in keeping with the design levels of the road system and adjacent environment).
- \* Need for positive guidance.
- " Conflicts between road and railway signs and signals.

#### **Environmental Factors:**

- " Extreme weather conditions.
- \* Lighting issues (night, dawn/dusk, tunnels, adjacent facilities, headlight or sunlight glare, etc.)
- \* Landscaping or vegetation.
- " Integration w/ surrounding land use (e.g., parked vehicles blocking sightlines, merging traffic lanes, etc.)

#### All Road Users:

Λ.

| <ul> <li>-pedestrians (incl<br/>-children / elderty</li> </ul> | uding strollers, baby carriages, and blind persons) |    |
|--|---|----|
|  | s (wheelchairs, scooters, walkers, etc)             |    |
| -bicyclists  |   |    |
| -motorcyclists   |   |    |
| -over-sized trucks   | \$  | ·. |
| -buses   |   |    |
| <ul> <li>recreational vehi</li> </ul>                          | icles   |    |
| -golfcarts   |   |    |
| <ul> <li>hazardous mate</li> </ul>                             | rials   |    |

(mage barriers/guide fencing, additional pedestrian bell, pedestrian gates, sign indicating potential presence of 2<sup>nd</sup> train at a multi track crossing, etc)

#### Other:

 Should closure of the crossing be considered due to inactivity, presence of nearby adjacent crossings, etc.

Commente Following Site Visit:

VFPA REPORT NUMBER: 20-0173

## VFPA FSPL TRANSPORTATION IMPROVEMENTS PROJECT 02 – MILE 117.63 SPUR 0.04, 65 ROBSON ROAD,

FEBRUARY 09, 2021



## REVISION HISTORY

FINAL ISSUE

| 2020/09/03                   | FIRST DRAFT                          |                                       |  |
|------------------------------|--------------------------------------|---------------------------------------|--|
| Prepared by                  | Reviewed by                          |                                       |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer |                                       |  |
| 2020/10/21                   | SECOND DRAFT                         |                                       |  |
| Prepared by                  | Reviewed by                          |                                       |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer |                                       |  |
| 2021/02/09                   | FINAL                                | -                                     |  |
| Prepared by                  | Reviewed by                          | Approved By                           |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer | R. Sewell, Senior<br>Project Engineer |  |

## SIGNATURES

PREPARED BY

09/02/2021

09/02/2021

Patrick McCabe, CPEng (Aus), APEC Eng Track Designer Date



Robert Sewell, P.Eng Senior Project Engineer

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## **NSD**

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## **1 CROSSING OVERVIEW**

WSP Canada Group Limited (WSP) has been contracted as part of the Fraser Surrey Port Lands – Transportation Improvements Preliminary Design Services project, to complete a Railway Crossing Safety Assessment on the 65 Robson Road grade crossing. The Vancouver Fraser Port Authority (VFPA) owned crossing is located within the Vancouver Frasier Port Authority (VFPA), Fraser Surrey Docklands. The crossing is located along the Canadian National (CN) Brownsville Spur which comes off Mile 117 of the Yale Subdivision.

A Railway Crossing Field Safety Assessment was undertaken on the 23rd of July 2020 and updates the previous Railway Crossing Assessment undertaken by WSP (formally MMM Group) on the 5<sup>th</sup> of May 2015. The Railway Crossing Assessment as conducted follows the guidelines of applicable requirements identified in the most recent edition of Transport Canada's Grade Crossing Regulations (GCR) and Grade Crossing Standards (GCS).

The crossing is a passive protected crossing (SRCS), equipped with two RAILWAY CROSSING and STOP signs, located within an industrial area. A Tractor Trailer (WB-20) is the design vehicle used to represent daily traffic on port property. The Railway traffic volumes were provided by the VFPA while the Average Annual Daily Traffic (AADT) was calculated based on the realigned infrastructure.

This report aims to identify the modifications to the grade crossing since the previous inspection completed by MMM Group in 2015, as well as highlight any new or previously identified non-compliances still relevant to this crossing.

## 1.1 LOCATION

The Robson Road grade crossing is located within Fraser Surrey Docks jurisdiction at 65 Robson Road and crosses the VFPA spur track. The crossing is located at the latitude and longitude of 49°10'58" and 112°54'32" respectfully. Figure 1, below shows the location of the crossing.



Figure 1: Crossing Location (source: Google Earth, 2020)

# 2 SAFETY ASSESSMENT

## 2.1 PREVIOUS ASSESSMENT (2015)

A previous crossing assessment was undertaken in 2015 by WSP for the 65 Robson Road crossing. The objective of the assessment was 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 referred to in the Railway Safety Act / Grade Crossing Regulations and contained in the Grade Crossing Standards.
- 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.

The outcome of the 2015 assessment offered recommendations for consideration by the VFPA.

Table 1: Previous Non-Compliances, illustrates the non-compliances and recommendations offered within the 2015 report. The recommendations were categorised within the three priority levels;

- Low implement the measures as soon as practicable
- Medium implement the measures by Transport Canada GCS & GCR November 2021 deadline.
- High implement the measures forthwith

|     | Observations   | Suggested Actions  | Priority | Addressed?   |  |  |  |
|-----|--|--|----------|--|--|--|--|
| GCS | Section 3 – Crossing Surface (Basic Requirem   | ent)   |          |  |  |  |  |
| a.  | Railway crossing surface does not extend at least 0.5m beyond the edge of the travelled way on both approaches.  | Extend railway crossing surface to extend at least 0.5m beyond the edge of the travelled way   | High     | No – Asphalt has been added since<br>2015 inspection. However, the<br>extension is breaking and insufficient |  |  |  |
| b.  | Flangeway depth does not meet the requirement due to debris.   | Clean debris from the flangeway. Once debris is removed from the flangeway, the railway company is to ensure the minimum depth is met. | High     | No – Debris remains within flangeway   |  |  |  |
| GCS | Section 4 – Railway Crossing and Number of T   | racks Sign (Basic Requirement)   |          |  |  |  |  |
| a.  | RAILWAY CROSSING sign not present on<br>south approach.  | Install RAILWAY CROSSING sign on south approach<br>as per GCS Section 8.1  | High     | Yes –New RAILWAY CROSSING<br>Signs has been installed.   |  |  |  |
| b.  | RAILWAY CROSSING sign is faded on the<br>north approach and is located too close to the<br>edge of travelled way | Replace RAILWAY CROSSING sign on the north<br>approach as per GCS Section 8.1 and relocate sign as<br>per GCS Section 4.1.             | High     | Yes – New RAILWAY CROSSING Sign<br>installed in compliance with GCS  |  |  |  |
| GCS | Section 5 – Crossing Surface   |  |          |  |  |  |  |
| a.  | The approach road surface at the grade crossing has cracks   | Repave crossing surface of the grade crossing such that it is smooth and continuous  | Medium   | No – Cracks have worsened between inspections.   |  |  |  |
| GCS | Section 7 – Sightlines   |  |          |  |  |  |  |

#### **Table 1: Previous Non-Compliances**

| a.  | Clear sightline areas where drivers stopped at<br>the crossing ( $D_{\text{STOPPED-VEH}}$ ) cannot be provided<br>or maintained due to fences and an equipment<br>yard on the northwest corner, and track<br>geometry of the southwest corner of the<br>crossing | If minimum sightlines cannot be provided and maintained, then a warning system with gates is required.  | Medium | No – Fence/ storage yard remain   |
|-----|--|---|--------|---|
| GCS | Section 8 – Signs  |   |        |   |
| a.  | Retroreflective strips are not provided on the<br>back of the RAILWAY CROSSING sign and<br>both sides of the sign supporting post  | Mount retroreflective strips on the back of the RAILWAY CROSSING sign and both sides of the sign supporting post.   | Medium | Yes – retroreflective strips installed on<br>back of both RAILWAY CROSSING<br>Signs and poles |
| b.  | RAILWAY CROSSING AHEAD signs are not<br>present on either approach of the crossing.  | Install RAILWAY CROSSING AHEAD signs on both<br>approaches of Robson Road as per BCMoT's Signage<br>and Pavement Manual (2000).   | Medium | Yes – RAILWAY CROSSING AHEAD<br>Signs installed on both approaches.                           |
| C.  | STOP signs are not present on either approach of the crossing.   | Install STOP signs on same post as RAILWAY CROSSING signs as per GCS Section 8.4.   | Medium | Yes – STOP Signs installed below<br>RAILWAY CROSSING Signs.                                   |
| d.  | EMERGENCY NOTIFICATION signs are not<br>present on either approach of the crossing   | Install EMERGENCY NOTIFICATION sign on both<br>approaches as per GCS Section 8.5  | Medium | Yes – EMERGENCY NOTIFICATION<br>Signs installed below STOP Signs.                             |
| e.  | Double stop bars and RAILWAY CROSSING<br>symbol pavement markings are not present on<br>either approach to the crossing for vehicles.  | Paint double stop bars and RAILWAY CROSSING<br>symbol pavement markings on both road approaches   | Low    | Yes - Double stop bars have been<br>installed but need repainting.                            |
| f.  | Stopping or parking restriction is not observed at the railway right-of-way  | Install NO STOPPING signs within the railway right-of-<br>way   | Low    | Yes – DO NOT STOP ON TRACKS<br>Sign installed below RAILWAY AHEAD<br>Sign on both approaches. |
| GC  | S Sections 9, 12 to 17 – Warning Syste   | em Design   |        |   |
| a.  | An active warning system without gates is warranted based on cross-product   | Install active warning system without gates. However,<br>Transport Canada indicated that the crossing could<br>stay passive indefinitely unless the sightline<br>requirements could not be met. | Low    | No  |

## 2.2 CROSSING MODIFICATIONS

As shown in Appendix A: Site Photographs, a number of changes have occurred at the crossing between inspections. Most changes were based on recommendations outlined in the 2015 inspection.

Table 1, shows what changes have been made based on the 2015 recommendations. Below is a summarised list of all the changes observed from the site inspection:

- New grade crossing signage, including;
  - o RAILWAY CROSSING Signs
  - o STOP Signs
  - o EMERGECNY NOTIFACATION Signs
  - RAILWAY CROSSING AHEAD signs
  - 0 DO NOT STOP ON TRACKS Signs
- New MUTCD compliant pavement marking
- A small amount of asphalt installed on both sides of crossing.

## 2.3 ASSESSMENT AND RECOMMENDATIONS

An updated Grade Crossing Safety Assessment was undertaken for the proposed realignment of the port road access and to determine any required crossing upgrades to ensure compliance with the GCR & GCS. **Appendix B: Site Inspection Report** provides details of the observations made during the site inspection. The inspection report also outlines outstanding safety issues, along with recommended remediations. Table 2: 2020 Crossing Recommendations, summarizes the recommendations from the field investigation.

The installation of the new track activates a warrant in the GSR and GCS to immediately comply with all requirements of the GCR and the GCS. Any grandfathered crossing rights become revoked upon completion of the new roadworks and crossing expansion. The client needs to ensure that the crossing design plans, fully completed crossing plans (E-4) and full crossing safety assessment, which comply with the full requirements of the GCR and GCS, have been completed and filed with Canadian Transportation Agency and applicable railway.

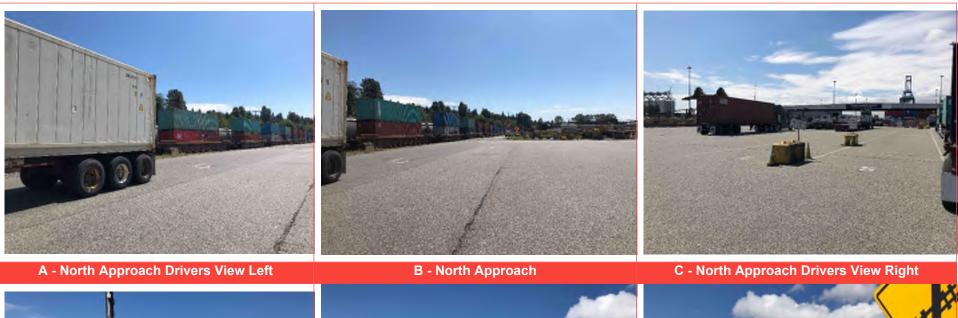
|          | Observations  | Suggested Actions   | Priority | Order of<br>Magnitude |
|----------|---|---|----------|-----------------------|
| GCS Sect | tion 3 – Crossing Surface (Basic Requirement)   |   |          |                       |
| a.       | Flangeway depth impeded due to debris   | Clean debris from the flangeway.  | Low      | \$500                 |
| b.       | Railway crossing surface does not extend at least 0.5m beyond the edge of the travelled way on both approaches.   | Extend railway crossing surface to extend at least 0.5m beyond the edge of the travelled way                      | High     | \$750                 |
| GCS Sect | tion 5 – Crossing Surface   |   |          |                       |
| a.       | The approach road surface at the grade crossing has cracks  | Repave crossing surface of the grade crossing such that it is smooth and continuous                               | Low      | \$20,000              |
| GCS Sect | tion 7 – Sightlines   |   |          |                       |
| a.       | Clear sightline areas where drivers stopped at the crossing $(D_{\text{STOPPED-VEH}})$ cannot be provided or maintained due to fences and an equipment yard on the northwest corner, and track geometry of the southwest corner of the crossing | If minimum sightlines cannot be provided and maintained, then a warning system with gates is required.            | High     | \$15,000              |
| GCS Sect | tion 8 – Signs  | · · · · · · · · · · · · · · · · · · ·   |          | L                     |
| a.       | Pavement markings are faded across the crossing and approaches.   | Repaint double stop bars and RAILWAY CROSSING symbol pavement markings and all line work on both road approaches. | Low      | \$800                 |
| GCS Sect | tions 9, 12 to 17 – Warning System Design   |   |          |                       |
| a.       | An active warning system with gates is warranted based on<br>cross-product and crossing angle   | Install active warning system with gates.   | High     | \$600,000             |

#### Table 2: 2020 Crossing Recommendations



# A SITE PHOTOGRAPHS

## **APPENDIX**





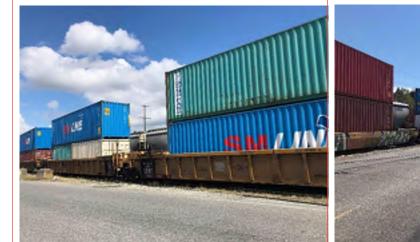
D - South Approach Drivers View Left

 E - South Approach



F - South Approach Drivers View Right

## **APPENDIX**



G – North Approach Driver View Left (At Stopped Position)



H - North Approach (At Stopped Position)



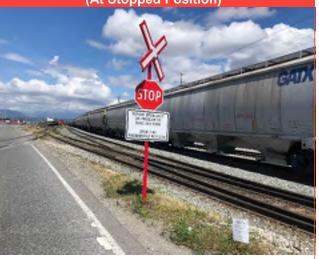
I – North Approach Drivers Right (At Stopped Position)



J- South Approach Drivers View Left (At Stopped Position)



K - South Approach (At Stopped Position)



L - South Approach Drivers View Right (At Stopped Position)

## **APPENDIX**





# B SITE INSPECTION REPORT

CANADIAN ROAD / RAILWAY GRADE CROSSING DETAILED SAFETY ASSESSMENT FIELD GUIDE (2005)\*

Appendix C2: Field Data Forms

×

Passive & Active Crossings

Mile117.63 Spur 0.04 (65 Robson Road),VFPA Surrey, British Columbia For Vancouver Fraser Port Authority

|           | Legend: |   |
|-----------|---------|---|
| calculate | Formula | Spreadsheet cell has formula  |
| look up   |         | User to look up value in table or chart.  |
|           |         | User to input value here for conditional formatting or formulas in other cells to function                |
|           |         | Warning! Value beyond acceptable limits.  |
|           |         | Warning! Value beyond acceptable limits for certain conditions (i.e. for people using assistive devices). |
|           | Rail    | Information to be provided by Railway Company   |
|           | Road    | Information to be provided by Roadway Authority   |
| measure   | observe | Information to be obtained during Site Investigation  |
|           | V       | Information provided by others to be verified in the field  |

\* Updated to reflect Transport Canada's Grade Crossing Standards (GCS) July 2014 and Grade Crossing Regulations (GCR)(SOR-2014-275 Feb 2016)

| Sheet 1                 |                                       |                              | Grade Cros                | sing Safety Assessm      | ent                                    |                                     | Passive Crossings |
|-------------------------|---------------------------------------|------------------------------|---------------------------|--------------------------|--|-------------------------------------|-------------------|
| Date of Assessment:     |                                       | 22-Jul-2                     | <b>0</b> Site Investigati | on                       |  |                                     |                   |
| Assessment Team Me      | embers & Affiliations:                | Patrick McCabe<br>Rob Sewell |                           |                          |  |                                     |                   |
| Reason for Assessme     | nt: New Proposed                      | Pedestrian Crossing          |                           |                          |  |                                     |                   |
|                         | periodic assessment                   | х                            | significant chai          | nge in infrastructure    |  | significant change in road          | or rail volumes   |
|                         | cessation of whistling                |                              |                           | nge in train operations  |  | significant change in road          | or rail speeds    |
|                         | change in vehicle types               |                              | 2+ fatal collisio         | ns in 5yr. Period        |  | other collision experience          | (see below)       |
| Railway Authority:      | Vancouver Fraser Port Authority       |                              |                           |                          | Road Authority:                        | Vancouver Fraser Port Au            | ithority (VFPA)   |
| Crossing Location:      | Robson Road and Plywood Road          |                              |                           |                          | Road Name/Number                       | r: Robson Road and Elevato          | or Road           |
| Location Number:        | N/A                                   |                              |                           |                          | Province:                              | British Columbia                    |                   |
| Municipality:           | City of Surrey, BC                    |                              |                           |                          | Location Reference (                   | (control section, etc.):            | DP Surrey Docks   |
| Railway: VFPA           |                                       | Mile:                        | 117.63                    |                          | Road Classification:                   |                                     |                   |
|                         |                                       |                              |                           |                          | (freeway/expresswa                     | y arterial, collector, local, etc): | ULU               |
| Sub-division:           | Yale Sub/ Brownsville Spur            | Spur:                        | 0.04                      |                          |  |                                     |                   |
| Type of Grade Crossir   | ng [private/public; warning devices]: | SRSC                         |                           |                          | Roadway East/West<br>Roadway North/ So |                                     |                   |
| Track Type: [mainline   | etc ]                                 |                              | Yard                      |                          |  |                                     |                   |
| index i yper [mainine   | ,, c.o.]                              |                              |                           |                          | *Urban Local Undivi                    | ded                                 |                   |
|                         |                                       |                              |                           |                          |  |                                     |                   |
| Collision History (5-ye | ear period): No record of ac          | citents at the subjec        | t railway crossin         | g within the past five y | /ears                                  |                                     |                   |
| Property                | Damage collisions:                    |                              | NIL                       |                          |  |                                     |                   |

Number of Persons Injured:

Number of Persons Killed:

NIL

NIL

NIL

NIL

NIL

Property Damage co

+ Personal Injury collisions:

+ Fatal Injury Collisions:

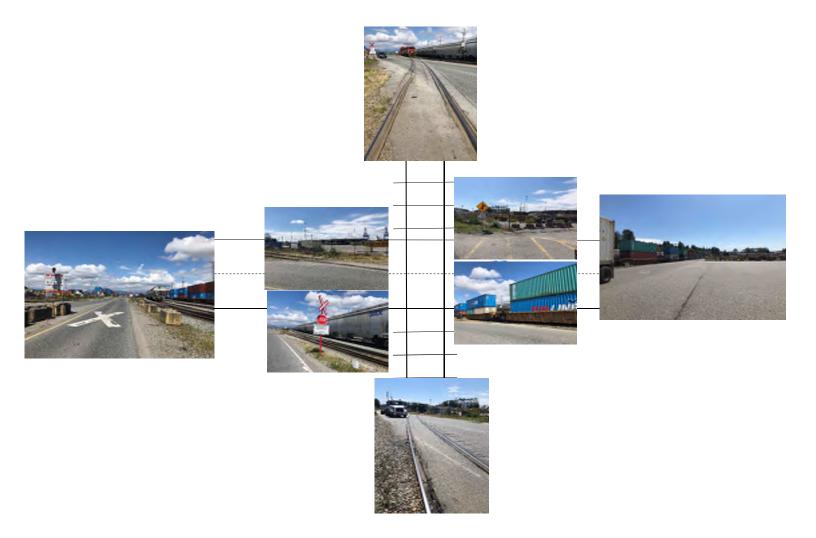
= Total Collisions in last 5 year period:

Provide Details of the collisions if available:

Sources:

- identify main contributing factors

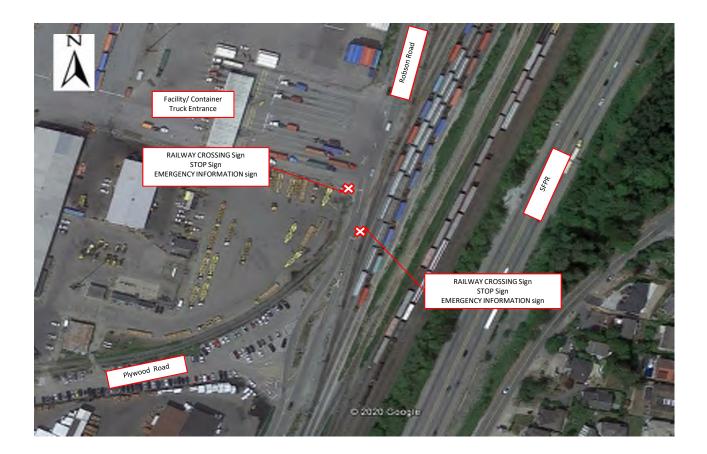
Sheet 2a

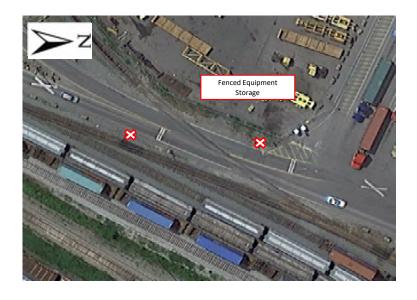


Sheet 2b

SCENE SKETCH

NOTE: All references to direction in this safety review are keyed to this diagram.





Images from Google Earth Notes:

- Include: - directions to nearby municipalities for both road & rail approaches (use arrows)
  - adjacent intersections
  - relevant road signs/signals
  - signal warning systems hardware
- landmarks - crosswalks/paths

- geographical features - bus stops, etc.

#### GENERAL INFORMATION

| Source  | e Item   |      |            |   |  |  |  |  |  |  |  |
|---------|--|------|------------|---|--|--|--|--|--|--|--|
| Rail    | Maximum Railway Operating Speed, V <sub>T</sub>            | =    | 10         | (mph)   |  |  |  |  |  |  |  |
| Rail    | Daily Train Volume:  | =    | 30         | (freight trains/day)                                |  |  |  |  |  |  |  |
| Ndii    |  | =    | 0          | (passenger trains/day)                              |  |  |  |  |  |  |  |
| Rail    | Switching during daytime? Y/N Yes nighttime? Y/N Yes       |      |            |   |  |  |  |  |  |  |  |
| Road    | Avg. Annual Daily Traffic, AADT:                           | =    | 2,830      | (vpd) Year of count: 2020                           |  |  |  |  |  |  |  |
| Road    | High seasonal fluctuation in volumes?                      |      | No         |   |  |  |  |  |  |  |  |
| Road    | Pedestrian Volumes   | =    | 0          | (ped./day)  |  |  |  |  |  |  |  |
| Road √  | Is crossing on a School Bus route?                         |      | No         |   |  |  |  |  |  |  |  |
| Road √  | Do Dangerous Goods trucks use this roadway?                |      | Yes        |   |  |  |  |  |  |  |  |
| Road    | Cyclist Volumes  | =    | 0          | (cyclists/day) Cyclist not anticipated              |  |  |  |  |  |  |  |
| Road √  | Regular use of crossing by persons with Assistive Devices? | )    |            | Pedestrians using Assistive Devices not anticipated |  |  |  |  |  |  |  |
| Road √  | Other special road users?                                  | type | Unknown    | daily volume None                                   |  |  |  |  |  |  |  |
| Road    | Forecasted AADT <sup>2</sup>                               | =    | 2,250      | (vpd) Forecasted Year: 2022                         |  |  |  |  |  |  |  |
|         | Design Speed:  |      | 30         | km/h Posted Speed: <b>30</b> km/h                   |  |  |  |  |  |  |  |
| Road √  | Maximum Operating Speed:                                   |      | 30         | km/h  |  |  |  |  |  |  |  |
|         | note: provide details if all approaches are not the same   |      |            |   |  |  |  |  |  |  |  |
| Road √  | Road Surface Type (asphalt, concrete, gravel, etc.):       |      | Asphalt    |   |  |  |  |  |  |  |  |
| observe | Surrounding Land Use (urban/rural)?:                       |      | Industrial |   |  |  |  |  |  |  |  |
| observe | Any schools, retirement homes, etc. nearby?                |      | No         |   |  |  |  |  |  |  |  |

#### Notes:

Sheet 3

1. Road Authority should provided plans if available.

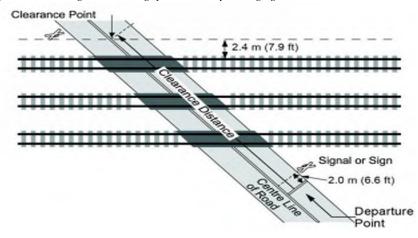
2. AADT is based upon modelled future traffic counts for the Realigned infrastrucutre.

#### From GCS Section 7.1.2:

| Column 1       | Column 2   | Column 3   |
|----------------|--|--|
| Class of Track | The maximum<br>allowable operating<br>speed for freight trains<br>is - | The maximum<br>allowable operating<br>speed for passenger<br>trains is - |
| Class 1 track  | 17 km/h (10 mph)   | 25 km/h (15 mph)   |
| Class 2 track  | 41 km/h (25 mph)   | 49 km/h (30 mph)   |
| Class 3 track  | 65 km/h (40 mph)   | 97 km/h (60 mph)   |
| Class 4 track  | 97 km/h (60 mph)   | 129 km/h (80 mph)  |
| Class 5 track  | 129 km/h (80 mph)  | 153 km/h (95 mph)  |

Figure 10-1 - Clearance Distance (cd) for Grade Crossings

(a) For Grade Crossings with a Warning System or Railway Crossing Sign

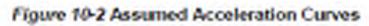


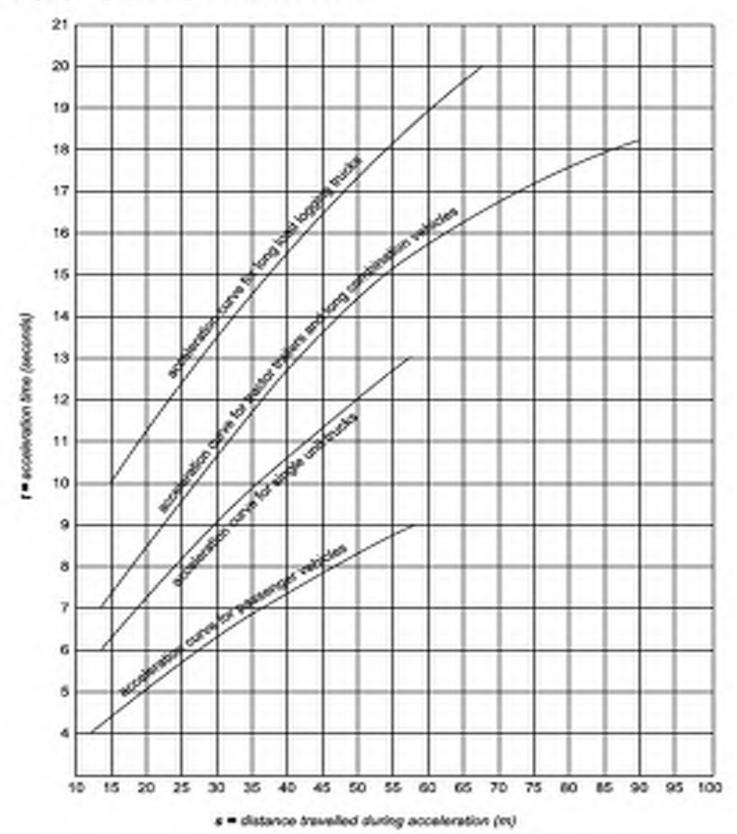
#### Grade Crossings Standards, July 2014

Table 10-1 Ratios of Acceleration Times on Grades

| Design Vehicle            | Road Grade (%) |     |     |     |     |  |  |  |  |  |  |  |
|---------------------------|----------------|-----|-----|-----|-----|--|--|--|--|--|--|--|
|                           | -4             | -2  | 0   | +2  | +4  |  |  |  |  |  |  |  |
| Passenger Car             | 0.7            | 0.9 | 1.0 | 1.1 | 1,3 |  |  |  |  |  |  |  |
| Single Unit Truck & Buses | 0.8            | 0.9 | 1.0 | 1.1 | 1.3 |  |  |  |  |  |  |  |
| Tractor-Semitrailer       | 0.8            | 0.9 | 1.0 | 1.2 | 1.7 |  |  |  |  |  |  |  |

Source: Geometric Design Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999





DESIGN CONSIDERATIONS

| Source    |  |  |                           |                   | Item                     |             |           |     |           |     | Reference       |
|-----------|--|--|---------------------------|-------------------|--------------------------|-------------|-----------|-----|-----------|-----|-----------------|
|           | Design Vehicle                         |  |                           |                   |                          |             |           |     |           |     |                 |
| Road      | Type:                                  | 6                                      | WB-20 Tractor-9           | Semitrailers (W   | /B-20)                   |             |           |     |           |     | Table 1* SOR 57 |
| look-up   | Length, L:                             |  | 22.7                      | m                 |                          |             | SB Approa | :h  | NB Approa | ch  | Table 1*        |
| look-up   | Stopping Sight Distance, SSD           |  | 45                        | m (round to       | 1.0% of grade)           | =           | 10        | m   | 45        | m   | Table 3*        |
| measure   | Clearance Distance, cd                 |  |                           |                   |                          | =           | 34.2      | m   | 34.2      | m   | GCS 16.1.1      |
| calculate | Vehicle Travel Distance, S             |  | S= L+cd                   | 56.9              | max <                    | =           | 56.9      | m   | 56.9      | m   |                 |
| look-up   | Vehicle Departure Time, t              |  |                           |                   |                          | =           | 15.5      | sec | 15.5      | sec | GCS Figure 10-2 |
| Road √    | Road Grade Effect:                     | maximum approa                         | ch grade within 'S        | i':               |                          | =           | 0.60      | %   | 0.70      | %   | Sheet 7         |
| look-up   | grade adjustment factor (anto ca       | lc assumes Truck)( ma                  | anual input from Tab      | le 10-1 if other) |                          | =           | 1.03      |     | 1.04      |     | GCS Table 10-1  |
| calculate |  | T= t x adjustment                      | factor                    |                   |                          | =           | 15.9      | sec | 16.0      | sec |                 |
|           | Design Vehicle Departure Tir           | <b>ne, T<sub>D</sub> = J +</b> T (whe  | re J = 2 sec (min.) perce | ption & reaction) |                          |             | 2.0       | sec | 2.0       | sec |                 |
| calculate |  | T <sub>G stop</sub> = T <sub>D</sub> = | 18.0                      | sec               |                          | <-          | 17.9      | sec | 18.0      | sec | GCS 10.3.2      |
| observe   | Do field acceleration times exce       | ed T <sub>D</sub> ?                    | Acceleration me           | easurement be     | yond the scope           | of this ass | essment.  |     |           |     |                 |
| measure   | Pedestrian, cyclist & Assistiv         | e Devices Depar                        | ture Time                 | pedest            | trian <b>cd</b> distance | =           | 0.0       | m   | 0.0       | m   | CCC 10.2.2      |
| calculate | walking speed 1.22m/s max.             | T <sub>P</sub> =                       | 0.0                       | sec               | (1.0m/s used)            | <-          | 0.0       | sec | 0.0       | sec | GCS 10.3.3      |
| calculate | T <sub>SSD</sub> = (SSD+cd+L)/(0.27783 | 7 x V <sub>road design</sub> ) =       | 12.2                      | sec               |                          |             |           |     |           |     |                 |
| Comments  | Following Site Visit:                  |  |                           |                   |                          |             |           |     |           |     |                 |

#### Table 1 - Design vehicle Lengths/Class

Sheet 4

| General Vehicle Descriptions            | Length (m) |
|---|------------|
| 1. Passenger Cars, Vans and Pickups (P) | 5.6        |
| 2. Light Single-unit Trucks (LSU)       | 6.4        |
| 3. Medium Single-unit Trucks (MSU)      | 10.0       |
| 4. Heavy Single-unit Trucks (HSU)       | 11.5       |
| 5. WB-19 Tractor-Semitrailers (WB-19)   | 20.7       |
| 6. WB-20 Tractor-Semitrailers (WB-20)   | 22.7       |
| 7. A-Train Doubles (ATD)                | 24.5       |
| 8. B-Train Doubles (BTD)                | 25.0       |
| 9. Standard Single-Unit Buses (8-12)    | 12.2       |
| 10. Articulated Buses (A-BUS)           | 18.3       |
| 11. Intercity Buses (I-BUS)             | 14.0       |

Table 6 - Minimum Sightlines along the Rail Line (D<sub>steped</sub>) (as illustrated in Figure 3)

| Railway Design<br>Speed V,                  |     | $T_{stopped} = Departure Time (greater of T_d or T_p) (seconds)$ |     |     |      |     |      |     |     |     |     |                       |  |  |  |  |
|---|-----|--|-----|-----|------|-----|------|-----|-----|-----|-----|-----------------------|--|--|--|--|
| (mph)                                       | ≤10 | 11   | 12  | 13  | 14   | 15  | 16   | 17  | 18  | 19  | 20  | 20 sec., add for each |  |  |  |  |
| WARNING:<br>Railway design<br>speed in mph! |     | additional second<br>(m)   |     |     |      |     |      |     |     |     |     |                       |  |  |  |  |
| STOP  | 300 | 30   | 30  | 30  | 30   | 30  | 30   | 30  | 30  | 30  | 30  | +0                    |  |  |  |  |
| 1-10  | -45 | 50   | 55  | 60  | - 45 | 70  | 72   | 76  | 80  | 85  | 90  | +5                    |  |  |  |  |
| 11-20                                       | 90  | 100  | 130 | 120 | 125  | 135 | 145  | 155 | 165 | 130 | 183 | +10                   |  |  |  |  |
| 21-30                                       | 135 | 150  | 165 | 175 | 190  | 205 | 215  | 230 | 245 | 255 | 270 | +15                   |  |  |  |  |
| 31-40                                       | 180 | 200  | 220 | 235 | 250  | 270 | 285  | 305 | 325 | 340 | 360 | +20                   |  |  |  |  |
| 41-50                                       | 225 | 250  | 270 | 290 | 315  | 335 | 360  | 380 | 405 | 425 | 450 | +25                   |  |  |  |  |
| 51-60                                       | 270 | 300  | 325 | 350 | 380  | 405 | -180 | 460 | 485 | 510 | 540 | +30                   |  |  |  |  |
| 61-76                                       | 315 | 350  | 380 | 415 | 445  | 470 | 505  | 535 | 565 | 595 | 630 | +35                   |  |  |  |  |
| 71-80                                       | 360 | 395  | 435 | 465 | 505  | 540 | 580  | 610 | 650 | 680 | 720 | +40                   |  |  |  |  |
| #1-90                                       | 405 | 46   | 490 | 535 | 530  | 605 | 650  | 685 | 730 | 765 | 810 | +45                   |  |  |  |  |
| 91-100                                      | 450 | 500  | 540 | 580 | 630  | 670 | 715  | 760 | 805 | 850 | 895 | +50                   |  |  |  |  |

Source: Geometric Design Guide for Canadian Roads, TAC; September 1999.

#### Table 3 – Determine SSD for Truck Class

| Road<br>rossing<br>Design |      | Truck Class<br>Stopping Sight Distance (SSD)<br>(m) |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|---------------------------|------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Speed V<br>(km/hr)        |      | Road Approach Gradient                              |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| (MII/III)                 | -10% | -9%   | -8% | -7% | -6% | -5% | -4% | -3% | -2% | -1% | 0%  | 196 | 2%  | 3%  | 4%  | 5%  | 6%  | 7%  | 8%  | 996 | 10% |
| 10                        | 10   | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  |
| 20                        | 26   | 26  | 26  | 26  | 26  | 26  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 24  | 24  | 24  | 24  | 24  |
| 30                        | 48   | 48  | 47  | 47  | 47  | 46  | 46  | 46  | 45  | 45  | 45  | 45  | 45  | 44  | 44  | 44  | 44  | 44  | 44  | 43  | 43  |
| 40                        | 76   | 75  | 74  | 74  | 73  | 73  | 72  | 71  | 71  | 70  | 70  | 70  | 69  | 69  | 68  | 68  | 68  | 67  | 67  | 67  | 67  |
| 50                        | 121  | 120   | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 111 | 110 | 109 | 108 | 108 | 107 | 106 | 106 | 105 | 105 | 104 | 104 |
| 60                        | 149  | 146   | 144 | 142 | 140 | 138 | 136 | 134 | 133 | 131 | 130 | 129 | 128 | 126 | 125 | 124 | 123 | 122 | 122 | 121 | 120 |
| 70                        | 210  | 205   | 202 | 198 | 195 | 192 | 189 | 187 | 184 | 182 | 180 | 178 | 176 | 175 | 173 | 171 | 170 | 169 | 167 | 166 | 165 |
| 80                        | 252  | 246   | 241 | 236 | 231 | 227 | 223 | 219 | 216 | 213 | 210 | 207 | 205 | 202 | 200 | 198 | 196 | 194 | 192 | 191 | 189 |
| 90                        | 318  | 311   | 304 | 297 | 292 | 286 | 281 | 277 | 273 | 269 | 265 | 262 | 258 | 255 | 252 | 250 | 247 | 245 | 243 | 240 | 238 |
| 100                       | 401  | 391   | 382 | 373 | 365 | 358 | 352 | 346 | 340 | 335 | 330 | 325 | 321 | 317 | 314 | 310 | 307 | 304 | 301 | 298 | 295 |
| 110                       | 455  | 441   | 428 | 417 | 406 | 397 | 388 | 380 | 373 | 366 | 360 | 354 | 349 | 344 | 339 | 334 | 330 | 326 | 322 | 319 | 315 |

\* Source: Transport Canada's "Determining Minimum Sightlines at Grade Crossings: A Guide for Road Authorities and Railway Companies"

#### Mile117.63 Spur 0.04 (65 Robson Road), VFPA

#### Surrey, British Columbia

LOCATION of GRADE CROSSING

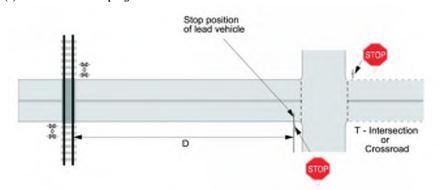
| Source   | Item   |    |                 |  |  |  |  |  |
|----------|--|----|-----------------|--|--|--|--|--|
|          |  |    |                 |  |  |  |  |  |
| observe  | "D" should not be less than 30m for either approach if the train speed exceeds 15 mph.                                 |    |                 |  |  |  |  |  |
|          | D = 22.5m  |    | GCS Section 9.1 |  |  |  |  |  |
| observe  | Are there pedestrian crossings on either road approach that could cause vehicles to queue back to the tracks?          |    |                 |  |  |  |  |  |
| Observe  |  | No |                 |  |  |  |  |  |
| observe  | Is "D" insufficient such that road vehicles might queue onto the rail tracks?  | No |                 |  |  |  |  |  |
|          | Is "D" insufficient such that road vehicles turning from a side street might not see warning devices for the crossing? | No |                 |  |  |  |  |  |
|          |  |    | · · · ·         |  |  |  |  |  |
| Comments | Following Site Visit:  |    |                 |  |  |  |  |  |

- The minimum "D" dimension to the edge of the entrance to Facility in north The Southern "D" is 91.5m

- RAILWAY CROSSING AHEAD sign installed from previous inspection (2015)

- Queuing lanes to access the container facility located in north approach - Railwayspeed = 10mph Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals

(a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

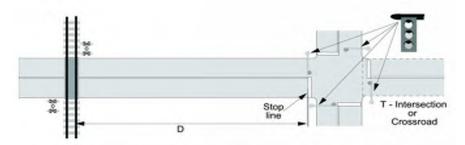
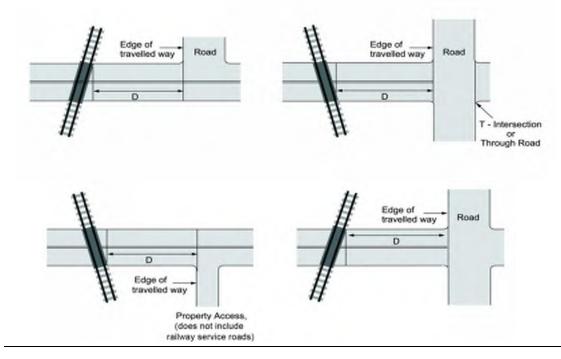


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings



Sheet 5

#### GRADE CROSSING SURFACE

Sheet 6

| e  | Item  |   |  |  |   |   |                                  |   |            |  |
|--|---|---|--|--|---|---|----------------------------------|---|------------|--|
| ve ls t  | the crossir   | ng smooth enough to allow road vehicles, pedestrians, cyclis  | sts, and other ro  | ad users to c  | oss at their n  | ormal speed v   | vithout conse                    | equence?  | SOR 60; GC |  |
|  |   | Yes   |  |  |   |   |                                  |   | 30K 00; GC |  |
| Ve   |   | ing Surface Material: Asphalt   |  |  |   |   |                                  |   | SOR 60; G0 |  |
| Gra  | Grade Crossing Surface Condition: Poor  |   |  |  |   |   |                                  |   |            |  |
|  | Approach Road Surface Type: Ashpalt Ashpalt   |   |  |  |   |   |                                  |   |            |  |
|  | •   | bad Surface Condition: Poor   |  |  |   |   |                                  |   | SOR 60; G0 |  |
| Ro   | badway Illu   | umination?: No  |  |  |   |   |                                  |   |            |  |
|  |   |   | SB Approach  |  |   | NB Approach   | 1                                |   |            |  |
|  |   | e crossing width (perp. C.L. min. = 8.0m)   | r  | 8.6  | m   |   | 1                                |   | GCS 5.1    |  |
|  |   | e extension beyond travel lanes (min. = 0.5m)   | 0.0  | m  | -   | 0.5   | m                                |   | GCS 5.1    |  |
|  | -   | th/Trail crossing width (min. = 1.5m)   | -  | NA   | m   | NA  | m                                |   | GCS 5.1    |  |
|  |   | th/Trail extension beyond sidewalk (min. = 0.5m)  | NA   | m  | _   | NA  | m                                |   | GCS 5.1    |  |
| i <mark>re</mark> Dis  | stance Be   | tween Travel Lane and C.L. of Trail   |  | NA   | m   |   |                                  |   |            |  |
| Cro  | oss-Sectio  | on:   |  | South (Rig   | nt) Rail:   |   | North (Left                      | ) Rail:   | GCS Table  |  |
| i <mark>re</mark> Fla  | angeway v   | vidth (min. = 65mm; max.= 120mm or 75mm <sup>1</sup> )  |  | 85   | mm  |   | 85                               | mm  | GCS Table  |  |
| <mark>ire</mark> Fla   | angeway c   | lepth (min. = 50mm; max.= no limit or 75mm <sup>1</sup> )   |  | 25   | mm  |   | 25                               | mm  | GCS Table  |  |
| Ru   | ural Field S  | ide Gap:  |  |  | _   |   |                                  |   | GCS Table  |  |
| i <mark>re</mark> Sid  | de Gap wi   | dth (max.= 120mm or 0 <sup>1</sup> )  |  | 25   | mm  |   | 25                               | mm  | GCS Table  |  |
|  |   | pth (max.= no limit or 0 <sup>1</sup> )   |  | 25   | mm  |   | 25                               | mm  | GCS Table  |  |
| We   | ear Limits  |   |  |  |   |   |                                  |   | GCS Table  |  |
| i <mark>re</mark> Ele  | evation of  | Top Rail above road surface (max. = 13mm <sup>1</sup> , 25mm, or 50mm)  |  | 0  | mm  |   | 0                                | mm  | GCS Table  |  |
| ire Ele  | evation of  | Top Rail below road surface (min. = -7mm <sup>1</sup> ,-25mm, or -50mm)   |  | 0  | mm  |   | 0                                | mm  | GCS Table  |  |
| quent u  | use by per  | sons using assistive devices  |  |  |   |   |                                  |   |            |  |
|  | rface, loose ti<br>ssings \$  | imbers, etc difference between road grade and rail supere   | elevation  | -  |   | ess of roadway ap   |                                  | -photos   |            |  |
| e Cros   | ssings \$   | Randards, July 2014   | elevation  | 1  |   |   |                                  | -photos   |            |  |
| e Cros   | ssings \$   |   | elevation  | (a)  | Figure 5-   |   | rossing Su                       |   | -          |  |
| e Cros<br>5-1 - 0  | ssings \$   | Randards, July 2014   | elevation  |  | Figure 5-   | 1 - Grade C   | rossing Su                       | rface Dimensions  | -          |  |
| e Cros<br>5-1 - 0  | ssings \$<br>Grade Ci   | Randards, July 2014   | elevation<br>65 mm   |  | Figure 5-   | 1 - Grade C   | rossing Su                       |   |            |  |
| e Cros<br>5-1 - 0  | ssings \$<br>Grade Cr<br>angeway:   | itandards, July 2014<br>rossing Surface – Cross Section   |  | Edge   | Figure 5-   | 1 - Grade C   | rossing Su                       | Edge of<br>traveled way   |            |  |
| e Cros<br>5-1 - 0  | ssings \$<br>Grade Cr<br>angeway:   | itandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:  |  | Edge   | Figure 5-<br>Road, incl<br>of shoulder -  | 1 - Grade C   | rossing Su                       | rface Dimensions  |            |  |
| e Cros<br>5-1 - 0  | ssings \$<br>Grade Cr<br>angeway:   | itandards, July 2014<br>rossing Surface – Cross Section<br>Minimum  |  | Edge   | Figure 5-<br>Road, incl<br>of shoulder -  | 1 - Grade C   | rossing Su                       | Edge of<br>travelled way<br>0.5 m or more b   |            |  |
| e Cros<br>5-1 - 0  | ssings \$<br>Grade Cr<br>angeway:   | itandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road  | 65 mm  | Edge   | Figure 5-<br>Road, incl<br>of shoulder -  | 1 - Grade C   | rossing Su                       | Edge of<br>travelled way  |            |  |
| e Cros<br>5-1 - 0  | ssings \$<br>Grade Cr<br>angeway:<br>Width  | itandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings   | 65 mm<br>75 mm<br>120 mm   | Edge of  | Figure 5-<br>Road, incl<br>of shoulder -  | 1 - Grade C   | rossing Su                       | Edge of<br>travelled way<br>0.5 m or more b<br>travelled surface<br>no shoulder                             | e where    |  |
| e Cros<br>5-1 - 0  | ssings \$<br>Grade Cr<br>angeway:   | itandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum  | 65 mm  | Edge of<br>End of<br>0.5 m of<br>beyond  | Figure 5-<br>Road, Incl<br>f shoulder<br>railway ties<br>or more<br>i shoulder with   | 1 - Grade C<br>luding a path  | rossing Su                       | Edge of<br>travelled way  | e where    |  |
| e Cros<br>5-1 - 0  | ssings \$<br>Grade Cr<br>angeway:<br>Width  | Itandards, July 2014<br>Insisting Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:  | 65 mm<br>75 mm<br>120 mm   | Edge of<br>End of  | Figure 5-<br>Road, Incl<br>f shoulder<br>railway ties<br>or more<br>i shoulder with   | 1 - Grade C<br>luding a path  | rossing Su                       | Edge of<br>travelled way<br>0.5 m or more b<br>travelled surface<br>no shoulder                             | e where    |  |
| e Cros<br>5-1 - 0  | ssings \$<br>Grade Cr<br>angeway:<br>Width  | itandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum  | 65 mm<br>75 mm<br>120 mm   | Edge of<br>End of<br>0.5 m of<br>beyond  | Figure 5-<br>Road, Incl<br>f shoulder<br>railway ties<br>or more<br>i shoulder with   | 1 - Grade C<br>luding a path  | rossing Sun                      | Edge of<br>travelled way<br>0.5 m or more b<br>travelled surface<br>no shoulder                             | e where    |  |
| e Cros<br>5-1 - 0  | ssings \$<br>Grade Cr<br>angeway:<br>Width  | tandards, July 2014<br>cossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road  | 65 mm<br>75 mm<br>120 mm<br>50 mm  | Edge of<br>End of<br>0.5 m of<br>beyond  | Figure 5-<br>Road, Incl<br>f shoulder<br>railway ties<br>or more<br>i shoulder with   | 1 - Grade C<br>luding a path  | rossing Sun                      | Edge of<br>travelled way<br>0.5 m or more b<br>travelled sufface<br>crossing surface                        | e where    |  |
| e Cros<br>5-1 - (<br>a) Fla  | ssings \$<br>Grade Cr<br>angeway:<br>Width  | tandards, July 2014<br>cossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm   | Edge of<br>End of<br>0.5 m of<br>beyond  | Figure 5-<br>Road, Incl<br>f shoulder<br>railway ties<br>or more<br>i shoulder with   | 1 - Grade C<br>luding a path  | rossing Sun                      | Eidge of<br>travelled way<br>0.5 m or more b<br>travelled surface<br>mosthoulder<br>Crossing surface<br>Rad | e where    |  |
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| e Cros<br>5-1 - (<br>a) Fla<br>(b) Fi<br>A spa<br>sidew  | ssings 5<br>Grade Cr<br>angeway:<br>Width<br>Depth<br>Depth   | ttandards, July 2014 rossing Surface – Cross Section  Minimum Maximum for:  Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for:  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings All other grade trail at rural locations, except fs s or trails designated by the road authority for use by persons Maximum width  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using  | Edge of<br>End of<br>0.5 m of<br>beyond  | Figure 5-<br>Road, Incl<br>f shoulder<br>railway ties<br>or more<br>i shoulder with   | 1 - Grade C<br>luding a path  | rossing Sun                      | Edge of<br>travelled way<br>0.5 m or more b<br>travelled sufface<br>no shoulder                             | e where    |  |
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| e Crost<br>5-1 - (<br>a) Fla<br>(b) Fli<br>A spa<br>sidew<br>assid<br>(e) Ek<br>The ty<br>ral wi<br>Wear<br>Public<br>assid<br>All oth   | ssings 3<br>Grade Cr<br>angewäy:<br>Width<br>Depth<br>Depth<br>ield side g<br>ace is per<br>valks, path<br>tave device<br>is per<br>valks, path<br>tave device<br>is per<br>valks, path<br>tave device<br>is per<br>is device<br>is device<br>i | tandards, July 2014  tossing Surface – Cross Section  Minimum Maximum for:  Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for:  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  Minimum Maximum for:  Public sidewalks, paths and trails designated by the road authority for use by persons Minimum Maximum for:  Public sidewalks, paths and trails designated by the road authority for use by persons All other grade crossings  Maximum width Maximum depth f the top of the rail with respect to the crossing surface rossing surface must be installed as close as possible to the ar limits below.  . path or trail designated by the road authority for use by perso S Maximum distance of the top of the rail above crossing surface Maximum distance of the top of the rail above crossing surface Maximum distance of the top of the rail above crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the<br>rtions using<br>13 mm         | Edge of<br>End of<br>0.5 m -<br>beyone<br>there is<br>2 · 0.5<br>or b<br>there | Figure 5-<br>Road, incl<br>of shoulder -<br>railway ties<br>or more -<br>i shoulder with<br>some<br>(b) Sid<br>m or more be<br>eyond should<br>e is one   | I - Grade C<br>luding a path<br>walk, path, i<br>lewalk, path, i<br>1- Sidew<br>oyond sidewo<br>ider where<br>wrfaces may<br>e only where<br>between then                     | vidth                            | Frace Dimensions  | e where    |  |
| e Crost<br>5-1 - (<br>a) Fla<br>(b) Fli<br>A spa<br>sidew<br>assid<br>(e) Ek<br>The ty<br>ral wi<br>Wear<br>Public<br>assid<br>All oth   | ssings 3<br>Grade Cr<br>angewäy:<br>Width<br>Depth<br>Depth<br>ield side g<br>ace is per<br>valks, path<br>tave device<br>is per<br>valks, path<br>tave device<br>is per<br>valks, path<br>tave device<br>is per<br>is device<br>is device<br>i | tandards, July 2014 cossing Surface – Cross Section  Minimum Maximum for:  Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for:  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings All other grade crossings  Maximum width Maximum width Maximum depth f the top of the rail with respect to the crossing surface mossing surface must be installed as close as possible to the ear limits below.  path or trail designated by the road authority for use by persons Maximum distance of the top of the rail above crossing surface Maximum distance of the top of the rail below crossing surface  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the<br>rtions using<br>13 mm         | Edge of<br>End of<br>0.5 m -<br>beyone<br>there is<br>2 · 0.5<br>or b<br>there | (b) Side<br>(b) Side<br>(c) | I - Grade C<br>luding a path<br>soluting a path<br>soluting a path<br>soluting a path<br>soluting a path<br>here<br>lewalk, path, o<br>I - Sidew<br>oyond sidewo<br>der where | vise                             | a road  | e where    |  |
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Sheet 7

#### **ROAD GEOMETRY**

| Source       |   |                       | lt                              | em     |          |      |                |                 |             | Reference           |
|--------------|---|-----------------------|---------------------------------|--------|----------|------|----------------|-----------------|-------------|---------------------|
| observe      | Are horizontal and vertical alignments smooth and                                     | continuous throug     | ghout SSD?                      |        |          |      |                |                 |             | Sheet 4             |
| Observe      | WB Approach: Yes  |                       | EB Approach:                    | Yes    |          |      |                |                 |             | Sileet 4            |
| observe      | Is horizontal alignment straight beyond rails for a d                                 | istance ≥ design ve   | ehicle length, L?               |        |          |      |                |                 |             | Sheet 4             |
| Observe      | WB Approach: Yes  |                       | EB Approach:                    | Yes    |          |      |                |                 |             | Sileet 4            |
| observe      | Are the road lanes at least the same width on the crossing as on the road approaches? |                       |                                 |        |          |      |                |                 |             |                     |
| Observe      | WB Approach: Yes EB Approach: Yes   |                       |                                 |        |          |      |                |                 |             |                     |
|              | Grades  |                       | SB Approach                     |        | NB Appro | ach  | Difference: ra | il e & rd grade | e (GCS 6.1) | GCS Sect. 6         |
| measure      | Slope within 8m of nearest rail (max. = 2%)   |                       | 0.20                            | %      | 0.70     | %    | 0.10%          | %               | 0.35%       | Diff in Grade Max   |
| measure      | Slope between 8m & 18m of nearest rail (max. = 5%)                                    |                       | 0.60                            | %      | 0.70     | %    |                |                 |             | 3%                  |
|              | If crossing is only for pedestrians, cyclists, or person                              | ns using assistive d  | evices (max. = 1 <sup>1</sup> c | r 2%): | -        | -    |                |                 |             |                     |
| measure      | slope within 5m of nearest rail =   |                       | N/A % N/A %                     |        |          |      |                |                 |             |                     |
| Road √       | General approach grade (max. = +/- 5%)  |                       | 0.50                            | %      | 0.70     | %    |                |                 |             |                     |
| ROAU V       | measured over the SSD distance of:  |                       | 10                              | m      | 45       | m    |                |                 |             | Sheet 4             |
| Rail √       | Are rail tracks super-elevated?   | No                    | Rate of s/e:                    | 0.00   | m/m Sdg  | 0.00 | m/m ML         |                 |             | GCS Sect. 6.1 & 6.2 |
| Deeder       | If train speeds exceed 15mph (70° minimum w/o warning                                 | system; 30° minimum v | with warning system             | ):     |          |      |                |                 |             |                     |
| Road √       | What is the angle between the crossing and the roa                                    | adway?                | =                               | 102.0  | degrees  |      |                |                 |             |                     |
| observe      | Condition of Road Approaches:   | Fair                  |                                 |        |          |      |                |                 |             | SOR 60              |
| observe      | (e.g., anything that might affect stopping or acceleration)                           |                       |                                 |        |          |      |                |                 |             |                     |
| observe      | NA  |                       |                                 |        |          |      |                |                 |             |                     |
| 1. If freque | nt use by persons using assistive devices   |                       |                                 |        |          |      |                |                 |             |                     |
| Comments     | Following Site Visit:   |                       |                                 |        |          |      |                |                 |             |                     |

\*Lege Urban

#### Cracks observed within both approach. Crossing angle is withing 110 degrees for passive crossings

#### Grade Crossings Standards, July 2014

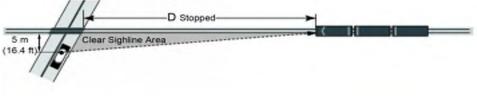
#### Table 6-1 - Difference in Gradient

|           | Classification      | Differe       | nce in Gradier | nt (%)         |     |
|-----------|---------------------|---------------|----------------|----------------|-----|
|           | RLU                 |               | 2              |                |     |
|           | RCU                 |               | 1              |                |     |
|           | RCD                 |               | 1              |                |     |
|           | RAU                 | _             | 0              |                |     |
|           | RAD                 |               | 0              |                |     |
|           | RFD                 |               | -              |                |     |
|           | ULU                 |               | 3              |                |     |
|           | UCU                 |               | 2              |                |     |
|           | UCD                 |               | 2              |                |     |
|           | UAU                 |               | 0              |                |     |
| id<br>(U) | Rural (R) Local (L) | Collector (C) | Arterial(A)    | Expressway (E) | Fre |
|           | Divided (D)         |               |                | Undivided (U)  |     |

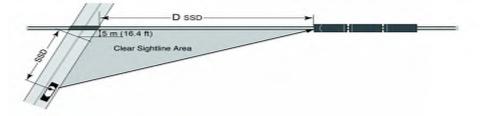
Source: Geometric Darign Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999

#### Figure 7-1 - Minimum Sightlines - Grade Crossings

(a) Sightlines for Users Stopped at a Grade Crossing (applicable to all quadrants)



(b) Sightlines for Users Approaching Grade Crossing (applicable to all quadrants)



#### Sheet 8

#### SIGHTLINES

| Driver Eye Height | = | 1.05m | passenger vehicles, pedestrians, cyclists & assistive devices |
|-------------------|---|-------|---|
|                   | = | 1.80m | buses & straight trucks                                       |
|                   | = | 2.10m | large trucks & tractor-trailers                               |
|                   |   |       |   |
| Target Height     | = | 1.20m | above rails   |

| Source    |  | Ite   | em           |                      |                     |                 | Reference                   |  |  |  |
|-----------|--|---|--------------|----------------------|---------------------|-----------------|-----------------------------|--|--|--|
| observe   | Are sightlines within the rail R.O.W. clear of bushe                         | s/vegetation; 15 m on each side of t                  | the track an | d, 30 m along the tr | ack, on each side o | f the crossing? |                             |  |  |  |
| observe   | -if no, detail the location Yes  |   |              |                      |                     |                 |                             |  |  |  |
| observe   | Are sightlines on the road R.O.W. within 15m of th                           | e rail crossing clear of bushes/veget                 | tation?      |                      |                     |                 |                             |  |  |  |
| observe   | -if no, detail the location Yes  |   |              |                      |                     |                 |                             |  |  |  |
|           |  |   | SB Approa    | ch                   | NB Approad          | h               |                             |  |  |  |
| look-up   | SSD minimum =  |   | 10           | m                    | 45                  | m               | Sheet 4                     |  |  |  |
| measure   | SSD Actual (not including turning movements):                                |   | 150.0        | m                    | 150.0               | m               |                             |  |  |  |
| calculate | D <sub>SSD</sub> =   | 0.277837 x V <sub>train km/h</sub> x T <sub>SSD</sub> | 55           | m                    | 55                  | m               | 1.609 convert mph to km/h   |  |  |  |
| calculate | D <sub>STOPPED</sub> minimum (m) =   | 0.277837 x V <sub>train km/h</sub> x T <sub>D</sub> = | 80           | m                    | 81                  | m               | T <sub>D</sub> from Sheet 4 |  |  |  |
| measure   | D <sub>STOPPED</sub> Actual:   | Driver looking LEFT                                   | 110          | m (ne)               | 200                 | m (sw)          |                             |  |  |  |
| measure   |  | Driver looking RIGHT                                  | 200          | m (nw)               | 30                  | m (se)          |                             |  |  |  |
| calculate | Ped./Cyclist D <sub>STOPPED</sub> (m)  |   | 0            | m                    | 0                   | m               | T <sub>P</sub> from Sheet 4 |  |  |  |
| measure   | Ped./Cyclist D <sub>STOPPED</sub> Actual:                                    | Person looking LEFT                                   | N/A          | m                    | N/A                 | m               |                             |  |  |  |
| measure   | ote: measured from a point 2m in advance of sign/signals Person looking RIGH |   | N/A          | m                    | N/A                 | m               |                             |  |  |  |
| observe   | Are there any obstacles within the sight triangles of                        | other than traffic signs/utility poles t              | that might a | ffect visibility?    |                     |                 |                             |  |  |  |
| observe   | Fencing and equipment within NW ap   | oproach   |              |                      |                     |                 |                             |  |  |  |

b)

**Comments Following Site Visit:** 

#### - Northwest Quadrentsightlines impacted by fencing and equipment

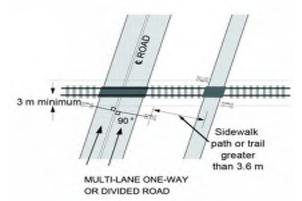
- If clear sightlines cannot be maintained, an active warning system will be required.

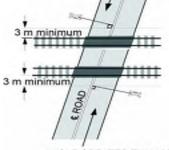
-special considerations for large trucks?

-can sightlines be maintained on an ongoing basis? (snow)

Figure 8-3 - Location of Railway Crossing Signs and Number of Tracks Signs (public grade crossings without warning systems)

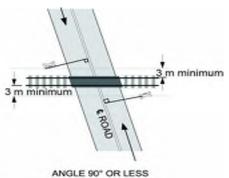






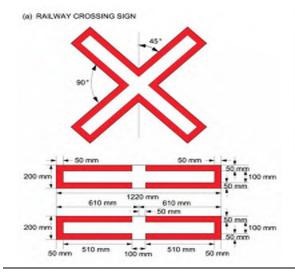
-special design vehicle?

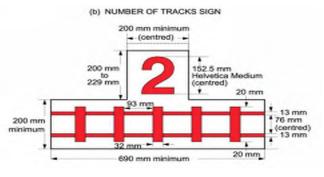
-photos



ANGLE GREATER THAN 90\*

#### Figure 8-1 - Railway Crossing Sign and Number of Tracks Sign





SIGNS AND PAVEMENT MARKINGS

| Source          |  |                     | 11                    | tem              |                       |             |     | Reference |
|-----------------|--|---------------------|-----------------------|------------------|-----------------------|-------------|-----|-----------|
|                 | Railway Crossing Sign  |                     | $\times$              | These s          | igns will be required |             |     | MUTCD     |
|                 |  | SB Approach         |                       | NB Approa        | h                     |             |     |           |
| measure         | distance from nearest rail:                                  | 16.5                | m                     | 20.8             | m                     |             |     |           |
| measure         | distance from edge of road:                                  | 2.0                 | m                     | 1.2              | m                     |             |     |           |
| measure         | height of centre of crossbucks:                              | 3.0                 | m                     | 3.0              | m                     |             |     |           |
| measure         | retroreflectivity readings:                                  | N/A                 | cd/lux/m <sup>2</sup> | N/A              | cd/lux/m <sup>2</sup> |             |     |           |
| observe         | Number of Tracks sign? No                                    |                     |                       |                  |                       |             |     |           |
| observe         | A Stop Sign must be installed at grade crossing without a wa | rning system if the | road design speed i   | is less than 15m | ıph                   | Yes/ No/ NA | Yes | SOR 64    |
| observe         | A Stop Ahead sign must be installed if the Stop Sigh         | is not clearly cvi  | sable within the      | Stopping Dist    | ance                  | Yes/ No/ NA | N/A | SOR 65    |
| Comments        | Following Site Visit:  |                     |                       |                  |                       |             |     |           |
| - New RAIL      | WAY CROSSING signs installed in 2017.                        |                     |                       |                  |                       |             |     |           |
| - The back      | of poles and signs have reflective strips (reflectivit       | y not measured      | ).                    |                  |                       |             |     |           |
| - NUMBER        | OF TRACKS Sign not required as only 1 track.                 |                     |                       |                  |                       |             |     |           |
| -general condit | tion -clear sightlines to the sig                            | gn                  |                       | -posts           | -photos               |             |     |           |
|                 | 1  |                     |                       |                  |                       |             |     | r         |
| Source          |  |                     | H                     | tem              |                       |             |     | Reference |
|                 | DO NOT STOP ON TRACKS  | ]                   |                       |                  |                       |             |     |           |

|         | ***  |     |  |   |  |  |
|---------|--|-----|--|---|--|--|
|         | HB-03  |     |  |   |  |  |
| Road √  | Does queued traffic routinely encroach closer than 5m from the crossing surface? | No  |  |   |  |  |
| observe | Are these signs present on either approach?                                      | Yes |  |   |  |  |
|         |  |     |  | - |  |  |

Comments Following Site Visit:

Sheet 9a

- DO NOT STOP ON TRACKS Sign installed below RAILWAY CROSSING AHEAD signs.

| Source  |   | ltem |        |        |               |  |                |  |  |
|---------|---|------|--------|--------|---------------|--|----------------|--|--|
|         | Railway Crossing Ahead Sign (WA 18-20)            |      | NA 168 |        |               |  | MUTCD & SOR 66 |  |  |
| look-up | Is AADT > 100? Yes                                |      | SB App | oroach | NB Approach   |  | Sheet 3        |  |  |
| observe | Is area urban such that WA 18-20 is not required? |      | Yes    |        | Yes           |  |                |  |  |
| measure | Distance from nearest rail to sign                | =    | 24.1   | m      | <b>18.5</b> m |  | MUTCD          |  |  |
| observe | height:   |      | 2.5    |        | 2.5           |  |                |  |  |
| observe | appropriate orientation of symbol                 |      | Yes    |        | Yes           |  |                |  |  |

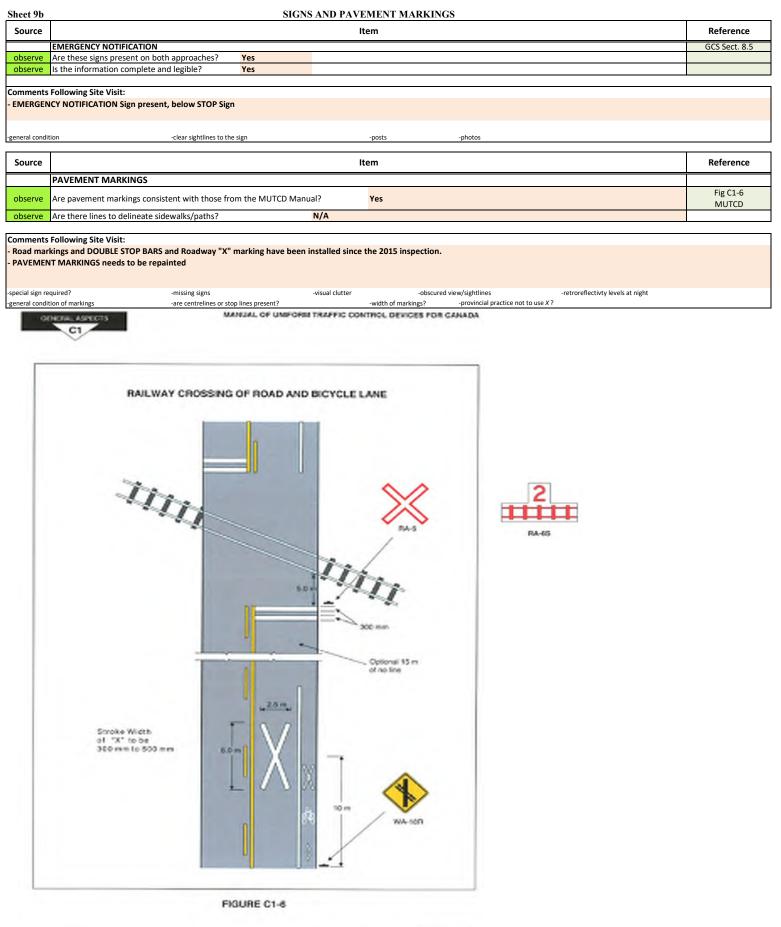
Comments Following Site Visit:

- RAILWAY CROSSING AHEAD Sign has been installed since the previous inspection. - Two signs installed on the North approach. Either side of truck facility entrance. - RAILWAY CROSSING AHEAD Sign installed Min. Approx 18.5m from crossing

| Source   |                                       |     | Item       | Reference          |
|----------|---------------------------------------|-----|------------|--------------------|
|          | ADVISORY SPEED SIGN                   |     | 30<br>km/h | MUTCD & SOR 66 (2) |
|          |                                       |     |            |                    |
| observe  | Are they present on both approaches?  | No  |            |                    |
| Observe  | Posted speed limit?                   | N/A | km/h       |                    |
| look un  | Are they required on either energesh? | Ne  |            | check SSD          |
| look-up  | Are they required on either approach? | No  |            | (Sheet 8)          |
|          |                                       |     |            |                    |
| Comments | Following Site Visit:                 |     |            |                    |

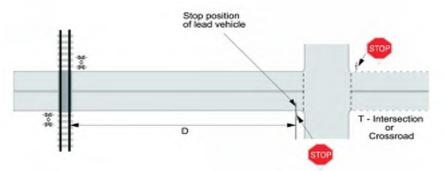
| - ADVISORY SPEED Sign not installed. |        |         |
|--------------------------------------|--------|---------|
| -general condition                   | -posts | -photos |

<sup>-</sup>general condition -posts -photos



JANUARY 2014

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

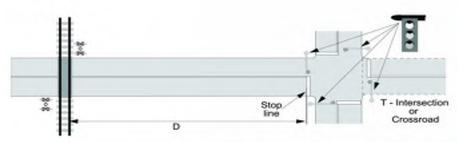
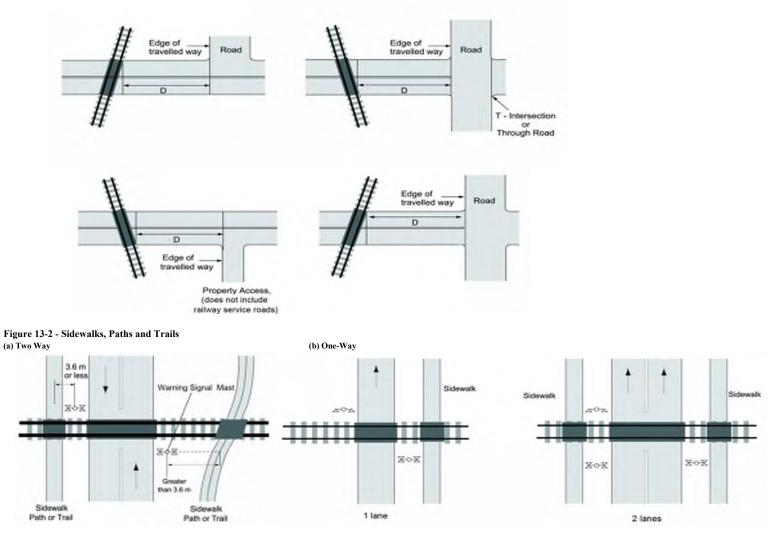


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings





| Sheet 11  |   | GRADE CROSSING WARNING SYSTEMS      |                    |               |   |              |                           |  |                |                              |                 |
|-----------|---|-------------------------------------|--------------------|---------------|---|--------------|---------------------------|--|----------------|------------------------------|-----------------|
| Source    |   |                                     |                    | Item          | is not required.                          |              |                           |  |                |                              | Reference       |
|           | Warning System Warrants   |                                     |                    |               |   |              |                           |  |                |                              |                 |
|           | if any of A through E below are   | met, then a warnir                  | ng system is warra | nted          |   |              |                           |  |                |                              |                 |
|           |   | Question Warrant for Warring System |                    |               |   |              |                           |  |                |                              |                 |
| look-up   | Existing AADT =   | 2,830                               | Forecast AADT =    |               | 2,250                                     |              |                           |  |                |                              | Sheet 3         |
| look-up   | Daily Train Volume =  | 30                                  |                    |               |   | trains       |                           |  |                |                              | Sheet 3         |
| calculate | A. Cross-Product =  | 67,500                              |                    |               |   |              | > 2,000 FLB               | req'd  | > 50,000 req   | uires gates                  |                 |
| look-up   | B. Maximum Rail Operating Sp  | eed =                               | 10                 |               | r   | nph          | (max = 80m                | nph or 50 mph v                                      | vith crosswalk | )                            | Sheet 3         |
| Rail      | C. Number of Tracks =   |                                     | 1                  |               |   |              |                           |  |                |                              |                 |
| Ndii      | if ≥ 2, can trains pass one another? No   |                                     |                    |               |   |              | if $\geq 2$ and tr        | ains can pass or                                     | ne another ->  | FLB req'd                    |                 |
| look-up   | D. Are Sightlines obscured?   |                                     |                    | if "Yes" -> F | LB req'd: If Fig 7                        | 7.1 applies> | add G                     | Sheet 8 & Fig 7.1                                    |                |                              |                 |
| observe   | E. Are any proximity conditions met? Yes  |                                     |                    |               |   |              | if "Yes" -> FLB required. |  |                |                              | GCS Sect 9 & 11 |
| look-up   | Is a Warning System warranted? Yes If any of A through E above meet the Warrant |                                     |                    |               |   |              |                           |  |                |                              |                 |
|           | Field Visit   | Present? (Y/N)                      | Condition / Alig   | nment:        |   |              |                           |  |                |                              | GCS 13          |
| observe   | Light Units,  | N                                   |                    |               |   |              |                           |  |                |                              | GCS 13          |
| observe   | Bells,  | N                                   |                    |               |   |              |                           |  |                |                              | GCS 13          |
| observe   | Gates,  | Ν                                   |                    |               |   |              |                           |  |                |                              | GCS 13          |
| observe   | Cantilever Lights,  | N                                   |                    |               |   |              |                           |  |                |                              | GCS 13          |
| observe   | Check that warning signal asser   | nblies and cantilev                 | ers are in accorda | nce with GCS  | Figures.                                  |              |                           |  |                |                              | GCS Sect. 12    |
| observe   | Is warning system housing at le   | ast 9m from travel                  | ed way of the roa  | d and 8m fro  | m the nearest rail?                       |              |                           |  |                |                              |                 |
| observe   | If there is a sidewalk, is a bell or  | n the adjacent asse                 | mbly?              |               |   |              |                           |  |                |                              |                 |
| Rail √    | Have all light units been aligned   | ?                                   | NA                 | Date?         | NA  |              |                           |  |                |                              |                 |
| Rail      | Design Approach Warning Time  | (greatest of):                      |                    |               | 20sec OR<br>[20+((cd-11)/3)]<br>if cd>11m | Td           | Тр                        | Gate Clearance<br>Time + Descent<br>Time + 5 seconds |                | (SSD + cd + L)/(0.277837xVv) |                 |
|           | SB Approach   |                                     | 35.0               | sec           | 27.7                                      | 17.9         | 0.0                       | 35.0   | 0.0            | 8.0                          |                 |
|           | NB Approach   |                                     | 35.0               | sec           | 27.7                                      | 18.0         | 0.0                       | 35.0   | 0.0            | 12.2                         |                 |
| observe   | Is warning time less than 35 sec  | : (without gates) or                | 55 sec (with gate  | s)            | N/A                                       |              |                           |  | -              |                              |                 |

#### **Comments Following Site Visit:**

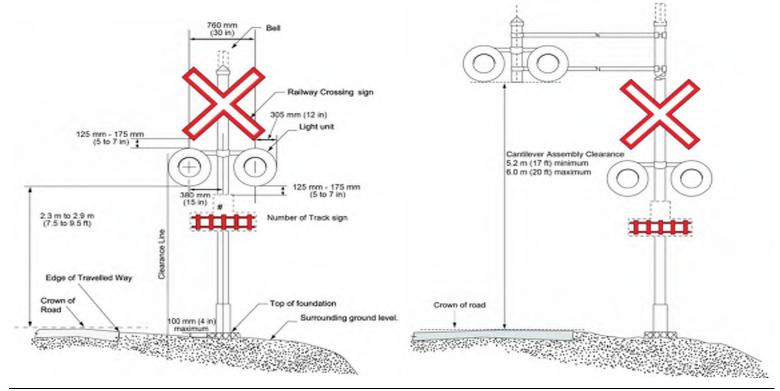
An Active Warning System without Gates is required due to the increase in AADT, proximity to intersection and sightlines

extraordinary conditions why warning system should be installed

-is warning system present but not warranted?

#### Figure 12-1 - Warning Signal Assemblies

#### Figure 12-3 - Cantilevers



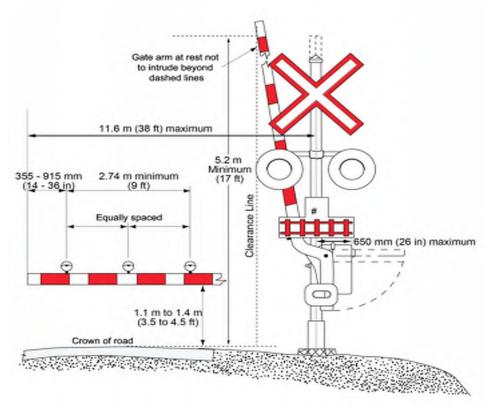


#### GATES FOR GRADE CROSSING WARNING SYSTEMS

GCS Section 9

| Source  | Item                                     |                       |                   |  |                      |              |                                 | Reference        |             |                |
|---|--|-----------------------|-------------------|--|----------------------|--------------|---------------------------------|------------------|-------------|----------------|
|   | Warning System Warrants                  |                       |                   |  |                      |              |                                 |                  |             |                |
|   | -if any of A through                     | E below are met th    | en a warning sys  | tem with gates is w                                      | arranted.            | Not requ     | uired as qwarning system        | is not necessa   | ry          |                |
| calculate   | A. Cross-Product =                       |                       | 67500             | (50,000 min)   |                      |              |                                 |                  |             |                |
| look-up   | B. Maximum Rail Operating Spe            | eed =                 | 10                | mph (  | max = 50mpł          | ר)           |                                 |                  |             | Sheet 3        |
| Rail V  | C. Number of Tracks =                    |                       | 1                 |  |                      |              |                                 |                  |             |                |
| itan v  | if ≥ 2, can trains pass on               | e another?            | N/A               |  |                      |              |                                 |                  |             |                |
| look-up   | D. Is D <sub>STOPPED</sub> Insufficient? |                       | No                |  |                      |              |                                 |                  |             | Sheet 8        |
| observe   | E. Are any proximity conditions          | s met?                | N/A               |  |                      |              |                                 |                  |             |                |
| calculate   | Gate clearance distance: eq 10.4         | 1b                    | 24.7              | m cd <sub>G stop</sub>                                   |                      | 34.7         | m cd SSD SB                     | 69.7             | m cd SSD NB |                |
| look-up   |  | travel time =         | 18.0              | sec <sub>G stop</sub>                                    |                      |              |                                 |                  |             | 7              |
|   | Gate arm clearance times:                |                       | 17.9              | sec SB from stop   | T <sub>G ssd</sub> = | 4.2          | sec SB from SSD                 |                  |             |                |
| calculate   |  |                       | 18.0              | sec NB from stop   | T <sub>G ssd</sub> = | 8.4          | sec NB from SSD                 |                  |             | GCS Sect. 10.4 |
| look-up   | Gate arm delay time:                     | 18.0                  | sec (greatest val | ue from above)   |                      |              |                                 |                  |             |                |
| calculate   | effect of grade =                        |                       | 0.5               | sec (SB from Sto   | p)                   | -4.2         | sec SB from SSD                 |                  |             |                |
| Calculate   |  |                       | 0.6               | sec (NB from Sto   | p)                   | 0.0          | sec NB from SSD                 |                  |             |                |
| measure   | Measure gate arm delay and co            | mpare with above:     |                   | N/A  |                      |              |                                 |                  |             |                |
| observe   | Do gates conform to standards of         | depicted in GCS Fig   | ures?             | N/A  |                      |              |                                 |                  |             |                |
| observe   | Check gate descent (10 to 15 see         | c) and ascent (6 to : | 12 sec)           | N/A  |                      |              |                                 |                  |             |                |
| observe   | Is gate striping vertical as depict      |                       |                   | N/A  |                      |              |                                 |                  | -           |                |
| observe   | Where railway equipment regularly sto    |                       |                   | n the activating limits of a<br>operation of the warning |                      | i, the warni | ng system must be equipped with | n a<br>Yes/No/NA | NA          | GCS 16.3.1     |
| Comments  | Following Site Visit:                    | control re            |                   | operation of the warning                                 | System               |              |                                 |                  |             |                |
|   | System with Gates is not equired         | d unless the railway  | y volume is incr  | ease or Dstopped is                                      | insufficient         | •            |                                 |                  |             |                |
| -extraordinary conditions why warning system should be installed -is warning system present but not warranted? No |  |                       |                   |  |                      |              |                                 |                  |             |                |

#### Figure 12-2 - Gates



Sheet 13

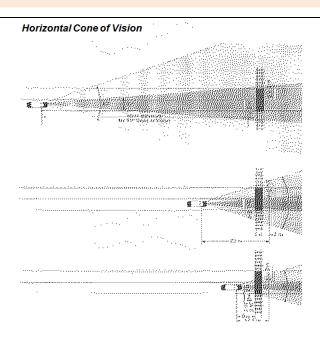
#### FLASHING LIGHT UNITS

Note: Driver's cone of vision is  $\pm$  5° horizontally; limited by top of windshield vertically.

| Source  |                                  |   | Item is not required as warning s             | ystem is not required.       |         |                     |                    | u |
|---------|----------------------------------|---|---|------------------------------|---------|---------------------|--------------------|---|
|         | Number and Location              |   |   |                              |         |                     |                    |   |
| look-up | Minimum Distance for Primar      | y Light Units (SSD)   | =   | 45.0                         | m       |                     |                    |   |
| look-up | Recommended Distance for P       | rimary Light Units  | =   | 69.7                         | m       |                     |                    |   |
|         | Are flashing light units located | d within 5° horizor   | tally of the centerline of the road (througho | ut the approach distance abo | ove)?   |                     |                    |   |
| observe |                                  |   |   |                              |         | Yes (covered by fro | nt and back units) |   |
|         | Does horizontal/vertical curva   | ature necessitate s   | upplemental units?                            |                              |         |                     | N/A                |   |
| observe | Can back lights be seen by all   | stopped drivers?  |   |                              |         |                     | N/A                |   |
| observe | Are lights obscured by vehicle   | Are lights obscured by vehicles stopped on adjacent intersections? N/A  |   |                              |         | N/A                 |                    |   |
| observe | Are additional light units requ  | Are additional light units required for drivers as they begin to turn onto an approach road from an intersecting road/lane/pkg lot? N/A |   |                              |         |                     |                    |   |
|         | Cantilevered Light Units         |   |   |                              |         |                     |                    |   |
| measure | Does D <sub>R</sub> exceed 7.7m? | N/A   |   |                              |         |                     |                    |   |
| measure | Does D <sub>L</sub> exceed 8.7m? | N/A   | (Assumes signal poles on both sides of ro     | ad alignment, approach side  | of rail | )                   |                    |   |
|         | Multiple Lanes                   |   |   |                              |         | ·                   |                    |   |
| observe | Can front light units be seen b  | y drivers in all lan  | es (would T/T obscure?)?                      | N/A                          |         |                     |                    |   |
| observe | Can back light units be seen b   | y all stopped drive   | rs in all lanes?                              | N/A                          |         |                     |                    |   |
|         | Sidewalks, paths, trails, etc.   |   |   |                              |         |                     |                    |   |
| measure | Distance from path centerline    | to signal mast =  |   | N/A                          | m (     | (max.=3.6m)         |                    |   |
| observe | Are separate light units requir  | cha:  |   | N/A                          |         |                     |                    |   |

Comments Following Site Visit:

Crossing currently regulated by a passive warning system.



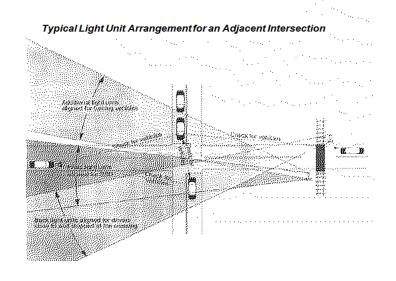
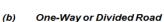
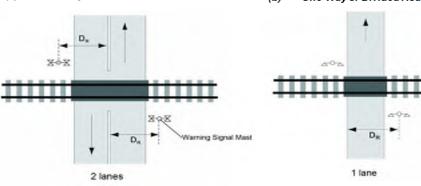
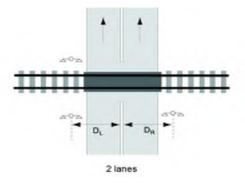


Figure 13-1 – Warning Signal Offsets Requiring Cantilevered Light Units

(a) Two-Way Road







GCS Sections 12-14





GCS Sections 13 and 14

#### PREPARE TO STOP AT RAILWAY CROSSING SIGN

| Source  |   | Item NA   |  |                 |                      |                                     |  |
|---------|---|---|--|-----------------|----------------------|-------------------------------------|--|
| observe | Are signs present?  | No<br>No  | EB approach<br>WB approach                                   |                 |                      | SOR 67 (1), (2)<br>GCS 18.21 & 18.2 |  |
| look-up | Minimum Distance for Primary Light U                                  | nits (SSD)  |  | N/A             | m                    | Sheet 13                            |  |
| look-up | Recommended distance for Primary Lig                                  | ecommended distance for Primary Light Units N/A m |  |                 |                      | Sheet 13                            |  |
|         | Warrants  | Varrants  |  |                 |                      |                                     |  |
| observe | Are all front light units obscured within minimum distance above? N/A |   |  |                 |                      |                                     |  |
| look-up | Is the facility designated a "freeway" or "expressway"?               |   |  | N/A             |                      | Sheet 3                             |  |
| observe | Do environmental conditions frequent                                  | ly obscure :                                      | ignal visibility?  | N/A             |                      |                                     |  |
|         | Considering maximum prevailing spee                                   | eds, geome  | try, and traffic composition, checkthe following:            |                 |                      |                                     |  |
| observe | Does sign flash during operation of gra                               | de crossing                                       | warning system?  | N/A             |                      |                                     |  |
| measure | Distance from the sign to 2.4m beyond                                 | l the furthe                                      | st rail =  | N/A             |                      |                                     |  |
| observe | Does the sign flash before the actuatio                               | n of the cro                                      | ssing warning system by the time required to travel from the | ne sign to clea | r the crossing? N/A  |                                     |  |
| measure | Distance from the sign to the closest ga                              | ate =   |  | N/A             | m                    |                                     |  |
| observe | Does the flashing sign precede actuation                              | on of the de                                      | scent of the gate arms by the time required to travel from   | the sign to cle | ar closest gate? N/A |                                     |  |
| measure | Time required for all queued vehicles t                               | o resume t  | o maximum road operating speed =                             | N/A             | sec                  |                                     |  |

Comments Following Site Visit:

#### - No PREPARE TO STOP AT RAILWAY CROSSING was observerd or required.

-general condition

Sheet 15

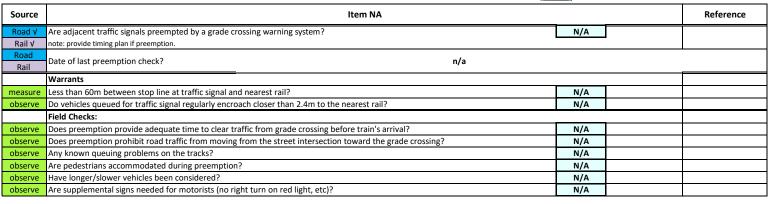
Sheet 14



-placement/orientation of signs

#### PREEMPTION OF TRAFFIC SIGNALS

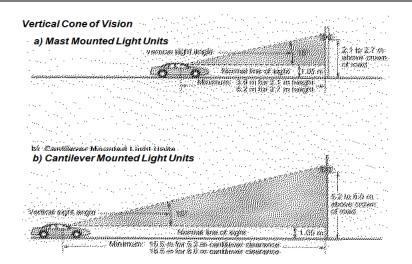
-functions as intended



**Comments Following Site Visit:** 

- No Traffic Signals located at crossing

-functions as intended



#### AREAS WITHOUT TRAIN WHISTLING

Sheet 16

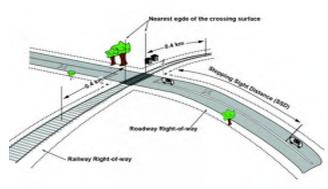
Grade Crossings Standards, July 2014

#### APPENDIX D - WHISTLING CESSATION

#### Table D-1 – Requirements for Warning Systems at Public Grade Crossings within an Area without Whistling

### Figure D-1 - prescribed area for whistling cessation as per article 23.1 of the RSA

|                               | (             | Column A           | Column B  |                                      |  |  |
|-------------------------------|---------------|--------------------|---|--------------------------------------|--|--|
| Railway<br>Design Speed       | Grade Crossin | gs for Vehicle Use | Grade Crossings For Sidewalks,<br>Paths, or Trails with the centreline<br>no closer than 3.6 m (12 ft) to a<br>warning signal for vehicles<br>No. of Tracks |                                      |  |  |
|                               | No            | o. of Tracks       |   |                                      |  |  |
|                               | 1             | 2 or more          | 1   | 2 or more                            |  |  |
| Column 1                      | Column 2      | Column 3           | Column 4  | Column 5                             |  |  |
| 1 – 25 km/h (15 mph)          | FLB           | FLB                | No warning<br>system<br>requirement   | No warning<br>system<br>requirements |  |  |
| 25 – 81 km/h<br>(16 – 50 mph) | FLB           | FLB & G            | FLB   | FLB & G                              |  |  |
| Over 81 km/h (50 mph)         | FLB & G       | FLB&G              | FLB & G   | FLB & G                              |  |  |



RSA = Railway Safety Act of Canada

#### Legend :

FLB is a warning system consisting of flashing lights and a bell.

FLB & G is a warning system consisting of flashing lights, a bell and gates

| Source  | rce Item   |    |           |    |  | Reference |
|---------|--|----|-----------|----|--|-----------|
| Rail    | Is train whistling prohibited at this crossing?  | No | 24 hours? | No |  |           |
| observe | berrye Is there evidence of routine unauthorized access (trespassing) on the rail line in the area of the crossing? No |    |           |    |  |           |
| observe | Are the requirements of Table D-1 met?   | No |           |    |  |           |

#### Comments Following Site Visit:

Whistle Cessation not required

#### Additional Prompt Lists

#### **Human Factors:**

- \* Control device visibility / background visual clutter.
- <sup>o</sup> Driver workload through this area (i.e., are there numerous factors that simultaneously require the driver's attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.).
- attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.), <sup>o</sup> Driver expectancy of the environment (i.e., are the control measures in keeping with the design levels of the road system and adjacent environment).
- \* Need for positive guidance.
- " Conflicts between road and railway signs and signals.

#### **Environmental Factors:**

- " Extreme weather conditions.
- \* Lighting issues (night, dawn/dusk, tunnels, adjacent facilities, headlight or sunlight glare, etc.)
- <sup>6</sup> Landscaping or vegetation.
- " Integration w/ surrounding land use (e.g., parked vehicles blocking sightlines, merging traffic lanes, etc.)

#### All Road Users:

Λ.

| nan | -reedes of the following been met:<br>-pedestrians (including strollers, baby carriages, and blind persons) |     |
|-----|---|-----|
|     | -children / elderty   |     |
|     | -assistive devices (wheelchairs, scooters, walkers, etc)  |     |
|     | -bicyclists   |     |
|     | -motorcyclists  |     |
|     | -over-sized trucks  | · · |
|     | -buses  |     |
|     | -recreational vehicles  |     |
|     | -goifearts  |     |
|     | -hazardous materials  |     |

(mage barriers/guide fencing, additional pedestrian bell, pedestrian gates, sign indicating potential presence of 2<sup>nd</sup> train at a multi track crossing, etc)

#### Other:

Should closure of the crossing be considered due to inactivity, presence of nearby adjacent crossings, etc.

Commente Following Site Visit:

VFPA REPORT NUMBER: 20-0173

## VFPA FSPL TRANSPORTATION IMPROVEMENTS PROJECT 03 – 10203, 59 TIMBERLAND ROAD,

FEBRUARY 09, 2021



# REVISION HISTORY

FINAL ISSUE

| 2020/09/03                   | FIRST DRAFT                          |                                       |  |
|------------------------------|--------------------------------------|---------------------------------------|--|
| Prepared by                  | Reviewed by                          |                                       |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer |                                       |  |
| 2020/10/21                   | SECOND DRAFT                         |                                       |  |
| Prepared by                  | Reviewed by                          |                                       |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer |                                       |  |
| 2021/02/09                   | FINAL                                | -                                     |  |
| Prepared by                  | Reviewed by                          | Approved By                           |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer | R. Sewell, Senior<br>Project Engineer |  |

## SIGNATURES

PREPARED BY

09/02/2021

Patrick McCabe, CPEng (Aus), APEC Eng Track Designer Date

Robert Sewell, P.Eng Senior Project Engineer Date

09/02/2021

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| 2   | SAFETY ASSESSMENT              | 2 |
| 2.1 | Previous Assessment (2015)     | 2 |
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# **1 CROSSING OVERVIEW**

WSP Canada Group Limited (WSP) has been contracted as part of the Fraser Surrey Port Lands – Transportation Improvements Preliminary Design Services project, to complete a Railway Crossing Safety Assessment on the 10203, 59 Timberland Road grade crossing. The SRY owned crossing is located within the Vancouver Fraser Port Authority (VFPA), Fraser Surrey Docklands near to the Canadian National (CN) Brownsville Spur which comes off Mile 117 of the Yale Subdivision.

A Railway Crossing Field Safety Assessment was undertaken on the 22nd of July 2020 and updates the previous Railway Crossing Assessment undertaken by WSP (formally MMM Group) on the 5<sup>th</sup> of May 2015. The Railway Crossing Assessment as conducted follows the guidelines of applicable requirements identified in the most recent edition of Transport Canada's Grade Crossing Regulations (GCR) and Grade Crossing Standards (GCS).

The crossing is a passive protected crossing (SRCS), equipped with two RAILWAY CROSSING and STOP signs, located within an industrial area. A Tractor Trailer (WB-20) is the design vehicle used to represent daily traffic on port property. The Railway traffic volumes were provided by the SRY while the Average Annual Daily Traffic (AADT) was calculated based on the realigned infrastructure.

This report aims to identify the modifications to the grade crossing since the previous inspection completed by MMM Group in 2015, as well as highlight any new or previously identified non-compliances still relevant to this crossing.

### 1.1 LOCATION

The Timberland Road grade crossing is located within Fraser Surrey Docks jurisdiction at 10203, 59 Timberland Road and crosses the SRY spur track. The crossing is located at the latitude and longitude of 49°11'19" and 112°54'25" respectfully. Figure 1, below shows the location of the crossing.

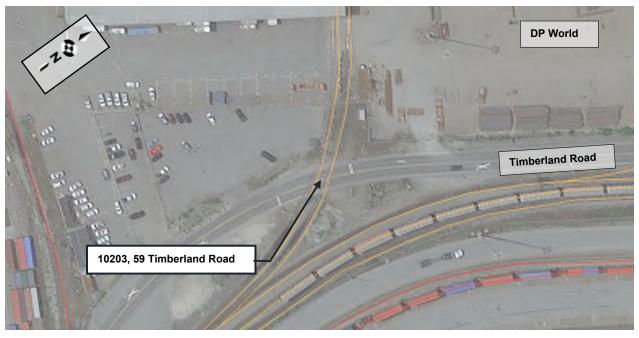


Figure 1: Crossing Location (source: Google Earth, 2020)

# 2 SAFETY ASSESSMENT

## 2.1 PREVIOUS ASSESSMENT (2015)

A previous crossing assessment was undertaken in 2015 by WSP for the 10203, 59 Timberland Road crossing. The objective of the assessment was 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 referred to in the Railway Safety Act / Grade Crossing Regulations and contained in the Grade Crossing Standards.
- 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.

The outcome of the 2015 assessment offered recommendations for consideration by the VFPA. Table 1: Previous Non-Compliances, illustrates the non-compliances and recommendations offered within the 2015 report. The recommendations were categorised within the three priority levels;

- Low implement the measures as soon as practicable
- Medium implement the measures by Transport Canada GCS & GCR November 2021 deadline.
- High implement the measures forthwith

#### **Table 1: Previous Non-Compliances**

|     | Observations  | Suggested Actions   | Priority | Addressed?  |  |  |  |
|-----|---|---|----------|---|--|--|--|
| GCS | Section 3 – Crossing Surface (Basic Requirem  | ent)  |          |   |  |  |  |
| a.  | Railway crossing surface does not extend at<br>least 0.5m beyond the edge of the travel lanes<br>on both approaches   | Extend railway crossing surface to extend at least 0.5m beyond the travel lanes                                     | High     | Yes   |  |  |  |
| GCS | CS Section 4 – Railway Crossing and Number of Tracks Sign (Basic Requirement)   |   |          |   |  |  |  |
| a.  | West approach RAILWAY CROSSING sign<br>located too close to edge of travelled way   | Relocate west approach RAILWAY CROSSING sign so that it is at least 2.0m from edge of traveled way.                 | High     | No – RAILWAY CROSSING Sign<br>relocated 1.8m from travelled way and<br>is not compliant with GCS. |  |  |  |
| b.  | NUMBER OF TRACKS sign not present on<br>both approaches.  | Install NUMBER OF TRACKS sign on both approaches<br>as per GCS Section 4.1.   | High     | Yes – NUMBER OF TRACK Sign<br>installed below STOP sign   |  |  |  |
| GCS | Section 7 – Sightlines  | · · · · · · · · · · · · · · · · · · ·   |          |   |  |  |  |
| a.  | Clear sightline areas where drivers stopped at the crossing (D $_{\rm STOPPED-VEH}$ ) cannot be provided or maintained due to fences on the northeast and northwest corners | If minimum sightlines cannot be provided and maintained, then a warning system with gates is required.              | Medium   | No – Fence/ storage yard remain   |  |  |  |
| GCS | Section 8 – Signs   |   |          |   |  |  |  |
| a.  | Retroreflective strips are not provided for the back of the RAILWAY CROSSING sign and both sides of the sign supporting post.   | Install retroreflective strips on the back of the RAILWAY CROSSING sign and both sides of the sign supporting post. | Medium   | Yes – retroreflective strips installed on<br>back of both RAILWAY CROSSING<br>Signs and poles     |  |  |  |

| RAILWAY CROSSING AHEAD signs are not<br>present on either approach of the crossing.   | Install RAILWAY CROSSING AHEAD signs on both approaches of Timberland Road as per BCMoT's<br>Signage and Pavement Manual (2000).   | Medium   | Yes – RAILWAY CROSSING AHEAD<br>Signs installed on both approaches.  |
|---|--|--|--|
| STOP signs on both road approaches are heavily faded.   | Replace STOP signs as per GCS Section 8.4.   | High   | Yes – STOP Signs installed below<br>RAILWAY CROSSING Signs.  |
| EMERGENCY NOTIFICATION signs are not<br>present on either approach of the crossing  | Install EMERGENCY NOTIFICATION sign on both<br>approaches as per GCS Section 8.5   | Medium   | Yes – EMERGENCY NOTIFICATION<br>Signs installed below RAILWAY<br>CROSSING Signs.   |
| Double stop bars and RAILWAY CROSSING<br>symbol pavement markings are not present on<br>either approach to the crossing for vehicles. | Paint double stop bars and RAILWAY CROSSING symbol pavement markings on both road approaches.  | Low  | Yes - Double stop bars have been<br>installed but need repainting.   |
| Stopping restriction is not observed at the railway right-of-way.   | Install NO STOPPING signs within the railway right-of-<br>way  | Low  | Yes – NO STOPPING Signs installed<br>along Timberland Road   |
| S Sections 9, 12 to 17 – Warning Syst   | em Design  |  |  |
| An active warning system without gates is warranted based on cross-product  | Install active warning system without gates. However,<br>Transport Canada indicated that the crossing could<br>stay passive indefinitely unless the sightline<br>requirements could not be met.  | Low  | No   |
|   | present on either approach of the crossing.<br>STOP signs on both road approaches are<br>heavily faded.<br>EMERGENCY NOTIFICATION signs are not<br>present on either approach of the crossing<br>Double stop bars and RAILWAY CROSSING<br>symbol pavement markings are not present on<br>either approach to the crossing for vehicles.<br>Stopping restriction is not observed at the<br>railway right-of-way.<br><b>S Sections 9, 12 to 17 – Warning Syste</b><br>An active warning system without gates is | present on either approach of the crossing.approaches of Timberland Road as per BCMoT's<br>Signage and Pavement Manual (2000).STOP signs on both road approaches are<br>heavily faded.Replace STOP signs as per GCS Section 8.4.EMERGENCY NOTIFICATION signs are not<br>present on either approach of the crossingInstall EMERGENCY NOTIFICATION sign on both<br>approaches as per GCS Section 8.5Double stop bars and RAILWAY CROSSING<br>symbol pavement markings are not present on<br>either approach to the crossing for vehicles.Paint double stop bars and RAILWAY CROSSING<br>symbol pavement markings are not present on<br>either approach to the crossing for vehicles.Stopping restriction is not observed at the<br>railway right-of-way.Install NO STOPPING signs within the railway right-of-<br>waySections 9, 12 to 17 – Warning System Design<br>warranted based on cross-productInstall active warning system without gates. However,<br>Transport Canada indicated that the crossing could<br>stay passive indefinitely unless the sightline | present on either approach of the crossing.approaches of Timberland Road as per BCMoT's<br>Signage and Pavement Manual (2000).STOP signs on both road approaches are<br>heavily faded.Replace STOP signs as per GCS Section 8.4.HighEMERGENCY NOTIFICATION signs are not<br>present on either approach of the crossingInstall EMERGENCY NOTIFICATION sign on both<br>approaches as per GCS Section 8.5.MediumDouble stop bars and RAILWAY CROSSING<br>symbol pavement markings are not present on<br>either approach to the crossing for vehicles.Paint double stop bars and RAILWAY CROSSING<br>symbol pavement markings on both road approaches.LowStopping restriction is not observed at the<br>railway right-of-way.Install NO STOPPING signs within the railway right-of-<br>wayLowAn active warning system without gates is<br>warranted based on cross-productInstall active warning system without gates is<br>warranted based on cross-productInstall active warning system ste sightlineLow |

### 2.2 CROSSING MODIFICATIONS

As shown in Appendix A: Site Photographs, a number of changes have occurred at the crossing between inspections. Most changes were based on recommendations outlined in the 2015 inspection. Table 1, shows what changes have been made based on the 2015 recommendations. Below is a summarised list of all the changes observed from the site inspection:

- New grade crossing signage, including;
  - RAILWAY CROSSING Signs
  - o STOP Signs
  - EMERGECNY NOTIFACATION Signs
  - RAILWAY CROSSING AHEAD signs
  - DO NOT STOP ON TRACKS Signs
  - PARKING RESTRICTION Signs
- New MUTCD compliant pavement marking
- Asphalt has been installed on both sides to extend the crossing 0.5m beyond the travelled way
- Facility entrance gate in Northwest quadrant relocated away from crossing.

## 2.3 ASSESSMENT AND RECOMMENDATIONS

An updated Grade Crossing Safety Assessment was undertaken for the proposed realignment of the port road access and to determine any required crossing upgrades to ensure compliance with the GCR & GCS. **Appendix B: Site Inspection Report** provides details of the observations made during the site inspection. The inspection report also outlines outstanding safety issues, along with recommended remediations. Table 2: 2020 Crossing Recommendations, summarizes the recommendations from the field investigation.

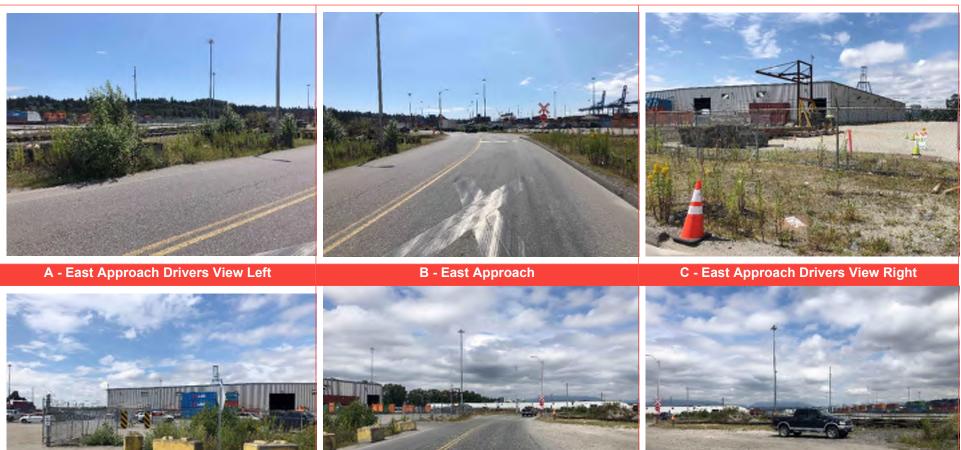
#### Table 2: 2020 Crossing Recommendations

|  | Observations  | Suggested Actions   | Priority | Order of<br>Magnitude Cost |  |  |  |  |  |
|--|---|---|----------|----------------------------|--|--|--|--|--|
| GCS Section 3 – Crossing Surface (Basic Requirement) |   |   |          |                            |  |  |  |  |  |
| a.   | Flangeway depth impeded due to debris   | Clean debris from the flangeway   | Low      | \$500                      |  |  |  |  |  |
| GCS Sec  | tion 7 – Sightlines   |   |          |                            |  |  |  |  |  |
| a.   | Clear sightline areas where drivers stopped at the crossing (D <sub>STOPPED-VEH</sub> ) cannot be provided or maintained due to fences on the northeast and northwest corners | If the sightlines cannot be met by removing fencing or obstructions,<br>then signal system with gates are required.<br>*However, manual flagging of railway movements is an alternative<br>lower-cost solution to a gated warning system. | High     | \$500,000°                 |  |  |  |  |  |
| GCS Sec  | tion 8 – Signs  |   |          |                            |  |  |  |  |  |
| a.   | Double stop bars and RAILWAY CROSSING symbol pavement markings are faded.   | Repaint double stop bars and RAILWAY CROSSING symbol on both road approaches as per MUTCD.  | Medium   | \$800                      |  |  |  |  |  |



# A SITE PHOTOGRAPHS

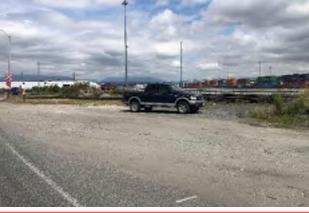






**D** - West Approach Drivers View Left

E - West Approach



F - West Approach Drivers View Right



G – East Approach Driver View Left (At Stopped Position)



H - East Approach (At Stopped Position)



I – East Approach Drivers View Right (At Stopped Position)



J- West Approach Drivers View Left (At Stopped Position)



K - West Approach (At Stopped Position)



L - West Approach Drivers View Right (At Stopped Position)





# B SITE INSPECTION REPORT

CANADIAN ROAD / RAILWAY GRADE CROSSING DETAILED SAFETY ASSESSMENT FIELD GUIDE (2005)\*

Appendix C2: Field Data Forms

×

Passive & Active Crossings

MileX.XX (10203, 59 Timberland Road),SRY Rail Surrey, British Columbia For Vancouver Fraser Port Authority

|           | Legend: |   |
|-----------|---------|---|
| calculate | Formula | Spreadsheet cell has formula  |
| look up   |         | User to look up value in table or chart.  |
|           |         | User to input value here for conditional formatting or formulas in other cells to function                |
|           |         | Warning! Value beyond acceptable limits.  |
|           |         | Warning! Value beyond acceptable limits for certain conditions (i.e. for people using assistive devices). |
|           | Rail    | Information to be provided by Railway Company   |
|           | Road    | Information to be provided by Roadway Authority   |
| measure   | observe | Information to be obtained during Site Investigation  |
|           | ٧       | Information provided by others to be verified in the field  |
|           |         |   |

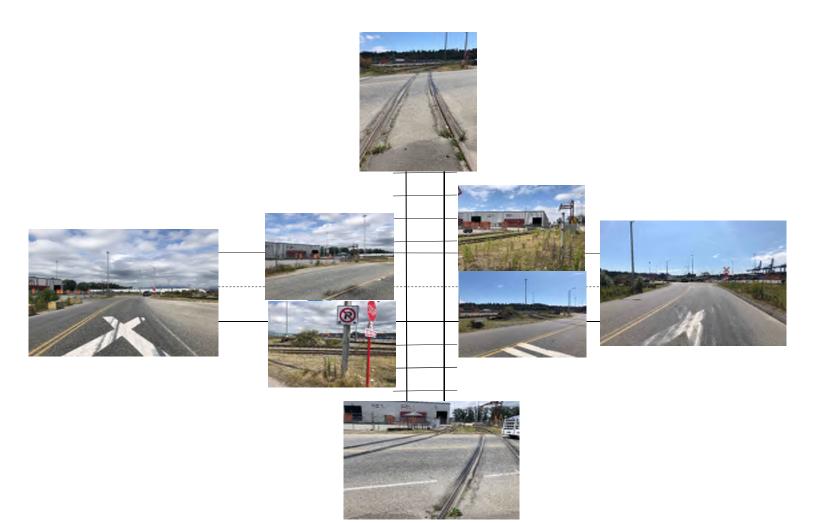
\* Updated to reflect Transport Canada's Grade Crossing Standards (GCS) July 2014 and Grade Crossing Regulations (GCR)(SOR-2014-275 Feb 2016)

| Sheet 1                    |  |                              | Grade Cros                  | sing Safety Assessm   | ent                                       |   | Passive Crossings |
|----------------------------|--|------------------------------|-----------------------------|---|---|---|-------------------|
| Date of Assessment:        |  | 22-Jul-20                    | <b>)</b> Site Investigation | on  |   |   |                   |
| Assessment Team Men        | nbers & Affiliations:  | Patrick McCabe<br>Rob Sewell |                             |   |   |   |                   |
| Reason for Assessment      | : New Proposed I   | Pedestrian Crossing          |                             |   |   |   |                   |
|                            | periodic assessment<br>cessation of whistling<br>change in vehicle types                   | X                            | significant char            | nge in infrastructure<br>nge in train operations<br>ns in 5yr. Period |   | significant change in road or r<br>significant change in road or r<br>other collision experience (see | ail speeds        |
| Railway Authority:         | Southern Railway of BC   |                              |                             | ]   | Road Authority:                           | Vancouver Frasier Port Autho  | ority (VFPA)      |
| Crossing Location:         | 10203 Timberland Road  |                              |                             |   | Road Name/Number:                         | Timberland Road, DP world F   | acility           |
| Location Number:           | N/A  |                              |                             |   | Province:                                 | British Columbia  |                   |
| Municipality:              | City of Surrey, BC   |                              |                             |   | Location Reference (cont                  | rol section, etc.):   | DP Surrey Docks   |
| Railway: SRY               |  | Mile:                        | N/A                         |   | Road Classification:                      |   | ULU               |
| Sub-division:              | N/A  | Spur:                        | N/A                         |   | Roadway East/West (yes                    |   |                   |
| Type of Grade Crossing     | [private/public; warning devices]:   | SRSC                         |                             |   | Roadway North/ South (                    | yes/ no) No   |                   |
| Track Type: [mainline, e   | etc.]  |                              | Yard                        |   | *Urban Local Undivided                    |   |                   |
| Collision History (5-yea   | r period): No record of ac   | citents at the subjec        | t railway crossin           | g within the past five y  | /ears                                     |   |                   |
| + Personal<br>+ Fatal Inju | amage collisions:<br>Injury collisions:<br>ry Collisions:<br>isions in last 5 year period: |                              | NIL<br>NIL<br>NIL<br>NIL    |   | of Persons Injured:<br>of Persons Killed: | NIL<br>NIL  |                   |

Provide Details of the collisions if available: Sources:

Sheet 2a

SCENE PHOTOGRAPHS



For the full set of photos taken, see the Appendix to the Safety Assessment Report.

Sheet 2b

SCENE SKETCH



NOTE: All references to direction in this safety review are keyed to this diagram.

Notes: Images from Google Earth

- Include: directions to nearby municipalities for both road & rail approaches (use arrows)
  - adjacent intersections
  - relevant road signs/signals
  - signal warning systems hardware

landmarks
 crosswalks/paths

- geographical features

- bus stops, etc.

#### GENERAL INFORMATION

| Source  |   |      | I          | em  | Reference |
|---------|---|------|------------|---|-----------|
| Rail    | Maximum Railway Operating Speed, V <sub>T</sub>           | =    | 10         | (mph)   |           |
| Rail    | Daily Train Volume:                                       | =    | 1          | (freight trains/day)                                |           |
| Ndii    |   | =    | 0          | (passenger trains/day)                              |           |
| Rail    | Switching during daytime? Y/N                             | Yes  |            | nighttime? Y/N Yes                                  |           |
| Road    | Avg. Annual Daily Traffic, AADT:                          | =    | 2,140      | (vpd) Year of count: 2020                           |           |
| Road    | High seasonal fluctuation in volumes?                     |      | No         |   |           |
| Road    | Pedestrian Volumes  | =    | 0          | (ped./day)  |           |
| Road √  | Is crossing on a School Bus route?                        |      | No         |   |           |
| Road √  | Do Dangerous Goods trucks use this roadway?               |      | Yes        |   |           |
| Road    | Cyclist Volumes   | =    | 0          | (cyclists/day) Cyclist not anticipated              |           |
| Road √  | Regular use of crossing by persons with Assistive Devices | ?    |            | Pedestrians using Assistive Devices not anticipated |           |
| Road √  | Other special road users?                                 | type | Unknown    | daily volume None                                   |           |
| Road    | Forecasted AADT <sup>2</sup>                              | =    | 140        | (vpd) Forecasted Year: 2022                         |           |
|         | Design Speed:   |      | 30         | km/h Posted Speed: <b>30</b> km/h                   |           |
| Road √  | Maximum Operating Speed:                                  |      | 30         | km/h  |           |
|         | note: provide details if all approaches are not the same  |      |            | -   |           |
| Road √  | Road Surface Type (asphalt, concrete, gravel, etc.):      |      | Asphalt    |   |           |
| observe | Surrounding Land Use (urban/rural)?:                      |      | Industrial |   |           |
| observe | Any schools, retirement homes, etc. nearby?               |      | No         |   |           |

#### Notes:

Sheet 3

1. Road Authority should provided plans if available.

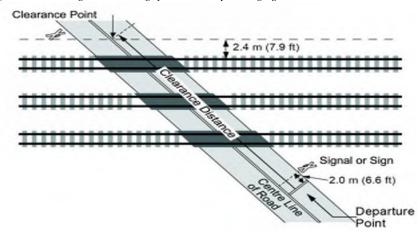
2. AADT is based upon modelled future traffic counts for the Realigned infrastrucutre.

#### From GCS Section 7.1.2:

| Column 1       | Column 2   | Column 3   |
|----------------|--|--|
| Class of Track | The maximum<br>allowable operating<br>speed for freight trains<br>is - | The maximum<br>allowable operating<br>speed for passenger<br>trains is - |
| Class 1 track  | 17 km/h (10 mph)   | 25 km/h (15 mph)   |
| Class 2 track  | 41 km/h (25 mph)   | 49 km/h (30 mph)   |
| Class 3 track  | 65 km/h (40 mph)   | 97 km/h (60 mph)   |
| Class 4 track  | 97 km/h (60 mph)   | 129 km/h (80 mph)  |
| Class 5 track  | 129 km/h (80 mph)  | 153 km/h (95 mph)  |

Figure 10-1 - Clearance Distance (cd) for Grade Crossings

(a) For Grade Crossings with a Warning System or Railway Crossing Sign

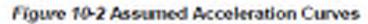


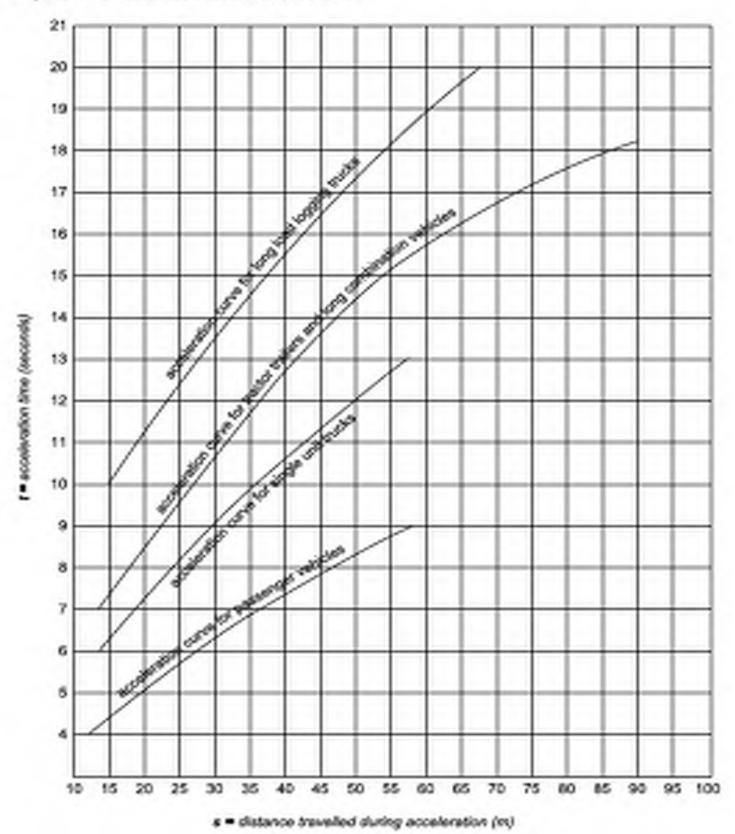
#### Grade Crossings Standards, July 2014

Table 10-1 Ratios of Acceleration Times on Grades

| Design Vehicle            |     | Ro  | ad Grade | (%) |     |
|---------------------------|-----|-----|----------|-----|-----|
|                           | -4  | -2  | 0        | +2  | +4  |
| Passenger Car             | 0.7 | 0.9 | 1.0      | 1.1 | 1.3 |
| Single Unit Truck & Buses | 0.8 | 0.9 | 1.0      | 1.1 | 1.3 |
| Tractor-Semitrailer       | 0.8 | 0.9 | 1.0      | 1.2 | 1.7 |

Source: Geometric Design Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999





DESIGN CONSIDERATIONS

| Source    |  |  |                           |                   | Item                     |             |            |     |           |     | Reference       |
|-----------|--|--|---------------------------|-------------------|--------------------------|-------------|------------|-----|-----------|-----|-----------------|
|           | Design Vehicle                         |  |                           |                   |                          |             |            |     |           |     |                 |
| Road      | Type:                                  | 6                                      | WB-20 Tractor-            | Semitrailers (W   | /B-20)                   |             |            |     |           |     | Table 1* SOR 57 |
| look-up   | Length, L:                             |  | 22.7                      | m                 |                          |             | EB Approad | :h  | WB Approa | ach | Table 1*        |
| look-up   | Stopping Sight Distance, SSD           |  | 45                        | m (round to       | 1.0% of grade)           | =           | 10         | m   | 45        | m   | Table 3*        |
| measure   | Clearance Distance, cd                 |  |                           |                   |                          | =           | 31.4       | m   | 31.4      | m   | GCS 16.1.1      |
| calculate | Vehicle Travel Distance, S             |  | S= L+cd                   | 54.1              | max <                    | =           | 54.1       | m   | 54.1      | m   |                 |
| look-up   | Vehicle Departure Time, t              |  |                           |                   |                          | =           | 15.1       | sec | 15.1      | sec | GCS Figure 10-2 |
| Road √    | Road Grade Effect:                     | maximum approa                         | ch grade within 'S        | i':               |                          | =           | 0.40       | %   | 0.70      | %   | Sheet 7         |
| look-up   | grade adjustment factor (anto ca       | lc assumes Truck)( ma                  | anual input from Tab      | le 10-1 if other) |                          | =           | 1.02       |     | 1.04      |     | GCS Table 10-1  |
| calculate |  | T= t x adjustment                      | factor                    |                   |                          | =           | 15.3       | sec | 15.6      | sec |                 |
|           | Design Vehicle Departure Tir           | ne, T <sub>D</sub> = J + T (whe        | re J = 2 sec (min.) perce | ption & reaction) |                          |             | 2.0        | sec | 2.0       | sec |                 |
| calculate |  | T <sub>G stop</sub> = T <sub>D</sub> = | 17.6                      | sec               |                          | <-          | 17.3       | sec | 17.6      | sec | GCS 10.3.2      |
| observe   | Do field acceleration times exce       | ed T <sub>D</sub> ?                    | Acceleration me           | easurement be     | yond the scope of        | of this ass | essment.   |     |           |     |                 |
| measure   | Pedestrian, cyclist & Assistiv         | e Devices Depar                        | ture Time                 | pedest            | trian <b>cd</b> distance | =           | 0.0        | m   | 0.0       | m   | CCS 10.2.2      |
| calculate | walking speed 1.22m/s max.             | T <sub>P</sub> =                       | 0.0                       | sec               | (1.0m/s used)            | <-          | 0.0        | sec | 0.0       | sec | GCS 10.3.3      |
| calculate | T <sub>SSD</sub> = (SSD+cd+L)/(0.27783 | 7 x V <sub>road design</sub> ) =       | 11.9                      | sec               |                          |             |            |     |           |     |                 |
| Comments  | Following Site Visit:                  |  |                           |                   |                          |             |            |     |           |     |                 |

#### Table 1 - Design vehicle Lengths/Class

Sheet 4

| General Vehicle Descriptions            | Length (m) |
|---|------------|
| 1. Passenger Cars, Vans and Pickups (P) | 5.6        |
| 2. Light Single-unit Trucks (LSU)       | 6.4        |
| 3. Medium Single-unit Trucks (MSU)      | 10.0       |
| 4. Heavy Single-unit Trucks (HSU)       | 11.5       |
| 5. WB-19 Tractor-Semitrailers (WB-19)   | 20.7       |
| 6. WB-20 Tractor-Semitrailers (WB-20)   | 22.7       |
| 7. A-Train Doubles (ATD)                | 24.5       |
| 8. B-Train Doubles (BTD)                | 25.0       |
| 9. Standard Single-Unit Buses (8-12)    | 12.2       |
| 10. Articulated Buses (A-BUS)           | 18.3       |
| 11. Intercity Buses (I-BUS)             | 14.0       |

Table 6 - Minimum Sightlines along the Rail Line (D<sub>steped</sub>) (as illustrated in Figure 3)

| Railway Design<br>Speed V,                            |     | 1   | [   | Depart | ture Tim  | ie (grea         | ter of T <sub>d</sub> | or T <sub>p</sub> ) ( | seconds |     |     | If greater of T, or T, > |
|---|-----|-----|-----|--------|-----------|------------------|-----------------------|-----------------------|---------|-----|-----|--------------------------|
| (inph)<br>WARNING:<br>Railway design<br>speed in mph! | ≤10 | 11  | 12  | 13     | 14        | 15               | 16                    | 17                    | 18      | 19  | 20  | 20 sec, add for each     |
|   |     |     |     | Minima | m Sightli | nes along<br>(m) | Rail Line             | (P.,)                 |         |     |     | additional second<br>(m) |
| STOP  | 30  | 30  | 30  | 30     | 30        | 30               | 30                    | 30                    | 30      | 30  | 30  | +0                       |
| 1-10  | -45 | 50  | 55  | 60     | - 45      | 70               | 72                    | 76                    | 80      | 85  | 90  | +5                       |
| 11-20   | 90  | 100 | 110 | 120    | 125       | 135              | 145                   | 155                   | 165     | 130 | 183 | +10                      |
| 21-30   | 135 | 150 | 165 | 175    | 190       | 205              | 215                   | 230                   | 245     | 255 | 270 | +15                      |
| 31-40   | 180 | 200 | 220 | 235    | 250       | 270              | 285                   | 305                   | 325     | 340 | 360 | +20                      |
| 41-50   | 225 | 250 | 270 | 290    | 315       | 335              | 360                   | 380                   | 405     | -05 | 450 | +25                      |
| 51-60   | 270 | 300 | 325 | 350    | 380       | 405              | -180                  | 460                   | 485     | 510 | 540 | +30                      |
| 61-70   | 315 | 350 | 380 | 415    | 445       | 470              | 505                   | 535                   | 565     | 595 | 630 | +35                      |
| 71-80   | 360 | 395 | 435 | 465    | 505       | 540              | 580                   | 610                   | 650     | 680 | 720 | +40                      |
| 11-90   | 405 | 445 | 490 | 535    | 530       | 605              | 650                   | 685                   | 730     | 765 | 810 | +45                      |
| 91-100  | 450 | 500 | 540 | 580    | 630       | 670              | 715                   | 760                   | 805     | 850 | 895 | +50                      |

Source: Geometric Design Guide for Canadian Roads, TAC; September 1999.

#### Table 3 – Determine SSD for Truck Class

| Road<br>Trossing<br>Design |      |     |     |     |     |     |     | St  | oppir |        | ick Cla<br>ht Di<br>(m) |        | e (SSI | D)  |     |     |     |     |     |     |     |
|----------------------------|------|-----|-----|-----|-----|-----|-----|-----|-------|--------|-------------------------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|
| Speed V<br>(km/hr)         |      |     |     |     |     |     |     |     | Ro    | ad App | oroach                  | Gradie | nt     |     |     |     |     |     |     |     |     |
| (MII(III)                  | -10% | -9% | -8% | -7% | -6% | -5% | -4% | -3% | -2%   | -1%    | 0%                      | 196    | 2%     | 3%  | 4%  | 5%  | 6%  | 7%  | 8%  | 9%  | 10% |
| 10                         | 10   | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10    | 10     | 10                      | 10     | 10     | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  |
| 20                         | 26   | 26  | 26  | 26  | 26  | 26  | 25  | 25  | 25    | 25     | 25                      | 25     | 25     | 25  | 25  | 25  | 24  | 24  | 24  | 24  | 24  |
| 30                         | 48   | 48  | 47  | 47  | 47  | 46  | 46  | 46  | 45    | 45     | 45                      | 45     | 45     | 44  | 44  | 44  | 44  | 44  | 44  | 43  | 43  |
| 40                         | 76   | 75  | 74  | 74  | 73  | 73  | 72  | 71  | 71    | 70     | 70                      | 70     | 69     | 69  | 68  | 68  | 68  | 67  | 67  | 67  | 67  |
| 50                         | 121  | 120 | 118 | 117 | 116 | 115 | 114 | 113 | 112   | 111    | 110                     | 109    | 108    | 108 | 107 | 106 | 106 | 105 | 105 | 104 | 104 |
| 60                         | 149  | 146 | 144 | 142 | 140 | 138 | 136 | 134 | 133   | 131    | 130                     | 129    | 128    | 126 | 125 | 124 | 123 | 122 | 122 | 121 | 120 |
| 70                         | 210  | 205 | 202 | 198 | 195 | 192 | 189 | 187 | 184   | 182    | 180                     | 178    | 176    | 175 | 173 | 171 | 170 | 169 | 167 | 166 | 165 |
| 80                         | 252  | 246 | 241 | 236 | 231 | 227 | 223 | 219 | 216   | 213    | 210                     | 207    | 205    | 202 | 200 | 198 | 196 | 194 | 192 | 191 | 189 |
| 90                         | 318  | 311 | 304 | 297 | 292 | 286 | 281 | 277 | 273   | 269    | 265                     | 262    | 258    | 255 | 252 | 250 | 247 | 245 | 243 | 240 | 238 |
| 100                        | 401  | 391 | 382 | 373 | 365 | 358 | 352 | 346 | 340   | 335    | 330                     | 325    | 321    | 317 | 314 | 310 | 307 | 304 | 301 | 298 | 295 |
| 110                        | 455  | 441 | 428 | 417 | 406 | 397 | 388 | 380 | 373   | 366    | 360                     | 354    | 349    | 344 | 339 | 334 | 330 | 326 | 322 | 319 | 315 |

\* Source: Transport Canada's "Determining Minimum Sightlines at Grade Crossings: A Guide for Road Authorities and Railway Companies"

### MileX.XX (10203, 59 Timberland Road),SRY Rail

#### Surrey, British Columbia

LOCATION of GRADE CROSSING

| Source  | Item   |    | Reference       |
|---------|--|----|-----------------|
|         |  |    |                 |
| observe | "D" should not be less than 30m for either approach if the train speed exceeds 15 mph.                                 |    |                 |
|         | D =24.4m   |    | GCS Section 9.1 |
| observe | Are there pedestrian crossings on either road approach that could cause vehicles to queue back to the tracks?          |    |                 |
| Observe |  | No |                 |
| observe | Is "D" insufficient such that road vehicles might queue onto the rail tracks?  | No |                 |
|         | Is "D" insufficient such that road vehicles turning from a side street might not see warning devices for the crossing? | No |                 |
|         |  |    | •               |

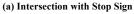
Comments Following Site Visit:

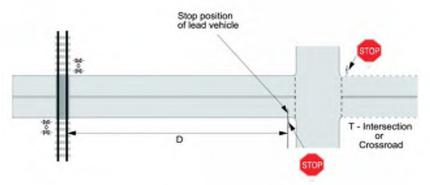
The minimum "D" dimension to the edge of the entrance to facility in south. The Northern "D" is 33m

Since the previous 2015 inspection was completed the southern facility gate has moved 20m south. Improving the D dimension from 4m

Railway speed = 10mph

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals





(b) Intersection with Traffic Signal

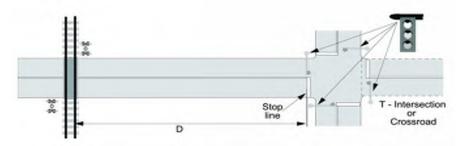
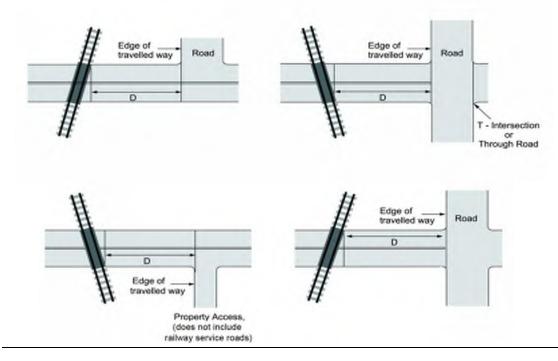


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings



Sheet 5

#### GRADE CROSSING SURFACE

| to the survey   |   | ľ  | tem   |  |   |  |  | Referen            |
|---|---|--|---|--|---|--|--|--------------------|
| ve Is the cros  | sing smooth enough to allow road vehicles, pedestrians, cycli   | ists, and other ro   | oad users to cr   | oss at their   | normal speed                              | without cons   | equence?   | SOR 60; G0         |
| Grade Cro   | ssing Surface Material: Asphalt   |  |   |  |   |  |  |                    |
| ve  | ssing Surface Condition: Fair   |  |   |  |   |  |  | SOR 60; G          |
|   | Road Surface Type: Ashpalt  |  |   |  |   |  |  |                    |
|   | Road Surface Condition: Fair  |  |   |  |   |  |  | SOR 60; G          |
| Roadway   | Illumination?: Yes  |  |   |  |   |  |  |                    |
|   |   | EB Approach  |   |  | WB Approa                                 | ch   |  | 000.5              |
|   | ace crossing width (perp. C.L. min. = 8.0m)<br>ace extension beyond travel lanes (min. = 0.5m)  | 0.5  | <b>10.5</b>   | m  | 2.0                                       | m  |  | GCS 5.:<br>GCS 5.: |
|   | Path/Trail crossing width (min. = 1.5m)   | 0.5  | NA  | m  | NA  | m<br>m   | No sidewalk  | GCS 5.             |
|   | Path/Trail extension beyond sidewalk (min. = 0.5m)  | NA   | m   |  | NA  | m  | No sidewalk  | GCS 5.             |
|   | Between Travel Lane and C.L. of Trail   |  | NA  | m  |   |  |  | 0000               |
| Cross-Sec   | tion:   |  | South (Righ   | nt) Rail:  |   | North (Lef   | :) Rail:   | GCS Table          |
| re Flangeway  | / width (min. = 65mm; max.= 120mm or 75mm <sup>1</sup> )  |  | 82  | mm   |   | 82   | mm   | GCS Table          |
| <mark>re</mark> Flangewa  | / depth (min. = 50mm; max.= no limit or 75mm <sup>1</sup> )   |  | 20  | mm   |   | 20   | mm   | GCS Table          |
|   | l Side Gap:   |  |   |  |   |  |  | GCS Table          |
|   | vidth (max.= 120mm or 0 <sup>1</sup> )  |  | 20  | mm   |   | 20   | mm   | GCS Table          |
|   | depth (max.= no limit or 0 <sup>1</sup> )   |  | 0   | mm   |   | 0  | mm   | GCS Table          |
| Wear Lim  |   |  |   | mm   |   | -  | mm   | GCS Table          |
|   | of Top Rail above road surface (max. = 13mm <sup>1</sup> , 25mm, or 50mm)   |  | 0   | mm<br>mm   |   | 0  | mm<br>mm   | GCS Table          |
|   | of Top Rail below road surface (min. = -7mm <sup>1</sup> ,-25mm, or -50mm)<br>ersons using assistive devices  |  | U   | 111111   |   | U  | 11111  | GCS Table          |
|   | e timbers, etc difference between road grade and rail super Standards, July 2014  | relevation   |   |  | ress of roadway a<br>-1 - Grade (         |  | -photos rface Dimensions   |                    |
| e Crossings   |   | relevation   | (1)   | Figure 5   | -1 - Grade (                              | Crossing Su  |  | -                  |
| e Crossings   | Standards, July 2014<br>Crossing Surface – Cross Section  | relevation   |   | Figure 5   |   | Crossing Su  |  |                    |
| e Crossings<br>5-1 – Grade  | Standards, July 2014<br>Crossing Surface – Cross Section  | relevation 65 mm   |   | Figure 5   | -1 - Grade (                              | Crossing Su  | rface Dimensions   |                    |
| e Crossings<br>5-1 – Grade<br>a) Flangewa   | Standards, July 2014<br>Crossing Surface – Cross Section  |  | Edge o  | Figure 5   | -1 - Grade (<br>cluding a path            | Crossing Su  | rface Dimensions   |                    |
| e Crossings<br>5-1 – Grade<br>a) Flangewa   | Standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Minimum   |  | Edge o  | Figure 5<br>Road, inc<br>of shoulder   | -1 - Grade (<br>cluding a path            | Crossing Su  | rface Dimensions   |                    |
| e Crossings<br>5-1 – Grade<br>a) Flangewa   | Standards, July 2014<br>Crossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road   | (5 mm  | Edge o  | Figure 5<br>Road, inc<br>of shoulder   | -1 - Grade (<br>cluding a path            | Crossing Su  | Edge of<br>travelled way   |                    |
| e Crossings<br>5-1 – Grade<br>a) Flangewa   | Standards, July 2014 Crossing Surface – Cross Section  Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings   | 65 mm<br>75 mm   | Edge of<br>End of<br>0.5 m o  | Figure 5<br>Road, inc<br>d shoulder<br>railway ties  | -1 - Grade (                              | Crossing Su  | Edge of<br>travelled way   |                    |
| e Crossings<br>5-1 – Grade<br>a) Flangewa<br>Widd   | Standards, July 2014 Crossing Surface – Cross Section  Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings   | 65 mm<br>75 mm<br>120 mm   | Edge of<br>End of<br>0.5 m o  | Figure 5<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (                              | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder                     |                    |
| e Crossings<br>5-1 – Grade<br>a) Flangewa<br>Widd   | Standards, July 2014 Crossing Surface – Cross Section  Minimum Maximum for: Public sidewalks, paths or trails designated by the road autionity for use by persons using assistive devices All other grade crossings Minimum   | 65 mm<br>75 mm<br>120 mm<br>50 mm  | Edge o<br>End of<br>0.5 m o<br>beyond   | Figure 5<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (                              | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder                     |                    |
| 5-1 – Grade<br>a) Flangewa<br>Widd  | Standards, July 2014 Crossing Surface – Cross Section  Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road  | 65 mm<br>75 mm<br>120 mm   | Edge o<br>End of<br>0.5 m o<br>beyond   | Figure 5<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (                              | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder                     |                    |
| e Crossings<br>5-1 – Grade<br>a) Flangewa<br>Widd<br>Depth<br>(b) Field sid<br>A space is po<br>sidewaks, po  | Standards, July 2014 Crossing Surface – Cross Section   Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings  Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  All other grade crossings | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit   | Edge o<br>End of<br>0.5 m o<br>beyond   | Figure 5<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (                              | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder                     |                    |
| e Crossings<br>5-1 - Grade<br>a) Flangewa<br>Widd<br>Depth<br>(b) Field sid<br>A space is pe  | Standards, July 2014 Crossing Surface – Cross Section   Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings  Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  All other grade crossings | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit   | Edge o<br>End of<br>0.5 m o<br>beyond   | Figure 5<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (                              | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface |                    |
| e Crossings<br>5-1 - Grade<br>a) Flangewa<br>Widd<br>Depth<br>(b) Field sid<br>A space is po<br>sidewaks, po  | Standards, July 2014 Crossing Surface – Cross Section   Minimum Maximum for:  Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings  Minimum Maximum for:  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  All other grade crossin | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>for public<br>public   | Edge o<br>End of<br>0.5 m o<br>beyond   | Figure 5<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (                              | Crossing Su  | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface |                    |
| e Crossings<br>5-1 - Grade<br>a) Flangewa<br>Widd<br>Depth<br>(b) Field sid<br>A space is po<br>sidewaks, po<br>assistive dev<br>(c) Elevation<br>The top of th   | Standards, July 2014 Crossing Surface – Cross Section  Minimum Maximum for: Public sidewalks, paths or trails designated by the road authonty for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authonty for use by persons using assistive devices All other grade crossings Maximum width   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>for public<br>ms using<br>120 mm<br>No limit   | Edge o<br>End of<br>0.5 m o<br>beyond   | Figure 5<br>Road, inc<br>shoulder<br>railway ties<br>or more<br>t shoulder w<br>s one  | -1 - Grade (<br>duding a path<br>there    | Width  | rface Dimensions   |                    |
| e Crossings<br>5-1 – Grade<br>a) Flangewa<br>Widd<br>Depth<br>(b) Field sid<br>A space is po<br>sidewalks, po<br>assistive dev<br>(c) Elevation<br>The top of the<br>rail within the<br>Wear limits:  | Standards, July 2014 Crossing Surface – Cross Section    Minimum Maximum for:  Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings  Minimum Maximum for:  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  Maximum for:  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  Maximum for:  Maximum width Maximum width Maximum width of the top of the rail with respect to the crossing surface crossing surface must be installed as close as possible to th wear limits below:  All, path or trail designated by the road authority for use by person   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>for public<br>ms using<br>120 mm<br>No limit<br>he top of the                          | Edge o<br>End of<br>bayond<br>there is  | Figure 5<br>Road, inc<br>of shoulder<br>railway ties<br>or more<br>i shoulder w<br>i one<br>(b) Sk   | dewalk, path.<br>1- Sidew                 | Crossing Su<br>or trail<br>Width<br>or trail along<br>walk, peth, or | rface Dimensions   | Sidewalk, path, o  |
| e Crossings<br>5-1 - Grade<br>a) Flangewa<br>Widd<br>Depth<br>(b) Field side<br>A space is p<br>sidewalks, pa<br>assistive dev<br>(c) Elevation<br>The top of the<br>raal within the<br>Wear limits:<br>Public sidewa                                     | Standards, July 2014 Crossing Surface – Cross Section    Minimum Maximum for:  Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings  Minimum Maximum for:  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  Maximum for:  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  Maximum for:  Maximum width Maximum width Maximum width of the top of the rail with respect to the crossing surface crossing surface must be installed as close as possible to th wear limits below:  All, path or trail designated by the road authority for use by person   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>for public<br>ms using<br>120 mm<br>No limit<br>he top of the                          | Edge o<br>End of<br>0.5 m o<br>beyond<br>there is<br>2 · 0.5<br>or b          | Figure 5<br>Road, inc<br>shoulder<br>railway tes<br>or more<br>shoulder w<br>sone  | dewalk, path.<br>1- Sidew                 | Crossing Su<br>or trail<br>Width<br>or trail along<br>walk, peth, or | rface Dimensions   | Sidewalk, path, o  |
| e Crossings<br>5-1 - Grade<br>a) Flangewa<br>Widd<br>Depth<br>(b) Field side<br>A space is p<br>sidewalks, pa<br>assistive dev<br>(c) Elevation<br>The top of the<br>raal within the<br>Wear limits:<br>Public sidewa                                     | Standards, July 2014 Crossing Surface – Cross Section  Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings All other grade crossing surface authority for use by person All other boy of the rail with respect to the crossing surface a crossing surface must be installed as close as possible to th wear limits below. All other trail designated by the road authority for use by persons All other trail designated by the road authority for use by persons All other trail designated by the road authority for use by persons All other trail designated by the road authority for use by persons All other trail designated by the road authority for use by persons All other trail designated by the road authority for use by persons All other trail designated by the road authority for use by persons All other trail designated by the road authority for use by persons All other trail designated by the road authority for use by persons All other trail designated by the road authority for use by persons All other trail designated by the road authority for use by persons All other trail designated by the road authority for use by persons All othe | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>No limit<br>No limit<br>No limit<br>he top of the<br>errons using                      | Edge o<br>End of<br>0.5 m o<br>beyond<br>there is<br>2 · 0.5<br>or b<br>there | Figure 5<br>Road, inc<br>of shoulder<br>railway ties<br>or more -<br>shoulder w<br>shoulder w<br>sone<br>(b) Ski<br>(b) Ski<br>m or more b<br>eyond shou<br>e is one | dewalk, path.<br>1- Sidew<br>surfaces may | Width<br>or trail alon;<br>malk, path, or                            | rface Dimensions   | Sidewalk, path, o  |
| e Crossings<br>5-1 – Grade<br>a) Flangewa<br>Widd<br>Depth<br>(b) Field sid<br>A space is p<br>sidewalks, pa<br>assistive dev<br>(c) Elevation<br>The top of the<br>real within the<br>Wear limits:<br>Public sidewa<br>assistive dev<br>All other public | Standards, July 2014 Crossing Surface – Cross Section   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>for public<br>ms using<br>120 mm<br>No limit<br>te top of the<br>errons using<br>13 mm | Edge o<br>End of<br>0.5 m o<br>beyond<br>there is<br>2 · 0.5<br>or b<br>there | (b) Sk<br>m or more b<br>eyond shoulder w<br>(b) Sk<br>m or more b<br>eyond shoulder w<br>to ne  | dewalk, path.<br>1- Sidew<br>sider where  | Viden  | rface Dimensions   | Sidewalk, path, o  |

Sheet 7

#### **ROAD GEOMETRY**

| Source       |  |                      | It                              | em      |          |      |                              |              | Reference           |  |  |  |
|--------------|--|----------------------|---------------------------------|---------|----------|------|------------------------------|--------------|---------------------|--|--|--|
| observe      | Are horizontal and vertical alignments smooth and continuous throughout SSD?             |                      |                                 |         |          |      |                              |              |                     |  |  |  |
| Observe      | WB Approach: Yes   |                      | EB Approach                     | Yes     |          |      |                              |              | Sheet 4             |  |  |  |
| observe      | Is horizontal alignment straight beyond rails for a distance ≥ design vehicle length, L? |                      |                                 |         |          |      |                              |              |                     |  |  |  |
| Observe      | WB Approach: No  |                      | EB Approach                     | No      |          |      |                              |              | Sheet 4             |  |  |  |
| observe      | Are the road lanes at least the same width on the c                                      | rossing as on the i  | road approaches                 | 5?      |          |      |                              |              |                     |  |  |  |
| Observe      | WB Approach: Yes   |                      | EB Approach                     | Yes     |          |      |                              |              |                     |  |  |  |
|              | Grades   |                      | EB Approach                     |         | WB Appro | bach | Difference: rail e & rd grac | le (GCS 6.1) | GCS Sect. 6         |  |  |  |
| measure      | Slope within 8m of nearest rail (max. = 2%)  |                      | 0.60                            | %       | 0.20     | %    | <b>0.30%</b> %               | 0.10%        | Diff in Grade Max   |  |  |  |
| measure      | Slope between 8m & 18m of nearest rail (max. = 5%)                                       |                      | 0.40                            | %       | 0.70     | %    |                              |              | 3%                  |  |  |  |
|              | If crossing is only for pedestrians, cyclists, or persor                                 | is using assistive d | evices (max. = 1 <sup>1</sup> o | or 2%): | -        | -    |                              |              |                     |  |  |  |
| measure      | slope within 5m of nearest rail =  |                      | N/A                             | %       | N/A      | %    |                              |              |                     |  |  |  |
| Road √       | General approach grade (max. = +/- 5%)   |                      | 0.50                            | %       | 0.50     | %    |                              |              |                     |  |  |  |
| NUdu V       | measured over the SSD distance of:   |                      | 10                              | m       | 45       | m    |                              |              | Sheet 4             |  |  |  |
| Rail √       | Are rail tracks super-elevated?  | No                   | Rate of s/e:                    | 0.00    | m/m Sdg  | 0.00 | m/m ML                       |              | GCS Sect. 6.1 & 6.2 |  |  |  |
| Road √       | If train speeds exceed 15mph (70° minimum w/o warning                                    | system; 30° minimum  | with warning system             | ):      |          |      |                              |              |                     |  |  |  |
| ROAU V       | What is the angle between the crossing and the roa                                       | idway?               | =                               | 70.0    | degrees  |      |                              |              |                     |  |  |  |
| observe      | Condition of Road Approaches:  | Fair                 |                                 |         |          |      |                              |              | SOR 60              |  |  |  |
| observe      | (e.g., anything that might affect stopping or acceleration)                              |                      |                                 |         |          |      |                              |              |                     |  |  |  |
| observe      | NA   |                      |                                 |         |          |      |                              |              |                     |  |  |  |
| 1. If freque | nt use by persons using assistive devices  |                      |                                 |         |          |      |                              |              |                     |  |  |  |
| Comments     | Following Site Visit:  |                      |                                 |         |          |      |                              |              |                     |  |  |  |

nts Following Site Visit:

"Leg Urban

#### Minor cracking within both approaches were observed.

#### Grade Crossings Standards, July 2014

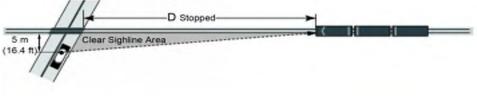
#### Table 6-1 - Difference in Gradient

|           | Classification     | Ditter          | ince in Gradien | n (%)         |       |
|-----------|--------------------|-----------------|-----------------|---------------|-------|
|           | RLU                |                 | 2               |               |       |
|           | RCU                |                 | 1               |               |       |
|           | RCD                |                 | 1               |               |       |
|           | RAU                |                 | 0               |               |       |
|           | RAD                |                 | 0               |               |       |
|           | RFD                |                 | -               |               |       |
|           | ULU                |                 | 3               |               |       |
|           | UCU                |                 | 2               |               |       |
|           | UCD                |                 | 2               |               |       |
|           | UMU                |                 | 0               |               |       |
| id<br>(U) | Rural (R) Local (L | ) Collector (C) | Arterial(A)     | Expressway (E | ) Fro |
|           | Divided (D)        |                 |                 | Undivided (U) |       |

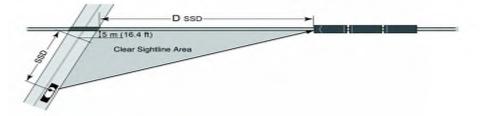
Source: Geometric Darign Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999

#### Figure 7-1 - Minimum Sightlines - Grade Crossings

(a) Sightlines for Users Stopped at a Grade Crossing (applicable to all quadrants)



(b) Sightlines for Users Approaching Grade Crossing (applicable to all quadrants)



#### Sheet 8

#### SIGHTLINES

| Driver Eye Height | = | 1.05m | passenger vehicles, pedestrians, cyclists & assistive devices |
|-------------------|---|-------|---|
|                   | = | 1.80m | buses & straight trucks                                       |
|                   | = | 2.10m | large trucks & tractor-trailers                               |
| Target Height     | = | 1.20m | above rails   |

| Source     |   |   |   | Reference    |                   |                       |                  |                             |
|------------|---|---|---|--------------|-------------------|-----------------------|------------------|-----------------------------|
| - hereiter | Are sightlines within the rail R.                                   | O.W. clear of busi  | hes/vegetation; 15 m on each side of t                | the track an | d, 30 m along the | track, on each side c | of the crossing? |                             |
| observe    | -if no, detail the location   |   |   |              |                   |                       |                  |                             |
| observe    | Are sightlines on the road R.O.                                     | W. within 15m of  | the rail crossing clear of bushes/veget               | tation?      |                   |                       |                  |                             |
| Observe    | -if no, detail the location   | No, only minor  | (weeds) within ROW                                    |              |                   |                       |                  |                             |
|            |   |   |   | EB Approa    | ch                | WB Approa             | ich              |                             |
| look-up    | SSD minimum =   |   |   | 10           | m                 | 45                    | m                | Sheet 4                     |
| measure    | SSD Actual (not including turning mo                                | ovements):  |   | 100.0        | m                 | 140.0                 | m                |                             |
| calculate  | D <sub>SSD</sub>  | =   | 0.277837 x V <sub>train km/h</sub> x T <sub>SSD</sub> | 53           | m                 | 53                    | m                | 1.609 convert mph to km/h   |
| calculate  | <b>D</b> <sub>STOPPED</sub> minimum (m)                             | =   | 0.277837 x V <sub>train km/h</sub> x T <sub>D</sub> = | 77           | m                 | 79                    | m                | T <sub>D</sub> from Sheet 4 |
| measure    | D <sub>STOPPED</sub> Actual:  |   | Driver looking LEFT                                   | 70           | m (ne)            | 100                   | m (sw)           |                             |
| measure    |   |   | Driver looking RIGHT                                  | 70           | m (nw)            | 150                   | m (se)           |                             |
| calculate  | Ped./Cyclist D <sub>STOPPED</sub> (m)                               |   |   | 0            | m                 | 0                     | m                | T <sub>P</sub> from Sheet 4 |
|            | Ped./Cyclist D <sub>STOPPED</sub> Actual:                           |   | Person looking LEFT                                   | N/A          | m                 | N/A                   | m                |                             |
| measure    | note: measured from a point 2m in adva                              | ance of sign/signals  | Person looking RIGHT                                  | N/A          | m                 | N/A                   | m                |                             |
| obsorvo    | Are there any obstacles within                                      | Are there any obstacles within the sight triangles other than traffic signs/utility poles that might affect visibility? |   |              |                   |                       |                  |                             |
| observe    | Fencing and equipment within DP World facility. Debri on South side |   |   |              |                   |                       |                  |                             |

b)

**Comments Following Site Visit:** 

- Debris on southeastern quadrant causes obstruction.

- Fencing and equipment blocks sight in northeast and Northwest quadrants.

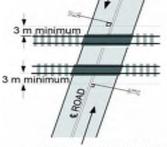
- Active Warning system may be required is sighlines cannot be met.

special considerations for large trucks?

a)

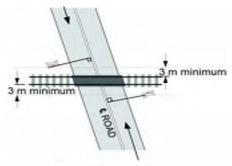
-can sightlines be maintained on an ongoing basis? (snow)

Figure 8-3 - Location of Railway Crossing Signs and Number of Tracks Signs (public grade crossings without warning systems)



-special design vehicle?

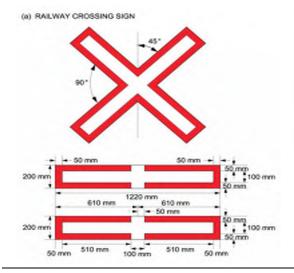
-photos

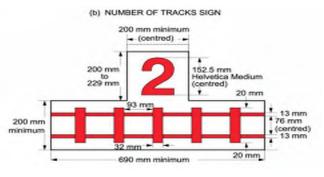


ANGLE GREATER THAN 90\*

ANGLE 90° OR LESS

#### Figure 8-1 - Railway Crossing Sign and Number of Tracks Sign





SIGNS AND PAVEMENT MARKINGS

| Source          | Item  |                        |                       |                 |                       |             |     |  |        |
|-----------------|---|------------------------|-----------------------|-----------------|-----------------------|-------------|-----|--|--------|
|                 | Railway Crossing Sign   |                        | $\times$              | These s         | igns will be required |             |     |  | MUTCD  |
|                 |   | EB Approach            |                       | WB Approad      | h                     |             |     |  |        |
| measure         | distance from nearest rail:   | 7.7                    | m                     | 12.0            | m                     |             |     |  |        |
| measure         | distance from edge of road:   | 1.8                    | m                     | 1.8             | m                     |             |     |  |        |
| measure         | height of centre of crossbucks:   | 3.5                    | m                     | 3.5             | m                     |             |     |  |        |
| measure         | retroreflectivity readings:   | N/A                    | cd/lux/m <sup>2</sup> | N/A             | cd/lux/m <sup>2</sup> |             |     |  |        |
| observe         | Number of Tracks sign? Yes  |                        |                       |                 |                       |             |     |  |        |
| observe         | A Stop Sign must be installed at grade crossing without a wa                      | arning system if the r | oad design speed is   | s less than 15m | ph                    | Yes/ No/ NA | Yes |  | SOR 64 |
| observe         | A Stop Ahead sign must be installed if the Stop Sigh                              | is not clearly cvis    | able within the S     | Stopping Dist   | ance                  | Yes/ No/ NA | N/A |  | SOR 65 |
| Comments        | Following Site Visit:   |                        |                       |                 |                       |             |     |  |        |
| - New RAIL      | WAY CROSSING signs installed in 2015.   |                        |                       |                 |                       |             |     |  |        |
| - The back      | - The back of poles and signs have reflective strips (reflectivity not measured). |                        |                       |                 |                       |             |     |  |        |
| - NUMBER        | OF TRACKS Sign not required as only 1 track.                                      |                        |                       |                 |                       |             |     |  |        |
| -general condit | ion -clear sightlines to the si   | gn                     |                       | -nosts          | -nhotos               |             |     |  |        |

| Source  | Item   |     | Reference |
|---------|--|-----|-----------|
|         | DO NOT STOP ON TRACKS  |     | MUTCD     |
| Road √  | Does queued traffic routinely encroach closer than 5m from the crossing surface? | No  |           |
| observe | Are these signs present on either approach?                                      | Yes |           |

**Comments Following Site Visit:** 

Sheet 9a

| Source  | Item  |   |        |        |             |  | Reference      |
|---------|---|---|--------|--------|-------------|--|----------------|
|         | Railway Crossing Ahead Sign (WA 18-20)            |   | NA-188 |        |             |  | MUTCD & SOR 66 |
| look-up | Is AADT > 100? Yes                                |   | EB Ap  | proach | WB Approach |  | Sheet 3        |
| observe | Is area urban such that WA 18-20 is not required? |   | Yes    |        | Yes         |  |                |
| measure | Distance from nearest rail to sign                | = | 50     | m      | 52.0 m      |  | MUTCD          |
| observe | height:   |   | 2.5    |        | 2.5         |  |                |
| observe | appropriate orientation of symbol                 |   | Yes    |        | Yes         |  |                |

Comments Following Site Visit:

- RAILWAY CROSSING AHEAD Sign has been installed since the previous inspection. - RAILWAY CROSSING AHEAD Sign installed Min. Approx 50m from crossing

-general condition -clear sightlines to the sign

| Source   | Item   | Reference              |
|----------|--|------------------------|
|          | ADVISORY SPEED SIGN  | MUTCD & SOR 66 (2)     |
|          |  |                        |
| observe  | Are they present on both approaches? No Posted speed limit? N/A km/h |                        |
| look-up  | Are they required on either approach? No                             | check SSD<br>(Sheet 8) |
|          | ·  |                        |
| Comments | Following Site Visit:  |                        |

-posts

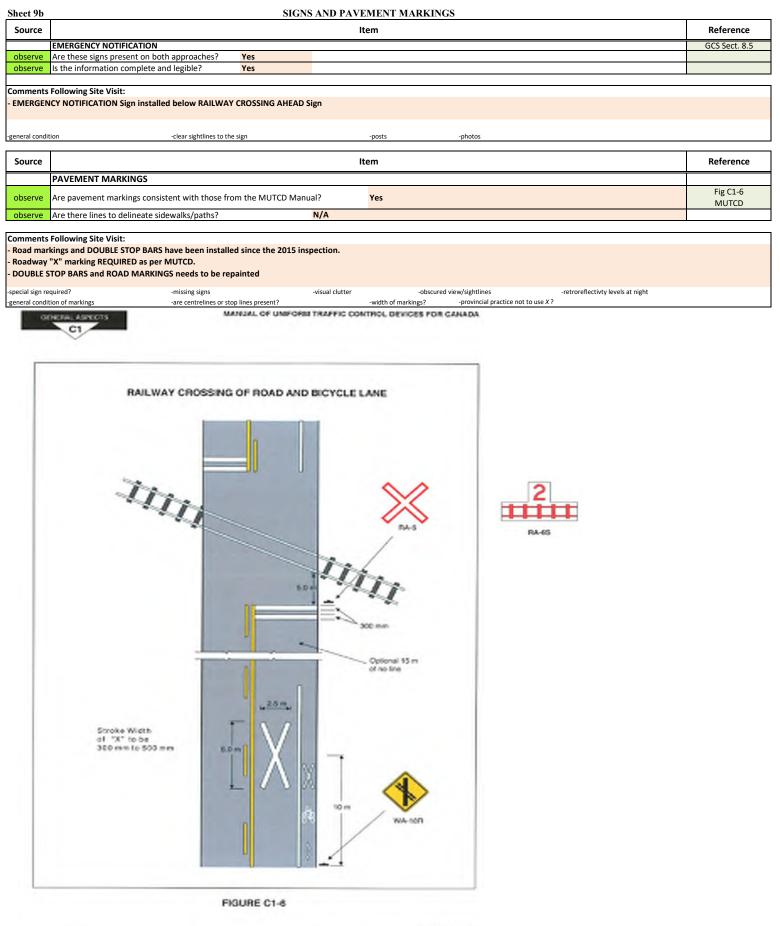
-aligned to the driver

-photos

| - ADVISORY SPEED Sign not installed |        |         |
|-------------------------------------|--------|---------|
|                                     |        |         |
| general condition                   | -posts | -photos |

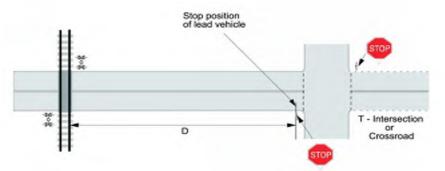
<sup>-</sup> DO NOT STOP ON TRACKS Signs are installed.

<sup>-</sup>general condition -posts -photos



JANUARY 2014

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

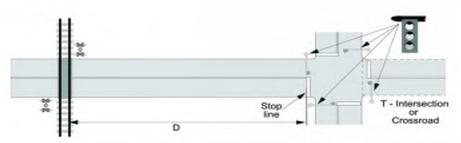
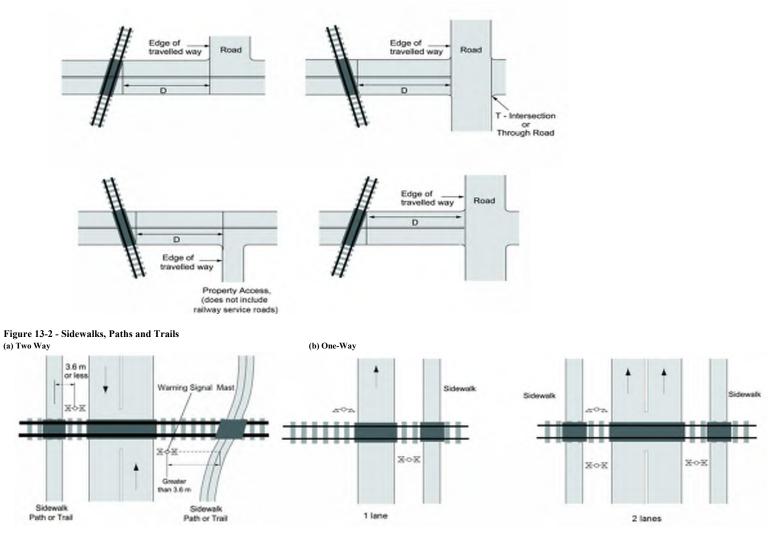


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings





| Sheet 11  |   |                     | GRAD               | E CROSSI      | NG WARNING S                              | SYSTEN | 48            |  | H  |                              | GCS Section 9     |
|-----------|---|---------------------|--------------------|---------------|---|--------|---------------|--|--|------------------------------|-------------------|
| Source    |   |                     |                    | ltem i        | s not required.                           |        |               |  |  |                              | Reference         |
|           | Warning System Warrants                 |                     |                    |               |   |        |               |  |  |                              |                   |
|           | if any of A through E below are         | met, then a warnir  | ng system is warra | inted         |   |        |               |  |  |                              |                   |
|           |   |                     | Question           |               |   |        |               | Warrant fo   | r Warning Sy   | stem                         |                   |
| look-up   | Existing AADT =                         | 2,140               | Forecast AADT =    | :             | 140                                       |        |               |  |  |                              | Sheet 3           |
| look-up   | Daily Train Volume =                    | 1                   |                    |               |   | trains |               |  |  |                              | Sheet 3           |
| calculate | A. Cross-Product =                      | 140                 |                    |               |   |        | > 2,000 FLB   | req'd  | > 50,000 req   | uires gates                  |                   |
| look-up   | B. Maximum Rail Operating Sp            | eed =               | 10                 |               | n   | nph    | (max = 80m    | ph or 50 mph v                                       | ith crosswalk  | ()                           | Sheet 3           |
| Rail      | C. Number of Tracks =                   |                     | 2                  |               |   |        |               |  |  |                              |                   |
| Kdli      | if $\geq 2$ , can trains pass one anoth | er?                 | No                 |               |   |        | if > 2 and tr | ains can pass or                                     | e another ->   | FLB req'd                    |                   |
| look-up   | D. Are Sightlines obscured?             |                     | N/A                |               |   |        | if "Yes" -> F | LB req'd: If Fig 7                                   | .1 applies>  | add G                        | Sheet 8 & Fig 7.1 |
| observe   | E. Are any proximity conditions         | s met?              | No                 |               |   |        | if "Yes" -> F | LB required.   |  |                              | GCS Sect 9 & 11   |
| look-up   | Is a Warning System warranted           | ?                   | No                 |               |   |        | If any of A t | hrough E above                                       | meet the Wa  | arrant                       |                   |
|           | Field Visit                             | Present? (Y/N)      | Condition / Alig   | nment:        |   |        |               | 0  |  |                              | GCS 13            |
| observe   | Light Units,                            | N                   |                    |               |   |        |               |  |  |                              | GCS 13            |
|           | Bells,                                  | N                   |                    |               |   |        |               |  |  |                              | GCS 13            |
| observe   | Gates,                                  | Ν                   |                    |               |   |        |               |  |  |                              | GCS 13            |
| observe   | Cantilever Lights,                      | N                   |                    |               |   |        |               |  |  |                              | GCS 13            |
| observe   | Check that warning signal assen         | nblies and cantilev | ers are in accorda | nce with GCS  | Figures.                                  |        |               |  |  |                              | GCS Sect. 12      |
| observe   | Is warning system housing at lea        | ast 9m from travel  | ed way of the roa  | d and 8m froi | m the nearest rail?                       |        |               |  |  |                              |                   |
|           | If there is a sidewalk, is a bell or    |                     |                    |               |   |        |               |  |  |                              |                   |
| Rail √    | Have all light units been aligned       | !?                  | NA                 | Date?         | NA  |        |               |  |  |                              |                   |
|           | Design Approach Warning Time            | (greatest of):      |                    |               |   |        |               |  |  |                              |                   |
| Rail      |   |                     |                    |               | 20sec OR<br>[20+((cd-11)/3)]<br>if cd>11m | Τd     | Тр            | Gate Clearance<br>Time + Descent<br>Time + 5 seconds | Traffic Signal<br>Clearance Time<br>(=0 if no traffic<br>signal) | (SSD + cd + L)/(0.277837xVv) |                   |
|           | EB Approach                             |                     | 34.6               | sec           | 26.8                                      | 17.3   | 0.0           | 34.6   | 0.0  | 7.7                          |                   |
|           | WB Approach                             |                     | 34.6               | sec           | 26.8                                      | 17.6   | 0.0           | 34.6   | 0.0  | 11.9                         |                   |
| observe   | Is warning time less than 35 sec        |                     |                    | s)            | N/A                                       |        |               |  |  |                              |                   |

**Comments Following Site Visit:** 

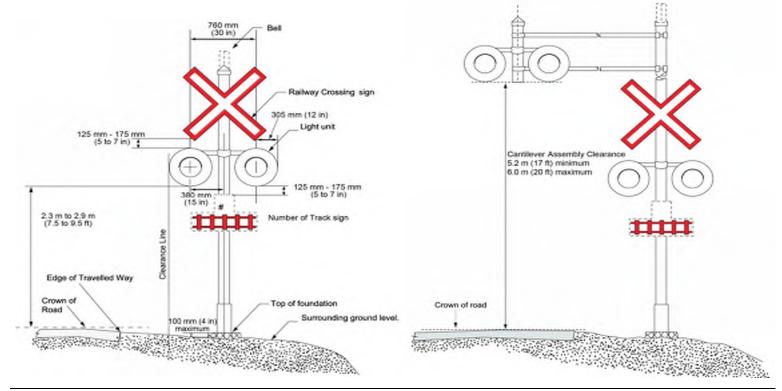
As the AADT has reduced since the 2015 inspection, the crossing does not meet the requirements for and active warning system

extraordinary conditions why warning system should be installed

-is warning system present but not warranted?

#### Figure 12-1 - Warning Signal Assemblies

#### Figure 12-3 - Cantilevers



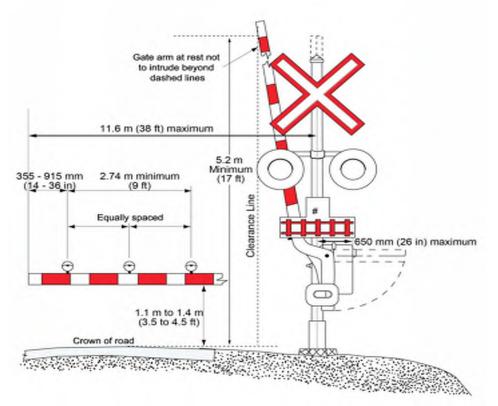


#### GATES FOR GRADE CROSSING WARNING SYSTEMS

GCS Section 9

| Source         |   |                     | Item  |                               |             | Reference      |
|----------------|---|---------------------|---|-------------------------------|-------------|----------------|
|                | Warning System Warrants   |                     |   |                               |             |                |
|                | -if any of A through E below are met th   | en a warning syst   | m with gates is warranted. Not required as qwar | rning system is not necessary |             |                |
| calculate      | A. Cross-Product =  | 140                 | (50,000 min)                                    |                               |             |                |
| look-up        | B. Maximum Rail Operating Speed =   | 10                  | mph (max = 50mph)                               |                               |             | Sheet 3        |
| Rail √         | C. Number of Tracks =   | 2                   |   |                               |             |                |
| Null V         | if $\geq 2$ , can trains pass one another?  | N/A                 |   |                               |             |                |
| look-up        | D. Is D <sub>STOPPED</sub> Insufficient?  | No                  | Minor vegetation work required on Northwest a   | and Southwest quadrants.      |             | Sheet 8        |
| observe        | E. Are any proximity conditions met?  | N/A                 |   |                               |             |                |
| calculate      | Gate clearance distance: eq 10.4b   | 24.7                | m cd <sub>G stop</sub> 34.7 m cd ssd Ef         | B 69.7                        | m cd ssd WB |                |
| look-up        | travel time =   | 17.6                | sec <sub>G stop</sub>                           |                               |             | 7              |
| calculate      | Gate arm clearance times:   | 17.3                | sec EB from stop T G ssd = 4.2 sec EB from      | n SSD                         |             | 7              |
| calculate      |   | 17.6                | sec WB from stop T G ssd = 8.4 sec WB fro       | om SSD                        |             | GCS Sect. 10.4 |
| look-up        | Gate arm delay time: 17.6   | sec (greatest value | e from above)                                   |                               |             |                |
| calculate      | effect of grade =   | 0.3                 | sec (SB from Stop) -4.2 sec EB from             | n SSD                         |             |                |
| calculate      |   | 0.6                 | sec (NB from Stop) 0.0 sec WB fro               | om SSD                        |             |                |
| measure        | Measure gate arm delay and compare with above:  |                     | N/A   |                               |             |                |
| observe        | Do gates conform to standards depicted in GCS Fig   | ures?               | N/A   |                               |             |                |
| observe        | Check gate descent (10 to 15 sec) and ascent (6 to :  | 12 sec)             | N/A   |                               |             |                |
| observe        | Is gate striping vertical as depicted in GCS Figures?   |                     | N/A   |                               |             |                |
| observe        | Where railway equipment regularly stops, or railway equipment is left standing, within the activating limits of a warning system, the warning system must be equipped with a control feature to minimize the operation of the warning system. |                     |   |                               |             |                |
| Comments       | Following Site Visit:   |                     | ·····   |                               |             |                |
| - Warning S    | system with Gates is not required unless sightlines   | cannot be obtai     | ed.   |                               |             |                |
| -extraordinary | conditions why warning system should be installed   |                     | -is warning system present b                    | but not warranted? <b>No</b>  |             |                |

#### Figure 12-2 - Gates



Sheet 13

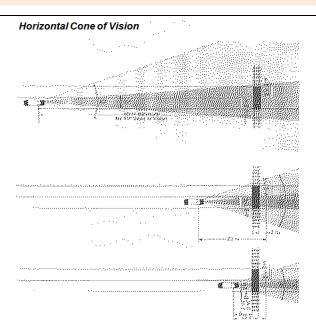
#### FLASHING LIGHT UNITS

Note: Driver's cone of vision is  $\pm$  5° horizontally; limited by top of windshield vertically.

| Source  |   |  | Item is not required as warning sy            | stem is not required.       |               |  | u |  |
|---------|---|--|---|-----------------------------|---------------|--|---|--|
|         | Number and Location   |  |   |                             |               |  |   |  |
| look-up | Minimum Distance for Primary  | / Light Units (SSD)  | =   | 45.0                        | m             |  |   |  |
| look-up | Recommended Distance for Pr   | imary Light Units =  | :   | 69.7                        | m             |  |   |  |
|         | Are flashing light units located  | within 5° horizont   | ally of the centerline of the road (throughou | t the approach distance abo | ve)?          |  |   |  |
| observe |   | Yes (covered by front and back units)                              |   |                             |               |  |   |  |
|         | Does horizontal/vertical curvat   | Does horizontal/vertical curvature necessitate supplemental units? |   |                             |               |  |   |  |
| observe | Can back lights be seen by all s  | Can back lights be seen by all stopped drivers? N/A                |   |                             |               |  |   |  |
| observe | Are lights obscured by vehicles stopped on adjacent intersections? N/A  |  |   |                             |               |  |   |  |
| observe | Are additional light units required for drivers as they begin to turn onto an approach road from an intersecting road/lane/pkg lot? N/A |  |   |                             |               |  |   |  |
|         | Cantilevered Light Units  |  |   |                             |               |  |   |  |
| measure | Does D <sub>R</sub> exceed 7.7m?  | N/A  |   |                             |               |  |   |  |
| measure | Does D <sub>L</sub> exceed 8.7m?  | N/A  | (Assumes signal poles on both sides of roa    | ad alignment, approach side | of rail)      |  |   |  |
|         | Multiple Lanes  | •  |   |                             |               |  |   |  |
| observe | Can front light units be seen by  | y drivers in all lane  | s (would T/T obscure?)?                       | N/A                         |               |  |   |  |
| observe | Can back light units be seen by   | / all stopped driver   | s in all lanes?                               | N/A                         |               |  |   |  |
|         | Sidewalks, paths, trails, etc.  |  |   |                             |               |  |   |  |
| measure | Distance from path centerline   | to signal mast =   |   | N/A                         | m (max.=3.6m) |  |   |  |
| observe | Are separate light units required?  |  |   |                             |               |  |   |  |

Comments Following Site Visit:

Crossing currently regulated by a passive warning system.



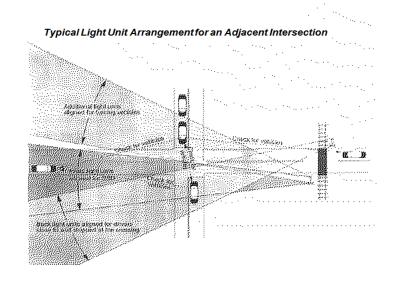
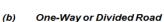
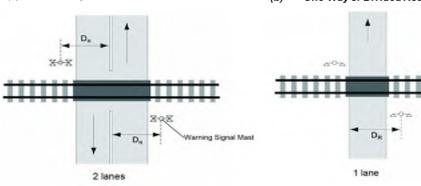
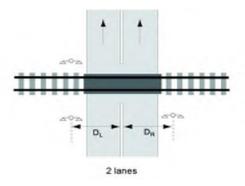


Figure 13-1 – Warning Signal Offsets Requiring Cantilevered Light Units

(a) Two-Way Road







GCS Sections 12-14





GCS Sections 13 and 14

#### PREPARE TO STOP AT RAILWAY CROSSING SIGN

| Source  |  | Item NA       |  |                 |                     |                                     |  |  |
|---------|--|---------------|--|-----------------|---------------------|-------------------------------------|--|--|
| observe | Are signs present?   | No<br>No      | EB approach<br>WB approach                                   |                 |                     | SOR 67 (1), (2)<br>GCS 18.21 & 18.2 |  |  |
| look-up | Minimum Distance for Primary Light   | Units (SSD)   |  | N/A             | m                   | Sheet 13                            |  |  |
| look-up | Recommended distance for Primary L   | ight Units    |  | N/A             | m                   | Sheet 13                            |  |  |
|         | Warrants   |               |  |                 |                     |                                     |  |  |
| observe | Are all front light units obscured with  | in minimum    | distance above?  | N/A             |                     |                                     |  |  |
| look-up | Is the facility designated a "freeway"   | or "expressv  | /ay"?  | N/A             |                     | Sheet 3                             |  |  |
| observe | Do environmental conditions frequen  | tly obscure   | signal visibility?   | N/A             |                     |                                     |  |  |
|         | Considering maximum prevailing spe   | eeds, geome   | try, and traffic composition, checkthe following:            |                 |                     |                                     |  |  |
| observe | Does sign flash during operation of gr   | ade crossing  | warning system?  | N/A             |                     |                                     |  |  |
| measure | Distance from the sign to 2.4m beyon   | d the furthe  | st rail =  | N/A             |                     |                                     |  |  |
| observe | Does the sign flash before the actuati   | on of the cro | ssing warning system by the time required to travel from the | ne sign to clea | r the crossing? N/A |                                     |  |  |
| measure | Distance from the sign to the closest gate =   |               |  |                 | m                   |                                     |  |  |
| observe | Does the flashing sign precede actuation of the descent of the gate arms by the time required to travel from the sign to clear closest gate? N/A |               |  |                 |                     |                                     |  |  |
| measure | Time required for all queued vehicles  | to resume t   | o maximum road operating speed =                             | N/A             | sec                 |                                     |  |  |

Comments Following Site Visit:

#### PREPARE TO STOP AT RAILWAY CROSSING Sign not required.



Sheet 15

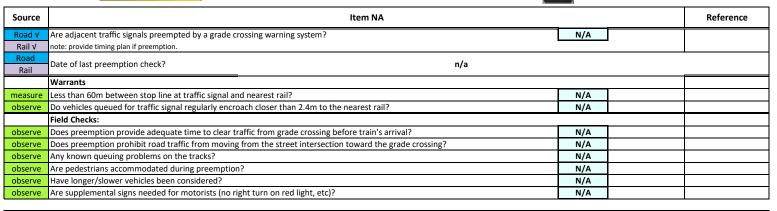
Sheet 14

lition



-placement/orientation of signs

#### PREEMPTION OF TRAFFIC SIGNALS

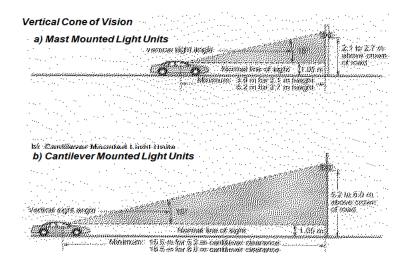


-functions as intended

**Comments Following Site Visit:** 

- No Traffic Signals located at crossing

-functions as intended



#### AREAS WITHOUT TRAIN WHISTLING

Sheet 16

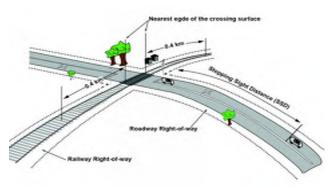
Grade Crossings Standards, July 2014

#### APPENDIX D - WHISTLING CESSATION

#### Table D-1 – Requirements for Warning Systems at Public Grade Crossings within an Area without Whistling

### Figure D-1 - prescribed area for whistling cessation as per article 23.1 of the RSA

|                               | Column A<br>Grade Crossings for Vehicle Use<br>No. of Tracks |           | Column B<br>Grade Crossings For Sidewalks,<br>Paths, or Trails with the centreline<br>no closer than 3.6 m (12 ft) to a<br>warning signal for vehicles<br>No. of Tracks |                                      |  |
|-------------------------------|--|-----------|---|--------------------------------------|--|
| Railway<br>Design Speed       |  |           |   |                                      |  |
|                               |  |           |   |                                      |  |
|                               | 1  | 2 or more | 1   | 2 or more                            |  |
| Column 1                      | Column 2   | Column 3  | Column 4  | Column 5                             |  |
| 1 – 25 km/h (15 mph)          | FLB  | FLB       | No warning<br>system<br>requirement   | No warning<br>system<br>requirements |  |
| 25 – 81 km/h<br>(16 – 50 mph) | FLB  | FLB & G   | FLB   | FLB & G                              |  |
| Over 81 km/h (50 mph)         | FLB & G  | FLB&G     | FLB & G   | FLB & G                              |  |



RSA = Railway Safety Act of Canada

#### Legend :

FLB is a warning system consisting of flashing lights and a bell.

FLB & G is a warning system consisting of flashing lights, a bell and gates

| Source  | ltem  |    |           |    |  | Reference |
|---------|---|----|-----------|----|--|-----------|
| Rail    | Is train whistling prohibited at this crossing?   | No | 24 hours? | No |  |           |
| observe | rve Is there evidence of routine unauthorized access (trespassing) on the rail line in the area of the crossing? No |    |           |    |  |           |
| observe | Are the requirements of Table D-1 met?  | No |           |    |  |           |

#### Comments Following Site Visit:

Whistle Cessation not required

#### Additional Prompt Lists

#### **Human Factors:**

- \* Control device visibility / background visual clutter.
- <sup>o</sup> Driver workload through this area (i.e., are there numerous factors that simultaneously require the driver's attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.).
- attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.), <sup>a</sup> Driver expectancy of the environment (i.e., are the control measures in keeping with the design levels of the road system and adjacent environment).
- \* Need for positive guidance.
- " Conflicts between road and railway signs and signals.

#### **Environmental Factors:**

- " Extreme weather conditions.
- \* Lighting issues (night, dawn/dusk, tunnels, adjacent facilities, headlight or sunlight glare, etc.)
- \* Landscaping or vegetation.
- " Integration w/ surrounding land use (e.g., parked vehicles blocking sightlines, merging traffic lanes, etc.)

#### All Road Users:

Λ.

| nan | -reedes of the following been met:<br>-pedestrians (including strollers, baby carriages, and blind persons) |     |
|-----|---|-----|
|     | -children / elderty   |     |
|     | -assistive devices (wheelchairs, scooters, walkers, etc)  |     |
|     | -bicyclists   |     |
|     | -motorcyclists  |     |
|     | -over-sized trucks  | · · |
|     | -buses  |     |
|     | -recreational vehicles  |     |
|     | -goifearts  |     |
|     | -hazardous materials  |     |

(mage barriers/guide fencing, additional pedestrian bell, pedestrian gates, sign indicating potential presence of 2<sup>nd</sup> train at a multi track crossing, etc)

#### Other:

 Should closure of the crossing be considered due to inactivity, presence of nearby adjacent crossings, etc.

Commente Following Site Visit:

VFPA REPORT NUMBER: 20-0173

## VFPA FSPL TRANSPORTATION IMPROVEMENTS PROJECT 04 – 10203, 57 TIMBERLAND ROAD,

FEBRUARY 09, 2021



## REVISION HISTORY

FINAL ISSUE

| 2020/09/03                   | FIRST DRAFT                          |                                       |  |  |  |
|------------------------------|--------------------------------------|---------------------------------------|--|--|--|
| Prepared by                  | Reviewed by                          |                                       |  |  |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer |                                       |  |  |  |
| 2020/10/21                   | SECOND DRAFT                         |                                       |  |  |  |
| Prepared by                  | Reviewed by                          |                                       |  |  |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer |                                       |  |  |  |
| 2021/02/09                   | FINAL                                |                                       |  |  |  |
| Prepared by                  | Reviewed by                          | Approved By                           |  |  |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer | R. Sewell, Senior<br>Project Engineer |  |  |  |

## SIGNATURES

PREPARED BY

cabo

09/02/2021

Date

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Robert Sewell, P.Eng Senior Project Engineer Date

09/02/2021

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# **NSD**

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| 2.2 | Crossing Modifications         | 3 |
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# **1 CROSSING OVERVIEW**

WSP Canada Group Limited (WSP) has been contracted as part of the Fraser Surrey Port Lands – Transportation Improvements Preliminary Design Services project, to complete a Railway Crossing Safety Assessment on the 10203, 57 Timberland Road grade crossing. The SRY owned crossing is located within the Vancouver Fraser Port Authority (VFPA), Fraser Surrey Docklands near to the Canadian National (CN) Brownsville Spur which comes off Mile 117 of the Yale Subdivision.

A Railway Crossing Field Safety Assessment was undertaken on the 22nd of July 2020 and updates the previous Railway Crossing Assessment undertaken by WSP (formally MMM Group) on the 5<sup>th</sup> of May 2015. The Railway Crossing Assessment as conducted follows the guidelines of applicable requirements identified in the most recent edition of Transport Canada's Grade Crossing Regulations (GCR) and Grade Crossing Standards (GCS).

The crossing is a passive protected crossing (SRCS), equipped with two RAILWAY CROSSING and STOP signs, located within an industrial area. A Tractor Trailer (WB-20) is the design vehicle used to represent daily traffic on port property. The Railway traffic volumes were provided by the SRY while the Average Annual Daily Traffic (AADT) was calculated based on the realigned infrastructure.

This report aims to identify the modifications to the grade crossing since the previous inspection completed by MMM Group in 2015, as well as highlight any new or previously identified non-compliances still relevant to this crossing.

## 1.1 LOCATION

The Timberland Road grade crossing is located within Fraser Surrey Docks jurisdiction at 10203, 57 Timberland Road and crosses the SRY spur track. The crossing is located at the latitude and longitude of 49°11'23" and 112°54'20" respectfully. Figure 1, below shows the location of the crossing.

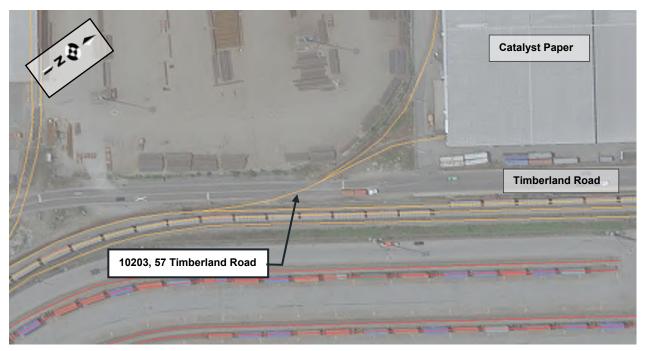


Figure 1: Crossing Location (source: Google Earth, 2020)

# 2 SAFETY ASSESSMENT

## 2.1 PREVIOUS ASSESSMENT (2015)

A previous crossing assessment was undertaken in 2015 by WSP for the 10203, 57 Timberland Road crossing. The objective of the assessment was 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 referred to in the Railway Safety Act / Grade Crossing Regulations and contained in the Grade Crossing Standards.
- 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.

The outcome of the 2015 assessment offered recommendations for consideration by the VFPA. Table 1: Previous Non-Compliances, illustrates the non-compliances and recommendations offered within the 2015 report. The recommendations were categorised within the three priority levels;

- Low implement the measures as soon as practicable
- Medium implement the measures by Transport Canada GCS & GCR November 2021 deadline.
- High implement the measures forthwith

Table 1: Previous Non-Compliances

**Table 1: Previous Non-Compliances** 

|     | Observations  | Suggested Actions  | Priority | Addressed?   |  |  |  |  |
|-----|---|--|----------|--|--|--|--|--|
| GCS | GCS Section 3 – Crossing Surface (Basic Requirement)  |  |          |  |  |  |  |  |
| a.  | Railway crossing surface does not extend a<br>minimum of 0.5m beyond the travel lanes on<br>both approaches   | Extend railway crossing surface to extend at least 0.5m beyond the travel lanes.   | High     | Partial – 0.5m extension of crossing<br>surface has occurred on the Northerm<br>side of crossing only. Southern side<br>limited by switch. |  |  |  |  |
| b.  | Flangeway depth does not meet the requirement due to debris   | Clean debris from the flangeway. Once debris is removed from the flangeway, the railway company is to ensure the minimum depth is met. | High     | No   |  |  |  |  |
| GCS | GCS Section 4 – Railway Crossing and Number of Tracks Sign (Basic Requirement)  |  |          |  |  |  |  |  |
| a.  | RAILWAY CROSSING sign on west approach<br>is located outside of the required height limits<br>and sign location from edge of travelled way<br>does not meet requirement   | Relocate RAILWAY CROSSING sign on west<br>approach as per GCS Section 4.1  | High     | Yes – New RAILWAY CROSSING<br>Signs have been installed on both<br>approaches.   |  |  |  |  |
| GCS | Section 5 – Crossing Surface  | · · · · · · · · · · · · · · · · · · ·  |          |  |  |  |  |  |
| a.  | The approach road surface at the grade crossing has cracks  | Repave crossing surface so that it is smooth and continuous  | Medium   | Yes – Observed cracks in crossing<br>surface approach repaired. New cracks<br>have formed in crossing surface.                             |  |  |  |  |
| GCS | GCS Section 7 – Sightlines  |  |          |  |  |  |  |  |
| a.  | Clear sightline areas where drivers stopped at the crossing ( $D_{\text{STOPPED-VEH}}$ ) cannot be provided or maintained due to fences and a storage yard on the northeast corner and northwest corners of the crossing. | If minimum sightlines cannot be provided and maintained, then a warning system with gates is required.                                 | Medium   | No – Fence/ storage yard remain, and<br>vegetation slightly increased  |  |  |  |  |

| GC | S Section 8 – Signs   |   |        |   |
|----|---|---|--------|---|
| a. | Retroreflective strips are not provided for the back of the RAILWAY CROSSING sign and both sides of the sign supporting post.         | Install retroreflective strips on the back of the RAILWAY CROSSING sign and both sides of the sign supporting post  | Medium | Yes – retroreflective strips installed on<br>back of both RAILWAY CROSSING<br>Signs and poles                           |
| b. | RAILWAY CROSSING AHEAD signs are not<br>present on either approach of the crossing.   | Install RAILWAY CROSSING AHEAD signs on both approaches to the grade crossing as per BCMoT's <i>Signage and Pavement Manual</i> (2000).   | Medium | Yes – RAILWAY CROSSING AHEAD<br>Signs installed on both approaches.<br>South approach has sign fallen over/<br>removed. |
| C. | STOP signs are not present on either approach of the crossing.  | Install STOP signs on same post as RAILWAY<br>CROSSING signs as per GCS Section 8.4   | Medium | Yes – STOP Signs installed below<br>RAILWAY CROSSING Signs.   |
| d. | EMERGENCY NOTIFICATION signs are not<br>present on either approach of the crossing.   | Install EMERGENCY NOTIFICATION sign on both approaches as per GCS Section 8.5.  | Medium | Yes – EMERGENCY NOTIFICATION<br>Signs installed below STOP Signs.   |
| e. | Double stop bars and RAILWAY CROSSING<br>symbol pavement markings are not present on<br>either approach to the crossing for vehicles. | Paint double stop bars on both road approaches as per<br>MUTCD Fig.C1-6 (Jan. 2014).  | Medium | Yes - Double stop bars have been<br>installed but need repainting.  |
| f. | RAILWAY CROSSING symbol pavement<br>markings are not present on either approach to<br>the crossing for vehicles.                      | Paint double stop bars and RAILWAY CROSSING symbol pavement markings on both road approaches  | Low    | Yes – RAILWAY CROSSING symbol<br>pavement marking painted as per<br>MUTCD. Needs repainting                             |
| g. | Stopping or parking restriction is not observed at the railway right-of-way.  | Install NO STOPPING signs within the railway right-of-<br>way.  | Low    | Yes – Parking restriction/ NO<br>STOPPING signs installed along<br>Timberland Road                                      |
| GC | S Sections 9, 12 to 17 – Warning System   | em Design   |        |   |
| a. | An active warning system without gates is warranted based on cross-product.   | Install active warning system without gates. However,<br>Transport Canada indicated that the crossing could<br>stay passive indefinitely unless the sightline<br>requirements could not be met. | Low    | No  |

## 2.2 CROSSING MODIFICATIONS

As shown in Appendix A: Site Photographs, a number of changes have occurred at the crossing between inspections. Most changes were based on recommendations outlined in the 2015 inspection. Table 1, shows what changes have been made based on the 2015 recommendations. Below is a summarised list of all the changes observed from the site inspection:

- New grade crossing signage, including;
  - RAILWAY CROSSING Signs
  - STOP Signs
  - o EMERGECNY NOTIFACATION Signs
  - RAILWAY CROSSING AHEAD signs
  - 0 DO NOT STOP ON TRACKS Signs
  - PARKING RESTRICTION Signs
  - SPEED ADVISORY TAB sign
- New MUTCD compliant pavement marking

- Asphalt has been installed on North side to extend the crossing 0.5m beyond the travelled way
- Cracking on outer surface of the crossing surface repaired.

### 2.3 ASSESSMENT AND RECOMMENDATIONS

An updated Grade Crossing Safety Assessment was undertaken for the proposed realignment of the port road access and to determine any required crossing upgrades to ensure compliance with the GCR & GCS. **Appendix B: Site Inspection Report** provides details of the observations made during the site inspection. The inspection report also outlines outstanding safety issues, along with recommended remediations. Table 2: 2020 Crossing Recommendations, summarizes the recommendations from the field investigation.

Lack of sightlines is a warrant in the GSR and GCS to require installation of automatic crossing protection. The client needs to insure that the crossing design plans, fully completed crossing plans (E-4) and full crossing safety assessment, which comply with requirements of the GCR and GCS, have been completed and filed with Canadian Transportation Agency and applicable railway.

#### Table 2: 2020 Crossing Recommendations

|  | Observations  | Suggested Actions  | Priority | Order of<br>Magnitude Cost |  |  |  |  |
|--|---|--|----------|----------------------------|--|--|--|--|
| GCS Section 3 – Crossing Surface (Basic Requirement) |   |  |          |                            |  |  |  |  |
| a.   | Railway crossing surface does not extend a minimum of 0.5m beyond the travel lanes on South approach  | Extend railway crossing surface to extend at least 0.5m beyond the travel lanes.   | High     | \$750                      |  |  |  |  |
| b.   | Flangeway depth does not meet the requirement due to debris   | Clean debris from the flangeway. Once debris is removed from the flangeway, the railway company is to ensure the minimum depth is met. | High     | \$500                      |  |  |  |  |
| GCS Sect   | ion 7 – Sightlines  | · · · · · · · · · · · · · · · · · · ·  |          |                            |  |  |  |  |
| a.   | Clear sightline areas where drivers stopped at the crossing ( $D_{\text{STOPPED-VEH}}$ ) cannot be provided or maintained due to fences and a storage yard on the northeast corner and northwest corners of the crossing. | If minimum sightlines cannot be provided and maintained, then a warning system with gates is required.                                 | Medium   | \$15,000                   |  |  |  |  |
| GCS Sect   | ion 8 – Signs   |  |          |                            |  |  |  |  |
| a.   | Double stop bars and RAILWAY CROSSING symbol<br>pavement markings are faded.  | Repaint double stop bars and RAILWAY CROSSING symbol on both road approaches as per MUTCD.   | Medium   | \$800                      |  |  |  |  |
| b.   | RAILWAY CROSSING AHEAD sign fallen over and<br>placed on opposite side of road on West approach.<br>East approach sign is incorrectly aligned.  | Reinstall and realign RAILWAY CROSSING AHEAD Signs   | High     | \$800                      |  |  |  |  |
| C.   | ADVISORY SPEED Sign incorrectly aligned.  | Realign ADVISORY SPEED Sign  | High     | \$500                      |  |  |  |  |
| GCS Se   | ctions 9, 12 to 17 – Warning System Design  |  |          |                            |  |  |  |  |
| a.   | An active warning system without gates is warranted<br>based on Sightlines.   | Install active warning system without gates.   | Low      | \$500,000                  |  |  |  |  |



# A SITE PHOTOGRAPHS



**D** - West Approach Drivers View Left

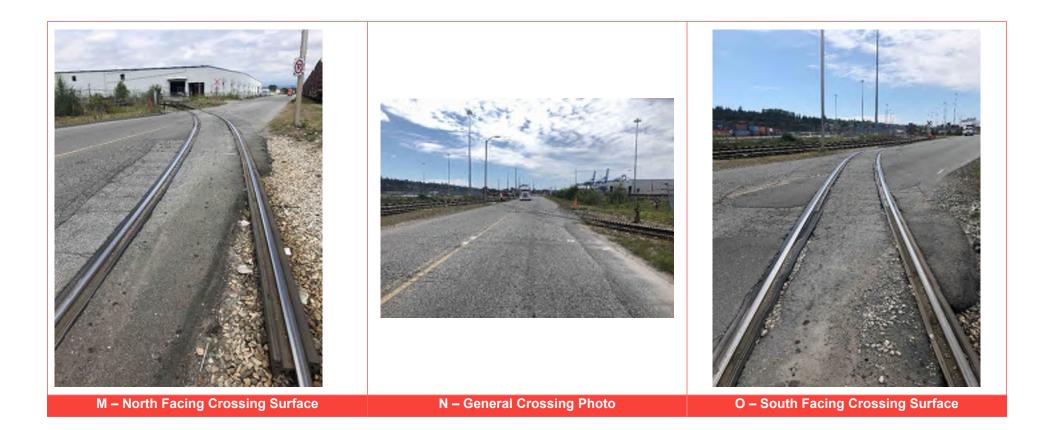
E - West Approach

F - West Approach Drivers View Right



J- West Approach Drivers View Left (At Stopped Position) K - West Approach (At Stopped Position)

L - West Approach Drivers View Right (At Stopped Position)





# B SITE INSPECTION REPORT

CANADIAN ROAD / RAILWAY GRADE CROSSING DETAILED SAFETY ASSESSMENT FIELD GUIDE (2005)\*

Appendix C2: Field Data Forms

×

Passive & Active Crossings

MileX.XX (10203, 57 Timberland Road),SRY Rail Surrey, British Columbia For Vancouver Fraser Port Authority

|   |           | Legend: |   |
|---|-----------|---------|---|
| ſ | calculate | Formula | Spreadsheet cell has formula  |
|   | look up   |         | User to look up value in table or chart.  |
|   |           |         | User to input value here for conditional formatting or formulas in other cells to function                |
|   |           |         | Warning! Value beyond acceptable limits.  |
|   |           |         | Warning! Value beyond acceptable limits for certain conditions (i.e. for people using assistive devices). |
|   |           | Rail    | Information to be provided by Railway Company   |
| _ |           | Road    | Information to be provided by Roadway Authority   |
|   | measure   | observe | Information to be obtained during Site Investigation  |
|   |           | V       | Information provided by others to be verified in the field  |
|   |           |         |   |

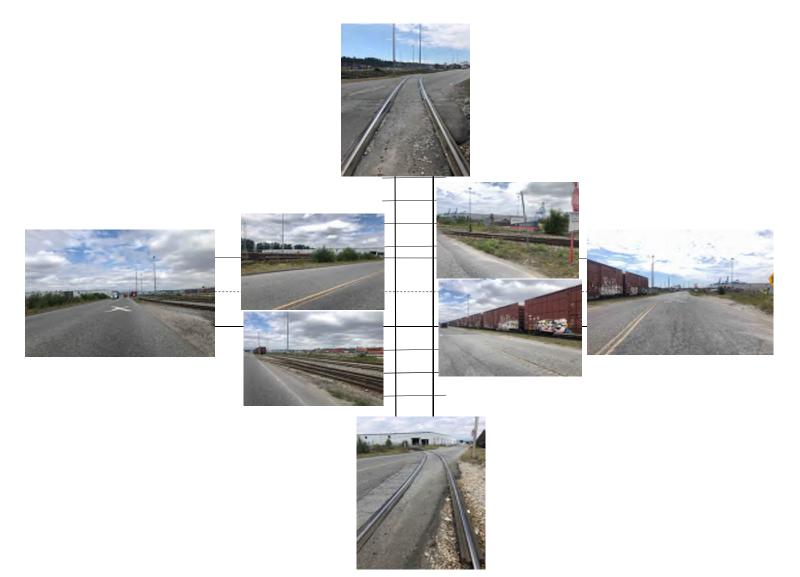
\* Updated to reflect Transport Canada's Grade Crossing Standards (GCS) July 2014 and Grade Crossing Regulations (GCR)(SOR-2014-275 Feb 2016)

| Sheet 1                    |   |                              | Grade Cros                  | sing Safety Assessm   | ent                                       |   | Passive Crossings |
|----------------------------|---|------------------------------|-----------------------------|---|---|---|-------------------|
| Date of Assessment:        |   | 22-Jul-20                    | <b>)</b> Site Investigation | on  |   |   |                   |
| Assessment Team Mer        | nbers & Affiliations:   | Patrick McCabe<br>Rob Sewell |                             |   |   |   |                   |
| Reason for Assessment      | t: New Proposed I   | Pedestrian Crossing          |                             |   |   |   |                   |
|                            | periodic assessment<br>cessation of whistling<br>change in vehicle types                      | X                            | significant char            | nge in infrastructure<br>nge in train operations<br>ns in 5yr. Period |   | significant change in road or rasing significant change in road or rasing other collision experience (see | ail speeds        |
| Railway Authority:         | Southern Railway of BC  |                              |                             |   | Road Authority:                           | Vancouver Frasier Port Autho  | ority (VFPA)      |
| Crossing Location:         | 10203 Timberland Road   |                              |                             |   | Road Name/Number:                         | Timberland Road, Catalyst Pa  | per               |
| Location Number:           | N/A   |                              |                             |   | Province:                                 | British Columbia  |                   |
| Municipality:              | City of Surrey, BC  |                              |                             |   | Location Reference (cont                  | rol section, etc.):   | DP Surrey Docks   |
| Railway: <b>SRY</b>        |   | Mile:                        | N/A                         |   | Road Classification:                      | arial collector local ataly   | ULU               |
| Sub-division:              | N/A   | Spur:                        | N/A                         |   | Roadway East/West (yes                    |   |                   |
| Type of Grade Crossing     | g [private/public; warning devices]:  | SRSC                         |                             |   | Roadway North/ South (                    | yes/ no) No   |                   |
| Track Type: [mainline,     | etc.]   |                              | Yard                        |   | *Urban Local Undivided                    |   |                   |
| Collision History (5-yea   | ar period): No record of ac   | citents at the subjec        | t railway crossin           | g within the past five y  | /ears                                     |   |                   |
| + Personal<br>+ Fatal Inju | Damage collisions:<br>Injury collisions:<br>Iry Collisions:<br>lisions in last 5 year period: |                              | NIL<br>NIL<br>NIL<br>NIL    |   | of Persons Injured:<br>of Persons Killed: | NIL<br>NIL  |                   |

Provide Details of the collisions if available: Sources:

Sheet 2a

SCENE PHOTOGRAPHS



Sheet 2b

SCENE SKETCH



Images from Google Earth Notes:

- Include: - directions to nearby municipalities for both road & rail approaches (use arrows)
  - adjacent intersections
  - relevant road signs/signals
  - signal warning systems hardware

- landmarks - crosswalks/paths - geographical features

- bus stops, etc.

#### GENERAL INFORMATION

| Source  |   |     | ŀ                | em  | Reference |
|---------|---|-----|------------------|---|-----------|
| Rail    | Maximum Railway Operating Speed, V <sub>T</sub>           | =   | 10               | (mph)   |           |
| Rail    | Daily Train Volume:                                       | =   | 5                | (freight trains/day)                                |           |
| Ndii    |   | =   | 0                | (passenger trains/day)                              |           |
| Rail    | Switching during daytime? Y/N                             | Yes |                  | nighttime? Y/N Yes                                  |           |
| Road    | Avg. Annual Daily Traffic, AADT:                          | =   | 2,140            | (vpd) Year of count: 2020                           |           |
| Road    | High seasonal fluctuation in volumes?                     |     | No               |   |           |
| Road    | Pedestrian Volumes  | =   | 0                | (ped./day)  |           |
| Road √  | Is crossing on a School Bus route?                        |     | No               |   |           |
| Road √  | Do Dangerous Goods trucks use this roadway?               |     | No               |   |           |
| Road    | Cyclist Volumes   | =   | 0                | (cyclists/day) Cyclist not anticipated              |           |
| Road √  | Regular use of crossing by persons with Assistive Devices | ?   |                  | Pedestrians using Assistive Devices not anticipated |           |
| Road √  | Other special road users?                                 | typ | e <b>Unknown</b> | daily volume None                                   |           |
| Road    | Forecasted AADT <sup>2</sup>                              | =   | 140              | (vpd) Forecasted Year: 2022                         |           |
|         | Design Speed:   |     | 30               | km/h Posted Speed: <b>30</b> km/h                   |           |
| Road √  | Maximum Operating Speed:                                  |     | 30               | km/h  |           |
|         | note: provide details if all approaches are not the same  |     |                  |   |           |
| Road √  | Road Surface Type (asphalt, concrete, gravel, etc.):      |     | Asphalt          |   |           |
| observe | Surrounding Land Use (urban/rural)?:                      |     | Industrial       |   |           |
| observe | Any schools, retirement homes, etc. nearby?               |     | No               |   |           |

#### Notes:

Sheet 3

1. Road Authority should provided plans if available.

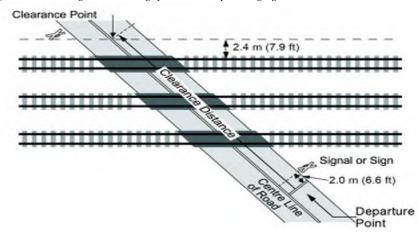
2. AADT to be verified during next scheduled safety assessment if significant developments are expected or traffic volumes increase.

#### From GCS Section 7.1.2:

| Column 1       | Column 2   | Column 3   |
|----------------|--|--|
| Class of Track | The maximum<br>allowable operating<br>speed for freight trains<br>is - | The maximum<br>allowable operating<br>speed for passenger<br>trains is - |
| Class 1 track  | 17 km/h (10 mph)   | 25 km/h (15 mph)   |
| Class 2 track  | 41 km/h (25 mph)   | 49 km/h (30 mph)   |
| Class 3 track  | 65 km/h (40 mph)   | 97 km/h (60 mph)   |
| Class 4 track  | 97 km/h (60 mph)   | 129 km/h (80 mph)  |
| Class 5 track  | 129 km/h (80 mph)  | 153 km/h (95 mph)  |

#### Figure 10-1 - Clearance Distance (cd) for Grade Crossings

(a) For Grade Crossings with a Warning System or Railway Crossing Sign

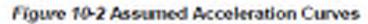


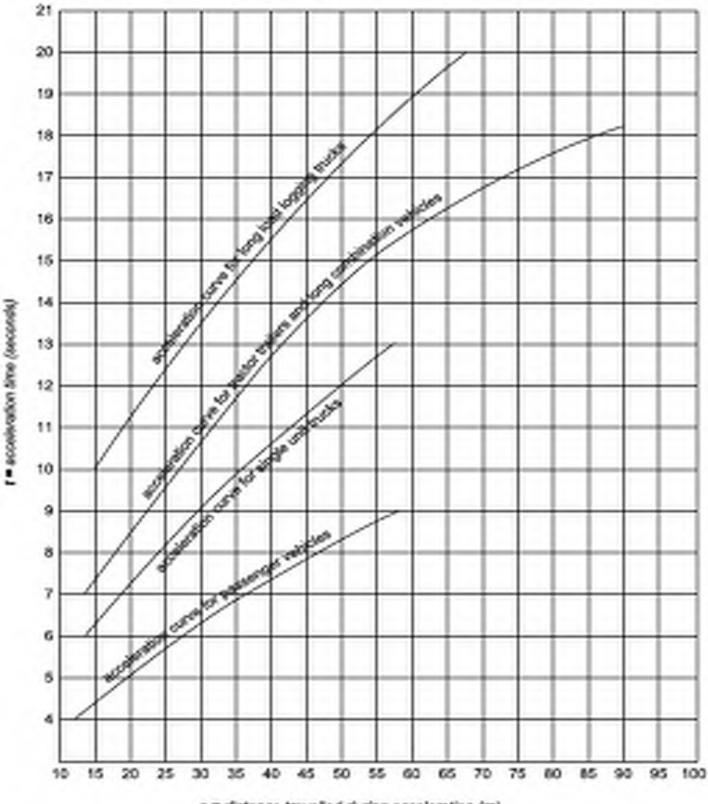
#### Grade Crossings Standards, July 2014

Table 10-1 Ratios of Acceleration Times on Grades

| Design Vehicle            |     | Ro  | ad Grade | (%) |     |
|---------------------------|-----|-----|----------|-----|-----|
|                           | -4  | -2  | 0        | +2  | +4  |
| Passenger Car             | 0.7 | 0.9 | 1.0      | 1.1 | 1,3 |
| Single Unit Truck & Buses | 0.8 | 0.9 | 1.0      | 1.1 | 1.3 |
| Tractor-Semitrailer       | 0.8 | 0.9 | 1.0      | 1.2 | 1.7 |

Source: Geometric Design Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999





DESIGN CONSIDERATIONS

| Source    |  |  |                          |                    | Item                     |            |             |     |          |     | Reference       |
|-----------|--|--|--------------------------|--------------------|--------------------------|------------|-------------|-----|----------|-----|-----------------|
|           | Design Vehicle                         |  |                          |                    |                          |            |             |     |          |     |                 |
| Road      | Type:                                  | 6                                      | WB-20 Tractor-           | Semitrailers (V    | VB-20)                   |            |             |     |          |     | Table 1* SOR 57 |
| look-up   | Length, L:                             |  | 22.7                     | m                  |                          |            | EB Approad  | ch  | WB Appro | ach | Table 1*        |
| look-up   | Stopping Sight Distance, SSD           |  | 45                       | m (round to        | 1.0% of grade)           | =          | 10          | m   | 45       | m   | Table 3*        |
| measure   | Clearance Distance, cd                 |  |                          |                    |                          | =          | 24.0        | m   | 37.0     | m   | GCS 16.1.1      |
| calculate | Vehicle Travel Distance, S             |  | S= L+cd                  | 59.7               | max <                    | =          | 46.7        | m   | 59.7     | m   |                 |
| look-up   | Vehicle Departure Time, t              |  |                          |                    |                          | =          | 15.9        | sec | 15.9     | sec | GCS Figure 10-2 |
| Road √    | Road Grade Effect:                     | maximum approa                         | ch grade within '        | S':                |                          | =          | 0.50        | %   | 1.00     | %   | Sheet 7         |
| look-up   | grade adjustment factor (anto ca       | lc assumes Truck)( m                   | anual input from Tal     | ble 10-1 if other) |                          | =          | 1.02        |     | 1.06     |     | GCS Table 10-1  |
| calculate |  | T= t x adjustment                      | factor                   |                    |                          | =          | <b>16.2</b> | sec | 16.9     | sec |                 |
|           | Design Vehicle Departure Tir           | <b>ne, T<sub>D</sub> =</b> J + T (whe  | re J = 2 sec (min.) perc | eption & reaction) |                          |            | 2.0         | sec | 2.0      | sec |                 |
| calculate |  | T <sub>G stop</sub> = T <sub>D</sub> = | 18.9                     | sec                |                          | <-         | 18.2        | sec | 18.9     | sec | GCS 10.3.2      |
| observe   | Do field acceleration times exce       | ed T <sub>D</sub> ?                    | Acceleration m           | easurement be      | eyond the scope of       | f this ass | essment.    |     |          |     |                 |
| measure   | Pedestrian , cyclist & Assistiv        | e Devices Depar                        | rture Time               | pedes              | trian <b>cd</b> distance | =          | 0.0         | m   | 0.0      | m   | 000 10 2 2      |
| calculate | walking speed 1.22m/s max.             | T <sub>P</sub> =                       | 0.0                      | sec                | (1.0m/s used)            | <-         | 0.0         | sec | 0.0      | sec | GCS 10.3.3      |
| calculate | T <sub>SSD</sub> = (SSD+cd+L)/(0.27783 | 7 x V <sub>road design</sub> ) =       | 12.6                     | sec                |                          |            |             |     |          |     |                 |
| Comments  | Following Site Visit:                  |  |                          |                    |                          |            |             |     |          |     |                 |

No Pedestrian crossing. Sidewalk ends before X on east approach

#### Table 1 - Design vehicle Lengths/Class

Sheet 4

| General Vehicle Descriptions            | Length (m) |
|---|------------|
| 1. Passenger Cars, Vans and Pickups (P) | 5.6        |
| 2. Light Single-unit Trucks (LSU)       | 6.4        |
| 3. Medium Single-unit Trucks (MSU)      | 10.0       |
| 4. Heavy Single-unit Trucks (HSU)       | 11.5       |
| 5. WB-19 Tractor-Semitrailers (WB-19)   | 20.7       |
| 6. WB-20 Tractor-Semitrailers (WB-20)   | 22.7       |
| 7. A-Train Doubles (ATD)                | 24.5       |
| 8. B-Train Doubles (BTD)                | 25.0       |
| 9. Standard Single-Unit Buses (8-12)    | 12.2       |
| 10. Articulated Buses (A-BUS)           | 18.3       |
| 11. Intercity Buses (I-BUS)             | 14.0       |

Table 6 - Minimum Sightlines along the Rail Line (D<sub>steped</sub>) (as illustrated in Figure 3)

| Railway Design<br>Speed V,                  |            | 1   | interest = | Depart | ure Tim   | e (grea          | ter of T <sub>d</sub> | or T <sub>p</sub> ) ( | seconds |     |     | If greater of T, or T, > |
|---|------------|-----|------------|--------|-----------|------------------|-----------------------|-----------------------|---------|-----|-----|--------------------------|
| (mph)                                       | <u>≤10</u> |     |            |        |           |                  |                       |                       |         |     | 20  | 20 sec, add for each     |
| WARNING:<br>Railway design<br>speed in mph! |            |     |            | Minima | m Sightli | nes along<br>(m) | Rail Line             | (P.,)                 |         |     |     | additional second<br>(m) |
| STOP  | 30         | 30  | 30         | 30     | 30        | 30               | 30                    | 30                    | 30      | 30  | 30  | +0                       |
| 1-10  | 45         | 50  | 55         | 60     | - 45      | 70               | 72                    | 76                    | 80      | 85  | 90  | +5                       |
| 11-20                                       | 90         | 100 | 110        | 120    | 125       | 135              | 145                   | 155                   | 165     | 170 | 183 | +10                      |
| 21-30                                       | 135        | 150 | 165        | 175    | 190       | 205              | 215                   | 230                   | 245     | 255 | 270 | +15                      |
| 31-40                                       | 180        | 200 | 220        | 235    | 250       | 270              | 285                   | 305                   | 325     | 340 | 360 | +20                      |
| 41-50                                       | 225        | 250 | 270        | 290    | 315       | 335              | 360                   | 380                   | 405     | -05 | 450 | +25                      |
| 51-60                                       | 270        | 300 | 325        | 350    | 380       | 405              | -180                  | 460                   | 485     | 510 | 540 | +30                      |
| 61-76                                       | 315        | 350 | 380        | 415    | 445       | 470              | 505                   | 535                   | 565     | 595 | 630 | +35                      |
| 71-80                                       | 360        | 395 | 435        | 465    | 505       | 540              | 580                   | 610                   | 650     | 680 | 720 | +40                      |
| #1-96                                       | 405        | 46  | 490        | 535    | 530       | 605              | 650                   | 685                   | 730     | 765 | 810 | +45                      |
| 91-100                                      | 450        | 500 | 540        | 580    | 630       | 670              | 715                   | 760                   | 805     | 850 | 895 | +50                      |

Source: Geometric Design Guide for Canadian Roads, TM; September 1999.

#### Table 3 - Determine SSD for Truck Class

| Road<br>Trossing<br>Design |      |                        |      |     |     |      |     | St  | oppir |      | ck Cla<br>ht Di<br>(m) |     | e (SSI | D)  |     |     |     |     |     |     |     |
|----------------------------|------|------------------------|------|-----|-----|------|-----|-----|-------|------|------------------------|-----|--------|-----|-----|-----|-----|-----|-----|-----|-----|
| Speed V<br>(km/hr)         |      | Road Approach Gradient |      |     |     |      |     |     |       |      |                        |     |        |     |     |     |     |     |     |     |     |
| (anom)                     | -10% | -9%                    | -896 | -7% | -6% | -596 | -4% | -3% | -296  | -196 | 0%                     | 196 | 296    | 396 | 4%  | 5%  | 6%  | 7%  | 8%  | 996 | 10% |
| 10                         | 10   | 10                     | 10   | 10  | 10  | 10   | 10  | 10  | 10    | 10   | 10                     | 10  | 10     | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  |
| 20                         | 26   | 26                     | 26   | 26  | 26  | 26   | 25  | 25  | 25    | 25   | 25                     | 25  | 25     | 25  | 25  | 25  | 24  | 24  | 24  | 24  | 24  |
| 30                         | 48   | 48                     | 47   | 47  | 47  | 46   | 46  | 46  | 45    | 45   | 45                     | 45  | 45     | 44  | 44  | 44  | 44  | 44  | 44  | 43  | 43  |
| 40                         | 76   | 75                     | 74   | 74  | 73  | 73   | 72  | 71  | 71    | 70   | 70                     | 70  | 69     | 69  | 68  | 68  | 68  | 67  | 67  | 67  | 67  |
| 50                         | 121  | 120                    | 118  | 117 | 116 | 115  | 114 | 113 | 112   | 111  | 110                    | 109 | 108    | 108 | 107 | 106 | 106 | 105 | 105 | 104 | 104 |
| 60                         | 149  | 146                    | 144  | 142 | 140 | 138  | 136 | 134 | 133   | 131  | 130                    | 129 | 128    | 126 | 125 | 124 | 123 | 122 | 122 | 121 | 120 |
| 70                         | 210  | 205                    | 202  | 198 | 195 | 192  | 189 | 187 | 184   | 182  | 180                    | 178 | 176    | 175 | 173 | 171 | 170 | 169 | 167 | 166 | 165 |
| 80                         | 252  | 246                    | 241  | 236 | 231 | 227  | 223 | 219 | 216   | 213  | 210                    | 207 | 205    | 202 | 200 | 198 | 196 | 194 | 192 | 191 | 189 |
| 90                         | 318  | 311                    | 304  | 297 | 292 | 286  | 281 | 277 | 273   | 269  | 265                    | 262 | 258    | 255 | 252 | 250 | 247 | 245 | 243 | 240 | 238 |
| 100                        | 401  | 391                    | 382  | 373 | 365 | 358  | 352 | 346 | 340   | 335  | 330                    | 325 | 321    | 317 | 314 | 310 | 307 | 304 | 301 | 298 | 295 |
| 110                        | 455  | 441                    | 428  | 417 | 406 | 397  | 388 | 380 | 373   | 366  | 360                    | 354 | 349    | 344 | 339 | 334 | 330 | 326 | 322 | 319 | 315 |

\* Source: Transport Canada's "Determining Minimum Sightlines at Grade Crossings: A Guide for Road Authorities and Railway Companies"

### MileX.XX (10203, 57 Timberland Road),SRY Rail

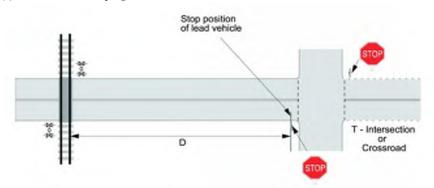
Surrey, British Columbia

Sheet 5

#### LOCATION of GRADE CROSSING

| Item  |   | Reference       |
|---|---|-----------------|
|   |   |                 |
| D should not be less than 30m for either approach if the train speed exceeds 15 mph.                                  |   |                 |
| D =53.4m  |   | GCS Section 9.1 |
| Are there pedestrian crossings on either road approach that could cause vehicles to queue back to the tracks?         |   |                 |
|   | No  |                 |
| s "D" insufficient such that road vehicles might queue onto the rail tracks?  | No  |                 |
| s "D" insufficient such that road vehicles turning from a side street might not see warning devices for the crossing? | No  |                 |
|   |   | •               |
| ollowing Site Visit:  |   |                 |
| n "D" dimension to the edge of the entrance to facility in East. The West "D" is 110m                                 |   |                 |
| s<br>s  | "D" should not be less than 30m for either approach if the train speed exceeds 15 mph.<br>=53.4m re there pedestrian crossings on either road approach that could cause vehicles to queue back to the tracks? "D" insufficient such that road vehicles might queue onto the rail tracks? "D" insufficient such that road vehicles turning from a side street might not see warning devices for the crossing? Illowing Site Visit: |                 |

#### Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

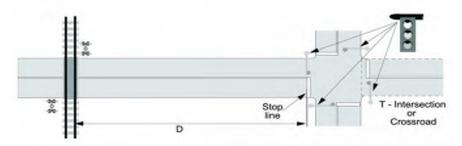
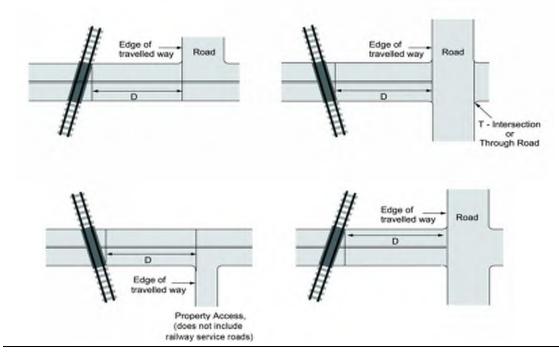


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings



#### GRADE CROSSING SURFACE

| e   |   |   | H  | tem   |  |   |   |   | Referen  |
|---|---|---|--|---|--|---|---|---|--|
| ve Is   | s the crossir   | ng smooth enough to allow road vehicles, pedestrians, cyclis<br>Yes   | sts, and other ro  | ad users to cr  | oss at their   | normal speed  | without cons                              | equence?  | SOR 60; GC   |
| ve  |   | ing Surface Material: Asphalt<br>ing Surface Condition: Poor  |  |   |  |   |   |   | SOR 60; G0   |
| _   |   | pad Surface Type: Ashpalt   |  |   |  |   |   |   |  |
|   | •••   | oad Surface Condition: Poor   |  |   |  |   |   |   | SOR 60; G0   |
| R   | Roadway Illu  | umination?: Yes   |  |   |  |   |   |   |  |
|   |   |   | EB Approach  | 7.0   |  | WB Approa   | ch  |   |  |
|   |   | e crossing width (perp. C.L. min. = 8.0m)<br>e extension beyond travel lanes (min. = 0.5m)  | 0.5  | <b>7.6</b><br>m   | m  | 0.5   | m   |   | GCS 5.1<br>GCS 5.1   |
| _   |   | th/Trail crossing width (min. = 1.5m)   | 0.5  | NA  | m  | NA  | m   | No sidewalk   | GCS 5.1  |
| _   |   | th/Trail extension beyond sidewalk (min. = 0.5m)  | NA   | m   |  | NA  | m   |   | GCS 5.1  |
| <mark>ire</mark> D  | Distance Bet  | tween Travel Lane and C.L. of Trail   |  | NA  | m  |   |   |   |  |
| С   | Cross-Sectio  | on:   |  | South (Righ   | nt) Rail:  |   | North (Left                               | :) Rail:  | GCS Table  |
| <mark>ire</mark> F  | langeway v  | vidth (min. = 65mm; max.= 120mm or 75mm <sup>1</sup> )  |  | 75  | mm   |   | 75  | mm  | GCS Table  |
|   |   | lepth (min. = 50mm; max.= no limit or 75mm <sup>1</sup> )   |  | 25  | mm   |   | 20  | mm  | GCS Table  |
| _   | Rural Field S   |   |  |   | -  |   |   |   | GCS Table  |
| _   |   | dth (max.= 120mm or 0 <sup>1</sup> )  |  | 2   | mm   |   | 2   | mm  | GCS Table  |
|   |   | pth (max.= no limit or 0 <sup>1</sup> )   |  | 0   | mm   |   | 0   | mm  | GCS Table  |
|   | Vear Limits   |   |  | 10  | mm   |   | 10  | mm  | GCS Table  |
| _   |   | Top Rail above road surface (max. = 13mm <sup>1</sup> , 25mm, or 50mm)<br>Top Rail below road surface (min. = -7mm <sup>1</sup> , -25mm, or -50mm)  |  | 10<br>0   | mm<br>mm   |   | 10<br>0                                   | mm<br>mm  | GCS Table<br>GCS Table   |
|   |   | sons using assistive devices  |  | U   |  |   | U   |   | GC3 TABLE  |
| ossing su   | urface, loose ti  |   | elevation  | _   | -surface distr   | ress of roadway a   | oproaches                                 | -photos   |  |
| e Cro<br>5-1 -  | urface, loose ti<br>ossings \$<br>- Grade Ci  | , .   | elevation  | (a)   | Figure 5   |   | Crossing Su                               | rface Dimensions  |  |
| e Cro<br>5-1 -  | urface, loose ti<br>ossings 1<br>- Grade Cr<br>Tangeway:  | imbers, etc difference between road grade and rail supere<br>Standards, July 2014<br>rossing Surface – Cross Section  |  |   | Figure 5   | -1 - Grade (  | Crossing Su                               | ·   | -  |
| e Cro<br>5-1 -  | urface, loose ti<br>ossings \$<br>- Grade Ci  | imbers, etc difference between road grade and rail supere<br>Standards, July 2014<br>rossing Surface - Cross Section<br>Minimum   | elevation<br>65 mm   | Edge o  | Figure 5<br>Road, inc<br>f shoulder  | -1 - Grade (<br>cluding a path  | Crossing Su                               | rface Dimensions  | -  |
| e Cro<br>5-1 -  | urface, loose ti<br>ossings 1<br>- Grade Cr<br>Tangeway:  | imbers, etc difference between road grade and rail supere<br>Standards, July 2014<br>rossing Surface - Cross Section<br>Minimum<br>Maximum for:   |  | Edge o  | Figure 5<br>Road, inc  | -1 - Grade (<br>cluding a path  | Crossing Su                               | rface Dimensions  |  |
| e Cro<br>5-1 -  | urface, loose ti<br>ossings 1<br>- Grade Cr<br>Tangeway:  | imbers, etc difference between road grade and rail supere<br>Standards, July 2014<br>rossing Surface - Cross Section<br>Minimum   |  | Edge o  | Figure 5<br>Road, inc<br>f shoulder  | -1 - Grade (<br>cluding a path  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyond  |  |
| e Cro<br>5-1 -  | urface, loose ti<br>ossings 1<br>- Grade Cr<br>Tangeway:  | Minimum Maximum for: Public sidewalks, paths or trails designated by the road   | 65 mm  | Edge o  | Figure 5<br>Road, inc<br>f shoulder  | -1 - Grade (<br>cluding a path  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyond  |  |
| e Cro<br>5-1 -  | urface, loose ti<br>ossings 1<br>- Grade Cr<br>Tangeway:  | Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices  | 65 mm<br>75 mm   | Edge of<br>End of<br>0.5 m of   | Figure 5<br>Road, inc<br>shoulder<br>railway ties  | -1 - Grade (  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyond  |  |
| e Cro<br>5-1 -  | urface, loose t<br>osssings \$<br>- Grade Ci<br>Tangeway:<br>Width  | Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings  | 65 mm<br>75 mm<br>120 mm   | Edge of<br>End of<br>0.5 m of   | Figure 5<br>Road, inc<br>e shoulder<br>railway ties  | -1 - Grade (  | Crossing Su<br>or trail                   | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface when<br>no shoulder |  |
| e Cro<br>5-1 -  | urface, loose t<br>osssings \$<br>- Grade Ci<br>Tangeway:<br>Width  | Minimum Maximum for: Public sidewalks, poths or trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum  | 65 mm<br>75 mm<br>120 mm   | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5<br>Road, inc<br>e shoulder<br>railway ties  | -1 - Grade (  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface when<br>no shoulder |  |
| e Cro<br>5-1 -<br>a) Fl   | urface, loose to<br>osssings \$<br>- Grade Cr<br>Tangeway:<br>Width<br>Depth  | Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings   | 65 mm<br>75 mm<br>120 mm<br>50 mm  | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5<br>Road, inc<br>e shoulder<br>railway ties  | -1 - Grade (  | Crossing Su<br>or trail                   | rface Dimensions  | •  |
| e Crc<br>5-1 -<br>a) Fl   | urface, loose ti<br>osssings 5<br>- Grade Ci<br>Tangeway:<br>Width<br>Depth<br>Field side g<br>pace is pem  | Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings All other gra | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public  | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5<br>Road, inc<br>e shoulder<br>railway ties  | -1 - Grade (  | Crossing Su<br>or trail                   | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface when<br>no shoulder | •  |
| e Crc<br>5-1 -<br>a) Fl   | urface, loose to<br>osssings \$<br>- Grade Cr<br>Tangeway:<br>Width<br>Depth<br>Field side g<br>pace is perm<br>walks, path   | Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings All other gra | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public  | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5<br>Road, inc<br>e shoulder<br>railway ties  | -1 - Grade (  | Crossing Su<br>or trail                   | rface Dimensions  | •  |
| (b) f   | urface, loose ti<br>osssings 5<br>- Grade Cr<br>Tangeway:<br>Width<br>Depth<br>Field side p<br>pace is permission, path<br>istive device  |   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>120 mm<br>No limit   | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5<br>Road, inc<br>e shoulder<br>railway ties  | -1 - Grade (  | Crossing Su<br>or trail                   | rface Dimensions  | •  |
| (b) f   | urface, loose to<br>osssings \$<br>- Grade Cr<br>Tangeway:<br>Width<br>Depth.<br>Field side g<br>bace is penth<br>sidve device<br>Elevation o   | Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum depth Maximum width Maximum depth of the road with respect to the crossing surface rossing surface must be installed as close as possible to the   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit  | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5<br>Road, inc<br>shoulder<br>railway ties<br>or more<br>shoulder w   | -1 - Grade (  | Vidth                                     | rface Dimensions  | •  |
| (c) 6 (c) for the second secon  | urface, loose to<br>osssings \$<br>- Grade Cr<br>Tangeway:<br>Width<br>Depth.<br>Field side g<br>bace is penth<br>sidve device<br>Elevation o   | Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum detth Maximum width Maximum depth f the top of the rail with respect to the crossing surface  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit  | Edge of<br>End of<br>0.5 m of<br>beyond   | Figure 5<br>Road, inc<br>shoulder<br>railway ties<br>or more<br>shoulder w   | -1 - Grade (<br>cluding a path  | Vidth                                     | rface Dimensions  | or Was   |
| e Cro<br>δ-1 -<br>a) Fl<br>(b) f<br>(c) 8<br>The<br>ral i<br>Wea<br>Public  | urface, loose ti<br>osssings 5<br>- Grade Cr<br>Tangeway:<br>Width<br>Depth<br>Field side p<br>bace is perm<br>walks, path<br>sidve device<br>Elevation o<br>to go of the c<br>within the w<br>ar limits:   | Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum with Maximum width f the top of the rail with respect to the crossing surface mossing surface must be installed as close as possible to the ear limits below.   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the                                  | Edge of<br>End of<br>Dayson<br>there is   | Figure 5<br>Road, inc<br>f shoulder<br>railway ties<br>or more<br>i shoulder w<br>i one<br>(b) Sk  | -1 - Grade (<br>cluding a path<br>where<br>dewalk, path,<br>1- Sidew  | Width<br>or trail along<br>calk, path, or | rface Dimensions  | e<br>or was<br>sto<br>sto<br>sto                                   |
| e Cro<br>δ-1 -<br>a) Fl<br>(b) f<br>(c) 8<br>The<br>ral i<br>Wea<br>Public  | urface, loose to<br>osssings 5<br>- Grade Ci<br>Tangeway:<br>Width<br>Depth<br>Depth<br>Field side p<br>pace is pen<br>visite device<br>Elevation o<br>top of the c<br>within the within the side of the c  | Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum with Maximum width f the top of the rail with respect to the crossing surface mossing surface must be installed as close as possible to the ear limits below.   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the                                  | Edge of<br>End of<br>0.5 m of<br>beyond<br>there is<br>2 · 0.5<br>or b          | Figure 5<br>Road, inc<br>d shoulder<br>railway ties<br>or more<br>i shoulder w<br>i one  | -1 - Grade (<br>cluding a path<br>where<br>dewalk, path,<br>1- Sidew  | Width<br>or trail along<br>calk, path, or | rface Dimensions  | e<br>or was<br>so<br>4- Sidewalk, path, or<br>5-0.5 m or more be;  |
| (b) f<br>(b) f<br>(c) f | urface, loose to<br>osssings 5<br>- Grade Ci<br>Tangeway:<br>Width<br>Depth<br>Depth<br>Depth<br>Field side of<br>pace is per<br>walks, path<br>table device<br>top of the c<br>within the w<br>ar limits we device<br>is the device  | Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings All other grade crossings Minimum Maximum with Maximum withh Maximum depth of the top of the rail with respect to the crossing surface mossing surface must be installed as close as possible to the ear limits below.  path or trail designated by the road authority for use by person surface Maximum distance of the top of the rail above crossing surface Maximum distance of the top of the rail below crossing surface   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the<br>recons using                  | Edge of<br>End of<br>0.5 m of<br>beyond<br>there is<br>2 - 0.5<br>or b<br>there | Figure 5<br>Road, inc<br>f shoulder<br>railway ties<br>or more<br>i shoulder w<br>i shoulder w<br>i shoulder w<br>i one<br>(b) Sk<br>m or more b<br>e is one | clevalk, path,<br>1 - Sidew<br>dewalk, path,<br>1 - Sidew<br>surfaces may   | Width                                     | rface Dimensions  | e<br>or was<br>so<br>4- Sidewalk, path, or<br>5-0.5 m or more be;  |
| (c) E Crosses (c)   | urface, loose ti<br>osssings 5<br>- Grade Ci<br>Tangeway:<br>Width<br>Depth<br>Depth<br>Field side g<br>pace is pen<br>walks, path<br>sidve device<br>Elevation o<br>top of the c<br>within the w<br>ar limits:<br>te usdevalk<br>stave device  |   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the<br>risons using<br>13 mm<br>7 mm | Edge of<br>End of<br>0.5 m of<br>beyond<br>there is<br>2 - 0.5<br>or b<br>there | (b) Sk<br>m or more t<br>eyond shoulder<br>(b) Sk<br>m or more t<br>eyond shoulder<br>e is one   | -1 - Grade (<br>cluding a path<br>where<br>dewalk, path,<br>1- Sidew<br>der where<br>surfaces may<br>de cnly where<br>between there | Width                                     | rface Dimensions  | e<br>or war<br>sig<br>4- Sidewalk, peth, or<br>5-0.5 m or more be; |
| (b) f<br>(b) f<br>(c) B<br>(c) C<br>(c) C | urface, loose ti<br>osssings 1<br>- Grade Cr<br>Tangeway:<br>Width<br>Depth<br>Depth<br>Field side g<br>Dace is permission<br>side device<br>Elevation o<br>togo of the could<br>the device<br>Elevation o<br>togo of the sub-<br>side device<br>of the public<br>above or be |   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>te top of the<br>risons using<br>13 mm        | Edge of<br>End of<br>0.5 m of<br>beyond<br>there is<br>2 - 0.5<br>or b<br>there | (b) Sk<br>m or more t<br>eyond shoulder<br>(b) Sk<br>m or more t<br>eyond shoulder<br>e is one   | dewalk, path.<br>1- Sidew<br>surfaces may<br>be road where<br>surfaces may<br>be road where<br>the road where<br>the road where     | Width                                     | rface Dimensions  | e<br>or war<br>sig<br>4- Sidewalk, peth, or<br>5-0.5 m or more be; |

Sheet 7

#### **ROAD GEOMETRY**

| Source       |   |                       | lt                              | em           |          |      |                |                 |              | Reference           |
|--------------|---|-----------------------|---------------------------------|--------------|----------|------|----------------|-----------------|--------------|---------------------|
| observe      | Are horizontal and vertical alignments smooth and           | continuous throug     | ghout SSD?                      |              |          |      |                |                 |              | Sheet 4             |
| 0050170      | WB Approach: Yes  |                       | EB Approach:                    |              |          |      |                |                 |              | Sheet 4             |
| observe      | Is horizontal alignment straight beyond rails for a d       | stance ≥ design ve    | ehicle length, L?               |              |          |      |                |                 |              | Sheet 4             |
| Observe      | WB Approach: Yes  |                       | EB Approach:                    | Yes          |          |      |                |                 |              | Sheet 4             |
| observe      | Are the road lanes at least the same width on the c         | ossing as on the r    | oad approaches                  | ?            |          |      |                |                 |              |                     |
| Observe      | WB Approach: Yes  |                       | EB Approach:                    | Yes          |          |      |                |                 |              |                     |
|              | Grades  |                       | EB Approach                     |              | WB Appro | bach | Difference: ra | ail e & rd grad | de (GCS 6.1) | GCS Sect. 6         |
| measure      | Slope within 8m of nearest rail (max. = 2%)                 |                       | 0.30                            | %            | 0.20     | %    | 0.15%          | %               | 0.10%        | Diff in Grade Max   |
| measure      | Slope between 8m & 18m of nearest rail (max. = 5%)          |                       | 0.50                            | %            | 1.00     | %    |                |                 |              | 3%                  |
|              | If crossing is only for pedestrians, cyclists, or persor    | s using assistive d   | evices (max. = 1 <sup>1</sup> o | or 2%):      | -        |      |                |                 |              |                     |
| measure      | slope within 5m of nearest rail =                           |                       | N/A                             | %            | N/A      | %    |                |                 |              |                     |
| Road V       | General approach grade (max. = +/- 5%)                      |                       | 0.50                            | %            | 0.50     | %    |                |                 |              |                     |
| KOAU V       | measured over the SSD distance of:                          |                       | 10                              | m            | 45       | m    |                |                 |              | Sheet 4             |
| Rail √       | Are rail tracks super-elevated?                             | No                    | Rate of s/e:                    | 0.00         | m/m Sdg  | 0.00 | m/m ML         |                 |              | GCS Sect. 6.1 & 6.2 |
| Decided      | If train speeds exceed 15mph (70° minimum w/o warning       | system; 30° minimum v | with warning system)            | ):           |          |      |                |                 |              |                     |
| Road √       | What is the angle between the crossing and the roa          | dway?                 | =                               | 75.0         | degrees  |      |                |                 |              |                     |
| observe      | Condition of Road Approaches:                               | Poor to Fair. Som     | e aligator cracki               | ing observed |          |      |                |                 |              | SOR 60              |
| observe      | (e.g., anything that might affect stopping or acceleration) |                       |                                 |              |          |      |                |                 |              |                     |
| observe      | NA  |                       |                                 |              |          |      |                |                 |              |                     |
| 1. If freque | nt use by persons using assistive devices                   |                       |                                 |              |          |      |                |                 |              |                     |
| Comments     | Following Site Visit:                                       |                       |                                 |              |          |      |                |                 |              |                     |
| - Cracking v | within both approaches observed. Reparis needed.            |                       |                                 |              |          |      |                |                 |              |                     |
| No Sido w    | alk on oither side of crossing                              |                       |                                 |              |          |      |                |                 |              |                     |

No Side walk on either side of crossing. Switches located on either side of crossing.

#### Grade Crossings Standards, July 2014

#### Table 6-1 - Difference in Gradient

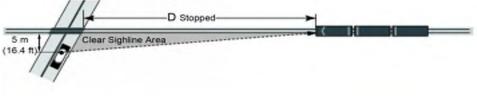
|             | Classificatio     | n Differ         | ence in Gradien | n (%)          |      |
|-------------|-------------------|------------------|-----------------|----------------|------|
|             | RLU               |                  | 2               |                |      |
|             | RCU               |                  | 1               |                |      |
|             | RCD               |                  | 1               |                |      |
|             | RAU               |                  | 0               |                |      |
|             | RAD               |                  | 0               |                |      |
|             | RFD               |                  | -               |                |      |
|             | ULU               |                  | 3               |                |      |
|             | UCU               |                  | 2               |                |      |
|             | UCD               |                  | 2               |                |      |
|             | UAU               |                  | 0               |                |      |
| nd<br>I (U) | Rural (R) Local ( | L) Collector (C) | Arterial(A)     | Expressway (E) | Free |
|             | Divided (D)       |                  |                 | Undivided (U)  |      |

Source: Geometric Darign Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999

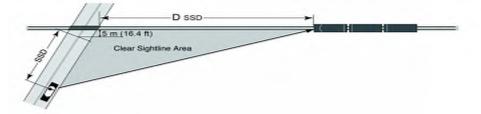
#### Figure 7-1 - Minimum Sightlines - Grade Crossings

"Lee Urba

(a) Sightlines for Users Stopped at a Grade Crossing (applicable to all quadrants)



(b) Sightlines for Users Approaching Grade Crossing (applicable to all quadrants)



#### Sheet 8

SIGHTLINES

| Driver Eye Height | = | 1.05m | passenger vehicles, pedestrians, cyclists & assistive devices |
|-------------------|---|-------|---|
|                   | = | 1.80m | buses & straight trucks                                       |
|                   | = | 2.10m | large trucks & tractor-trailers                               |
| Target Height     | = | 1.20m | above rails   |

| Source    |   | Ite   | em           |                    |                       |                  | Reference                   |
|-----------|---|---|--------------|--------------------|-----------------------|------------------|-----------------------------|
| -         | Are sightlines within the rail R.O.W. clear of bu         | shes/vegetation; 15 m on each side of                 | the track ar | nd, 30 m along the | track, on each side c | of the crossing? |                             |
| observe   | -if no, detail the location Yes                           |   |              |                    |                       |                  |                             |
| observe   | Are sightlines on the road R.O.W. within 15m              | of the rail crossing clear of bushes/vege             | tation?      |                    |                       |                  |                             |
| Observe   | -if no, detail the location Yes                           |   |              |                    |                       |                  |                             |
|           |   |   | EB Approa    | ch                 | WB Approa             | ich              |                             |
| look-up   | SSD minimum =   |   | 10           | m                  | 45                    | m                | Sheet 4                     |
| measure   | SSD Actual (not including turning movements):             |   | 95.0         | m                  | 150.0                 | m                |                             |
| calculate | D <sub>SSD</sub> =  | 0.277837 x V <sub>train km/h</sub> x T <sub>SSD</sub> | 56           | m                  | 56                    | m                | 1.609 convert mph to km/h   |
| calculate | D <sub>STOPPED</sub> minimum (m) =                        | 0.277837 x V <sub>train km/h</sub> x T <sub>D</sub> = | 81           | m                  | 84                    | m                | T <sub>D</sub> from Sheet 4 |
| measure   | D <sub>STOPPED</sub> Actual:                              | Driver looking LEFT                                   | 100          | m (ne)             | 95                    | m (sw)           |                             |
| measure   |   | Driver looking RIGHT                                  | 80           | m (nw)             | 150                   | m (se)           |                             |
| calculate | Ped./Cyclist D <sub>STOPPED</sub> (m)                     |   | 0            | m                  | 0                     | m                | T <sub>P</sub> from Sheet 4 |
| measure   | Ped./Cyclist D <sub>STOPPED</sub> Actual:                 | Person looking LEFT                                   | N/A          | m                  | N/A                   | m                |                             |
| measure   | note: measured from a point 2m in advance of sign/signals | Person looking RIGHT                                  | N/A          | m                  | N/A                   | m                |                             |
| observe   | Are there any obstacles within the sight triang           | les other than traffic signs/utility poles            | that might   | affect visibility? |                       |                  |                             |
| observe   | Fencing and equipment within fa                           | cility.   |              |                    |                       |                  |                             |

b)

#### **Comments Following Site Visit:**

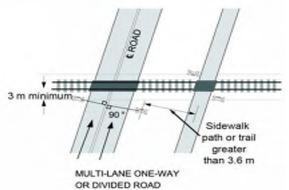
- Fencing and equipment obstructs sightlines in the Northwest and Northeast quadrants.

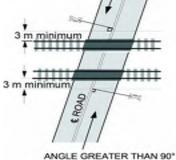
-special considerations for large trucks?

-can sightlines be maintained on an ongoing basis? (snow)

Figure 8-3 - Location of Railway Crossing Signs and Number of Tracks Signs (public grade crossings without warning systems)

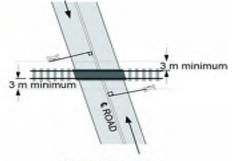






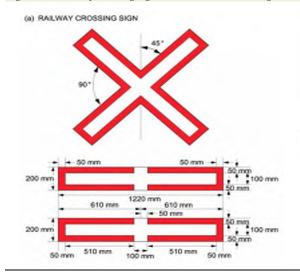
-special design vehicle?

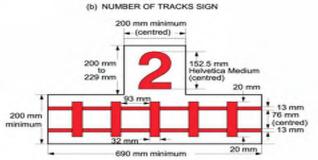
-photos



THAN 90" ANGLE 90° OR LESS

Figure 8-1 - Railway Crossing Sign and Number of Tracks Sign





SIGNS AND PAVEMENT MARKINGS

| Source     |  |                         | lt                    | em              |                       |             |     | Reference |
|------------|--|-------------------------|-----------------------|-----------------|-----------------------|-------------|-----|-----------|
|            | Railway Crossing Sign  |                         | $\times$              | These s         | igns will be required |             |     | MUTCD     |
|            |  | EB Approach             |                       | WB Approa       | ch                    |             |     |           |
| measure    | distance from nearest rail:                                  | 15.0                    | m                     | 27.2            | m                     |             |     |           |
| measure    | distance from edge of road:                                  | 1.0                     | m                     | 1.5             | m                     |             |     |           |
| measure    | height of centre of crossbucks:                              | 2.5                     | m                     | 2.5             | m                     |             |     |           |
| measure    | retroreflectivity readings:                                  | N/A                     | cd/lux/m <sup>2</sup> | N/A             | cd/lux/m <sup>2</sup> |             |     |           |
| observe    | Number of Tracks sign? No                                    |                         |                       |                 |                       |             |     |           |
| observe    | A Stop Sign must be installed at grade crossing without a wa | arning system if the re | oad design speed is   | s less than 15m | nph                   | Yes/ No/ NA | Yes | SOR 64    |
| observe    | A Stop Ahead sign must be installed if the Stop Sigh         | is not clearly cvis     | able within the S     | Stopping Dist   | ance                  | Yes/ No/ NA | N/A | SOR 65    |
| Comments   | Following Site Visit:  |                         |                       |                 |                       |             |     |           |
| - New RAIL | WAY CROSSING signs installed in 2015.                        |                         |                       |                 |                       |             |     |           |
| - The back | of poles and signs have reflective strips (reflectivi        | ty not measured).       |                       |                 |                       |             |     |           |
| - NUMBER   | OF TRACKS Sign not required as only 1 track.                 |                         |                       |                 |                       |             |     |           |

-general condition -clear sightlines to the sign -posts -photos

| Source  | Item  | Reference |
|---------|---|-----------|
|         | DO NOT STOP ON TRACKS   | MUTCD     |
| Road √  | Does queued traffic routinely encroach closer than 5m from the crossing surface? No |           |
| observe | Are these signs present on either approach? No                                      |           |

**Comments Following Site Visit:** 

Sheet 9a

- DO NOT STOP ON TRACKS Sign installed on RAILWAY CROSSING AHEAD Sign

| -general condition | -posts | -photos |
|--------------------|--------|---------|
|                    |        |         |

| Source  |   |  | Item   |       |                           | Reference      |
|---------|---|--|--------|-------|---------------------------|----------------|
|         | Railway Crossing Ahead Sign (WA 18-20)            | und the second s | NA-18  |       |                           | MUTCD & SOR 66 |
| look-up | Is AADT > 100? Yes                                |  | EB App | roach | WB Approach               | Sheet 3        |
| observe | Is area urban such that WA 18-20 is not required? | Y  | 'es    |       | No, fallen over and moved |                |
| measure | Distance from nearest rail to sign                | =  | 4.5    | m     | <b>70.0</b> m             | MUTCD          |
| observe | height:   |  | 2.5    |       | 2.5                       |                |
| observe | appropriate orientation of symbol                 | Y  | 'es    |       | Yes                       |                |

Comments Following Site Visit:

RAILWAY CROSSING AHEAD Sign has been installed since the previous inspection.

- RAILWAY CROSSING AHEAD Sign installed Min. Approx 38m from crossing

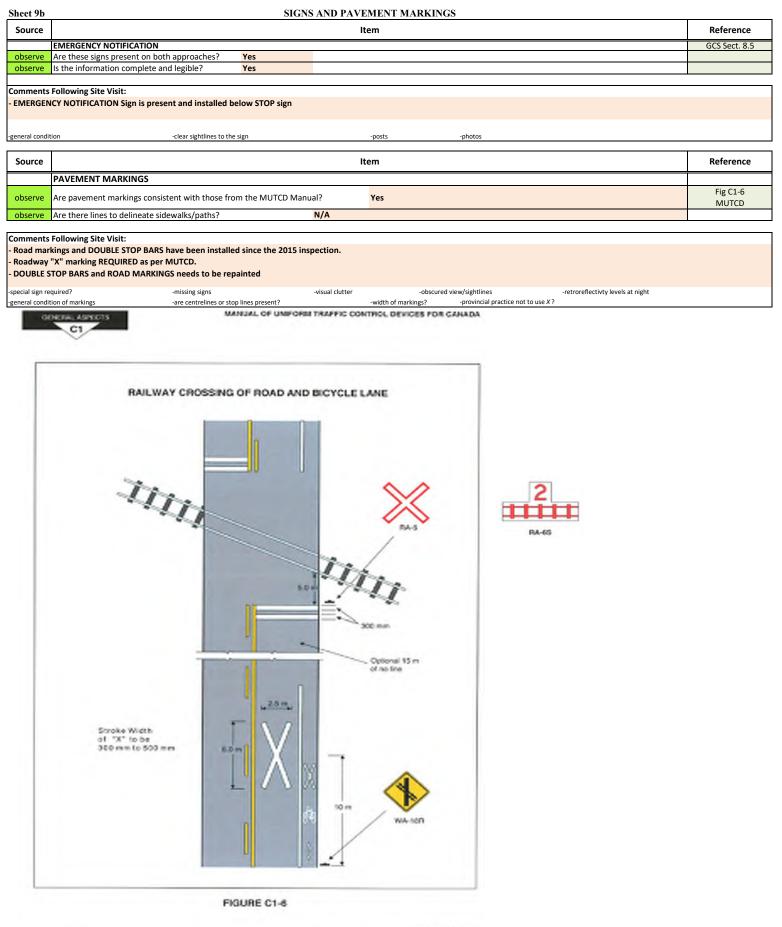
Westbound sign not aligned correctly. Eastbound sign and pole removed and placed on opposite side of road.

-photos

| Source   |   | Item           | Reference              |
|----------|---|----------------|------------------------|
|          | ADVISORY SPEED SIGN   | 30<br>km/h     | MUTCD & SOR 66 (2)     |
|          |   |                |                        |
| observe  | Are they present on both approaches?<br>Posted speed limit? | No<br>N/A km/h |                        |
| look-up  | Are they required on either approach?                       | No             | check SSD<br>(Sheet 8) |
|          |   |                |                        |
| Commonto | Following Site Visit:                                       |                |                        |

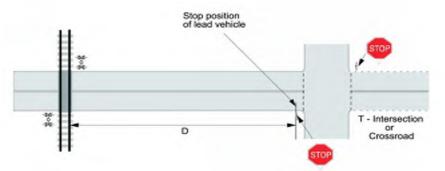
Comments Following Site Visit:

-general condition -posts



JANUARY 2014

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

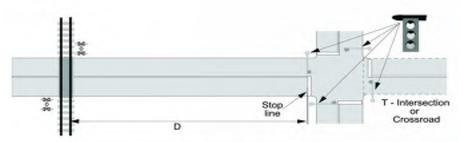
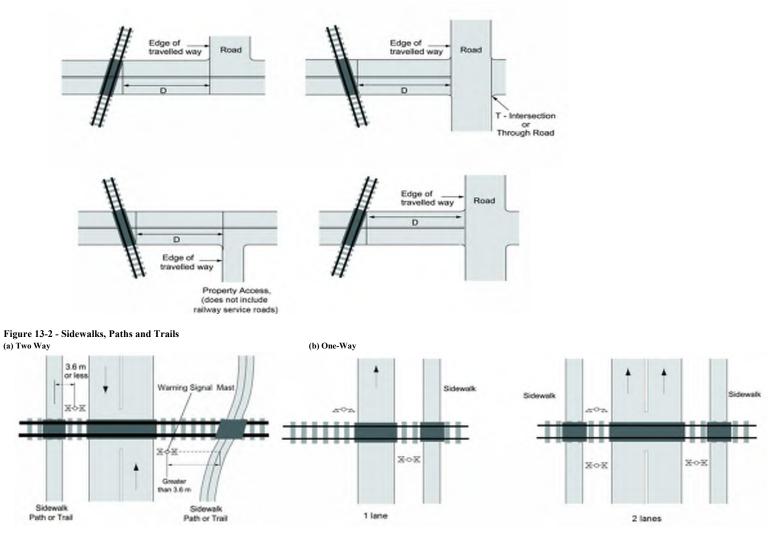


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings





| Sheet 11  |                                      |                     | GRAD               | E CROSSI      | NG WARNING S                              | SYSTEM | MS                  |  | H  |                              | GCS Section 9     |
|-----------|--------------------------------------|---------------------|--------------------|---------------|---|--------|---------------------|--|--|------------------------------|-------------------|
| Source    | Item is not required.                |                     |                    |               |   |        |                     |  |  |                              | Reference         |
|           | Warning System Warrants              |                     |                    |               |   |        |                     |  |  |                              |                   |
|           | if any of A through E below are      | met, then a warnir  | ng system is warr  | anted         |   |        |                     |  |  |                              |                   |
|           | Question Warrant for Warring System  |                     |                    |               |   |        |                     |  |  |                              |                   |
| look-up   | Existing AADT =                      | 2,140               | Forecast AADT :    | =             | 140                                       |        |                     |  |  |                              | Sheet 3           |
| look-up   | Daily Train Volume =                 | 5.000               |                    |               |   | trains |                     |  |  |                              | Sheet 3           |
| calculate | A. Cross-Product =                   | 700                 |                    |               |   |        | > 2,000 FLB         | req'd  | > 50,000 req   | uires gates                  |                   |
| look-up   | B. Maximum Rail Operating Sp         | eed =               | 10                 |               | n   | nph    | (max = 80m          | ph or 50 mph w                                       | ith crosswalk  | x)                           | Sheet 3           |
| Rail      | C. Number of Tracks =                |                     | 1                  |               |   |        |                     |  |  |                              |                   |
| Nali      | if ≥ 2, can trains pass one anoth    | ier?                | N/A                |               |   |        | if $\geq 2$ and tra | ains can pass or                                     | ne another ->  | FLB req'd                    |                   |
| look-up   | D. Are Sightlines obscured?          |                     | Yes                |               |   |        | if "Yes" -> Fl      | LB req'd: If Fig 7                                   | '.1 applies>   | add G                        | Sheet 8 & Fig 7.1 |
| observe   | E. Are any proximity condition       | s met?              | No                 |               |   |        | if "Yes" -> Fl      | LB required.   |  |                              | GCS Sect 9 & 11   |
| look-up   | Is a Warning System warranted        | ?                   | Yes                |               |   |        | If any of A t       | hrough E above                                       | meet the Wa  | arrant                       |                   |
|           | Field Visit                          | Present? (Y/N)      | Condition / Alig   | gnment:       |   |        |                     |  |  |                              | GCS 13            |
| observe   | Light Units,                         | N                   |                    |               |   |        |                     |  |  |                              | GCS 13            |
| observe   | Bells,                               | N                   |                    |               |   |        |                     |  |  |                              | GCS 13            |
| observe   | Gates,                               | N                   |                    |               |   |        |                     |  |  |                              | GCS 13            |
| observe   | Cantilever Lights,                   | N                   |                    |               |   |        |                     |  |  |                              | GCS 13            |
| observe   | Check that warning signal asser      | mblies and cantilev | ers are in accorda | ance with GCS | Figures.                                  |        |                     |  |  |                              | GCS Sect. 12      |
| observe   | Is warning system housing at le      | ast 9m from travel  | ed way of the roa  | d and 8m fro  | m the nearest rail?                       |        |                     |  |  |                              |                   |
| observe   | If there is a sidewalk, is a bell or | n the adjacent asse | mbly?              |               |   |        |                     |  |  |                              |                   |
| Rail √    | Have all light units been aligned    | 1?                  | NA                 | Date?         | NA  |        |                     |  |  |                              |                   |
|           | Design Approach Warning Time         | e (greatest of):    |                    |               |   |        |                     |  |  |                              |                   |
| Rail      |                                      |                     |                    |               | 20sec OR<br>[20+((cd-11)/3)]<br>if cd>11m | Td     | Тр                  | Gate Clearance<br>Time + Descent<br>Time + 5 seconds | Traffic Signal<br>Clearance Time<br>(=0 if no traffic<br>signal) | (SSD + cd + L)/(0.277837xVv) |                   |
|           | EB Approach                          | 1                   | 35.9               | sec           | 24.3                                      | 18.2   | 0.0                 | 35.9   | 0.0  | 6.8                          |                   |
|           | WB Approach                          |                     | 35.9               | sec           | 28.7                                      | 18.9   | 0.0                 | 35.9   | 0.0  | 12.6                         |                   |
| observe   | Is warning time less than 35 sec     |                     | 55 sec (with gate  | es)           | N/A                                       |        |                     |  |  |                              |                   |

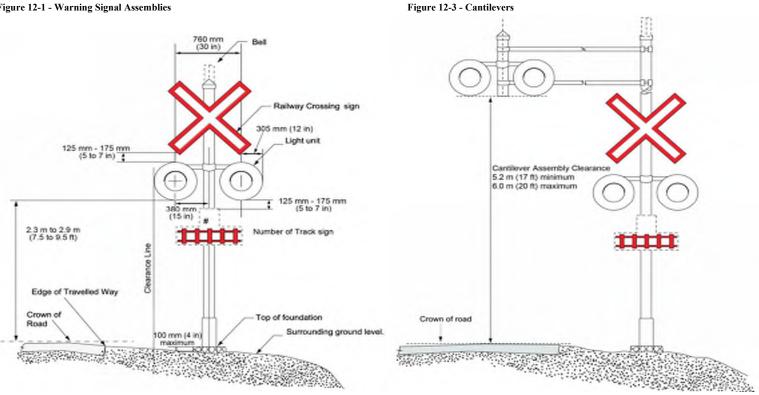
**Comments Following Site Visit:** 

Based on the sightlines and the above requirements, an active warning system is required.

xtraordinary conditions why warning system should be installed

-is warning system present but not warranted?

#### Figure 12-1 - Warning Signal Assemblies



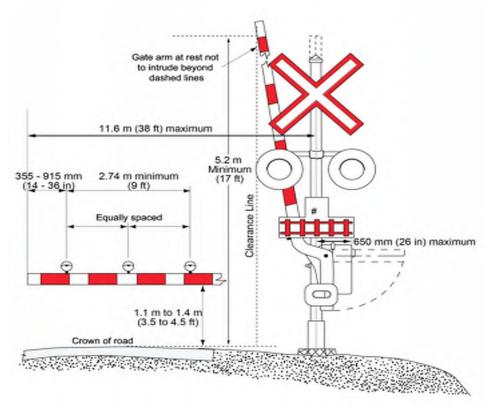


#### GATES FOR GRADE CROSSING WARNING SYSTEMS

GCS Section 9

|  |   | Item  |  |  |  |   | Reference   |
|--|---|---|--|--|--|---|---|
| Warning System Warrants                            |   |   |  |  |  |   |   |
| -if any of A through E below are met t             | hen a warning syst  | tem with gates is warranted.  | Not req  | uired as qwarning system i   | is not necessar  | y   |   |
| A. Cross-Product =                                 | 700   | (50,000 min)  |  |  |  |   |   |
| B. Maximum Rail Operating Speed =                  | 10  | mph (max = 50mp   | ר)   |  |  |   | Sheet 3   |
|  | 1   |   |  |  |  |   |   |
| if $\geq 2$ , can trains pass one another?         | N/A   |   |  |  |  |   |   |
| D. Is D <sub>STOPPED</sub> Insufficient?           | No  |   |  |  |  |   | Sheet 8   |
| E. Are any proximity conditions met?               | N/A   |   |  |  |  |   |   |
| Gate clearance distance: eq 10.4b                  | 24.7  | m cd <sub>G stop</sub>  | 34.7   | m cd ssd EB  | 69.7   | m cd ssd WB   |   |
| travel time =                                      | 18.9  | sec <sub>G stop</sub>   |  |  |  |   |   |
| Gate arm clearance times:                          | 18.2  | sec EB from stop T G ssd =  | 4.2  | sec EB from SSD  |  |   |   |
|  | 18.9  | sec WB from stop T G ssd =  | 8.4  | sec WB from SSD  |  |   | GCS Sect. 10.4  |
| Gate arm delay time: 18.9                          | sec (greatest val   | ue from above)  |  |  |  |   | 005 5000. 10.4  |
| effect of grade =                                  | 0.4   | sec (SB from Stop)  | -4.2   | sec EB from SSD  |  |   |   |
|  | 1.2   | sec (NB from Stop)  | 0.0  | sec WB from SSD  |  |   |   |
| Measure gate arm delay and compare with above      | :   | N/A   |  |  |  |   |   |
| Do gates conform to standards depicted in GCS Fig  | gures?  | N/A   |  |  |  |   |   |
| Check gate descent (10 to 15 sec) and ascent (6 to | 12 sec)   | N/A   |  |  |  |   |   |
|  |   | N/A   |  |  |  | -   |   |
|  | 0.  | а о,  | i, the warn  | ing system must be equipped with   | a<br>Yes/No/NA   | NA  | GCS 16.3.1  |
| Following Site Visit:                              |   | operation of the warning system.  |  |  |  |   |   |
|  |   | *** I   |  |  |  |   |   |
| time requirements are not met, ann active warni    | ng system with ga   | ites is required.   |  |  |  |   |   |
|  |   |   |  |  |  |   |   |
| conditions why warning system should be installed  |   |   | is warning   | system present but not warranted?  | ? No   |   |   |
|  | -if any of A through E below are met th<br>A. Cross-Product =<br>B. Maximum Rail Operating Speed =<br>C. Number of Tracks =<br>if ≥ 2, can trains pass one another?<br>D. Is D <sub>STOPPED</sub> Insufficient?<br>E. Are any proximity conditions met?<br>Gate clearance distance: eq 10.4b<br>travel time =<br>Gate arm clearance times:<br>Gate arm clearance times:<br>Gate arm clearance times:<br>Gate arm delay time:<br>18.9<br>effect of grade =<br>Measure gate arm delay and compare with above<br>Do gates conform to standards depicted in GCS Figures3<br>Where railway equipment regularly stops, or railway equipment<br>control f<br>collowing Site Visit: | -if any of A through E below are met then a warning system with gamma for the system with | -if any of A through E below are met then a warning system with gates is warranted.         A. Cross-Product =       700       (50,000 min)         B. Maximum Rail Operating Speed =       10       mph       (max = 50mpl         C. Number of Tracks =       1       1       1         D. Is D <sub>STOPPED</sub> Insufficient?       No       1       1         E. Are any proximity conditions met?       N/A       1       1         Gate clearance distance: eq 10.4b       24.7       m cd G stop       1         Gate clearance distance: eq 10.4b       24.7       m cd G stop       1         Gate arm clearance times:       18.9       sec C Stop       1       1         Gate arm delay time:       18.9       sec (SB from stop)       T G stod       1       1         Gate arm delay time:       18.9       sec (SB from Stop)       1       2 sec (NB from Stop)       1       2 sec (NA A       1       2 sec (NB | if any of A through E below are met then a warning system with gates is warranted. Not req         A. Cross-Product =       700       (50,000 min)         B. Maximum Rail Operating Speed =       10       mph       (max = 50mph)         C. Number of Tracks =       1       1         D. Is D <sub>STOPPED</sub> Insufficient?       No       8         E. Are any proximity conditions met?       N/A       9         Gate clearance distance: eq 10.4b       24.7       m cd G stop       34.7         Gate clearance distance: eq 10.4b       24.7       m cd G stop       34.7         Gate arm clearance times:       18.9       sec G stop       9       9       6 stod = 4.2       18.9       sec (SB from stop)       7 G std = 4.2       18.9       sec (SB from stop)       7 G std = 4.2       18.9       sec (SB from Stop)       -4.2       18.9       sec (SB from Stop)       -4.2       18.9       sec (SB from Stop)       -4.2       1.2       sec (SB from Stop)       -4.2       0.4       sec (SB from Stop)       0.0       -4.2       1.2       sec (MB from Stop)       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0 <t< td=""><td>-if any of A through E below are met then a warning system with gates is warranted.       Not required as qwarning system in A. Cross-Product =         A. Cross-Product =       700       (50,000 min)         B. Maximum Rail Operating Speed =       10       mph       (max = 50mph)         C. Number of Tracks =       1      </td><td>-if any of A through E below are met then a warning system with gates is warranted.       Not required as qwarning system is not necessar         A. Cross-Product =       700       (50,000 min)         B. Maximum Rail Operating Speed =       0       mph       (max = 50mph)         C. Number of Tracks =       1      </td><td>-if any of A through E below are met then a warning system with gates is warranted.       Not required as qwarning system is not necessary         A. Cross-Product =       700       (S0,000 min)         B. Maximum Rail Operating Speed =       10       mph       (max = 50mph)         C. Number of Tracks =       1      </td></t<> | -if any of A through E below are met then a warning system with gates is warranted.       Not required as qwarning system in A. Cross-Product =         A. Cross-Product =       700       (50,000 min)         B. Maximum Rail Operating Speed =       10       mph       (max = 50mph)         C. Number of Tracks =       1 | -if any of A through E below are met then a warning system with gates is warranted.       Not required as qwarning system is not necessar         A. Cross-Product =       700       (50,000 min)         B. Maximum Rail Operating Speed =       0       mph       (max = 50mph)         C. Number of Tracks =       1 | -if any of A through E below are met then a warning system with gates is warranted.       Not required as qwarning system is not necessary         A. Cross-Product =       700       (S0,000 min)         B. Maximum Rail Operating Speed =       10       mph       (max = 50mph)         C. Number of Tracks =       1 |

#### Figure 12-2 - Gates



Sheet 13

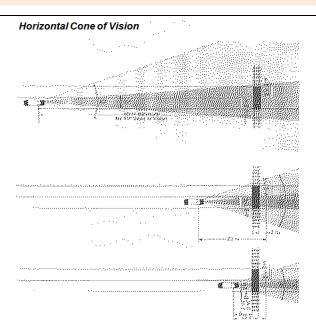
#### FLASHING LIGHT UNITS

Note: Driver's cone of vision is ± 5° horizontally; limited by top of windshield vertically.

| Source  | Item is not required as warning system is not required.                |                       |   |                             |               |                               | u |  |
|---------|--|-----------------------|---|-----------------------------|---------------|-------------------------------|---|--|
|         | Number and Location  |                       |   |                             |               |                               |   |  |
| look-up | Minimum Distance for Primary   | / Light Units (SSD)   | =   | 45.0                        | m             |                               |   |  |
| look-up | Recommended Distance for Pr  | imary Light Units =   | :   | 69.7                        | m             |                               |   |  |
|         | Are flashing light units located                                       | within 5° horizont    | ally of the centerline of the road (throughou | t the approach distance abo | ve)?          |                               |   |  |
| observe |  |                       |   |                             | Yes (cove     | ered by front and back units) |   |  |
|         | Does horizontal/vertical curvat  | ture necessitate su   | pplemental units?                             |                             |               | N/A                           |   |  |
| observe | Can back lights be seen by all s                                       | stopped drivers?      |   |                             |               | N/A                           |   |  |
| observe | Are lights obscured by vehicles stopped on adjacent intersections? N/A |                       |   |                             |               |                               |   |  |
| observe | Are additional light units requi                                       | ired for drivers as t | hey begin to turn onto an approach road fro   | m an intersecting road/lane | /pkg lot?     | N/A                           |   |  |
|         | Cantilevered Light Units   |                       |   |                             |               |                               |   |  |
| measure | Does D <sub>R</sub> exceed 7.7m?                                       | N/A                   |   |                             |               |                               |   |  |
| measure | Does D <sub>L</sub> exceed 8.7m?                                       | N/A                   | (Assumes signal poles on both sides of roa    | ad alignment, approach side | of rail)      |                               |   |  |
|         | Multiple Lanes   | •                     |   |                             |               |                               |   |  |
| observe | Can front light units be seen by                                       | y drivers in all lane | s (would T/T obscure?)?                       | N/A                         |               |                               |   |  |
| observe | Can back light units be seen by  | / all stopped driver  | s in all lanes?                               | N/A                         |               |                               |   |  |
|         | Sidewalks, paths, trails, etc.   |                       |   |                             |               |                               |   |  |
| measure | Distance from path centerline  | to signal mast =      |   | N/A                         | m (max.=3.6m) |                               |   |  |
| observe | Are separate light units require                                       | ed?                   |   | N/A                         |               |                               |   |  |

Comments Following Site Visit:

Crossing currently regulated by a passive warning system.



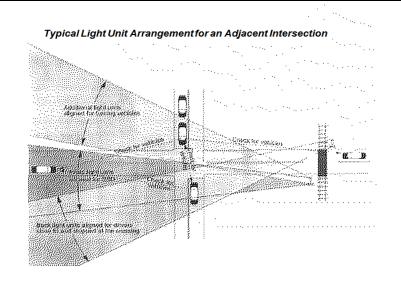


Figure 13-1 – Warning Signal Offsets Requiring Cantilevered Light Units

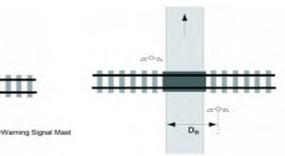
ZQE

D<sub>a</sub>

2 lanes

(a) Two-Way Road

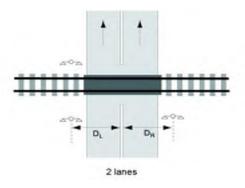
- D,



(b)



One-Way or Divided Road



GCS Sections 12-14





GCS Sections 13 and 14

#### PREPARE TO STOP AT RAILWAY CROSSING SIGN

| Source  | Item NA   |   |  |                 |                      |                                     |  |
|---------|---|---|--|-----------------|----------------------|-------------------------------------|--|
| observe | Are signs present?                                      | No<br>No  | EB approach<br>WB approach                                   |                 |                      | SOR 67 (1), (2)<br>GCS 18.21 & 18.2 |  |
| look-up | Minimum Distance for Primary Light U                    | Jnits (SSD)   |  | N/A             | m                    | Sheet 13                            |  |
| look-up | Recommended distance for Primary Li                     | ight Units  |  | N/A             | m                    | Sheet 13                            |  |
|         | Warrants  |   |  |                 |                      |                                     |  |
| observe | Are all front light units obscured withi                | Are all front light units obscured within minimum distance above? N/A |  |                 |                      |                                     |  |
| look-up | Is the facility designated a "freeway" or "expressway"? |   |  |                 |                      | Sheet 3                             |  |
| observe | Do environmental conditions frequent                    | tly obscure :   | signal visibility?   | N/A             |                      |                                     |  |
|         | Considering maximum prevailing spe                      | eds, geome  | try, and traffic composition, checkthe following:            |                 |                      |                                     |  |
| observe | Does sign flash during operation of gra                 | ade crossing  | warning system?  | N/A             |                      |                                     |  |
| measure | Distance from the sign to 2.4m beyon                    | d the furthe  | st rail =  | N/A             |                      |                                     |  |
| observe | Does the sign flash before the actuation                | on of the cro   | ssing warning system by the time required to travel from the | ne sign to clea | r the crossing? N/A  |                                     |  |
| measure | Distance from the sign to the closest gate = N/A m      |   |  |                 |                      |                                     |  |
| observe | Does the flashing sign precede actuati                  | on of the de  | scent of the gate arms by the time required to travel from t | he sign to clea | ar closest gate? N/A |                                     |  |
| measure | Time required for all queued vehicles                   | to resume t   | o maximum road operating speed =                             | N/A             | sec                  |                                     |  |

Comments Following Site Visit:

#### NO PREPARE TO STOP AT RAILWAY CROSSING Signs were observed on site nor required.

-general condition

Sheet 15

Sheet 14

-placement/orientation of signs

-functions as intended



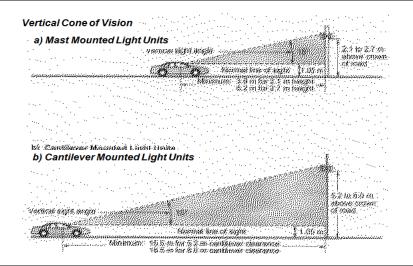
PREEMPTION OF TRAFFIC SIGNALS

| Source       | Item NA   |     |  |  |  |  |
|--------------|---|-----|--|--|--|--|
| Road √       | Are adjacent traffic signals preempted by a grade crossing warning system?                                | N/A |  |  |  |  |
| Rail √       | note: provide timing plan if preemption.  |     |  |  |  |  |
| Road<br>Rail | Date of last preemption check? n/a  |     |  |  |  |  |
|              | Warrants  |     |  |  |  |  |
| measure      | Less than 60m between stop line at traffic signal and nearest rail?                                       | N/A |  |  |  |  |
| observe      | Do vehicles queued for traffic signal regularly encroach closer than 2.4m to the nearest rail?            | N/A |  |  |  |  |
|              | Field Checks:   |     |  |  |  |  |
| observe      | Does preemption provide adequate time to clear traffic from grade crossing before train's arrival?        | N/A |  |  |  |  |
| observe      | Does preemption prohibit road traffic from moving from the street intersection toward the grade crossing? | N/A |  |  |  |  |
| observe      | Any known queuing problems on the tracks?   | N/A |  |  |  |  |
| observe      | Are pedestrians accommodated during preemption?   | N/A |  |  |  |  |
| observe      | Have longer/slower vehicles been considered?  | N/A |  |  |  |  |
| observe      | Are supplemental signs needed for motorists (no right turn on red light, etc)?                            | N/A |  |  |  |  |

**Comments Following Site Visit:** 

- No Traffic Signals located at crossing

-functions as intended



#### AREAS WITHOUT TRAIN WHISTLING

Sheet 16

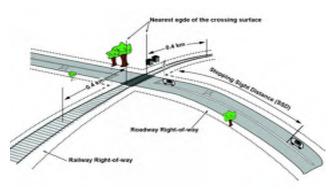
#### Grade Crossings Standards, July 2014

#### APPENDIX D - WHISTLING CESSATION

#### Table D-1 – Requirements for Warning Systems at Public Grade Crossings within an Area without Whistling

### Figure D-1 - prescribed area for whistling cessation as per article 23.1 of the RSA

| Column A                      |               |                    | Column B   |                                      |  |  |
|-------------------------------|---------------|--------------------|--|--------------------------------------|--|--|
| Railway<br>Design Speed       | Grade Crossin | gs for Vehicle Use | Grade Crossings For Sidewalks,<br>Paths, or Trails with the centrelin<br>no closer than 3.6 m (12 ft) to a<br>warning signal for vehicles<br>No. of Tracks |                                      |  |  |
|                               | No            | o. of Tracks       |  |                                      |  |  |
|                               | 1             | 2 or more          | 1  | 2 or more                            |  |  |
| Column 1                      | Column 2      | Column 3           | Column 4   | Column 5                             |  |  |
| 1 – 25 km/h (15 mph)          | FLB           | FLB                | No warning<br>system<br>requirement  | No warning<br>system<br>requirements |  |  |
| 25 – 81 km/h<br>(16 – 50 mph) | FLB           | FLB & G            | FLB  | FLB & G                              |  |  |
| Over 81 km/h (50 mph)         | FLB & G       | FLB & G            | FLB & G  | FLB & G                              |  |  |



RSA = Railway Safety Act of Canada

Legend :

FLB is a warning system consisting of flashing lights and a bell.

FLB & G is a warning system consisting of flashing lights, a bell and gates

| Source  | Item  |    |           |    |  |  |  |
|---------|---|----|-----------|----|--|--|--|
| Rail    | Is train whistling prohibited at this crossing?     | No | 24 hours? | No |  |  |  |
| observe | Is there evidence of routine unauthorized access (t | No |           |    |  |  |  |
| observe | Are the requirements of Table D-1 met?              | No |           |    |  |  |  |

#### Comments Following Site Visit:

Whistle Cessation not required

#### Additional Prompt Lists

#### **Human Factors:**

- \* Control device visibility / background visual clutter.
- <sup>o</sup> Driver workload through this area (i.e., are there numerous factors that simultaneously require the driver's attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.).
- attention such as traffic lights, padestrian activity, merging/entering traffic, commercial signing, etc.). <sup>o</sup> Driver expectancy of the environment (i.e., are the control measures in keeping with the design levels of the road system and adjacent environment).
- \* Need for positive guidance.
- " Conflicts between road and railway signs and signals.

#### **Environmental Factors:**

- " Extreme weather conditions.
- \* Lighting issues (night, dawn/dusk, tunnels, adjacent facilities, headlight or sunlight glare, etc.)
- \* Landscaping or vegetation.
- " Integration w/ surrounding land use (e.g., parked vehicles blocking sightlines, merging traffic tanes, etc.)

#### All Road Users:

Λ.

| 1.1.1.1 | <ul> <li>enceds of the following been met:</li> <li>-pedestrians (including strollers, baby carriages, and blind persons)</li> </ul> |     |
|---------|--|-----|
|         | -children / elderty  |     |
|         | -assistive devices (wheelchairs, scooters, walkers, etc)   |     |
|         | -bicyclists  |     |
|         | -motorcyclists   |     |
|         | -over-sized trucks   | · · |
|         | -buses   |     |
|         | -recreational vehicles   |     |
|         | -golfcarts   |     |
|         | -hazardous materials   |     |

(mage barriers/guide fencing, additional pedestrian bell, pedestrian gates, sign indicating potential presence of 2<sup>nd</sup> train at a multi track crossing, etc)

#### Other:

 Should closure of the crossing be considered due to inactivity, presence of nearby adjacent crossings, etc.

Commente Following Site Visit:

VFPA REPORT NUMBER: 20-0173

## VFPA FSPL TRANSPORTATION IMPROVEMENTS PROJECT 05 – 10550 TIMBERLAND ROAD, CROSSING ASSESSMENT REPORT

#### FEBRUARY 09, 2021



# REVISION HISTORY

FINAL ISSUE

| 2020/09/03                   | FIRST DRAFT                          |                                       |  |
|------------------------------|--------------------------------------|---------------------------------------|--|
| Prepared by                  | Reviewed by                          |                                       |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer |                                       |  |
| 2020/10/21                   | SECOND DRAFT                         |                                       |  |
| Prepared by                  | Reviewed by                          |                                       |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer |                                       |  |
| 2021/02/09                   | FINAL                                | -                                     |  |
| Prepared by                  | Reviewed by                          | Approved By                           |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer | R. Sewell, Senior<br>Project Engineer |  |

## SIGNATURES

PREPARED BY

09/02/2021

09/02/2021

Date

Patrick McCabe, CPEng (Aus), APEC Eng Track Designer Date



Robert Sewell, P.Eng Senior Project Engineer

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# **NSD**

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# **1 CROSSING OVERVIEW**

WSP Canada Group Limited (WSP) has been contracted as part of the Fraser Surrey Port Lands – Transportation Improvements Preliminary Design Services project, to complete a Railway Crossing Safety Assessment on the 10550 Timberland Road grade crossing. The SRY owned crossing is located within the Vancouver Fraser Port Authority (VFPA), Fraser Surrey Docklands near to the Canadian National (CN) Brownsville Spur which comes off Mile 117 of the Yale Subdivision.

A Railway Crossing Field Safety Assessment was undertaken on the 22nd of July 2020 and updates the previous Railway Crossing Assessment undertaken by WSP (formally MMM Group) on the 5<sup>th</sup> of May 2015. The Railway Crossing Assessment as conducted follows the guidelines of applicable requirements identified in the most recent edition of Transport Canada's Grade Crossing Regulations (GCR) and Grade Crossing Standards (GCS).

The crossing is a passive protected crossing (SRCS), equipped with two RAILWAY CROSSING and STOP signs, located within an industrial area. A Tractor Trailer (WB-20) is the design vehicle used to represent daily traffic on port property. The Railway traffic volumes were provided by the SRY, while the Average Annual Daily Traffic (AADT) was calculated based on the realigned infrastructure.

This report aims to identify the modifications to the grade crossing since the previous inspection completed by MMM Group in 2015, as well as highlight any new or previously identified non-compliances still relevant to this crossing.

## 1.1 LOCATION

The Timberland Road grade crossing is located within Fraser Surrey Docks jurisdiction at 10550 Timberland Road and crosses the SRY spur track SW03. The crossing is located at the latitude and longitude of 49°11'31" and 112°54'10" respectfully. Figure 1, below shows the location of the crossing.



Figure 1: Crossing Location (source: Google Earth, 2020)

# 2 SAFETY ASSESSMENT

## 2.1 PREVIOUS ASSESSMENT (2015)

A previous crossing assessment was undertaken in 2015 by WSP for the 10550 Timberland Road crossing. The objective of the assessment was 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 referred to in the Railway Safety Act / Grade Crossing Regulations and contained in the Grade Crossing Standards.
- 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.

The outcome of the 2015 assessment offered recommendations for consideration by the VFPA. Table 1: Previous Non-Compliances, illustrates the non-compliances and recommendations offered within the 2015 report. The recommendations were categorised within the three priority levels;

- Low implement the measures as soon as practicable
- Medium implement the measures by Transport Canada GCS & GCR November 2021 deadline.
- High implement the measures forthwith

#### **Table 1: Previous Non-Compliances**

|     | Observations  | Suggested Actions   | Priority | Addressed?  |
|-----|---|---|----------|---|
| GCS | Section 3 – Crossing Surface  |   |          |   |
| a.  | The railway crossing surface does not extend a<br>minimum of 0.5m beyond the sidewalk on the<br>south approach.   | Extend railway crossing surface to at least 0.5m beyond the sidewalk on the south approach.                         | High     | Yes – Asphalt has been installed on<br>either end of the concrete panels  |
| GCS | Section 7 – Sightlines  |   |          |   |
| a.  | Clear sightline areas where drivers stopped at<br>the crossing (DSTOPPED-VEH) cannot be<br>provided or maintained due to fences and<br>equipment on the southwest and southeast<br>corners of the crossing. | Install active warning system with gates if DSTOPPED cannot be provided and maintained.                             | High     | No – Fence/ gate remain, and<br>vegetation increased  |
| GCS | Section 8 – Signs   |   |          |   |
| a.  | Retroreflective strips are not provided for the back of the RAILWAY CROSSING sign and both sides of the sign supporting post.   | Install retroreflective strips on the back of the RAILWAY CROSSING sign and both sides of the sign supporting post. | Medium   | Yes – retroreflective strips installed on<br>back of both RAILWAY CROSSING<br>Signs and poles                                       |
| b.  | RAILWAY CROSSING AHEAD signs are not<br>present on either approach of the crossing.   | Install RAILWAY CROSSING AHEAD signs 45m +/-<br>10m in advance of the double stop bar on both<br>approaches.        | Medium   | Yes – RAILWAY CROSSING AHEAD<br>Signs installed on both approaches.<br>North approach has vegetation partially<br>obstructing sign. |
| C.  | STOP signs are not present on either approach of the crossing.  | STOP signs should be installed on the same post as the RAILWAY CROSSING signs on both approaches.                   | Medium   | Yes – STOP Signs installed below<br>RAILWAY CROSSING Signs.   |

| d.   | EMERGENCY NOTIFICATION signs are not<br>present on either approach of the crossing.                              | Install EMERGENCY NOTIFICATION sign on both<br>approaches as per GCS Section 8.5.   | Medium | Yes – EMERGENCY NOTIFICATION<br>Signs installed below STOP Signs.                  |  |  |
|--|--|---|--------|--|--|--|
| e.   | Double stop bar pavement markings are not present on either approach to the crossing for vehicles.               | Paint double stop bars on both road approaches as per MUTCD Fig.C1-6 (Jan. 2014).   | Medium | Yes - Double stop bars have been installed.  |  |  |
| f.   | RAILWAY CROSSING symbol pavement<br>markings are not present on either approach to<br>the crossing for vehicles. | Paint RAILWAY CROSSING symbol pavement markings on both road approaches as per MUTCD Fig.C1-6 (Jan. 2014).  | High   | Yes – RAILWAY CROSSING symbol<br>pavement marking painted as per<br>MUTCD          |  |  |
| g.   | Stopping or parking restriction not observed along the railway right-of-way.                                     | Install NO STOPPING signs within the railway right-of-<br>way   | Medium | Yes – Parking restriction/ NO<br>STOPPING signs installed along<br>Timberland Road |  |  |
| GCS Sections 9, 12 to 17 – Warning System Design |  |   |        |  |  |  |
| h.   | An active warning system without gates is warranted based on cross-product.                                      | Install active warning system without gates. However,<br>Transport Canada indicated that the crossing could<br>stay passive indefinitely unless the sightline<br>requirements could not be met. | Low    | No   |  |  |

## 2.2 CROSSING MODIFICATIONS

As shown in Appendix A: Site Photographs, a number of changes have occurred at the crossing between inspections. Most changes were based on recommendations outlined in the 2015 inspection. Table 1, shows what changes have been made based on the 2015 recommendations. Below is a summarised list of all the changes observed from the site inspection:

- New grade crossing signage, including;
  - RAILWAY CROSSING Signs
  - STOP Signs
  - EMERGECNY NOTIFACATION Signs
  - RAILWAY CROSSING AHEAD signs
  - o PARKING RESTRICTION Signs
- New MUTCD compliant pavement marking
  - Hatching across facility entrance.
- Vegetation in North West Quadrant increased
- Asphalt has been installed to extend the crossing 0.5m beyond the travelled way

## 2.3 ASSESSMENT AND RECOMMENDATIONS

An updated Grade Crossing Safety Assessment was undertaken for the proposed realignment of the port road access and to determine any required crossing upgrades to ensure compliance with the GCR & GCS. **Appendix B: Site Inspection Report** provides details of the observations made during the site inspection. The inspection report also outlines outstanding safety issues, along with recommended remediations. Table 2: 2020 Crossing Recommendations, summarizes the recommendations from the field investigation. Lack of sightlines is a warrant in the GSR and GCS to require installation of automatic crossing protection. The client needs to ensure that the crossing design plans, fully completed crossing plans (E-4) and full crossing safety assessment, which comply with requirements of the GCR and GCS, have been completed and filed with Canadian Transportation Agency and applicable railway.

#### Table 2: 2020 Crossing Recommendations

|          | Observations  | Suggested Actions   | Priority | Order of<br>Magnitude Cost |
|----------|---|---|----------|----------------------------|
| GCS Sect | tion 5 – Crossing Surface   |   |          |                            |
| a.       | Vertical movement of rails with in the Crossing Surface when vehicles cross.  | Undertake appropriate maintenance of the substructure of the Lo crossing surface.                                   |          | \$5000                     |
| GCS Sect | tion 7 – Sightlines   |   |          |                            |
| a.       | Clear sightline areas where drivers stopped at the<br>crossing (DSTOPPED-VEH) cannot be provided or<br>maintained due to fences and equipment on the<br>southwest and North west corners of the crossing. | Install active warning system with gates if DSTOPPED cannot be provided and maintained                              | Medium   | \$15,000                   |
| GCS Sect | tion 8 – Signs  |   |          |                            |
| a.       | RAILWAY CROSSING symbol and HATCHING pavement markings are faded.   | Repaint RAILWAY CROSSING symbol and HATCHING pavement<br>markings on road approaches as per MUTCD                   | High     | \$750                      |
| GCS Sect | tions 9, 12 to 17 – Warning System Design   |   |          |                            |
| a.       | An active warning system without gates is warranted based on Sightlines.  | Install active warning system without gates. DTM crossing activation to be implemented and coordinated with the SRY | Medium   | \$500,000                  |



# A SITE PHOTOGRAPHS

## **APPENDIX**



D - South Approach Drivers View Left

**E** - South Approach

F - South Approach Drivers View Right

## **APPENDIX**

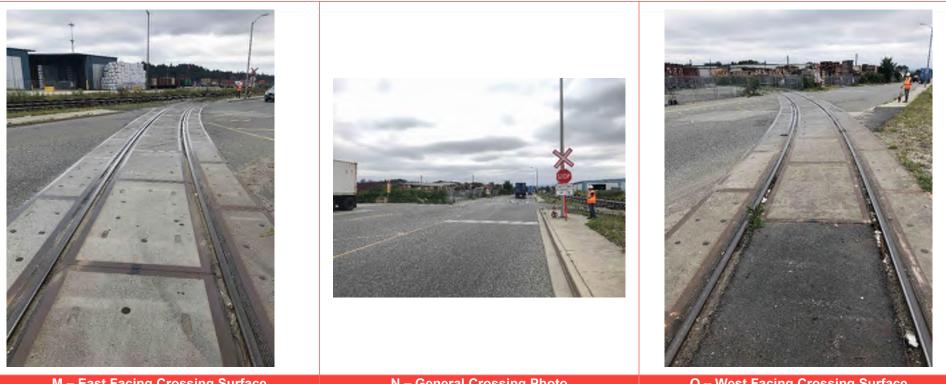


J- South Approach Drivers View Left (At Stopped Position)

K - South Approach (At Stopped Position)

L - South Approach Drivers View Right (At Stopped Position)

# **APPENDIX**



M – East Facing Crossing Surface

N – General Crossing Photo

**O – West Facing Crossing Surface** 



# B SITE INSPECTION REPORT

CANADIAN ROAD / RAILWAY GRADE CROSSING DETAILED SAFETY ASSESSMENT FIELD GUIDE (2005)\*

Appendix C2: Field Data Forms

×

Passive & Active Crossings

MileX.XX (10550 Timberland Road),SRY Rail Surrey, British Columbia For Vancouver Fraser Port Authority

|           | Legend: |   |
|-----------|---------|---|
| calculate | Formula | Spreadsheet cell has formula  |
| look up   |         | User to look up value in table or chart.  |
|           |         | User to input value here for conditional formatting or formulas in other cells to function                |
|           |         | Warning! Value beyond acceptable limits.  |
|           |         | Warning! Value beyond acceptable limits for certain conditions (i.e. for people using assistive devices). |
|           | Rail    | Information to be provided by Railway Company   |
|           | Road    | Information to be provided by Roadway Authority   |
| measure   | observe | Information to be obtained during Site Investigation  |
|           | v       | Information provided by others to be verified in the field  |

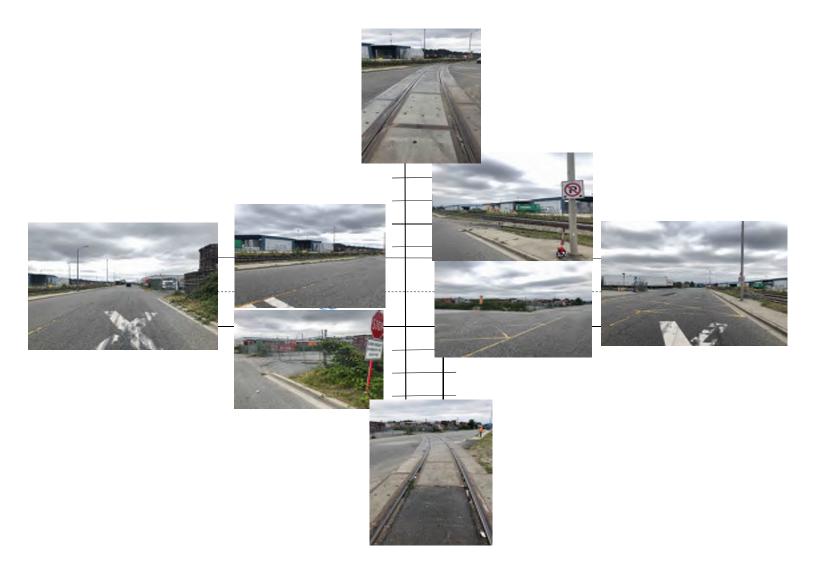
\* Updated to reflect Transport Canada's Grade Crossing Standards (GCS) July 2014 and Grade Crossing Regulations (GCR)(SOR-2014-275 Feb 2016)

| Sheet 1                 |   |                              | Grade Cr                 | ossing Safety Assessm  | ent   |   | Passive Crossings |
|-------------------------|---|------------------------------|--------------------------|--|---|---|-------------------|
| Date of Assessment:     |   | 22-Jul-20                    | <b>0</b> Site Investiga  | ation  |   |   |                   |
| Assessment Team Me      | embers & Affiliations:  | Patrick McCabe<br>Rob Sewell |                          |  |   |   |                   |
| Reason for Assessme     | nt: New Proposed I  | Pedestrian Crossing          |                          |  |   |   |                   |
|                         | periodic assessment<br>cessation of whistling<br>change in vehicle types                            | X                            | significant ch           | nange in infrastructure<br>nange in train operations<br>sions in 5yr. Period |   | significant change in road or ra<br>significant change in road or ra<br>other collision experience (see | ail speeds        |
| Railway Authority:      | Vancouver Fraser Port Authority   |                              |                          | 7  | Road Authority:                                   | Vancouver Fraser Port Autho   | rity (VFPA)       |
| Crossing Location:      | 10550 Timberland Road   |                              |                          |  | Road Name/Number:                                 | 10550 Timberland Road   |                   |
| Location Number:        | N/A   |                              |                          |  | Province:   | British Columbia  |                   |
| Municipality:           | City of Surrey, BC  |                              |                          |  | Location Reference (cont                          | rol section, etc.):   | DP Surrey Docks   |
| Railway: SRY            |   | Mile:                        | N/A                      |  | Road Classification:                              | erial, collector, local, etc):  | ULU               |
| Sub-division:           | N/A   | Spur:                        | N/                       | Ά  |   |   | 010               |
| Type of Grade Crossi    | ng [private/public; warning devices]:   | SRSC                         |                          |  | Roadway East/West (yes,<br>Roadway North/ South ( |   |                   |
| Track Type: [mainline   | e, etc.]  |                              | Yard                     |  | *Urban Local Undivided                            |   |                   |
| Collision History (5-ye | ear period): No record of ac  | citents at the subjec        | t railway cross          | ing within the past five y   |   |   |                   |
| + Person<br>+ Fatal In  | Damage collisions:<br>al Injury collisions:<br>jury Collisions:<br>ollisions in last 5 year period: |                              | NIL<br>NIL<br>NIL<br>NIL |  | of Persons Injured:<br>of Persons Killed:         | NIL NIL   |                   |

Provide Details of the collisions if available: Sources:

Sheet 2a

SCENE PHOTOGRAPHS



Sheet 2b

SCENE SKETCH

NOTE: All references to direction in this safety review are keyed to this diagram.



- Include: directions to nearby municipalities for both road & rail approaches (use arrows)
  - adjacent intersections
  - relevant road signs/signals
  - signal warning systems hardware
- landmarks
   crosswalks/paths

- geographical features

- bus stops, etc.

#### GENERAL INFORMATION

| Source  |  |      | lt         | em                                     | Reference |
|---------|--|------|------------|--|-----------|
| Rail    | Maximum Railway Operating Speed, V <sub>T</sub>            | =    | 10         | (mph)                                  |           |
| Rail    | Daily Train Volume:  | =    | 1          | (freight trains/day)                   |           |
| Ndli    |  | =    | 0          | (passenger trains/day)                 |           |
| Rail    | Switching during daytime? Y/N                              | Yes  |            | nighttime? Y/N Yes                     |           |
| Road    | Avg. Annual Daily Traffic, AADT:                           | =    | 2,390      | (vpd) Year of count: 2020              |           |
| Road    | High seasonal fluctuation in volumes?                      |      | No         |  |           |
| Road    | Pedestrian Volumes   | =    | 0          | (ped./day)                             |           |
| Road √  | Is crossing on a School Bus route?                         |      | No         |  |           |
| Road √  | Do Dangerous Goods trucks use this roadway?                |      | Yes        |  |           |
| Road    | Cyclist Volumes  | =    | 0          | (cyclists/day) Cyclist not anticipated |           |
| Road √  | Regular use of crossing by persons with Assistive Devices? |      |            | None                                   |           |
| Road √  | Other special road users?                                  | type | Unknown    | daily volume None                      |           |
| Road    | Forecasted AADT <sup>2</sup>                               | =    | 460        | (vpd) Forecasted Year: 2022            |           |
|         | Design Speed:  |      | 30         | km/h Posted Speed: <b>30</b> km/h      |           |
| Road √  | Maximum Operating Speed:                                   |      | 30         | km/h                                   |           |
|         | note: provide details if all approaches are not the same   |      |            |  |           |
| Road √  | Road Surface Type (asphalt, concrete, gravel, etc.):       |      | Asphalt    |  |           |
| observe | Surrounding Land Use (urban/rural)?:                       |      | Industrial |  |           |
| observe | Any schools, retirement homes, etc. nearby?                |      | No         |  |           |

#### Notes:

Sheet 3

1. Road Authority should provided plans if available.

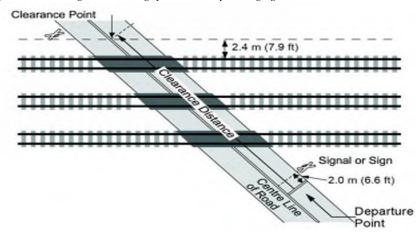
2. AADT is based upon modelled future traffic counts for the Realigned infrastrucutre.

#### From GCS Section 7.1.2:

| Column 1       | Column 2   | Column 3   |
|----------------|--|--|
| Class of Track | The maximum<br>allowable operating<br>speed for freight trains<br>is - | The maximum<br>allowable operating<br>speed for passenger<br>trains is - |
| Class 1 track  | 17 km/h (10 mph)   | 25 km/h (15 mph)   |
| Class 2 track  | 41 km/h (25 mph)   | 49 km/h (30 mph)   |
| Class 3 track  | 65 km/h (40 mph)   | 97 km/h (60 mph)   |
| Class 4 track  | 97 km/h (60 mph)   | 129 km/h (80 mph)  |
| Class 5 track  | 129 km/h (80 mph)  | 153 km/h (95 mph)  |

Figure 10-1 - Clearance Distance (cd) for Grade Crossings

(a) For Grade Crossings with a Warning System or Railway Crossing Sign

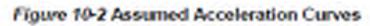


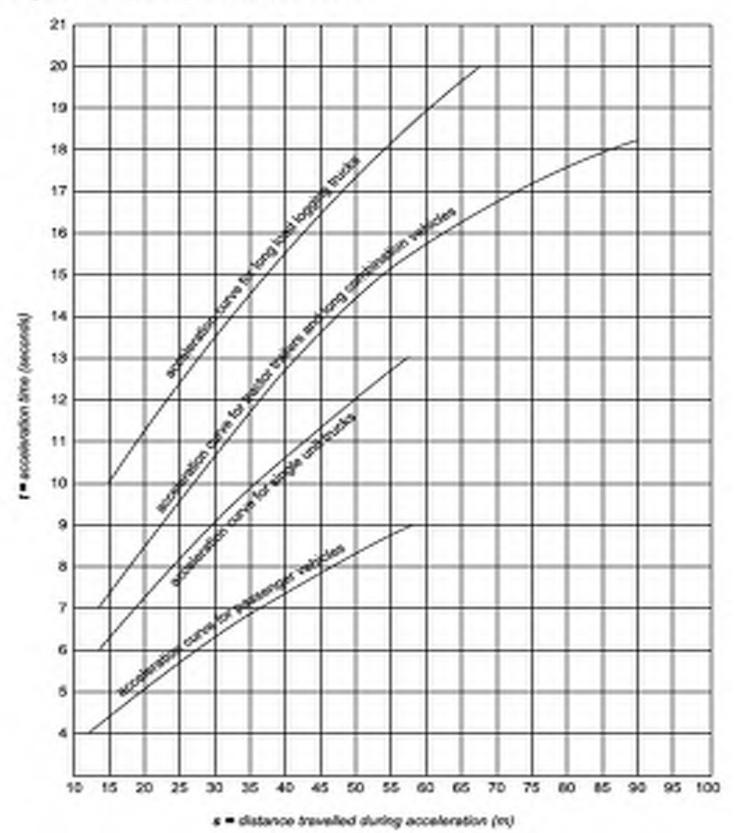
#### Grade Crossings Standards, July 2014

Table 10-1 Ratios of Acceleration Times on Grades

| Design Vehicle            | Road Grade (%) |     |     |     |     |  |  |  |  |  |
|---------------------------|----------------|-----|-----|-----|-----|--|--|--|--|--|
|                           | -4             | -2  | 0   | +2  | +4  |  |  |  |  |  |
| Passenger Car             | 0.7            | 0.9 | 1.0 | 1.1 | 1,3 |  |  |  |  |  |
| Single Unit Truck & Buses | 0.8            | 0.9 | 1.0 | 1.1 | 1.3 |  |  |  |  |  |
| Tractor-Semitrailer       | 0.8            | 0.9 | 1.0 | 1.2 | 1.7 |  |  |  |  |  |

Source: Geometric Design Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999





DESIGN CONSIDERATIONS

| Source    |  |  |                           |                   | Item                    |             |            |     |           |     | Reference       |
|-----------|--|--|---------------------------|-------------------|-------------------------|-------------|------------|-----|-----------|-----|-----------------|
|           | Design Vehicle                         |  |                           |                   |                         |             |            |     |           |     |                 |
| Road      | Type:                                  | 6                                      | WB-20 Tractor-            | emitrailers (W    | /B-20)                  |             |            |     |           |     | Table 1* SOR 57 |
| look-up   | Length, L:                             |  | 22.7                      | m                 |                         |             | SB Approad | :h  | NB Approa | ch  | Table 1*        |
| look-up   | Stopping Sight Distance, SSD           |  | 45                        | m (round to       | 1.0% of grade)          | =           | 10         | m   | 45        | m   | Table 3*        |
| measure   | Clearance Distance, cd                 |  |                           |                   |                         | =           | 26.3       | m   | 26.2      | m   | GCS 16.1.1      |
| calculate | Vehicle Travel Distance, S             |  | S= L+cd                   | 49.0              | max <                   | =           | 49.0       | m   | 48.9      | m   |                 |
| look-up   | Vehicle Departure Time, t              |  |                           |                   |                         | =           | 14.3       | sec | 14.3      | sec | GCS Figure 10-2 |
| Road √    | Road Grade Effect:                     | maximum approa                         | ch grade within 'S        | !:                |                         | =           | 0.80       | %   | 1.20      | %   | Sheet 7         |
| look-up   | grade adjustment factor (anto ca       | lc assumes Truck)( m                   | anual input from Tab      | le 10-1 if other) |                         | =           | 1.04       |     | 1.08      |     | GCS Table 10-1  |
| calculate |  | T= t x adjustment                      | factor                    |                   |                         | =           | 14.9       | sec | 15.5      | sec |                 |
|           | Design Vehicle Departure Tir           | ne, T <sub>D</sub> = J + T (whe        | re J = 2 sec (min.) perce | ption & reaction) |                         |             | 2.0        | sec | 2.0       | sec |                 |
| calculate |  | T <sub>G stop</sub> = T <sub>D</sub> = | 17.5                      | sec               |                         | <-          | 16.9       | sec | 17.5      | sec | GCS 10.3.2      |
| observe   | Do field acceleration times exce       | ed T <sub>D</sub> ?                    | Acceleration me           | asurement be      | yond the scope o        | of this ass | essment.   |     |           |     |                 |
| measure   | Pedestrian, cyclist & Assistiv         | e Devices Depar                        | ture Time                 | pedest            | rian <b>cd</b> distance | =           | 0.0        | m   | 0.0       | m   | CC5 10 2 2      |
| calculate | walking speed 1.22m/s max.             | Т <sub>Р</sub> =                       | 0.0                       | sec               | (1.0m/s used)           | <-          | 0.0        | sec | 0.0       | sec | GCS 10.3.3      |
| calculate | T <sub>SSD</sub> = (SSD+cd+L)/(0.27783 | 7 x V <sub>road design</sub> ) =       | 11.3                      | sec               |                         |             |            |     |           |     | •               |
| Comments  | Following Site Visit:                  |  |                           |                   |                         |             |            |     |           |     |                 |

#### Table 1 - Design vehicle Lengths/Class

Sheet 4

| General Vehicle Descriptions            | Length (m) |
|---|------------|
| 1. Passenger Cars, Vans and Pickups (P) | 5.6        |
| 2. Light Single-unit Trucks (LSU)       | 6.4        |
| 3. Medium Single-unit Trucks (MSU)      | 10.0       |
| 4. Heavy Single-unit Trucks (HSU)       | 11.5       |
| 5. WB-19 Tractor-Semitrailers (WB-19)   | 20.7       |
| 6. WB-20 Tractor-Semitrailers (WB-20)   | 22.7       |
| 7. A-Train Doubles (ATD)                | 24.5       |
| 8. B-Train Doubles (BTD)                | 25.0       |
| 9. Standard Single-Unit Buses (8-12)    | 12.2       |
| 10. Articulated Buses (A-BUS)           | 18.3       |
| 11. Intercity Buses (I-BUS)             | 14.0       |

#### Table 6 - Minimum Sightlines along the Rail Line (D<sub>steped</sub>) (as illustrated in Figure 3)

| Railway Design<br>Speed V,                  |            | 1  |     | Depart | ture Tim | ie (grea | ter of T <sub>d</sub> | orT_) ( | seconds |     |     | If greater of T, or T, > |  |
|---|------------|--|-----|--------|----------|----------|-----------------------|---------|---------|-----|-----|--------------------------|--|
| (mph)                                       | <u>≤10</u> | 11   | 12  | 13     | 14       | 15       | 16                    | 17      | 18      | 19  | 20  | 20 sec, add for each     |  |
| WARNING:<br>Railway design<br>speed in mph! |            | Minimum Sightlines along Rail Line (D <sub>myne</sub> )<br>(m) |     |        |          |          |                       |         |         |     |     | additional second<br>(m) |  |
| STOP  | 30         | 30   | 30  | 30     | 30       | 30       | 30                    | 30      | 30      | 30  | 30  | +0                       |  |
| 1-10  | 45         | 50   | 55  | 60     | - 65     | 70       | 72                    | 76      | 80      | 85  | 90  | +5                       |  |
| 11-20                                       | 90         | 100  | 110 | 120    | 125      | 135      | 145                   | 155     | 165     | 170 | 183 | +10                      |  |
| 21-30                                       | 135        | 150  | 165 | 175    | 190      | 205      | 215                   | 230     | 245     | 255 | 270 | +15                      |  |
| 31-40                                       | 180        | 200  | 220 | 235    | 250      | 270      | 285                   | 305     | 325     | 340 | 360 | +20                      |  |
| 41-50                                       | 225        | 250  | 270 | 290    | 315      | 335      | 360                   | 380     | 405     | -05 | 450 | +25                      |  |
| 51-60                                       | 270        | 300  | 325 | 350    | 380      | 405      | -180                  | 460     | 485     | 510 | 540 | +30                      |  |
| 61-70                                       | 315        | 350  | 380 | 415    | 445      | 470      | 505                   | 535     | 565     | 595 | 630 | +35                      |  |
| 71-80                                       | 360        | 395  | 435 | 465    | 505      | 540      | 580                   | 610     | 650     | 680 | 720 | +40                      |  |
| #1-90                                       | 405        | 46   | 490 | 535    | 530      | 605      | 650                   | 685     | 730     | 765 | 810 | +45                      |  |
| 91-100                                      | 450        | 500  | 540 | 580    | 630      | 670      | 715                   | 760     | 805     | 850 | 895 | +50                      |  |

Source: Geometric Design Guide for Canadian Roads, TAC; September 1999.

#### Table 3 – Determine SSD for Truck Class

| Road<br>Crossing<br>Design |                        |     |     |     |     |     |     | St  | oppir |     | ick Cla<br>ht Di<br>(m) |     | e (SSI | D)  |     |     |     |     |     |     |     |
|----------------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-------|-----|-------------------------|-----|--------|-----|-----|-----|-----|-----|-----|-----|-----|
| Speed V<br>(km/hr)         | Road Approach Gradient |     |     |     |     |     |     |     |       |     |                         |     |        |     |     |     |     |     |     |     |     |
| (kingini)                  | -10%                   | -9% | -8% | -7% | -6% | -5% | -4% | -3% | -2%   | -1% | 0%                      | 1%  | 296    | 3%  | 4%  | 5%  | 6%  | 7%  | 896 | 996 | 10% |
| 10                         | 10                     | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10    | 10  | 10                      | 10  | 10     | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  |
| 20                         | 26                     | 26  | 26  | 26  | 26  | 26  | 25  | 25  | 25    | 25  | 25                      | 25  | 25     | 25  | 25  | 25  | 24  | 24  | 24  | 24  | 24  |
| 30                         | 48                     | 48  | 47  | 47  | 47  | 46  | 46  | 46  | 45    | 45  | 45                      | 45  | 45     | 44  | 44  | 44  | 44  | 44  | 44  | 43  | 43  |
| 40                         | 76                     | 75  | 74  | 74  | 73  | 73  | 72  | 71  | 71    | 70  | 70                      | 70  | 69     | 69  | 68  | 68  | 68  | 67  | 67  | 67  | 67  |
| 50                         | 121                    | 120 | 118 | 117 | 116 | 115 | 114 | 113 | 112   | 111 | 110                     | 109 | 108    | 108 | 107 | 106 | 106 | 105 | 105 | 104 | 104 |
| 60                         | 149                    | 146 | 144 | 142 | 140 | 138 | 136 | 134 | 133   | 131 | 130                     | 129 | 128    | 126 | 125 | 124 | 123 | 122 | 122 | 121 | 120 |
| 70                         | 210                    | 205 | 202 | 198 | 195 | 192 | 189 | 187 | 184   | 182 | 180                     | 178 | 176    | 175 | 173 | 171 | 170 | 169 | 167 | 166 | 165 |
| 80                         | 252                    | 246 | 241 | 236 | 231 | 227 | 223 | 219 | 216   | 213 | 210                     | 207 | 205    | 202 | 200 | 198 | 196 | 194 | 192 | 191 | 189 |
| 90                         | 318                    | 311 | 304 | 297 | 292 | 286 | 281 | 277 | 273   | 269 | 265                     | 262 | 258    | 255 | 252 | 250 | 247 | 245 | 243 | 240 | 238 |
| 100                        | 401                    | 391 | 382 | 373 | 365 | 358 | 352 | 346 | 340   | 335 | 330                     | 325 | 321    | 317 | 314 | 310 | 307 | 304 | 301 | 298 | 295 |
| 110                        | 455                    | 441 | 428 | 417 | 406 | 397 | 388 | 380 | 373   | 366 | 360                     | 354 | 349    | 344 | 339 | 334 | 330 | 326 | 322 | 319 | 315 |

\* Source: Transport Canada's "Determining Minimum Sightlines at Grade Crossings: A Guide for Road Authorities and Railway Companies"

LOCATION of GRADE CROSSING

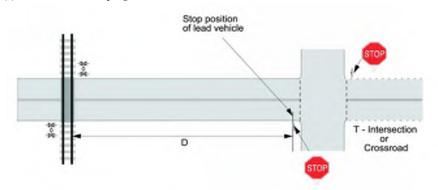
| GCS Section 9.1 |
|-----------------|
|                 |
|                 |
|                 |
|                 |
| -               |

Comments Following Site Visit:

- The minimum "D" dimension to the edge of the entrance to facility in South approach. The North approach "D" is 20.5m - RAILWAY CROSSING AHEAD sign installed from previous inspection (2015)

- Railwayspeed = 10mph

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

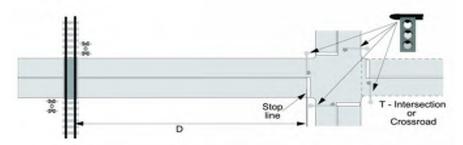
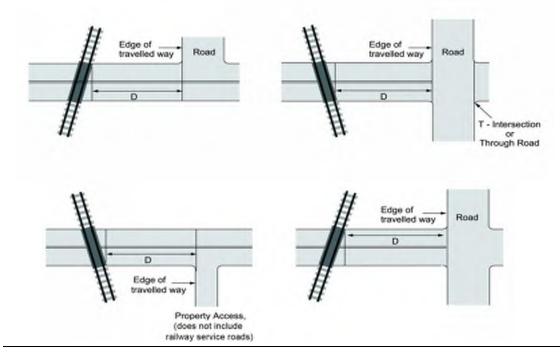


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings



Sheet 5

#### GRADE CROSSING SURFACE

Sheet 6

| ce   |   |  |  |   | tem  |  |   |   |  | Referenc   |
|--|---|--|--|---|--|--|---|---|--|--|
| ve   | Is the crossir  | ng smooth enough to allow road vehicles, p   | edestrians, cyclis   | sts, and other re   | oad users to c                             | ross at their  | normal speed  | without cons                              | equence?   | 50D 60-60  |
|  |   | Ye   | es   |   |  |  |   |   |  | SOR 60; GC   |
| ve   | Grade Cross   | ing Surface Material: As   | sphalt   |   |  |  |   |   |  | SOR 60; GC   |
| ve   |   | •  | air  |   |  |  |   |   |  | 30K 00; GC   |
|  |   |  | shpalt   |   |  |  |   |   |  |  |
| ve   |   |  | air  |   |  |  |   |   |  | SOR 60; GC   |
|  | Roadway Illi  | umination?: Ye   | es   |   |  |  |   |   |  |  |
|  |   |  |  | SB Approach   |  |  | NB Approad  | h   |  |  |
| _  |   | e crossing width (perp. C.L. min. = 8.0m)  |  |   | 12.8                                       | m  |   | _   |  | GCS 5.1  |
| ire  |   | e extension beyond travel lanes (min. = 0.5m   | n)   | 0.5   | m  |  | 1.0   | m   |  | GCS 5.1  |
| ire  | Sidewalk/Pa   | th/Trail crossing width (min. = 1.5m)  |  | -   | NA   | m  | 1.8   | m   | Crosswalk on NB only   | GCS 5.1  |
| ire  | -   | th/Trail extension beyond sidewalk (min. =   | 0.5m)  | NA  | m  |  | 0.5   | m   | Crosswalk on NB only   | GCS 5.1  |
| ire  | Distance Be   | tween Travel Lane and C.L. of Trail  |  |   | 1.0  | m  |   |   |  |  |
| _  | Cross-Section   |  |  |   | South (Rig                                 | ht) Rail:  |   | North (Lef                                |  | GCS Table !  |
|  |   | vidth (min. = 65mm; max.= 120mm or 75mm <sup>1</sup> )   |  |   | 63   | mm   |   | 65  | mm   | GCS Table !  |
| _  | • •   | lepth (min. = 50mm; max.= no limit or 75mm <sup>1</sup> )  |  |   | 50   | mm   |   | 50  | mm   | GCS Table !  |
| _  | Rural Field S   |  |  |   | -  |  |   | -   |  | GCS Table !  |
|  |   | dth (max.= 120mm or 0 <sup>1</sup> )   |  |   | 3  | mm   |   | 2   | mm   | GCS Table !  |
| _  |   | pth (max.= no limit or 0 <sup>1</sup> )  |  |   | 10   | mm   |   | 10  | mm   | GCS Table !  |
|  | Wear Limits   |  |  |   | _  | -  |   | _   |  | GCS Table !  |
|  |   | Top Rail above road surface (max. = 13mm <sup>1</sup> ,  |  |   | 12   | mm   |   | 10  | mm   | GCS Table !  |
|  |   | Top Rail below road surface (min. = -7mm <sup>1</sup> ,-2  | 25mm, or -50mm)  |   | 0  | mm   |   | 0   | mm   | GCS Table !  |
|  | Following Si  | sons using assistive devices   |  |   |  |  |   |   |  |  |
| e Ci   |   | tandards, July 2014  | grade and rail supere  | elevation   | 1  |  | ress of roadway a   |   | -photos  |  |
| e Ci   | rossings \$   |  | grade and rail supere  | elevation   | 10   | Figure 5   | -1 - Grade (  | Crossing Su                               |  | -  |
| e Ci<br>5-1  | rossings \$   | tandards, July 2014  | grade and rail supere  | elevation   | 1  | Figure 5   |   | Crossing Su                               | urface Dimensions  | -  |
| e Ci<br>5-1  | rossings \$<br>- Grade Ci   | tandards, July 2014  | grade and rail supere  | elevation<br>65 mm  | 1  | Figure 5   | -1 - Grade (  | Crossing Su                               |  | -  |
| e Ci<br>5-1  | rossings \$<br>– Grade Ci<br>Flangeway:   | itandards, July 2014<br>rossing Surface – Cross Section  | grade and rail supere  |   | Edge                                       | Figure 5<br>Road, inc<br>of shoulder   | -1 - Grade (<br>duding a path   | Crossing Su                               | Edge of<br>travelled way   |  |
| e Ci<br>5-1  | rossings \$<br>– Grade Ci<br>Flangeway:   | itandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:   |  |   | Edge                                       | Figure 5   | -1 - Grade (<br>duding a path   | Crossing Su                               | rface Dimensions   |  |
| e Ci<br>5-1  | rossings \$<br>– Grade Ci<br>Flangeway:   | itandards, July 2014<br>rossing Surface – Cross Section<br>Minimum   | ed by the road   |   | Edge                                       | Figure 5<br>Road, inc<br>of shoulder   | -1 - Grade (<br>duding a path   | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyon  |  |
| e Ci<br>5-1  | rossings \$<br>– Grade Ci<br>Flangeway:   | ttandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designate  | ed by the road   | 65 mm   | Edge                                       | Figure 5<br>Road, inc<br>of shoulder   | -1 - Grade (<br>duding a path   | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe   |  |
| e Ci<br>5-1  | rossings \$<br>– Grade Ci<br>Flangeway:   | ttandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designate<br>authority for use by persons using assistiv   | ed by the road   | 65 mm<br>75 mm  | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>( railway ties<br>or more  | -1 - Grade (  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe   |  |
| e Ci<br>5-1  | rossings 5<br>– Grade Ci<br>Flangeway:<br>Width   | tandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designate<br>authority for use by persons using assistiv<br>All other grade crossings   | ed by the road   | 65 mm<br>75 mm<br>120 mm  | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>f railway bes<br>or more<br>d shoulder   | -1 - Grade (  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder  |  |
| e Ci<br>5-1  | rossings 5<br>– Grade Ci<br>Flangeway:<br>Width   | tandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designate<br>authority for use by persons using assistiv<br>All other grade crossings<br>Minimum<br>Maximum for:  | ed by the road<br>re devices   | 65 mm<br>75 mm<br>120 mm  | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>f railway bes<br>or more<br>d shoulder   | -1 - Grade (  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder  |  |
| e Ci<br>5-1  | rossings 5<br>– Grade Ci<br>Flangeway:<br>Width   | tandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designate<br>authority for use by persons using assistiv<br>All other grade crossings<br>Minimum  | ed by the road<br>we devices   | 65 mm<br>75 mm<br>120 mm  | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>f railway bes<br>or more<br>d shoulder   | -1 - Grade (  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder  |  |
| e Ci<br>5-1  | rossings 5<br>– Grade Ci<br>Flangeway:<br>Width   | tandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designate<br>authority for use by persons using assistiv<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designa  | ed by the road<br>we devices   | 65 mm<br>75 mm<br>120 mm<br>50 mm   | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>f railway bes<br>or more<br>d shoulder   | -1 - Grade (  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder<br>Crossing surface                                |  |
| e Ci   | rossings 5<br>– Grade Ci<br>Flangeway:<br>Width   | tandards, July 2014<br>rossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designate<br>authority for use by persons using assistiv<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designate<br>authority for use by persons using assistiv<br>All other grade crossings  | ed by the road<br>we devices   | 65 mm<br>75 mm<br>120 mm<br>50 mm   | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>f railway bes<br>or more<br>d shoulder   | -1 - Grade (  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Rahway<br>Crossing          | ne<br>Oño  |
| e Ci   | - Grade Ci<br>Flangeway:<br>Width<br>Depth  | Minimum Maximum for: Public sidewalks, paths and trails designate authority for use by persons using assistly All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designate authority for use by persons using assistly All other grade crossings Hinde on the outer side of the rail at rural lo  | ed by the road<br>re devices<br>ned by the road<br>re devices  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public   | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>f railway bes<br>or more<br>d shoulder   | -1 - Grade (  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder<br>Crossing surface                                | ne<br>Año  |
| e Ci   | - Grade Ci<br>Flangeway:<br>Width<br>Depth  | Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designate<br>authority for use by persons using assistiv<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designate<br>authority for use by persons using assistiv<br>All other grade crossings<br>authority for use by persons using assistiv<br>All other grade crossings  | ed by the road<br>re devices<br>ned by the road<br>re devices  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public   | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>f railway bes<br>or more<br>d shoulder   | -1 - Grade (  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Rahway<br>Crossing          | ne<br>Oño  |
| e Ci   | - Grade Ci<br>Flangeway:<br>Width<br>Depth<br>Depth   | Minimum Maximum for: Public sidewalks, paths and trails designate authority for use by persons using assistly All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designate authority for use by persons using assistly All other grade crossings Hinde on the outer side of the rail at rural lo  | ed by the road<br>re devices<br>ned by the road<br>re devices  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public   | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>f railway bes<br>or more<br>d shoulder   | -1 - Grade (  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Rahway<br>Crossing          | ne<br>Oño  |
| (b)  | - Grade Ci<br>Flangeway:<br>Width<br>Depth<br>Depth   | tandards, July 2014<br>cossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designate<br>authority for use by persons using assistiv<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designate<br>authority for use by persons using assistiv<br>All other grade crossings<br>All other grade crossings<br>Public sidewalks, paths and trails designate<br>authority for use by persons using assistiv<br>All other grade crossings<br>Public sidewalks of the rail at rural loss or trails designated by the road authority<br>Public sidewalks of the rail at rural loss or trails designated by the road authority is  | ed by the road<br>re devices<br>ned by the road<br>re devices  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>No limit<br>or public<br>ne ublic   | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>f railway bes<br>or more<br>d shoulder   | -1 - Grade (  | Crossing Su                               | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Rahway<br>Crossing          |  |
| e C1<br>δ-1<br>a)<br>(b)<br>A:1<br>asid<br>asid<br>asid<br>asid<br>asid<br>asid<br>Th  | - Grade Ci<br>Flangeway:<br>Width<br>Depth<br>) Field side (<br>space is period<br>space is period<br>space is period<br>() Elevation of<br>the top of the c  | tandards, July 2014  ossing Surface – Cross Section  Minimum Maximum for:  Public sidewalks, paths or trails designate authority for use by persons using assistiv All other grade crossings Minimum Maximum for:  Public sidewalks, paths and trails designate authority for use by persons using assistiv All other grade crossings  public do the outer side of the rail at rural los or trails designated by the road authority  Maximum width Maximum width Maximum depth  f the top of the rail with respect to the cor  rossing surface must be installed as close.   | ed by the road<br>we devices<br>fied by the road<br>we devices<br>cations, except th<br>for use by person<br>rossing surface   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>50 mm<br>No limit<br>No limit<br>No limit  | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>(railway bes<br>or more<br>d shoulder w<br>s one   | -1 - Grade (  | Crossing Su<br>n or trail                 | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>Sign | ne<br>Oño  |
| e Ci<br>5-1<br>a)<br>(b)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>(c)<br>5-1<br>(c)<br>(c)<br>(c)<br>(c)<br>(c)<br>(c)<br>(c)<br>(c)   | - Grade Ci<br>Flangeway:<br>Width<br>Depth<br>) Field side (<br>space is perm<br>sistive device<br>) Elevation o<br>e top of the ci<br>i within the w   | tandards, July 2014 rossing Surface – Cross Section Minimum Maximum for: Public sidewalks, paths or trails designate authority for use by persons using assistly All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designate authority for use by persons using assistly All other grade crossings Hold on the outer side of the rail at rural los s or trails designated by the road authority Maximum width Maximum depth f the top of the rail with respect to the cr   | ed by the road<br>we devices<br>fied by the road<br>we devices<br>cations, except th<br>for use by person<br>rossing surface   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>50 mm<br>No limit<br>No limit<br>No limit  | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>(railway bes<br>or more<br>d shoulder w<br>s one   | -1 - Grade (<br>duding a path<br>there  | Crossing Su<br>n or trail                 | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign | or Wat   |
| e Ci<br>5-1<br>a)<br>(b)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>5-1<br>(c)<br>(c)<br>5-1<br>(c)<br>(c)<br>(c)<br>(c)<br>(c)<br>(c)<br>(c)<br>(c) | - Grade Ci<br>Flangeway:<br>Width<br>Depth<br>) Field side (<br>space is pen<br>dewalks, path<br>subtre device<br>) Elevation o<br>is sop of the o<br>i within the w<br>ear limits:   | tandards, July 2014 rossing Surface – Cross Section Minimum Maximum for: Public sidewalks, paths or trails designate authority for use by persons using assistly All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designate authority for use by persons using assistly All other grade crossings Public sidewalks, paths and trails designate authority for use by persons using assistly All other grade crossings Public sidewalks of the rail at rural los s or trails designated by the road authority is Maximum width Maximum depth f the top of the rail with respect to the or mossing surface must be installed as close tear limits below.   | ed by the road<br>re devices<br>ned by the road<br>re devices<br>cations, except %<br>for use by person<br>rossing surface<br>as possible to the   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>50 mm<br>No limit<br>or public<br>ns using<br>120 mm<br>No limit<br>e top of the                                 | Edge<br>End o                              | Figure 5<br>) Road, inc<br>of shoulder<br>f railway bes<br>or more<br>d shoulder w<br>s one<br>(b) Sk  | dewalk, path.   | Vieth<br>or trail along<br>walk, peth, or | Edge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign | or water sign of the sign of t |
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Sheet 7

#### **ROAD GEOMETRY**

| Source       |  |                     | lt                               | em       |          |      |                             |              | Reference           |  |
|--------------|--|---------------------|----------------------------------|----------|----------|------|-----------------------------|--------------|---------------------|--|
| observe      | Are horizontal and vertical alignments smooth and  | continuous throu    | ghout SSD?                       |          |          |      |                             |              | Sheet 4             |  |
| Observe      | WB Approach: Yes   |                     | EB Approach                      | Sileet 4 |          |      |                             |              |                     |  |
| observe      | Is horizontal alignment straight beyond rails for a distance ≥ design vehicle length, L? |                     |                                  |          |          |      |                             |              |                     |  |
| Observe      | WB Approach: Yes EB Approach: Yes  |                     |                                  |          |          |      |                             |              |                     |  |
| observe      | Are the road lanes at least the same width on the c                                      | rossing as on the   | road approaches                  | s?       |          |      |                             |              |                     |  |
| Observe      | WB Approach: Yes   |                     | EB Approach                      | : Yes    |          |      |                             |              |                     |  |
|              | Grades   |                     | SB Approach                      |          | NB Appro | ach  | Difference: rail e & rd gra | de (GCS 6.1) | GCS Sect. 6         |  |
| measure      | Slope within 8m of nearest rail (max. = 2%)  |                     | 1.20                             | %        | 1.00     | %    | <b>0.60%</b> %              | 0.50%        | Diff in Grade Max   |  |
| measure      | Slope between 8m & 18m of nearest rail (max. = 5%)                                       |                     | 0.80                             | %        | 1.20     | %    |                             |              | 3%                  |  |
|              | If crossing is only for pedestrians, cyclists, or persor                                 | s using assistive o | devices (max. = 1 <sup>1</sup> c | or 2%):  | -        |      |                             |              |                     |  |
| measure      | slope within 5m of nearest rail =  |                     | N/A                              | %        | N/A      | %    |                             |              |                     |  |
| Road √       | General approach grade (max. = +/- 5%)   |                     | 1.00                             | %        | 1.00     | %    |                             |              |                     |  |
| KOdu v       | measured over the SSD distance of:   |                     | 10                               | m        | 45       | m    |                             |              | Sheet 4             |  |
| Rail √       | Are rail tracks super-elevated?  | No                  | Rate of s/e:                     | 0.00     | m/m Sdg  | 0.00 | m/m ML                      |              | GCS Sect. 6.1 & 6.2 |  |
| Deeder       | If train speeds exceed 15mph (70° minimum w/o warning                                    | system; 30° minimum | with warning system              | ):       |          |      |                             |              |                     |  |
| Road √       | What is the angle between the crossing and the roa                                       | dway?               | =                                | 150.0    | degrees  |      |                             |              |                     |  |
| observe      | Condition of Road Approaches:  | Fair.               |                                  |          |          |      |                             |              | SOR 60              |  |
| observe      | (e.g., anything that might affect stopping or acceleration)                              |                     |                                  |          |          |      |                             |              |                     |  |
| observe      | NA   |                     |                                  |          |          |      |                             |              |                     |  |
| 1. If freque | nt use by persons using assistive devices  |                     |                                  |          |          |      |                             |              |                     |  |
| Comments     | Following Site Visit:  |                     |                                  |          |          |      |                             |              |                     |  |

nts Following Site Visit:

"Leg Urbar

#### Minor cracks within both approaches. Roadway hatch marking and RAILWAY AHEADSymbols need repainting.

#### Grade Crossings Standards, July 2014

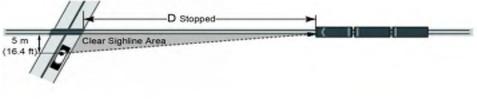
#### Table 6-1 - Difference in Gradient

|           | Classificatio      | Differ           | ence in Gradier | nt (%)         |      |
|-----------|--------------------|------------------|-----------------|----------------|------|
|           | RLU                |                  | 2               |                |      |
|           | RCU                |                  | 1               |                |      |
|           | RCD                |                  | 1               |                |      |
|           | RAU                |                  | 0               |                |      |
|           | RAD                |                  | 0               |                |      |
|           | RFD                |                  | -               |                |      |
|           | ULU                |                  | 3               |                |      |
|           | UCU                |                  | 2               |                |      |
|           | UCD                |                  | 2               |                |      |
|           | UAU                |                  | 0               |                |      |
| id<br>(U) | Rural (R) Local () | .) Collector (C) | Arterial(A)     | Expressway (E) | Free |
|           | Divided (D)        |                  |                 | Undivided (U)  |      |

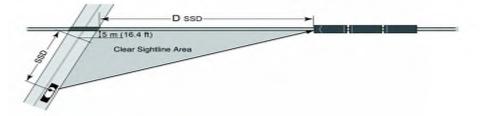
Source: Geometric Derign Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999

#### Figure 7-1 - Minimum Sightlines - Grade Crossings

(a) Sightlines for Users Stopped at a Grade Crossing (applicable to all quadrants)



(b) Sightlines for Users Approaching Grade Crossing (applicable to all quadrants)



#### Sheet 8

SIGHTLINES

| Driver Eye Height | = | 1.05m | passenger vehicles, pedestrians, cyclists & assistive devices |  |
|-------------------|---|-------|---|--|
|                   | = | 1.80m | buses & straight trucks                                       |  |
|                   | = | 2.10m | large trucks & tractor-trailers                               |  |
| Target Height     | = | 1.20m | above rails   |  |
|                   |   |       |   |  |

| Source    | Item  |               |   |             |                   |            |        |                             |
|-----------|---|---------------|---|-------------|-------------------|------------|--------|-----------------------------|
| observe   | Are sightlines within the rail R.O.W. clear of bushes/vegetation; 15 m on each side of the track and, 30 m along the track, on each side of the crossing? |               |   |             |                   |            |        |                             |
| Observe   | if no, detail the location Yes  |               |   |             |                   |            |        |                             |
| observe   | Are sightlines on the road R.O.W. withi   | n 15m of th   | e rail crossing clear of bushes/veget                 | tation?     |                   |            |        |                             |
| Observe   | -if no, detail the location Yes   |               |   |             |                   |            |        |                             |
|           |   |               |   | SB Approa   | ch                | NB Approad | ch     |                             |
| look-up   | SSD minimum =   |               |   | 10          | m                 | 45         | m      | Sheet 4                     |
| measure   | SSD Actual (not including turning movements):   |               |   | 250.0       | m                 | 250.0      | m      |                             |
| calculate | D <sub>SSD</sub>  | =             | 0.277837 x V <sub>train km/h</sub> x T <sub>SSD</sub> | 50          | m                 | 50         | m      | 1.609 convert mph to km/h   |
| calculate | D <sub>STOPPED</sub> minimum (m)  | =             | 0.277837 x V <sub>train km/h</sub> x T <sub>D</sub> = | 76          | m                 | 78         | m      | T <sub>D</sub> from Sheet 4 |
| measure   | D <sub>STOPPED</sub> Actual:  |               | Driver looking LEFT                                   | 15          | m (ne)            | 60         | m (sw) |                             |
| measure   |   |               | Driver looking RIGHT                                  | 200         | m (nw)            | 200        | m (se) |                             |
| calculate | Ped./Cyclist D <sub>STOPPED</sub> (m)   |               |   | 0           | m                 | 0          | m      | T <sub>P</sub> from Sheet 4 |
|           | Ped./Cyclist D <sub>STOPPED</sub> Actual:   |               | Person looking LEFT                                   | N/A         | m                 | N/A        | m      |                             |
| measure   | note: measured from a point 2m in advance of sign   | n/signals     | Person looking RIGHT                                  | N/A         | m                 | N/A        | m      |                             |
| observe   | Are there any obstacles within the sigh   | t triangles c | ther than traffic signs/utility poles t               | hat might a | ffect visibility? |            | -      |                             |
| observe   | Fencing and equipment wi  | ithin facilit | y.  |             |                   |            |        |                             |

b)

**Comments Following Site Visit:** 

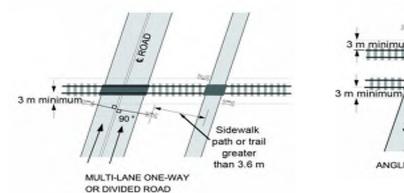
a)

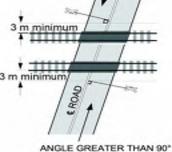
- Fencing and equipment blocks sightlines in the North West and South West Quadrants

- Clear Sightlines where drivers stop.

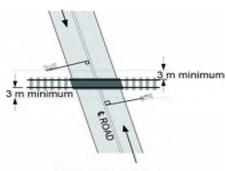
-can sightlines be maintained on an ongoing basis? (snow)

Figure 8-3 - Location of Railway Crossing Signs and Number of Tracks Signs (public grade crossings without warning systems)



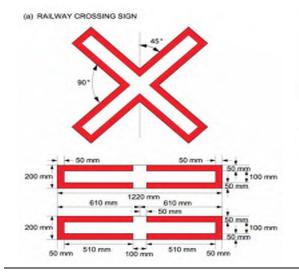


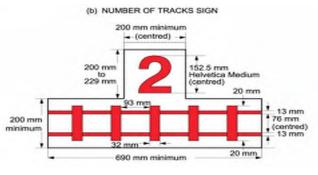
-photos



ANGLE 90° OR LESS

#### Figure 8-1 - Railway Crossing Sign and Number of Tracks Sign

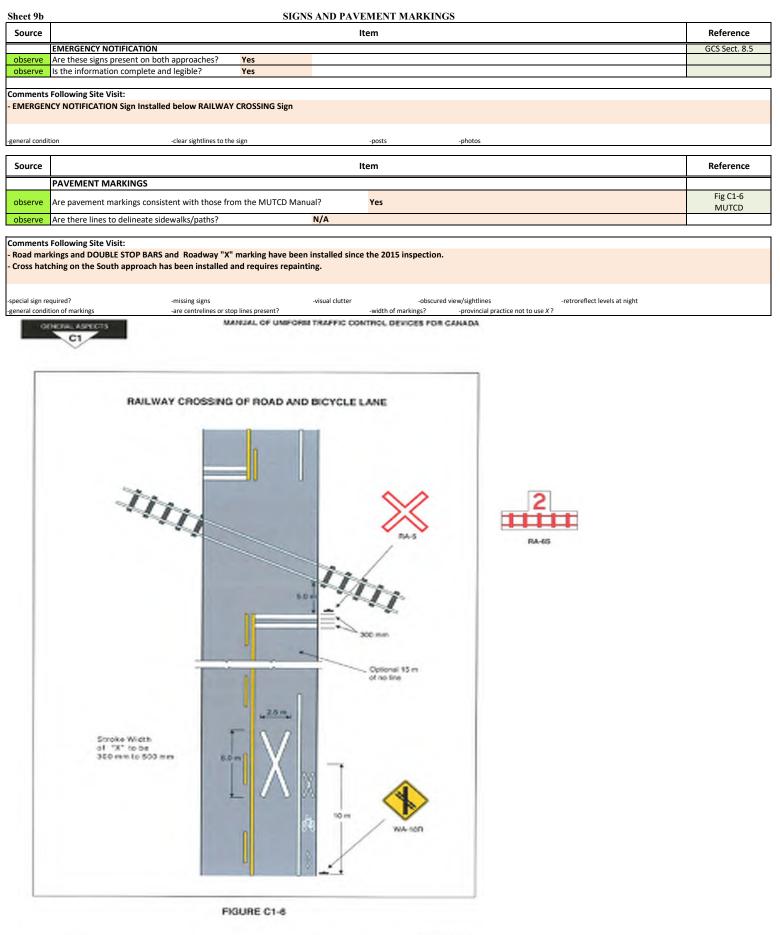




SIGNS AND PAVEMENT MARKINGS

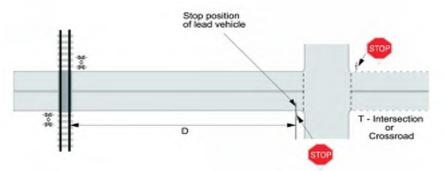
Sheet 9a

| Source   |   | Ite   | em             |  |             |        |            | Reference   |
|--|---|---|----------------|--|-------------|--------|------------|---|
|  | Railway Crossing Sign   | $\sim$  |                |  |             |        |            | MUTCD   |
|  |   |   |                | ns will be required                        |             |        |            |   |
|  | dictor on from popyost will   |   | NB Approach    |  |             |        |            |   |
| measure<br>measure   | distance from nearest rail:<br>distance from edge of road:  | 12.5 m<br>1.0 m   |                | m<br>m                                     |             |        |            |   |
| measure  | height of centre of crossbucks:   | 3.5 m   |                | m  |             |        |            |   |
| measure  | retroreflectivity readings:   | N/A cd/lux/m <sup>2</sup>   | N/A            | cd/lux/m <sup>2</sup>                      |             |        |            |   |
| observe  | Number of Tracks sign? No   |   |                | · ·  |             |        |            |   |
| observe  | A Stop Sign must be installed at grade crossing without a wa  |   |                |  | Yes/ No/ NA | Yes    |            | SOR 64  |
| observe  | A Stop Ahead sign must be installed if the Stop Sigr  | is not clearly visable within the St  | topping Distan | ce   | Yes/ No/ NA | N/A    |            | SOR 65  |
|  | Following Site Visit:   |   |                |  |             |        |            |   |
|  | WAY CROSSING signs installed in 2017.<br>of poles and signs only have partial reflective strip:   | (reflectivity net measured)   |                |  |             |        |            |   |
|  | OF TRACKS Sign not required as only 1 track.  | (renectivity not measured).   |                |  |             |        |            |   |
| -general condit  |   | gn  | -posts         | -photos                                    |             |        |            |   |
|  |   |   |                |  |             |        |            |   |
| Source   |   | Ite   | em             |  |             |        |            | Reference   |
|  | DO NOT STOP ON TRACKS   | -   |                |  |             |        |            |   |
|  |   | 1   |                |  |             |        |            |   |
|  |   |   |                |  |             |        |            |   |
|  | $\smile$  | 1   |                |  |             |        |            | MUTCD   |
|  | ***   | 1   |                |  |             |        |            |   |
|  |   | J   |                |  |             |        |            |   |
|  | ris-03  |   |                |  |             |        |            |   |
| Road √   | Does queued traffic routinely encroach closer than  | 5m from the crossing surface?   |                | No   |             |        |            |   |
| observe  | Are these signs present on either approach?   |   |                | No   |             |        |            |   |
| Comments   | Following Site Visit:   |   |                |  |             |        |            |   |
| - DO NOT S   | TOP ON TRACKS Sign not installed.   |   |                |  |             |        |            |   |
|  |   |   |                |  |             |        |            |   |
|  |   |   |                |  |             |        |            |   |
| -general condit  | tion -posts   | -photos   |                |  |             |        |            |   |
|  |   |   |                |  |             |        |            |   |
|  | [   |   |                |  |             |        |            |   |
| Source   |   | It  | em             |  |             |        |            | Reference   |
| Source   | Railway Crossing Ahead Sign (WA 18-20)  |   | em             |  |             |        |            | Reference<br>MUTCD & SOR 66   |
| Source   | Railway Crossing Ahead Sign (WA 18-20)  | -   | em             | ULLIS?                                     | WA-25R      |        |            |   |
| Source   | Railway Crossing Ahead Sign (WA 18-20)<br>Is AADT > 100? Yes  |   |                |  |             |        |            |   |
| look-up<br>observe   | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?  | Value Ves   | SB Approach    | NB Approach<br><mark>Yes</mark>            |             |        |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>measure  | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign  | Yes<br>= 80   | SB Approach    | NB Approach<br>Yes<br>m 57.0               |             |        |            | MUTCD & SOR 66  |
| look-up<br>observe<br>measure<br>observe   | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:   | -         Yes           -         80           2.5         2.5  | SB Approach    | MB Approach<br>Yes<br>m 57.0<br>2.5        |             |        |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>measure  | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign  | Yes<br>= 80   | SB Approach    | NB Approach<br>Yes<br>m 57.0               |             |        |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>measure<br>observe<br>observe<br>Comments<br>- RAILWAY   | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 57m<br>proach Sign obscured by vegetation.   | Yes       =     80       2.5       Yes  | SB Approach    | MB Approach<br>Yes<br>m 57.0<br>2.5        | m           | photos |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>measure<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- North App  | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 57m<br>proach Sign obscured by vegetation.   | Yes<br>= 80<br>2.5<br>Yes<br>e previous inspection.<br>from crossing. (North approach)<br>gn  | SB Approach    | NB Approach<br>Yes<br>m 57.0<br>2.5<br>Yes | m           | photos |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- North App<br>general condit   | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 57m<br>proach Sign obscured by vegetation.   | Yes<br>= 80<br>2.5<br>Yes<br>e previous inspection.<br>from crossing. (North approach)<br>gn  | -posts         | NB Approach<br>Yes<br>m 57.0<br>2.5<br>Yes | m           | photos | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD  |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- North App<br>general condit   | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 57m<br>broach Sign obscured by vegetation.<br>tion -clear sightlines to the si   | Yes<br>= 80<br>2.5<br>Yes<br>e previous inspection.<br>from crossing. (North approach)<br>gn  | -posts         | NB Approach<br>Yes<br>m 57.0<br>2.5<br>Yes | m           | photos | 30<br>km/h | MUTCD & SOR 66 Sheet 3 MUTCD MUTCD Reference                                    |
| look-up<br>observe<br>observe<br>observe<br>RAILWAY<br>- RAILWAY<br>- North App<br>-general condit   | Is AADT > 100? Yes Is area urban such that WA 18-20 is <u>not</u> required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since th CROSSING AHEAD Sign installed Min. Approx 57m proach Sign obscured by vegetation. ton clear sightlines to the si ADVISORY SPEED SIGN Are they present on both approaches?  | Yes<br>= 80<br>2.5<br>Yes<br>Previous inspection.<br>from crossing. (North approach)<br>gn<br>It  | -posts         | NB Approach<br>Yes<br>m 57.0<br>2.5<br>Yes | m           | photos | 30<br>km/h | MUTCD & SOR 66 Sheet 3 MUTCD MUTCD Reference                                    |
| look-up<br>observe<br>observe<br>observe<br>RAILWAY<br>RAILWAY<br>North App<br>general condit<br>Source  | Is AADT > 100? Yes Is area urban such that WA 18-20 is <u>not</u> required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since the CROSSING AHEAD Sign installed Min. Approx 57m proach Sign obscured by vegetation. ion clear sightlines to the si ADVISORY SPEED SIGN Are they present on both approaches? Posted speed limit?   | Yes<br>Previous inspection.<br>from crossing. (North approach)<br>Provide the second | -posts         | NB Approach<br>Yes<br>m 57.0<br>2.5<br>Yes | m           | photos | 30<br>km/h | MUTCD & SOR 66  Sheet 3  MUTCD  MUTCD  Reference  MUTCD & SOR 66 (2)  check SSD |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>- North App<br>-general condit<br>Source<br>observe<br>look-up<br>Comments | Is AADT > 100? Yes Is area urban such that WA 18-20 is <u>not</u> required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since the CROSSING AHEAD Sign installed Min. Approx 57m proach Sign obscured by vegetation. ion clear sightlines to the si ADVISORY SPEED SIGN Are they present on both approaches? Posted speed limit? Are they required on either approach?   | Yes       =     80       2.5     Yes   Previous inspection. from crossing. (North approach) gn It No N/A km/h No  | -posts         | NB Approach<br>Yes<br>m 57.0<br>2.5<br>Yes | m           | photos | 30<br>km/h | MUTCD & SOR 66  Sheet 3  MUTCD  MUTCD  Reference  MUTCD & SOR 66 (2)  check SSD |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>- North App<br>-general condit<br>Source<br>observe<br>look-up<br>Comments | Is AADT > 100? Yes Is area urban such that WA 18-20 is <u>not</u> required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since the CROSSING AHEAD Sign installed Min. Approx 57m broach Sign obscured by vegetation. ion clear signtlines to the si ADVISORY SPEED SIGN Are they present on both approaches? Posted speed limit? Are they required on either approach? Following Site Visit: (SPEED Sign installed on the North approach only) | Yes       =     80       2.5     Yes   Previous inspection. from crossing. (North approach) gn It No N/A km/h No  | -posts         | NB Approach<br>Yes<br>m 57.0<br>2.5<br>Yes | m           | photos | 30<br>km/h | MUTCD & SOR 66  Sheet 3  MUTCD  MUTCD  Reference  MUTCD & SOR 66 (2)  check SSD |



JANUARY 2016

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

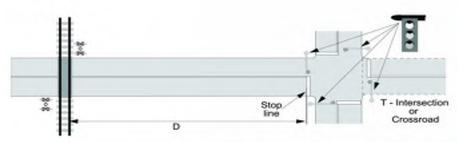
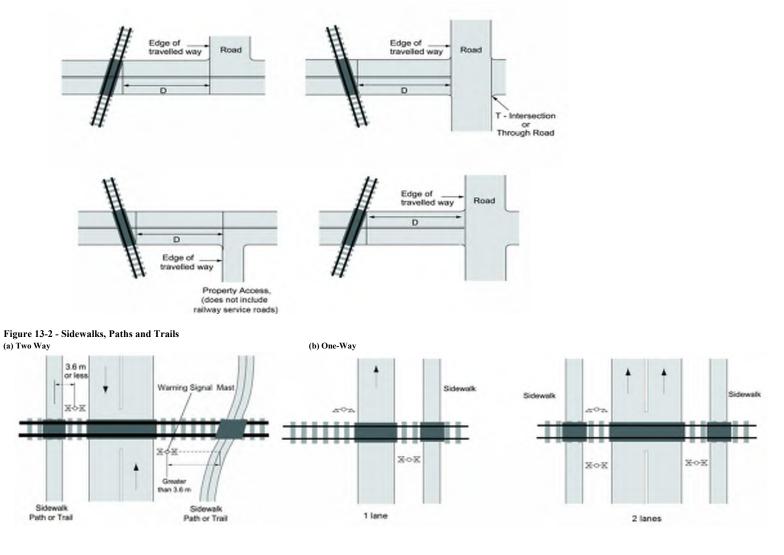


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings





| Sheet 11  |   | GRAD                  | E CROSSI      | NG WARNING S                              | SYSTEM | AS   |  | H.             |                              | GCS Section 9     |
|-----------|---|-----------------------|---------------|---|--------|--|--|----------------|------------------------------|-------------------|
| Source    |   | Item is not required. |               |   |        |  |  |                | Reference                    |                   |
|           | Warning System Warrants   |                       |               |   |        |  |  |                |                              |                   |
|           | if any of A through E below are met, then a war                                 | ning system is warra  | nted          |   |        |  |  |                |                              |                   |
|           |   | Question              |               |   |        |  | Warrant fo   | or Warning Sy  | stem                         |                   |
| look-up   | Existing AADT = 2,390   | Forecast AADT =       |               | 460                                       |        |  |  |                |                              | Sheet 3           |
| look-up   | Daily Train Volume = 1  |                       |               |   | trains |  |  |                |                              | Sheet 3           |
| calculate | A. Cross-Product = 460  |                       |               |   |        | > 2,000 FLB                                      | req'd  | > 50,000 req   | uires gates                  |                   |
| look-up   | B. Maximum Rail Operating Speed =   | 10                    |               | n   | nph    | (max = 80m                                       | ph or 50 mph v                                       | vith crosswalk | .)                           | Sheet 3           |
| Rail      | C. Number of Tracks =   | 1                     |               |   |        |  |  |                |                              |                   |
| Nali      | if ≥ 2, can trains pass one another?  | N/A                   |               |   |        | if $\geq$ 2 and tr                               | ains can pass o                                      | ne another ->  | FLB req'd                    |                   |
| look-up   | D. Are Sightlines obscured?   | Yes                   |               |   |        | if "Yes" -> FLB req'd: If Fig 7.1 applies> add G |  |                | add G                        | Sheet 8 & Fig 7.1 |
| observe   | E. Are any proximity conditions met?  | Yes                   |               |   |        | if "Yes" -> FLB required.                        |  |                |                              | GCS Sect 9 & 11   |
| look-up   | Is a Warning System warranted? Yes If any of A through E above meet the Warrant |                       |               |   |        |  |  |                |                              |                   |
|           | Field Visit Present? (Y/N   | ) Condition / Alig    | nment:        |   |        |  |  |                |                              | GCS 13            |
| observe   | Light Units, N  |                       |               |   |        |  |  |                |                              | GCS 13            |
| observe   | Bells, N  |                       |               |   |        |  |  |                |                              | GCS 13            |
| observe   | Gates, N  |                       |               |   |        |  |  |                |                              | GCS 13            |
| observe   | Cantilever Lights, N  |                       |               |   |        |  |  |                |                              | GCS 13            |
| observe   | Check that warning signal assemblies and cantile                                | evers are in accorda  | nce with GCS  | Figures.                                  |        |  |  |                |                              | GCS Sect. 12      |
| observe   | Is warning system housing at least 9m from trav                                 | eled way of the road  | d and 8m fror | m the nearest rail?                       |        |  |  |                |                              |                   |
| observe   | If there is a sidewalk, is a bell on the adjacent as                            | sembly?               |               |   |        |  |  |                |                              |                   |
| Rail √    | Have all light units been aligned?  | NA                    | Date?         | NA  |        |  |  |                |                              |                   |
|           | Design Approach Warning Time (greatest of):                                     |                       |               |   |        |  |  |                |                              |                   |
| Rail      |   |                       |               | 20sec OR<br>[20+((cd-11)/3)]<br>if cd>11m | Td     | Тр   | Gate Clearance<br>Time + Descent<br>Time + 5 seconds | Clearance Time | (SSD + cd + L)/(0.277837xVv) |                   |
|           | SB Approach   | 34.5                  | sec           | 25.1                                      | 16.9   | 0.0  | 34.5   | 0.0            | 7.1                          |                   |
|           | NB Approach   | 34.5                  | sec           | 25.1                                      | 17.5   | 0.0  | 34.5   | 0.0            | 11.3                         |                   |
| observe   | Is warning time less than 35 sec (without gates)                                | or 55 sec (with gate  | s)            | N/A                                       |        |  |  | •              |                              |                   |

#### **Comments Following Site Visit:**

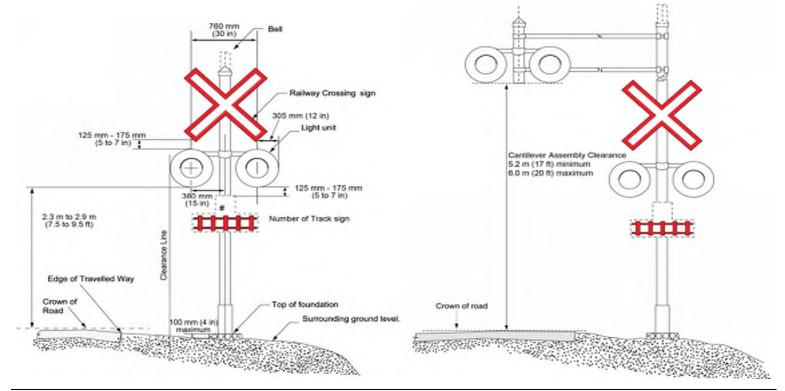
As per previous inspection, an active warning is required due to sightlines. The reduction in AADT has not reduced the need for an active warning system.

extraordinary conditions why warning system should be installed

-is warning system present but not warranted?

#### Figure 12-1 - Warning Signal Assemblies

#### Figure 12-3 - Cantilevers



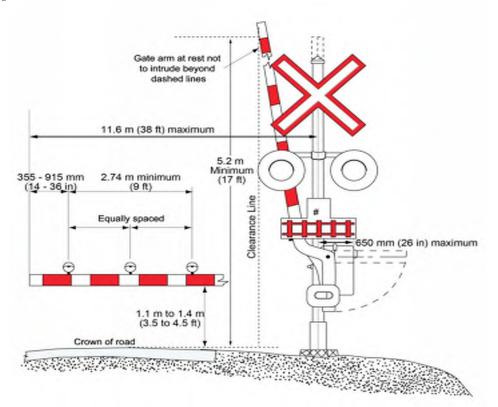


#### GATES FOR GRADE CROSSING WARNING SYSTEMS

GCS Section 9

| Source           |  |   | ltem                                  |             |   |                |             | Reference      |  |
|------------------|--|---|---------------------------------------|-------------|---|----------------|-------------|----------------|--|
|                  | Warning System Warrants  |   |                                       |             |   |                |             |                |  |
|                  | -if any of A through E below are met th  | -if any of A through E below are met then a warning system with gates is warranted. Not required as warning system is not necessary |                                       |             |   |                |             |                |  |
| calculate        | A. Cross-Product =   | 460   | (50,000 min)                          |             |   |                |             |                |  |
|                  | B. Maximum Rail Operating Speed =  | 10  | mph (max = 50mp                       | h)          |   |                |             | Sheet 3        |  |
| Rail √           | C. Number of Tracks =  | 1   |                                       |             |   |                |             |                |  |
|                  | if $\geq 2$ , can trains pass one another?   | N/A   |                                       |             |   |                |             |                |  |
| look-up          | D. Is D <sub>STOPPED</sub> Insufficient?   | NO  |                                       |             |   |                |             | Sheet 8        |  |
| observe          | E. Are any proximity conditions met?   | N/A   |                                       |             |   |                |             |                |  |
| calculate        | Gate clearance distance: eq 10.4b  | 24.7  | m cd <sub>G stop</sub>                | 34.7        | m cd SSD SB                             | 69.7           | m cd SSD NB |                |  |
| look-up          | travel time =  | 17.5  | sec <sub>G stop</sub>                 |             |   |                |             |                |  |
| calculate        | Gate arm clearance times:  | 16.9  | sec SB from stop T <sub>G ssd</sub> = | 4.2         | sec SB from SSD                         |                |             |                |  |
| calculate        |  | 17.5  | sec NB from stop T <sub>G ssd</sub> = | 8.4         | sec NB from SSD                         |                |             | GCS Sect. 10.4 |  |
| look-up          | Gate arm delay time: 17.5  | sec (greatest value   | ue from above)                        |             |   |                |             | 000 5000. 10.4 |  |
| calculate        | effect of grade =  | 0.8   | sec (SB from Stop)                    | -4.2        | sec SB from SSD                         |                |             |                |  |
| calculate        |  | 1.5   | sec (NB from Stop)                    | 0.0         | sec NB from SSD                         |                |             |                |  |
|                  | Measure gate arm delay and compare with above:   |   | N/A                                   |             |   |                |             |                |  |
|                  | Do gates conform to standards depicted in GCS Fig  |   | N/A                                   |             |   |                |             |                |  |
|                  | Check gate descent (10 to 15 sec) and ascent (6 to 2   | 12 sec)   | N/A                                   |             |   |                |             |                |  |
| observe          | Is gate striping vertical as depicted in GCS Figures?<br>Where railway equipment regularly stops, or railway equipment | in left steeding with in  | N/A                                   |             | ·                                       | - 1            |             |                |  |
| observe          |  |   | operation of the warning system.      | i, the warn | ing system must be equipped with        | a<br>Yes/No/NA | NA          | GCS 16.3.1     |  |
| Comments         | Following Site Visit:  |   |                                       |             |   |                |             |                |  |
| - Warning S      | system with Gates is not required.   |   |                                       |             |   |                |             |                |  |
| -extraordinary o | conditions why warning system should be installed  |   | · · · · · · · · · · · · · · · · · · · | is warning  | system present but <u>not</u> warranted | ? <b>No</b>    |             |                |  |

#### Figure 12-2 - Gates



Sheet 13

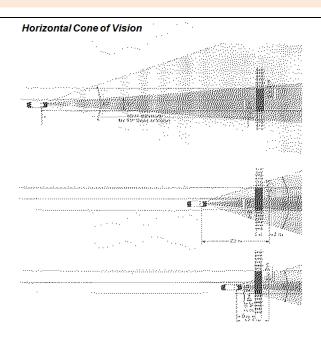
#### FLASHING LIGHT UNITS

Note: Driver's cone of vision is  $\pm$  5° horizontally; limited by top of windshield vertically.

| Source  |  |   | Item is not required as warning s         | system is not required.    |       | Item is not required as warning system is not required. |  |  |  |  |  |  |
|---------|--|---|---|----------------------------|-------|---|--|--|--|--|--|--|
|         | Number and Location  |   |   |                            |       |   |  |  |  |  |  |  |
| look-up | Minimum Distance for Primar  | y Light Units (SSD) =   |   | 45.                        | 0     | m   |  |  |  |  |  |  |
| look-up | Recommended Distance for P   | commended Distance for Primary Light Units = 69.7 m   |   |                            |       |   |  |  |  |  |  |  |
|         | Are flashing light units located                                       | flashing light units located within 5° horizontally of the centerline of the road (throughout the approach distance above)?             |   |                            |       |   |  |  |  |  |  |  |
| observe |  | Yes (covered by front and back units)   |   |                            |       |   |  |  |  |  |  |  |
|         | N/A N/A  |   |   |                            |       |   |  |  |  |  |  |  |
| observe | Can back lights be seen by all   | in back lights be seen by all stopped drivers? N/A  |   |                            |       |   |  |  |  |  |  |  |
| observe | Are lights obscured by vehicles stopped on adjacent intersections? N/A |   |   |                            |       |   |  |  |  |  |  |  |
| observe | Are additional light units requ  | Are additional light units required for drivers as they begin to turn onto an approach road from an intersecting road/lane/pkg lot? N/A |   |                            |       |   |  |  |  |  |  |  |
|         | Cantilevered Light Units   |   |   |                            |       |   |  |  |  |  |  |  |
| measure | Does D <sub>R</sub> exceed 7.7m?                                       | N/A   |   |                            |       |   |  |  |  |  |  |  |
| measure | Does D <sub>L</sub> exceed 8.7m?                                       | N/A   | (Assumes signal poles on both sides of re | oad alignment, approach si | ide o | of rail)  |  |  |  |  |  |  |
|         | Multiple Lanes   |   |   |                            |       |   |  |  |  |  |  |  |
| observe | Can front light units be seen b  | y drivers in all lanes  | (would T/T obscure?)?                     | N//                        | 4     |   |  |  |  |  |  |  |
| observe | Can back light units be seen b   | y all stopped drivers   | in all lanes?                             | N//                        | 4     |   |  |  |  |  |  |  |
|         | Sidewalks, paths, trails, etc.   |   |   |                            |       | -   |  |  |  |  |  |  |
| measure | Distance from path centerline  | to signal mast =  |   | N//                        | 4     | m (max.=3.6m)   |  |  |  |  |  |  |
| observe | Are separate light units required?                                     |   |   |                            |       |   |  |  |  |  |  |  |

Comments Following Site Visit:

Crossing currently regulated by a passive warning system.



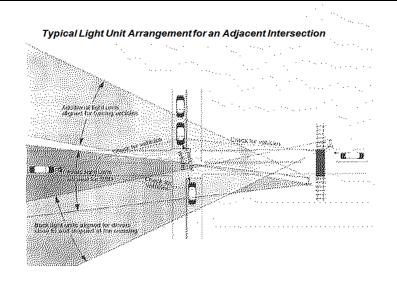
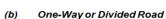
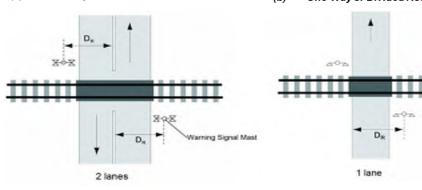
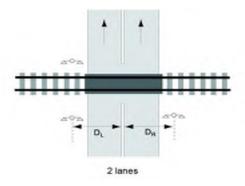


Figure 13-1 – Warning Signal Offsets Requiring Cantilevered Light Units

(a) Two-Way Road







GCS Sections 12-14

PREPARE TO STOP AT RAILWAY CROSSING SIGN





GCS Sections 13 and 14

| Source  |   |                    | Item NA                                       |                              |        |                     | Reference        |
|---------|---|--------------------|---|------------------------------|--------|---------------------|------------------|
|         | Are signs present?  | No                 | EB approach                                   |                              |        |                     | SOR 67 (1), (2)  |
| observe |   | No                 | WB approach                                   |                              |        |                     | GCS 18.21 & 18.2 |
|         |   |                    |   |                              |        |                     |                  |
| look-up | Minimum Distance for Primary  | Light Units (SSD)  |   | N/A                          | 1      | m                   | Sheet 13         |
| look-up | Recommended distance for Prin   | mary Light Units   |   | N/A                          | 1      | m                   | Sheet 13         |
|         | Warrants  |                    |   |                              |        |                     |                  |
| observe | Are all front light units obscured within minimum distance above? N/A |                    |   |                              |        |                     |                  |
| look-up | Is the facility designated a "free                                    | way" or "express   | vay"?   | N/A                          |        |                     | Sheet 3          |
| observe | Do environmental conditions fro                                       | equently obscure   | signal visibility?                            | N/A                          |        |                     |                  |
|         | Considering maximum prevailing  | ng speeds, geome   | etry, and traffic composition, checkthe follo | wing:                        |        |                     |                  |
| observe | Does sign flash during operation                                      | n of grade crossin | g warning system?                             | N/A                          |        |                     |                  |
| measure | Distance from the sign to 2.4m  | beyond the furthe  | est rail =                                    | N/A                          | 1      |                     |                  |
| observe | Does the sign flash before the a                                      | ctuation of the cr | ossing warning system by the time required    | to travel from the sign to   | clear  | the crossing? N/A   |                  |
| measure | Distance from the sign to the clo                                     | osest gate =       |   | N/A                          | 1      | m                   |                  |
| observe | Does the flashing sign precede a                                      | actuation of the d | escent of the gate arms by the time required  | I to travel from the sign to | o clea | r closest gate? N/A |                  |
| measure | Time required for all queued ve                                       | hicles to resume   | o maximum road operating speed =              | N/A                          | 1      | sec                 |                  |

#### **Comments Following Site Visit:**

No Flashing lights wee observed or required.

-general condition

Sheet 15

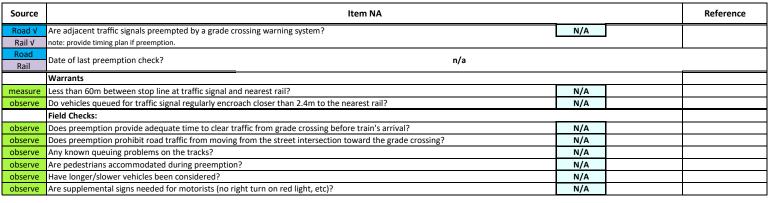
Sheet 14



-placement/orientation of signs

#### PREEMPTION OF TRAFFIC SIGNALS

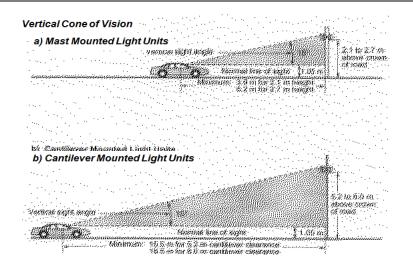
-functions as intended



**Comments Following Site Visit:** 

- No Traffic Signals located at crossing

-functions as intended



#### AREAS WITHOUT TRAIN WHISTLING

Sheet 16

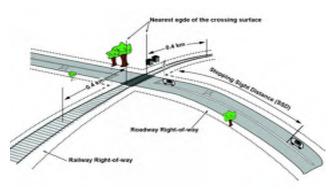
#### Grade Crossings Standards, July 2014

#### APPENDIX D - WHISTLING CESSATION

#### Table D-1 – Requirements for Warning Systems at Public Grade Crossings within an Area without Whistling

### Figure D-1 - prescribed area for whistling cessation as per article 23.1 of the RSA

|                               | (             | Column A           | Column B   |                                      |  |  |
|-------------------------------|---------------|--------------------|--|--------------------------------------|--|--|
| Railway<br>Design Speed       | Grade Crossin | gs for Vehicle Use | Grade Crossings For Sidewalk<br>Paths, or Trails with the centre<br>no closer than 3.6 m (12 ft) to a<br>warning signal for vehicles |                                      |  |  |
|                               | No            | o. of Tracks       | No.  | of Tracks                            |  |  |
|                               | 1             | 2 or more          | 1  | 2 or more                            |  |  |
| Column 1                      | Column 2      | Column 3           | Column 4   | Column 5                             |  |  |
| 1 – 25 km/h (15 mph)          | FLB           | FLB                | No warning<br>system<br>requirement  | No warning<br>system<br>requirements |  |  |
| 25 – 81 km/h<br>(16 – 50 mph) | FLB           | FLB & G            | FLB  | FLB & G                              |  |  |
| Over 81 km/h (50 mph)         | FLB & G       | FLB&G              | FLB & G  | FLB & G                              |  |  |



RSA = Railway Safety Act of Canada

#### Legend :

FLB is a warning system consisting of flashing lights and a bell.

FLB & G is a warning system consisting of flashing lights, a bell and gates

| Source  | Item  |                                       |           |    |  |  |
|---------|---|---------------------------------------|-----------|----|--|--|
| Rail    | Is train whistling prohibited at this crossing?     | No                                    | 24 hours? | No |  |  |
| observe | Is there evidence of routine unauthorized access (t | ail line in the area of the crossing? | No        |    |  |  |
| observe | Are the requirements of Table D-1 met?              | No                                    |           |    |  |  |

#### Comments Following Site Visit:

Whistle Cessation not required

#### Additional Prompt Lists

#### **Human Factors:**

- \* Control device visibility / background visual clutter.
- <sup>o</sup> Driver workload through this area (i.e., are there numerous factors that simultaneously require the driver's attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.).
- attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.),
  <sup>a</sup> Driver expectancy of the environment (i.e., are the control measures in keeping with the design levels of the road system and adjacent environment).
- \* Need for positive guidance.
- " Conflicts between road and raikway signs and signals.

#### **Environmental Factors:**

- " Extreme weather conditions.
- \* Lighting issues (night, dawn/dusk, tunnels, adjacent facilities, headlight or sunlight glare, etc.)
- <sup>6</sup> Landscaping or vegetation.
- " Integration w/ surrounding land use (e.g., parked vehicles blocking sightlines, merging traffic lanes, etc.)

#### All Road Users:

Λ.

| <ul> <li>enceds of the following been met:</li> <li>-pedestrians (including strollers, baby carriages, and blind persons)</li> </ul> |     |
|--|-----|
| -children / elderty  |     |
| -assistive devices (wheelchairs, scooters, walkers, etc)   |     |
| -bicyclists  |     |
| -motorcyclists   |     |
| -over-sized trucks   | · · |
| -buses   |     |
| -recreational vehicles   |     |
| -golfcarts   |     |
| -hazardous materials   |     |

(mage barriers) guide fencing, additional pedestrian bell, pedestrian gates, sign indicating potential presence of 2<sup>nd</sup> train at a multi track crossing, etc)

#### Other:

 Should closure of the crossing be considered due to inactivity, presence of nearby adjacent crossings, etc.

Commente Following Site Visit:

VFPA REPORT NUMBER: 20-0173

## VFPR FSPL TRANSPORTATION IMPROVEMENTS PROJECT 06 - MILE X.XX, 357 DOCK ROAD, CROSSING ASSESSMENT REPORT

FEBRUARY 09, 2021



# REVISION HISTORY

FIINAL ISSUE

| 2020/09/03                   | FIRST DRAFT                           |                                       |  |
|------------------------------|---------------------------------------|---------------------------------------|--|
| Prepared by                  | Reviewed by                           |                                       |  |
| P. McCabe, Track<br>Designer | R. Sewell, Senior<br>Project Engineer |                                       |  |
| 2020/10/21                   | SECOND DRAFT                          |                                       |  |
| Prepared by                  | Reviewed by                           |                                       |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer  |                                       |  |
| 2021/02/09                   | FINAL                                 |                                       |  |
| Prepared by                  | Reviewed by                           | Approved By                           |  |
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## SIGNATURES

PREPARED BY

09/02/2021

09/02/2021

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# **NSD**

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| 2.1 | Previous Assessment (2015)     | 2 |
| 2.2 | Crossing Modifications         | 3 |
| 2.3 | Assessment and Recommendations | 4 |

# **1 CROSSING OVERVIEW**

WSP Canada Group Limited (WSP) has been contracted as part of the Fraser Surrey Port Lands – Transportation Improvements Preliminary Design Services project, to complete a Railway Crossing Safety Assessment on the Dock Road grade crossing. The SRY owned crossing is located within the Vancouver Fraser Port Authority (VFPA), Fraser Surrey Docklands near to the Canadian National (CN) Brownsville Spur which comes off Mile 117 of the Yale Subdivision.

A Railway Crossing Field Safety Assessment was undertaken on the 22nd of July 2020 and updates the previous Railway Crossing Assessment undertaken by WSP (formally MMM Group) on the 5<sup>th</sup> of May 2015. The Railway Crossing Assessment as conducted follows the guidelines of applicable requirements identified in the most recent edition of Transport Canada's Grade Crossing Regulations (GCR) and Grade Crossing Standards (GCS).

The crossing is a passive protected crossing (SRCS), equipped with two RAILWAY CROSSING and STOP signs, located within an industrial area. A Tractor Trailer (WB-20) is the design vehicle used to represent daily traffic on port property. The Railway traffic volumes were provided by the SRY, while the Average Annual Daily Traffic (AADT) was calculated based on the realigned infrastructure.

This report aims to identify the modifications to the grade crossing since the previous inspection completed by MMM Group in 2015, as well as highlight any new or previously identified non-compliances still relevant to this crossing.

## **1.1 LOCATION**

Dock Road is located within Fraser Surrey Docks jurisdiction at 357 Dock Road and crosses the SRY spur track. The crossing is located at the latitude and longitude of 49°11'38" and 112°54'05" respectfully. Figure 1, below shows the location of the crossing.

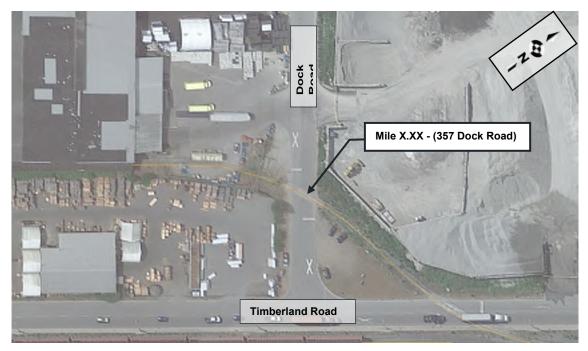


Figure 1: Crossing Location (source: Google Earth, 2020)

# 2 SAFETY ASSESSMENT

## 2.1 PREVIOUS ASSESSMENT (2015)

A previous crossing assessment was undertaken in 2015 by WSP for the 357 Dock Road crossing. The objective of the assessment was 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 referred to in the Railway Safety Act / Grade Crossing Regulations and contained in the Grade Crossing Standards.
- 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.

The outcome of the 2015 assessment offered recommendations for consideration by the VFPA. Table 1: Previous Non-Compliances, illustrates the non-compliances and recommendations offered within the 2015 report. The recommendations were categorised within the three priority levels;

- Low implement the measures as soon as practicable
- Medium implement the measures by Transport Canada GCS & GCR November 2021 deadline.
- High implement the measures forthwith

Table 1: Previous Non-Compliances

**Table 1: Previous Non-Compliances** 

|     | Observations  | Suggested Actions  | Priority | Addressed?   |
|-----|---|--|----------|--|
| GCS | Section 3 – Crossing Surface (Basic Requirem  | ent)   |          |  |
| a.  | Flangeway depth does not meet the requirement due to debris.  | Clean debris from the flangeway.<br>Once debris is removed from the flangeway, the<br>railway company is to ensure the minimum depth is<br>met.  | High     | No   |
| GCS | Section 4 – Railway Crossing and Number of T  | racks Sign (Basic Requirement)   |          |  |
| a.  | RAILWAY CROSSING sign located on the east approach only.  | Install RAILWAY CROSSING sign on the west approach.  | High     | No – Sign installed on East approach<br>missing. West approach has new pole<br>but sign missing.   |
| GCS | Section 6 – Road Geometry   |  |          |  |
| a.  | The slope of the crossing on the west approach<br>within 8m of the nearest rail is up to 3.5 percent<br>thereby exceeding the maximum gradient of 2<br>percent specified for routes identified for public<br>grade crossings. Although the grades of the<br>existing crossing do not comply with Part C of<br>the Standards, the road geometry of the<br>crossing as inspected complies with the<br>Regulations | Reconstruct approaches so that slope of the crossing<br>within 8m of the nearest rail is no more than 2 percent<br>on the west approach. This action will need to be<br>undertaken as soon as practicable or when the City or<br>Railway Company alters the road geometry and/or<br>approach of the crossing (see sections 88 and 89 of<br>the Regulations). | High     | No – West Approach grade within 8m<br>measured between 1.5% - 3.0%.<br>Approach steepens at edge of roadway.<br>No evidence of road<br>regrading/reconstruction present. |
| GCS | Section 7 – Sightlines  |  | I        |  |

| a.  | Clear sightline areas where drivers stopped at<br>the crossing (DSTOPPED-VEH) cannot be<br>provided or maintained due to fences and<br>equipment on the southwest and southeast<br>corners of the crossing. | Install active warning system with gates if DSTOPPED cannot be provided and maintained  | Medium | No – Vegetation increased as Railway<br>operations have ceased.   |
|-----|---|---|--------|---|
| GCS | Section 8 – Signs   |   |        |   |
| a.  | RAILWAY CROSSING sign on east approach in poor condition.   | Replace RAILWAY CROSSING sign on east approach.   | Medium | No – RAILWAY CROSSING Sign<br>missing   |
| b.  | Retroreflective strips are not provided for the back of the RAILWAY CROSSING sign and both sides of the sign supporting post.   | Install retroreflective strips on the back of the<br>RAILWAY CROSSING sign and both sides of the sign<br>supporting post.   | Medium | Partial – Reflective strips located on<br>West approach pole. But RAILWAY<br>CROSSING Sign missing. Both East<br>Pole and Sign missing. |
| C.  | RAILWAY CROSSING AHEAD signs are not<br>present on either approach of the crossing.   | Install RAILWAY CROSSING AHEAD signs 45m +/-<br>10m in advance of the stopping location on both<br>approaches.  | Medium | Yes – RAILWAY CROSSING AHEAD<br>Signs are installed   |
| d.  | STOP signs are not present on either approach of the crossing.  | STOP signs should be installed on the same post as the RAILWAY CROSSING signs on both approaches.   | Medium | No  |
| e.  | EMERGENCY NOTIFICATION signs are not<br>present on either approach of the crossing.   | Install EMERGENCY NOTIFICATION sign on both approaches as per GCS Section 8.5.  | Medium | No  |
| f.  | Double stop bar pavement markings are not present on either approach.   | Paint double stop bars on both road approaches as per MUTCD Fig.C1-6 (Jan. 2014).   | High   | Yes – Double stop bars have been<br>installed   |
| g.  | RAILWAY CROSSING symbol pavement<br>markings are not present on either approach   | Paint RAILWAY CROSSING symbol pavement<br>markings on both road approaches as per MUTCD<br>Fig.C1-6 (Jan. 2014).  | Medium | Yes – RAILWAY CROSSING SYMBOL<br>painted on both approaches   |
| h.  | Stopping or parking restriction is not observed<br>on the driveway at the railway right-of-way.   | Install NO STOPPING signs within the railway right-of-<br>way.  | Low    | Yes – PARKING RESTRICTION Signs<br>installed along Dock Road.   |
| i.  | Vehicles are observed to park within the railway ROW.   | Install NO PARKING signs on both approaches.  | Low    | Yes – PARKING RESTRICTION Signs<br>installed along Dock Road  |
| GC  | S Sections 9, 12 to 17 – Warning Syste  | em Design   |        |   |
| j.  | An active warning system without gates is warranted based on cross-product.   | Install active warning system without gates. However,<br>Transport Canada indicated that the crossing could<br>stay passive indefinitely unless the sightline<br>requirements could not be met. | Low    | No – Railway operations have ceased   |

## 2.2 CROSSING MODIFICATIONS

As shown in Appendix A: Site Photographs, a number of changes have occurred at the crossing between inspections. Most changes were based on recommendations outlined in the 2015 inspection. Table 1, shows what changes have been made based on the 2015 recommendations. Below is a summarised list of all the changes observed from the site inspection:

• Rail operations have ceased along the spur track

- New grade crossing signage, including;
  - o RAILWAY CROSSING Signs (believed previously installed but now missing)
  - o STOP Signs (believed previously installed but now missing)
  - RAILWAY CROSSING AHEAD signs
  - PARKING RESTRICTION Signs
- New MUTCD compliant pavement markings.
- Vegetation along ROW increased
- New lighting along Dock Road

## 2.3 ASSESSMENT AND RECOMMENDATIONS

An updated Grade Crossing Safety Assessment was undertaken for the proposed realignment of the port road access and to determine any required crossing upgrades to ensure compliance with the GCR & GCS. **Appendix B: Site Inspection Report** provides details of the observations made during the site inspection. The inspection report also outlines outstanding safety issues, along with recommended remediations. As the railway operations have ceased along the spur, limited immediate remediations are advised. Table 2: 2020 Crossing Recommendations, summarizes the updated high priority recommendations from the field investigation. However, if railway operations were to resume, an updated Grade Crossing Safety Assessment is advised.

|          | Observations  | Suggested Actions   | Priority | Order of<br>Magnitude Cost |
|----------|---|---|----------|----------------------------|
| GCS Sect | tion 8 – Signs  |   |          |                            |
| a.       | RAILWAY CROSSING signs on both East and West approach missing.  | Install RAILWAY CROSSING signs on both approaches   | High     | \$800                      |
| b.       | Retroreflective strips are not provided for the back of the RAILWAY CROSSING sign and both sides of the sign supporting post. | Install retroreflective strips on the back of the RAILWAY CROSSING sign and both sides of the sign supporting post. | High     | \$800                      |
| C.       | EMERGENCY NOTIFICATION signs are not present on both approaches.  | Install EMERGENCY NOTIFICATION sign on both approaches as<br>per GCS Section 8.5.                                   | High     | \$750                      |
| d.       | STOP signs are not present on either approach of the crossing.  | STOP signs should be installed on the same post as the RAILWAY CROSSING signs on both approaches.                   | High     | \$750                      |

#### Table 2: 2020 Crossing Recommendations

If sightlines cannot be maintained, an active warning system might be warranted depending on road-rail volume cross-product. A crossing safety assessment would need to be undertaken should rail services resume.



# A SITE PHOTOGRAPHS

# **APPENDIX**



**D** - West Approach Drivers View Left

E - West Approach

F - West Approach Drivers View Right

## **APPENDIX**





J- West Approach Drivers View Left (At Stopped Position) K - West Approach (At Stopped Position)

L - West Approach Drivers View Right (At Stopped Position)

# **APPENDIX**





# B SITE INSPECTION REPORT

CANADIAN ROAD / RAILWAY GRADE CROSSING DETAILED SAFETY ASSESSMENT FIELD GUIDE (2005)\*

Appendix C2: Field Data Forms

Passive & Active Crossings

MileX.XX (357 Dock Road),SRY Rail Surrey, British Columbia For Vancouver Fraser Port Authority

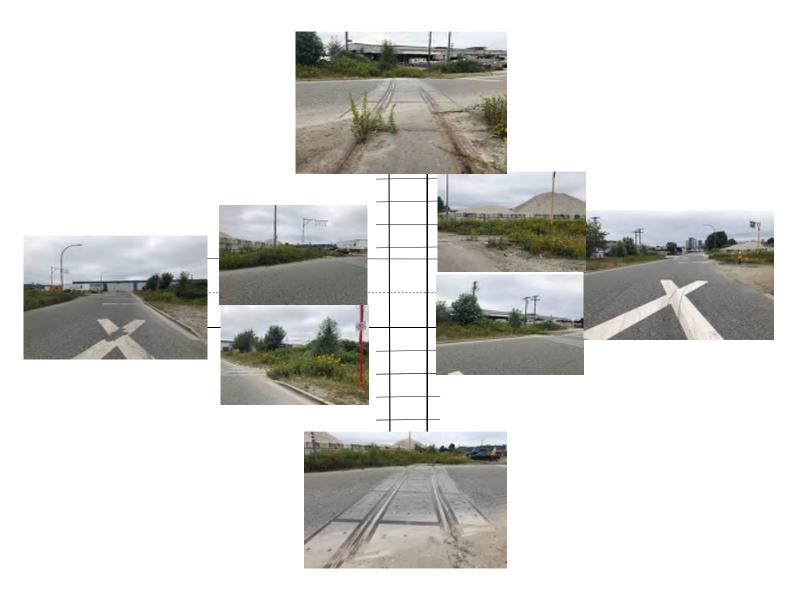
|           | Legend: |   |
|-----------|---------|---|
| calculate | Formula | Spreadsheet cell has formula  |
| look up   |         | User to look up value in table or chart.  |
|           |         | User to input value here for conditional formatting or formulas in other cells to function                |
|           |         | Warning! Value beyond acceptable limits.  |
|           |         | Warning! Value beyond acceptable limits for certain conditions (i.e. for people using assistive devices). |
|           | Rail    | Information to be provided by Railway Company   |
|           | Road    | Information to be provided by Roadway Authority   |
| measure   | observe | Information to be obtained during Site Investigation  |
|           | ٧       | Information provided by others to be verified in the field  |
|           |         |   |

\* Updated to reflect Transport Canada's Grade Crossing Standards (GCS) July 2014 and Grade Crossing Regulations (GCR)(SOR-2014-275 Feb 2016)

| Sheet 1                |  |                              | Grade Cros         | sing Safety Assessm      | ent                        |                                 | Passive Crossings |
|------------------------|--|------------------------------|--------------------|--------------------------|----------------------------|---------------------------------|-------------------|
| Date of Assessment:    |  | 22-Jul-20                    | 0 Site Investigati | on                       |                            |                                 |                   |
| Assessment Team N      | lembers & Affiliations:                | Patrick McCabe<br>Rob Sewell |                    |                          |                            |                                 |                   |
| Reason for Assessme    | ent: New Proposed                      | Pedestrian Crossing          |                    |                          |                            |                                 |                   |
|                        | periodic assessment                    | Х                            | significant char   | nge in infrastructure    |                            | significant change in road or r |                   |
|                        | cessation of whistling                 |                              |                    | nge in train operations  |                            | significant change in road or r | •                 |
|                        | change in vehicle types                |                              | 2+ fatal collisio  | ns in 5yr. Period        |                            | other collision experience (see | e below)          |
| Railway Authority:     | Southern Railway of BC                 |                              |                    |                          | Road Authority:            | Vancouver Fraser Port Autho     | ority (VFPA)      |
| Crossing Location:     | Dock Road                              |                              |                    |                          | Road Name/Number:          | Dock Road                       |                   |
| Location Number:       | 357 Dock Road                          |                              |                    |                          | Province:                  | British Columbia                |                   |
| Municipality:          | City of Surrey, BC                     |                              |                    |                          | Location Reference (cont   | rol section, etc.):             |                   |
| Railway: SRY           |  | Mile:                        | N/A                |                          | Road Classification:       |                                 | DP Surrey Docks   |
| Naliway. SKI           |  | white.                       | N/A                |                          | (freeway/expressway arte   | erial collector local etc):     | ULU               |
| Sub-division:          | N/A                                    | Spur:                        | N/A                |                          | (inceway) expressivaly and |                                 | 010               |
|                        |  |                              | •                  |                          | Roadway East/West (yes/    | (no) No                         |                   |
| Type of Grade Cross    | ing [private/public; warning devices]: | SRSC                         |                    |                          | Roadway North/ South (     |                                 |                   |
| Track Type: [mainlin   | e, etc.]                               |                              | Yard               |                          |                            |                                 |                   |
|                        |  |                              |                    |                          | *Urban Local Undivided     |                                 |                   |
| Collision History (5-y | vear period): No record of ac          | citents at the subjec        | t railway crossin  | g within the past five y | /ears                      |                                 |                   |
| Property               | y Damage collisions:                   |                              | NIL                |                          |                            |                                 |                   |
|                        | nal Injury collisions:                 |                              | NIL                | Number o                 | of Persons Injured:        | NIL                             |                   |
|                        | njury Collisions:                      |                              | NIL                |                          | of Persons Killed:         | NIL                             |                   |
|                        | Collisions in last 5 year period:      |                              | NIL                |                          |                            |                                 |                   |

Provide Details of the collisions if available: Sources:

SCENE PHOTOGRAPHS



For the full set of photos taken, see the Appendix to the Safety Assessment Report.

Sheet 2b

SCENE SKETCH

NOTE: All references to direction in this safety review are keyed to this diagram.



Notes: Images from Google Earth

Include: - directions to nearby municipalities for both road & rail approaches (use arrows)

- adjacent intersections

- relevant road signs/signals

- signal warning systems hardware

landmarks
 crosswalks/paths

- geographical features

- bus stops, etc.

#### GENERAL INFORMATION

| Shoot | 2 |
|-------|---|
| Sheet | 3 |

| Source  |   | Item |            |   |   |  |  |  |  |  |  |
|---------|---|------|------------|---|---|--|--|--|--|--|--|
| Rail    | Maximum Railway Operating Speed, V <sub>T</sub>           | =    | 10         | (mph)   |   |  |  |  |  |  |  |
| Rail    | Daily Train Volume:                                       | =    | 0          | (freight trains/day)                                |   |  |  |  |  |  |  |
| Ndli    |   | =    | 0          | (passenger trains/day)                              |   |  |  |  |  |  |  |
| Rail    | Switching during daytime? Y/N                             | No   |            | nighttime? Y/N No                                   |   |  |  |  |  |  |  |
| Road    | Avg. Annual Daily Traffic, AADT:                          | =    | 210        | (vpd) Year of count: 2020                           |   |  |  |  |  |  |  |
| Road    | High seasonal fluctuation in volumes?                     |      | No         |   |   |  |  |  |  |  |  |
| Road    | Pedestrian Volumes  | =    | 0          | (ped./day)  |   |  |  |  |  |  |  |
| Road √  | Is crossing on a School Bus route?                        |      | No         |   |   |  |  |  |  |  |  |
| Road √  | Do Dangerous Goods trucks use this roadway?               |      | Yes        |   |   |  |  |  |  |  |  |
| Road    | Cyclist Volumes   | =    | 0          | (cyclists/day) Cyclist not anticipated              |   |  |  |  |  |  |  |
| Road √  | Regular use of crossing by persons with Assistive Devices | ?    |            | Pedestrians using Assistive Devices not anticipated |   |  |  |  |  |  |  |
| Road √  | Other special road users?                                 | ty   | pe Unknown | daily volume None                                   |   |  |  |  |  |  |  |
| Road    | Forecasted AADT <sup>2</sup>                              | =    | 240        | (vpd) Forecasted Year: 202                          | 2 |  |  |  |  |  |  |
|         | Design Speed:   |      | 30         | km/h Posted Speed: <b>30</b> km/h                   |   |  |  |  |  |  |  |
| Road √  | Maximum Operating Speed:                                  |      | 30         | km/h  |   |  |  |  |  |  |  |
|         | note: provide details if all approaches are not the same  |      |            |   |   |  |  |  |  |  |  |
| Road √  | Road Surface Type (asphalt, concrete, gravel, etc.):      |      | Asphalt    |   |   |  |  |  |  |  |  |
| observe | Surrounding Land Use (urban/rural)?:                      |      | Industrial |   |   |  |  |  |  |  |  |
| observe | Any schools, retirement homes, etc. nearby?               |      | No         |   |   |  |  |  |  |  |  |

#### Notes:

1. Road Authority should provided plans if available.

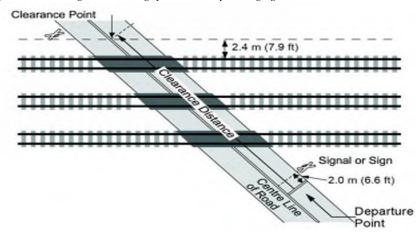
2. AADT is based upon modelled future traffic counts for the Realigned infrastrucutre.

#### From GCS Section 7.1.2:

| Column 1       | Column 2   | Column 3   |
|----------------|--|--|
| Class of Track | The maximum<br>allowable operating<br>speed for freight trains<br>is - | The maximum<br>allowable operating<br>speed for passenger<br>trains is - |
| Class 1 track  | 17 km/h (10 mph)   | 25 km/h (15 mph)   |
| Class 2 track  | 41 km/h (25 mph)   | 49 km/h (30 mph)   |
| Class 3 track  | 65 km/h (40 mph)   | 97 km/h (60 mph)   |
| Class 4 track  | 97 km/h (60 mph)   | 129 km/h (80 mph)  |
| Class 5 track  | 129 km/h (80 mph)  | 153 km/h (95 mph)  |

Figure 10-1 - Clearance Distance (cd) for Grade Crossings

(a) For Grade Crossings with a Warning System or Railway Crossing Sign

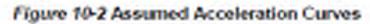


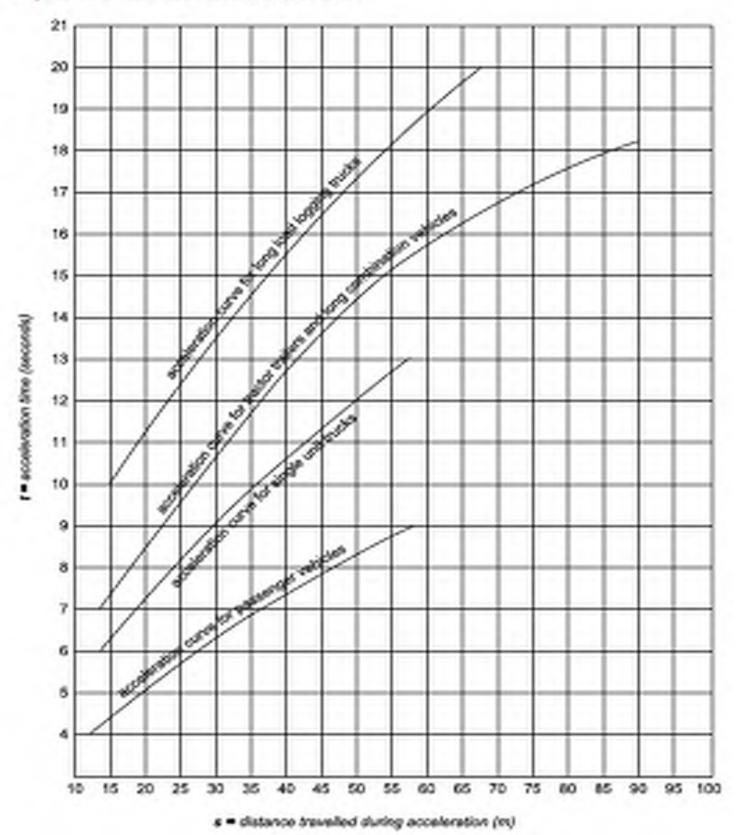
#### Grade Crossings Standards, July 2014

Table 10-1 Ratios of Acceleration Times on Grades

| Design Vehicle            | Road Grade (%) |     |     |     |     |  |  |  |  |  |  |  |
|---------------------------|----------------|-----|-----|-----|-----|--|--|--|--|--|--|--|
|                           | -4             | -2  | 0   | +2  | +4  |  |  |  |  |  |  |  |
| Passenger Car             | 0.7            | 0.9 | 1.0 | 1.1 | 1,3 |  |  |  |  |  |  |  |
| Single Unit Truck & Buses | 0.8            | 0.9 | 1.0 | 1.1 | 1.3 |  |  |  |  |  |  |  |
| Tractor-Semitrailer       | 0.8            | 0.9 | 1.0 | 1.2 | 1.7 |  |  |  |  |  |  |  |

Source: Geometric Design Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999





DESIGN CONSIDERATIONS

| Source    |  |                                  |                           |                   | Item                    |            |          |     |      |     | Reference       |
|-----------|--|----------------------------------|---------------------------|-------------------|-------------------------|------------|----------|-----|------|-----|-----------------|
|           | Design Vehicle                         |                                  |                           |                   |                         |            |          |     |      |     |                 |
| Road      | Type:                                  | 6                                | WB-20 Tractor-            | emitrailers (W    | B-20)                   |            |          |     |      |     | Table 1* SOR 57 |
| look-up   | Length, L:                             |                                  | 22.7                      | m                 |                         |            | Table 1* |     |      |     |                 |
| look-up   | Stopping Sight Distance, SSD           | 1                                | 45                        | m (round to 2     | 1.0% of grade)          | =          | 10       | m   | 45   | m   | Table 3*        |
| measure   | Clearance Distance, cd                 |                                  |                           |                   |                         | =          | 11.2     | m   | 10.9 | m   | GCS 16.1.1      |
| calculate | Vehicle Travel Distance, S             |                                  | S= L+cd                   | 33.9              | max <                   | =          | 33.9     | m   | 33.6 | m   |                 |
| look-up   | Vehicle Departure Time, t              |                                  |                           |                   |                         | =          | 11.6     | sec | 11.6 | sec | GCS Figure 10-2 |
| Road √    | Road Grade Effect:                     | maximum approa                   | ch grade within 'S        | !:                |                         | =          | 1.00     | %   | 0.50 | %   | Sheet 7         |
| look-up   | grade adjustment factor (anto ca       | lc assumes Truck)( ma            | anual input from Tab      | le 10-1 if other) |                         | =          | 1.06     |     | 1.02 |     | GCS Table 10-1  |
| calculate |  | T= t x adjustment                | factor                    |                   |                         | =          | 12.3     | sec | 11.9 | sec |                 |
|           | Design Vehicle Departure Tir           | $me, T_{D} = J + T$ (when        | re J = 2 sec (min.) perce | ption & reaction) |                         |            | 2.0      | sec | 2.0  | sec |                 |
| calculate |  | $T_{G stop} = T_{D} =$           | 14.3                      | sec               |                         | <-         | 14.3     | sec | 13.9 | sec | GCS 10.3.2      |
| observe   | Do field acceleration times exce       | ed T <sub>D</sub> ?              | Acceleration me           | asurement be      | yond the scope o        | f this ass | essment. |     |      |     |                 |
| measure   | Pedestrian, cyclist & Assistiv         | ve Devices Depar                 | ture Time                 | pedest            | rian <b>cd</b> distance | =          | 0.0      | m   | 0.0  | m   | CCC 10.2.2      |
| calculate | walking speed 1.22m/s max.             | T <sub>P</sub> =                 | 0.0                       | sec               | (1.0m/s used)           | <-         | 0.0      | sec | 0.0  | sec | GCS 10.3.3      |
| calculate | T <sub>SSD</sub> = (SSD+cd+L)/(0.27783 | 7 x V <sub>road design</sub> ) = | 9.5                       | sec               |                         |            |          |     |      |     |                 |
| Comments  | Following Site Visit:                  |                                  |                           |                   |                         |            |          |     |      |     |                 |

- Railway Operations have ceased.

- No sidewalk located at crossing

#### Table 1 - Design vehicle Lengths/Class

| General Vehicle Descriptions            | Length (m) |
|---|------------|
| 1. Passenger Cars, Vans and Pickups (P) | 5.6        |
| 2. Light Single-unit Trucks (LSU)       | 6.4        |
| 3. Medium Single-unit Trucks (MSU)      | 10.0       |
| 4. Heavy Single-unit Trucks (HSU)       | 11.5       |
| 5. WB-19 Tractor-Semitrailers (WB-19)   | 20.7       |
| 6. WB-20 Tractor-Semitrailers (WB-20)   | 22.7       |
| 7. A-Train Doubles (ATD)                | 24.5       |
| 8. B-Train Doubles (BTD)                | 25.0       |
| 9. Standard Single-Unit Buses (8-12)    | 12.2       |
| 10. Articulated Buses (A-BUS)           | 18.3       |
| 11. Intercity Buses (I-BUS)             | 14.0       |

Table 6 - Minimum Sightlines along the Rail Line (D<sub>steped</sub>) (as illustrated in Figure 3)

| Railway Design<br>Speed V,                  |     | If greater of T, or T, >  |     |     |      |     |      |     |     |     |     |                      |  |  |  |
|---|-----|---|-----|-----|------|-----|------|-----|-----|-----|-----|----------------------|--|--|--|
| (mph)                                       | ≤10 | 11  | 12  | 13  | 14   | 15  | 16   | 17  | 18  | 19  | 20  | 20 sec, add for each |  |  |  |
| WARNING:<br>Railway design<br>speed in mph! |     | Minimum Sightlines along Rail Line (D <sub>maper</sub> )<br>(m) |     |     |      |     |      |     |     |     |     |                      |  |  |  |
| 570P  | 300 | 30  | 30  | 30  | 30   | 30  | 30   | 30  | 30  | 30  | 30  | +0                   |  |  |  |
| 1-10  | -45 | 50  | 55  | 60  | - 45 | 70  | 72   | 76  | 80  | 85  | 90  | +5                   |  |  |  |
| 11-20                                       | 90  | 100   | 130 | 120 | 125  | 135 | 145  | 155 | 165 | 130 | 180 | +10                  |  |  |  |
| 21-30                                       | 135 | 150   | 165 | 175 | 190  | 205 | 215  | 230 | 245 | 255 | 270 | +15                  |  |  |  |
| 31-40                                       | 180 | 200   | 220 | 235 | 250  | 270 | 285  | 305 | 325 | 340 | 360 | +20                  |  |  |  |
| 41-50                                       | 225 | 250   | 270 | 290 | 315  | 335 | 360  | 380 | 405 | 425 | 450 | +25                  |  |  |  |
| 51-60                                       | 270 | 300   | 325 | 350 | 380  | 405 | -180 | 460 | 485 | 510 | 540 | +30                  |  |  |  |
| 61-76                                       | 315 | 350   | 380 | 415 | 445  | 470 | 505  | 535 | 565 | 595 | 630 | +35                  |  |  |  |
| 71-80                                       | 360 | 395   | 435 | 465 | 505  | 540 | 580  | 610 | 650 | 680 | 720 | +40                  |  |  |  |
| #1-90                                       | 405 | 46  | 490 | 535 | 530  | 605 | 650  | 685 | 730 | 765 | 810 | +45                  |  |  |  |
| 91-100                                      | 450 | 500   | 540 | 580 | 630  | 670 | 715  | 760 | 805 | 850 | 895 | +50                  |  |  |  |

Source: Geometric Design Guide for Canadian Roads, TAC; September 1999.

#### Table 3 - Determine SSD for Truck Class

| Road<br>Crossing<br>Design |      |                        |     |     |     |     |     | St  | oppir |     | ick Cla<br>ht Di<br>(m) |     | e (SSI | D)  |     |     |     |     |     |     |     |
|----------------------------|------|------------------------|-----|-----|-----|-----|-----|-----|-------|-----|-------------------------|-----|--------|-----|-----|-----|-----|-----|-----|-----|-----|
| Speed V<br>(km/hr)         |      | Road Approach Gradient |     |     |     |     |     |     |       |     |                         |     |        |     |     |     |     |     |     |     |     |
| (kano in )                 | -10% | -9%                    | -8% | -7% | -6% | -5% | -4% | -3% | -296  | -1% | 0%                      | 196 | 2%     | 3%  | 4%  | 5%  | 6%  | 7%  | 896 | 996 | 10% |
| 10                         | 10   | 10                     | 10  | 10  | 10  | 10  | 10  | 10  | 10    | 10  | 10                      | 10  | 10     | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  |
| 20                         | 26   | 26                     | 26  | 26  | 26  | 26  | 25  | 25  | 25    | 25  | 25                      | 25  | 25     | 25  | 25  | 25  | 24  | 24  | 24  | 24  | 24  |
| 30                         | 48   | 48                     | 47  | 47  | 47  | 46  | 46  | 46  | 45    | 45  | 45                      | 45  | 45     | 44  | 44  | 44  | 44  | 44  | 44  | 43  | 43  |
| 40                         | 76   | 75                     | 74  | 74  | 73  | 73  | 72  | 71  | 71    | 70  | 70                      | 70  | 69     | 69  | 68  | 68  | 68  | 67  | 67  | 67  | 67  |
| 50                         | 121  | 120                    | 118 | 117 | 116 | 115 | 114 | 113 | 112   | 111 | 110                     | 109 | 108    | 108 | 107 | 106 | 106 | 105 | 105 | 104 | 104 |
| 60                         | 149  | 146                    | 144 | 142 | 140 | 138 | 136 | 134 | 133   | 131 | 130                     | 129 | 128    | 126 | 125 | 124 | 123 | 122 | 122 | 121 | 120 |
| 70                         | 210  | 205                    | 202 | 198 | 195 | 192 | 189 | 187 | 184   | 182 | 180                     | 178 | 176    | 175 | 173 | 171 | 170 | 169 | 167 | 166 | 165 |
| 80                         | 252  | 246                    | 241 | 236 | 231 | 227 | 223 | 219 | 216   | 213 | 210                     | 207 | 205    | 202 | 200 | 198 | 196 | 194 | 192 | 191 | 189 |
| 90                         | 318  | 311                    | 304 | 297 | 292 | 286 | 281 | 277 | 273   | 269 | 265                     | 262 | 258    | 255 | 252 | 250 | 247 | 245 | 243 | 240 | 238 |
| 100                        | 401  | 391                    | 382 | 373 | 365 | 358 | 352 | 346 | 340   | 335 | 330                     | 325 | 321    | 317 | 314 | 310 | 307 | 304 | 301 | 298 | 295 |
| 110                        | 455  | 441                    | 428 | 417 | 406 | 397 | 388 | 380 | 373   | 366 | 360                     | 354 | 349    | 344 | 339 | 334 | 330 | 326 | 322 | 319 | 315 |

\* Source: Transport Canada's "Determining Minimum Sightlines at Grade Crossings: A Guide for Road Authorities and Railway Companies"

Sheet 4

### MileX.XX (357 Dock Road),SRY Rail

Surrey, British Columbia

LOCATION of GRADE CROSSING

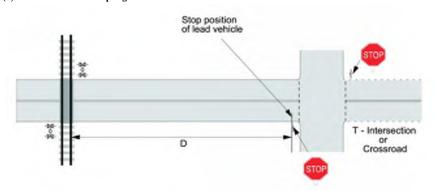
| Source  | Item   |    | Reference       |
|---------|--|----|-----------------|
|         |  |    |                 |
| observe | "D" should not be less than 30m for either approach if the train speed exceeds 15 mph.                                 |    |                 |
|         | D =18.6m   |    | GCS Section 9.1 |
| observe | Are there pedestrian crossings on either road approach that could cause vehicles to queue back to the tracks?          |    |                 |
| Observe |  | No |                 |
| observe | Is "D" insufficient such that road vehicles might queue onto the rail tracks?  | No |                 |
|         | Is "D" insufficient such that road vehicles turning from a side street might not see warning devices for the crossing? | No |                 |

Comments Following Site Visit:

- The minimum "D" dimension to the edge of the entrance to facility in Northern approach. The Southern approach "D" is 40.5m - RAILWAY CROSSING AHEAD sign installed from previous inspection (2015)

- Railwayspeed = 10mph

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

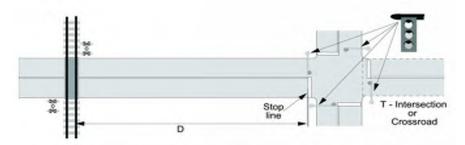
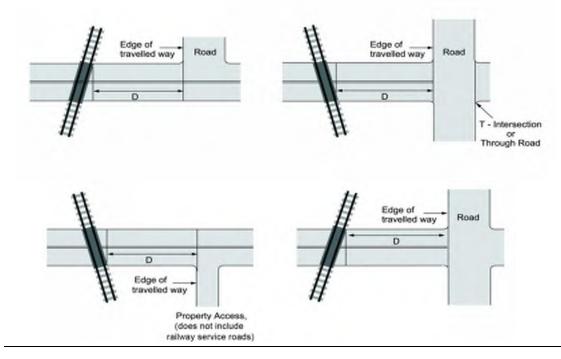


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings



Active Crossings C2.8

Sheet 5

# GRADE CROSSING SURFACE

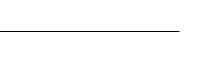
|  |  | I   | Item                               |  |                    |                |  | Reference                  |
|--|--|---|------------------------------------|--|--------------------|----------------|--|----------------------------|
| rve Is the cros  | sing smooth enough to allow road vehicles, pedestrians, cyclis   | sts, and other r  | oad users to cr                    | ross at thei   | r normal speed     | I without cons | equence?   | SOR 60; GCS                |
|  | Yes  |   |                                    |  |                    |                |  |                            |
| rve  | ssing Surface Material: Concrete Panels<br>ssing Surface Condition: Fair   |   |                                    |  |                    |                |  | SOR 60; GC                 |
|  | Road Surface Type: Ashpalt   |   |                                    |  |                    |                |  |                            |
|  | Road Surface Condition: Fair   |   |                                    |  |                    |                |  | SOR 60; GC                 |
|  | Illumination?: Yes   |   |                                    |  |                    |                |  | ,                          |
|  |  | SB Approach   | ı                                  |  | NB Approa          | ch             |  |                            |
| ure Road Surf  | ace crossing width (perp. C.L. min. = 8.0m)  |   | 22.2                               | m  |                    |                |  | GCS 5.1                    |
| ure Road Surf  | ace extension beyond travel lanes (min. = 0.5m)  | 0.5   | m                                  |  | 2.5                | m              |  | GCS 5.1                    |
| ure Sidewalk/  | Path/Trail crossing width (min. = 1.5m)  |   | NA                                 | m  | N/A                | m              | No sidewalk  | GCS 5.1                    |
|  | Path/Trail extension beyond sidewalk (min. = 0.5m)   | NA  | m                                  |  | N/A                | m              |  | GCS 5.1                    |
|  | Between Travel Lane and C.L. of Trail  |   | N/A                                | m  |                    |                |  |                            |
| Cross-Sec  |  |   | South (Righ                        | _  |                    | North (Left    |  | GCS Table 5                |
|  | y width (min. = 65mm; max.= 120mm or 75mm <sup>1</sup> )   |   | 61                                 | mm   |                    | 61             | mm   | GCS Table 5                |
|  | y depth (min. = 50mm; max.= no limit or 75mm <sup>1</sup> )  |   | 10                                 | mm   |                    | 10             | mm   | GCS Table 5                |
|  | d Side Gap:  |   |                                    | -  |                    |                |  | GCS Table 5                |
|  | width (max.= 120mm or 0 <sup>1</sup> )   |   | 22                                 | mm   |                    | 22             | mm   | GCS Table 5                |
|  | depth (max.= no limit or 0 <sup>1</sup> )  |   | 0                                  | mm   |                    | 0              | mm   | GCS Table 5                |
| Wear Lim   |  |   | -                                  |  |                    | -              |  | GCS Table 5                |
|  | of Top Rail above road surface (max. = 13mm <sup>1</sup> , 25mm, or 50mm)  |   | 5                                  | mm<br>mm   |                    | 5              | mm<br>mm   | GCS Table 5<br>GCS Table 5 |
| ure Elevation  |  |   |                                    |  |                    |                |  |                            |
| quent use by p<br>ents Following<br>eway and field   | of Top Rail below road surface (min. = -7mm <sup>1</sup> ,-25mm, or -50mm)<br>ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.  | be cleared  |                                    |  |                    |                |  |                            |
| quent use by p<br>ents Following<br>eway and field   | ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.  |   |                                    |  | tress of roadway a | approaches     | -photos  |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fl<br>ossing surface, loos  | ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.  |   | ]                                  | -surface dis   |                    |                | -photos<br>rface Dimensions  |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fl<br>ossing surface, loos<br>le Crossing<br>6-1 – Grade  | ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.<br>e timbers, etc.<br>- difference between road grade and rail supere<br>standards, July 2014<br>Crossing Surface – Cross Section  |   | ]                                  | -surface dis<br>Figure :   |                    | Crossing Su    | rface Dimensions   |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fl<br>ossing surface, loos<br>the Crossing surface<br>to 5-1 – Grade  | ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.<br>e timbers, etc.<br>- difference between road grade and rail supere<br>standards, July 2014<br>Crossing Surface – Cross Section  | elevation   | (a)                                | -surface dis<br>Figure :   | 5-1 - Grade        | Crossing Su    | rface Dimensions   |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fl<br>ossing surface, loos<br>le Crossing<br>6-1 – Grade  | ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.<br>e timbers, etc.<br>- difference between road grade and rail supere<br>standards, July 2014<br>Crossing Surface – Cross Section<br>y<br>Minimum  |   | (a)<br>Edge d                      | -surface dis<br>Figure :<br>Road, in<br>of shoulder                        | 5-1 - Grade        | Crossing Su    | Edge of<br>travelled way   |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fl<br>ossing surface, loos<br>the Crossing surface<br>to 5-1 – Grade  | ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.<br>- difference between road grade and rail supere<br>standards, July 2014<br>Crossing Surface – Cross Section<br>Minimum<br>Maximum for:  | elevation   | (a)<br>Edge d                      | -surface dis<br>Figure :   | 5-1 - Grade        | Crossing Su    | Edge of<br>travelled way<br>0.5 m or more beyond   |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fl<br>ossing surface, loos<br>the Crossing surface<br>to 5-1 – Grade  | ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.<br>e timbers, etc.<br>- difference between road grade and rail supere<br>standards, July 2014<br>Crossing Surface – Cross Section<br>y<br>Minimum  | elevation   | (a)<br>Edge d                      | -surface dis<br>Figure :<br>Road, in<br>of shoulder                        | 5-1 - Grade        | Crossing Su    | Edge of<br>travelled way   |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fl<br>ossing surface, loos<br>the Crossing surface<br>to 5-1 – Grade  | ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.<br>e timbers, etc.<br>- difference between road grade and rail supere<br>Standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road   | elevation   | (a)<br>Edge d                      | -surface dis<br>Figure :<br>Road, in<br>of shoulder                        | 5-1 - Grade        | Crossing Su    | Edge of<br>travelled way   |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fi<br>ossing surface, loos<br>le Crossings<br>e 5-1 – Grade<br>a) Flangewa<br>Widd  | ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.<br>e timbers, etc difference between road grade and rail supere<br>s Standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings  | 65 mm<br>75 mm<br>120 mm  | (a)<br>Edge c<br>End of            | -surface dis<br>Figure :<br>Road, in<br>of shoulder                        | 5-1 - Grade        | Crossing Su    | Edge of<br>travelied way<br>0.5 m or more beyond<br>travelied surface where<br>no shoulder                     |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fl<br>ossing surface, loos<br>the Crossing surface<br>to 5-1 – Grade  | ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.<br>e timbers, etc difference between road grade and rail supere<br>s Standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings  | 65 mm   | (a)<br>Edge o<br>End of<br>bayon   | -surface dis<br>Figure :<br>Road, ir<br>shoulder<br>railway 5e<br>shoulder | 5-1 - Grade        | Crossing Su    | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder                     |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fi<br>ossing surface, loos<br>le Crossings<br>e 5-1 – Grade<br>a) Flangewa<br>Widd  | ersons using assistive devices Site Visit: side gap constructed out of rubber. Flangeways needs to ange on eastern side. e timbers, etc. e difference between road grade and rail supere standards, July 2014 Crossing Surface – Cross Section      Minimum Maximum for: Public sidewalks, paths or trails designated by the road authonty for use by persons using assistive devices All other grade crossings Minimum Maximum for:   | 65 mm<br>75 mm<br>120 mm  | (a)<br>Edge o<br>End of<br>0.5 m o | -surface dis<br>Figure :<br>Road, ir<br>shoulder<br>railway 5e<br>shoulder | 5-1 - Grade        | Crossing Su    | Edge of<br>travelied way<br>0.5 m or more beyond<br>travelied surface where<br>no shoulder                     |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fi<br>ossing surface, loos<br>le Crossings<br>e 5-1 – Grade<br>a) Flangewa<br>Widd  | ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.<br>- difference between road grade and rail supere<br>standards, July 2014<br>Crossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum  | 65 mm<br>75 mm<br>120 mm  | (a)<br>Edge o<br>End of<br>bayon   | -surface dis<br>Figure :<br>Road, ir<br>shoulder<br>railway 5e<br>shoulder | 5-1 - Grade        | Crossing Su    | Edge of<br>travelied way<br>0.5 m or more beyond<br>travelied surface where<br>no shoulder                     |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fi<br>ossing surface, loos<br>le Crossings<br>e 5-1 – Grade<br>a) Flangewa<br>Widd  | ersons using assistive devices<br>Site Visit:<br>side gap constructed out of rubber. Flangeways needs to<br>ange on eastern side.<br>- difference between road grade and rail supere<br>standards, July 2014<br>Crossing Surface – Cross Section<br>y:<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road   | elevation<br>65 mm<br>75 mm<br>120 mm<br>50 mm                                  | (a)<br>Edge o<br>End of<br>bayon   | -surface dis<br>Figure :<br>Road, ir<br>shoulder<br>railway 5e<br>shoulder | 5-1 - Grade        | Crossing Su    | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface where<br>no shoulder<br>Crossing surface | <b>5</b> 82.               |
| equent use by p<br>ents Following<br>eway and field<br>tation within fl<br>ossing surface, loss<br>te Crossings<br>te Crossings<br>te C-1 – Grade<br>a) Flangewa<br>Widd<br>Depth<br>(b) Field sid<br>A space is p | ersons using assistive devices Site Visit: side gap constructed out of rubber. Flangeways needs to ange on eastern side.  e timbers, etc difference between road grade and rail supere standards, July 2014 Crossing Surface – Cross Section  y: Minimum Maximum for: Public sidewalks, paths or trails designated by the road authonty for use by persons using assistive devices All other grade crossings   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public             | (a)<br>Edge o<br>End of<br>bayon   | -surface dis<br>Figure :<br>Road, ir<br>shoulder<br>railway 5e<br>shoulder | 5-1 - Grade        | Crossing Su    | Edge of<br>travelied way<br>0.5 m or more beyond<br>travelied surface where<br>no shoulder                     |                            |
| equent use by p<br>ents Following<br>eway and field<br>tation within fi<br>ossing surface, loos<br>le Crossings<br>e 5-1 – Grade<br>a) Flangewa<br>wide<br>(b) Field sid<br>A space is p<br>sidewaks p             | ersons using assistive devices Site Visit: side gap constructed out of rubber. Flangeways needs to ange on eastern side.  e timbers, etc difference between road grade and rail supere standards, July 2014 Crossing Surface – Cross Section  y: Minimum Maximum for: Public sidewalks, paths or trails designated by the road authonty for use by persons using assistive devices All other grade crossings   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public             | (a)<br>Edge o<br>End of<br>bayon   | -surface dis<br>Figure :<br>Road, ir<br>shoulder<br>railway 5e<br>shoulder | 5-1 - Grade        | Crossing Su    | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled sufface where<br>no shoulder<br>Crossing surface | Wam                        |
| equent use by p<br>ents Following<br>eway and field<br>tation within fi<br>ossing surface, loos<br>le Crossings<br>e 5-1 – Grade<br>a) Flangewa<br>wide<br>(b) Field sid<br>A space is p<br>sidewaks p             | ersons using assistive devices Site Visit: side gap constructed out of rubber. Flangeways needs to ange on eastern side difference between road grade and rail supere timbers, etc difference between road grade and rail supere Standards, July 2014 Crossing Surface – Cross Section  V Minimum Maximum for: Public sidewalks, paths or trails designated by the road authonity for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authonity for use by persons using assistive devices All other grade crossings All other gra | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>75 mm<br>No limit<br>or public<br>resusing | (a)<br>Edge o<br>End of<br>bayon   | -surface dis<br>Figure :<br>Road, ir<br>shoulder<br>railway 5e<br>shoulder | 5-1 - Grade        | Crossing Su    | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled sufface where<br>no shoulder<br>Crossing surface |                            |

2- 0.5 m or more beyond sidewalk; or beyond shoulder where there is one

3- Crossing surfaces may be separate only where the space between them \_\_\_\_\_ is 1.0 m or more; otherwise crossing surface must be continuous.

2.2

Public sidewalk, path or trail designated by the road authority for use by persons using assistive devices Maximum distance of the top of the rail above crossing 13 mm surface Maximum distance of the top of the rail below crossing surface 7 mm All other public grade crossings; the maximum distance of the top of the rail above or below the crossing surface 25 mm Private grade crossings, the maximum distance of the top of the rail above or below the crossing surface 50 mm



5-0.5 m or more beyond sidewalk

2009

Width

Sheet 7

## ROAD GEOMETRY

| Source        |   |                      | Ite                               | em     |           |      |               |                  |           | Reference           |
|---------------|---|----------------------|-----------------------------------|--------|-----------|------|---------------|------------------|-----------|---------------------|
| observe       | Are horizontal and vertical alignments smooth and                                 | continuous throu     | ghout SSD?                        |        |           |      |               |                  |           | Sheet 4             |
| observe       | WB Approach: Yes  |                      | EB Approach:                      | Yes    |           |      |               |                  |           | Sheet 4             |
| observe       | Is horizontal alignment straight beyond rails for a di                            | stance ≥ design v    | ehicle length, L?                 |        |           |      |               |                  |           | Sheet 4             |
| 0030170       | WB Approach: Yes  |                      | EB Approach:                      | Yes    |           |      |               |                  |           | Sheet 4             |
| observe       | the road lanes at least the same width on the crossing as on the road approaches? |                      |                                   |        |           |      |               |                  |           |                     |
| Observe       | WB Approach: Yes  |                      | EB Approach:                      | Yes    |           |      |               |                  |           |                     |
|               | Grades  |                      | SB Approach                       |        | NB Approa | ach  | Difference: r | ail e & rd grade | (GCS 6.1) | GCS Sect. 6         |
| measure       | Slope within 8m of nearest rail (max. = 2%)                                       |                      | 1.00                              | %      | 1.50      | %    | 0.50%         | %                | 0.75%     | Diff in Grade Max   |
| measure       | Slope between 8m & 18m of nearest rail (max. = 5%)                                |                      | 1.00                              | %      | 0.50      | %    |               |                  |           | 3%                  |
|               | If crossing is only for pedestrians, cyclists, or person                          | s using assistive of | devices (max. = 1 <sup>1</sup> or | r 2%): | -         | -    |               |                  |           |                     |
| measure       | slope within 5m of nearest rail =   |                      | N/A                               | %      | N/A       | %    |               |                  |           |                     |
| Road √        | General approach grade (max. = +/- 5%)  |                      | 1.00                              | %      | 1.00      | %    |               |                  |           |                     |
| Road v        | measured over the SSD distance of:  |                      | 10                                | m      | 45        | m    |               |                  |           | Sheet 4             |
| Rail √        | Are rail tracks super-elevated?   | No                   | Rate of s/e:                      | 0.00   | m/m Sdg   | 0.00 | m/m ML        |                  |           | GCS Sect. 6.1 & 6.2 |
|               | If train speeds exceed 15mph (70° minimum w/o warning                             | system; 30° minimum  | with warning system)              | :      |           |      |               |                  |           |                     |
| Road √        | What is the angle between the crossing and the roa                                | dway?                | =                                 | 60.0   | degrees   |      |               |                  |           |                     |
| -             | Condition of Road Approaches:   | Fair.                |                                   |        |           |      |               |                  |           | SOR 60              |
| observe       | (e.g., anything that might affect stopping or acceleration)                       |                      |                                   |        |           |      |               |                  |           |                     |
| observe       | NA  |                      |                                   |        |           |      |               |                  |           |                     |
| 1. If frequer | nt use by persons using assistive devices   |                      |                                   |        |           |      |               |                  |           | ·                   |
| Comments      | Following Site Visit:   |                      |                                   |        |           |      |               |                  |           |                     |

## Minor crack in ashpalt observed on the approaches Crossing angle less than 70d. A warning system is warrented.

#### Grade Crossings Standards, July 2014

#### Table 6-1 - Difference in Gradient

| RLU         2           RCU         1           RCD         1           RAU         0           RAD         0           RFD         -           ULU         3           UCU         2           UCD         2           UAU         0 | Classification | Difference in Gradient (%) |
|---|----------------|----------------------------|
| RCD         1           RAU         0           RAD         0           RFD         -           ULU         3           UCU         2           UCD         2   | RLU            | 2                          |
| RAU         0           RAD         0           RFD         -           ULU         3           UCU         2           UCD         2   | RCU            | 1                          |
| RAD         0           RFD         -           ULU         3           UCU         2           UCD         2   | RCD            | 1                          |
| RFD         .           ULU         3           UCU         2           UCD         2   | RAU            | 0                          |
| ULU 3<br>UCU 2<br>UCD 2   | RAD            | 0                          |
| UCU 2<br>UCD 2  | RFD            |                            |
| UCD 2   | ULU            | 3                          |
|   | UCU            | 2                          |
| UAU 0   | UCD            | 2                          |
|   | UAU            | 0                          |

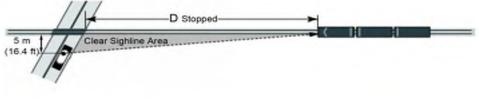
Divided (D)

Source: Geometric Derign Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999

#### Figure 7-1 - Minimum Sightlines - Grade Crossings

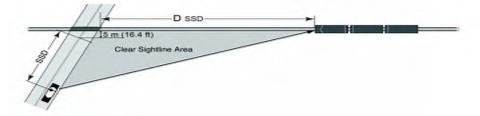
"Leger Urban

(a) Sightlines for Users Stopped at a Grade Crossing (applicable to all quadrants)



Undivided (U)

(b) Sightlines for Users Approaching Grade Crossing (applicable to all quadrants)



#### Sheet 8

## SIGHTLINES

| Driver Eye Height | = | 1.05m | passenger vehicles, pedestrians, cyclists & assistive devices |
|-------------------|---|-------|---|
|                   | = | 1.80m | buses & straight trucks                                       |
|                   | = | 2.10m | large trucks & tractor-trailers                               |
| Target Height     | = | 1.20m | above rails   |

| Source    |   | Ite   | em           |                    |                         |                  | Reference                   |
|-----------|---|---|--------------|--------------------|-------------------------|------------------|-----------------------------|
| -         | Are sightlines within the rail R.O.W. clear of b          | ushes/vegetation; 15 m on each side of t              | the track ar | nd, 30 m along the | e track, on each side o | of the crossing? |                             |
| observe   | -if no, detail the location No                            |   |              |                    |                         |                  |                             |
| observe   | Are sightlines on the road R.O.W. within 15m              | of the rail crossing clear of bushes/veget            | tation?      |                    |                         |                  |                             |
| Observe   | -if no, detail the location No                            |   |              |                    |                         |                  |                             |
|           |   |   | SB Approa    | ch                 | NB Approa               | ch               |                             |
| look-up   | SSD minimum =   |   | 10           | m                  | 45                      | m                | Sheet 4                     |
| measure   | SSD Actual (not including turning movements):             |   | 175.0        | m                  | 40.6                    | m                |                             |
| calculate | D <sub>SSD</sub> =  | 0.277837 x V <sub>train km/h</sub> x T <sub>SSD</sub> | 42           | m                  | 42                      | m                | 1.609 convert mph to km/h   |
| calculate | D <sub>STOPPED</sub> minimum (m) =                        | 0.277837 x V <sub>train km/h</sub> x T <sub>D</sub> = | 64           | m                  | 62                      | m                | T <sub>D</sub> from Sheet 4 |
| measure   | D <sub>STOPPED</sub> Actual:                              | Driver looking LEFT                                   | 30           | m (ne)             | 65                      | m (sw)           |                             |
| measure   |   | Driver looking RIGHT                                  | 125          | m (nw)             | 60                      | m (se)           |                             |
| calculate | Ped./Cyclist D <sub>STOPPED</sub> (m)                     |   | 0            | m                  | 0                       | m                | T <sub>P</sub> from Sheet 4 |
|           | Ped./Cyclist D <sub>STOPPED</sub> Actual:                 | Person looking LEFT                                   | N/A          | m                  | N/A                     | m                |                             |
| measure   | note: measured from a point 2m in advance of sign/signals | Person looking RIGHT                                  | N/A          | m                  | N/A                     | m                |                             |
| observe   | Are there any obstacles within the sight triang           | les other than traffic signs/utility poles t          | that might   | affect visibility? |                         | -                |                             |
| Observe   | Fencing and equipment within fa                           | cility. Heavy vegetation thoughout the                | ROW.         |                    |                         |                  |                             |

**Comments Following Site Visit:** 

- Fencing and equipment blocks sights to the east . Heavy vegetation along the ROW. If removed sightlines improve.

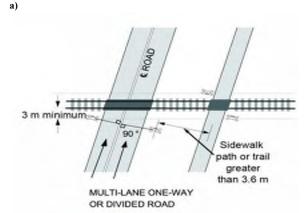
- SSD limited by road intersection in south

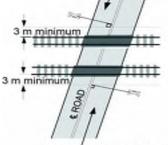
-visibility along the track impaired due to the angle of crossing?-special considerations for large trucks?

-special considerations for large trucks?

-can sightlines be maintained on an ongoing basis? (snow)

Figure 8-3 - Location of Railway Crossing Signs and Number of Tracks Signs (public grade crossings without warning systems) a) b)



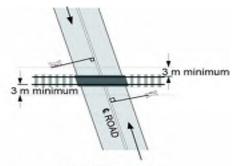


ANGLE GREATER THAN 90\*

-check visibility at all pedestrian crossing points

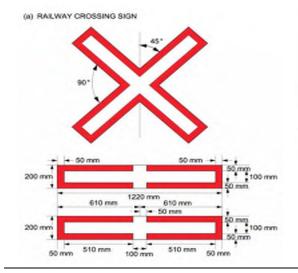
-special design vehicle?

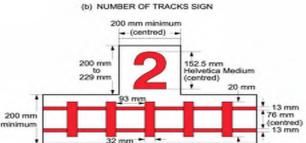
-photos



ANGLE 90° OR LESS

## Figure 8-1 - Railway Crossing Sign and Number of Tracks Sign





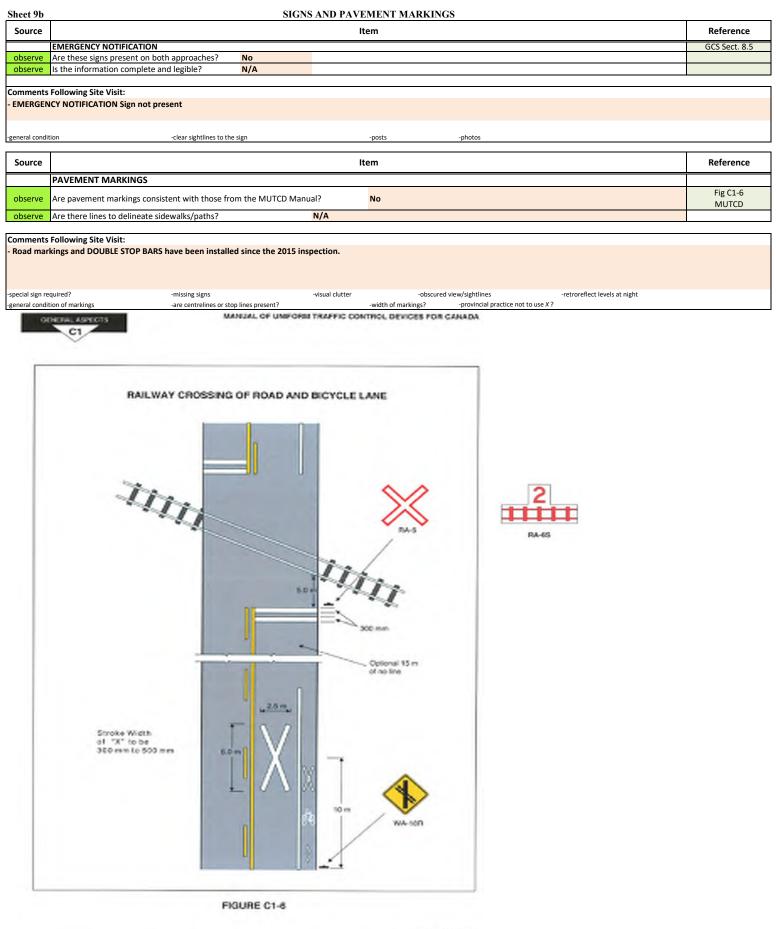
690 mm minimum

20 mm

SIGNS AND PAVEMENT MARKINGS

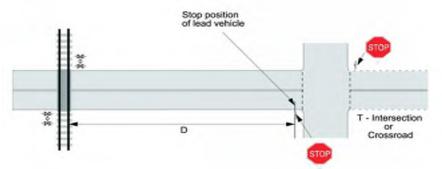
Sheet 9a

| Source   |  |   | Item   |                          |  |               |            | Reference   |
|--|--|---|--|--------------------------|--|---------------|------------|---|
|  | Railway Crossing Sign  | \$  | $\times$                                     |                          |  |               |            | MUTCD   |
|  |  | <   |  | hese signs will be       | required                                 |               |            |   |
|  |  | SB Approach   |  | proach                   |  |               |            |   |
| measure  | distance from nearest rail:  | N/A m   |  | .0 m                     |  |               |            |   |
| measure  | distance from edge of road:<br>height of centre of crossbucks:   | N/A m<br>N/A m  |  | .1 m<br>/A m             |  |               |            |   |
| measure  | retroreflectivity readings:  |   |  |                          | 1  |               |            |   |
| measure<br>observe   | Number of Tracks sign? No  |   | ux/m <sup>2</sup> N,                         | /A cd/lux/m <sup>2</sup> |  |               |            |   |
| observe  | A Stop Sign must be installed at grade crossing without a wa   | arning system if the road de                                | sign speed is less that                      | an 15mph                 | Ye                                       | es/ No/ NA N/ | Δ          | SOR 64  |
|  | A Stop Ahead sign must be installed if the Stop Sign   |   |  |                          |  | es/No/NA N/   |            | SOR 65  |
| Comments   | Following Site Visit:  |   |  | -                        |  |               | •          |   |
| -  | pole is installed on the south approach.   |   |  |                          |  |               |            |   |
| - A pole wit   | th reflective tape is located on the North approach  | . No signs are on the po                                    | ole.   |                          |  |               |            |   |
| -general condit  | ion -clear sightlines to the si  | gn  | -posts                                       |                          | -photos                                  |               |            |   |
| general contait  |  | 5''   | p0303  |                          | photos                                   |               |            |   |
| Source   |  |   | Item   |                          |  |               |            | Reference   |
|  |  | _   |  |                          |  |               |            |   |
|  | DO NOT STOP ON TRACKS  | ר   |  |                          |  |               |            |   |
|  |  |   |  |                          |  |               |            |   |
|  |  | 1   |  |                          |  |               |            | MUTCD   |
|  |  |   |  |                          |  |               |            |   |
|  |  | J   |  |                          |  |               |            |   |
|  | P18-00   |   |  |                          |  |               |            |   |
| Road √   | Does queued traffic routinely encroach closer than   | 5m from the crossing s                                      | urface?                                      | No                       |  |               |            |   |
| observe  | Are these signs present on either approach?  |   |  | No                       |  |               |            |   |
| Comments   | Following Site Visit:  |   |  |                          |  |               |            |   |
|  | TOP ON TRACKS Sign not required.   |   |  |                          |  |               |            |   |
| -general condit  | ion -posts   | -phot   | tos  |                          |  |               |            |   |
|  | <u>.</u>   |   |  |                          |  |               |            |   |
| Source   |  |   |  |                          |  |               |            |   |
|  |  |   | Item   |                          |  |               |            | Reference   |
|  | Railway Crossing Ahead Sign (WA 18-20)   | •   | Item   | ~                        |  |               |            | Reference   |
|  | Railway Crossing Ahead Sign (WA 18-20)   |   | Item   | 1#                       |  |               |            | Reference   |
|  | Railway Crossing Ahead Sign (WA 18-20)   |   | Item   |                          |  |               |            |   |
|  | Railway Crossing Ahead Sign (WA 18-20)   |   | Item   |                          |  |               |            | Reference   |
|  | Railway Crossing Ahead Sign (WA 18-20)   |   |  |                          |  |               |            |   |
|  |  | HI-II<br>WA-II  | NA-16R                                       |                          |  | 255           |            | MUTCD & SOR 66  |
| look-up  | Is AADT > 100? <b>Yes</b>  | UL-13   | SB App                                       | proach                   | NB Approach<br>Yes                       |               |            |   |
|  |  |   | NA-16R                                       |                          | NB Approach                              |               |            | MUTCD & SOR 66  |
| look-up<br>observe   | Is AADT > 100? <b>Yes</b><br>Is area urban such that WA 18-20 is <u>not</u> required?  |   | SB App<br>Yes                                | proach                   | NB Approach<br>Yes                       | 208           |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>measure  | Is AADT > 100? <b>Yes</b><br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign  |   | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m               | 28            |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>measure<br>observe<br>observe  | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol   | =   | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m<br>2.5        | 28            |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>measure<br>observe<br>observe<br>Comments  | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:  | = Yes   | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m<br>2.5        |               |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>measure<br>observe<br>observe<br>Comments<br>- RAILWAY   | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the  | =<br>Yes<br>e previous inspection.                          | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m<br>2.5        |               |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY   | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 33m   | =<br>Yes<br>e previous inspection.<br>from crossing         | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>measure<br>observe<br>observe<br>Comments<br>- RAILWAY   | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 33m   | =<br>Yes<br>e previous inspection.<br>from crossing         | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m<br>2.5        | -photos       |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>-general condit  | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 33m   | =<br>Yes<br>e previous inspection.<br>from crossing         | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               |            | MUTCD & SOR 66<br>Sheet 3<br>MUTCD                                    |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY   | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 33m<br>ion -clear sightlines to the si  | =<br>Yes<br>e previous inspection.<br>from crossing         | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               |            | MUTCD & SOR 66<br>Sheet 3   |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>-general condit  | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 33m   | =<br>Yes<br>e previous inspection.<br>from crossing         | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               |            | MUTCD & SOR 66<br>Sheet 3<br>MUTCD                                    |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>-general condit  | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 33m<br>ion -clear sightlines to the si  | =<br>Yes<br>e previous inspection.<br>from crossing         | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30         | MUTCD & SOR 66<br>Sheet 3<br>MUTCD                                    |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>-general condit  | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 33m<br>ion -clear sightlines to the si  | =<br>Yes<br>e previous inspection.<br>from crossing         | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD<br>Reference                       |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>-general condit  | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 33m<br>ion -clear sightlines to the si  | =<br>Yes<br>e previous inspection.<br>from crossing         | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD<br>Reference                       |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>-general condit  | Is AADT > 100? Yes<br>Is area urban such that WA 18-20 is <u>not</u> required?<br>Distance from nearest rail to sign<br>height:<br>appropriate orientation of symbol<br>Following Site Visit:<br>CROSSING AHEAD Sign has been installed since the<br>CROSSING AHEAD Sign installed Min. Approx 33m<br>ion -clear sightlines to the si  | =<br>Yes<br>e previous inspection.<br>from crossing         | SB App<br>Yes<br>33<br>2.5                   | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD<br>Reference                       |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>-general condit  | Is AADT > 100? Yes Is area urban such that WA 18-20 is <u>not</u> required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since the CROSSING AHEAD Sign installed Min. Approx 33m ion -clear sightlines to the si ADVISORY SPEED SIGN  | = Yes<br>e previous inspection.<br>from crossing            | SB App<br>Yes<br>33<br>2.5<br>-posts<br>Item | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD<br>Reference                       |
| look-up<br>observe<br>measure<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>-general condit<br>Source  | Is AADT > 100? Yes Is area urban such that WA 18-20 is <u>not</u> required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since the CROSSING AHEAD Sign installed Min. Approx 33m ion -clear sightlines to the si ADVISORY SPEED SIGN Are they present on both approaches? Posted speed limit?   | = Yes e previous inspection. from crossing gn No N/A km/    | SB App<br>Yes<br>33<br>2.5<br>-posts<br>Item | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD<br>Reference                       |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>-general condit  | Is AADT > 100? Yes Is area urban such that WA 18-20 is <u>not</u> required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since the CROSSING AHEAD Sign installed Min. Approx 33m ion -clear sightlines to the si ADVISORY SPEED SIGN Are they present on both approaches?   | = Yes e previous inspection. from crossing gn No            | SB App<br>Yes<br>33<br>2.5<br>-posts<br>Item | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD<br>Reference<br>MUTCD & SOR 66 (2) |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>- RAILWAY<br>-general condit<br>Source<br>observe<br>look-up                             | Is AADT > 100? Yes Is area urban such that WA 18-20 is <u>not</u> required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since the CROSSING AHEAD Sign installed Min. Approx 33m ion -clear sightlines to the si ADVISORY SPEED SIGN Are they present on both approaches? Posted speed limit? Are they required on either approach?   | = Yes e previous inspection. from crossing gn No N/A km/    | SB App<br>Yes<br>33<br>2.5<br>-posts<br>Item | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD<br>Reference<br>MUTCD & SOR 66 (2) |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>- RAILWAY<br>-general condit<br>Source<br>observe<br>look-up                             | Is AADT > 100? Yes Is area urban such that WA 18-20 is <u>not</u> required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since the CROSSING AHEAD Sign installed Min. Approx 33m ion -clear sightlines to the si ADVISORY SPEED SIGN Are they present on both approaches? Posted speed limit?   | = Yes e previous inspection. from crossing gn No N/A km/    | SB App<br>Yes<br>33<br>2.5<br>-posts<br>Item | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD<br>Reference<br>MUTCD & SOR 66 (2) |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>- RAILWAY<br>Source<br>Source<br>look-up<br>Comments                                     | Is AADT > 100? Yes Is area urban such that WA 18-20 is <u>not</u> required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since the CROSSING AHEAD Sign installed Min. Approx 33m ion clear sightlines to the si ADVISORY SPEED SIGN Are they present on both approaches? Posted speed limit? Are they required on either approach? Following Site Visit:                    | = Yes e previous inspection. from crossing gn No N/A km/    | SB App<br>Yes<br>33<br>2.5<br>-posts<br>Item | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD<br>Reference<br>MUTCD & SOR 66 (2) |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>- RAILWAY<br>Source<br>Source<br>look-up<br>Comments                                     | Is AADT > 100? Yes Is area urban such that WA 18-20 is <u>not</u> required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since the CROSSING AHEAD Sign installed Min. Approx 33m ion -clear sightlines to the si ADVISORY SPEED SIGN Are they present on both approaches? Posted speed limit? Are they required on either approach?   | = Yes e previous inspection. from crossing gn No N/A km/    | SB App<br>Yes<br>33<br>2.5<br>-posts<br>Item | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD<br>Reference<br>MUTCD & SOR 66 (2) |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>- RAILWAY<br>- RAILWAY<br>- general condit<br>Source<br>look-up<br>Comments<br>- ADVISOR | Is AADT > 100? Yes Is area urban such that WA 18-20 is not required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since the CROSSING AHEAD Sign installed Min. Approx 33m ion clear sightlines to the si ADVISORY SPEED SIGN Are they present on both approaches? Posted speed limit? Are they required on either approach? Following Site Visit: YSPEED Sign not installed | = Yes e previous inspection. from crossing gn No N/A km/ No | SB App<br>Yes<br>33<br>2.5<br>-posts<br>Item | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD<br>Reference<br>MUTCD & SOR 66 (2) |
| look-up<br>observe<br>observe<br>observe<br>Comments<br>- RAILWAY<br>- RAILWAY<br>- RAILWAY<br>Source<br>Source  | Is AADT > 100? Yes Is area urban such that WA 18-20 is not required? Distance from nearest rail to sign height: appropriate orientation of symbol Following Site Visit: CROSSING AHEAD Sign has been installed since the CROSSING AHEAD Sign installed Min. Approx 33m ion clear sightlines to the si ADVISORY SPEED SIGN Are they present on both approaches? Posted speed limit? Are they required on either approach? Following Site Visit: YSPEED Sign not installed | = Yes e previous inspection. from crossing gn No N/A km/    | SB App<br>Yes<br>33<br>2.5<br>-posts<br>Item | proach                   | NB Approach<br>Yes<br>40 m<br>2.5<br>Yes |               | 30<br>km/h | MUTCD & SOR 66<br>Sheet 3<br>MUTCD<br>Reference<br>MUTCD & SOR 66 (2) |



JANUARY 2016

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

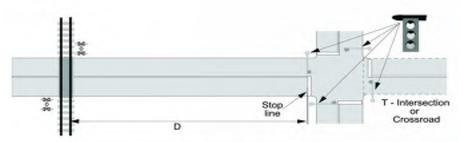
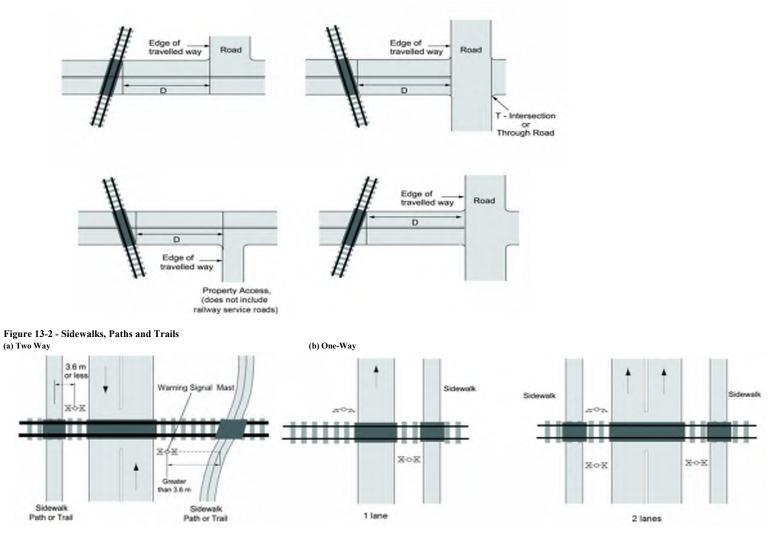


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings





| Sheet 11 |   |                     | GRAD               | E CROSSI      | NG WARNING                                | SYSTEN | 48                 |  | H  |                              | GCS Section 9     |
|----------|---|---------------------|--------------------|---------------|---|--------|--------------------|--|--|------------------------------|-------------------|
| Source   |   |                     |                    | ltem i        | is not required.                          |        |                    |  |  |                              | Reference         |
|          | Warning System Warrants                 |                     |                    |               |   |        |                    |  |  |                              |                   |
|          | if any of A through E below are r       | net, then a warnin  | ig system is warra | anted         |   |        |                    |  |  |                              |                   |
|          |   |                     | Question           |               |   |        |                    | Warrant fo   | r Warning Sy   | stem                         |                   |
|          | Existing AADT =                         | 210                 | Forecast AADT =    | -             | 240                                       |        |                    |  |  |                              | Sheet 3           |
| look-up  | Daily Train Volume =                    | 0                   |                    |               |   | trains |                    |  |  |                              | Sheet 3           |
|          | A. Cross-Product =                      | 0                   |                    |               |   |        | > 2,000 FLB        |  | > 50,000 req   | 0                            |                   |
| look-up  | B. Maximum Rail Operating Spe           | eed =               | 10                 |               |   | mph    | (max = 80m         | ph or 50 mph w                                       | ith crosswalk  | x)                           | Sheet 3           |
| Rail     | C. Number of Tracks =                   |                     | 1                  |               |   |        |                    |  |  |                              |                   |
| nan      | if $\geq$ 2, can trains pass one anothe | er?                 | N/A                |               |   |        | if $\ge 2$ and tra | ains can pass or                                     | ne another ->  | FLB req'd                    |                   |
| look-up  | D. Are Sightlines obscured?             |                     | No                 |               |   |        | if "Yes" -> Fl     | LB req'd: If Fig 7                                   | '.1 applies>   | add G                        | Sheet 8 & Fig 7.1 |
| observe  | E. Are any proximity conditions         | met?                | No                 |               |   |        | if "Yes" -> Fl     | LB required.   |  |                              | GCS Sect 9 & 11   |
| look-up  | Is a Warning System warranted?          | )                   | No                 |               |   |        | If any of A t      | hrough E above                                       | meet the Wa  | arrant                       |                   |
|          | Field Visit                             | Present? (Y/N)      | Condition / Alig   | nment:        |   |        |                    |  |  |                              | GCS 13            |
| observe  | Light Units,                            | N                   |                    |               |   |        |                    |  |  |                              | GCS 13            |
| observe  | Bells,                                  | N                   |                    |               |   |        |                    |  |  |                              | GCS 13            |
| observe  | Gates,                                  | N                   |                    |               |   |        |                    |  |  |                              | GCS 13            |
| observe  | Cantilever Lights,                      | N                   |                    |               |   |        |                    |  |  |                              | GCS 13            |
| observe  | Check that warning signal assem         | blies and cantileve | ers are in accorda | nce with GCS  | Figures.                                  |        |                    |  |  |                              | GCS Sect. 12      |
| observe  | Is warning system housing at lea        | ist 9m from travele | ed way of the roa  | d and 8m froi | m the nearest rail?                       |        |                    |  |  |                              |                   |
| observe  | If there is a sidewalk, is a bell on    | the adjacent asse   | mbly?              |               |   |        |                    |  |  |                              |                   |
| Rail √   | Have all light units been aligned       | ?                   | NA                 | Date?         | NA  |        |                    |  |  |                              |                   |
|          | Design Approach Warning Time            | (greatest of):      |                    |               |   |        |                    |  |  |                              |                   |
| Rail     |   |                     |                    |               | 20sec OR<br>[20+((cd-11)/3)]<br>if cd>11m | Td     | Тр                 | Gate Clearance<br>Time + Descent<br>Time + 5 seconds | Traffic Signal<br>Clearance Time<br>(=0 if no traffic<br>signal) | (SSD + cd + L)/(0.277837xVv) |                   |
|          | SB Approach                             |                     | 31.3               | sec           | 20.1                                      | 14.3   | 0.0                | 31.3   | 0.0  | 5.3                          |                   |
|          | NB Approach                             |                     | 31.3               | sec           | 20.0                                      | 13.9   | 0.0                | 31.3   | 0.0  | 9.4                          |                   |
| observe  | Is warning time less than 35 sec        | (without gates) or  |                    |               | N/A                                       |        |                    |  |  |                              |                   |

**Comments Following Site Visit:** 

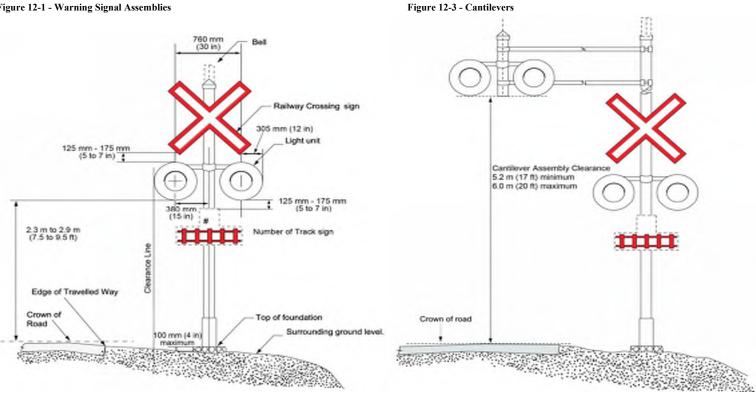
Railway operations have ceased along spur.

If Railway oerations increase, an active warning system may be required due to crossing angle.

- Train Speed: 10mph

xtraordinary conditions why warning system should be installed

## Figure 12-1 - Warning Signal Assemblies



-is warning system present but not warranted?



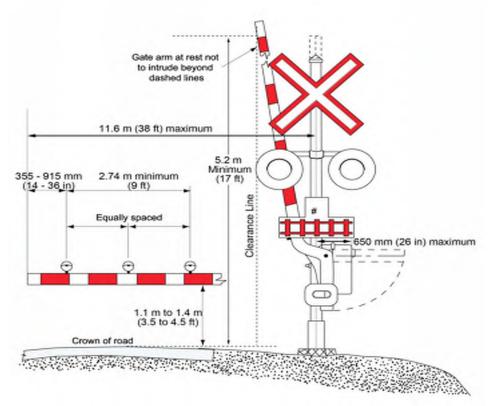
Sheet 12

## GATES FOR GRADE CROSSING WARNING SYSTEMS

GCS Section 9

| Source         |  |                   | ltem                             |             |  |               |             | Reference      |
|----------------|--|-------------------|----------------------------------|-------------|--|---------------|-------------|----------------|
|                | Warning System Warrants  |                   |                                  |             |  |               |             |                |
|                | -if any of A through E below are met the   | en a warning sys  | tem with gates is warranted.     | Not req     | uired as warning system is               | not necessary |             |                |
| calculate      | A. Cross-Product =   | 0                 | (50,000 min)                     |             |  |               |             |                |
| ,              | B. Maximum Rail Operating Speed =  | 10                | mph (max = 50mp                  | h)          |  |               |             | Sheet 3        |
| Rail √         | C. Number of Tracks =  | 1                 |                                  |             |  |               |             |                |
| Null V         | if $\geq 2$ , can trains pass one another?   | N/A               |                                  |             |  |               |             |                |
| look-up        | D. Is D <sub>STOPPED</sub> Insufficient? No Minor vegetation work required on Northwest and Southwest quadrants.       |                   |                                  |             |  |               |             |                |
| observe        | E. Are any proximity conditions met?   | N/A               |                                  |             |  |               |             |                |
| calculate      | Gate clearance distance: eq 10.4b  | 24.7              | m cd <sub>G stop</sub>           | 34.7        | m cd SSD SB                              | 69.7          | m cd SSD NB |                |
| look-up        | travel time =  | 14.3              | sec <sub>G stop</sub>            |             |  |               |             |                |
| calculate      | Gate arm clearance times:  | 14.3              | sec SB from stop T G ssd =       | 4.2         | sec SB from SSD                          |               |             |                |
| calculate      |  | 13.9              | sec NB from stop T G ssd =       | 8.4         | sec NB from SSD                          |               |             | GCS Sect. 10.4 |
| look-up        | Gate arm delay time: 14.3  | sec (greatest val | ue from above)                   |             |  |               |             |                |
| calculate      | effect of grade =  | 0.9               | sec (SB from Stop)               | -4.2        | sec SB from SSD                          |               |             |                |
|                |  | 0.3               | sec (NB from Stop)               | 0.0         | sec NB from SSD                          |               |             |                |
|                | Measure gate arm delay and compare with above:   |                   | N/A                              |             |  |               |             |                |
| observe        | Do gates conform to standards depicted in GCS Figu   |                   | N/A                              |             |  |               |             |                |
| observe        | Check gate descent (10 to 15 sec) and ascent (6 to 2   | 12 sec)           | N/A                              |             |  |               |             |                |
| observe        | Is gate striping vertical as depicted in GCS Figures?<br>Where railway equipment regularly stops, or railway equipment | i - 1 - 6+ - +    | N/A                              |             |  | -             |             |                |
| observe        |  |                   | operation of the warning system. | n, the warn | ing system must be equipped with a       | a Yes/No/NA   | NA          | GCS 16.3.1     |
| Comments       | Following Site Visit:  |                   |                                  |             |  |               |             |                |
| - Warning S    | system with Gates is not required.   |                   |                                  |             |  |               |             |                |
| -extraordinary | conditions why warning system should be installed  |                   |                                  | -is warning | system present but <u>not</u> warranted? | ? No          |             |                |

## Figure 12-2 - Gates



## Sheet 13

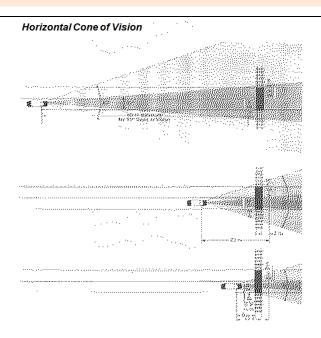
#### FLASHING LIGHT UNITS

Note: Driver's cone of vision is  $\pm$  5° horizontally; limited by top of windshield vertically.

| Source  |                                  |                       | Item is not required as warning s            | system is not required.     |      |                    |                     | u |
|---------|----------------------------------|-----------------------|--|-----------------------------|------|--------------------|---------------------|---|
|         | Number and Location              |                       |  |                             |      |                    |                     |   |
| look-up | Minimum Distance for Primar      | y Light Units (SSD) : | =  | 45.0                        | )    | m                  |                     |   |
| look-up | Recommended Distance for P       | rimary Light Units =  |  | 69.7                        |      | m                  |                     |   |
|         | Are flashing light units located | l within 5° horizont  | ally of the centerline of the road (througho | out the approach distance a | bove | e)?                |                     |   |
| observe |                                  |                       |  |                             |      | Yes (covered by fr | ont and back units) |   |
|         | Does horizontal/vertical curva   | iture necessitate su  | pplemental units?                            |                             |      | [                  | N/A                 |   |
| observe | Can back lights be seen by all   | stopped drivers?      |  |                             |      |                    | N/A                 |   |
| observe | Are lights obscured by vehicle   | s stopped on adjac    | ent intersections?                           |                             |      |                    | N/A                 |   |
| observe | Are additional light units requ  | ired for drivers as t | hey begin to turn onto an approach road fr   | om an intersecting road/la  | ne/p | pkg lot?           | N/A                 |   |
|         | Cantilevered Light Units         |                       | · · ·  |                             |      |                    |                     |   |
| measure | Does D <sub>R</sub> exceed 7.7m? | N/A                   |  |                             |      |                    |                     |   |
| measure | Does D <sub>L</sub> exceed 8.7m? | N/A                   | (Assumes signal poles on both sides of ro    | oad alignment, approach si  | de o | of rail)           |                     |   |
|         | Multiple Lanes                   | •                     |  |                             |      |                    |                     |   |
| observe | Can front light units be seen b  | y drivers in all lane | s (would T/T obscure?)?                      | N/A                         | L.   |                    |                     |   |
| observe | Can back light units be seen b   | y all stopped driver  | s in all lanes?                              | N/A                         |      |                    |                     |   |
|         | Sidewalks, paths, trails, etc.   |                       |  |                             |      |                    |                     |   |
| measure | Distance from path centerline    | to signal mast =      |  | N/A                         |      | m (max.=3.6m)      |                     |   |
| observe | Are separate light units requir  | red?                  |  | N/A                         |      |                    |                     |   |

Comments Following Site Visit:

Crossing currently regulated by a passive warning system.



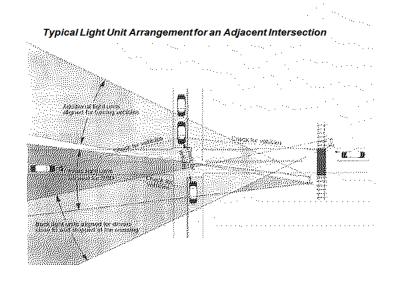
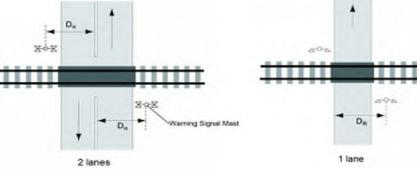
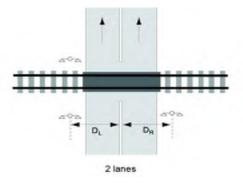


Figure 13-1 – Warning Signal Offsets Requiring Cantilevered Light Units

(a) Two-Way Road







GCS Sections 12-14





GCS Sections 13 and 14

#### PREPARE TO STOP AT RAILWAY CROSSING SIGN

| Source  |   |              | Item NA  |                 |                      | Reference                           |
|---------|---|--------------|--|-----------------|----------------------|-------------------------------------|
| observe | Are signs present?                        | No<br>No     | EB approach<br>WB approach                                   |                 |                      | SOR 67 (1), (2)<br>GCS 18.21 & 18.2 |
| look-up | Minimum Distance for Primary Light U      | nits (SSD)   |  | N/A             | m                    | Sheet 13                            |
| look-up | Recommended distance for Primary Lip      | ght Units    |  | N/A             | m                    | Sheet 13                            |
|         | Warrants                                  |              |  |                 |                      |                                     |
| observe | Are all front light units obscured within | n minimum    | distance above?  | N/A             |                      |                                     |
| look-up | Is the facility designated a "freeway" o  | r "expressw  | ay"?   | N/A             |                      | Sheet 3                             |
| observe | Do environmental conditions frequent      | ly obscure s | ignal visibility?  | N/A             |                      |                                     |
|         | Considering maximum prevailing spee       | eds, geome   | ry, and traffic composition, checkthe following:             |                 |                      |                                     |
| observe | Does sign flash during operation of gra   | ide crossing | warning system?  | N/A             |                      |                                     |
| measure | Distance from the sign to 2.4m beyond     | d the furthe | st rail =  | N/A             |                      |                                     |
| observe | Does the sign flash before the actuatio   | n of the cro | ssing warning system by the time required to travel from th  | ne sign to clea | the crossing? N/A    |                                     |
| measure | Distance from the sign to the closest g   | ate =        |  | N/A             | m                    |                                     |
| observe | Does the flashing sign precede actuation  | on of the de | scent of the gate arms by the time required to travel from t | he sign to clea | ar closest gate? N/A |                                     |
| measure | Time required for all queued vehicles t   | o resume to  | maximum road operating speed =                               | N/A             | sec                  |                                     |

Comments Following Site Visit:

#### PREPARE TO STOP RAILWAY CROSSING Signs not required.

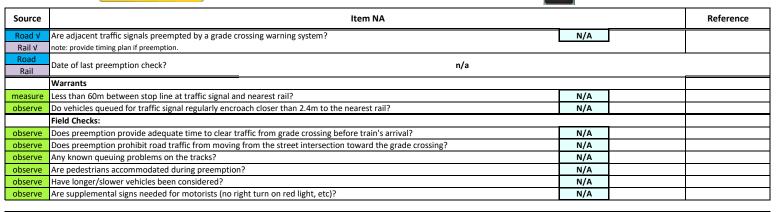


Sheet 15

Sheet 14



# PREEMPTION OF TRAFFIC SIGNALS

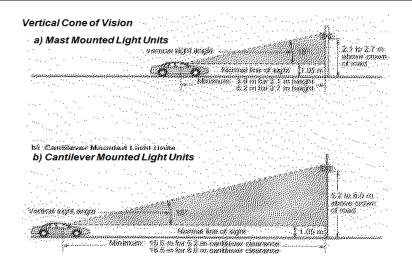


-functions as intended

**Comments Following Site Visit:** 

- No Traffic Signals located at crossing

-functions as intended



## AREAS WITHOUT TRAIN WHISTLING

Sheet 16

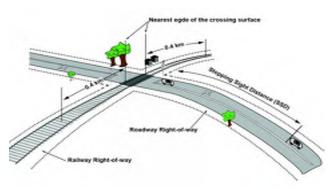
#### Grade Crossings Standards, July 2014

#### APPENDIX D - WHISTLING CESSATION

#### Table D-1 – Requirements for Warning Systems at Public Grade Crossings within an Area without Whistling

# Figure D-1 - prescribed area for whistling cessation as per article 23.1 of the RSA

|                               | (             | Column A           | Column B  |                                      |  |  |
|-------------------------------|---------------|--------------------|---|--------------------------------------|--|--|
| Railway<br>Design Speed       | Grade Crossin | gs for Vehicle Use | Grade Crossings For Sidewalks,<br>Paths, or Trails with the centrelin<br>no closer than 3.6 m (12 ft) to a<br>warning signal for vehicles |                                      |  |  |
|                               | No            | o. of Tracks       | No.   | of Tracks                            |  |  |
|                               | 1             | 2 or more          | 1   | 2 or more                            |  |  |
| Column 1                      | Column 2      | Column 3           | Column 4  | Column 5                             |  |  |
| 1 – 25 km/h (15 mph)          | FLB           | FLB                | No warning<br>system<br>requirement   | No warning<br>system<br>requirements |  |  |
| 25 – 81 km/h<br>(16 – 50 mph) | FLB           | FLB & G            | FLB   | FLB & G                              |  |  |
| Over 81 km/h (50 mph)         | FLB & G       | FLB & G            | FLB & G   | FLB & G                              |  |  |



RSA = Railway Safety Act of Canada

Legend :

FLB is a warning system consisting of flashing lights and a bell.

FLB & G is a warning system consisting of flashing lights, a bell and gates

| Source  |   | Item                                   |           |    |  |  |  |  |  |
|---------|---|--|-----------|----|--|--|--|--|--|
| Rail    | Is train whistling prohibited at this crossing?     | No                                     | 24 hours? | No |  |  |  |  |  |
| observe | Is there evidence of routine unauthorized access (t | rail line in the area of the crossing? | No        |    |  |  |  |  |  |
| observe | Are the requirements of Table D-1 met?              | No                                     |           |    |  |  |  |  |  |

## Comments Following Site Visit:

Whistle Cessation not required

#### Additional Prompt Lists

#### **Human Factors:**

- \* Control device visibility / background visual clutter.
- <sup>o</sup> Driver workload through this area (i.e., are there numerous factors that simultaneously require the driver's attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.).
- attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.), <sup>o</sup> Driver expectancy of the environment (i.e., are the control measures in keeping with the design levels of the road system and adjacent environment).
- \* Need for positive guidance.
- " Conflicts between road and railway signs and signals.

#### **Environmental Factors:**

- " Extreme weather conditions.
- \* Lighting issues (night, dawn/dusk, tunnels, adjacent facilities, headlight or sunlight glare, etc.)
- <sup>6</sup> Landscaping or vegetation.
- " Integration w/ surrounding land use (e.g., parked vehicles blocking sightlines, merging traffic tanes, etc.)

#### All Road Users:

Λ.

| navç | <ul> <li>needs of the following been met:</li> <li>pedestrians (including strollers, baby carriages, and blind persons)</li> </ul> |     |
|------|--|-----|
|      | -children / elderty  |     |
|      | -assistive devices (wheelchairs, scooters, walkers, etc)   |     |
|      | -bicyclists  |     |
|      | -motorcyclists   |     |
|      | -over-sized trucks   | · · |
|      | -buses   |     |
|      | -recreational vehicles   |     |
|      | -golfcarts   |     |
|      | -hazardous materials   |     |

(maze barriers/guide fencing, additional pedestrian bell, pedestrian gates, sign indicating potential presence of 2<sup>nd</sup> train at a multi track crossing, etc)

#### Other:

 Should closure of the crossing be considered due to inactivity, presence of nearby adjacent crossings, etc.

Comments Following Site Visit:

VFPA REPORT NUMBER: 20-0173

# VFPA FSPL TRANSPORTATION IMPROVEMENTS PROJECT 07 - MILE X.XX, 10610 TIMBERLANDS ROAD, CROSSING ASSESSMENT REPORT

FEBRUARY 09, 2021



# REVISION HISTORY

FINAL ISSUE

| 2020/09/03                   | FIRST DRAFT                           |                                       |  |
|------------------------------|---------------------------------------|---------------------------------------|--|
| Prepared by                  | Reviewed by                           |                                       |  |
| P. McCabe, Track<br>Designer | R. Sewell, Senior<br>Project Engineer |                                       |  |
| 2020/10/21                   | SECOND DRAFT                          |                                       |  |
| Prepared by                  | Reviewed by                           |                                       |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer  |                                       |  |
| 2021/02/09                   | FINAL                                 |                                       |  |
| Prepared by                  | Reviewed by                           | Approved By                           |  |
| P. McCabe, Track<br>Designer | G. Smith, Senior<br>Project Engineer  | R. Sewell, Senior<br>Project Engineer |  |

# SIGNATURES

PREPARED BY

09/02/2021

Patrick McCabe, CPEng (Aus), APEC Eng Track Designer Date



Robert Sewell, P.Eng Senior Project Engineer Date

09/02/2021

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# **NSD**

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| 2.2 | Crossing Modifications         | 3 |
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# **1 CROSSING OVERVIEW**

WSP Canada Group Limited (WSP) has been contracted as part of the Fraser Surrey Port Lands – Transportation Improvements Preliminary Design Services project, to complete a Railway Crossing Safety Assessment on the 10610 Timberland Road grade crossing. The SRY owned crossing is located within the Vancouver Fraser Port Authority (VFPA), Fraser Surrey Docklands near to the Canadian National (CN) Brownsville Spur which comes off Mile 117 of the Yale Subdivision.

A Railway Crossing Field Safety Assessment was undertaken on the 22nd of July 2020 and updates the previous Railway Crossing Assessment undertaken WSP (formally MMM Group) on the 5<sup>th</sup> of May 2015. The Railway Crossing Assessment as conducted follows the guidelines of applicable requirements identified in the most recent edition of Transport Canada's Grade Crossing Regulations (GCR) and Grade Crossing Standards (GCS).

The crossing is a passive protected crossing (SRCS), equipped with two RAILWAY CROSSING and STOP signs, located within an industrial area. A Tractor Trailer (WB-20) is the design vehicle used to represent daily traffic on port property. The Railway traffic volumes were provided by the SRY while the Average Annual Daily Traffic (AADT) was calculated based on the realigned infrastructure.

This report aims to identify the modifications to the grade crossing since the previous inspection completed by MMM Group in 2015, as well as highlight any new or previously identified non-compliances still relevant to this crossing.

# 1.1 LOCATION

The Timberland Road grade crossing is located within Fraser Surrey Docks jurisdiction at 10610 Timberland Road and crosses the SRY spur track. The crossing is located at the latitude and longitude of 49°11'39" and 112°53'59" respectfully. Figure 1, below shows the location of the crossing.



Figure 1: Crossing Location (source: Google Earth, 2020)

# 2 SAFETY ASSESSMENT

# 2.1 PREVIOUS ASSESSMENT (2015)

A previous crossing assessment was undertaken in 2015 by WSP for the 10610 Timberland Road crossing. The objective of the assessment was 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 referred to in the Railway Safety Act / Grade Crossing Regulations and contained in the Grade Crossing Standards.
- Ensure that all the crash mitigation measures/factors aimed to eliminate or reduce the identified safety problems were fully considered, evaluated and documented for review/action by the appropriate authorities.

The outcome of the 2015 assessment offered recommendations for consideration by the VFPA. Table 1: Previous Non-Compliances, illustrates the non-compliances and recommendations offered within the 2015 report. The recommendations were categorised within the three priority levels;

- Low implement the measures as soon as practicable
- Medium implement the measures by Transport Canada GCS & GCR November 2021 deadline.
- High implement the measures forthwith

# **Table 1: Previous Non-Compliances**

|     | Observations   | Suggested Actions  | Priority | Addressed?   |
|-----|--|--|----------|--|
| GCS | Section 3 – Crossing Surface (Basic Requirem   | ent)   |          |  |
| a.  | Railway crossing surface does not extend a<br>minimum of 0.5m beyond the travel lanes on the<br>south approach.  | Extend railway crossing surface to at least 0.5m beyond the travel lanes on the south approach   | High     | Yes – Railway crossing surface extends<br>0.5m beyond travel way.                                  |
| b.  | Flangeway depth does not meet the requirement due to debris.   | Clean debris from the flangeway.<br>Once debris is removed from the flangeway, the<br>railway company is to ensure the minimum depth is<br>met | High     | No   |
| GCS | Section 4 – Railway Crossing and Number of T   | racks Sign (Basic Requirement)   |          |  |
| a.  | RAILWAY CROSSING sign on the south<br>approach is located too close to the nearest<br>railway, too far from the curb and does not face<br>the correct direction. | Relocate RAILWAY CROSSING sign on the south approach as per GCS Section 4.1.   | High     | Yes – New RAILWAY CROSSING<br>Signs installed in compliant location.                               |
| GCS | Section 8 – Signs  |  |          |  |
| a.  | Retroreflective strips are not provided for the back of the RAILWAY CROSSING sign and both sides of the sign supporting post.                                    | Install retroreflective strips on the back of the RAILWAY CROSSING sign and both sides of the sign supporting post.                            | Medium   | Yes – New RAILWAY CROSSING<br>Signs installed with reflective strips on<br>front and back of sign. |
| b.  | RAILWAY CROSSING AHEAD signs are not<br>present on either approach of the crossing   | Install RAILWAY CROSSING AHEAD signs 45m +/-<br>10m in advance of the stopping location  | Medium   | Yes – Signs installed in compliant location.   |
| C.  | STOP signs are not present on either approach of the crossing.   | STOP signs should be installed on the same post as the RAILWAY CROSSING signs on both approaches   | Medium   | Yes – STOP Signs installed below<br>RAILWAY CROSSING Signs   |

| d. | EMERGENCY NOTIFICATION signs are not<br>present on either approach of the crossing.                | Install EMERGENCY NOTIFICATION sign on both<br>approaches as per GCS Section 8.5   | Medium | Yes – EMERGENCY NOTIFICATION<br>Sign installed below RAILWAY<br>CROSSING Sign. |
|----|--|--|--------|--|
| e. | Double stop bars are not present on either approach to the crossing for vehicles.                  | Paint double stop bars on both road approaches as per MUTCD Fig.C1-6 (Jan. 2014).  | High   | Yes – Double stop bars painted on both approaches                              |
| f. | RAILWAY CROSSING symbol pavement<br>markings are not present on either approach to<br>the crossing | Paint RAILWAY CROSSING symbol pavement<br>markings on both road approaches as per MUTCD<br>Fig.C1-6 (Jan. 2014).   | Medium | Yes – RAILWAY CROSSING SYMBOL<br>painted on both approaches                    |
| g. | Stopping or parking restriction is not observed<br>on the driveway at the railway right-of-way.    | Install NO STOPPING signs within the railway right-of-<br>way.   | Low    | Yes – PARKING RESTRICTION Signs<br>installed along Timberland Road.            |
| GC | S Sections 9, 12 to 17 – Warning Syste   | em Design  |        | I  |
| a. | An active warning system without gates is warranted based on cross-product.                        | Install active warning system without gates. However,<br>Transport Canada indicated that the crossing could<br>stay passive indefinitely unless the sightline<br>requirements could not be met | Low    | No   |

# 2.2 CROSSING MODIFICATIONS

As shown in Appendix A: Site Photographs, a number of changes have occurred at the crossing between inspections. Most changes were based on recommendations outlined in the 2015 inspection. Table 1, shows what changes have been made based on the 2015 recommendations. Below is a summarised list of all the changes observed from the site inspection:

- Rail operations have ceased along the spur track
- New grade crossing signage, including;
  - o RAILWAY CROSSING Signs
  - STOP Signs
  - RAILWAY CROSSING AHEAD signs
  - EMERGENCY INFORMATION Signs
  - PARKING RESTRICTION Signs
- New MUTCD compliant pavement markings.

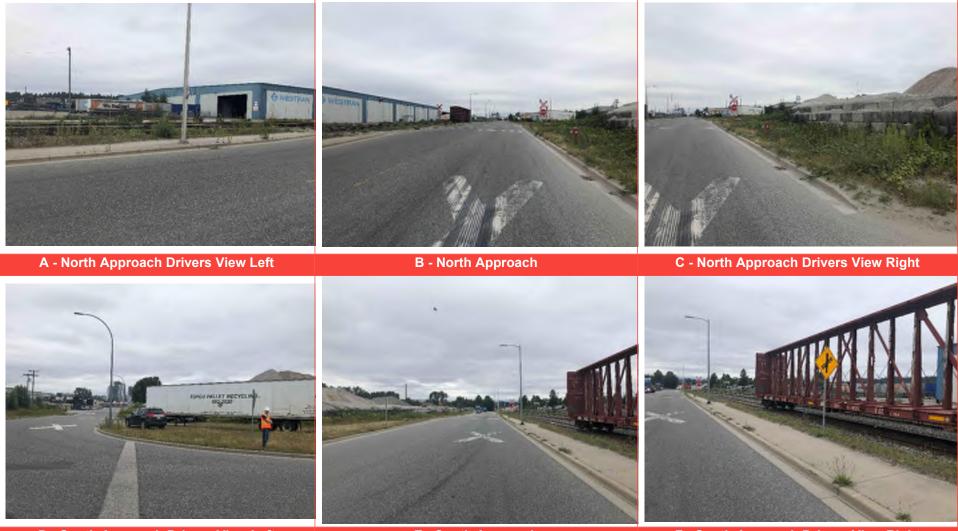
# 2.3 ASSESSMENT AND RECOMMENDATIONS

An updated Grade Crossing Safety Assessment was undertaken for the proposed realignment of the port road access and to determine any required crossing upgrades to ensure compliance with the GCR & GCS. **Appendix B: Site Inspection Report** provides details of the observations made during the site inspection. The inspection report also outlines outstanding safety issues, along with recommended remediations. As the railway operations have ceased along the spur, no upgrades are recommended. However, if railway operations are bought back, an updated Grade Crossing Safety Assessment is advised.



# A SITE PHOTOGRAPHS

# **APPENDIX**



D - South Approach Drivers View Left

E - South Approach

F - South Approach Drivers View Right

# **APPENDIX**



- G North Approach Driver View Left (At Stopped Position)
- H North Approach (At Stopped Position)
- I North Approach Drivers View Right (At Stopped Position)



J- South Approach Drivers View Left (At Stopped Position)



K - South Approach (At Stopped Position)



# **APPENDIX**





# B SITE INSPECTION REPORT

CANADIAN ROAD / RAILWAY GRADE CROSSING DETAILED SAFETY ASSESSMENT FIELD GUIDE (2005)\*

Appendix C2: Field Data Forms

×

Passive & Active Crossings

MileX.XX (10610 Timberland Road),SRY Rail Surrey, British Columbia For Vancouver Fraser Port Authority

|           | Legend: |   |
|-----------|---------|---|
| calculate | Formula | Spreadsheet cell has formula  |
| look up   |         | User to look up value in table or chart.  |
|           |         | User to input value here for conditional formatting or formulas in other cells to function                |
|           |         | Warning! Value beyond acceptable limits.  |
|           |         | Warning! Value beyond acceptable limits for certain conditions (i.e. for people using assistive devices). |
|           | Rail    | Information to be provided by Railway Company   |
|           | Road    | Information to be provided by Roadway Authority   |
| measure   | observe | Information to be obtained during Site Investigation  |
|           | ٧       | Information provided by others to be verified in the field  |

\* Updated to reflect Transport Canada's Grade Crossing Standards (GCS) July 2014 and Grade Crossing Regulations (GCR)(SOR-2014-275 Feb 2016)

| Sheet 1                 |                                       |                              | Grade Cros           | sing Safety Assessme     | ent                     |                                  | Passive Crossings   |
|-------------------------|---------------------------------------|------------------------------|----------------------|--------------------------|-------------------------|----------------------------------|---------------------|
| Date of Assessment:     |                                       | 22-Jul-2                     | 0 Site Investigation | on                       |                         |                                  |                     |
| Assessment Team Me      | embers & Affiliations:                | Patrick McCabe<br>Rob Sewell |                      |                          |                         |                                  |                     |
| Reason for Assessme     | nt: New Proposed                      | Pedestrian Crossing          |                      |                          |                         |                                  |                     |
|                         | periodic assessment                   | х                            | significant char     | nge in infrastructure    |                         | significant change in road or ra | ail volumes         |
|                         | cessation of whistling                |                              | significant char     | nge in train operations  |                         | significant change in road or ra | ail speeds          |
|                         | change in vehicle types               |                              | 2+ fatal collisio    | ns in 5yr. Period        |                         | other collision experience (see  | below)              |
| Railway Authority:      | Vancouver Fraser Port Authority       |                              |                      |                          | Road Authority:         | City of Surrey                   |                     |
| Crossing Location:      | 10610 Timberland Road                 |                              |                      |                          | Road Name/Number:       | 10610 Timberland Road            |                     |
| Location Number:        | N/A                                   |                              |                      |                          | Province:               | British Columbia                 |                     |
| Municipality:           | City of Surrey, BC                    |                              |                      |                          | Location Reference (con | trol section, etc.):             | Fraser Surrey Docks |
| Railway: SRY            |                                       | Mile:                        | N/A                  |                          | Road Classification:    |                                  |                     |
| Sub-division:           | N/A                                   | Course                       | N/A                  |                          | (freeway/expressway ar  | terial, collector, local, etc):  | ULU                 |
| Sub-uivision.           | NA                                    | Spur:                        | N/A                  |                          | Roadway East/West (yes  | ( no)                            |                     |
| Type of Grade Crossi    | ng [private/public; warning devices]: | SRSC                         |                      |                          | Roadway North/ South    |                                  |                     |
| Track Type: [mainline   | e, etc.]                              |                              | Yard                 |                          |                         |                                  |                     |
|                         |                                       |                              |                      |                          | *Urban Local Undivided  |                                  |                     |
| a                       |                                       |                              |                      |                          |                         |                                  |                     |
| Collision History (5-ye | ear period): No record of ac          | citents at the subject       | ct railway crossin   | g within the past five y | ears                    |                                  |                     |
| Property                | Damage collisions:                    |                              | NIL                  |                          |                         |                                  |                     |
| + Person                | al Injury collisions:                 |                              | NIL                  | Number o                 | of Persons Injured:     | NIL                              |                     |
| + Fatal In              | jury Collisions:                      |                              | NIL                  | Number o                 | of Persons Killed:      | NIL                              |                     |

NIL

= Total Collisions in last 5 year period:

Provide Details of the collisions if available:

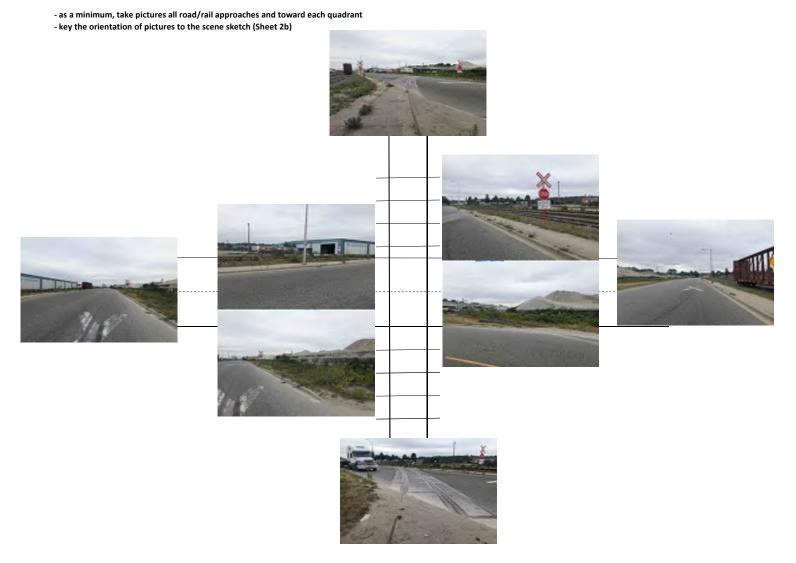
Sources:

- identify main contributing factors

- attach collision diagrams if available

Sheet 2a

SCENE PHOTOGRAPHS



For the full set of photos taken, see the Appendix to the Safety Assessment Report.

Sheet 2b

SCENE SKETCH

NOTE: All references to direction in this safety review are keyed to this diagram.



Notes: Images from Google Earth

Include: - directions to nearby municipalities for both road & rail approaches (use arrows)

- adjacent intersections

- relevant road signs/signals

- signal warning systems hardware

- landmarks - crosswalks/paths - geographical features

- bus stops, etc.

## GENERAL INFORMATION

| Source  |  |      | lt         | em                                     | Reference |
|---------|--|------|------------|--|-----------|
| Rail    | Maximum Railway Operating Speed, V <sub>T</sub>            | =    | 10         | (mph)                                  |           |
| Rail    | Daily Train Volume:  | =    | 0          | (freight trains/day)                   |           |
| Ndli    |  | =    | 0          | (passenger trains/day)                 |           |
| Rail    | Switching during daytime? Y/N                              | Yes  |            | nighttime? Y/N Yes                     |           |
| Road    | Avg. Annual Daily Traffic, AADT:                           | =    | 3,000      | (vpd) Year of count: 2020              |           |
| Road    | High seasonal fluctuation in volumes?                      |      | No         |  |           |
| Road    | Pedestrian Volumes   | =    | 0          | (ped./day)                             |           |
| Road √  | Is crossing on a School Bus route?                         |      | No         |  |           |
| Road √  | Do Dangerous Goods trucks use this roadway?                |      | Yes        |  |           |
| Road    | Cyclist Volumes  | =    | 0          | (cyclists/day) Cyclist not anticipated |           |
| Road √  | Regular use of crossing by persons with Assistive Devices? |      |            | None                                   |           |
| Road √  | Other special road users?                                  | type | Unknown    | daily volume None                      |           |
| Road    | Forecasted AADT <sup>2</sup>                               | =    | 1,170      | (vpd) Forecasted Year: 2022            |           |
|         | Design Speed:  |      | 30         | km/h Posted Speed: <b>30</b> km/h      |           |
| Road √  | Maximum Operating Speed:                                   |      | 30         | km/h                                   |           |
|         | note: provide details if all approaches are not the same   |      |            |  |           |
| Road √  | Road Surface Type (asphalt, concrete, gravel, etc.):       |      | Asphalt    |  |           |
| observe | Surrounding Land Use (urban/rural)?:                       |      | Industrial |  |           |
| observe | Any schools, retirement homes, etc. nearby?                |      | No         |  |           |

#### Notes:

Sheet 3

1. Road Authority should provided plans if available.

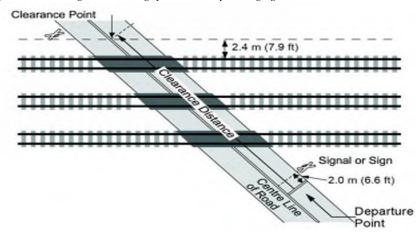
2. AADT is based upon modelled future traffic counts for the Realigned infrastrucutre.

## From GCS Section 7.1.2:

| Column 1       | Column 2   | Column 3   |
|----------------|--|--|
| Class of Track | The maximum<br>allowable operating<br>speed for freight trains<br>is - | The maximum<br>allowable operating<br>speed for passenger<br>trains is - |
| Class 1 track  | 17 km/h (10 mph)   | 25 km/h (15 mph)   |
| Class 2 track  | 41 km/h (25 mph)   | 49 km/h (30 mph)   |
| Class 3 track  | 65 km/h (40 mph)   | 97 km/h (60 mph)   |
| Class 4 track  | 97 km/h (60 mph)   | 129 km/h (80 mph)  |
| Class 5 track  | 129 km/h (80 mph)  | 153 km/h (95 mph)  |

Figure 10-1 - Clearance Distance (cd) for Grade Crossings

(a) For Grade Crossings with a Warning System or Railway Crossing Sign

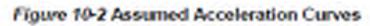


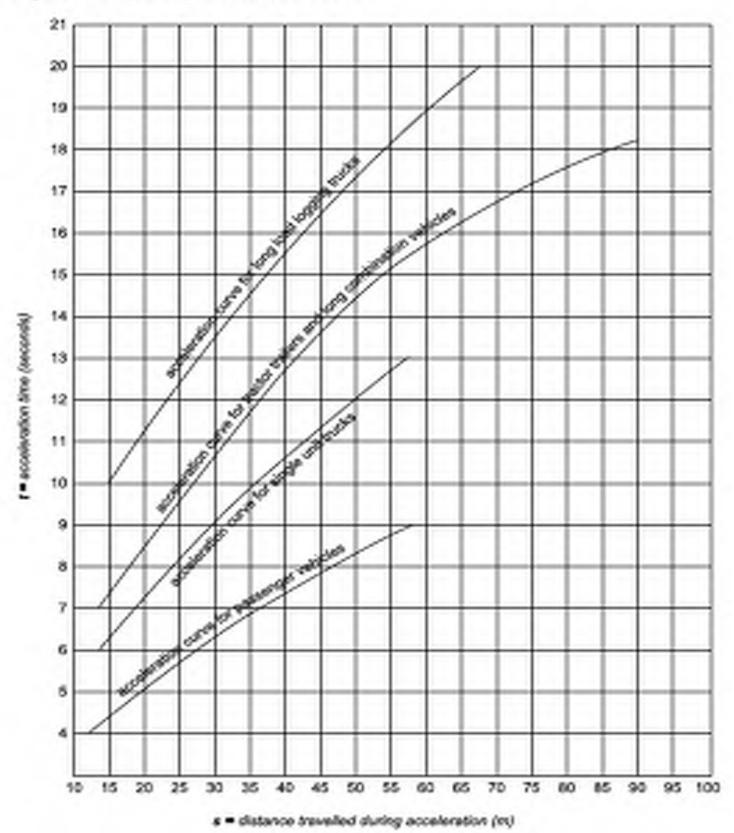
#### Grade Crossings Standards, July 2014

Table 10-1 Ratios of Acceleration Times on Grades

| Design Vehicle            |     | Ro  | ad Grade | (%) |     |
|---------------------------|-----|-----|----------|-----|-----|
|                           | -4  | -2  | 0        | +2  | +4  |
| Passenger Car             | 0.7 | 0.9 | 1.0      | 1.1 | 1,3 |
| Single Unit Truck & Buses | 0.8 | 0.9 | 1.0      | 1.1 | 1.3 |
| Tractor-Semitrailer       | 0.8 | 0.9 | 1.0      | 1.2 | 1.7 |

Source: Geometric Design Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999





DESIGN CONSIDERATIONS

| Source    |  |  |                          |                    | Item                     |            |            |     |           |     | Reference       |
|-----------|--|--|--------------------------|--------------------|--------------------------|------------|------------|-----|-----------|-----|-----------------|
|           | Design Vehicle                         |  |                          |                    |                          |            |            |     |           |     |                 |
| Road      | Type:                                  | 6                                      | WB-20 Tractor-           | Semitrailers (V    | VB-20)                   |            |            |     |           |     | Table 1* SOR 57 |
| look-up   | Length, L:                             | -                                      | 22.7                     | m                  |                          |            | SB Approad | :h  | NB Approa | ich | Table 1*        |
| look-up   | Stopping Sight Distance, SSD           |  | 45                       | m (round to        | 1.0% of grade)           | =          | 10         | m   | 45        | m   | Table 3*        |
| measure   | Clearance Distance, cd                 |  |                          |                    |                          | =          | 29.1       | m   | 16.4      | m   | GCS 16.1.1      |
| calculate | Vehicle Travel Distance, S             |  | S= L+cd                  | 51.8               | max <                    | =          | 51.8       | m   | 39.1      | m   |                 |
| look-up   | Vehicle Departure Time, t              |  |                          |                    |                          | =          | 14.8       | sec | 14.8      | sec | GCS Figure 10-2 |
| Road √    | Road Grade Effect:                     | maximum approa                         | ch grade within 'S       | S':                |                          | =          | 0.60       | %   | 0.50      | %   | Sheet 7         |
| look-up   | grade adjustment factor (anto ca       | lc assumes Truck)( ma                  | anual input from Tab     | ble 10-1 if other) |                          | =          | 1.03       |     | 1.02      |     | GCS Table 10-1  |
| calculate |  | T= t x adjustment                      | factor                   |                    |                          | =          | 15.2       | sec | 15.1      | sec |                 |
|           | Design Vehicle Departure Tir           | <b>ne, T<sub>D</sub> = J +</b> T (whe  | re J = 2 sec (min.) perc | eption & reaction) |                          |            | 2.0        | sec | 2.0       | sec |                 |
| calculate |  | T <sub>G stop</sub> = T <sub>D</sub> = | 17.2                     | sec                |                          | <-         | 17.2       | sec | 17.1      | sec | GCS 10.3.2      |
| observe   | Do field acceleration times exce       | ed T <sub>D</sub> ?                    | Acceleration m           | easurement be      | eyond the scope of       | f this ass | essment.   |     |           |     |                 |
| measure   | Pedestrian , cyclist & Assistiv        | e Devices Depar                        | ture Time                | pedes              | trian <b>cd</b> distance | =          | 0.0        | m   | 0.0       | m   | 000 10 2 2      |
| calculate | walking speed 1.22m/s max.             | T <sub>P</sub> =                       | 0.0                      | sec                | (1.0m/s used)            | <-         | 0.0        | sec | 0.0       | sec | GCS 10.3.3      |
| calculate | T <sub>SSD</sub> = (SSD+cd+L)/(0.27783 | 7 x V <sub>road design</sub> ) =       | 11.6                     | sec                |                          |            |            |     |           |     |                 |
| Comments  | Following Site Visit:                  |  |                          |                    |                          |            |            |     |           |     |                 |

## Table 1 - Design vehicle Lengths/Class

Sheet 4

| General Vehicle Descriptions            | Length (m) |
|---|------------|
| 1. Passenger Cars, Vans and Pickups (P) | 5.6        |
| 2. Light Single-unit Trucks (LSU)       | 6.4        |
| 3. Medium Single-unit Trucks (MSU)      | 10.0       |
| 4. Heavy Single-unit Trucks (HSU)       | 11.5       |
| 5. WB-19 Tractor-Semitrailers (WB-19)   | 20.7       |
| 6. WB-20 Tractor-Semitrailers (WB-20)   | 22.7       |
| 7. A-Train Doubles (ATD)                | 24.5       |
| 8. B-Train Doubles (BTD)                | 25.0       |
| 9. Standard Single-Unit Buses (8-12)    | 12.2       |
| 10. Articulated Buses (A-BUS)           | 18.3       |
| 11. Intercity Buses (I-BUS)             | 14.0       |

## Table 6 - Minimum Sightlines along the Rail Line (D<sub>steped</sub>) (as illustrated in Figure 3)

| Railway Design<br>Speed V,                  |            | $T_{stoppet} = Departure Time (greater of T_d or T_p) (seconds)$ |     |     |      |     |      |     |     |     |     |                       |  |
|---|------------|--|-----|-----|------|-----|------|-----|-----|-----|-----|-----------------------|--|
| (mph)                                       | <u>≤10</u> | 11   | 12  | 13  | 14   | 15  | 16   | 17  | 18  | 19  | 20  | 20 sec., add for each |  |
| WARNING:<br>Railway design<br>speed in mph! |            | Minimum Sightlines along Rail Line (D <sub>anger</sub> )<br>(m)  |     |     |      |     |      |     |     |     |     |                       |  |
| STOP  | 30         | 30   | 30  | 30  | 30   | 30  | 30   | 30  | 30  | 30  | 30  | +0                    |  |
| 1-10  | 45         | 50   | 55  | 60  | - 65 | 70  | 72   | 76  | 80  | 85  | 90  | +5                    |  |
| 11-20                                       | 90         | 100  | 110 | 120 | 125  | 135 | 145  | 155 | 165 | 170 | 183 | +10                   |  |
| 21-30                                       | 135        | 150  | 165 | 175 | 190  | 205 | 215  | 230 | 245 | 255 | 270 | +15                   |  |
| 31-40                                       | 180        | 200  | 220 | 235 | 250  | 270 | 285  | 305 | 325 | 340 | 360 | +20                   |  |
| 41-50                                       | 225        | 250  | 270 | 290 | 315  | 335 | 360  | 380 | 405 | -05 | 450 | +25                   |  |
| 51-60                                       | 270        | 300  | 325 | 350 | 380  | 405 | -180 | 460 | 485 | 510 | 540 | +30                   |  |
| 61-70                                       | 315        | 350  | 380 | 415 | 445  | 470 | 505  | 535 | 565 | 595 | 630 | +35                   |  |
| 71-80                                       | 360        | 395  | 435 | 465 | 505  | 540 | 580  | 610 | 650 | 680 | 720 | +40                   |  |
| #1-90                                       | 405        | 46   | 490 | 535 | 530  | 605 | 650  | 685 | 730 | 765 | 810 | +45                   |  |
| 91-100                                      | 450        | 500  | 540 | 580 | 630  | 670 | 715  | 760 | 805 | 850 | 895 | +50                   |  |

Source: Geometric Design Guide for Canadian Roads, TAC; September 1999.

# Table 3 – Determine SSD for Truck Class

| Road<br>Trossing<br>Design |                       | Truck Class<br>Stopping Sight Distance (SSD)<br>(m) |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----------------------------|-----------------------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Speed V<br>(km/hr)         | INVOL APPIVOLI VIOLIT |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| (MII(III)                  | -10%                  | -9%   | -8% | -7% | -6% | -5% | -4% | -3% | -2% | -1% | 0%  | 196 | 2%  | 3%  | 4%  | 5%  | 6%  | 7%  | 8%  | 9%  | 10% |
| 10                         | 10                    | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  |
| 20                         | 26                    | 26  | 26  | 26  | 26  | 26  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 24  | 24  | 24  | 24  | 24  |
| 30                         | 48                    | 48  | 47  | 47  | 47  | 46  | 46  | 46  | 45  | 45  | 45  | 45  | 45  | 44  | 44  | 44  | 44  | 44  | 44  | 43  | 43  |
| 40                         | 76                    | 75  | 74  | 74  | 73  | 73  | 72  | 71  | 71  | 70  | 70  | 70  | 69  | 69  | 68  | 68  | 68  | 67  | 67  | 67  | 67  |
| 50                         | 121                   | 120   | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 111 | 110 | 109 | 108 | 108 | 107 | 106 | 106 | 105 | 105 | 104 | 104 |
| 60                         | 149                   | 146   | 144 | 142 | 140 | 138 | 136 | 134 | 133 | 131 | 130 | 129 | 128 | 126 | 125 | 124 | 123 | 122 | 122 | 121 | 120 |
| 70                         | 210                   | 205   | 202 | 198 | 195 | 192 | 189 | 187 | 184 | 182 | 180 | 178 | 176 | 175 | 173 | 171 | 170 | 169 | 167 | 166 | 165 |
| 80                         | 252                   | 246   | 241 | 236 | 231 | 227 | 223 | 219 | 216 | 213 | 210 | 207 | 205 | 202 | 200 | 198 | 196 | 194 | 192 | 191 | 189 |
| 90                         | 318                   | 311   | 304 | 297 | 292 | 286 | 281 | 277 | 273 | 269 | 265 | 262 | 258 | 255 | 252 | 250 | 247 | 245 | 243 | 240 | 238 |
| 100                        | 401                   | 391   | 382 | 373 | 365 | 358 | 352 | 346 | 340 | 335 | 330 | 325 | 321 | 317 | 314 | 310 | 307 | 304 | 301 | 298 | 295 |
| 110                        | 455                   | 441   | 428 | 417 | 406 | 397 | 388 | 380 | 373 | 366 | 360 | 354 | 349 | 344 | 339 | 334 | 330 | 326 | 322 | 319 | 315 |

\* Source: Transport Canada's "Determining Minimum Sightlines at Grade Crossings: A Guide for Road Authorities and Railway Companies"

# MileX.XX (10610 Timberland Road),SRY Rail

# Surrey, British Columbia

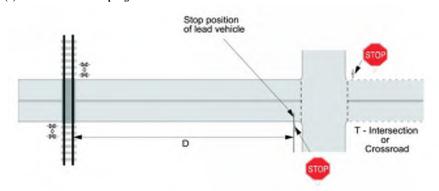
LOCATION of GRADE CROSSING

| Source      | Item   |    | Reference       |
|-------------|--|----|-----------------|
|             |  |    |                 |
| observe     | "D" should not be less than 30m for either approach if the train speed exceeds 15 mph.                                 |    |                 |
|             | D =46m   |    | GCS Section 9.1 |
| observe     | Are there pedestrian crossings on either road approach that could cause vehicles to queue back to the tracks?          |    |                 |
| observe     |  | No |                 |
| observe     | Is "D" insufficient such that road vehicles might queue onto the rail tracks?  | No |                 |
|             | is "D" insufficient such that road vehicles turning from a side street might not see warning devices for the crossing? | No |                 |
|             |  |    | ·               |
| Comments    | Following Site Visit:  |    |                 |
| - The minin | num "D" diminsion is measured on the South approach. The North "D" is 66m  |    |                 |
|             |  |    |                 |

- RAILWAY CROSSING AHEAD sign installed from previous inspection (2015)

- Railwayspeed = 10mp

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

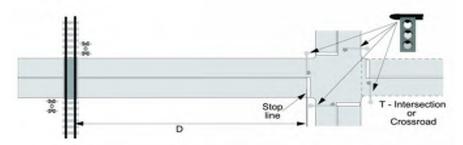
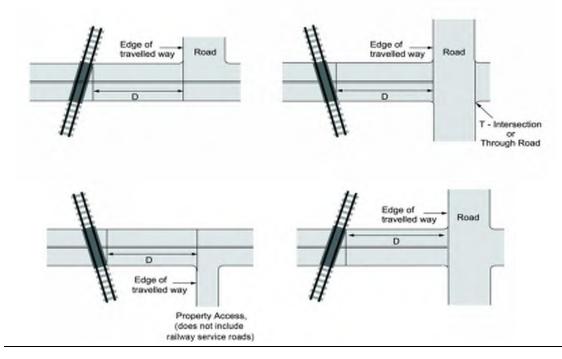


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings



Sheet 5

# GRADE CROSSING SURFACE

Sheet 6

| e   |  |  | I'  | tem  |   |  |   |  | Referenc  |
|---|--|--|---|--|---|--|---|--|---|
| ls the  | ne crossin   | g smooth enough to allow road vehicles, pedestrians, cy  | clists, and other ro  | oad users to o   | cross at their  | normal speed   | without cons                                      | sequence?  | SOR 60; GC  |
| Grad  | do Crocci  | Yes  | le .  |  |   |  |   |  |   |
| /e  |  | ing Surface Material: Concrete Pane<br>ing Surface Condition: Fair   | 15  |  |   |  |   |  | SOR 60; GC  |
|   |  | ad Surface Type: Ashpalt   |   |  |   |  |   |  |   |
|   |  | ad Surface Condition: Fair   |   |  |   |  |   |  | SOR 60; GC  |
|   |  | imination?: Yes  |   |  |   |  |   |  | 5511 55, 66   |
|   |  |  | SB Approach   |  |   | NB Approac   | h   |  |   |
| re Road   | d Surface  | e crossing width (perp. C.L. min. = 8.0m)  |   | 19.7   | m   |  |   |  | GCS 5.1   |
|   |  | e extension beyond travel lanes (min. = 0.5m)  | 2.0   | m  |   | 1.0  | m   |  | GCS 5.1   |
|   |  | th/Trail crossing width (min. = 1.5m)  | 2.0   | NA   | m   | 1.5  | m   | Crosswalk on WB only   | GCS 5.1   |
|   |  | th/Trail extension beyond sidewalk (min. = 0.5m)   | NA  | m  |   | 1.0  | m   | Crosswalk on WB only   | GCS 5.1   |
|   |  | ween Travel Lane and C.L. of Trail   |   | 0.8  | m   |  |   |  | 000 511   |
|   | ss-Sectio  |  |   | South (Rig   |   |  | North (Lef  | t) Rail:   | GCS Table   |
|   |  | /idth (min. = 65mm; max.= 120mm or 75mm <sup>1</sup> )   |   | 61   | mm  |  | 65  | mm   | GCS Table   |
|   | · ·  |  |   | 25   | mm  |  | 25  | mm   | GCS Table   |
|   | al Field Si  | epth (min. = 50mm; max.= no limit or 75mm <sup>1</sup> )<br>ide Gap:   |   | 25   |   |  | 25  |  | GCS Table   |
|   |  | Ith (max.= 120mm or 0 <sup>1</sup> )   |   | 6  | mm  |  | 6   | mm   | GCS Table   |
|   |  | T(1) (max.= 120mm or 0)<br>T(1) (max.= no limit or 0)  |   | 10   | mm  |  | 10  | mm   | GCS Table   |
|   | ar Limits:   |  |   | 10   |   |  | 10  |  | GCS Table   |
|   |  | Top Rail above road surface (max. = 13mm <sup>1</sup> , 25mm, or 50mm  | )   | 11   | mm  |  | 10  | mm   | GCS Table   |
|   |  | Top Rail below road surface (mix. = 13mm , 25mm, or 50mm   |   | 0  | mm  |  | 0   | mm   | GCS Table S   |
|   |  | sons using assistive devices   | 1   | L V  |   |  | U   |  | GC3 Table   |
| Cross   |  | tandards, July 2014  | perelevation  | 1  |   | ress of roadway a<br>5-1 - Grade (   |   | -photos  |   |
| Cross   | sings S  |  | perelevation  |  | Figure 5  | 5-1 - Grade (  | Crossing Su                                       |  |   |
| 6 Cross<br>5-1 – G  | sings S  | tandards, July 2014  | perelevation  | 1  | Figure 5  |  | Crossing Su                                       | urface Dimensions  | -   |
| 6 Cross<br>5-1 – G  | sings S<br>irade Cn<br>ngeway:   | tandards, July 2014  | perelevation  | 1  | Figure 5  | 5-1 - Grade (  | Crossing Su                                       | Irface Dimensions  | -   |
| 6 Cross<br>5-1 – G  | sings S<br>irade Cn<br>ngeway:   | tandards, July 2014<br>ossing Surface – Cross Section  |   | Edge   | Figure 5  | -1 - Grade (<br>cluding a path   | Crossing Su                                       | urface Dimensions  |   |
| 6 Cross<br>5-1 – G  | sings S<br>Frade Cri<br>ngeway:<br>Width   | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road   | 65 mm   | Edge   | Figure 5<br>) Road, in<br>of shoulder   | -1 - Grade (<br>cluding a path   | Crossing Su                                       | Edge of<br>travelled way<br>0.5 m or more beyond   |   |
| 6 Cross<br>5-1 – G  | sings S<br>irade Cro<br>ngeway:<br>Width   | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices   | 65 mm<br>75 mm  | Edge   | Figure 5<br>) Road, in<br>of shoulder   | -1 - Grade (<br>cluding a path   | Crossing Su                                       | Edge of<br>travelled way<br>0.5 m or more beyond   |   |
| 6 Cross<br>5-1 – G  | sings S<br>irade Cro<br>ngeway:<br>Width   | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road   | 65 mm   | Edge<br>End c  | Figure 5<br>) Road, in<br>of shoulder<br>(railway Sec   | -1 - Grade (<br>cluding a path   | Crossing Su                                       | Edge of<br>travelled way<br>0.5 m or more beyon:<br>travelid surface whe<br>no shoulder  |   |
| a Cross<br>5-1 – Gi<br>a) Flan  | sings S<br>irade Cn<br>ngeway:<br>Width  | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices   | 65 mm<br>75 mm  | Edge<br>End o  | Figure 5<br>) Road, in<br>of shoulder<br>(railway tee   | cluding a path   | Crossing Su                                       | Edge of<br>travelled way<br>0.5 m or more beyond   |   |
| a Cross<br>5-1 – Gi<br>a) Flan  | sings S<br>irade Cn<br>ngeway:<br>Width  | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings  | 65 mm<br>75 mm<br>120 mm  | Edge<br>End o  | Figure 5<br>) Road, in<br>of shoulder<br>f railway ter<br>or more<br>d shoulder   | cluding a path   | Crossing Su                                       | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface whe<br>no shoulder   |   |
| a Cross<br>5-1 – Gi<br>a) Flan  | sings S<br>irade Cr<br>ngeway:<br>Width<br>Depth   | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum   | 65 mm<br>75 mm<br>120 mm<br>50 mm   | Edge<br>End o  | Figure 5<br>) Road, in<br>of shoulder<br>f railway ter<br>or more<br>d shoulder   | cluding a path   | Crossing Su                                       | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface whe<br>no shoulder   |   |
| a Cross<br>5-1 – Gi<br>a) Flan  | sings S<br>irade Cn<br>ngeway:<br>Width<br>Depth   | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the roe<br>authority for use by persons using assistive devices   | 65 mm<br>75 mm<br>120 mm<br>50 mm   | Edge<br>End o  | Figure 5<br>) Road, in<br>of shoulder<br>f railway ter<br>or more<br>d shoulder   | cluding a path   | Crossing Su                                       | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface whe<br>no shoulder   |   |
| 9 Cross<br>5-1 – Gi<br>a) Flan  | sings S<br>irade Cr<br>ngeway:<br>Width<br>Depth   | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the roe<br>authority for use by persons using assistive devices<br>All other grade crossings  | 65 mm<br>75 mm<br>120 mm<br>50 mm   | Edge<br>End o  | Figure 5<br>) Road, in<br>of shoulder<br>f railway ter<br>or more<br>d shoulder   | cluding a path   | Crossing Su                                       | Eidge of<br>travelled way<br>0.5 m or more beyon<br>travelled surface whe<br>no shoulder<br>Crossing surface   | re  |
| <ul> <li>Cross</li> <li>5-1 - Gi</li> <li>a) Flan</li> <li>(b) Fleid</li> <li>A space sidewal</li> </ul>  | bings S<br>irade Cro<br>ngeway:<br>Width<br>Depth<br>control of the group of the grou  | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the roe<br>authority for use by persons using assistive devices<br>All other grade crossings<br>ap<br>inted on the outer side of the rail at rural locations, except<br>or trails designated by the road authority for use by per-  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>d<br>75 mm<br>No limit<br>ot for public  | Edge<br>End o  | Figure 5<br>) Road, in<br>of shoulder<br>f railway ter<br>or more<br>d shoulder   | cluding a path   | Crossing Su                                       | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface whe<br>no shoulder<br>Crossing surface   | re  |
| <ul> <li>Cross</li> <li>5-1 - Gi</li> <li>a) Flan</li> <li>(b) Fleid</li> <li>A space sidewal</li> </ul>  | bepth<br>Inde side g<br>te spermake,<br>te device  | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the roe<br>authority for use by persons using assistive devices<br>All other grade crossings<br>ap<br>inted on the outer side of the rail at rural locations, except<br>or trails designated by the road authority for use by per-  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>d<br>75 mm<br>No limit<br>ot for public  | Edge<br>End o  | Figure 5<br>) Road, in<br>of shoulder<br>f railway ter<br>or more<br>d shoulder   | cluding a path   | Crossing Su                                       | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Rahvay<br>Crossing                       | re  |
| <ul> <li>Cross</li> <li>5-1 - Gi</li> <li>a) Flan</li> <li>(b) Fleid</li> <li>A space sidewal</li> </ul>  | bepth<br>ce spermal<br>be permanent<br>be permanen | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and Italis designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>ap<br>inted on the outer side of the rail at rural locations, excepts<br>o or trails designated by the road authority for use by persons   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>d<br>75 mm<br>No limit<br>tor public<br>rooms using  | Edge<br>End o  | Figure 5<br>) Road, in<br>of shoulder<br>f railway ter<br>or more<br>d shoulder   | cluding a path   | Crossing Su                                       | Edge of<br>travelled way<br>0.5 m or more beyond<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Rahvay<br>Crossing                       | re  |
| (b) Fiel<br>(b) Fiel<br>(c) Elen<br>The top   | bepth<br>Inde side g<br>te is permises<br>wration of<br>p of the ci  | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>authority for use by persons using assistive devices<br>All other grade crossings<br>app<br>inted on the outer side of the rail at rural locations, except<br>s or trails designated by the road authority for use by person<br>Maximum width<br>Maximum depth<br>The top of the rail with respect to the crossing surface<br>rossing surface must be installed as close as possible to  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>50 mm<br>75 mm<br>No limit<br>tor public<br>rooms using<br>120 mm<br>No limit<br>No limit                            | Edge<br>End o  | Figure 5<br>) Road, in<br>of shoulder<br>(railway tier<br>or more<br>d shoulder vier<br>is one  | cluding a path   | Width   | Edge of<br>travelied way<br>0.5 m or more beyond<br>travelied surface when<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign             | re  |
| (b) Field<br>(b) Field<br>(c) Electron<br>(c) electro | bepth<br>wide side g<br>be being<br>with a side g<br>be being<br>we device<br>we device<br>we device   | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>All other grade crossings<br>authority for use by persons using assistive devices<br>All other grade crossings<br>ap<br>inted on the outer side of the rail at rural locations, except<br>s or trails designated by the road authority for use by persons<br>Maximum width<br>Maximum depth<br>The top of the rail with respect to the crossing surface  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>50 mm<br>75 mm<br>No limit<br>tor public<br>rooms using<br>120 mm<br>No limit<br>No limit                            | Edge<br>End o  | Figure 5<br>) Road, in<br>of shoulder<br>(railway tier<br>or more<br>d shoulder vier<br>is one  | cluding a path   | Width   | Eidge of<br>travelled way<br>0.5 m or more beyon:<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign             | or Was  |
| <ul> <li>Cross</li> <li>5-1 - Gi</li> <li>a) Flan</li> <li>(b) Flat</li> <li>(c) Elen</li> <li>The tog</li> <li>rail with</li> <li>Wear II</li> </ul>   | sings S<br>irade Cri<br>ngeway:<br>Width<br>Depth<br>Depth<br>id side g<br>te is perm<br>alks, paths<br>we device<br>reation of<br>port the cu   | tandards, July 2014 ossing Surface – Cross Section Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings ap inted on the outer side of the rail at rural locations, except s Maximum width Maximum depth (the top of the rail with respect to the crossing surface ar limits below.   | 45 mm<br>75 mm<br>120 mm<br>50 mm<br>No limit<br>tor public<br>some using<br>120 mm<br>No limit<br>tee<br>the top of the                                  | Edge<br>End c  | Figure 5<br>) Road, in<br>of shoulder<br>(railway Sec<br>all all all all all<br>or more<br>d shoulder of<br>is one<br>(b) Si  | cluding a path   | Width<br>or trail alony<br>walk, peth, or         | Eidge of<br>travelled way<br>0.5 m or more beyon:<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign             | or was<br>signed<br>4- Sidewalk, path, or                         |
| <ul> <li>Cross</li> <li>5-1 - Gi</li> <li>a) Flan</li> <li>(b) Fiel</li> <li>A space</li> <li>sidewal</li> <li>assistiv</li> <li>(c) Eler</li> <li>The top</li> <li>rad with</li> <li>Wear II</li> <li>Public :</li> </ul>  | sings S<br>irade Cri<br>ngeway:<br>Width<br>Depth<br>Depth<br>id side g<br>te is perm<br>alks, paths<br>we device<br>reation of<br>port the cu   | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>authority for use by persons using assistive devices<br>All other grade crossings<br>ap<br>inted on the outer side of the rail at rural locations, except<br>s or trails designated by the road authority for use by persons<br>Maximum width<br>Maximum depth<br>The top of the rail with respect to the crossing surface<br>rossing surface must be installed as close as possible to<br>are limits below.   | 45 mm<br>75 mm<br>120 mm<br>50 mm<br>No limit<br>tor public<br>some using<br>120 mm<br>No limit<br>tee<br>the top of the                                  | Edge<br>End o<br>D.5 m<br>bayon<br>there                       | Figure 5<br>) Road, in<br>of shoulder<br>f railway 5er<br>or more<br>d shoulder<br>is one<br>(b) Si<br>(b) Si   | cluding a path   | Width<br>or trail alony<br>walk, peth, or         | Eidge of<br>travelled way<br>0.5 m or more beyon:<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign             | or was<br>see to be<br>4- Sidewalk, path, or                      |
| <ul> <li>Cross</li> <li>5-1 - Gi</li> <li>a) Flan</li> <li>(b) Fiel</li> <li>A space</li> <li>sidewal</li> <li>assistiv</li> <li>(c) Eler</li> <li>The top</li> <li>rad with</li> <li>Wear II</li> <li>Public :</li> </ul>  | sings S<br>irade Cri<br>ngeway:<br>Width<br>Depth<br>Depth<br>id side g<br>te is perm<br>alks, paths<br>we device<br>reation of<br>port the cu<br>hin the we<br>limits:<br>sidewalk,<br>we device  | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>authority for use by persons using assistive devices<br>All other grade crossings<br>ap<br>inted on the outer side of the rail at rural locations, except<br>s or trails designated by the road authority for use by persons<br>Maximum width<br>Maximum depth<br>The top of the rail with respect to the crossing surface<br>rossing surface must be installed as close as possible to<br>are limits below.   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>80 75 mm<br>No limit<br>sons using<br>120 mm<br>No limit<br>to public<br>rooms using                                 | Edge<br>End c<br>0.5 m<br>beyon<br>there                       | Figure 5<br>) Road, in<br>of shoulder<br>f railway 5er<br>or more<br>d shoulder<br>is one<br>(b) Si<br>(b) Si   | cluding a path   | Width<br>or trail alony<br>walk, peth, or         | Eidge of<br>travelled way<br>0.5 m or more beyon:<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign             | or war<br>sig   |
| <ul> <li>Cross</li> <li>5-1 - Gi</li> <li>a) Flan</li> <li>(b) Fiel</li> <li>A space</li> <li>sidewal</li> <li>assistiv</li> <li>(c) Eler</li> <li>The top</li> <li>rad with</li> <li>Wear II</li> <li>Public :</li> </ul>  | verdervice   | tandards, July 2014 ossing Surface – Cross Section  Minimum  Maximum for:  Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings  Minimum Maximum for:  Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings  All other grade crossings  ap ited on the outer side of the rail at rural locations, except s or trails designated by the road authority for use by persons using assistive devices Maximum width Maximum depth (the top of the rail with respect to the crossing surfaces must be installed as close as possible to are limits below.  path or trail designated by the road authority for use by s  | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>80 75 mm<br>No limit<br>sons using<br>120 mm<br>No limit<br>to public<br>rooms using                                 | Edge<br>End c<br>0.5 m<br>beyon<br>there<br>2-0.5<br>of<br>the | Figure 5<br>) Road, in<br>of shoulder<br>( railway 5er<br>or more<br>d shoulder<br>is one<br>(b) Si<br>(b) Si<br>im or more<br>beyond shours<br>re is one<br>3- Crossing                              | dewalk, path.<br>1- Sidew<br>beyond sidew<br>suffaces may  | Width<br>or trail along<br>salk, path, or<br>ask; | Eidge of<br>travelled way<br>0.5 m or more beyon:<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign             | or was<br>signed<br>4- Sidewalk, path, or<br>-5-0.5 m or more bay |
| <ul> <li>Cross</li> <li>5-1 - Gi</li> <li>a) Flan</li> <li>(b) Field</li> <li>A space sidewal assisted</li> <li>(c) Elen</li> <li>The top rad with</li> <li>Wear II</li> <li>Public rad sisted</li> <li>All other</li> </ul>  | sings S<br>irade Cri<br>ngeway:<br>Width<br>Depth<br>dd side g<br>ie is perm<br>siks, path<br>we device<br>reation of<br>p of the cri<br>hin the wid<br>limita:<br>sidewafk,<br>we device  | tandards, July 2014<br>ossing Surface – Cross Section<br>Minimum<br>Maximum for:<br>Public sidewalks, paths or trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>Minimum<br>Maximum for:<br>Public sidewalks, paths and trails designated by the road<br>authority for use by persons using assistive devices<br>All other grade crossings<br>authority for use by persons using assistive devices<br>All other grade crossings<br>ap<br>inted on the outer side of the rail at rural locations, excepts<br>or trails designated by the road authority for use by persons<br>by the top of the rail with respect to the crossing surface<br>rossing surface must be installed as close as possible to<br>car limits below:<br>path or trail designated by the road authority for use by<br>s<br>Maximum distance of the top of the rail above crossing<br>Maximum distance of the top of the rail above crossing<br>Maximum distance of the top of the rail below crossing<br>Maximum distance of the top of the rail below crossing<br>Maximum distance of the top of the rail below crossing   | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>No limit<br>to for public<br>sons using<br>120 mm<br>No limit<br>to the top of the<br>persons using<br>13 mm<br>7 mm | Edge<br>End c<br>0.5 m<br>beyon<br>there<br>2-0.5<br>of<br>the | Figure 5<br>) Road, in<br>of shoulder<br>f railway ter<br>or more<br>d shoulder of<br>s one<br>(b) Si<br>(b) Si<br>im or more<br>beyond shours<br>re is one<br>3- Crossing<br>be separat<br>the space | dewalk, path.<br>1- Sidew<br>beyond sidew.   | Width   | Eidge of<br>travelled way<br>0.5 m or more beyon:<br>travelled surface whe<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign<br>a a road | or was<br>signed<br>4- Sidewalk, path, or<br>-5-0.5 m or more bay |
| <ul> <li>Cross</li> <li>5-1 – Gi</li> <li>a) Flan</li> <li>(b) Fiel</li> <li>A space</li> <li>sidewal</li> <li>assistiv</li> <li>(c) Elen</li> <li>The top</li> <li>rad with</li> <li>Wear II</li> <li>Public t</li> <li>assistiv</li> <li>All other</li> <li>raid abo</li> <li>Private</li> </ul>  | sings S<br>irade Cro<br>ngeway:<br>Width<br>Depth<br>Depth<br>dd side g<br>te is permises, path-<br>we device<br>wation of<br>p of the cri<br>hin the wide<br>limits:<br>sidewalk,<br>we device<br>er public of<br>ove or beilt<br>sidewalk of the cri<br>hin the wide   | tandards, July 2014 ossing Surface – Cross Section Minimum Maximum for: Public sidewalks, paths or trails designated by the road authority for use by persons using assistive devices All other grade crossings Minimum Maximum for: Public sidewalks, paths and trails designated by the road authority for use by persons using assistive devices All other grade crossings ap inded on the outer side of the rail at rural locations, except s or trails designated by the road authority for use by persons Maximum width Maximum depth The top of the rail with respect to the crossing surface russ the installed as close as possible to are limits below. path or trail designated by the road authority for use by Maximum distance of the top of the rail above crossing surface Maximum distance of the top of the rail above crossing surface Maximum distance of the top of the rail above crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing Surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance of the top of the rail below crossing surface Maximum distance Addition Addition Addition Addition Addition Addition Addition Additi | 65 mm<br>75 mm<br>120 mm<br>50 mm<br>No limit<br>to for public<br>sons using<br>120 mm<br>No limit<br>to be top of the<br>persons using<br>13 mm<br>7 mm  | Edge<br>End c<br>0.5 m<br>beyon<br>there<br>2-0.5<br>of<br>the | Figure 5<br>) Road, in<br>of shoulder<br>f railway ter<br>or more<br>d shoulder of<br>s one<br>(b) Si<br>(b) Si<br>im or more<br>beyond shours<br>re is one<br>3- Crossing<br>be separat<br>the space | dewalk, path.<br>1- Sidew<br>beyond sidew<br>deform there<br>surfaces may<br>be portion there<br>to prove the prove there<br>to prove the prove the prove the<br>to prove the prove the prove the prove the<br>to prove the prove th | Width   | Edge of<br>travelled way<br>0.5 m or more beyond<br>no shoulder<br>Crossing surface<br>Railway<br>Crossing<br>sign<br>as road                            | or war<br>sky<br>4- Sidewalk, path, or<br>5-0.5 m or more bay     |

Sheet 7

# **ROAD GEOMETRY**

| Source       |  |                       | It                  | em   |         |      |        |   |       | Reference           |  |
|--------------|--|-----------------------|---------------------|------|---------|------|--------|---|-------|---------------------|--|
| observe      | Are horizontal and vertical alignments smooth and  | continuous throug     | shout SSD?          |      |         |      |        |   |       | Sheet 4             |  |
| Observe      | WB Approach: Yes   |                       | EB Approach         |      |         |      |        |   |       | Sheet 4             |  |
| observe      | Is horizontal alignment straight beyond rails for a d  | istance ≥ design ve   | hicle length, L?    |      |         |      |        |   |       | Sheet 4             |  |
| 000001100    | WB Approach: Yes   |                       | Sheet 4             |      |         |      |        |   |       |                     |  |
| observe      | Are the road lanes at least the same width on the crossing as on the road approaches?                            |                       |                     |      |         |      |        |   |       |                     |  |
| 00000.70     | WB Approach: Yes EB Approach: Yes  |                       |                     |      |         |      |        |   |       |                     |  |
|              | Grades   | e (GCS 6.1)           | GCS Sect. 6         |      |         |      |        |   |       |                     |  |
| measure      | Slope within 8m of nearest rail (max. = 2%)  |                       | 0.80                | %    | 0.80    | %    | 0.40%  | % | 0.40% | Diff in Grade Max   |  |
| measure      | Slope between 8m & 18m of nearest rail (max. = 5%)   |                       | 0.60                | %    | 0.50    | %    |        |   |       | 3%                  |  |
|              | If crossing is only for pedestrians, cyclists, or persons using assistive devices (max. = 1 <sup>1</sup> or 2%): |                       |                     |      |         |      |        |   |       |                     |  |
| measure      | slope within 5m of nearest rail =  |                       | N/A                 | %    | N/A     | %    |        |   |       |                     |  |
| Road √       | General approach grade (max. = +/- 5%)   |                       | 1.00                | %    | 1.00    | %    |        |   |       |                     |  |
| KUdu V       | measured over the SSD distance of:   |                       | 10                  | m    | 45      | m    |        |   |       | Sheet 4             |  |
| Rail √       | Are rail tracks super-elevated?  | No                    | Rate of s/e:        | 0.00 | m/m Sdg | 0.00 | m/m ML |   |       | GCS Sect. 6.1 & 6.2 |  |
| Deedel       | If train speeds exceed 15mph (70° minimum w/o warning  | system; 30° minimum v | vith warning system | ):   |         |      |        |   |       |                     |  |
| Road √       | What is the angle between the crossing and the roa   | idway?                | =                   | 71.0 | degrees |      |        |   |       |                     |  |
| observe      | Condition of Road Approaches:  | Fair.                 |                     |      |         |      |        |   |       | SOR 60              |  |
| observe      | (e.g., anything that might affect stopping or acceleration)  |                       |                     |      |         |      |        |   |       |                     |  |
| observe      | NA   |                       |                     |      |         |      |        |   |       |                     |  |
| 1. If freque | quent use by persons using assistive devices   |                       |                     |      |         |      |        |   |       |                     |  |
| Comments     | Following Site Visit:  |                       |                     |      |         |      |        |   |       |                     |  |
| - Minor cra  | cks within both approachs. But still in Fair Condition   | n.                    |                     |      |         |      |        |   |       |                     |  |
| C            |  |                       |                     |      |         |      |        |   |       |                     |  |

- Crossing Angle measured via aerial imagery.

#### Grade Crossings Standards, July 2014

#### Table 6-1 - Difference in Gradient

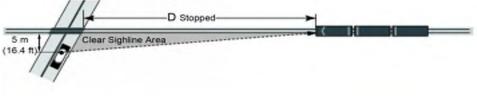
|             | Classific     | ation   | Differe       | nce in Gradier | vt (%)         |      |
|-------------|---------------|---------|---------------|----------------|----------------|------|
|             | RU            | j -     |               | 2              |                |      |
|             | RCL           | J.      |               | 1              |                |      |
|             | RC            | 0       |               | 1              |                |      |
|             | RA            | J       | -             | 0              |                |      |
|             | RAD           | 0       |               | 0              |                |      |
|             | RFC           | 0       |               | -              |                |      |
|             | ULL           | j       |               | 3              |                |      |
|             | UCL           | )       |               | 2              |                |      |
|             | UCE           | o o     |               | 2              |                |      |
|             | UM            | j .     |               | 0              |                |      |
| nd<br>I (U) | Rural (R) Loc | cal (L) | Collector (C) | Arterial(A)    | Expressway (E) | Free |
|             | Divided (D)   |         |               |                | Undivided (U)  |      |

Source: Geometric Darign Guide for Canadian Roads, published by the Transportation Association of Canada and dated September 1999

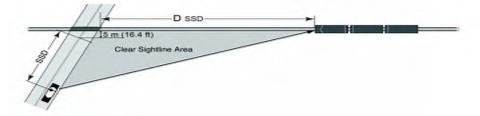
#### Figure 7-1 - Minimum Sightlines - Grade Crossings

Urbay

(a) Sightlines for Users Stopped at a Grade Crossing (applicable to all quadrants)



(b) Sightlines for Users Approaching Grade Crossing (applicable to all quadrants)



#### Sheet 8

#### SIGHTLINES

| Driver Eye Height | = | 1.05m | passenger vehicles, pedestrians, cyclists & assistive devices |
|-------------------|---|-------|---|
|                   | = | 1.80m | buses & straight trucks                                       |
|                   | = | 2.10m | large trucks & tractor-trailers                               |
| Target Height     | = | 1.20m | above rails   |

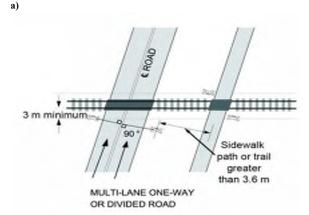
| Source     |  | Item  |              |                    |                       |                 |                             |  |  |  |  |  |
|------------|--|---|--------------|--------------------|-----------------------|-----------------|-----------------------------|--|--|--|--|--|
| - here was | Are sightlines within the rail R.O.W. clear of I         | oushes/vegetation; 15 m on each side of t             | he track ar: | d, 30 m along the  | track, on each side o | f the crossing? |                             |  |  |  |  |  |
| observe    | -if no, detail the location No                           |   |              |                    |                       |                 |                             |  |  |  |  |  |
| observe    | Are sightlines on the road R.O.W. within 15m             |   |              |                    |                       |                 |                             |  |  |  |  |  |
| Observe    | -if no, detail the location No                           |   |              |                    |                       |                 |                             |  |  |  |  |  |
|            |  | SB Approach NB Approach                               |              |                    |                       |                 |                             |  |  |  |  |  |
| look-up    | SSD minimum =  |   | 10           | m                  | 45                    | m               | Sheet 4                     |  |  |  |  |  |
| measure    | SSD Actual (not including turning movements):            |   | 250.0        | m                  | 200.0                 | m               |                             |  |  |  |  |  |
| calculate  | D <sub>SSD</sub> =                                       | 0.277837 x V <sub>train km/h</sub> x T <sub>SSD</sub> | 52           | m                  | 52                    | m               | 1.609 convert mph to km/h   |  |  |  |  |  |
| calculate  | D <sub>STOPPED</sub> minimum (m) =                       | 0.277837 x V <sub>train km/h</sub> x T <sub>D</sub> = | 77           | m                  | 76                    | m               | T <sub>D</sub> from Sheet 4 |  |  |  |  |  |
| measure    | D <sub>STOPPED</sub> Actual:                             | Driver looking LEFT                                   | 80           | m (ne)             | 200                   | m (sw)          |                             |  |  |  |  |  |
| measure    |  | Driver looking RIGHT                                  | 200          | m (nw)             | 80                    | m (se)          |                             |  |  |  |  |  |
| calculate  | Ped./Cyclist D <sub>STOPPED</sub> (m)                    |   | 0            | m                  | 0                     | m               | T <sub>P</sub> from Sheet 4 |  |  |  |  |  |
|            | Ped./Cyclist D <sub>STOPPED</sub> Actual:                | Person looking LEFT                                   | N/A          | m                  | N/A                   | m               |                             |  |  |  |  |  |
| measure    | note: measured from a point 2m in advance of sign/signal | s Person looking RIGHT                                | N/A          | m                  | N/A                   | m               |                             |  |  |  |  |  |
| observe    | Are there any obstacles within the sight trian           | gles other than traffic signs/utility poles t         | hat might :  | affect visibility? |                       | -               |                             |  |  |  |  |  |
| Observe    | Vegetation, parked vehicles & re                         | Vegetation, parked vehicles & retaining wall          |              |                    |                       |                 |                             |  |  |  |  |  |

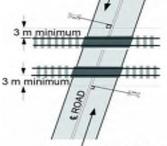
**Comments Following Site Visit:** 

- Railway currently not in use. Vegetation, Parked Vehicles and retaining walls obstruct sightlines in West.

No vegetation or obstructions in the East.

Figure 8-3 - Location of Railway Crossing Signs and Number of Tracks Signs (public grade crossings without warning systems) a) b)





ANGLE GREATER THAN 90\*

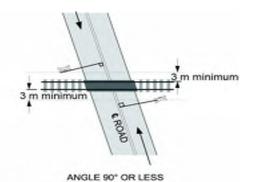
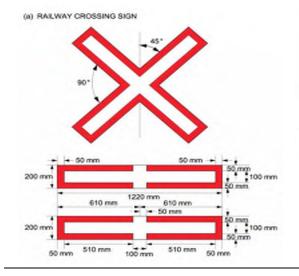
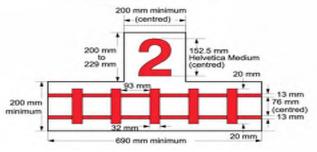


Figure 8-1 - Railway Crossing Sign and Number of Tracks Sign







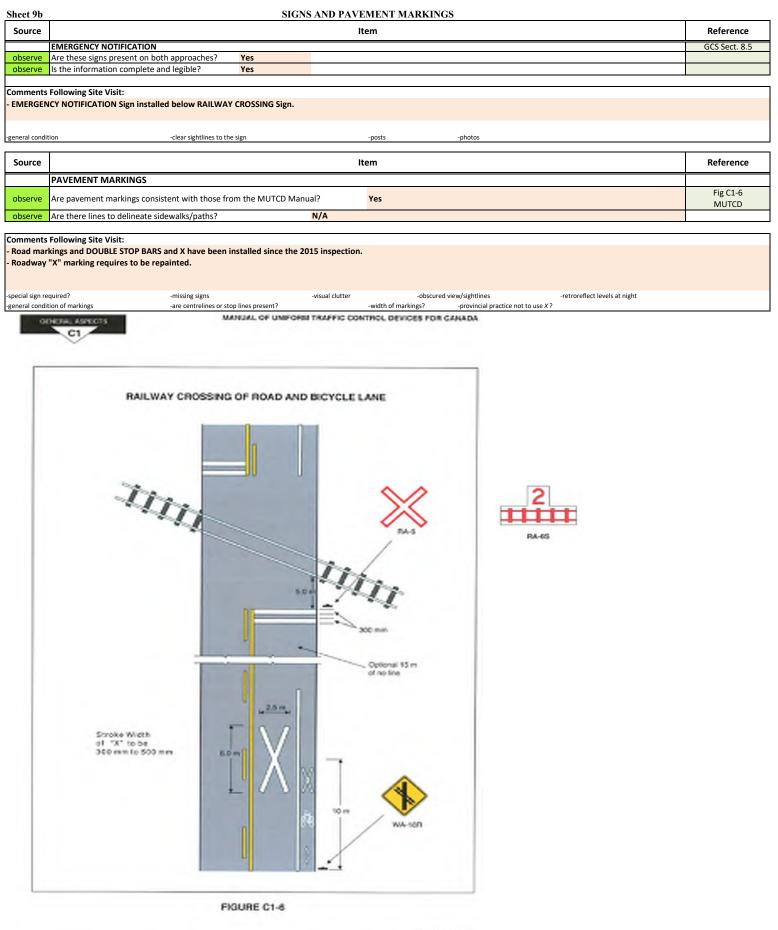
SIGNS AND PAVEMENT MARKINGS

| Source             |   |                         | I                     | Item             |                       |                   |              |         | Reference      |
|--------------------|---|-------------------------|-----------------------|------------------|-----------------------|-------------------|--------------|---------|----------------|
|                    |   |                         |                       |                  |                       |                   |              |         |                |
|                    |   |                         | ~ /                   | >                |                       |                   |              |         |                |
|                    | Railway Crossing Sign                                       |                         | $\sim$                |                  |                       |                   |              |         | NULTOD         |
|                    |   |                         | 200                   |                  |                       |                   |              |         | MUTCD          |
|                    |   |                         | 0                     | 👌 These s        | signs will be ı       | equired           |              |         |                |
|                    |   | SB Approach             |                       | NB Approad       | h                     |                   |              |         |                |
| measure            | distance from nearest rail:                                 | 9.8                     | m                     | 10.7             | m                     |                   |              |         |                |
| measure            | distance from edge of road:                                 | 2.1                     | m                     | 1.9              | m                     |                   |              |         |                |
| measure            | height of centre of crossbucks:                             | 3.5                     | m                     | 2.5              | m                     |                   |              |         |                |
| measure            | retroreflectivity readings:                                 | N/A                     | cd/lux/m <sup>2</sup> | N/A              | cd/lux/m <sup>2</sup> |                   |              |         |                |
| observe            | Number of Tracks sign? No                                   |                         |                       | _                | ,,                    |                   |              |         |                |
| observe            | A Stop Sign must be installed at grade crossing without a w | arning system if the ro | ad design speed       | is less than 15m | nph                   |                   | Yes/ No/ NA  | Yes     | SOR 64         |
| observe            | A Stop Ahead sign must be installed if the Stop Sigr        | is not clearly visab    | ole within the S      | Stopping Dista   | ance                  |                   | Yes/ No/ NA  | N/A     | SOR 65         |
| Comments           | Following Site Visit:                                       |                         |                       |                  |                       |                   |              |         |                |
| - New RAIL         | WAY CROSSING signs installed in 2017.                       |                         |                       |                  |                       |                   |              |         |                |
|                    | of poles and signs only have partial reflective strip       | s (reflectivity not n   | neasured).            |                  |                       |                   |              |         |                |
|                    | OF TRACKS Sign not required as only 1 track.                |                         |                       |                  |                       |                   |              |         |                |
| -general condit    | tion -clear sightlines to the si                            | gn                      |                       | -posts           |                       | photos            |              |         |                |
|                    |   |                         |                       |                  |                       |                   |              |         | _              |
| Source             |   |                         | ľ                     | Item             |                       |                   |              |         | Reference      |
|                    | DO NOT STOP ON TRACKS                                       | 2                       |                       |                  |                       |                   |              |         |                |
|                    |   |                         |                       |                  |                       |                   |              |         |                |
|                    |   |                         |                       |                  |                       |                   |              |         |                |
|                    | T T   | 1                       |                       |                  |                       |                   |              |         | MUTCD          |
|                    | ****  | 1                       |                       |                  |                       |                   |              |         |                |
|                    |   | J                       |                       |                  |                       |                   |              |         |                |
|                    | na-aa   |                         |                       |                  |                       |                   |              |         |                |
| Road √             | Does queued traffic routinely encroach closer than          | 5m from the cross       | ing surface?          |                  | No<br>No              |                   |              |         |                |
| observe            | Are these signs present on either approach?                 |                         |                       |                  | INU                   |                   |              |         |                |
| Comments           | Following Site Visit:                                       |                         |                       |                  |                       |                   |              |         |                |
|                    | TOP ON TRACKS Sign not required.                            |                         |                       |                  |                       |                   |              |         |                |
|                    |   |                         |                       |                  |                       |                   |              |         |                |
|                    |   |                         |                       |                  |                       |                   |              |         |                |
| -general condit    | tion -posts   |                         | -photos               |                  |                       |                   |              |         |                |
|                    |   |                         |                       |                  |                       |                   |              |         | _              |
| Source             |   |                         | ľ                     | Item             |                       |                   |              |         | Reference      |
|                    | Railway Crossing Ahead Sign (WA 18-20)                      | ^                       |                       | $\sim$           | ^                     |                   | ^            |         |                |
|                    |   |                         | 12                    |                  | 1.0                   |                   | 1.           |         |                |
|                    |   | (###                    |                       |                  |                       | > <.              | -#           |         | MUTCD & SOR 66 |
|                    |   |                         |                       | 18               | #                     |                   | 1#           |         |                |
|                    |   | $\sim$                  |                       | $\checkmark$     | $\sim$                |                   | $\checkmark$ |         |                |
|                    |   | W.A-18                  | 10.                   | A-18R            | NA-19R                |                   | WA-20R       |         |                |
| look-up            | Is AADT > 100? Yes  |                         |                       | SB Approac       |                       | NB Approach       |              |         | Sheet 3        |
| observe            | Is area urban such that WA 18-20 is <u>not</u> required?    |                         | Yes                   | .,               |                       | Yes               | m            |         | MUTCO          |
| measure            | Distance from nearest rail to sign                          | =                       | 2.                    | 57               | m                     | 65.0              | ш            |         | MUTCD          |
| observe<br>observe | height:<br>appropriate orientation of symbol                |                         | Yes 2.                |                  |                       | 2.5<br>Yes        |              |         |                |
| Observe            |   |                         |                       |                  |                       | 103               |              |         |                |
| Comments           | Following Site Visit:                                       |                         |                       |                  |                       |                   |              |         |                |
|                    | CROSSING AHEAD Sign has been installed since th             | e previous inspecti     | ion.                  |                  |                       |                   |              |         |                |
| - RAILWAY          | CROSSING AHEAD Sign installed Min. Approx 34m               | from crossing           |                       |                  |                       |                   |              |         |                |
| -general condit    | tion along sinktling - to the st                            | <b>40</b>               |                       | posts            |                       | aligned to the de | ivor         | nhotos  |                |
| -Remenal cougit    | tion -clear sightlines to the si                            | gii                     |                       | -posts           |                       | aligned to the dr | IVEI         | -photos |                |
|                    |   |                         |                       | ltem             |                       |                   |              |         | Reference      |

| Source  |                                       |     | ltem       | Reference          |
|---------|---------------------------------------|-----|------------|--------------------|
|         | ADVISORY SPEED SIGN                   |     | 30<br>km/h | MUTCD & SOR 66 (2) |
|         |                                       |     |            |                    |
| observe | Are they present on both approaches?  | No  |            |                    |
| observe | Posted speed limit?                   | N/A | km/h       |                    |
| look-up | Are they required on either approach? | No  |            | check SSD          |
| 100к-ир | Are they required on either approach: | NO  |            | (Sheet 8)          |
|         |                                       |     |            |                    |

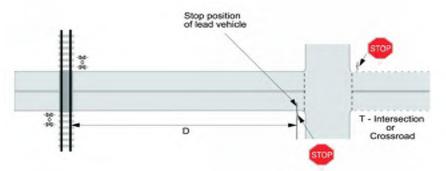
Comments Following Site Visit:
- No ADVISORY SPEED Sign observed on site.
- general condition -posts -photos

Sheet 9a



JANUARY 2014

Figure 9-1 - Proximity of Warning Systems to Stop Signs and Traffic Signals (a) Intersection with Stop Sign



(b) Intersection with Traffic Signal

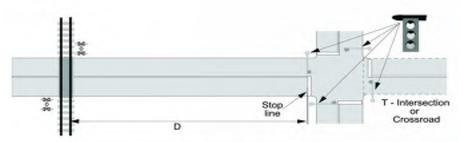
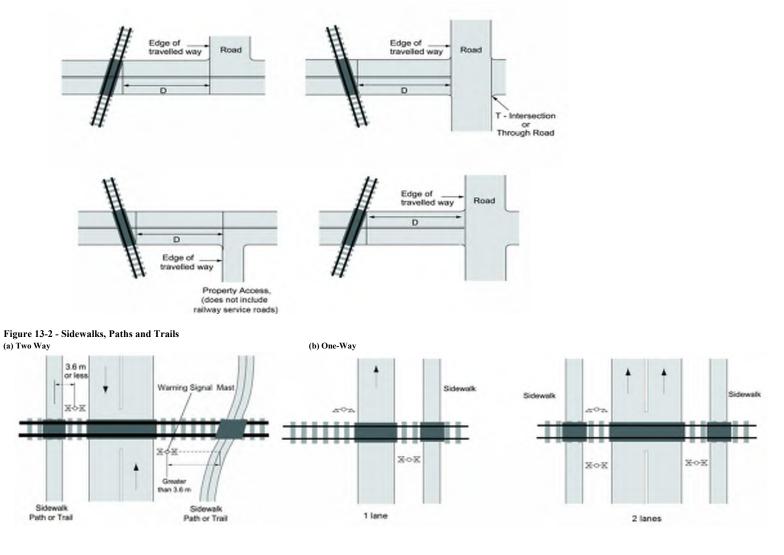


Figure 11-1 - Restrictions on the Proximity of Intersections and Entranceways to Public Grade Crossings





| Sheet 11    |   | GRADE                 | CROSSIN       | G WARNING S                               | SYSTEN | 15                 |  | Н             |                              | GCS Section 9     |
|-------------|---|-----------------------|---------------|---|--------|--------------------|--|---------------|------------------------------|-------------------|
| Source      |   |                       | Item is       | not required.                             |        |                    |  |               |                              | Reference         |
|             | Warning System Warrants<br>if any of A through E below are met, then a warr | ning system is warrar | nted          |   |        |                    |  |               |                              |                   |
|             |   | Question              |               |   |        |                    | Warrant fo   | r Warning Sy  | stem                         |                   |
| look-up     | Existing AADT = 3,000   | Forecast AADT =       |               | 1,170                                     |        |                    |  |               |                              | Sheet 3           |
| look-up     | Daily Train Volume = 0.000  |                       |               |   | trains |                    |  |               |                              | Sheet 3           |
| calculate   | A. Cross-Product = 0  |                       |               |   |        | > 2,000 FLB        | req'd  | > 50,000 req  | uires gates                  |                   |
| look-up     | B. Maximum Rail Operating Speed =   | 10                    |               | n   | nph    | (max = 80m         | ph or 50 mph w                                       | ith crosswalk | ()                           | Sheet 3           |
| <b>D</b> '' | C. Number of Tracks =   | 1                     |               |   |        |                    |  |               |                              |                   |
| Rail        | if ≥ 2, can trains pass one another?  | N/A                   |               |   |        | if $\geq$ 2 and tr | ains can pass or                                     | e another ->  | FLB reg'd                    |                   |
| look-up     | D. Are Sightlines obscured?   | No                    |               |   |        | if "Yes" -> F      | LB reg'd: If Fig 7                                   | .1 applies>   | add G                        | Sheet 8 & Fig 7.1 |
| observe     | E. Are any proximity conditions met?  | No                    |               |   |        | if "Yes" -> F      | LB required.   | ••            |                              | GCS Sect 9 & 11   |
| look-up     | Is a Warning System warranted?  | No                    |               |   |        | If any of A t      | hrough E above                                       | meet the Wa   | arrant                       |                   |
|             |   | ) Condition / Align   | ment:         |   |        |                    | 0  |               |                              | GCS 13            |
| observe     | Light Units, N  | ,, 0                  |               |   |        |                    |  |               |                              | GCS 13            |
|             | Bells, N  |                       |               |   |        |                    |  |               |                              | GCS 13            |
| observe     | Gates, N  |                       |               |   |        |                    |  |               |                              | GCS 13            |
| observe     | Cantilever Lights, N  |                       |               |   |        |                    |  |               |                              | GCS 13            |
| observe     | Check that warning signal assemblies and cantile                            | vers are in accordan  | ce with GCS F | igures.                                   |        |                    |  |               |                              | GCS Sect. 12      |
| observe     | Is warning system housing at least 9m from trave                            | eled way of the road  | and 8m from   | the nearest rail?                         |        |                    |  |               |                              |                   |
| observe     | If there is a sidewalk, is a bell on the adjacent as                        | sembly?               |               |   |        |                    |  |               |                              |                   |
| Rail √      | Have all light units been aligned?  | NA                    | Date?         | NA  |        |                    |  |               |                              |                   |
|             | Design Approach Warning Time (greatest of):                                 |                       |               |   |        |                    |  |               |                              |                   |
| Rail        |   |                       |               | 20sec OR<br>[20+((cd-11)/3)]<br>if cd>11m | Td     | Тр                 | Gate Clearance<br>Time + Descent<br>Time + 5 seconds |               | (SSD + cd + L)/(0.277837xVv) |                   |
|             | SB Approach   | 34.2                  | sec           | 26.0                                      | 17.2   | 0.0                | 34.2   | 0.0           | 7.4                          |                   |
|             | NB Approach   | 34.2                  | sec           | 21.8                                      | 17.1   | 0.0                | 34.2   | 0.0           | 10.1                         |                   |
| observe     | Is warning time less than 35 sec (without gates)                            | or 55 sec (with gates | )             | N/A                                       |        |                    |  |               |                              |                   |

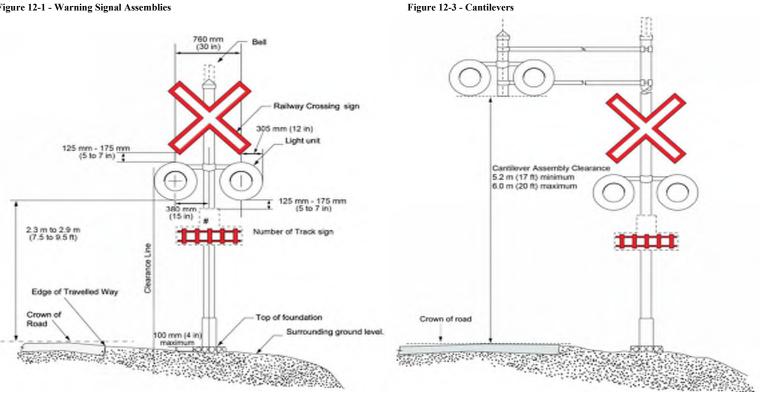
**Comments Following Site Visit:** 

Active warning system not required as Railway operations have ceased.

If Railway operations are increased, a new Grade Crossing Field Safety Assessment is required.

xtraordinary conditions why warning system should be installed

Figure 12-1 - Warning Signal Assemblies



-is warning system present but not warranted?

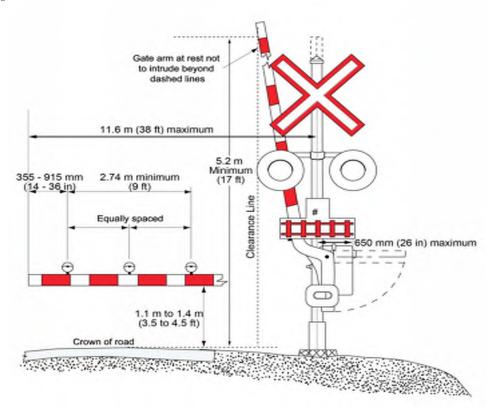


## GATES FOR GRADE CROSSING WARNING SYSTEMS

GCS Section 9

| Source         |   |                   | ltem                                  |             |                                  |                |             | Reference      |  |  |  |
|----------------|---|-------------------|---------------------------------------|-------------|----------------------------------|----------------|-------------|----------------|--|--|--|
|                | Warning System Warrants   |                   |                                       |             |                                  |                |             |                |  |  |  |
|                | -if any of A through E below are met th   | en a warning syst | tem with gates is warranted.          | Not req     | uired as warning system is       | not necessary  | /           |                |  |  |  |
| calculate      | A. Cross-Product =  | 0                 | (50,000 min)                          |             |                                  |                |             |                |  |  |  |
| look-up        | B. Maximum Rail Operating Speed =   | 10                | mph (max = 50mp                       | h)          |                                  |                |             | Sheet 3        |  |  |  |
| Rail √         | C. Number of Tracks =   | 1                 |                                       |             |                                  |                |             |                |  |  |  |
| Null V         | if ≥ 2, can trains pass one another?  | N/A               |                                       |             |                                  |                |             |                |  |  |  |
| look-up        | D. Is D <sub>STOPPED</sub> Insufficient?  | No                | Minor vegetation work req             | uired on    | Northwest and Southwest          | t quadrants.   |             | Sheet 8        |  |  |  |
| observe        | E. Are any proximity conditions met?  | N/A               |                                       |             |                                  |                |             |                |  |  |  |
| calculate      | Gate clearance distance: eq 10.4b   | 24.7              | m cd <sub>G stop</sub>                | 34.7        | m cd SSD SB                      | 69.7           | m cd SSD NB |                |  |  |  |
| look-up        | travel time =   | 17.2              | sec <sub>G stop</sub>                 |             |                                  |                |             |                |  |  |  |
| calculate      | Gate arm clearance times:   | 17.2              | sec SB from stop T <sub>G ssd</sub> = | 4.2         | sec SB from SSD                  |                |             |                |  |  |  |
| calculate      |   | 17.1              | sec NB from stop T <sub>G ssd</sub> = | 8.4         | sec NB from SSD                  |                |             | GCS Sect. 10.4 |  |  |  |
| look-up        | Gate arm delay time: 17.2   | sec (greatest val | ue from above)                        |             |                                  |                |             |                |  |  |  |
| calculate      | effect of grade =   | 0.5               | sec (SB from Stop)                    | -4.2        | sec SB from SSD                  |                |             |                |  |  |  |
| culculate      |   | 0.4               | sec (NB from Stop)                    | 0.0         | sec NB from SSD                  |                |             |                |  |  |  |
| measure        | Measure gate arm delay and compare with above:  |                   | N/A                                   |             |                                  |                |             |                |  |  |  |
| observe        | Do gates conform to standards depicted in GCS Fig   | ures?             | N/A                                   |             |                                  |                |             |                |  |  |  |
| observe        | Check gate descent (10 to 15 sec) and ascent (6 to 2  | 12 sec)           | N/A                                   |             |                                  |                |             |                |  |  |  |
| observe        | Is gate striping vertical as depicted in GCS Figures?   |                   | N/A                                   |             |                                  |                | -           |                |  |  |  |
| observe        | Where railway equipment regularly stops, or railway equipment<br>control fe                           |                   | operation of the warning system.      | n, the warn | ing system must be equipped with | a<br>Yes/No/NA | NA          | GCS 16.3.1     |  |  |  |
| Comments       | Following Site Visit:   |                   |                                       |             |                                  |                | •           |                |  |  |  |
| - Warning S    | system with gates not required.   |                   |                                       |             |                                  |                |             |                |  |  |  |
| -extraordinary | ry conditions why warning system should be installed -is warning system present but not warranted? No |                   |                                       |             |                                  |                |             |                |  |  |  |

## Figure 12-2 - Gates



Sheet 13

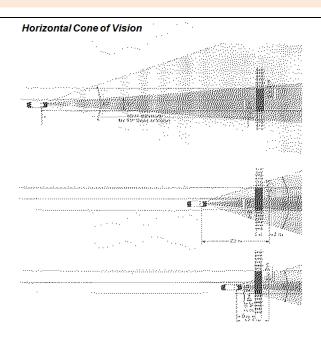
## FLASHING LIGHT UNITS

Note: Driver's cone of vision is  $\pm$  5° horizontally; limited by top of windshield vertically.

| Source  |   |                       | Item is not required as warning s          | system is not required.   |                      |               |     | u |
|---------|---|-----------------------|--|---|----------------------|---------------|-----|---|
|         | Number and Location   |                       |  |   |                      |               |     |   |
| look-up | Minimum Distance for Primar   | y Light Units (SSD) = |  | 45  | <b>.0</b>            | m             |     |   |
| look-up | Recommended Distance for P  | rimary Light Units =  |  | 69  | .7                   | m             |     |   |
|         | Are flashing light units located  | l within 5° horizonta | Ily of the centerline of the road (through | out the approach distance   | abov                 | ve)?          |     |   |
| observe | Yes (covered by front and back unit   |                       |  |   | ront and back units) |               |     |   |
|         | Does horizontal/vertical curva  | iture necessitate sup | oplemental units?                          |   |                      |               | N/A |   |
| observe | Can back lights be seen by all stopped drivers? N/A   |                       |  |   |                      |               |     |   |
| observe | Are lights obscured by vehicle  | s stopped on adjace   | nt intersections? N/A                      |   |                      |               |     |   |
| observe | e Are additional light units required for drivers as they begin to turn onto an approach road from an intersecting road/lane/pkg lot? N/A |                       |  |   | N/A                  |               |     |   |
|         | Cantilevered Light Units  |                       |  |   |                      |               |     |   |
| measure | Does D <sub>R</sub> exceed 7.7m?  | N/A                   |  |   |                      |               |     |   |
| measure | Does D <sub>L</sub> exceed 8.7m?  | N/A                   | (Assumes signal poles on both sides of r   | ssumes signal poles on both sides of road alignment, approach side of rail) |                      |               |     |   |
|         | Multiple Lanes  |                       |  |   |                      |               |     |   |
| observe | Can front light units be seen by drivers in all lanes (would T/T obscure?)?   |                       |  | N,  | /Α                   |               |     |   |
| observe | Can back light units be seen b  | y all stopped drivers | in all lanes?                              | N   | /Α                   |               |     |   |
|         | Sidewalks, paths, trails, etc.  |                       |  |   |                      |               |     |   |
| measure | Distance from path centerline   | to signal mast =      |  | N   | /Α                   | m (max.=3.6m) |     |   |
| observe | Are separate light units required?  |                       |  | N   | /Δ                   |               |     |   |

Comments Following Site Visit:

Crossing currently regulated by a passive warning system.



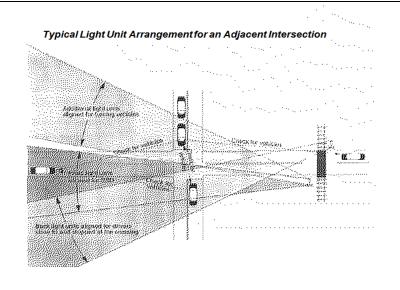


Figure 13-1 – Warning Signal Offsets Requiring Cantilevered Light Units

ZQE

D<sub>a</sub>

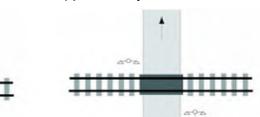
2 lanes

Warning Signal Mast

(a) Two-Way Road

XóX

D.



DR

1 lane

000

# (b) One-Way or Divided Road

192

GCS Sections 12-14

PREPARE TO STOP AT RAILWAY CROSSING SIGN





GCS Sections 13 and 14

|         |   |                    |   |                                 |            | I LETTO ESTACIA DISECTIONE A LE |                  |
|---------|---|--------------------|---|---------------------------------|------------|---------------------------------|------------------|
| Source  | Item NA   |                    |   |                                 |            | Reference                       |                  |
|         | Are signs present?  | No                 | EB approach                               |                                 |            |                                 | SOR 67 (1), (2)  |
| observe |   | No                 | WB approach                               |                                 |            |                                 | GCS 18.21 & 18.2 |
|         |   |                    |   |                                 |            |                                 |                  |
| look-up | Minimum Distance for Primary  | Light Units (SSD)  |   | N/A                             | m          |                                 | Sheet 13         |
| look-up | Recommended distance for Primary Light Units  |                    |   | N/A                             | m          |                                 | Sheet 13         |
|         | Warrants  |                    |   |                                 |            |                                 |                  |
| observe | Are all front light units obscured within minimum distance above?   |                    |   | N/A                             |            |                                 |                  |
| look-up | Is the facility designated a "freeway" or "expressway"?   |                    |   | N/A                             |            |                                 | Sheet 3          |
| observe | Do environmental conditions frequently obscure signal visibility?   |                    |   |                                 |            |                                 |                  |
|         | Considering maximum prevailing speeds, geometry, and traffic composition, checkthe following:   |                    |   |                                 |            |                                 |                  |
| observe | Does sign flash during operation  | n of grade crossin | g warning system?                         | N/A                             |            |                                 |                  |
| measure | Distance from the sign to 2.4m beyond the furthest rail =   |                    |   | N/A                             |            |                                 |                  |
| observe | Does the sign flash before the actuation of the crossing warning system by the time required to travel from the sign to clear the crossing? N/A |                    |   |                                 |            |                                 |                  |
| measure | Distance from the sign to the cl  | osest gate =       |   | N/A                             | m          |                                 |                  |
| observe | Does the flashing sign precede a  | actuation of the d | escent of the gate arms by the time requi | ed to travel from the sign to o | clear clos | sest gate? N/A                  |                  |
| measure | Time required for all queued ve   | hicles to resume   | to maximum road operating speed =         | N/A                             | sec        |                                 |                  |

Comments Following Site Visit:

#### - No PREPARE TO STOP AT RAILWAY CROSSING Signs required.

-general condition

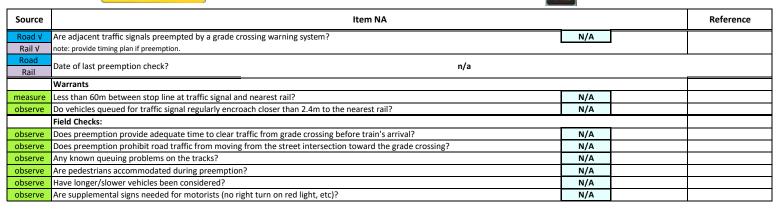
Sheet 15

Sheet 14



-placement/orientation of signs

PREEMPTION OF TRAFFIC SIGNALS

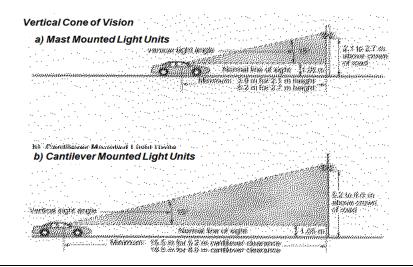


-functions as intended

**Comments Following Site Visit:** 

No TRAFIC SIGNALS located at crossing.

-functions as intended



## AREAS WITHOUT TRAIN WHISTLING

Sheet 16

#### Grade Crossings Standards, July 2014

#### APPENDIX D - WHISTLING CESSATION

#### Table D-1 – Requirements for Warning Systems at Public Grade Crossings within an Area without Whistling

# Figure D-1 - prescribed area for whistling cessation as per article 23.1 of the RSA

|                               | (                               | Column A     | Column B  |                                      |  |  |
|-------------------------------|---------------------------------|--------------|---|--------------------------------------|--|--|
| Railway<br>Design Speed       | Grade Crossings for Vehicle Use |              | Grade Crossings For Sidewalks,<br>Paths, or Trails with the centrelin<br>no closer than 3.6 m (12 ft) to a<br>warning signal for vehicles |                                      |  |  |
|                               | No                              | o. of Tracks | No. of Tracks   |                                      |  |  |
|                               | 1                               | 2 or more    | 1   | 2 or more                            |  |  |
| Column 1                      | Column 2                        | Column 3     | Column 4  | Column 5                             |  |  |
| 1 – 25 km/h (15 mph)          | FLB                             | FLB          | No warning<br>system<br>requirement   | No warning<br>system<br>requirements |  |  |
| 25 – 81 km/h<br>(16 – 50 mph) | FLB                             | FLB & G      | FLB   | FLB & G                              |  |  |
| Over 81 km/h (50 mph)         | FLB & G                         | FLB&G        | FLB & G   | FLB & G                              |  |  |



RSA = Railway Safety Act of Canada

#### Legend :

FLB is a warning system consisting of flashing lights and a bell.

FLB & G is a warning system consisting of flashing lights, a bell and gates

| Source  | rce Item   |    |           |    |  |  |
|---------|--|----|-----------|----|--|--|
| Rail    | Is train whistling prohibited at this crossing?  | No | 24 hours? | No |  |  |
| observe | Is there evidence of routine unauthorized access (trespassing) on the rail line in the area of the crossing? |    |           |    |  |  |
| observe | Are the requirements of Table D-1 met?   | No |           |    |  |  |

## Comments Following Site Visit:

Whistle Cessation not required

#### Additional Prompt Lists

#### **Human Factors:**

- \* Control device visibility / background visual clutter.
- <sup>o</sup> Driver workload through this area (i.e., are there numerous factors that simultaneously require the driver's attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.).
- attention such as traffic lights, pedestrian activity, merging/entering traffic, commercial signing, etc.), <sup>o</sup> Driver expectancy of the environment (i.e., are the control measures in keeping with the design levels of the road system and adjacent environment).
- \* Need for positive guidance.
- " Conflicts between road and railway signs and signals.

#### **Environmental Factors:**

- " Extreme weather conditions.
- \* Lighting issues (night, dawn/dusk, tunnels, adjacent facilities, headlight or sunlight glare, etc.)
- <sup>6</sup> Landscaping or vegetation.
- " Integration w/ surrounding land use (e.g., parked vehicles blocking sightlines, merging traffic tanes, etc.)

#### All Road Users:

Λ.

| nan | -reedes of the following been met:<br>-pedestrians (including strollers, baby carriages, and blind persons) |     |
|-----|---|-----|
|     | -children / elderty   |     |
|     | -assistive devices (wheelchairs, scooters, walkers, etc)  |     |
|     | -bicyclists   |     |
|     | -motorcyclists  |     |
|     | -over-sized trucks  | · · |
|     | -buses  |     |
|     | -recreational vehicles  |     |
|     | -goifearts  |     |
|     | -hazardous materials  |     |

(mage barriers/guide fencing, additional pedestrian bell, pedestrian gates, sign indicating potential presence of 2<sup>nd</sup> train at a multi track crossing, etc)

#### Other:

Should closure of the crossing be considered due to inactivity, presence of nearby adjacent crossings, etc.

Commente Following Site Visit: