Enclosure 1

STRATHCONA COUNTY

Encl 1 - CN Rail Safety Assessment Report.docx

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Executive Summary

Since the implementation of train whistle cessation at multiple crossing along Hwy 630, the residents contacted the County and raised concerns of train whistle noise. Administration has reviewed six additional rail crossing locations for the possibility of implementing train whistle cessation upon Strathcona County council request. The six CN Rail crossings include:

- CN MILE 10.02 at Township Road 515, west of Range Road 233
- CN MILE 11.08 at Township Road 514, west of Range Road 233
- CN MILE 11.92 at Range Road 233, south of Township Road 514
- CN MILE 13.47 at Township Road 512, west of Range Road 232
- CN MILE 14.12 at Range Road 232, south of Township Road 512
- CN MILE 15.95 at Township Road 510, west of Range Road 231

The train whistle cessation process follows the federally-controlled Railway Safety Act, where a municipality, as the road authority, can request the cessation of train whistles at an at-grade rail crossing. Whistle cessation is achieved through municipal Councils passing a resolution once any and all required safety measures are made. Transport Canada defines the standards for the required safety measures and specifies procedures consistent with the Railway Safety Act and grade crossing regulations. Strathcona County developed Policy SER-013-004 Train Whistle Cessation; the policy outlines the required steps to achieve whistle cessation within Strathcona County. The policy defines a benefitting area with a minimum of 50 households as being able to request and pursue train whistle cessation. Under the existing policy, all seven proposed crossings meet the minimum benefitting area threshold for whistle cessation as outlined in the policy.

Each crossing is unique and evaluated independently to ensure the required safety measures are in place and in compliance with Transport Canada's whistle cessation standards. Evaluations require engineering review and assessment to define the scope of work that may or may not be

required to implement whistle cessation. At a minimum, each crossing must have new warning system (recommended by CN railway) with appropriate signing, line marking and sufficient sightlines to be considered for train whistle cessation according to Transport Canada's Grade Crossing Standards. Currently, five crossings are equipped with flashing lights and bells, and one stop controlled. The details of each crossing warning systems can be found in detailed safety assessments for each crossing in the Appendices A-F. Safety assessments for each crossing have been completed and yet to be reviewed by CN Railway. The outcome of the safety assessments includes safety upgrades that are required to be fulfilled prior to the approved implementation of whistle cessation.

The estimated cost of implementing the required safety measures are:

CN MILE 10.02 at Township Road 515	= $501,000.00
CN MILE 11.08 at Township Road 514	= $501,000.00
CN MILE 11.92 at Range Road 233	= $601,000.00
CN MILE 13.47 at Township Road 512	= $501,000.00
CN MILE 14.12 at Range Road 232	= $506,000.00
CN MILE 15.95 at Township Road 510	= $501,000.00
CN work permit application fee	= $1,000.00
Total estimated cost	**= $ 3,112,000**

The required safety measures include the installation of new warning systems, which can only be completed by CN Rail. Residents have expressed noise concerns living nearby these railway crossings. Should whistle cessation be desired, Strathcona County would contact and inform residents prior to the whistle cessation resolution at Council. All CN Rail work relies upon CN Rail forces, programs, and priorities and Strathcona County retains no control over the implementation of these works.

Table of Contents

1.0 Introduction

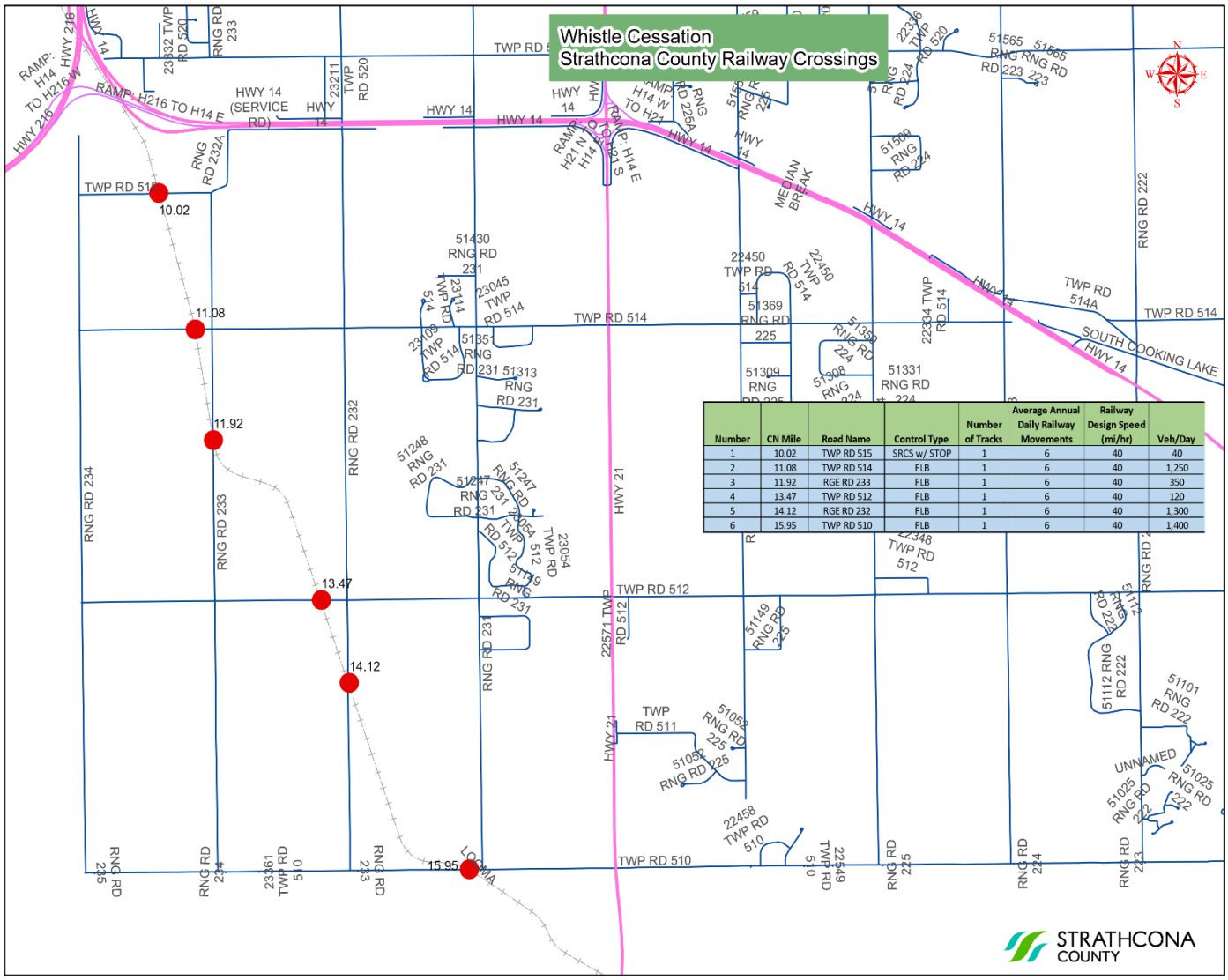
Train whistling is a proven and effective deterrent to vehicle/train collisions at grade crossings. However, the noise pollution can lead to problems for residents along the rail corridor by reducing the quality of life.

The purpose of this report is for the evaluation of the feasibility of completing cessation of train whistles on railway crossings at the following six locations:

- CN MILE 10.02 at Township Road 515, west of Range Road 233
- CN MILE 11.08 at Township Road 514, west of Range Road 233
- CN MILE 11.92 at Range Road 233, south of Township Road 514
- CN MILE 13.47 at Township Road 512, west of Range Road 232
- CN MILE 14.12 at Range Road 232, south of Township Road 512
- CN MILE 15.95 at Township Road 510, west of Range Road 231

Deficiencies in meeting safety requirements according to the Rail Safety Act, Grade Crossing Regulations, and industry accepted standards at the crossing have been identified in the detailed reports, Appendix A-F. The information that has been collected will allow the Railway Company; Transport Canada, and the road authority to make engineering decisions in which the safety of all grade crossing users is considered.

2.0 Location Map



Number	CN Mile	Road Name	Control Type	Number of Tracks	Average Annual Daily Railway Movements	Railway Design Speed (mi/hr)	Veh/Day
1	10.02	TWP RD 515	SRCS w/ STOP	1	6	40	40
2	11.08	TWP RD 514	FLB	1	6	40	1,250
3	11.92	RGE RD 233	FLB	1	6	40	350
4	13.47	TWP RD 512	FLB	1	6	40	120
5	14.12	RGE RD 232	FLB	1	6	40	1,300
6	15.95	TWP RD 510	FLB	1	6	40	1,400

3.0 Safety Assessment

Detailed safety assessments for each railway crossing were conducted by Strathcona County's Traffic Safety Engineer. The fundamental objectives for the assessments were to reduce crash risk and minimize the frequency and severity of preventable crashes. The assessment includes the review of standards and guidelines considering the site characteristics, existing traffic control system, and the railway and roadway operational characteristics. Field data was

collected in accordance with the Transport Canada Field Guide to conduct the Detailed Safety Assessments.

4.0 Procedure for Eliminating Train Whistles

Strathcona County is following the procedure according to Transport Canada guidelines and is consistent with the requirements of section 23.1 of the Railway Safety Act, section 104 of Grade Crossing Regulations and Appendix D of the Grade Crossing Standards. Transport Canada's Procedures for Eliminating Whistling at Public Grade Crossing is;

- *Interest from the residents and municipality receives request from a resident or Council to stop train whistling at one or multiple crossings*
- *Municipality contact with rail company to assess the feasibility of the whistling cessation request*
- *Municipality issues notifications to all relevant associations or organizations*
- *Municipality and the railway company assess the crossings against the prescribed requirements in the Grade Crossing Standards and Grade Crossing Regulations*
- *Municipality and Railway agree that the crossing meet the requirements as per Grade Crossing Standards, and Grade Crossing Regulations*
- *Municipality and Railway request a final decision from Transport Canada*
- *Council passes a resolution declaring that it agrees that whistle should not be used in that area, thereby prohibiting train whistling*
- *Railway Company notifies Transport Canada and informs the Municipality within 30 days that it has arranged to have whistling ceased at the crossing*
- *Municipality and railway share the responsibility for monitoring and maintaining the conditions that support the cessation of train whistling at the crossing*

5.0 Requirements for Whistle Cessation

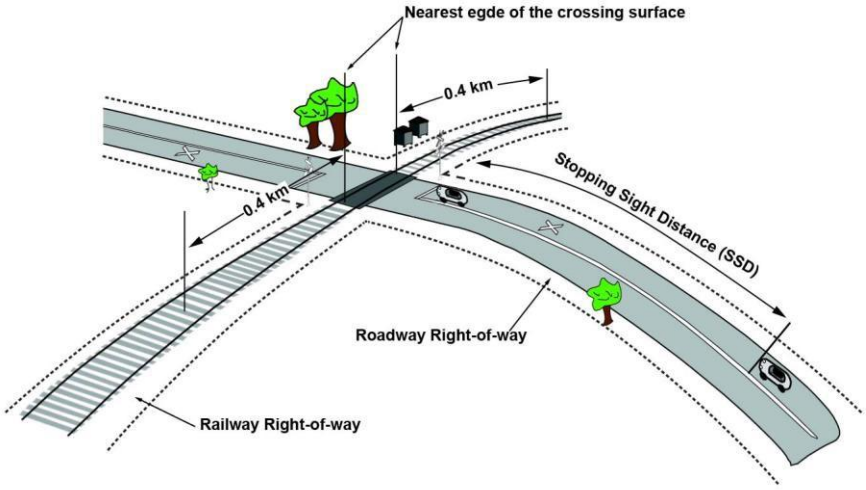
The requirements for whistle cessation at grade crossing are specified in section 104 of the Grade Crossing Regulations and Appendix D of the Grade Crossing Standards.

APPENDIX D – WHISTLING CESSATION

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

	Column A		**Column B**	
Railway Design Speed	Grade Crossings for Vehicle Use		Grade Crossings For Sidewalks, Paths, or Trails with the centreline no closer than 3.6 m (12 ft) to a warning signal for vehicles	
	No. 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 system requirement	No warning system requirements
25 – 81 km/h (16 – 50 mph)	FLB	FLB & G	FLB	FLB & G
Over 81 km/h (50 mph)	FLB & G	FLB & G	FLB & G	FLB & G
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*				

Figure 1 – prescribed area for whistling cessation as per article 23.1 of the RSA



6.0 Cost Estimates

Table 2 below presents the proposed improvements identified through the detailed safety assessment to facilitate the safe implementation of whistle cessation and provide cost estimates for each crossing.

LOCATION	Proposed Improvements	Cost estimate
CN MILE 10.02/Township Road 515	Install new warning system**	$500,000.00
	Install warning signs and line markings	$1,000.00
CN MILE 11.08/Township Road 514	Install new warning system*	$500,000.00
	Install warning signs and line markings	$1,000.00
CN MILE 11.92/Range Road 233	Install new warning system*	$500,000.00
	Install warning signs and line markings	$1,000.00
	Private access relocation***	$100,000.00
CN MILE 13.47/Township Road 512	Install new warning system*	$500,000.00
	Install warning signs and line markings	$1,000.00
CN MILE 14.12/Range Road 232	Install new warning system*	$500,000.00
	Crossing surface repair	$5,000.00
	Install warning signs and line markings	$1,000.00
CN MILE 15.95/Township Road 510	Install new warning system*	$500,000.00
	Install warning signs and line markings	$1,000.00
Miscellaneous cost	CN work permit application fee	$1,000.00
	Total cost estimate	**$3,112,000.00**

*recommended by CN Rail
**recommended by CN Rail/County
***costs are approximate and may be subject to change for land and unknown costs

Table 2: Proposed improvements cost

APPENDIX 'A'

Safety Assessment for Grade Crossing
CN MILE 10.02 @ Township Road 515

1.1. CN Mile 10.02

The railway crossing is located on Township Road 515, 620m west of Range Road 233. Township Road 515 runs east-west between Range Road 233 and Range Road 234, while railway line runs in north-south direction. The crossing has one track, and has standard railway crossing sign and stop sign. There are about 87 households living within a three km radius of the crossing.

Field investigation and safety audit was conducted to identify the mitigation measures necessary to facilitate the safe implementation of anti-whistling and provide associated cost estimates for upgrades.

1.2. General Information:

- Railway Authority – CN Rail
- Track Type – Main Line
- Number of Tracks – 1
- Railway Subdivision – Camrose
- Road Authority – Strathcona County
- Road Name – Township Road 515
- Road Classification – Class 4
- Design Classification – RAU80
- Type of Grade Crossing – Passive crossing equipped with Standard Railway Crossing Sign (SRCS), and stop sign

1.3. Rail Operations:

- Maximum Railway Operating Speed – 40 mph
- Switching operation within 400m (1/4 mile) of crossing
- Daily train volume – 6 freight trains

1.4. Collision History:

- There is no collision reported at the railway crossing in last five years (2015-2019) of available data.

1.5. Road Advance Warning Signs:

- Railway Crossing Ahead sign (WA-18) posted on either side of the crossing. Since the railway line is crossing road at 106 degrees, the warning signs are not conforming to MUTCDC standards, and should be changed to WA-18L signs.

1.6. Road Operations:

- Average weekday traffic is 40 vehicles per day according to 2016 traffic counts
- School Bus Route – Yes

- Dangerous Goods Route – No
- Posted speed limit – 80 km/h

1.7. Trespassing:

- There is no evidence of trespassing within 400m of the crossing

1.8. Grade Crossing Surface

- Crossing surface is made up of wood
- Road surface – Asphalt
- Flangeway width is 80mm and depth is 150mm
- Field side gap is 80mm
- The surface is not smooth and may be hazardous for vehicles traveling at posted speed. A bump sign with 20 kph speed warning sign is recommended to install at 50m on either side of the crossing

1.9. Crossing Angle:

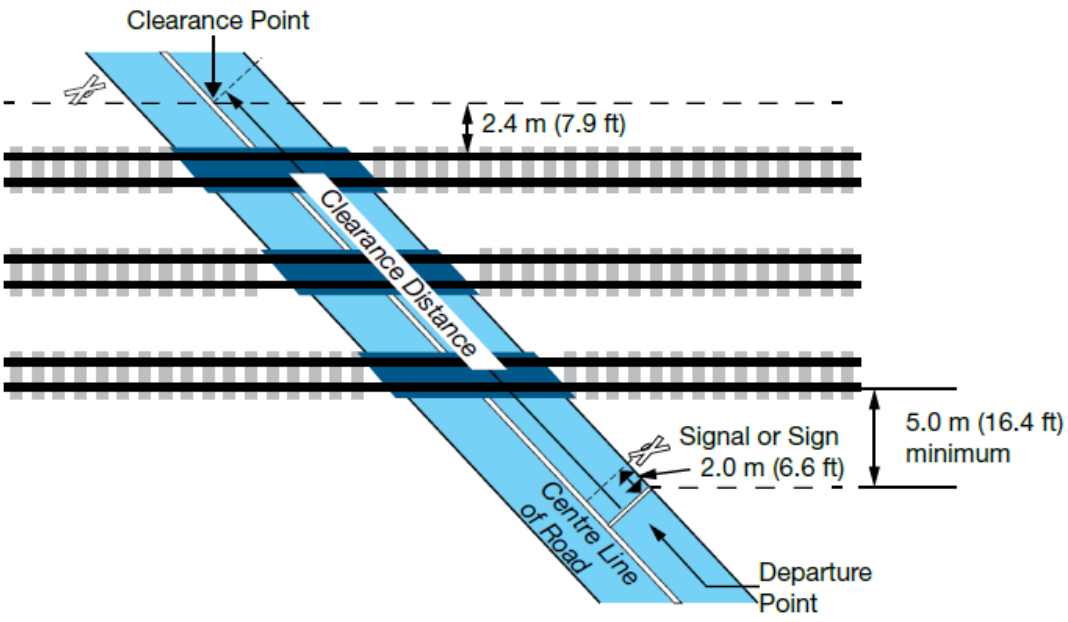
- Grade crossing angle is 106 degrees, compliant with GCS

1.10. Warning System

- Standard railway crossing sign (SRCS) with the stop sign
- Cross product = traffic volume x train volume
  = 40 x 6 = 240 < 2,000; satisfies current waring system requirements

1.11. Design Calculations:

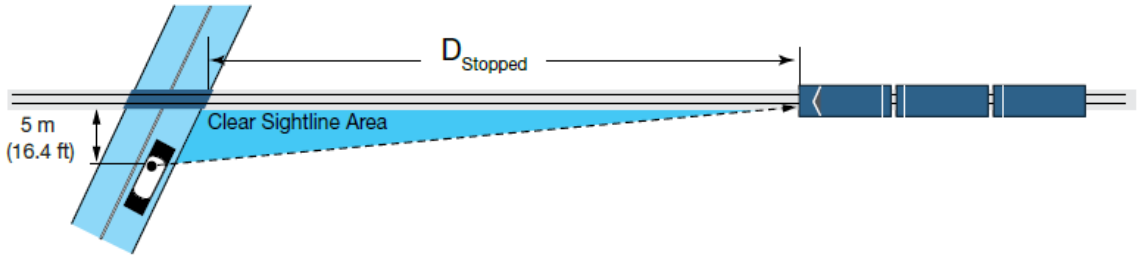
- Design vehicle – WB-20 (Tractor-Semitrailer)
- Clearance Distance – Distance between the departure point in advance of crossing to the clearance point beyond the farthest rail
  - **Cd** = 11.5 m



- Vehicle Travel Distance – Total distance; design vehicle must travel during acceleration to pass completely through the clearance distance;
    - **S=Cd+L**; **Cd**=clearance distance, **L**=length of design vehicle
    - **S**=34.2m
- Departure Time – Time required for design vehicle ($\mathbf{T_D}$) or pedestrian ($\mathbf{T_P}$) to pass completely through clearance distance (**cd**) from stopped position
- Maximum approach grade within 'S' = -2%
    - $\mathbf{T_D = J + T}$
        - J is Perception-reaction time; 2 seconds
        - T is the time, for design vehicle to travel though clearance distance (**S**)
    - **T= t x G**
        - **T is** the time, required for design vehicle to accelerate through the vehicle travel distance (S) from assumed acceleration curves from *Geometric Design Guide for Canadian Roads*
        - **G** = ratio of acceleration times on grade
        - t = 11.7 sec
        - T = 11.7 x 0.9 = 10.5 sec
    - T_D = 2 + 10.5 =12.5 sec
    - T_P = cd/V_P= 11.5 sec; V_P=1.0 m/s (avg. pedestrian speed)
    - Departure Time = 12.2 seconds; (Greater of T_D and T_P)

1.12. Sightlines:

- For a stop-controlled railway crossing, $D_{stopped}$ is the minimum distance along the line that a motorist needs to see approaching railway equipment, from the stopped position.
- $D_{stopped}$ = 240m;
- Sightlines are clear for motorists on either side of the crossing.



1.13. Whistle Cessation Requirements

- Current railway design speed is 40 mph with one railway track requires flashing lights and bells to qualify for whistle cessation according to Table D-1 of GCS.

1.14. Safety Deficiencies

Based on design calculations and field investigation; the safety deficiency is;

- Crossing surface is not smooth and hazardous for motorists operating at posted speed of 80 kph.
- SRCS with stop sign do not qualify for whistle cessation.

1.15. Recommendations:

The requirements for train whistle cessation at this crossing are not met as per Grade Crossing Standards. Deficiencies in meeting the Grade Crossing Standards should be fulfilled to improve safety of the crossing.

- Install 'NO TRAIN WHISTLE' tabs under existing Railway Crossing Ahead warning signs on either side of crossing.
- Improve crossing surface by addressing uneven surface or install bump warning sign with 20 kph speed tab
- Install flashing lights and bells to fulfill whistle cessation requirements

1.16. Cost Estimate:

- Install new warning system = $500,000 (CN/County recommendation)
- Install 'NO TRAIN WHISTLE' sign tabs
- Install bump warning signs and line markings = $1,000
- Total cost estimate = $501,000.00

APPENDIX 'B'

Safety Assessment for Grade Crossing
CN MILE 11.08 @ Township Road 514

2.1. CN Mile 11.08

The railway crossing is located on Township Road 514, approximately 200m west of Range Road 233south of Township Road 514. Township Road 514 is oriented in the east-west direction and railway line is in the north-south direction. The crossing has one track and has an active warning system (Flashing lights and bells). There are about 86 households living within a three km radius of the crossing.

Field investigation and safety audit was conducted to identify the mitigation measures necessary to facilitate the safe implementation of anti-whistling and provide associated cost estimates for upgrades.

2.2. General Information:

- Railway Authority – CN Rail
- Track Type – Main Line
- Number of Tracks – 1
- Railway Subdivision – Camrose
- Road Authority – Strathcona County
- Road Name – Township Road 514
- Road Classification – Class 1
- Design Classification – RAU80
- Type of Grade Crossing – Active Crossing equipped with Standard Railway Crossing Sign (SRCS), Flashing lights, and Bells

2.3. Rail Operations:

- Maximum Railway Operating Speed – 40 mph
- No switching operation within 400m (1/4 mile) of crossing
- Daily train volume – 6 freight trains

2.4. Collision History:

- There is no collision reported at the railway crossing in last five years (2015-2019) of available data.

2.5. Road Advance Warning Signs:

- Railway Crossing Ahead signs (WA-18L) are present and in good condition on both approaches.
- Temporary bump signs are posted on either side of the crossing

2.6. Road Operations:

- Average weekday traffic is 1,250 vehicles per day (2016 counts)
- School Bus Route – Yes

- Dangerous Goods Route – No
- Posted speed limit – 80 km/h

2.7. Trespassing:

- There is no evidence of trespassing within 400m of the crossing.

2.8. Grade Crossing Surface:

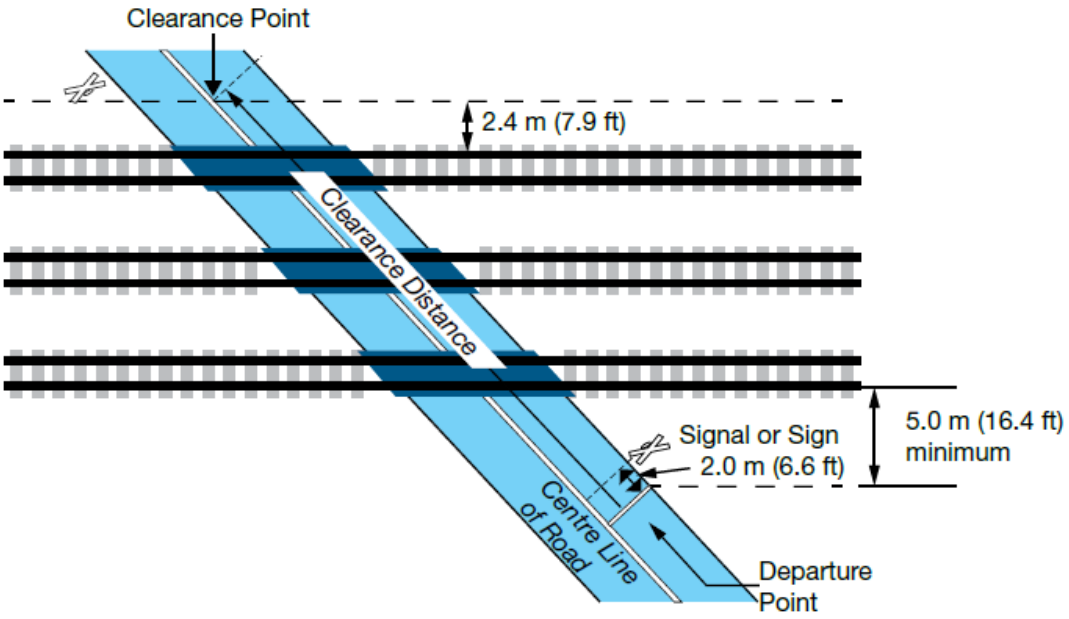
- Crossing surface material is asphalt
- Road surface – Asphalt
- Flangeway width is 70 mm and depth is 50 mm
- Field side gap width is none
- The surface is not smooth and may be hazardous for vehicles traveling at posted speed. A bump sign with 20 kph speed warning sign is recommended to install at 50m on either side of the crossing

2.9. Crossing Angle:

- Grade crossing angle is 99 degrees, compliant with GCS

2.10. Design Calculations:

- Design vehicle – WB-20 (Tractor-Semitrailer)
- Clearance Distance – Distance between the departure point in advance of crossing to the clearance point beyond the farthest rail
    - **Cd** = 10.5 m



- Vehicle Travel Distance – Total distance; design vehicle must travel during acceleration to pass completely through the clearance distance;
    - **S=Cd+L**; **Cd**=clearance distance, **L**=length of design vehicle
    - **S**=33.2 m
- Departure Time – Time required for design vehicle ($\mathbf{T_D}$) or pedestrian ($\mathbf{T_P}$) to pass completely through clearance distance (**cd**) from stopped position
- Maximum approach grade within 'S' = 1%
    - $\mathbf{T_D = J + T}$
        - J = Perception-reaction time; 2 seconds
        - T = the time, for design vehicle to travel though clearance distance (**S**)
    - **T= t x G**
        - **T =** the time, required for design vehicle to accelerate through the vehicle travel distance (S) from assumed acceleration curves from *Geometric Design Guide for Canadian Roads*
    - T_D = 2 + 11.3 =13.3 seconds
    - T_P = cd/V_P= 10.5 sec; V_P=1.0 m/s (avg. pedestrian speed)
    - Departure Time = 13.3 seconds; (Greater of T_D and T_P)

2.11. Sightlines:

- Stopping sight distance = 210m, for WB-20 at posted speed of 80 km/h
- Sightlines are clear for approaching traffic and the warning system is visible from stopping sight distance.

2.12. Deficiencies

- Crossing surface is not smooth and would be hazardous for vehicles traveling at posted speed

2.13. Recommendations:

The requirements for train whistle cessation at this crossing are met as per Grade Crossing Standards. Deficiencies in meeting the Grade Crossing Standards should be fulfilled to improve safety of the crossing;

- It is recommended to install 'NO TRAIN WHISTLE' tabs under existing Railway Crossing Ahead warning signs on either side of crossing.
- Repair crossing surface or install bump waring signs with 20 km/h speed tab.

2.14. Cost Estimate:

- Install new warning system = $500,000 (CN recommendation)
- Install 'NO TRAIN WHISTLE' sign tabs
- Install bump warning sign and line marking = $1,000.00
- Total cost estimate = $501,000.00

APPENDIX 'C'

Safety Assessment for Grade Crossing
CN MILE 11.92 @ Rng Rd 233

3.1. CN Mile 11.92

The railway crossing is located on Range Road 233, approximately 1.3 km south of Township Road 514. Range Road 233 is oriented in the north-south direction and the railway line is in the east-west direction. The crossing has one track and has an active warning system (Flashing lights and bells). There are about 117 households living within a three km radius of the crossing. Field investigation and safety audit was conducted to identify the mitigation measures necessary to facilitate the safe implementation of anti-whistling and provide associated cost estimates for upgrades.

3.2. General Information:

- Railway Authority – CN Rail
- Track Type – Main Line
- Number of Tracks – 1
- Railway Subdivision – Camrose
- Road Authority – Strathcona County
- Road Name – Range Road 233
- Road Classification – Class 2
- Design Classification – RLU80
- Type of Grade Crossing – Active Crossing equipped with Standard Railway Crossing Sign (SRCS), Flashing lights, and Bells

3.3. Rail Operations:

- Maximum Railway Operating Speed – 40 mph
- No switching operation within 400m (1/4 mile) of crossing
- Daily train volume – 6 freight trains

3.4. Collision History:

- One Collision occurred at the railway crossing in last five year (2015-2019);
    - Date: June 4, 2016
    - Injury Severity: Minor
    - Railway equipment involved: No
    - Description: A motorcycle traveling in the northbound direction approached railway crossing, and the tire wedged between the tracks, lost control, and fell on the ground.

3.5. Road Advance Warning Signs:

- Railway Crossing Ahead signs (WA-18R) are present and in good condition on both approaches.

3.6. Road Operations:

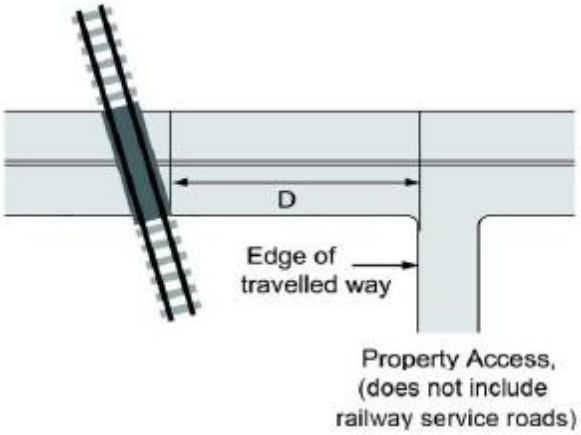
- Average weekday traffic is 350 vehicles per day.
- School Bus Route – Yes
- Dangerous Goods Route – No
- Posted speed limit – 80 km/h

3.7. Trespassing:

- There is no evidence of trespassing within 400m of the crossing.

3.8. Location of Grade Crossing:

- Public grade crossing where the design speed is more than 25 km/h must be constructed 30m away from the intersecting road or entrance way according to section 11.1 of GCS.



- There is a private access located 20m south of the crossing, between the warning signal and the crossing, and is not safe for vehicles coming out of the access. Although access relocation is not required for whistle cessation but is recommended for safety reasons.

3.9. Grade Crossing Surface:

- The surface material is concrete
- Road surface – Asphalt
- Flangeway width is 65 mm and depth is 40 mm
- Field side gap width is none

3.10. Crossing Angle:

- Grade crossing angle is 11 degrees
- According to section 6.5 of GCS, the crossing angle should not be less than 30 degrees with a warning system
- The realignment of the crossing is not required for whistle cessation.

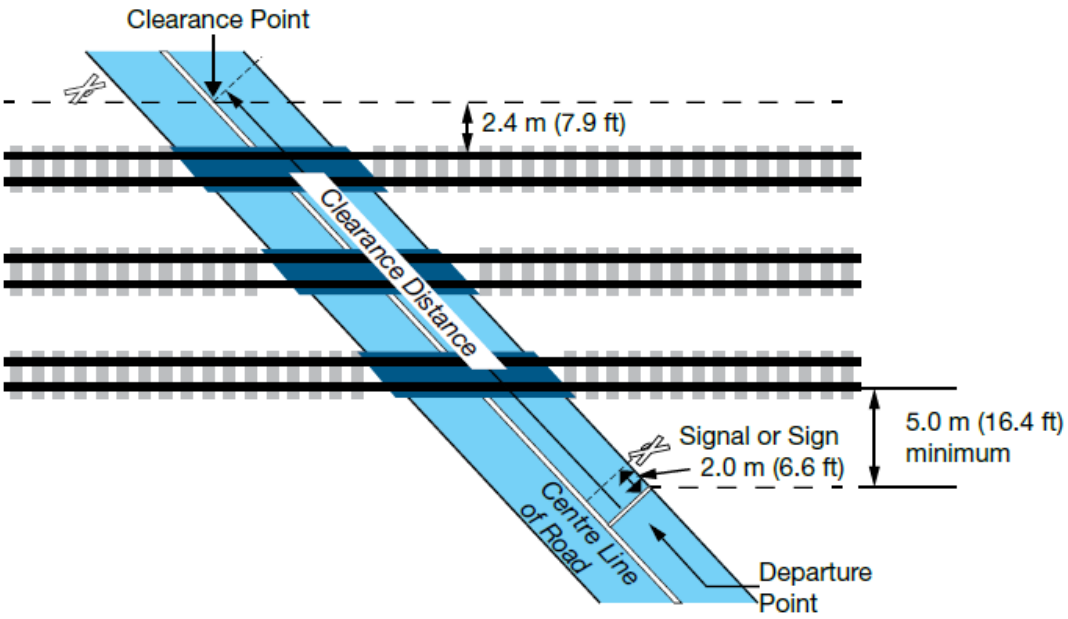
3.11. Warning System

- Standard railway crossing sign with flashing lights and bells
- Cross product = traffic volume x train volume

= 350 x 6 = 2100 < 50,000; satisfies current waring system requirements

3.12. Design Calculations:

- Design vehicle – WB-20 (Tractor-Semitrailer)
- Clearance Distance – Distance between the departure point in advance of crossing to the clearance point beyond the farthest rail
    - **Cd** = 70 m



- Vehicle Travel Distance – Total distance; design vehicle must travel during acceleration to pass completely through the clearance distance;
    - **S=Cd+L**; **Cd**=clearance distance, **L**=length of design vehicle
    - **S**=92.7 m
- Departure Time – Time required for design vehicle (T_D) or pedestrian (T_P) to pass completely through clearance distance (**cd**) from stopped position
- Maximum approach grade within 'S' = 1%
    - $T_D = J + T$
        - J = Perception-reaction time; 2 seconds
        - T = the time, for design vehicle to travel though clearance distance (**S**)
    - **T= t x G**
        - **T =** the time, required for design vehicle to accelerate through the vehicle travel distance (S) from assumed acceleration curves from *Geometric Design Guide for Canadian Roads*
    - T_D = 2 + 18.2 =20.2 seconds
    - T_P = cd/V_P= 70 sec; V_P=1.0 m/s (avg. pedestrian speed)
    - Departure Time = 70 seconds; (Greater of T_D and T_P)

3.13. Sightlines:

- Stopping sight distance = 210m, for WB-20 at posted speed of 80 km/h
- Sightlines are clear for approaching traffic and the warning system is visible from stopping sight distance.

3.14. Deficiencies

- Based on the field investigation, the presence of access in close proximity of the crossing may be hazardous considering the vehicles exiting out of the access have no prior warning before crossing since the warning system is away from the access.

3.15. Recommendations:

The requirements for train whistle cessation at this crossing are met as per Grade Crossing Standards. Deficiencies in meeting the Grade Crossing Standards should be fulfilled to improve safety of the crossing;

- It is recommended to install 'NO TRAIN WHISTLE' tabs under existing Railway Crossing Ahead warning signs on either side of crossing.
- Relocate existing private access away from the crossing to at least south of the warning system

3.16. Cost Estimate:

- Install new warning system = $500,000.00 (CN recommendation)
- Install 'NO TRAIN WHISTLE' sign tabs
- Install bump warning sign and line marking = $1,000.00
- Private access relocation = $100,000.00(to be verified, dependent on land, design and construction costs)
- Total cost estimate = $601,000.00

APPENDIX 'D'

Safety Assessment for Grade Crossing
CN MILE 13.47 @ Township Road 512

4.1. CN Mile 13.47

The railway crossing is located on Township Road 512, approximately 300m west of Range Road 232. Township Road 512 is oriented in the east-west direction and the railway line is in the north-south direction. The crossing has one track and has an active warning system (Flashing lights and bells). There are about 210 households living within a three km radius of the crossing. Field investigation and safety audit was conducted to identify the mitigation measures necessary to facilitate the safe implementation of anti-whistling and provide associated cost estimates for upgrades.

4.2. General Information:

- Railway Authority – CN Rail
- Track Type – Main Line
- Number of Tracks – 1
- Railway Subdivision – Camrose
- Road Authority – Strathcona County
- Road Name – Township Road 512
- Road Classification – Class 3
- Design Classification – RLU80
- Type of Grade Crossing – Active Crossing equipped with Standard Railway Crossing Sign (SRCS), Flashing lights, and Bells

4.3. Rail Operations:

- Maximum Railway Operating Speed – 40 mph
- No switching operation within 400m (1/4 mile) of crossing
- Daily train volume – 6 freight trains

4.4. Collision History:

- There is no collision reported at the railway crossing in last five years (2015-2019) of available data.

4.5. Road Advance Warning Signs:

- Railway Crossing Ahead signs are present. Warning sign on east side of the crossing is WA-18R, and damaged; should be WA-18L. The sign on the west side is in good condition.

4.6. Road Operations:

- Average weekday traffic is 100 vehicles per day.
- School Bus Route – Yes
- Dangerous Goods Route – No

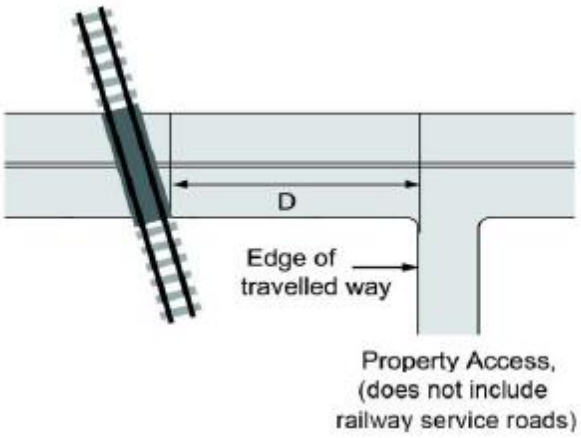
- Posted speed limit – 80 km/h

4.7. Trespassing:

- There is no evidence of trespassing within 400m of the crossing.

4.8. Location of Grade Crossing:

- Public grade crossing where the design speed is more than 25 km/h must be constructed 30m away from the intersecting road or entrance way according to GCS Section 11.1.



- There is a private access located 20m east of the crossing, not compliant with current standards, but does not require relocation for whistle cessation.

4.9. Grade Crossing Surface:

- The surface material is asphalt
- Road surface – Asphalt
- Flangeway width is 70 mm and depth is 30 mm
- Field side gap is none

4.10. Crossing Angle:

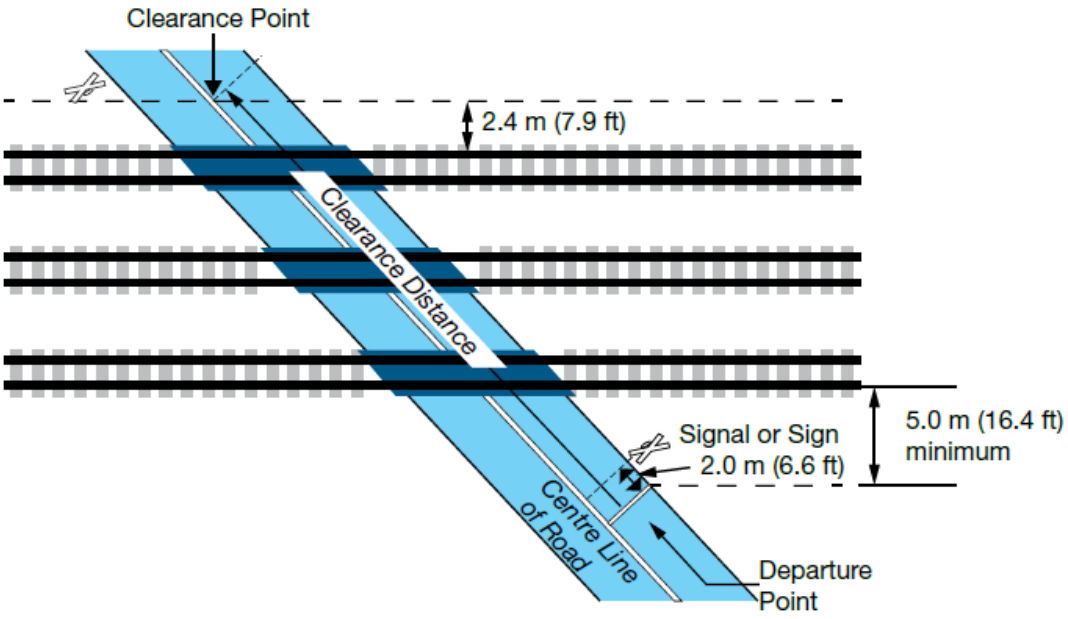
- Grade crossing angle is 108 degrees
- According to GCS section 6.5, the crossing angle is within the 30-150 degrees range and satisfies current standards.

4.11. Warning System

- Standard railway crossing sign with flashing lights and bells
- Cross product = traffic volume x train volume
  = 100 x 6 = 600 < 50,000; satisfies current waring system requirements

4.12. Design Calculations:

- Design vehicle – WB-20 (Tractor-Semitrailer)
- Clearance Distance – Distance between the departure point in advance of crossing to the clearance point beyond the farthest rail
  - **Cd** = 11.8 m



- Vehicle Travel Distance – Total distance; design vehicle must travel during acceleration to pass completely through the clearance distance;
    - **S=Cd+L**; **Cd**=clearance distance, **L**=length of design vehicle
    - **S**=34.5 m
- Departure Time – Time required for design vehicle ($\mathbf{T_D}$) or pedestrian ($\mathbf{T_P}$) to pass completely through clearance distance (**cd**) from stopped position
- Maximum approach grade within 'S' = 0%
    - $\mathbf{T_D = J + T}$
        - J = Perception-reaction time; 2 seconds
        - T = the time, for design vehicle to travel though clearance distance (**S**)
    - **T= t x G**
        - **T =** the time, required for design vehicle to accelerate through the vehicle travel distance (S) from assumed acceleration curves from *Geometric Design Guide for Canadian Roads*
    - T_D = 2 + 11.7 =13.7 seconds
    - T_P = cd/V_P= 12 sec; V_P=1.0 m/s (avg. pedestrian speed)
    - Departure Time = 14 seconds; (Greater of T_D and T_P)

4.13. Sightlines:

- Stopping sight distance = 210m, for WB-20 at posted speed of 80 km/h
- Sightlines are clear for approaching traffic and the warning system is visible from stopping sight distance.

4.14. Deficiencies

- Based on the field investigation, there is no significant deficiencies observed other than warning sign needs be of proper orientation.

4.15. Recommendations:

The requirements for train whistle cessation at this crossing are met as per Grade Crossing Standards. Deficiencies in meeting the Grade Crossing Standards should be fulfilled to improve safety of the crossing;

- It is recommended to install 'NO TRAIN WHISTLE' tabs under existing Railway Crossing Ahead warning signs on either side of crossing.
- Remove WA-18R sign on the east side of crossing and install left version (WA-18L) of railway crossing ahead warning sign.

4.16. Cost Estimate:

- Install new warning system = $500,000 (CN recommendation)
- Install 'NO TRAIN WHISTLE' sign tabs
- Replace WA-18R with WA-18L signs and line markings = $1,000.00
- Total cost estimate = $501,000.00

APPENDIX 'E'

Safety Assessment for Grade Crossing
CN MILE 14.12 @ Range Road 232

5.1. CN Mile 14.12

The railway crossing is located on Range Road 232, approximately 970m south of Township Road 512. Range Road 232 is oriented in the north-south direction and the railway line is in the east-west direction. The crossing has one track and has an active warning system (Flashing lights and bells). There are about 173 households living within a three km radius of the crossing. Field investigation and safety audit was conducted to identify the mitigation measures necessary to facilitate the safe implementation of anti-whistling and provide associated cost estimates for upgrades.

5.2. General Information:

- Railway Authority – CN Rail
- Track Type – Main Line
- Number of Tracks – 1
- Railway Subdivision – Camrose
- Road Authority – Strathcona County
- Road Name – Range Road 232
- Road Classification – Class 2
- Design Classification – RLU80
- Type of Grade Crossing – Active Crossing equipped with Standard Railway Crossing Sign (SRCS), Flashing lights, and Bells

5.3. Rail Operations:

- Maximum Railway Operating Speed – 40 mph
- No switching operation within 400m (1/4 mile) of crossing
- Daily train volume – 6 freight trains

5.4. Collision History:

- One Collision occurred at the railway crossing in last five year (2015-2019);
    - Date: March 15, 2017
    - Injury Severity: Property Damage Only
    - Railway equipment involved: No
    - Description: Vehicle 1 stopped at the railway crossing when vehicle 2 made contact with vehicle 1 rear bumper

5.5. Road Advance Warning Signs:

- Railway Crossing Ahead signs (WA-18R) are present. The sign on the north side is faded and may need to be replaced. The sign on south side is in good condition.

5.6. Road Operations:

- Average weekday traffic is 1,300 vehicles per day (2019 traffic counts).
- School Bus Route – Yes
- Dangerous Goods Route – No
- Posted speed limit – 80 km/h

5.7. Trespassing:

- There is no evidence of trespassing within 400m of the crossing.

5.8. Grade Crossing Surface:

- The surface material is made up of wood
- Road surface – Asphalt
- Flangeway width is 70 mm and depth is 140 mm
- Field side gap is 40mm
- Flangeway width, depth and field side gap satisfies current GCS.
- There is a gap in the road surface on the southwest side of the railway crossing, may be hazardous for some vehicles

Figure 1: Range Road 232 looking north

5.9. Crossing Angle:

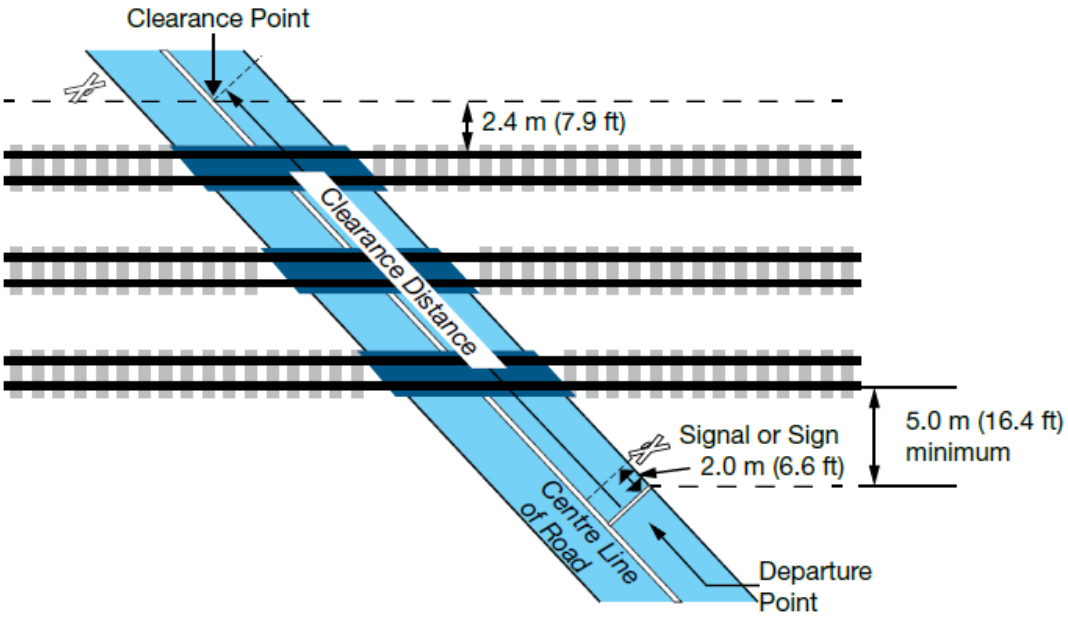
- Grade crossing angle is 19 degrees
- According to GCS Sec 6.5, for grade crossing with the warning system the crossing angle should be between 30-150 degrees
- Current crossing angle do not comply with GCS, but it is not the requirement of whistle cessation

5.10. Warning System

- Standard railway crossing sign with flashing lights and bells
- Cross product = traffic volume x train volume
  = 1,300 x 6 = 7,800 < 50,000; satisfies current waring system requirements

5.11. Design Calculations:

- Design vehicle – WB-20 (Tractor-Semitrailer)
- Clearance Distance – Distance between the departure point in advance of crossing to the clearance point beyond the farthest rail
  - **Cd** = 31 m



- Vehicle Travel Distance – Total distance; design vehicle must travel during acceleration to pass completely through the clearance distance;
  - **S=Cd+L**; **Cd**=clearance distance, **L**=length of design vehicle

- **S**=53.7 m

- Departure Time – Time required for design vehicle ($\mathbf{T_D}$) or pedestrian ($\mathbf{T_P}$) to pass completely through clearance distance (**cd**) from stopped position
- Maximum approach grade within 'S' = 0%
  - $\mathbf{T_D = J + T}$
    - J = Perception-reaction time; 2 seconds
    - T = the time, for design vehicle to travel though clearance distance (**S**)
  - **T= t x G**
    - **T =** the time, required for design vehicle to accelerate through the vehicle travel distance (S) from assumed acceleration curves from *Geometric Design Guide for Canadian Roads*
  - T_D = 2 + 15 =17 seconds
  - T_P = Cd /V_P= 31 sec; V_P=1.0 m/s (avg. pedestrian speed)
  - Departure Time = 17 seconds; (Greater of T_D and T_P)

5.12. Sightlines:

- Stopping sight distance = 210m, for WB-20 at posted speed of 80 km/h
- Sightlines are clear for approaching traffic and the warning system is visible from stopping sight distance.

5.13. Deficiencies

- Based on the field investigation, there is gap in the south approach, may be hazardous for some vehicles.
- Warning sign on the north side is faded

5.14. Recommendations:

The requirements for train whistle cessation at this crossing are met as per Grade Crossing Standards. Deficiencies in meeting the Grade Crossing Standards should be fulfilled to improve safety of the crossing;

- It is recommended to install 'NO TRAIN WHISTLE' tabs under existing Railway Crossing Ahead warning signs on either side of crossing.
- Remove faded WA-R sign on the north side, and replace with the new sign
- Repair south approach by filling asphalt to remove gap in the road surface.

5.15. Cost Estimate:

- Install new warning system = $500,000 (CN recommendation)
- Install 'NO TRAIN WHISTLE' sign tabs
- Remove and replace WA-18L sign and line marking = $1,000.00
- Repair approach road surface = $5,000.00
- Total cost estimate = $506,000.00

APPENDIX 'F'

Safety Assessment for Grade Crossing
CN MILE 15.95 @ Township Road 510

6.1. CN Mile 15.95

The railway crossing is located on Township Road 510, approximately 150m west of Range Road 231. Township Road 510 is oriented in the east-west direction and the railway line is in the north-south direction. The crossing has one track and has an active warning system (Flashing lights and bells). There are about 58 households living within a three km radius of the crossing. Three km radius extends into Leduc County, but household count is limited to Strathcona County residents.

Field investigation and safety audit was conducted to identify the mitigation measures necessary to facilitate the safe implementation of anti-whistling and provide associated cost estimates for upgrades.

6.2. General Information:

- Railway Authority – CN Rail
- Track Type – Main Line
- Number of Tracks – 1
- Railway Subdivision – Camrose
- Road Authority – Strathcona County
- Road Name – Township Road 510
- Road Classification – Class 2
- Design Classification – RLU80
- Type of Grade Crossing – Active Crossing equipped with Standard Railway Crossing Sign (SRCS), Flashing lights, and Bells

6.3. Rail Operations:

- Maximum Railway Operating Speed – 40 mph
- No switching operation within 400m (1/4 mile) of crossing
- Daily train volume – 6 freight trains

6.4. Collision History:

- There is no collision reported at the railway crossing in last five years (2015-2019) of available data

6.5. Road Advance Warning Signs:

- Railway Crossing Ahead signs (WA-18L) are present on the east side and in good condition.
- Right version (WA-R) of railway crossing ahead warning sign is present on the west side, should be changed to left version (WA-18L).
- Bump signs are posted with 50 km/h speed tab.

6.6. Road Operations:

- Average weekday traffic is 1,400 vehicles per day (2019 traffic counts).
- School Bus Route – Yes
- Dangerous Goods Route – No
- Posted speed limit – 80 km/h

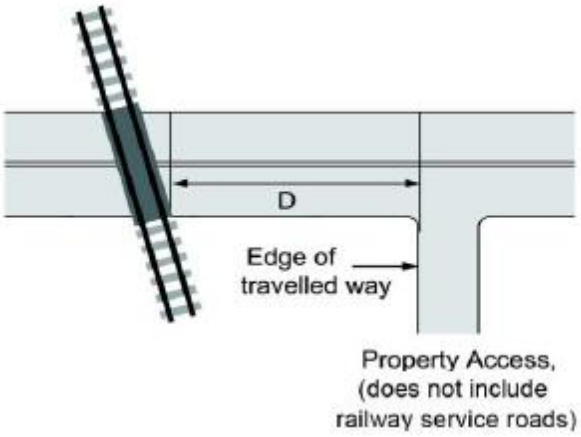
6.7. Trespassing:

- There is no evidence of trespassing within 400m of the crossing.

6.8. Location of Grade Crossing:

- Public grade crossing where the design speed is more than 25 km/h must be constructed 30m away from the intersecting road or entrance way according to GCS Section 11.1.

- There is a private access located 20m east of the crossing, not compliant with current standards, but does not require for whistle cessation.



6.9. Grade Crossing Surface:

- The surface material is made up of wood
- Road surface – Asphalt
- Flangeway width is 70 mm and depth is 50 mm
- Field side gap is none
- Flangeway width, depth and field side gap satisfies current GCS.

6.10. Crossing Angle:

- Grade crossing angle is 151 degrees
- According to GCS Sec 6.5, for grade crossing with the warning system the crossing angle should be between 30-150 degrees
- Current crossing angle do not comply with GCS, but it is not the requirement of whistle cessation

6.11. Sightlines:

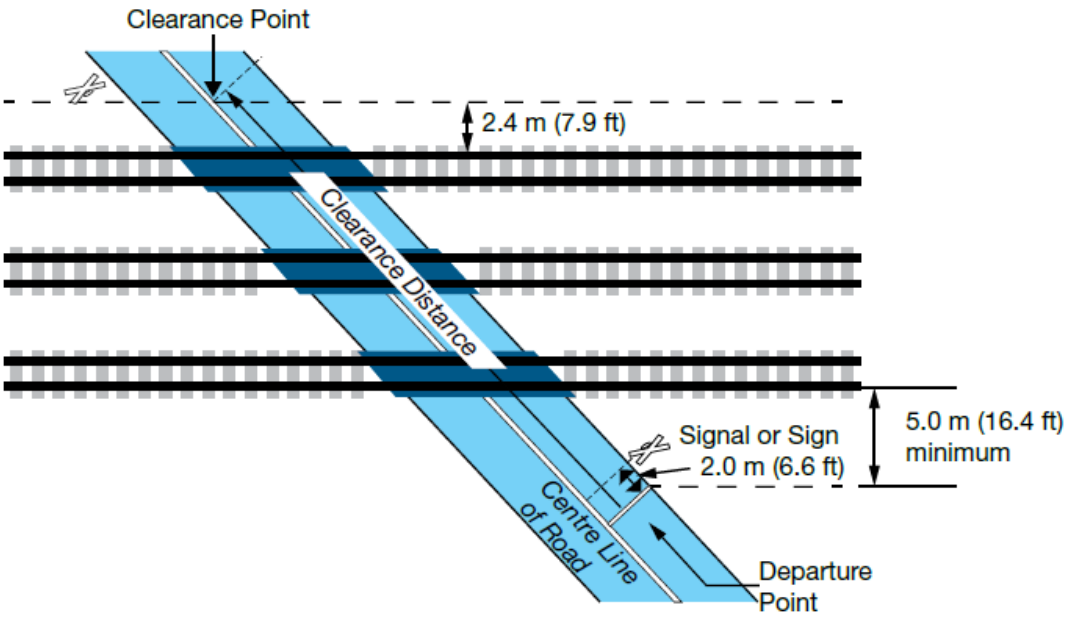
- Stopping sight distance = 210m, for WB-20 at posted speed of 80 km/h
- Sightlines are clear for approaching traffic and the warning system is visible from stopping sight distance.

6.12. Warning System

- Standard railway crossing sign with flashing lights and bells
- Cross product = traffic volume x train volume
  = 1,400 x 6 = 8,400 < 50,000; satisfies current waring system requirements

6.13. Design Calculations:

- Design vehicle – WB-20 (Tractor-Semitrailer)
- Clearance Distance – Distance between the departure point in advance of crossing to the clearance point beyond the farthest rail
  - **Cd** = 17.30



- Vehicle Travel Distance – Total distance; design vehicle must travel during acceleration to pass completely through the clearance distance;
  - **S=Cd+L**; **Cd**=clearance distance, **L**=length of design vehicle
  - **S**=40 m
- Departure Time – Time required for design vehicle (T_D) or pedestrian (T_P) to pass completely through clearance distance (**cd**) from stopped position
- Maximum approach grade within 'S' = 0%

- **T_D = J + T**
  - J = Perception-reaction time; 2 seconds
  - T = the time, for design vehicle to travel though clearance distance (**S**)
- **T= t x G**
  - **T =** the time, required for design vehicle to accelerate through the vehicle travel distance (S) from assumed acceleration curves from *Geometric Design Guide for Canadian Roads*
- T_D = 2 + 12.2 =14.7 seconds
- T_P = Cd /V_P= 17.3 sec; V_P=1.0 m/s (avg. pedestrian speed)
- Departure Time = 14.7 seconds; (Greater of T_D and T_P)

6.14. Deficiencies

- Based on the field investigation, there is no significant deficiencies observed other than warning sign needs be of proper orientation.

6.15. Recommendations:

The requirements for train whistle cessation at this crossing are met as per Grade Crossing Standards. Deficiencies in meeting the Grade Crossing Standards should be fulfilled to improve safety of the crossing;

- It is recommended to install 'NO TRAIN WHISTLE' tabs under existing Railway Crossing Ahead warning signs on either side of crossing.
- Remove WA-18R sign on the west side of side of crossing and install left version (WA-18L) of railway crossing ahead warning sign.

6.16. Cost Estimate:

- Install new warning system = $500,000 (CN recommendation)
- Install 'NO TRAIN WHISTLE' sign tabs
- Replace WA-18R with WA-18L signs and line markings = $1,000.00
- Total cost estimate = $501,000.00