THE CORPORATION OF THE TOWNSHIP OF MALAHIDE
ROAD SAFETY AUDIT – PHASE 2
BETWEEN RON McNEIL LINE & JOHN WISE LINE

CJDL
Consulting Engineers

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BETWEEN RON McNEIL LINE & JOHN WISE LINE

1.0 BACKGROUND AND INTRODUCTION

Cyril J. Demeyere Limited (CJDL) has been retained by the Township of Malahide to complete Phase 2 of a Road Safety Audit consisting of all Township roads located between Ron McNeil Line and John Wise Line; the extents of which are illustrated in Figure 1. The purpose of this Audit is to review physical features of the approximately 110km of roadways within the study area and identify hazards with the potential to affect road user safety.

This report provides a recommended priority listing for corrective and/or mitigation measures to be implemented in order to rectify the observed deficiencies within the project limits. Detailed geometric and grading design of the recommended corrective measures is beyond the scope of work of this project; however, may be completed supplementally on a project specific basis upon request.

2.0 CRITERIA REVIEW

Road Safety criteria was evaluated in accordance with guidance material found in 'Geometric Design Guide for Canadian Roads' (TAC, 1999), 'Geometric Design Standards for Ontario Highways' (MTO, 1994), 'Roadside Safety Manual' (MTO, 1993), 'Roadside Design Manual' (MTO, 2020), and 'Rural Intersection Safety Handbook' (Transport Canada, 2006) and sound engineering judgment. Site observations made by CJDL staff during site visits to each road segment were documented using a standardized evaluation template, where areas of non-conformance were flagged for further examination. Completed Criteria Review sheets with site photographs are included in Appendix B for reference.

Each road segment was evaluated using a design speed equal to the legal posted speed, considered the appropriate normal practice for "Secondary Highways" (MTO, 1994). "Secondary Highways" are analogous to County Roads; therefore, it is appropriate to evaluate Township roads with design speeds equal to the posted speed limit.

2.1 Geometry

The recommended 'rural' cross-section to be applied to the studied road segments is as follows for design speed of 80 km/h and Average Annual Daily Traffic (AADT) counts for the ranges identified in subsection 3; (2x) 3.5m vehicular travel lanes, (2x) 1.0m gravel shoulders, with (2x) 5.56m boulevard width remaining assuming (66' (20.12m) ROW) to construct drainage facilities in accordance with Municipal Engineers Association, 1984 and TAC, 1999 recommendation, unless site conditions warrant otherwise.

Each of the studied road segments are considered two-lane rural cross-sections, and have been assumed to generally be centred within the right-of-way. Cross-fall over the vehicular travel lanes is recommended as 2.0%, and gravel shoulders should have maximum crossfall of 4-6%.

2.2 Surface Treatment Condition

A cursory review of the road surface condition along road segments in the study area was completed during the site visits. Surface conditions that impact the safety of roads were documented; such as road edge degradation causing lane width reductions in localized areas and large pot holes that could cause vehicles to lose control. A quantitative pavement condition assessment was not in the scope of this assignment.

2.3 Drainage

A cursory review of drainage in areas impacting these road segments was completed during the site visits. Roadside swales should generally contain roadway flows to within the right-of-way and, following existing topography, should convey flows to Municipal Drains or other outlets intersecting the areas of study.

2.4 Vertical Alignment

Maximum road segment grades and Rates of Vertical Curvature (K) were reviewed as part of this study. Table 2-1 describes the reference standards with respect to roadway speed limits.

Table 2-1 - Vertical Alignment Design Standards (TAC, 1999)

Speed Limit	Maximum Road Segment Grade*	K_{CREST}	K_{SAG}
50 km/h	8-12%	6-7	5-6
60 km/h	6-12%	10-13	8-9
80 km/h	6-8%	24-36	12-16
*May be modified depending on existing topography in the region.			

CJDL identified areas of suspected non-conforming vertical alignment within the project limits and surveyed the centreline profile. Each suspected deficient road segment was surveyed using GPS survey equipment and a centreline profile was plotted and reviewed for conformance to recommended design criteria. Road segments which do not meet the standards shown in Table 2-1 are identified. Plots completed have been included in Appendix B.

For a design speed of 80 km/h, the minimum design passing sight distance required is 550m (TAC, 1999). When passing sight distance is reviewed with respect to pavement markings, TAC recommends a minimum of 275m be required; this value has been used as a minimum for the purpose of this analysis.

2.5 Horizontal Alignment

For 50 km/h, the minimum recommended design radius is 80 to 100m for a corresponding maximum superelevation of 0.08 to 0.04 m/m.

For 60 km/h, the minimum recommended design radius is 120 to 150m for a corresponding maximum superelevation of 0.08 to 0.04 m/m.

For 80 km/h, the minimum recommended design radius is 230 to 280m for a corresponding maximum superelevation of 0.08 to 0.04 m/m (TAC, 1999).

2.6 Intersections

The design stopping sight distance for passenger vehicles is 115 - 140m and 155 - 210m for trucks at a design speed of 80 km/h. A line-of-sight distance of 250 - 330m is recommended to permit passenger vehicles approaching a stop-controlled intersection to turn left into oncoming traffic without impacting the 80 km/h travel speed of approaching traffic. Vertical or horizontal curves within these sight distances are not recommended.

Intersection alignment is preferred at 90°; however, this may not be feasible to achieve depending on site specific circumstances. It is recommended that horizontal intersection alignment does not skew by greater than 20° from perpendicular (Transport Canada, 2006). Further, the preferred rural intersection corner radius is >12 m to permit turning of farm equipment and trucks (Transport Canada, 2006).

2.7 Clear Zone

A significant number of serious accidents and injuries can be reduced if a clear zone is provided from the edge of the travelled portion of the roadway. The clear zone should be generally free of obstacles which can potentially cause damage to a vehicle. Table 2-2 describes the reference standards with respect to clear zone limits:

Table 2-2 - Desirable Clear Zone Values (MTO, 2020)

Design Speed (km/h)	AADT	Clear Zone (m)
70 to 80	≥ 1500	5.5
	≥ 750	5
	< 750	3.5
≤ 60	≥ 1500	4.5
	≥ 750	3.5
	< 750	3

2.8 Embankments, Bridges, Structures or Culverts

Roadside embankments parallel with the flow of traffic were reviewed to determine if protection is warranted to be installed. Areas where fill heights approach 3 m (from roadside swale to centreline road) and/or slopes are 3:1 or steeper were reviewed in greater detail to determine if embankment protection is warranted (MTO, 1993).

Ditches transverse to the roadway, such as culvert locations, were reviewed to determine if protection is warranted to be installed. Transverse ditches are generally critical to errant motorists because the banks of these ditches are typically struck head on by run-off-the-road vehicles. Transverse ditch banks deeper than 0.75m which cannot be flattened to slopes of 4:1, or preferably less, are recommended to be shielded by a roadside barrier (MTO, 1993).

More recent design guidelines do not provide a method for evaluating the protection requirements of

existing embankments, therefore the evaluation method described in the 1993 MTO Roadside Safety Manual was used.

2.9 Visual Aid

The presence of pavement marking and advanced warning signage, together with horizontal and vertical alignment considerations, may provide a greater factor of safety to a road segment. AADT counts for each road section were reviewed together with the above criteria to determine whether existing markings and signage are adequate, or where additional consideration is warranted to increase safety for vehicular traffic.

Generally, it is recommended that all surface treated roads receive centre pavement markings, to assist with indication of safe passing zones and restrictive passing at vertical curves. Stop bars are additionally required at all stop-controlled intersections, save and except for those with gravel return aprons.

2.10 Active Transportation

The 'Elgin - St. Thomas Cycling Master Plan' (September 2014) has been initiated to develop and implement a network throughout Elgin County that encourages active forms of transportation and recreation. Against a number of criteria, The Cycling Master Plan study selected a number of designated routes throughout the County in an attempt to improve connections between Aylmer and Tillsonburg, and recommended improvements (i.e., bicycle lanes, multi-use trail, paved shoulder, etc.) along these routes. Please refer to the referenced study for further information.

Conservation Line, (Springwater Road to Rogers Road), Rogers Road (Conservation Line to Brook Line), and Brook Line (Rogers Road to Aylmer Town Limits) are designated as Proposed Active Transportation routes in the next 0-10 years. These road segments are currently equipped with "Share the Road" cycling signage.

Dingle Street (full length), Glencolin Line (Springfield Road to Springer Hill Road), and Springer Hill Road (Glencolin Line to Pressey Road) are designated as Proposed Active Transportation routes in the next 11-20 years. These road segments are currently equipped with "Share the Road" cycling signage, with the exception of the southbound lane of Springer Hill Road.

Glencolin Line (Springwater Road to Hacienda Road), Hacienda Road (Dingle Street to Glencolin Line), Pigram Road (Pressey Line to Ron McNeil Line), Pressey Line (full length), and Springer Hill Road (Heritage Line to Glencolin Line) are designated as Proposed Active Transportation routes in 20+ years. These road segments are currently equipped with "Share the Road" cycling signage, with the exception of Pigram Road and Pressey Line between Springer Hill Road and Carter Road.

3.0 ROAD SEGMENT ANALYSIS

The following sections provide a detailed outline of methodology and criteria used to evaluate road safety of road segments within the study area, including a summary of noted deficiencies and recommended corrective measures.

Priority rankings are identified in their respective sections herein as:

- PRIORITY 'A' = Immediate priority
- PRIORITY 'B' = medium priority
- PRIORITY 'C' = low priority

PRIORITY 'A' rankings potentially pose a current safety risk, where a portion of the assessed segment falls outside of TAC, MTO, and Transport Canada guidelines, and the recommended corrections should be investigated immediately.

PRIORITY 'B' rankings include segments which may marginally fall outside of the recommended guidelines, however do not pose an immediate safety concern. Recommended corrections should be investigated in the medium term, 1-to-5-year timeframe.

PRIORITY 'C' ranking includes those segments of marginal non-conformance to the recommended guidelines. An immediate safety concern is not present; however, corrections should be investigated as the opportunity arises. Segments which are absent of a priority rating do not require further investigation.

3.1 Anger Road: John Wise Line to Chalet Line

AADT: 104
Surface Treatment: Double Surface Treatment
Design Speed: 80 km/h
Priority 'C'

3.1.1 Geometry / Alignment

Anger Road is a two-lane rural cross-section. Lane widths were measured at 3.7m with 0.7m of gravel shoulder; recommended cross-section is 3.5m lane widths with 1.0m shoulder. Therefore, the shoulder width of Anger Road generally does not meet the recommended with of 1.0m.

3.1.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.1.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.1.4 Vertical Alignment

Topographic survey included as Drawings 1 and 2 in Appendix B indicate all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

3.1.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.1.6 Intersections

Anger Road intersects with two other roads along its alignment. Stop-controlled T-intersections are present at Chalet Line and John Wise Line. Stopping sight distance >210m is afforded and considered adequate at Chalet Line and John Wise Line. Line of sight distance >330m is afforded and is considered adequate at both intersections and is considered adequate.

3.1.7 Clear Zone

No obstructions are located within the recommended 3.5m clear zone along Anger Road.

3.1.8 Embankments, Bridges, Structures or Culverts

Embankment protection is not warranted at the culvert crossing south of Chalet Line. Refer to Appendix B for embankment protection warrant guide for this location.

3.1.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT.

A solid yellow line is painted along the centreline of Anger Road. ATV Trail signs are present at each end of Anger Road.

3.1.10 Recommendations

i. Shoulder widening to suit recommended Geometry.

3.2 Bradley Creek Line: Imperial Road to Hacienda Road

AADT: 363
Surface Treatment: Double Surface Treatment
Design Speed: 80 km/h
Priority 'C'

3.2.1 Geometry / Alignment

Bradley Creek Line is a two-lane rural cross-section. Lane widths were measured at 3.6m with a 2.0m shoulder, which meets and exceeds recommended values.

3.2.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.2.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.2.4 Vertical Alignment

Topographic survey included as Drawing 3 in Appendix B indicates all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

3.2.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.2.6 Intersections

Bradley Creek Line intersects two other roads along its alignment. Stop-controlled T-intersections are present at Imperial Road and Hacienda Road. Stopping sight distance >210m is afforded and considered adequate at Imperial Road and Hacienda Road. Line of sight distance >330m is afforded and is considered adequate at both intersections and is considered adequate.

3.2.7 Clear Zone

No obstructions are located within the recommended 3.5m clear zone along Bradley Creek Line.

3.2.8 Embankments, Bridges, Structures or Culverts

Embankments are not present along Bradley Creek Line. The drain culvert crossing west of Mun No. 49731 Bradley Creek Line consists of a ditch transverse to the direction of traffic. The ditch height is greater than 0.75m, but the ditch side slopes are flatter than 4:1. Therefore, protection is not required at this location.

3.2.9 Visual Aid

A speed limit of 80 km/h is posted at each end of Bradley Creek Line.

3.2.10 Recommendations

i. No changes are recommended for Bradley Creek Line.

3.3 Brook Line: Rogers Road to Caverly Road

AADT: 587 to 600
Surface Treatment: Double Surface Treatment
Design Speed: 50-80 km/h
Priority 'C'

3.3.1 Geometry / Alignment

Brook Line is a two-lane rural cross-section. Lane widths were measured 3.5m with 1.5 to 2.0m of shoulder; which meets and exceeds design recommendations.

3.3.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.3.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.3.4 Vertical Alignment

Topographic survey included as Drawing 4 in Appendix B indicates all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

3.3.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.3.6 Intersections

Brook Line intersects two roads along its alignment. Stop-controlled T-intersections are present at Rogers Road and Caverly Road. Stopping sight distance >210m is afforded and considered adequate at Rogers Road and Caverly Road. Line of sight distance >330m is afforded and is considered adequate at both intersections and is considered adequate.

3.3.7 Clear Zone

No obstructions are located within the recommended 3.0m or 3.5m clear zone along Brook Line.

3.3.8 Embankments, Bridges, Structures or Culverts

Embankments are not present along Brook Line.

3.3.9 Visual Aid

A 50 km/h speed limit sign is posted approximately 400m west of Caverly Road. A solid yellow line is painted along the road's centreline.

3.3.10 Recommendations

i. No changes are recommended for Brook Line.

3.4 Carter Road: John Wise Line to Pressey Line

AADT: 227 to 416
Surface Treatment: Double Surface Treatment
Design Speed: 80 km/h
Priority 'A'

3.4.1 Geometry / Alignment

Carter Road is a two-lane rural cross-section. Lane widths were measured to vary from 3.7m to 4.5m with 2.5m of shoulder; which meets and exceeds design recommendations.

3.4.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.4.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.4.4 Vertical Alignment

Topographic survey included as Drawings 5 to 13 in Appendix B indicate all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

There are two (2) instances where minimum crest value was exceeded (K=20 at STA 1+000, K=15 at 2+150, and one (1) instance where minimum sag value was exceeded (K=16 at STA 0+800). Speed reduction to 60 km/h should be posted at these locations to account for reduced stopping sight distance caused by vertical curves.

3.4.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment. The horizontal curves on the north and south sides of the intersection with Talbot Line are within design recommendations. However, it would be beneficial to equip the curves with chevron signage as per OTM recommendations.

3.4.6 Intersections

Carter Road intersects with six (6) roads along its alignment. Five (5) stop-controlled intersections are present at John Wise Line, Talbot Line, Glencolin Line, College Line, and Pressey Line. One (1) through street intersection is present at Chalet Line.

There is a horizontal curve present at the north and southbound approaches to the stop-controlled intersection with Talbot Line. The southbound approach is accompanied by a "Stop Sign Ahead" sign. The northbound approach is accompanied by an "S" bend hazard sign.

The other four (4) stop-controlled intersections are afforded stopping sight distances >210m and considered adequate. Line of sight distance >330m is afforded at these intersections and is considered adequate.

A vertical curve is present at the through street intersection with Chalet Line. The northbound lane is equipped with a "Hidden Intersection" sign. Sight distance is poor for the southbound traffic approaching and turning left onto Chalet Line until at the intersection.

Carter Road intersects with a railway between Glencolin Line and College Line. This intersection is stop-controlled and is marked with "Stop Sign Ahead" signs, "Railway Ahead" signs, and railway paint markings on the surface. The railway also has a posted sign indicating "Attention Active Trains".

3.4.7 Clear Zone

Hydro poles at Mun No 9677 are located within the recommended 3.5m clear zone of this roadway. Consideration should be given to posting hazard signs on objects within the clear zone or relocating the objects when feasible.

3.4.8 Embankments, Bridges, Structures or Culverts

Embankment protection is warranted at three (3) locations along Carter Road (near Mun Nos 7900, 8403, 8868). Steel beam or high-tension cable guiderail protection should be used. Guiderail length and road offset should be set in accordance with MTO recommendations. Refer to Appendix B for executed warrant guide.

Eroding washout fill was noted at the embankment to the north of Chalet Line. The stability of this fill should be evaluated and vegetative protection considered.

3.4.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT.

A solid yellow line is present along the centreline of Carter Road.

3.4.10 Recommendations

i. Speed limit reductions to 60 km/h where vertical curves do not meet design recommendation should be considered as an interim measure until opportunity for possible correction with future road reconstruction. Vertical alignment correction should be prioritized based on AADT.

ii. Equip horizontal curves on the north and south sides of the Talbot Line intersection with chevron signage.

iii. “Hidden Intersection” signage for southbound traffic at Chalet Line.

iv. Evaluate hydro poles in clear zone. Hazard signage should be installed or objects in clear zone relocated.

v. Embankment protection warranted at three (3) locations.

vi. Eroding washout fill was noted at the embankment to the north of Chalet Line. The stability of this fill should be evaluated and vegetative protection considered.

3.5 Catherina Street: West End to Hacienda Road

AADT: no data
Surface Treatment: Double Surface Treatment
Design Speed: 50 km/h
Priority 'C'

3.5.1 Geometry / Alignment

Catherina Street is a two-lane rural cross-section. Lane widths were measured at 3.6m with a concrete curb; which meets recommended values.

3.5.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.5.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.5.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.5.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.5.6 Intersections

Catherina Street intersects with two (2) roads along its alignment. A stop-controlled intersection is located at Hacienda Road and a through street intersection is located at Louisa Crescent. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

3.5.7 Clear Zone

No obstructions are located within the recommended 3.0m clear zone along Catherina Street.

3.5.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Catherina Street.

3.5.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. There are no lane markings on the road.

3.5.10 Recommendations

i. No action recommended.

3.6 Catherine Street: Pressey Line to Ron McNeil Line

AADT: no data
Surface Treatment: Double Surface Treatment
Design Speed: 50 km/h
Priority 'C'

3.6.1 Geometry / Alignment

Catherine Street is classified as a two-lane urban cross-section with allowance for parking on one side of the road and curb and gutter. Lane widths were measured at 3.1m with 1.0m of shoulder and no on-street parking. The recommended cross-section for an urban local road with parking is 3.0m lane widths with 2.4m allowance for parking shoulder (8.4m total). Lane widths meet design recommendations for urban local roads. The road will need to be widened to allow for on street parking.

3.6.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.6.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.6.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.6.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.6.6 Intersections

Catherine Street intersects with two (2) roads along its alignment. A stop-controlled intersection are located at Pressey Line and Ron McNeil Line. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

3.6.7 Clear Zone

No obstructions are located within the recommended 3.0m clear zone along Catherine Street.

3.6.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Catherine Street.

3.6.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. There are no lane markings on the road.

3.6.10 Recommendations

i. Road widening to allow for on street parking..

3.7 Caverly Road: Brook Line to South End

AADT: 100
Surface Treatment: Double Surface Treatment
Design Speed: 50 km/h
Priority 'C'

3.7.1 Geometry / Alignment

Caverly Road is classified as a two-lane urban cross-section with allowance for parking on one side of the road and curb and gutter. Lane widths were measured at 2.55 to 2.85m with no shoulder with on street parking. The recommended cross-section for an urban local road with parking is 3.0m lane widths with 2.4m allowance for parking shoulder (8.4m total). The road will need to be widened to meet design recommendations and allow for on street parking.

3.7.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.7.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.7.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.7.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.7.6 Intersections

Caverly Road intersects with one (1) road along its alignment. A through street intersection is located at Brook Line. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

3.7.7 Clear Zone

No obstructions are located within the recommended 3.0m clear zone along Caverly Road.

3.7.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Caverly Road.

3.7.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. There are no lane markings on the road.

3.7.10 Recommendations

i. Road widening to suit recommended Geometry.
ii. Shoulder widening to suit recommended Geometry.

3.8 Chalet Line: Hacienda Road to East Cul-de-sac

AADT: 66 to 175
Surface Treatment: Gravel
Design Speed: 80 km/h
Priority 'A'

3.8.1 Geometry / Alignment

Chalet Line is a two-lane rural cross-section. Lane widths were measured to vary from 3.25 to 3.5m with no shoulder to 1.5m of shoulder; recommended cross-section is 3.5m lane widths with 1.0m shoulder.

3.8.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.8.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.8.4 Vertical Alignment

Topographic survey included as Drawings 14 to 18 in Appendix B indicate all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

There are four (4) instances where minimum crest value was exceeded (K=12 at STA 4+950, K=7 at STA 5+200, K=21 at STA 6+400, and K=20 at STA 7+040). Speed reductions to 50 km/h (where K<10) and 60 km/h (where 10<K<24) should be posted at these locations to account for reduced stopping sight distance caused by vertical curves.

3.8.5 Horizontal Alignment

The horizontal curve shown on Drawing 14, near Mun No. 52220, has a radius of 181m and meets design recommendations. However, it would be beneficial to equip the curves with chevron signage as per OTM recommendations.

The horizontal curve shown on Drawing 18 has a radius of 73m, which does not meet design recommendations (230 to 280 for 80 km/h roads and 80 to 100m for 50 km/h roads). Horizontal curve signage is not present. A speed reduction to 40 km/h should be posted along with horizontal curve and chevron signage to meet design recommendations.

3.8.6 Intersections

Chalet Line intersects with five (5) roads along its alignment. Stop-controlled intersections are located at Hacienda Road, Springfield Road, and Carter Road. Through street intersections are located at Walker Road and Anger Road. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

3.8.7 Clear Zone

Hydro poles at Mun No 52220 and 52773 are located within the recommended 3.5m clear zone of this roadway. Consideration should be given to posting hazard signs on objects within the clear zone or relocating the objects when feasible.

3.8.8 Embankments, Bridges, Structures or Culverts

Embankment protection is warranted at two (2) locations along Chalet Line: the embankment near Mun No 52773 and at the pond on the north side of Chalet Line west of Carter Road. Protection is required at the pond west of Carter Road because the pond edge is within the clear zone. Protection is not required on the south side of the road at the pond location.

Steel beam or high-tension cable guiderail protection should be used. Guiderail length and road offset should be set in accordance with MTO recommendations. Refer to Appendix B for executed warrant guide.

3.8.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. A faded hazard sign is located at Mun No. 52220.

3.8.10 Recommendations

i. Road widening to suit recommended Geometry.

ii. Speed limit reductions to 50 and 60 km/h should be considered where vertical curves do not meet design recommendations as an interim measure until opportunity for possible correction with future road reconstruction. Vertical alignment correction should be prioritized based on AADT.

iii. Speed limit reduction to 40 km/h should be considered where horizontal curve does not meet design recommendation as an interim measure until opportunity for possible correction with future road reconstruction. Horizontal alignment correction should be prioritized based on AADT.

iv. Equip horizontal curve near Mun No. 52220 with chevron signage.

v. Embankment protection is warranted at two (2) locations.

vi. Evaluate hydro poles in clear zone. Hazard signage should be installed or objects in clear zone relocated.

vii. Replace faded hazard sign at Mun No 52220.

3.9 Church Street: Springwater Road to Norton Street

AADT: 100
Surface Treatment: Double Surface Treatment
Design Speed: 60 km/h
Priority 'C'

3.9.1 Geometry / Alignment

Church Street is a two-lane rural cross-section. Lane widths were measured at 3.65m with 1.0m of shoulder; which meets recommended values.

3.9.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.9.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.9.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.9.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.9.6 Intersections

Church Street intersects with two (2) roads along its alignment. Stop-controlled intersections are located at Springwater Road and Norton Street. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

3.9.7 Clear Zone

A hydro pole near Mun No. 47343 is within the recommended 3.0m clear zone along Church Street.

3.9.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Church Street.

3.9.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. There are no lane markings on the road.

3.9.10 Recommendations

i. Evaluate hydro pole in clear zone. Hazard signage should be installed or objects in clear zone relocated.

3.10 College Line: Springwater Road to Springer Hill Road

AADT: 381 to 795
Surface Treatment: Double Surface Treatment
Design Speed: 60-80 km/h
Priority 'A'

3.10.1 Geometry / Alignment

College Line is a two-lane rural cross-section. Lane widths were measured to vary from 3.25m to 3.75m with 1.3 to 2.0m of shoulder; recommended cross-section is 3.5m lane widths with 1.0m shoulder.

3.10.2 Surface Treatment Condition

Localized paved road edge raveling was noted at numerous locations College Line. The raveling and pavement loss in these areas decreases the already deficient lane widths between Springfield Road and Springer Hill Road. A large pothole was noted at Mun No. 52464.

3.10.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.10.4 Vertical Alignment

Topographic survey included as Drawings 19 to 23 in Appendix B indicate all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

There are two (2) instances where minimum crest value was exceeded (K=20 at STA 5+500, and K=19 at STA 13+100). Speed reductions to 60 km/h should be posted at these locations to account for reduced stopping sight distance caused by vertical curves.

3.10.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.10.6 Intersections

College Line intersects with eight (8) roads along its alignment. Stop-controlled intersections are located at Springwater Road, Imperial Road, Hacienda Road, Springfield Road, and Springer Hill Road. Through street intersections are located at Dorchester Road, Rogers Road, Walker Road, and Carter Road. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

College Line intersects with a railway between Carter Road and Springer Hill Road. This intersection is a signaled railway crossing marked with "Railway Ahead" sign for westbound traffic, and railway paint markings on the surface for both directions.

3.10.7 Clear Zone

No obstructions are located within the recommended 3.5m clear zone along College Line between Springwater Road and Imperial Road and between Hacienda Road and Springer Hill Road.

Between Imperial Road and Hacienda Road the AADT is 795, which requires a clear zone of 5.0m. Along this section of College Line, the row of hydro poles on the north side of the road and the hydro pole at Mun No. 49856 on the south side of the road are within the clear zone.

3.10.8 Embankments, Bridges, Structures or Culverts

There are no embankments requiring protection along College Line. There are two (2) culvert crossings that were evaluated for the need of roadside barriers. The culvert at Mun No. 51416 does not have ditch side slopes steeper than 4:1. Therefore, roadside protection is not required. The double culvert east of Springfield Road is an approximately 4 to 4.5m deep ditch with ditch side slopes of 1:1 to 2:1 which cannot be flattened to 4:1. Therefore, the double culvert requires roadside protection. steel beam or high-tension cable guiderail protection should be used. Guiderail length and road offset should be set in accordance with MTO recommendations.

3.10.9 Visual Aid

A speed limit of 60 km/h is posted between Hacienda Road and Springer Hill Road. Speed limit signage is not present on the remainder of College Line and is not required due to a low AADT.

A solid yellow line is painted on the centerline of College Line.

3.10.10 Recommendations

i. Road widening to suit recommended Geometry.

ii. Localized shoulder repairs where pavement raveling is contributing to reduced lane widths.

iii. Repair pothole near Mun No 52464.

iv. Speed limit reductions to 60 km/h should be considered where vertical curves do not meet design recommendations as an interim measure until opportunity for possible correction with future road reconstruction. Vertical alignment correction should be prioritized based on AADT.

v. Evaluate hydro poles in clear zone. Hazard signage should be installed or objects in clear zone relocated.

vi. Roadside protection is warranted at the double culvert east of Springfield Road.

3.11 Conservation Line: Springwater Road to Imperial Road

AADT: 314 to 408
Surface Treatment: Double Surface Treatment
Design Speed: 50-80 km/h
Priority 'A'

3.11.1 Geometry / Alignment

Conservation Line is a two-lane rural cross-section. Lane widths were measured to vary from 3.65m to 3.75m with 1.0 to 1.5m of shoulder; which meets and exceeds recommended values.

3.11.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.11.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.11.4 Vertical Alignment

Topographic survey included as Drawings 24 and 25 in Appendix B indicate all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

3.11.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.11.6 Intersections

Conservation Line intersects with three (3) other roads along its alignment. Stop-controlled T-intersections are present at Springwater Road and Imperial Road. The intersection with Rogers Road is a 4-way stop-controlled intersection. Stopping sight distance >210m is afforded and line of sight distance >330m is afforded at all intersections and is considered adequate.

3.11.7 Clear Zone

No obstructions are located within the recommended 3.0m to 3.5m clear zone along Conservation Line.

3.11.8 Embankments, Bridges, Structures or Culverts

Embankment Protection Warrants were completed at embankments west of Mun No. 48110 and east of Mun No. 47719. Both warrants determined that protection is not warranted at these locations.

Roadside barriers are warranted at the Lee Municipal Drain culvert crossing on the north side of the road. The drain ditch on the north side of the road has side slopes steeper than 4:1. If flattening the ditch slopes is not possible, the north side of the road at this location requires protection. Steel beam or high-tension cable guiderail protection should be used. Guiderail length and road offset should be set in accordance with MTO recommendations.

3.11.9 Visual Aid

A speed limit of 50 km/h posted at each end of Conservation Line. "Share the Road" cycling signs are also posted along Conservation Line.

The section of Conservation Line between Mun No. 49210 and Imperial Road meets the density requirements for a speed zone reduction. A speed zone reduction to 60km/h should be posted in this area.

A solid yellow line is painted along the centerline of the entire road segment.

3.11.10 Recommendations

i. Roadside protection is warranted at the Lee Municipal Drain culvert crossing on the north side of the road.
ii. A speed zone reduction to 60km/h should be posted between Mun No. 49120 and Imperial Road.

3.12 Dingle Street: Aylmer Town Limit to Springfield Road

AADT: 133 to 802
Surface Treatment: Double Surface Treatment
Design Speed: 60 km/h
Priority 'B'

3.12.1 Geometry / Alignment

Dingle Street is a two-lane rural cross-section. Lane widths were measured to vary from 3.0m to 3.6m with 1.0 to 1.5m of shoulder; recommended cross-section is 3.5m lane widths with 1.0m shoulder.

3.12.2 Surface Treatment Condition

Poor surface treatment condition that could impact vehicle control was noted at the south end of the bridge on Dingle Street.

3.12.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.12.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.12.5 Horizontal Alignment

Topographic survey included as Drawings 26 to 30 in Appendix B indicate six (6) horizontal curves are located on Dingle Street. Two (2) curves with centerline radii from 107 to 133m are located to the west of Hacienda Road without any posted speed reductions or Chevron warning signs. This section of road has a posted speed limit of 50 km/h. and the minimum design radius for this section of road is 90m. Therefore, the horizontal cures meet minimum design standards. However, it would be beneficial to equip the curves with chevron signage as per OTM recommendations.

Four (4) horizontal curves with centerline radii from 34 to 73m are located between Hacienda Road and Springfield Road, where the posted speed limit is 60 km/h. The curves are signed with curve ahead signs and speed reductions of 30 km/h. It would be beneficial to equip the curves with chevron signage as per OTM recommendations.

3.12.6 Intersections

Dingle Street intersects with two (2) roads along its alignment in the study area. Stop-controlled intersections are located at Hacienda Road and Springfield Road. Stopping sight distance >210m is afforded and line of sight distance >330m is afforded at both intersections and is considered adequate.

3.12.7 Clear Zone

Hydro poles near Mun Nos 49894, 49908, 50144, and 50589 are located within the recommended 3m clear zone of this roadway. However, hazard signs are mounted on each hydro pole. Consideration should be given to posting hazard signs on objects within the clear zone or relocating the objects when feasible.

3.12.8 Embankments, Bridges, Structures or Culverts

There are no embankments requiring protection along Dingle Street.

3.12.9 Visual Aid

Speed limits are posted as 50 km/h and 60 km/h to the west and east of Hacienda Road respectively. A solid yellow line is painted along the centerline of Dingle Street.

3.12.10 Recommendations

i. Road widening to suit recommended Geometry.

ii. Minor surface treatment repair at bridge crossing.

iii. Evaluate hydro poles in clear zone. Hazard signage should be installed or objects in clear zone relocated.

iv. Trim vegetation covering hazard sign at hydro pole near Mun No 50589.

v. Equip horizontal curves Dingle Street with chevron signage.

3.13 Dorchester Road: College Line to Ron McNeil Line

AADT: 178
Surface Treatment: Double Surface Treatment
Design Speed: 80 km/h
Priority 'C'

3.13.1 Geometry / Alignment

Dorchester Road is a two-lane rural cross-section. Lane widths were measured at 3.7m with 2.0m of shoulder; which meets and exceeds design recommendations.

3.13.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.13.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.13.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.13.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.13.6 Intersections

Dorchester Road intersects with two (2) roads along its alignment in the study area. Stop-controlled intersections are located at College Line and Ron McNeil Line. Stopping sight distance >210m is afforded and line of sight distance >330m is afforded at both intersections and is considered adequate.

3.13.7 Clear Zone

No obstructions are located within the recommended 3.5m clear zone along Dorchester Road.

3.13.8 Embankments, Bridges, Structures or Culverts

There are no embankments requiring protection along Dorchester Road.

3.13.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. A solid yellow line is painted along the centerline of Dorchester Road.

3.13.10 Recommendations

i. No changes are recommended for Dorchester Road.

3.14 Glencolin Line: Springwater to Road Imperial Road

AADT: 1011 to 1424
Surface Treatment: Double Surface Treatment
Design Speed: 80 km/h
Priority 'B'

3.14.1 Geometry / Alignment

Glencolin Line is a two-lane rural cross-section. Lane widths were measured at 3.6m with 2.5 to 2.6m of shoulder; which meets and exceeds design recommendations.

3.14.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.14.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.14.4 Vertical Alignment

Topographic survey included as Drawings 31 and 32 in Appendix B indicate all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

3.14.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.14.6 Intersections

This section of Glencolin Line intersects three (3) roads along its alignment. Stop-controlled intersections are located at Springwater Road and Imperial Road. A through street intersection is located at Rogers Road.

Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate, with the exception of Springer Hill Road.

3.14.7 Clear Zone

Between Springwater Road and Imperial Road there are hydro poles within the recommended 5m clear zone. These hydro poles are located at Mun No. 48102 (1 on south side, row of hydro poles on the north side of the road), at Mun No. 48625 (1 on south side of the road), a row of hydro poles on the south side of the road at Rogers Road, at Mun No. 48813 (1 on the north side of the road).

3.14.8 Embankments, Bridges, Structures or Culverts

There are no embankments requiring protection along Glencolin Line.

3.14.9 Visual Aid

Speed limit signage is not posted west of Imperial Road and is not required due to low AADT.

The following signage is present along Glencolin Line: Share the Road and Deaf Child in Area.

Solid or dashed yellow lines are painted along the centerline of Glencolin Line.

3.14.10 Recommendations

i. Evaluate hydro poles in clear zone. Hazard signage should be installed or objects in clear zone relocated.

3.15 Glencolin Line: Hacienda Road to Springer Hill Road

AADT: 361 to 1140
Surface Treatment: Double Surface Treatment
Design Speed: 60 km/h
Priority 'A'

3.15.1 Geometry / Alignment

Glencolin Line is a two-lane rural cross-section. Lane widths were measured to vary from 3.65m to 3.75m with 2.0 to 2.6m of shoulder. It is understood from Township staff that design lane widths between Hacienda Road and Springer Hill Road are 3.0m travel lanes and a 2.5m buggy lane including shoulder. Measurements are in general conformance with these criteria.

3.15.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.15.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.15.4 Vertical Alignment

Topographic survey included as Drawings 33 to 35 in Appendix B indicate all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 60 km/h.

3.15.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.15.6 Intersections

This portion of Glencolin Line intersects five (5) roads along its alignment. Stop-controlled intersections are located at Hacienda Road and Springer Hill Road. Through street intersections are located at Springfield Road, Walker Road, and Carter Road.

Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate, with the exception of Springer Hill Road. The line of sight for vehicles at the Glencolin Line stop sign to southbound Springer Hill Road traffic is approximately 100m. However, southbound Springer Hill Road traffic has an "intersection ahead" sign. Therefore, the limited line of sight at the intersection is acceptable.

Glencolin Line intersects with a railway between Hacienda Road and Springfield Road. This intersection is a signaled railway crossing marked with "Railway Ahead" signs.

3.15.7 Clear Zone

No obstructions are located within the recommended 3.5m clear zone.

3.15.8 Embankments, Bridges, Structures or Culverts

There are no embankments requiring protection along Glencolin Line.

The Fuller Drain culvert (near Mun No. 70727) has an embankment height less than 3.0m, therefore an embankment protection warrant is not required. The drain ditch on the north side of the road, transverse to the direction of traffic, is deeper than 0.75m and has side slopes steeper than 4:1. The same ditch on the south side of the road has side slopes flatter than 4:1. Therefore, the ditch side slopes on the north

side of the road are recommended to be flattened to a minimum slope of 4:1 or alternatively, a roadside barrier should be installed.

The culvert west of Walker Road has an embankment height less than 3.0m, therefore an embankment protection warrant is not required. The drain ditch on both sides of the road, transverse to the direction of traffic, is deeper than 0.75m and has side slopes steeper than 4:1. Therefore, the ditch side slopes on the north side of the road are recommended to be flattened to a minimum slope of 4:1 or alternatively, a roadside barrier should be installed.

The culvert crossing near Mun No. 53042 has a ditch transverse to the road alignment on the north side of the road. The east and west banks of the north ditch are steeper than 4:1. If these ditches cannot be flattened, roadside protection will be required. On the south side of the road, the ditch is parallel to the road alignment. An Embankment Protection Warrant was completed for this ditch and is enclosed in Appendix B. Based on the Warrant, protection is not recommended for the south side of the road at this location.

Steel beam or high-tension cable guiderail protection should be used. Guiderail length and road offset should be set in accordance with MTO recommendations.

3.15.9 Visual Aid

A speed limit of 60 km/h is posted along Glencolin Line between Hacienda Road and Springer Hill Road. Speed limit signage is not posted west of Hacienda Road and is not required due to low AADT.

The following signage is present along Glencolin Line: Community Safe Zone, Share the Road, cycling and horse traffic keep right, school zone, and pedestrian warning.

Solid yellow lines are painted along the centerline of Glencolin Line. A white solid line painted on the shoulder to indicate where cycling and horse traffic is to keep right of.

A pedestrian sign near Mun No 52313 was faded at the time of inspection. The solid yellow line between Carter Road and Springer Hill Road was faded at the time of inspection.

3.15.10 Recommendations

i. Replace faded pedestrian sign at Mun No 52313.

ii. Roadside protection is required at three (3) locations.

iii. Repaint faded centerline between Carter Road and Springer Hill Road.

3.16 Hacienda Road: John Wise Line to Glencolin Line

AADT: 1000 to 1230
Surface Treatment: Double Surface Treatment
Design Speed: 80 km/h
Priority 'A'

3.16.1 Geometry / Alignment

Hacienda Road is a two-lane rural cross-section. Lane widths were measured to vary from 3.75m to 4.0m with 2.0 to 2.5m of shoulder; which meets and exceeds design recommendations.

3.16.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.16.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.16.4 Vertical Alignment

Topographic survey included as Drawings 36 to 39 in Appendix B indicate all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

There is one (1) instance where minimum crest value was exceeded (K=18 at STA 0+600). Speed reductions to 60 km/h should be posted at these locations to account for reduced stopping sight distance caused by vertical curves.

3.16.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment. The horizontal curves at the intersection with College Line meet design recommendations. However, it would be beneficial to equip the curves with chevron signage as per OTM recommendations.

3.16.6 Intersections

Hacienda Road intersects seven (7) roads along its alignment. Stop-controlled intersections are located at John Wise Line and Talbot Line. Through street intersections are located at Van Patter Line, Chalet Line, Bradley Creek Line, Dingle Road, and Glencolin Line.

Stopping sight distances >210m are afforded and considered adequate at all intersections with the exception of Van Patter Line. The stopping distance for southbound Hacienda Traffic is only 80m to Van Patter Line. Line of sight distance >330m is afforded and is considered adequate at all intersections

Hacienda Road intersects with a railway between Dingle Line and Glencolin Line. This intersection is a signaled railway crossing marked with "Railway Ahead" signs, a painted stop bar, and railway crossing paint marks on the road.

3.16.7 Clear Zone

Rows of hydro poles on the east and west sides of Hacienda Road between John Wise Line and Van Patter are within the recommended 5m clear zone along Hacienda Road.

Two (2) of the three (3) trees on the west side of Hacienda Road, near Mun No. 8174, and hydro poles between Van Patter Line and Chalet Line are within the recommended 5m clear zone.

3.16.8 Embankments, Bridges, Structures or Culverts

Embankment protection is warranted at one (1) location along Hacienda Road: the embankment at the pond south of Talbot Line on the east side of the road. Steel beam or high-tension cable guiderail protection should be used. Guiderail length and road offset should be set in accordance with MTO recommendations. Refer to Appendix B for executed warrant guide.

The culvert located at the intersection of Hacienda Road and Glencolin Line requires protection on the southeast corner of the intersection. The culvert at this location has steep ditch slopes and vertical concrete blocks at the inlet of the culvert that could be struck head on by northbound Hacienda Road Traffic. Steel beam or high-tension cable guiderail protection should be used. Guiderail length and road offset should be set in accordance with MTO recommendations.

3.16.9 Visual Aid

Speed limits of 60 km/h are posted between approximately 400m south of Talbot Line and Dingle Street and speed limits of 80 km/h are posted to the south of Talbot Line and north of Dingle Street. The following additional signage is present along Hacienda Road: Share the Road and horse and buggy warning.

The section of Hacienda Road between John Wise Line and the vertical curve noted at STA 0+600 meets the density requirements for a speed zone reduction. A speed zone reduction to 60km/h should be posted in this area.

Single solid, double solid, or dashed yellow lines are painted along the centerline of Hacienda Road.

3.16.10 Recommendations

i. Speed limit reductions to 60 km/h should be considered where vertical curves (STA 0+600, north of John Wise Line) do not meet design recommendations as an interim measure until opportunity for possible correction with future road reconstruction. Vertical alignment correction should be prioritized based on AADT. A speed zone reduction to 60km/h between John Wise Line and STA 0+600 is also recommended as it meets the Municipality's density requirements.

ii. Equip horizontal curves at the College Line intersection with chevron signage.

iii. Evaluate hydro poles and trees in clear zone. Hazard signage should be installed or objects in clear zone relocated.

iv. Embankment/roadside protection is warranted at two (2) locations.

v. "Hidden Intersection" sign for southbound traffic approaching Van Patter line Intersection.

3.17 Hilltop Lane: West End to Springfield Road

AADT: no data
Surface Treatment: Double Surface Treatment
Design Speed: 50 km/h
Priority 'C'

3.17.1 Geometry / Alignment

Hilltop Lane is a two-lane rural cross-section. Lane widths were measured at 3.6m with 1.5m of shoulder; which meets recommended values.

3.17.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.17.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.17.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.17.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.17.6 Intersections

Hilltop Lane intersects with one (1) road along its alignment. A stop-controlled intersection is located at Springfield Road. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

3.17.7 Clear Zone

No obstructions are located within the recommended 3.0m clear zone along Hilltop Lane.

3.17.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Hilltop Lane.

3.17.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. There are no lane markings on the road.

3.17.10 Recommendations

i. No action recommended.

3.18 John Wise Line: Springfield Road to Richmond Road

AADT: 727 to 1326
Surface Treatment: Double Surface Treatment
Design Speed: 80 km/h
Priority 'A'

3.18.1 Geometry / Alignment

John Wise Line is a two-lane rural cross-section. Lane widths were measured at 3.75m with 2.0m of shoulder; which meets and exceeds design recommendations.

3.18.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.18.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.18.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.18.5 Horizontal Alignment

Topographic survey included as Drawing 40 in Appendix B indicates two (2) horizontal curves with centerline radii from 95 to 102m are located between Carter Road and Richmond Road, where the speed limit is assumed to be 80 km/h. The curves are signed with curve ahead signs and chevron warning signs, both of which are considered appropriate. Speed limit reduction to 50 km/h for the horizontal curves could be implemented to meet design guidelines for horizontal minimum design radius (90m).

3.18.6 Intersections

John Wise Line intersects five (5) roads along its alignment. Stop-controlled intersections are located at Springfield Road and Richmond Road. Through street intersections are located at Sawmill Road, Anger Road, and Carter Road.

Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

3.18.7 Clear Zone

The majority of hydro poles on the north and south side of John Wise Line are within the recommended 5m clear zone between Springfield Road and Carter Road. There are no obstructions within the recommended 3.5m clear zone between Carter Road and Richmond Road

3.18.8 Embankments, Bridges, Structures or Culverts

Embankment protection is warranted at one (1) location along John Wise Line: the embankment near Mun No 51082 west of Springfield Road. Steel beam or high-tension cable guiderail protection should be used. Guiderail length and road offset should be set in accordance with MTO recommendations. Refer to Appendix B for executed warrant guide.

3.18.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. A solid yellow line is painted along the centerline of John Wise Line. Additional signage along John Wise Line includes: ATV trails and deer crossing.

3.18.10 Recommendations

i. Speed limit reduction to 50 km/h should be considered where horizontal curve does not meet design recommendation as an interim measure until opportunity for possible correction with future road reconstruction. Horizontal alignment correction should be prioritized based on AADT.

ii. Evaluate hydro poles in clear zone. Hazard signage should be installed or objects in clear zone relocated.

iii. Embankment protection is warranted at one (1) location.

3.19 Louisa Crescent: Hacienda Road to Catherina Street

AADT: 50
Surface Treatment: Double Surface Treatment
Design Speed: 50 km/h
Priority 'C'

3.19.1 Geometry / Alignment

Louisa Crescent is a two-lane rural cross-section. Lane widths were measured at 3.6m with a concrete curb; which meets recommended values.

3.19.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.19.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.19.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.19.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.19.6 Intersections

Louisa Crescent intersects with two (2) roads along its alignment. Stop-controlled intersections are located at Hacienda Road and Catherina Street. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

3.19.7 Clear Zone

No obstructions are located within the recommended 3.0m clear zone along Louisa Crescent.

3.19.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Louisa Crescent.

3.19.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. There are no lane markings on the road.

3.19.10 Recommendations

i. No changes are recommended for Louisa Crescent.

3.20 Norton Street: Talbot Line to North End Cul-de-sac

AADT: 200
Surface Treatment: Double Surface Treatment
Design Speed: 50 km/h
Priority 'B'

3.20.1 Geometry / Alignment

Norton Street is a two-lane rural cross-section. Lane widths were measured at 3.6m with 1.0m of shoulder; which meets recommended values.

3.20.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.20.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.20.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.20.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.20.6 Intersections

Norton Street intersects with two (2) roads along its alignment. A stop-controlled intersection is located at Talbot Line and a through street intersection is located at Church Street. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

3.20.7 Clear Zone

Hydro poles are within the recommended 3.0m clear zone along the full length Norton Street.

3.20.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Norton Street.

3.20.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. There are no lane markings on the road.

3.20.10 Recommendations

i. Evaluate hydro poles in clear zone. Hazard signage should be installed or objects in clear zone relocated.

3.21 Pigram Road: Ron McNeil Line to Pressey Road

AADT: 673
Surface Treatment: Double Surface Treatment
Design Speed: 80 km/h
Priority 'A'

3.21.1 Geometry / Alignment

Pigram Road is a two-lane rural cross-section. Lane widths were measured at 3.6m with 2.0m of shoulder; which meets and exceeds design recommendations.

3.21.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.21.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.21.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.21.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.21.6 Intersections

Pigram Road intersects with two (2) roads along its alignment in the study area. A stop-controlled intersection is located at Pressey Line. A through street intersection is located at Ron McNeil Line. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

The stop sign at Pressey Line is equipped with a flashing light. Crop planting limits appear to be staked out onto the farmland to the west of Pigram Road at Pressey Line. It appears that any planting beyond this staked area will cause line of sight problems at this intersection.

3.21.7 Clear Zone

No obstructions are located within the recommended 4m clear zone along Pigram Road.

3.21.8 Embankments, Bridges, Structures or Culverts

Protection is warranted for the bridge at the Bear Creek Municipal Drain crossing. The creek ditches that are transverse to the direction of traffic are deeper than 0.75m and the ditch side slopes are steeper than 4:1. Therefore, protection is required and steel beam or high-tension cable guiderail protection should be used. Guiderail length and road offset should be set in accordance with MTO recommendations.

3.21.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. A solid or dashed yellow line is painted along the centerline of Pigram Road.

3.21.10 Recommendations

i. Enforce crop planting limits at Pressey Line to maintain intersection line of site.

ii. Roadside protection is warranted at one (1) location.

3.22 Pressey Line: Springfield Road to Springer Hill Road

AADT: 946 to 1748 (highest among roads studied)
Surface Treatment: Double Surface Treatment
Design Speed: 80 km/h
Priority 'B'

3.22.1 Geometry / Alignment

Pressey Line is a two-lane rural cross-section. Lane widths were measured to vary from 3.3m to 3.95m with 1.5 to 2.0m of shoulder; recommended cross-section is 3.5m lane widths with 1.0m shoulder.

3.22.2 Surface Treatment Condition

Localized paved road edge raveling was noted at numerous locations Pressey Line. The raveling and pavement loss in these areas decreases the already deficient lane widths between Springfield Road and Carter Road. Potholes have developed in numerous locations and should continue to be monitored by the Township for repair.

3.22.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.22.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.22.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.22.6 Intersections

Pressey Line intersects five (5) roads along its alignment in the study area. A stop-controlled intersection is located at Springfield Road. Through street intersections are located at Walker Road, Carter Road, Pigram Road, and Springer Hill Road. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

3.22.7 Clear Zone

Hydro poles on the south side of Pressey Line are within the recommended 3.5m clear zone where the posted speed limit is 50 km/h. Hydro poles are within the recommended 5m clear zone on the north side of the road between 400m east of Springfield Road and Walker Road, on the south side of the road between Walker Road and Carter Road. The row of trees west of Mun No. 123251 are within the recommended 5m clear zone. No obstructions are located within the recommended 5m clear zone along the remainder of Pressey Line.

3.22.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Pressey Line.

A bridge is located between Pigram Road and Springer Hill Road. The bridge was reconstructed with widened lane widths in 2020 and is appropriately equipped with guard rails and hazard signs.

3.22.9 Visual Aid

Between Springfield Road and Walker Road, speed limits of 50 km/h and 80 km/h are posted for westbound traffic and eastbound traffic, respectively.

A solid yellow line is pained along the centreline of Pressey Line. Share the road signs and a deer crossing sign are located on Pressey Line. A solid white line is painted on the road edges of the horizontal curve of Pressey Line.

3.22.10 Recommendations

i. Road widening to suit recommended Geometry.

ii. Evaluate hydro poles and trees in clear zone. Hazard signage should be installed or objects in clear zone relocated.

iii. Localized shoulder repairs where pavement raveling is contributing to reduced lane widths.

3.23 Rogers Road: John Wise Line to Ron McNeil Line

AADT: 101 to 1195
Surface Treatment: Double Surface Treatment
Design Speed: 80 km/h
Priority 'A'

3.23.1 Geometry / Alignment

Rogers Road is a two-lane rural cross-section. Lane widths were measured to vary from 3.5m to 3.7m with 1.2 to 2.5m of shoulder; which meets and exceeds design recommendations.

3.23.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.23.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.23.4 Vertical Alignment

Topographic survey included as Drawings 42 to 48 in Appendix B indicate all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

There are four (4) instances where minimum crest value was exceeded (K=15 at STA 1+300, K=8 at STA 1+550, K=20 at STA 1+800, and K=23 at STA 5+100) and one (1) instance where minimum sag value was exceeded (K=12 at STA 1+450). Speed reductions to 50 km/h (where K<10) and 60 km/h (where 10<K<24) should be posted at these locations to account for reduced stopping sight distance caused by vertical curves.

3.23.5 Horizontal Alignment

Horizontal curves with centreline radii of 237 to 204m are located between Talbot Line and Glencolin Line, which meet design recommendations. The curves are signed with curve ahead signs, chevron warning signs, and for a speed reduction of 50 km/h, both of which is considered appropriate. Chevron sign placement should be updated as per OTM requirements.

3.23.6 Intersections

Rogers Road intersects with eight (8) roads along its alignment in the study area. Stop-controlled intersections are located at John Wise Line, Conservation Line (4-way), Talbot Line, Glencolin Line, College Line, and Ron McNeil Line. Through street intersections are located at Catt Line and Brook Line. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

3.23.7 Clear Zone

There are multiple obstructions within the recommended 5m clear zone along Rogers Road between John Wise Line and Talbot Line. The obstruction within the clear zone include:

- One (1) tree near Mun No. 7707;
- The edge of the woodlot north of Mun No. 7881, on the east side of the road;
- Hydro poles near Mun No. 8122;
- Two (2) trees south of Mun No. 8692;

- One (1) hydro pole at Catt Line on the east side of the road; and
- One (1) tree on the east side of the road, between Brook Line and Talbot Line near a Natural Gas Warning sign.

No obstructions are located within the recommended 3.5m clear zone along the remainder of Rogers Road.

3.23.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Rogers Road. The pond/creek south of Conservation Line does not have ditches transverse to the direction of traffic that pose a safety risk. No protection is required at this location.

3.23.9 Visual Aid

A speed limit of 60 km/h is posted for northbound traffic approaching Talbot Line and a speed limit of 80 km/h is posted in the same location for southbound traffic. Speed limit signage is not present for the remainder of Rogers Road, with the exception of the horizontal curve speed reduction, on this section of road and is not required due to a low AADT.

3.23.10 Recommendations

i. Speed limit reductions to 50 and 60 km/h should be considered where vertical curves do not meet design recommendations as an interim measure until opportunity for possible correction with future road reconstruction. Vertical alignment correction should be prioritized based on AADT.

ii. Chevron signage on curves north of Talbot Line should be updated as per current OTM requirements.

iii. Evaluate hydro poles and trees in clear zone. Hazard signage should be installed or objects in clear zone relocated.

3.24 Springer Hill Road: South End to Pressey Line

AADT: 361 to 469
Surface Treatment: Double Surface Treatment
Design Speed: 80 km/h
Priority 'A'

3.24.1 Geometry / Alignment

Springer Hill Road is a two-lane rural cross-section. Lane widths were measured to vary from 3.5m to 3.6m with 1.2m to 2.0m of shoulder; which meets and exceeds design recommendations.

3.24.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.24.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.24.4 Vertical Alignment

Topographic survey included as Drawings 49 to 51 in Appendix B indicate all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

There are two (2) instances where minimum crest value was exceeded (K=17 at STA 5+900 and K=8 at STA 7+200). Speed reductions to 50 km/h (where K<10) and 60 km/h (where 10<K<24) should be posted at these locations to account for reduced stopping sight distance caused by vertical curves.

3.24.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.24.6 Intersections

Springer Hill Road intersects with five (5) roads along its alignment in the study area. Stop-controlled intersections are located at Heritage Line, Talbot Line, and Pressey Line. Through street intersections are located at Glencolin Line and College Line. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate, with the exception of the intersection at Glencolin Line.

The line of sight for vehicles at the Glencolin Line stop sign to southbound Springer Hill Road traffic is approximately 100m. However, southbound Springer Hill Road traffic has an "intersection ahead" sign. Therefore, the limited line of sight at the intersection is acceptable.

Springer Hill Road intersects with a railway between College Line and Pressey Line. This intersection is a stop-controlled railway crossing marked with "Railway Ahead" signs, railway crossing paint marks on the road, and an "Attention Active Trains" sign.

3.24.7 Clear Zone

Two (2) hydro poles near Mun No. 9822 are located within recommended 3.5m clear zone along Springer Hill Road.

3.24.8 Embankments, Bridges, Structures or Culverts

Embankment protection is warranted at three (3) municipal drain crossings (near Mun Nos 9822, 9851, and 9931). Steel beam or high-tension cable guiderail protection should be used. Guiderail length and road offset should be set in accordance with MTO recommendations. Refer to Appendix B for executed warrant guide.

The culverts north of Talbot Line have ditches transverse to the direction of traffic on Springer Hill Road, are deeper than 0.75m, and have side slopes steeper than 4:1. However, the culverts are at a stop-controlled intersection. Therefore, the risk of a critical collision with these ditch side slopes is low and protection is not required.

3.24.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. A solid yellow line is painted along the centerline of Springer Hill Road, between Heritage Line and Glencolin Line. Lane markings are not present along Springer Hill Road, north of Glencolin Line.

Additional signage that is used on this road includes: “share the road”, horse and buggy warning, T-intersection ahead for College Line, and “Rural Community. Please Slow Down” sign.

3.24.10 Recommendations

i. Speed limit reductions to 50 and 60 km/h should be considered where vertical curves do not meet design recommendations as an interim measure until opportunity for possible correction with future road reconstruction. Vertical alignment correction should be prioritized based on AADT.

ii. Evaluate hydro poles in clear zone. Hazard signage should be installed or objects in clear zone relocated.

iii. Embankment protection warranted at three (3) municipal drain crossings.

3.25 Van Patter Line: Imperial Road to Hacienda Road

AADT: 106
Surface Treatment: Gravel
Design Speed: 80 km/h
Priority 'A'

3.25.1 Geometry / Alignment

Van Patter Line is a two-lane rural cross-section. Lane widths were measured at 3.5m with 1.0m of shoulder; which meets design recommendations.

3.25.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.25.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.25.4 Vertical Alignment

Topographic survey included as Drawings 53 to 54 in Appendix B indicate all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

3.25.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.25.6 Intersections

Van Patter Line intersects with two (2) roads along its alignment. Stop-controlled intersections are located at Imperial Road and Hacienda Road. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at Imperial Road and is considered adequate. The line of sight of southbound Hacienda Road traffic when stopped on Van Patter Line is <100m. Recommendations for this deficient line of sight are described in Section 3.15.

3.25.7 Clear Zone

A hydro pole at Mun No 49512 and the row of hydro poles on the north side of the road at the west end of Van Patter Line are located within the recommended 3.5m clear zone of this roadway. Consideration should be given to posting hazard signs on objects within the clear zone or relocating the objects when feasible.

3.25.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Van Patter Road.

3.25.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. Lane markings are not present on Van Patter Line. A no parking on road sign is located at the soccer field parking lot, east of Imperial Road.

3.25.10 Recommendations

i. Evaluate hydro poles in clear zone. Hazard signage should be installed or objects in clear zone relocated.

3.26 Walker Road: Chalet Line to Ron McNeil Line

AADT: 93 to 394
Surface Treatment: Double Surface Treatment/Gravel
Design Speed: 60-80 km/h
Priority 'A'

3.26.1 Geometry / Alignment

Walker Line is a two-lane rural cross-section. Lane widths were measured to vary from 3.5m to 3.75m with 1.0m to 1.5m of shoulder; which meets and exceeds design recommendations.

3.26.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.26.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.26.4 Vertical Alignment

Topographic survey included as Drawings 55 to 58 in Appendix B indicate all segment grades are less than 6%, which falls within the recommended design parameters for a speed limit of 80 km/h.

There is one (1) instance where minimum crest value was exceeded (K=10 at STA 3+600). Speed reductions to 50 km/h (where K<10) and 60 km/h (where 10<K<24) should be posted at these locations to account for reduced stopping sight distance caused by vertical curves.

3.26.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment. The horizontal 'S'-curve on Walker Road, south of Glencolin Line, meets design recommendations. However, it would be beneficial to equip the curves with chevron signage as per OTM recommendations.

3.26.6 Intersections

Walker Road intersects with six (6) roads along its alignment in the study area. Stop-controlled intersections are located at Chalet Line, Talbot Line, Glencolin Line, College Line, Pressey Line, and Ron McNeil Line. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at Imperial Road and is considered adequate.

A steep drop was noted at the northeast corner of the intersection with College Line that has been temporarily marked with pylons. This steep drop (slope>1:1) should be regraded or protection measures put in place.

Walker Road intersects with a railway between Glencolin Line and College Line. This intersection is a stop-controlled railway crossing marked with "Railway Ahead" signs, railway crossing paint marks on the road, and an "Attention Active Trains effective Dec 19, 2016" sign.

3.26.7 Clear Zone

No obstructions are located within the recommended 3.0 to 3.5m clear zone along Walker Road.

3.26.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Walker Road.

3.26.9 Visual Aid

A speed limit of 50 km/h is posted between Talbot Line and half the distance to Chalet Line, where the posted speed limit changes to 80 km/h. A speed limit of 60km /h is posted between Talbot Line and College Line. Speed limit signage is not present on the remaining section of road and is not required due to a low AADT. There are no lane markings on the gravel portion of Walker Road. A solid yellow line is painted along the centerline of the portion of Walker Road with surface treatment. Additional signage along Walker Road includes: ATV Trail, “Rural Settlement Area”,

3.26.10 Recommendations

i. Speed limit reductions to 50 km/h should be considered where vertical curves do not meet design recommendations as an interim measure until opportunity for possible correction with future road reconstruction. Vertical alignment correction should be prioritized based on AADT.

ii. Equip horizontal curve south of Glencolin Line with chevron signage.

iii. Regrade slope to catchbasin at northeast corner of intersection with College Line.

3.27 Weldon Street: Springwater Road to East End

AADT: No data
Surface Treatment: Double Surface Treatment
Design Speed: 50 km/h
Priority 'C'

3.27.1 Geometry / Alignment

Weldon Street is a two-lane rural cross-section. Lane widths were measured at 2.3m with1.0m of shoulder; recommended cross-section is 3.5m lane widths with 1.0m shoulder.

3.27.2 Surface Treatment Condition

No deficiencies were noted along the road surface that impact road safety.

3.27.3 Drainage

No drainage deficiencies were noted that may impact road safety.

3.27.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.27.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.27.6 Intersections

Weldon Street intersects with one (1) road along its alignment. A stop-controlled intersection is located at Springwater Road. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at all intersections and is considered adequate.

3.27.7 Clear Zone

A small tree at Mun No 47373 is located within the recommended 3.0m clear zone along Weldon Street.

3.27.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Weldon Street.

3.27.9 Visual Aid

Speed limit signage is not present on this section of road and is not required due to a low AADT. There are no lane markings on the road.

3.27.10 Recommendations

i. Road widening to suit recommended Geometry.
ii. Evaluate small tree in clear zone. Hazard signage should be installed or objects in clear zone relocated.

3.28 Woolleyville Line: Springfield Road to East End

AADT: 216
Surface Treatment: Double Surface Treatment/Gravel
Design Speed: 50 km/h
Priority 'C'

3.28.1 Geometry / Alignment

Woolleyville Line is a two-lane rural cross-section. Lane widths were measured at 3.25m with 1.0 of shoulder; recommended cross-section is 3.5m lane widths with 1.0m shoulder.

3.28.2 Surface Treatment Condition

Localized paved road edge raveling was noted along Woolleyville Line. The raveling and pavement loss in these areas decreases the already deficient lane widths on the road segment.

3.28.3 Drainage

The east end of Woolleyville Line does not have any drainage ditches on either side of the road.

3.28.4 Vertical Alignment

No vertical curves requiring further review exist within this road segment.

3.28.5 Horizontal Alignment

No horizontal curves requiring further review exist within this road segment.

3.28.6 Intersections

Woolleyville Line intersects with one (1) road along its alignment. A stop-controlled intersection is located at Springfield Road. Stopping sight distances >210m are afforded and considered adequate at all intersections. Line of sight distance >330m is afforded and is considered adequate at Imperial Road and is considered adequate.

3.28.7 Clear Zone

Trees and hydro poles are located within the recommended 3.0m clear zone of this roadway near Mun Nos. 51333 and 51432. Consideration should be given to posting hazard signs on objects within the clear zone or relocating the objects when feasible.

3.28.8 Embankments, Bridges, Structures or Culverts

There are no embankments, bridges, structures, or culverts requiring protection along Woolleyville Line.

3.28.9 Visual Aid

A speed limit of 50 km/h is posted at the entrance of Woolleyville Road. No lane markings are present along the road. Additional signage includes: children playing warning and a pavement ends sign.

3.28.10 Recommendations

i. Road widening to suit recommended Geometry.
ii. Localized paved shoulder repairs.
iii. Construction of roadside ditches where required to fix drainage issues.
iv. Evaluate hydro poles in clear zone. Hazard signage should be installed or objects in clear zone relocated.

4.0 CONCLUSIONS

The suggested mitigation measures reviewed in Section 3.0 above as summarized in the Appendix 'A'.

Quantities of the most common deficiencies in the study area are:

- Lane width less than recommended values – 8
- Shoulder width less than recommended values - 3
- Poor surface treatment condition – 5
- Vertical alignment values less than design recommendations – 18
- Horizontal alignment values less than design recommendation - 2
- Roadside Protection Warranted – 16
- Locations with hydro poles/trees in recommended clear zone – 33
- Faded signage – 2
- Intersection deficiencies - 4

As an additional safety measure, all centrelines can be painted or repainted for all evaluated roads.

Deficiency Priority Ranking in the recommended order of priority are based on AADT and sound engineering judgment in each independent section, and severity of deficiency. Deficiencies are presented by road segment, to ease in creation of a master priority listing consistent with budget considerations allotted.

Evaluation of these deficiency recommendations has been completed in accordance with recommendations from:

"Draft Elgin - St. Thomas Cycling Master Plan" (2014)

"Geometric Design Guide for Canadian Roads" (TAC, 1999)

"Municipal Works Design Manual" (Municipal Engineers Association, 1984)

"Roadside Safety Manual" (MTO, 1993)

"Geometric Design Standards for Ontario Highways" (MTO, 1994)

"Roadside Design Manual (MTO, 2020)

"Rural Intersection Safety Handbook" (Transport Canada, 2006)

If there are any questions, please do not hesitate to contact this office.

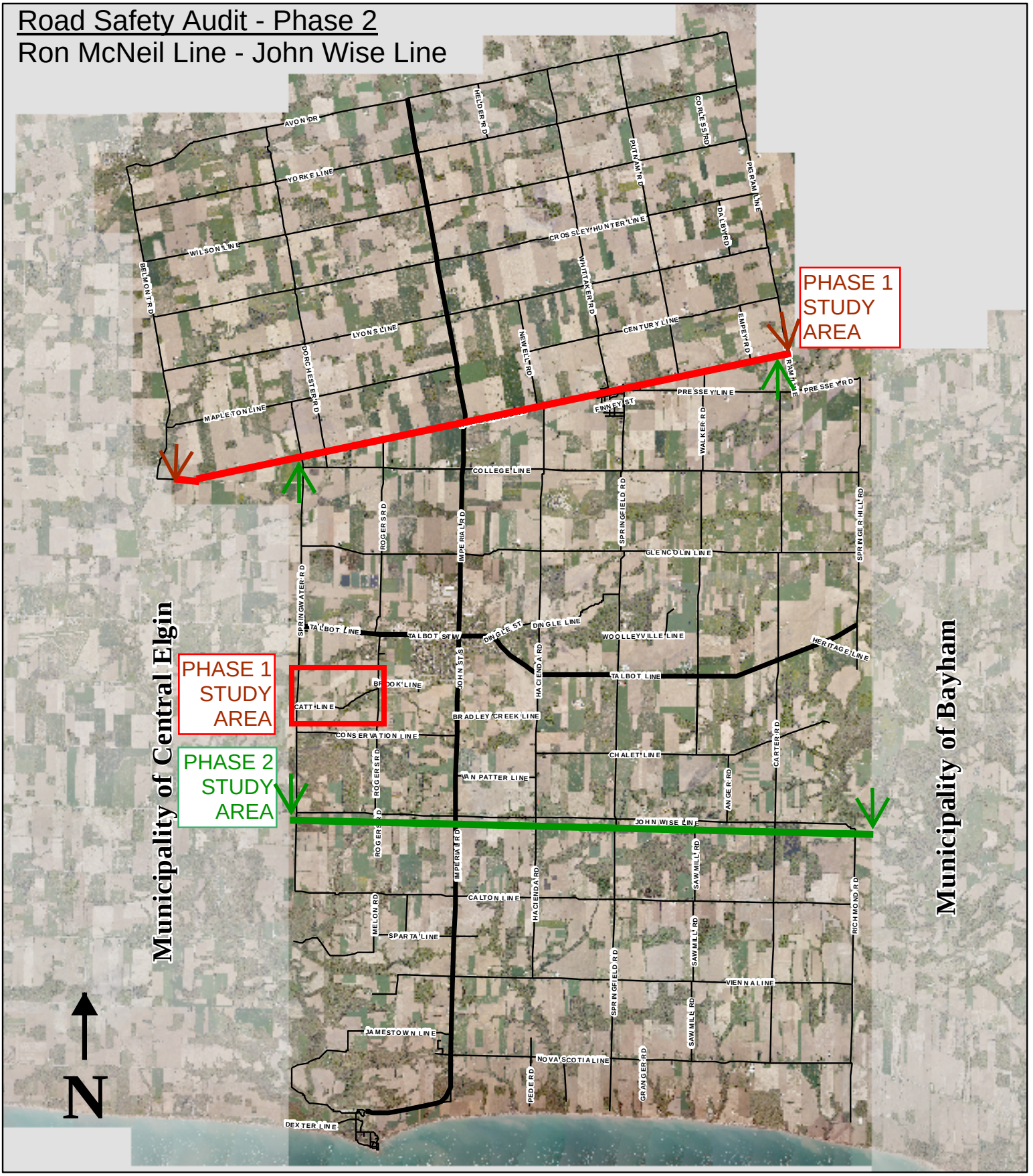
All of which is respectfully submitted by,

Cameron Cluett, P.Eng. Deren Lyle, P. Eng.

CJC/sed

Township of Malahide

Road Safety Audit - Phase 2
Ron McNeil Line - John Wise Line



Map Produced by:
Township of Malahide GIS Department
Projection: NAD 83 UTM Zone 17
Date: Oct 01, 2009
This drawing is neither a legally recorded map nor a survey and is not intended to be used as one.

APPENDIX ‘A’

- DEFICIENCY PRIORITY RANKING

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Project No. 19031
Date: 11-Jun-21

APPENDIX A:
DEFICIENCY PRIORITY LISTING

Priority Ranking	Road Name	From	To	*AADT***	Surface Treatment	Lane Width*	Shoulder Width*	Surface Treatment Condition	Drainage	Vertical Alignment	Horizontal Alignment	Intersections	Clear Zones	Embankment	Visual Aid	Comments
C	Anger Road	John Wise Line	Chalet Line	104	Surface Treatment	3.7m	0.7m								Repaint solid yellow centreline.	
C	Bradley Creek Line	Imperial Road	Hacienda Road	363	Surface Treatment	3.8m	2.0m								Paint solid yellow centreline.	
C	Brook Line	Rogers Road	Caverly Road	587 - 600	Surface Treatment	3.5m	1.5 - 2.0m								Repaint solid yellow centreline.	
A	Carter Road	John Wise Line	Pressey Line	227 - 416	Surface Treatment	3.7 - 4.5m	2.5m			STA 0+800 (Sag, K=16) STA 1+000 (Crest, K=20) STA 2+150 (Crest, K=15)		Poor sightline for southbound traffic at Chalet Line. No intersection ahead sign.	hydro pole in clear zone at Mun No. 9677.	Protection required at Mun No. 7900 between John Wise and Chalet. Protection required at Mun No. 8403, 8868 between Chalet Line and Talbot Line Washout fill eroding at Mun No. 8403 embankment.	Repaint solid yellow centreline.	3 animal related collisions between 2011 and 2015
C	Catherina Street	West End	Hacienda Road	Unknown	Surface Treatment	3.6m	Curb								Paint solid yellow centreline.	
C	Catherine Street	Pressey Line	Ron McNeil Line	Unknown	Surface Treatment	3.1m	1.0m								Paint solid yellow centreline.	
C	Caverly Road	Brook Line	South End	100	Surface Treatment	2.55 - 2.85m	No shoulder								Paint solid yellow centreline.	
A	Chalet Line	Hacienda Road	East Culdesac	60 - 175	Gravel/Surface Treatment	3.25 - 3.5m	0.0 - 1.5m			STA 4+950 (Crest, K=12) STA 5+200 (Crest, K=7) STA 6+400 (Crest, K=21) STA 7+040 (Crest, K=20)	STA 7+600 Radius = 73m		hydro pole in clear zone at Mun No. 52220. hydro pole in clear zone at Mun No. 52773.	Protection required at Mun No. 52773 east of Carter Road. Protection required on the north side of Chalet Line, west of Carter Road, at the pond.	Faded hazard sign on hydro pole at Mun. No. 52220. Chevron signage at horizontal curve near Mun No. 52220.	1 animal related collision in 2016
C	Church Street	Springwater Road	Norton Street	100	Surface Treatment	3.65m	1.0m						hydro pole in clear zone at Mun No. 47343		Paint solid yellow centreline.	
A	College Line	Springwater Road	Springer Hill Road	381 - 795	Surface Treatment	3.2 - 3.75m	1.3 - 2.0m	Poor pavement shoulder condition Pothole at Mun No 52464		STA 5+500 (Crest, K=20) STA 13+100 (Crest, K=19)		.	Row of hydro poles in clear zone on the north side of the road between Imperial Road and Hacienda Road. Hydro pole in clear zone at Mun No. 49856, north side of the road.	Protection required at double culvert west of Springfield Road.	Repaint solid yellow centreline.	6 animal related collisions between 2009 and 2016
A	Conservation Line	Springwater Road	Imperial Road	314 - 408	Surface Treatment	3.65 - 3.75m	1.0 -1.5m							Protection required at the Lee Municipal Drain on the north side of the road.	Repaint solid yellow centreline. Speed zone reduction from Mun No. 49210 to Imperial Road.	1 animal related collision in 2010
B	Dingle Street	Aylmer Town Limit	Springfield Road	133 - 802	Surface Treatment	3.0 - 3.6m	1.0 - 1.5m	Poor pavement condition on south side of bridge crossing					hydro pole in clear zone at Mun No. 49894. hydro pole in clear zone at Mun No. 49908. hydro pole in clear zone at Mun No. 50144. hydro pole in clear zone at Mun No. 50589.		Vegetation partially covering hazard sign on hydro pole at Mun No 50589. Repaint solid yellow centreline. Chevron signage at horizontal curves.	3 animal related collisions between 2011 and 2015
C	Dorchester Road	College Line	Ron McNeil Line	178	Surface Treatment	3.7m	2.0m								Repaint solid yellow centreline.	
A	Glencolin Line	Hacienda Road	Springer Hill Road	361 - 1140	Surface Treatment	3.65 - 3.75m	2.0 - 2.6m							Protection required at Fuller Drain on the north side of the road. Protection required at culvert crossing west of Walker Road on the north side of the road. Protection required at culvert near Mun No. 53042 on the north side of the road.	Faded pedestrian sign at Mun. No. 52313. Repaint solid yellow centreline.	
B	Glencolin Line	Springwater Road	Imperial Road	1011 - 1424	Surface Treatment	3.6m	2.5 - 2.6m						hydro pole in clear zone at Mun No. 48102. hydro pole in clear zone at Mun No. 48625. hydro pole in clear zone at Mun No. 48813.		Repaint solid yellow centreline.	4 animal related collision between 2010 and 2016
A	Hacienda Road	John Wise Line	Glencolin Line	1000 - 1230	Surface Treatment	3.75 - 4.0m	2.0 - 2.5m			STA 0+600 (Crest, K=18)		Sightline for left turn to Van Patter Line = 80m. No intersection ahead sign for southbound traffic.	Trees in clear zone at Mun No. 8174. Hydro poles in clear zone between Van Patter Line and Chalet Line.	Protection is required at the pond south of Talbot Line on the east side of the road. Protection required for the culvert at the southeast corner of the intersection with College Line.	Chevron signage for horizontal curves at the College Line intersection. Repaint solid , dashed, or double yellow centreline	6 animal related collision between 2009 and 2016 in study area (16 total on Hacienda Road)
C	Hilltop Lane	West End	Springfield Road	N/A	Surface Treatment	3.7m	1.5m								Paint solid yellow centreline.	
A	John Wise Line	Springfield Road	Richmond Road	727 - 1326	Surface Treatment	3.75m	2.0m				STA 11+400 Radii = 95 - 102m. Chevron signs and S-bend signs present. Update chevrons as required. No speed reduction posted.		Hydro poles in clear zone on north and south side of the road, between Springfield Road and Carter Road.	Protection is required at the embankment near Mun No. 51082, west of Springfield Road.	Repaint solid yellow centreline.	10 animal related collisions between 2010 and 2014
C	Louisa Crescent	Hacienda Road	Catherina Street	50	Surface Treatment	3.6m	Curb								Paint solid yellow centreline.	
B	Norton Street	Talbot Line	North End Culdesac	200	Surface Treatment	3.6m	1.0m						Hydro poles in clear zone along full length of road.		Paint solid yellow centreline.	
A	Pigram Road	Ron McNeil Line	Pressey Road	673	Surface Treatment	3.6m	2.0m					Crop planting limits appear to be staked out at Pressey Line intersection. Ensure limits are enforced to maintain adequate intersection sight lines.		Protection is required at the Bear Creek Bridge.	Repaint solid or dashed yellow centreline.	2 animal related collision in 2011
B	Pressey Line	Springfield Road	Springer Hill Road	946 - 1748	Surface Treatment	3.3 - 3.95m	1.5 - 2.0m	Poor pavement shoulder condition Potholes in numerous locations along Pressey Line					Hydro poles in clear zone on the south side of the road where speed limit is 50km/h. Hydro poles in clear zone between Springfield Road and Walker Road. Row of trees in clear zone west of Mun No. 123251.		Repaint solid yellow centreline.	

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Project No. 19031
Date: 11-Jun-21

APPENDIX A:
DEFICIENCY PRIORITY LISTING

Priority Ranking	Road Name	From	To	*AADT***	Surface Treatment	Lane Width*	Shoulder Width*	Surface Treatment Condition	Drainage	Vertical Alignment	Horizontal Alignment	Intersections	Clear Zones	Embankment	Visual Aid	Comments
A	Rogers Road	John Wise Line	Ron McNeil Line	101 - 1195	Surface Treatment	3.5 - 3.7m	1.2 - 2.5m			STA 1+300 (Crest, K=15) STA 1+450 (Sag, K=12) STA 1+550 (Crest, K=8) STA 1+800 (Crest, K=20) STA 5+100 (Crest, K=23)			Tree in clear zone at Mun No. 7707 Woodlot north of Mun No 7881 in clear zone. Hydro poles in clear zone near Mun No. 8122. Two trees in clear zone near Mun No. 8692. Hydro pole in clear zone at Catt Line, east side of road. Tree in clear zone on east side of the road, between Brook Line and Talbot Line (near natural gas warning sign)		Repaint solid yellow centreline.	10 animal related collisions between 2010 and 201t6
A	Springer Hill Road	South End	Heritage Line	361 - 469	Surface Treatment	3.5 - 3.6m	1.2 - 2.5m			STA 5+900 (Crest, K=17) STA 7+200 (Crest, K=8)			Two hydro poles in clear zone at Mun No. 9822.	Protection required at Mun No. 9822, 9851, and 9931.	Repaint solid yellow centreline between Heritage Line and Glencolin Line. Paint solid yellow line north of Glencolin Line.	2 animal related collision between 2015 and 2016
A	Van Patter Line	Imperial Road	Hacienda Road	106	Gravel	3.5m	1.0m					80m of sightline for southbound Hacienda Traffic. See Hacienda Road recommendation.	Hydro pole in clear zone at Mun No.49512. Row of hydro poles at west end of road are within			
A	Walker Road	Chalet Line	Ron McNeil Line	93 - 394	Gravel/Surface Treatment	3.5 - 3.75m	1.0 - 1.5m			STA 3+600 (Crest, K=10)		Steep drop to CB at intersection with College Line marked by temporary pylons.			Repaint solid yellow centreline on paved portion of Walker Road. Chevron signage at horizontal curve south of Glencolin Line.	
C	Weldon Street	Springwater Road	East End	Unknown	Surface Treatment	2.3m	1.0m						Small tree in clear zone at Mun No. 47373.		Paint solid yellow centreline.	
B	Woolleyville Line	Springfield Road	East End	216	Gravel/Surface Treatment	3.25m	1.0m	Minor pavement shoulder ravelling	No roadside ditches at east end. Construct ditches as required.				hydro pole in clear zone at Mun No.51333. hydro pole in clear zone at Mun No.51432.		Repaint solid yellow centreline on paved portion of Wolleyville Line.	

NOTES:
*Bold values do not meet design recommendations
**AADT Counts in the above table have been updated to reflect 2018 counts. Where 2018 traffic data AADT is not available, 2015 data was used.
PRIORITY 'A' = IMMEDIATE PRIORITY
PRIORITY 'B' = MEDIUM PRIORITY
PRIORITY 'C' = LOW PRIORITY

APPENDIX ‘B'

- ROAD SEGMENT EVALUATIONS

Anger Road

John Wise Line to Chalet Line

- Criteria Review Sheet
- Embankment Protection Warrant Guide
- Centreline Profile Drawings (1-2)

2.0 Criteria Review

Road Name: *Anger Road*	Study Section: *John Wise Line to Chalet Line*
Direction of Travel: *North to South*	Total Distance Analysed: *1.72 km*
Posted Speed: *80km/h*	AADT: *104 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

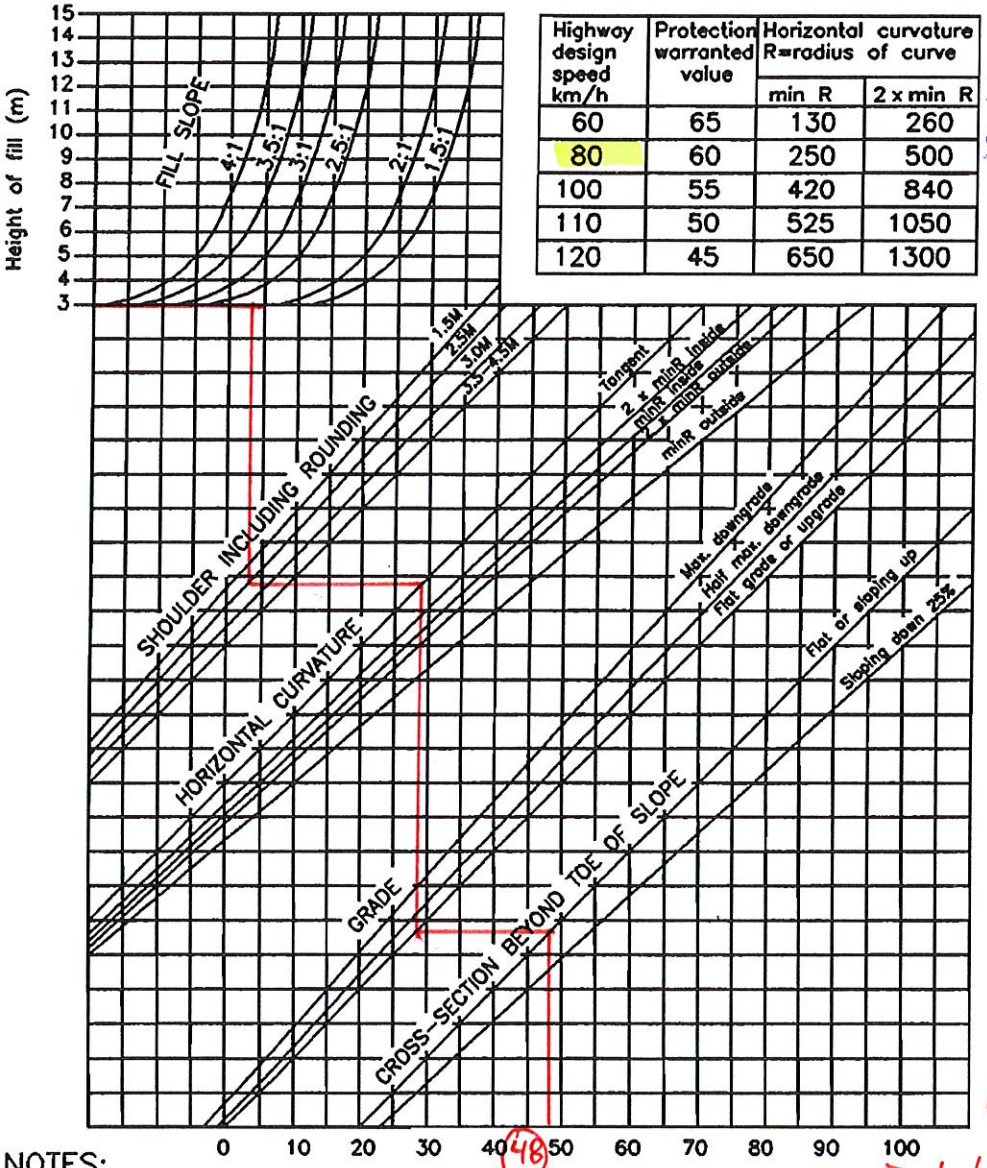
Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.6m x 2 = 7.2m - Shoulder(s): 2.0m wide - Boulevard(s): 5.40m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.4m 0.7m OK OK	Shoulder width
	Surface Treatment	- Comment on surface treatment	Surface treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	Sight lines OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	Anger Road / Chalet Line - Intersection control: - Stopping sight distance: 155-210m	Stop sign. ↔ Warning Sign. Sight Lines, Stopping Distance OK	
	List of intersections within project limits	Anger Road / John Wise Line - Intersection control: - Stopping sight distance: 155-210m	Stop sign. ↔ Warning Sign. Sight Lines, Stopping Distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	EWG OK @ embankment S. of Chalet.	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culverts OK.	
Visual Aids		- Line painting: - Signage?	ATV trail sign, Solid yellow line.	

Anger Road
100m S of Chalet Line.

April 2, 2020

Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300

H=3m
Shoulder 2.5m
Slope = 2.75:1



OK.

EMBANKMENT PROTECTION WARRANT GUIDE

< Protection Warranted Value
∴ No Protection Recommended

NOTES:

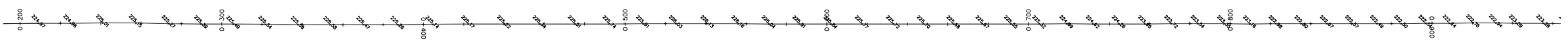
1 Guide rail is not required for:
Undivided Hwys
–On fill heights less than 3 metres.
–Slopes 3:1 or flatter.

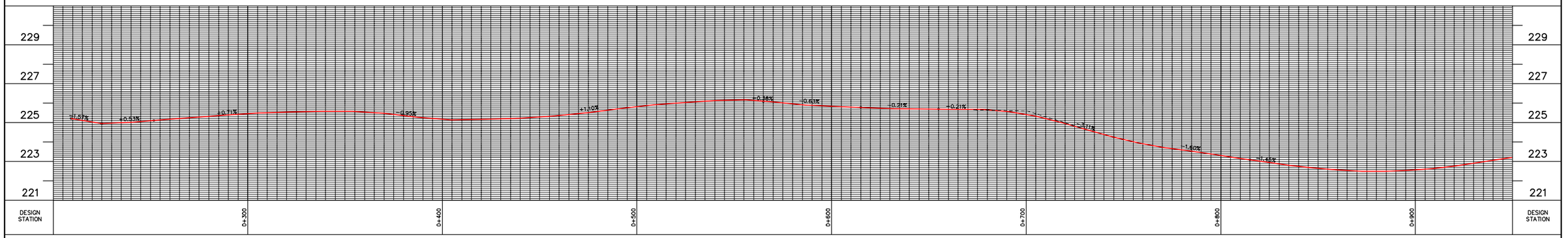
Divided Hwys
–On fill heights less than 2 metres.
–Slopes 4:1 or flatter.

2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

FIGURE 2.5.1 Embankment Warrant Guide

ANGER ROAD





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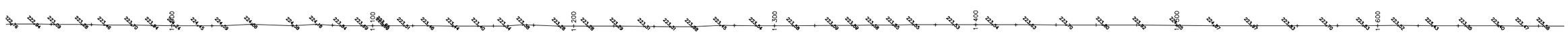

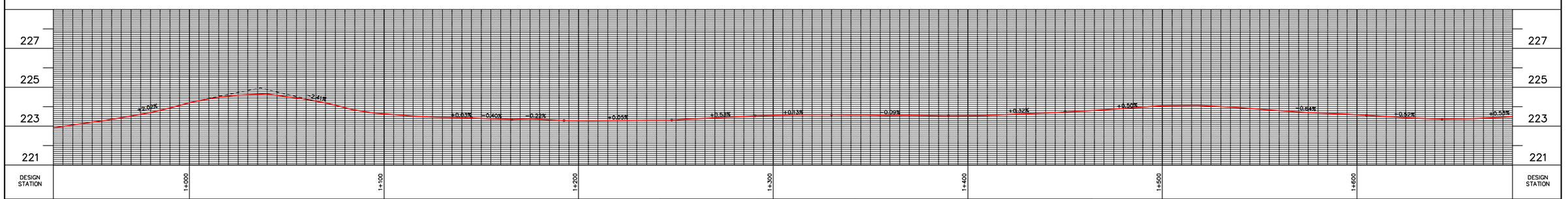

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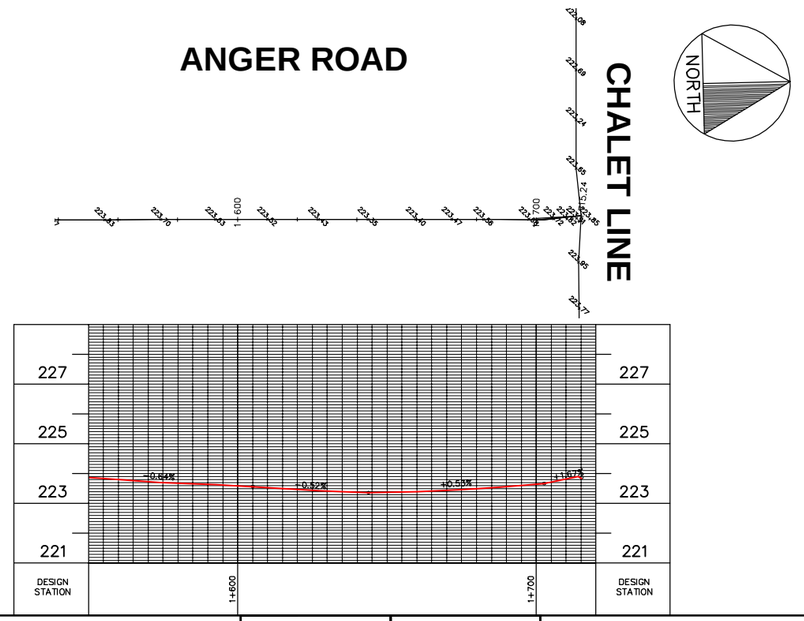
ROAD SAFETY AUDIT – PHASE 2

ANGER ROAD

STA 0+200 TO STA 1+650

DESIGN BY: CC DJL	DRAWN BY: TWM	CHECKED BY: CC DJL
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

DRAWING No. 1



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ANGER ROAD

STA 1+550 TO STA 1+715

DESIGN BY: CC DJL	DRAWN BY: TWM	CHECKED BY: CC DJL
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

DRAWING No. 2

Bradley Creek Line
Imperial Road to Hacienda Road

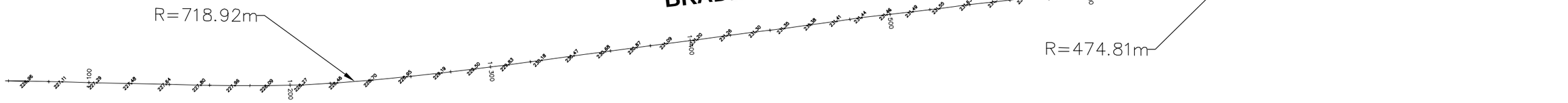
- Criteria Review Sheet
- Centreline Profile Drawing (3)

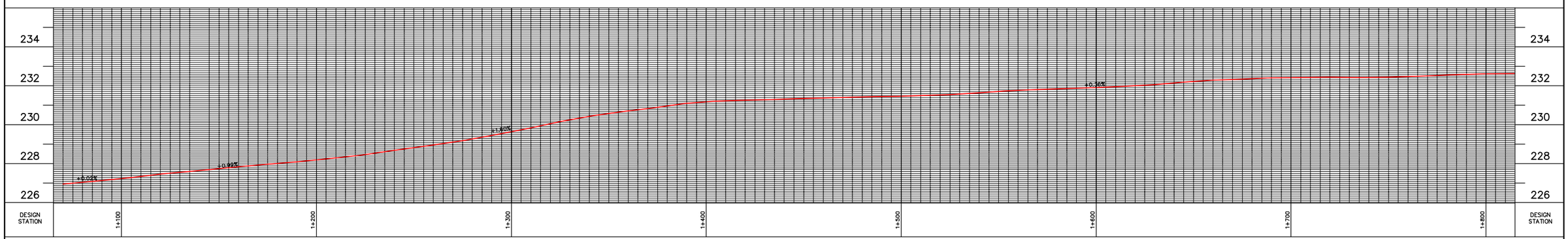
2.0 Criteria Review

Road Name: *Bradley Creek Line*	Study Section: *Imperial Road to Hacienda Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.05 km*
Posted Speed: *80km/h*	AADT: *363 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

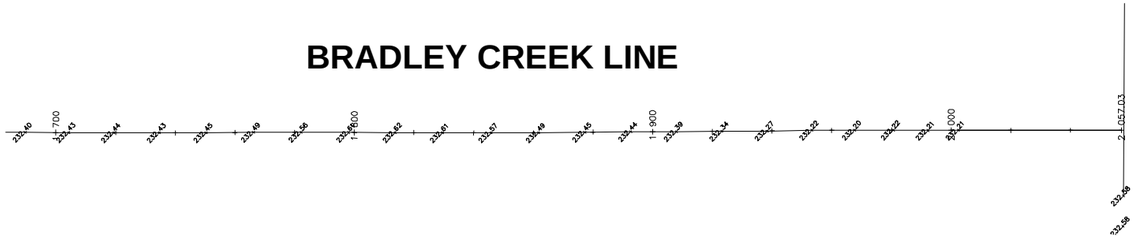
Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.40m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.6m 2m OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Bradley Creek Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	2 curves @ Sta 1+200 & 1+600. R > 280m. OK.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK.	
Intersections	List of intersections within project limits	Bradley Creek Line / Imperial Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ↔ Warning sign. Sight Lines, Stopping Distance OK	
	List of intersections within project limits	Bradley Creek Line / Hacienda Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ↔ Warning sign. Sight Lines, Stopping Distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK	
Visual Aids		- Line painting: - Signage?	Speed limit 80km/h posted	

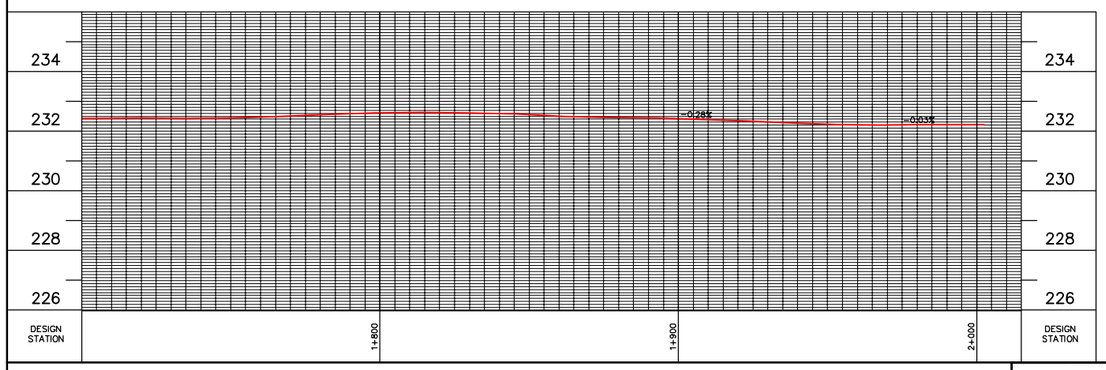
BRADLEY CREEK LINE





BRADLEY CREEK LINE





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PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

BRADLEY CREEK LINE

STA 0+070 TO STA 2+000

DRAWING No. **3**

Brook Line

Rogers Road to Caverly Road

- Criteria Review Sheet
- Centreline Profile Drawing (4)

2.0 Criteria Review

Road Name: *Brook Line*	Study Section: Rogers Road to 400m W of Caverly Road (speed limit change)
Direction of Travel: *East to West*	Total Distance Analysed: *0.4 km*
Posted Speed: *80km/h*	AADT: *587 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

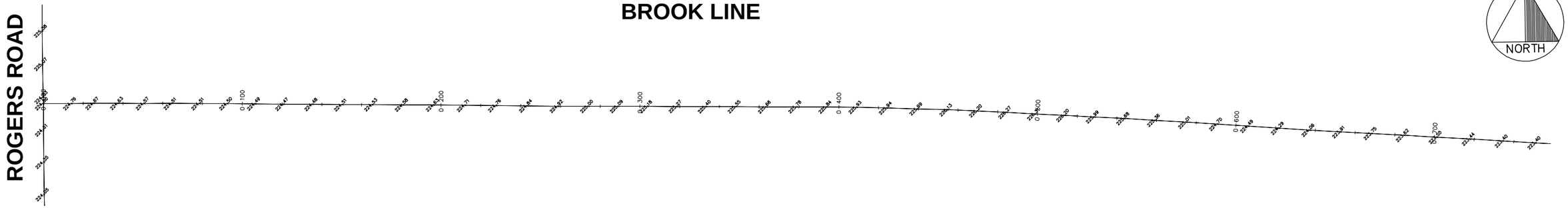
Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0m 2 m OK OK	Lane width...
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK.	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Brook Line / Rogers Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ⇔ Warning sign. Sight lines, Stopping Distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) **4m** (MTO, 2020) **3.5m** (excluding cut or fill slopes)	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK	
Visual Aids		- Line painting: - Signage?	Solid yellow line	

2.0 Criteria Review

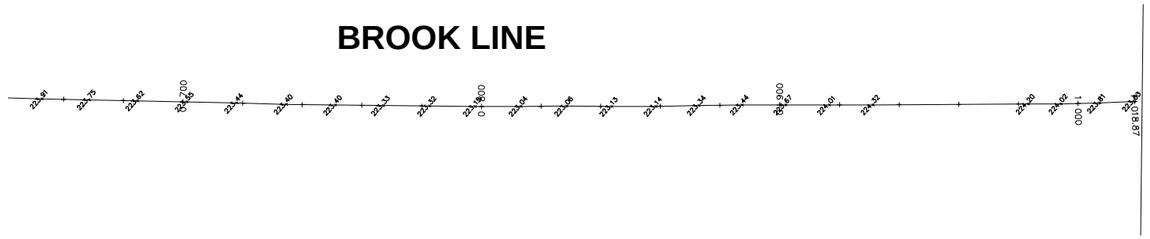
Road Name: *Brook Line*	Study Section: *400m W of Caverly Road (speed limit change) to Caverly Road*
Direction of Travel: *East to West*	Total Distance Analysed: *0.6 km*
Posted Speed: *50km/h*	AADT: *600 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

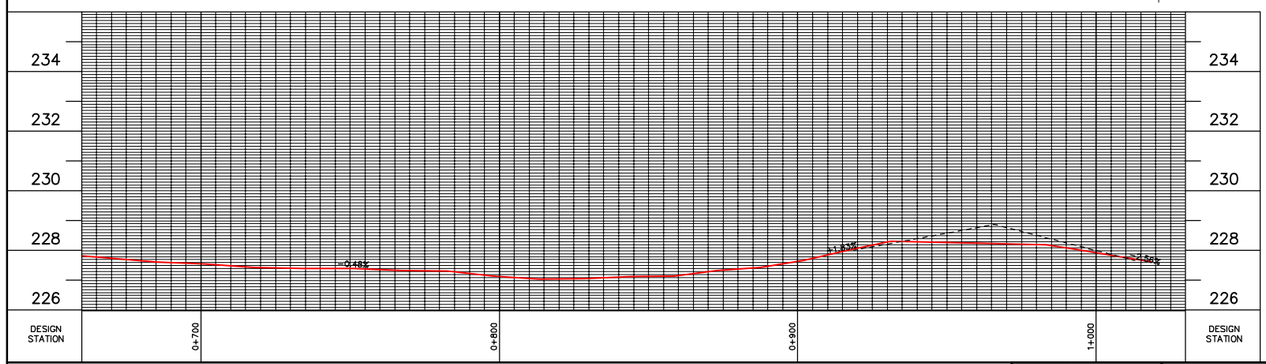
Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.5m x 2 = **7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0m 1.5m OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **8-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **100 to 80m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **160-350m**	OK	
	Decision Sight Distance	- Min decision sight distance: **75-145m**	OK	
Intersections	List of intersections within project limits	Brook Line / Caverly Road - Intersection control: - Stopping sight distance: **60-110m**	Stop sign. ↔ Warning Sign. Sight Lines, Stopping Distance OK	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid Line Speed limit posted	

BROOK LINE



BROOK LINE





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PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

BROOK LINE
STA 0+000 TO STA 1+020

DRAWING No. 4

Carter Road

John Wise Line to Pressey Line

- Criteria Review Sheets
- Embankment Protection Warrant Guides
- Site Photographs
- Centreline Profile Drawings (5-13)

2.0 Criteria Review

Road Name: *Carter Road*	Study Section: John Wise Line to Chalet Line
Direction of Travel: *North to South*	Total Distance Analysed: *3.16 km*
Posted Speed: *80km/h*	AADT: *327 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

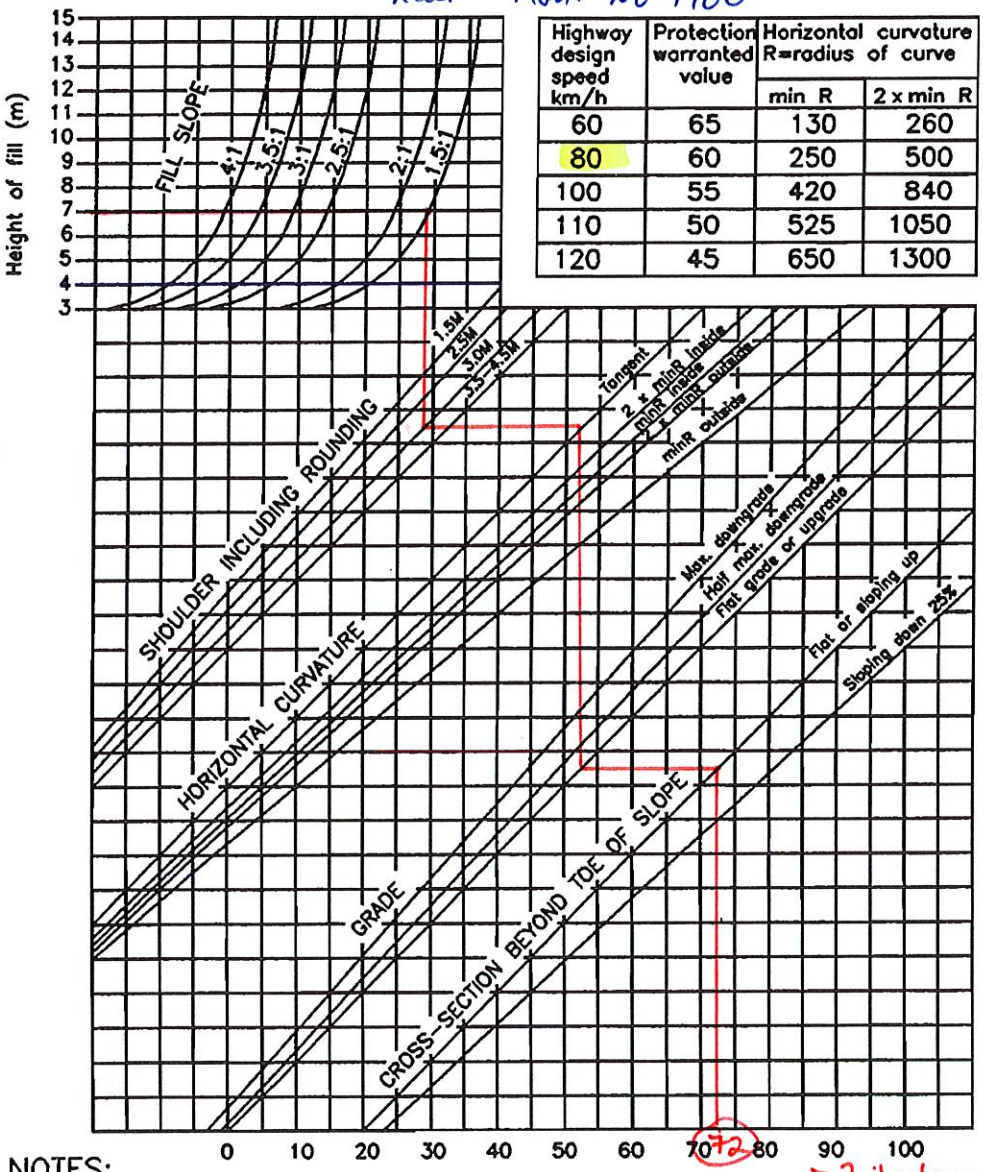
Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0m 2.5m OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	$K_{crest} < 24$ ⑤ Sta 1+000, 2+150 $K_{sag} < 12$ 0+800	2 crest $K < 24$ 1 sag $K < 12$
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Carter Road / John Wise Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ↔ Warning Sign. Sight lines, stopping distance OK.	
	List of intersections within project limits	Carter Road / Chalet Line - Intersection control: - Stopping sight distance: **155-210m**	Through St. Hidden intersection sign for northbound traffic.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	Embankment Warrant Guide Failed. ⑤ Pirrie Creek crossing.	Protection Required near Mun. No. 7900
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK	
Visual Aids		- Line painting: - Signage?	Solid line.	

Carter Road
Pinnie Creek
near Mun. No 7900

April 3, 2020

H = 7m
Shoulder = 3.0m
Slope = 1.5:1

Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300



EMBANKMENT PROTECTION WARRANT GUIDE

NOTES:

1 Guide rail is not required for:

Undivided Hwys
–On fill heights less than 3 metres.
–Slopes 3:1 or flatter.

Divided Hwys
–On fill heights less than 2 metres.
–Slopes 4:1 or flatter.

2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

> Protection Warranted Value.
∴ Protection Recommended.

FIGURE 2.5.1 Embankment Warrant Guide

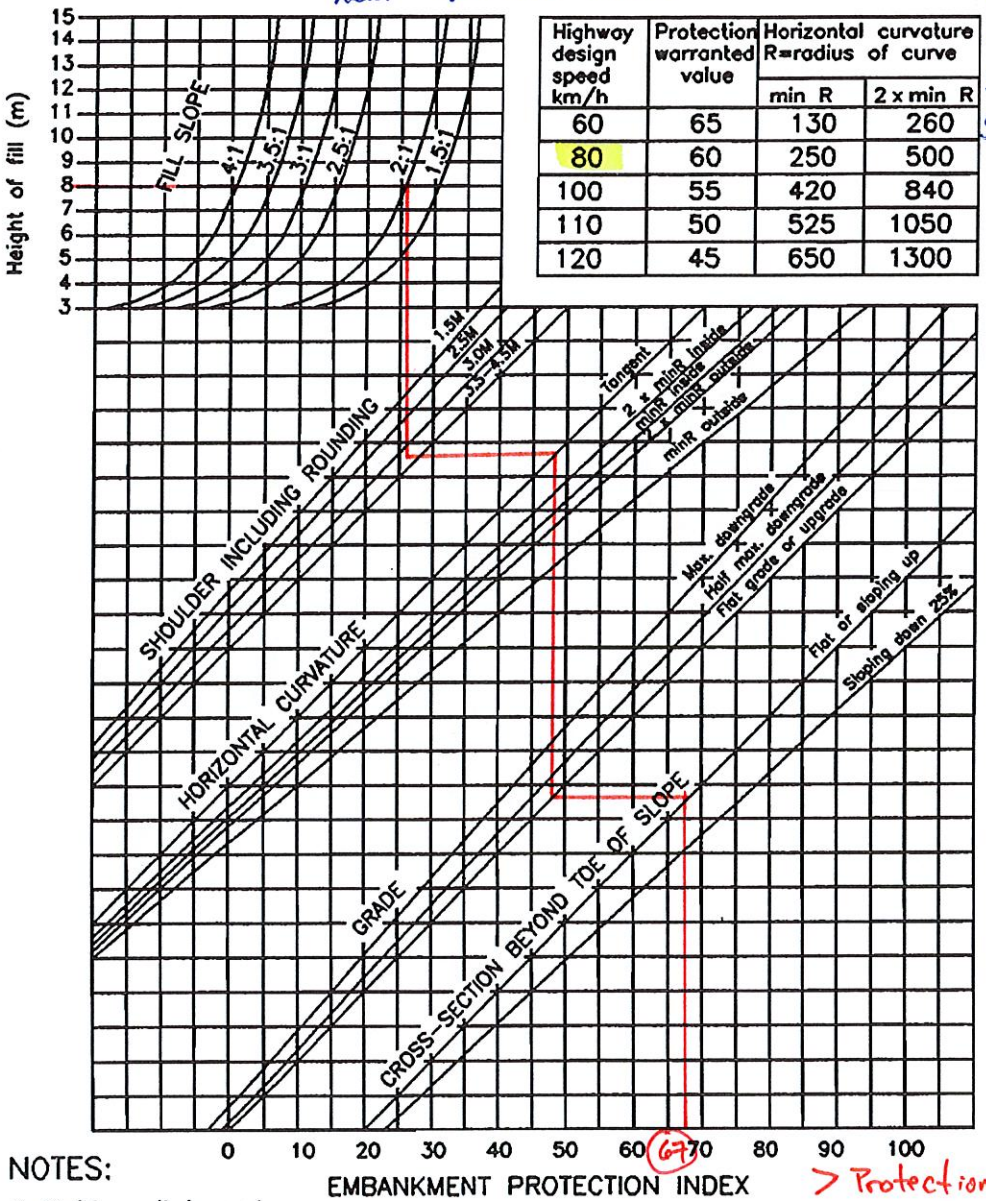
2.0 Criteria Review

Road Name: *Carter Road*	Study Section: Chalet Line to Talbot Line
Direction of Travel: *North to South*	Total Distance Analysed: *2.04 km*
Posted Speed: *80km/h*	AADT: *362 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.5m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	8.5 2.5 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	Kcrest<24 @ Sta 2+150,	1 Carter Road Kcrest<24, @ intersections Adequate signage. OK.
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	R= 56m @ Talbot Line - Adequate signage in place.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK.	
Intersections	List of intersections within project limits	Carter Road / Chalet Line - Intersection control: - Stopping sight distance: **155-210m**	Through St. Poor sight line for SB traffic OK NB traffic has "Hidden Intersection" Sign. OK.	
	List of intersections within project limits	Carter Road / Talbot Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Sight lines, stopping distance OK. "S" Bend sign, Stop sign ahead sign. OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	Embankment warrant guide fails @ Hwy. No. 8868 & 8403.	Protection recommended @ 2 locations
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK	
Visual Aids		- Line painting: - Signage?	Solid yellow line Hidden intersection @ Chalet. OK. S-bend warning @ Talbot. OK	

Carter Road
N of Chalet Line
near Mun. No 8403

April 3, 2020



Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300

H = 8m
Shoulder = 2.5 - 3.7m
Slope = 2:1

EMBANKMENT PROTECTION WARRANT GUIDE

NOTES:

1 Guide rail is not required for:
Undivided Hwys
–On fill heights less than 3 metres.
–Slopes 3:1 or flatter.

Divided Hwys
–On fill heights less than 2 metres.
–Slopes 4:1 or flatter.

2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

> Protection Warranted Value
∴ Protection Recommended.

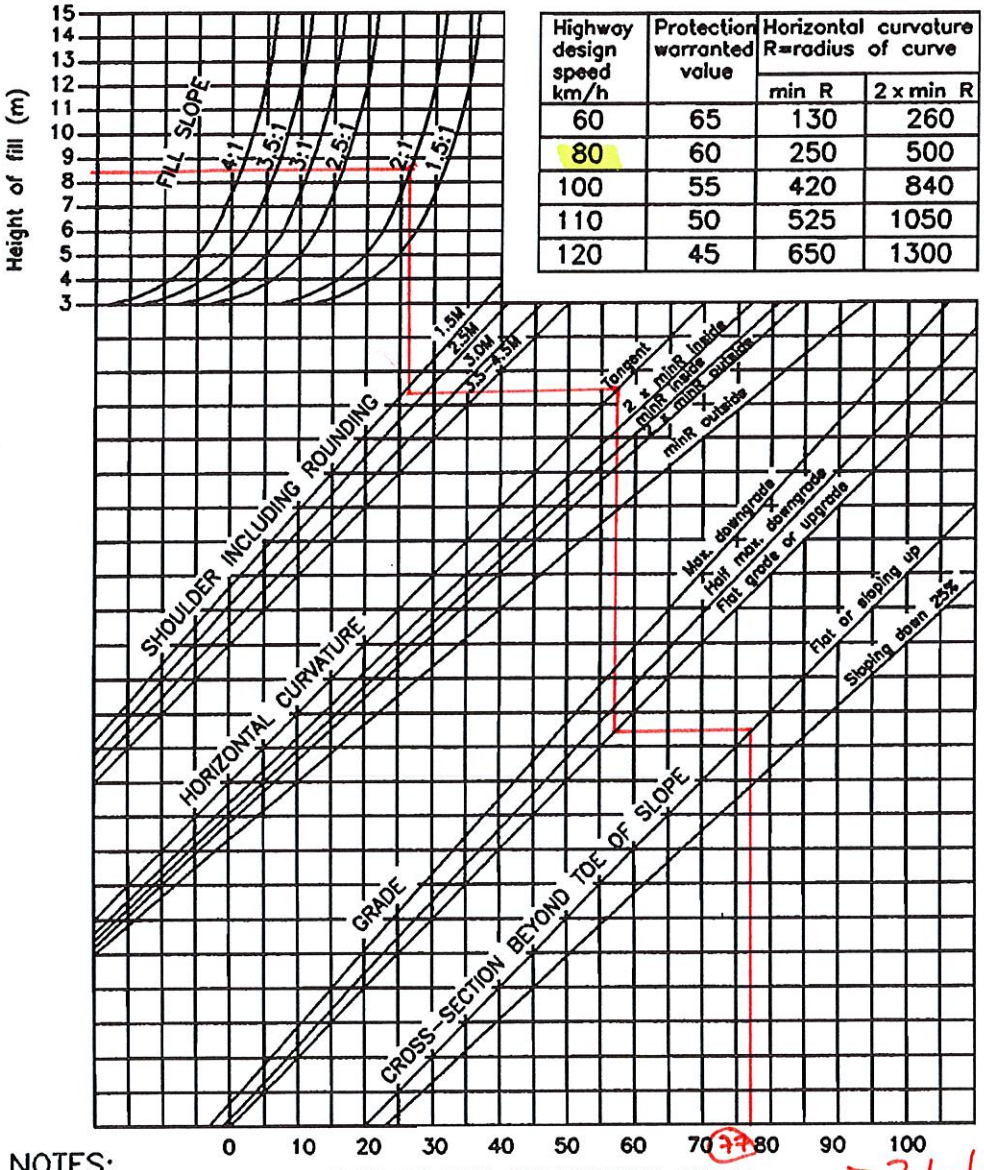
FIGURE 2.5.1 Embankment Warrant Guide

Carter Road.
near Mun. No 8868

April 3, 2020

H = 8.5m
Shoulder = 2.2m
Slope = 2:1

Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300



EMBANKMENT PROTECTION WARRANT GUIDE

NOTES:

1 Guide rail is not required for:

Undivided Hwys
- On fill heights less than 3 metres.
- Slopes 3:1 or flatter.

Divided Hwys
- On fill heights less than 2 metres.
- Slopes 4:1 or flatter.

2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

> Protection Warranted Value
∴ Protection recommended.

FIGURE 2.5.1 Embankment Warrant Guide

2.0 Criteria Review

Road Name: *Carter Road*	Study Section: Talbot Line to Glencolin Line
Direction of Travel: *North to South*	Total Distance Analysed: *2.77 km*
Posted Speed: *80km/h*	AADT: *416 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.5m 2.5 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Patton Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Carter Road / Talbot Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign ahead. Stop sign. Sight lines, stopping distance OK.	
	List of intersections within project limits	Carter Road / Glencolin Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign ↔ Warning sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	Hydropoles in clear zone	HP @ Mun. No. 9677. x3
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line.	

2.0 Criteria Review

Road Name: *Carter Road*	Study Section: Glencolin Line to College Line
Direction of Travel: *North to South*	Total Distance Analysed: *2.06 km*
Posted Speed: *80km/h*	AADT: *354 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

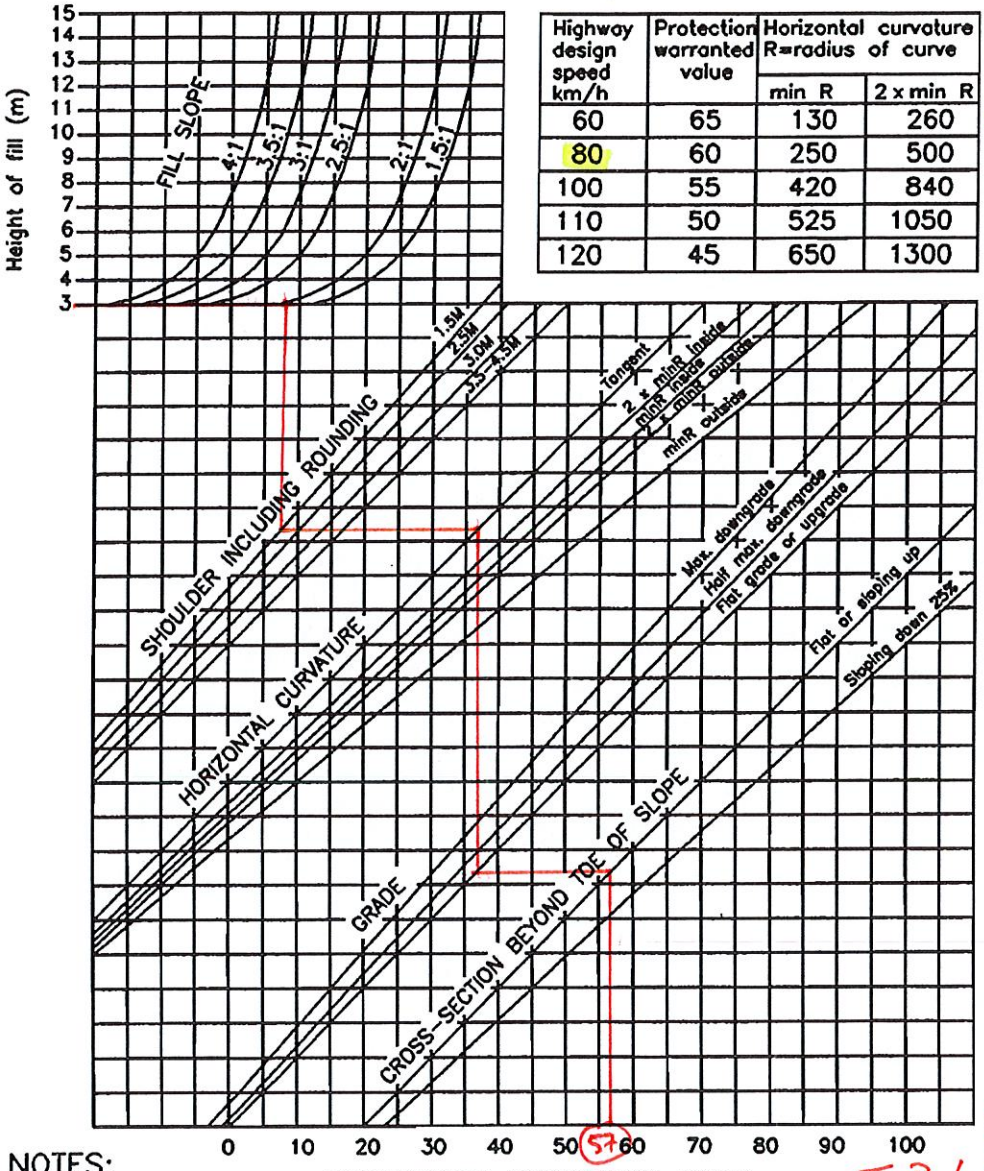
Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.6m 2.5m OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Eicher Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Carter Road / Glencolin Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ↔ Warning sign. Sight lines, stopping distance OK	
	List of intersections within project limits	Carter Road / College Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ↔ Warning sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK,	
	Embankments	- Slope? - Height? - Protection required? Limits?	Embankment @ R.W. crossing OK.	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK.	
Visual Aids		- Line painting: - Signage?	Solid yellow line, stop sign ahead for railway crossing + Railway Crossing sign, Railway crossing markings on road, "Attention Trains Operating Effective Dec 19, 2016" sign.	

Carter Road
Railway Crossing.

April 3, 2020

H=3m
Shoulder 2.2m
Slope 1.75:1

Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300



EMBANKMENT PROTECTION WARRANT GUIDE

OK.
< Protection Warranted Value
∴ No protection recommended.

NOTES:

1 Guide rail is not required for:

Undivided Hwys
–On fill heights less than 3 metres.
–Slopes 3:1 or flatter.

Divided Hwys
–On fill heights less than 2 metres.
–Slopes 4:1 or flatter.

2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

FIGURE 2.5.1 Embankment Warrant Guide

2.0 Criteria Review

Road Name: *Carter Road*	Study Section: College Line to Pressey Line
Direction of Travel: *North to South*	Total Distance Analysed: *2.07 km*
Posted Speed: *80km/h*	AADT: *277 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

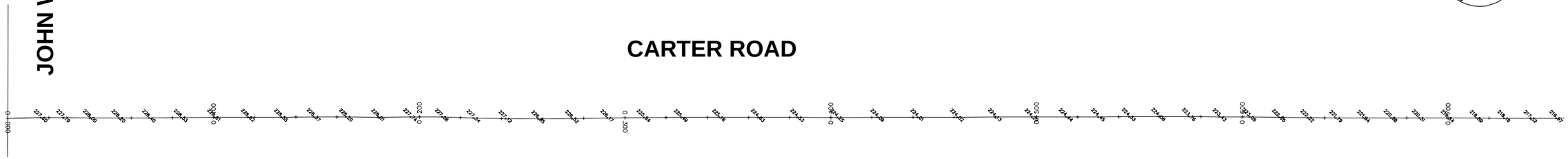
Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	8.0m 2.0m OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Catfish Creek Municipal Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Carter Road / College Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign ↔ Warning Sign Stopping distance, sight lines OK.	
	List of intersections within project limits	Carter Road / Pressey Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign, ↔ Warning Sign. Stopping distance, sight lines OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) **4m** (excluding cut or fill slopes) (MTO, 2020) **3.5m**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Bridge, Guard rails OK.	
Visual Aids		- Line painting: - Signage?	Solid yellow line.	

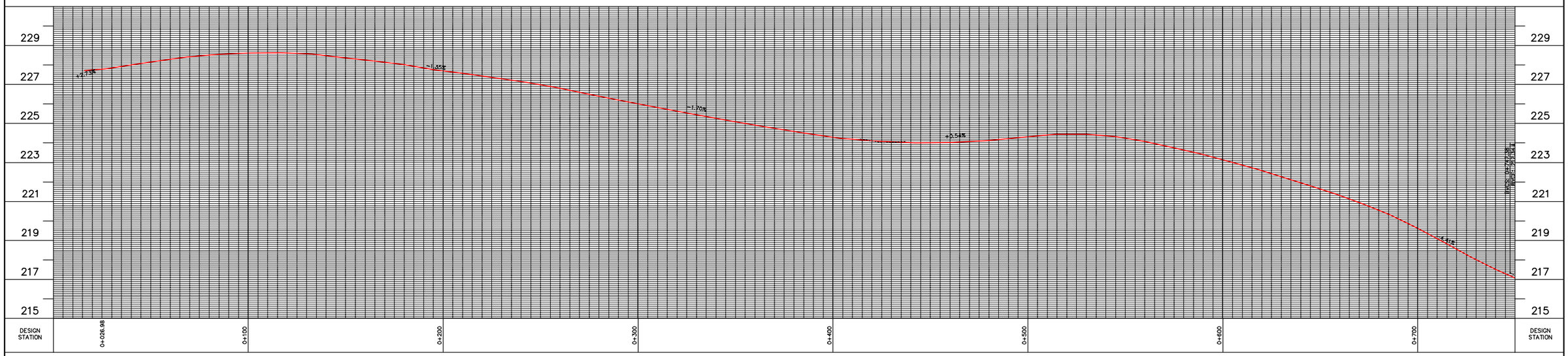
(Above) Carter Road – Facing south. Washout fill marked by temporary orange cones at Mun No 8403. Vertical curve at Chalet Line intersection.

(Below) Facing south. Vertical curve at Chalet Line intersection.

JOHN WISE LINE

CARTER ROAD





METRIC SCALE HORIZ 1:2000, VERT. 1:200

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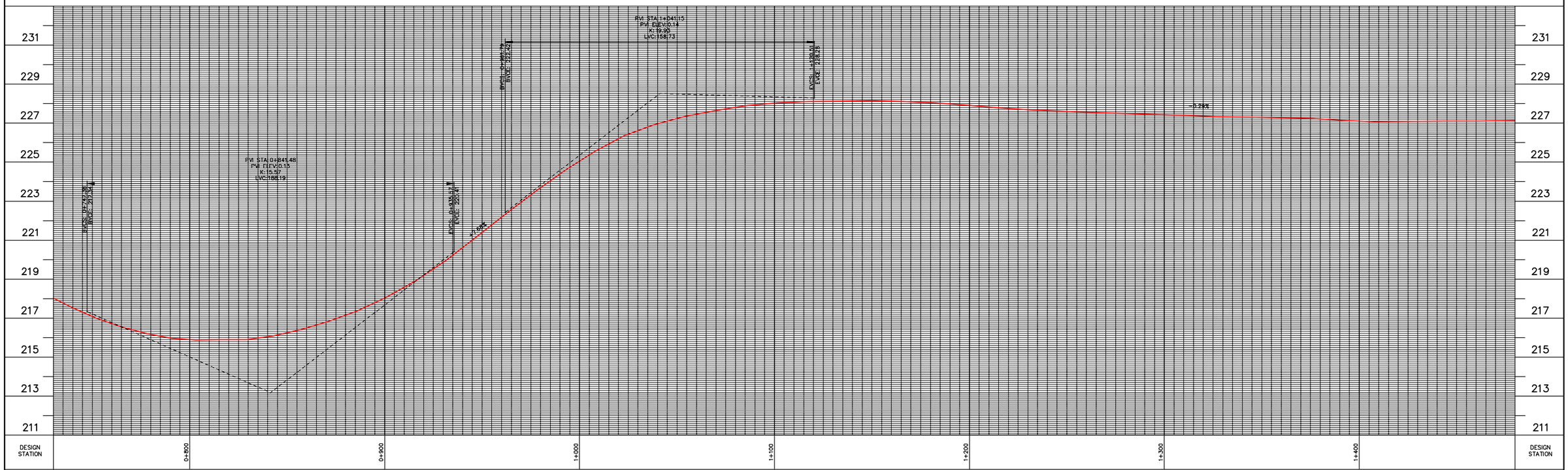
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

CARTER ROAD
STA 0+000 TO STA 0+750

DRAWING No. 5

CARTER ROAD



NORTH

METRIC SCALE HORIZ 1:2000, VERT. 1:200

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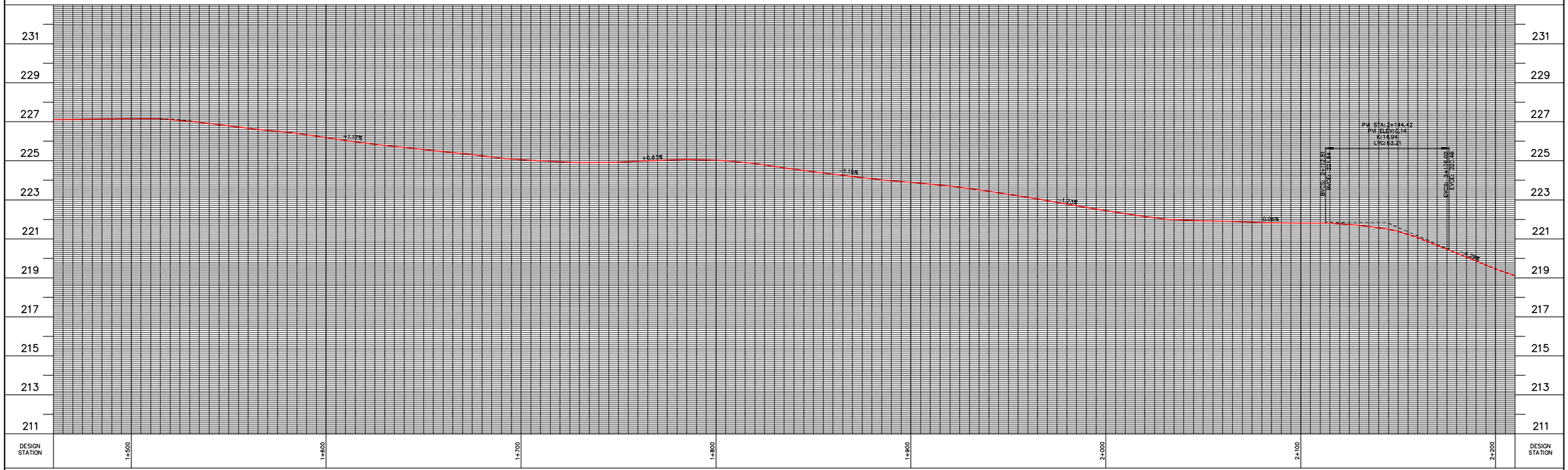
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

CARTER ROAD
STA 0+730 TO STA 1+480

DRAWING No. 6

CARTER ROAD

CHALET ROAD



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METRIC SCALE HORIZ 1:2000, VERT. 1:200

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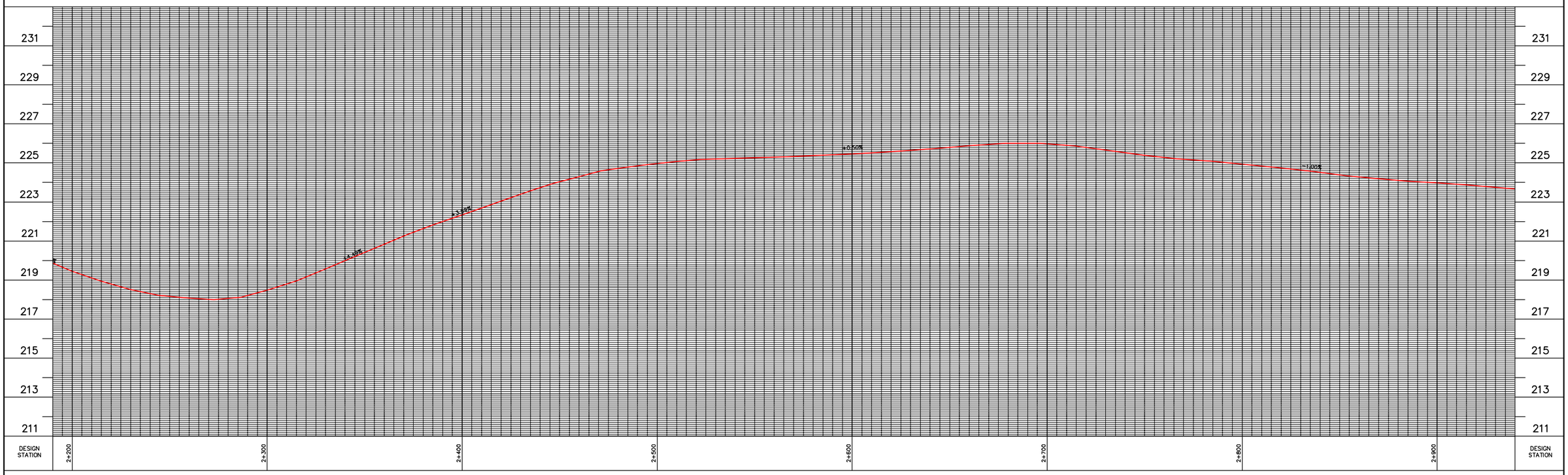
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

CARTER ROAD

STA 1+460 TO STA 2+210

DRAWING No. **7**

CARTER ROAD



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METRIC SCALE HORIZ 1:2000, VERT. 1:200

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PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

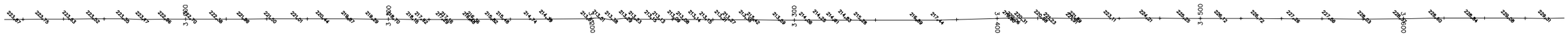
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

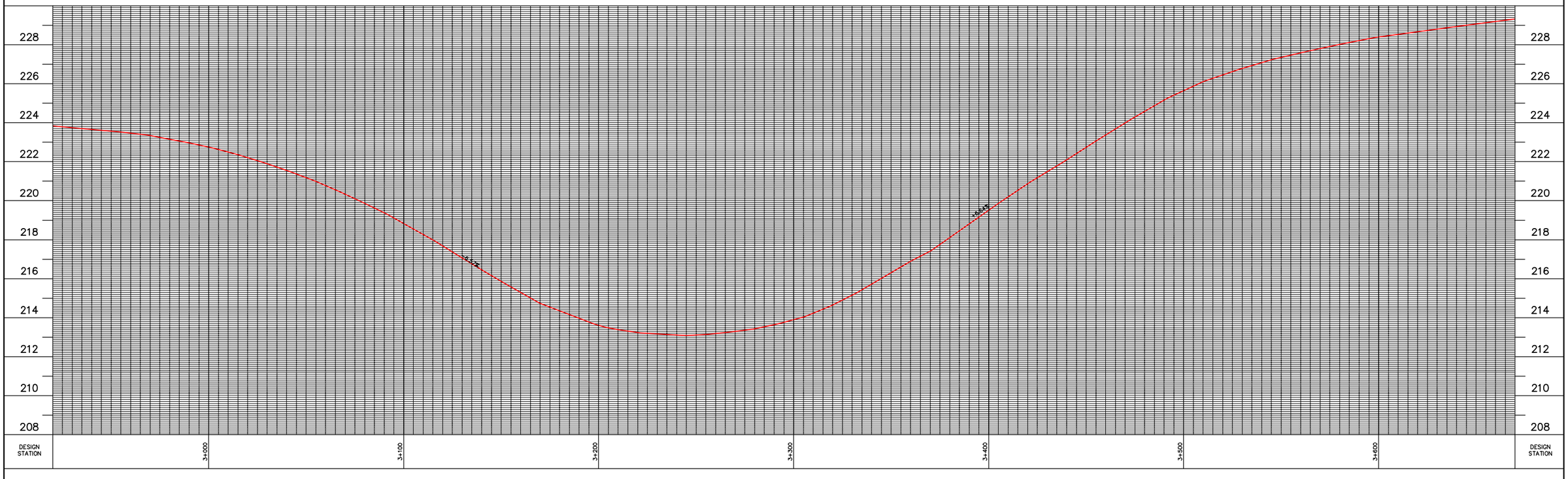
CARTER ROAD
STA 2+190 TO STA 2+940

DRAWING No. **8**

NORTH

CARTER ROAD





METRIC SCALE HORIZ 1:2000, VERT. 1:200

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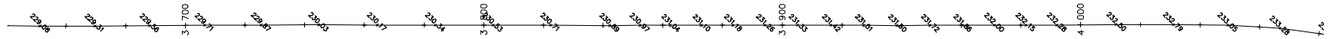
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

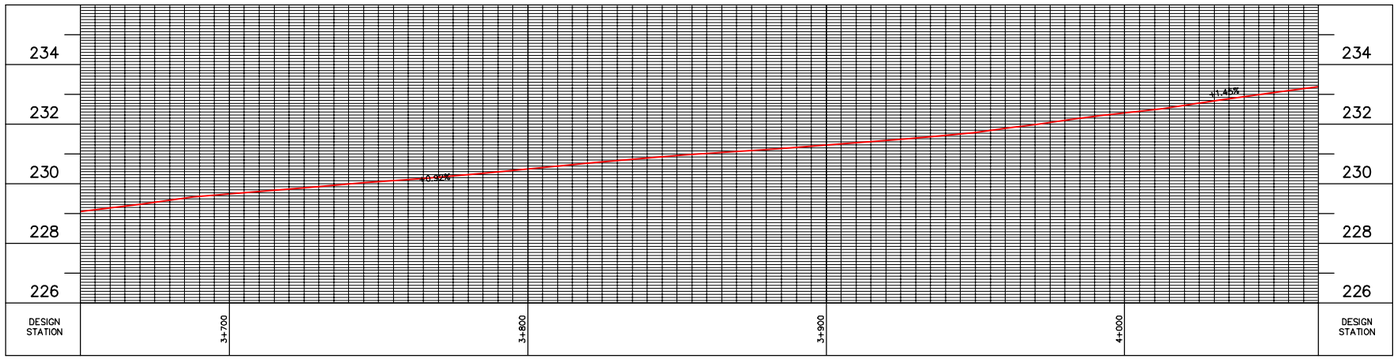
CARTER ROAD

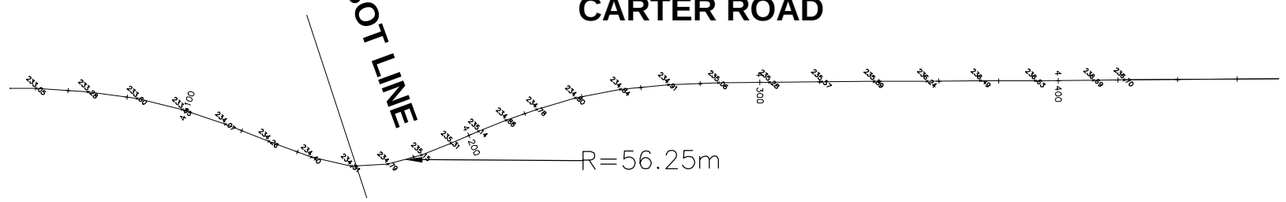
STA 2+920 TO STA 3+670

DRAWING No. 9

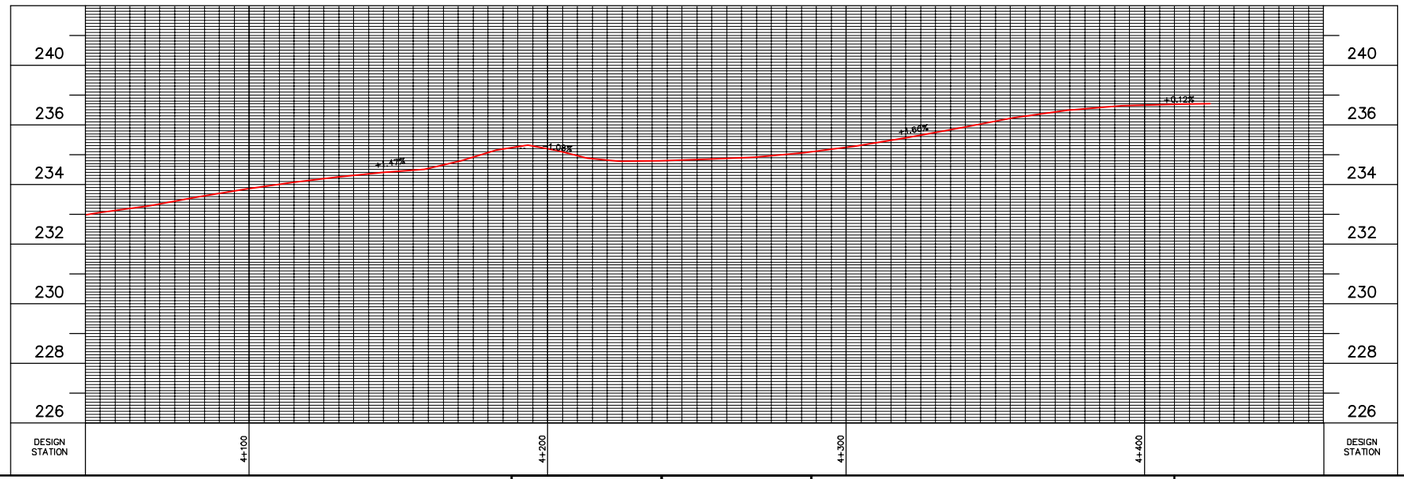
CARTER ROAD







CARTER ROAD



C. CLUETT 100214735 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

D.J. LYLE 100174772 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

METRIC SCALE HORIZ 1:2000, VERT. 1:200

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PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

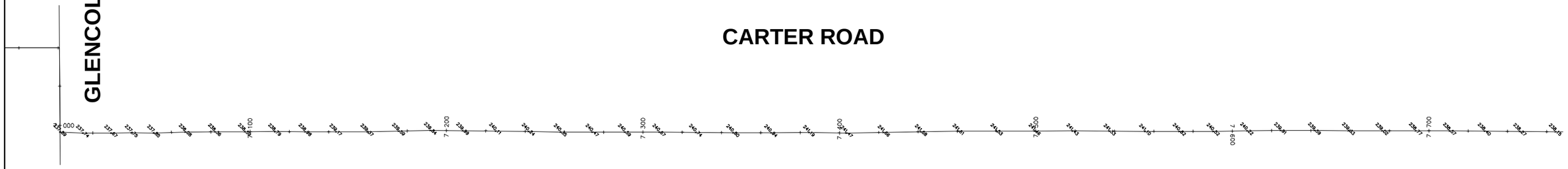
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

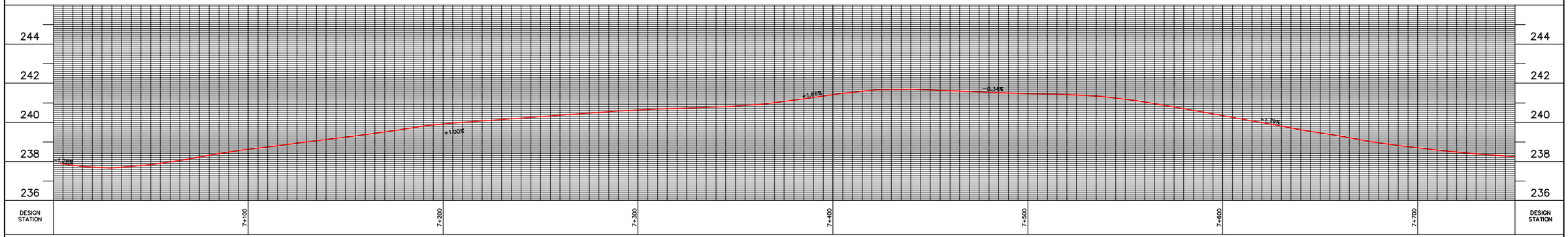
CARTER ROAD
STA 3+650 TO STA 4+400

DRAWING No. **10**

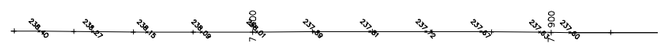
GLENCOLIN LINE

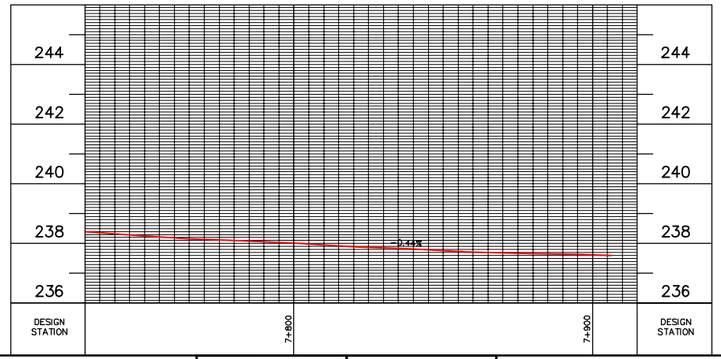
CARTER ROAD





CARTER ROAD





METRIC SCALE HORIZ 1:2000, VERT. 1:200

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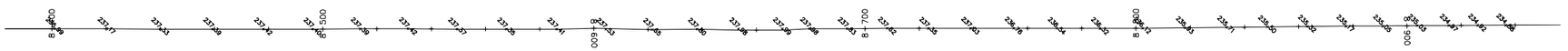
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

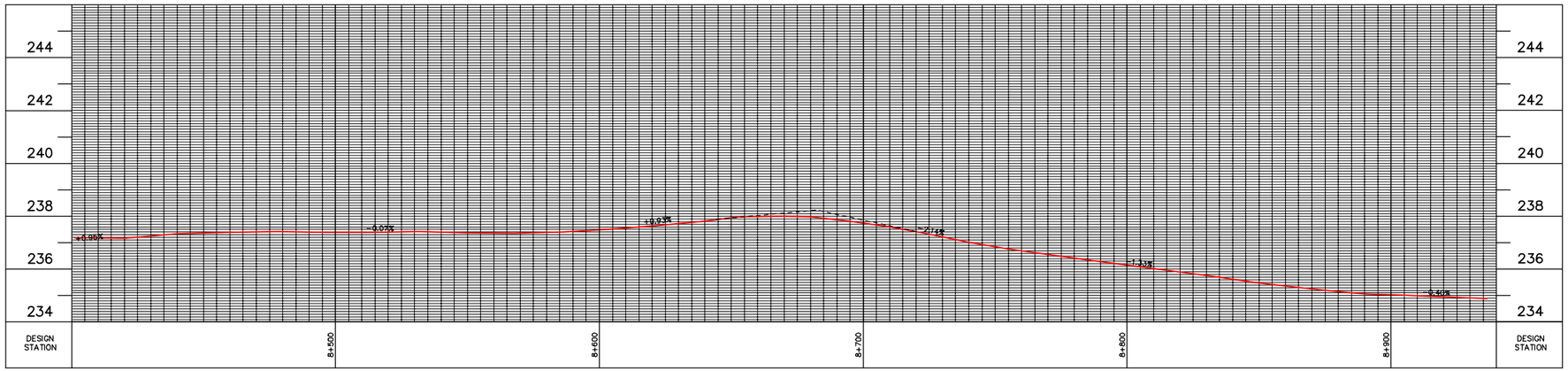
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

CARTER ROAD
STA 7+000 TO STA 7+900

DRAWING No. **11**

CARTER ROAD





METRIC SCALE HORIZ 1:2000, VERT. 1:200

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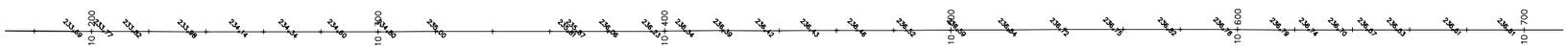
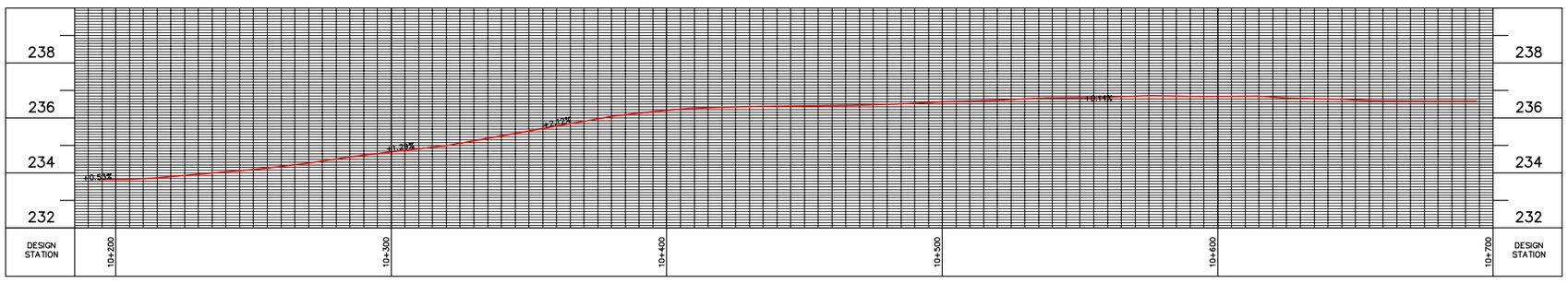
ROAD SAFETY AUDIT – PHASE 2
CARTER ROAD
STA 8+400 TO STA 8+940

DESIGN BY: CC DJL	DRAWN BY: TWM	CHECKED BY: CC DJL
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

DRAWING No. **12**

CARTER ROAD





NORTH

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TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
CARTER ROAD
STA 10+200 TO STA 10+700

DRAWING No. 13

Catherina Street
West End to Hacienda Road

- Criteria Review Sheet

2.0 Criteria Review

Road Name: *Catherina Street*	Study Section: *West End to Hacienda Road*
Direction of Travel: *North to South/East to West*	Total Distance Analysed: *0.13 km*
Posted Speed: *50km/h*	AADT: *50 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.2 curb OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage to CBs. OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **8-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **100 to 80m** - Maximum super elevation: **4-8%** (TAC, 1999)	OK	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **160-350m**	N/A	
	Decision Sight Distance	- Min decision sight distance: **75-145m**	N/A	
Intersections	List of intersections within project limits	Louisa Crescent / Hacienda Road - Intersection control: - Stopping sight distance: **60-110m**	Stop sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	No lines on road.	

Catherine Street
Pressey Line to Ron McNeil Line

- Criteria Review Sheet

2.0 Criteria Review

Road Name: *Catherine Street*	Study Section: *Pressey Line to Ron McNeil Line*
Direction of Travel: *North to South*	Total Distance Analysed: *0.14 km*
Posted Speed: *50km/h*	AADT: *50 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 23, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	6.2m No shoulder OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Stover Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **8-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **100 to 80m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **160-350m**	OK	
	Decision Sight Distance	- Min decision sight distance: **75-145m**	OK	
Intersections	List of intersections within project limits	Catherine Street / Pressey Line - Intersection control: - Stopping sight distance: **60-110m**	Stop sign. Sight lines, stopping distance OK.	
	List of intersections within project limits	Catherine Street / Ron McNeil Line - Intersection control: - Stopping sight distance: **60-110m**	Stop sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	No lines painted.	

Caverly Road
Brook Line to South End

- Criteria Review Sheet

2.0 Criteria Review

Road Name: *Caverly Road*	Study Section: Brook Line to South End
Direction of Travel: *North to South*	Total Distance Analysed: *0.24 km*
Posted Speed: *50km/h*	AADT: *100 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 23, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	5.1 to 5.7 No shoulder OK OK	Lane Width shoulder
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Lower Catfish 2	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **8-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **100 to 80m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **160-350m**	OK	
	Decision Sight Distance	- Min decision sight distance: **75-145m**	OK	
Intersections	List of intersections within project limits	Caverly Road / Brook Line - Intersection control: - Stopping sight distance: **60-110m**	Through St. sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	OK	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culvert OK	
Visual Aids		- Line painting: - Signage?	No line, speed limit posted.	

Chalet Line

Hacienda Road to East Cul-de-sac

- Criteria Review Sheets
- Embankment Protection Warrant Guide
- Site Photographs
- Centreline Profile Drawings (14-18)

2.0 Criteria Review

Road Name: *Chalet Line*	Study Section: *Hacienda Road to Springfield Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.06 km*
Posted Speed: *N/A Gravel/Surface Treatment; Assume 60km/h*	AADT: *136 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0m 1.0m OK OK	
	Surface Treatment	- Comment on surface treatment	Gravel. OK.	
	Drainage	- Roadside swales? - Municipal Drains: S. Ryan Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **150 to 120m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **200-410m**	OK	
	Decision Sight Distance	- Min decision sight distance: **95-175m**	OK	
Intersections	List of intersections within project limits	Chalet Line / Hacienda Road - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. ↔ Warning sign. Sight lines, stopping distance OK.	
	List of intersections within project limits	Chalet Line / Springfield Road - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culvert OK	
Visual Aids		- Line painting: - Signage?	N/A.	

2.0 Criteria Review

Road Name: *Chalet Line*	Study Section: *Springfield Road to Walker Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.06 km*
Posted Speed: *N/A Gravel; Assume 60km/h*	AADT: *66 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0m 1.0m OK OK	
	Surface Treatment	- Comment on surface treatment	Gravel OK	
	Drainage	- Roadside swales? - Municipal Drains: S. Ryan Drain, Learn Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **150 to 120m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **200-410m**	OK	
	Decision Sight Distance	- Min decision sight distance: **95-175m**	OK	
Intersections	List of intersections within project limits	Chalet Line / Springfield Road - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. Sight lines, stopping distance OK.	
	List of intersections within project limits	Chalet Line / Walker Road - Intersection control: - Stopping sight distance: **75-130m**	Through St. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culverts OK.	
Visual Aids		- Line painting: - Signage?	N/A.	

2.0 Criteria Review

Road Name: *Chalet Line*	Study Section: *Walker Road to Anger Road*
Direction of Travel: *East to West*	Total Distance Analysed: *0.83 km*
Posted Speed: *N/A Gravel; Assume 60km/h*	AADT: *127 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0m 1.0 m OK OK	
	Surface Treatment	- Comment on surface treatment	Gravel. OK.	
	Drainage	- Roadside swales? - Municipal Drains: Johnson Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **150 to 120m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **200-410m**	OK	
	Decision Sight Distance	- Min decision sight distance: **95-175m**	OK	
Intersections	List of intersections within project limits	Chalet Line / Walker Road - Intersection control: - Stopping sight distance: **75-130m**	Through St. Stopping distance, sight lines OK.	
	List of intersections within project limits	Chalet Line / Anger Road - Intersection control: - Stopping sight distance: **75-130m**	Through street, stopping distance, sight lines OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	N/A	

2.0 Criteria Review

Road Name: *Chalet Line*	Study Section: *Anger Road to Carter Road*
Direction of Travel: *East to West*	Total Distance Analysed: *1.30 km*
Posted Speed: *N/A Gravel; Assume 60km/h*	AADT: *175 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	6.5 to 7.0m 0 to 1.0m OK OK	Width Shoulder
	Surface Treatment	- Comment on surface treatment	Gravel OK.	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-12%** -Vertical curve 'K' value	Krest < 10 @ Sta 5+200	1 Krest fail.
	Horizontal Alignment	- Minimum design radius: **150 to 120m** - Maximum super elevation: **4-8%** (TAC, 1999)	Radius = 180m. OK.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **200-410m**	OK	
	Decision Sight Distance	- Min decision sight distance: **95-175m**	OK	
Intersections	List of intersections within project limits	Chalet Line / Anger Road - Intersection control: - Stopping sight distance: **75-130m**	Through St. sight lines, stopping distance OK. Intersection ahead sign for horizontal curve. OK.	
	List of intersections within project limits	Chalet Line / Carter Road - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. Stopping distance, sight lines OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	Hydropole in clear zone	HP @ Mun No 5+220
	Embankments	- Slope? - Height? - Protection required? Limits?	Pond west of Carter Road. No shoulder, vertical 0.3m drop then 2.7m before pond edge. on north side of road.	Pond edge within clear zone.
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK	
Visual Aids		- Line painting: - Signage?	Faded hazard sign on HP @ 5+220.	Faded hazard sign on HP.

South side of road not a concern.

2.0 Criteria Review

Road Name: *Chalet Line*	Study Section: *Carter Road to East Culdesac*
Direction of Travel: *East to West*	Total Distance Analysed: *1.56 km*
Posted Speed: *N/A Surface Treatment; Assume 80km/h*	AADT: *72 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

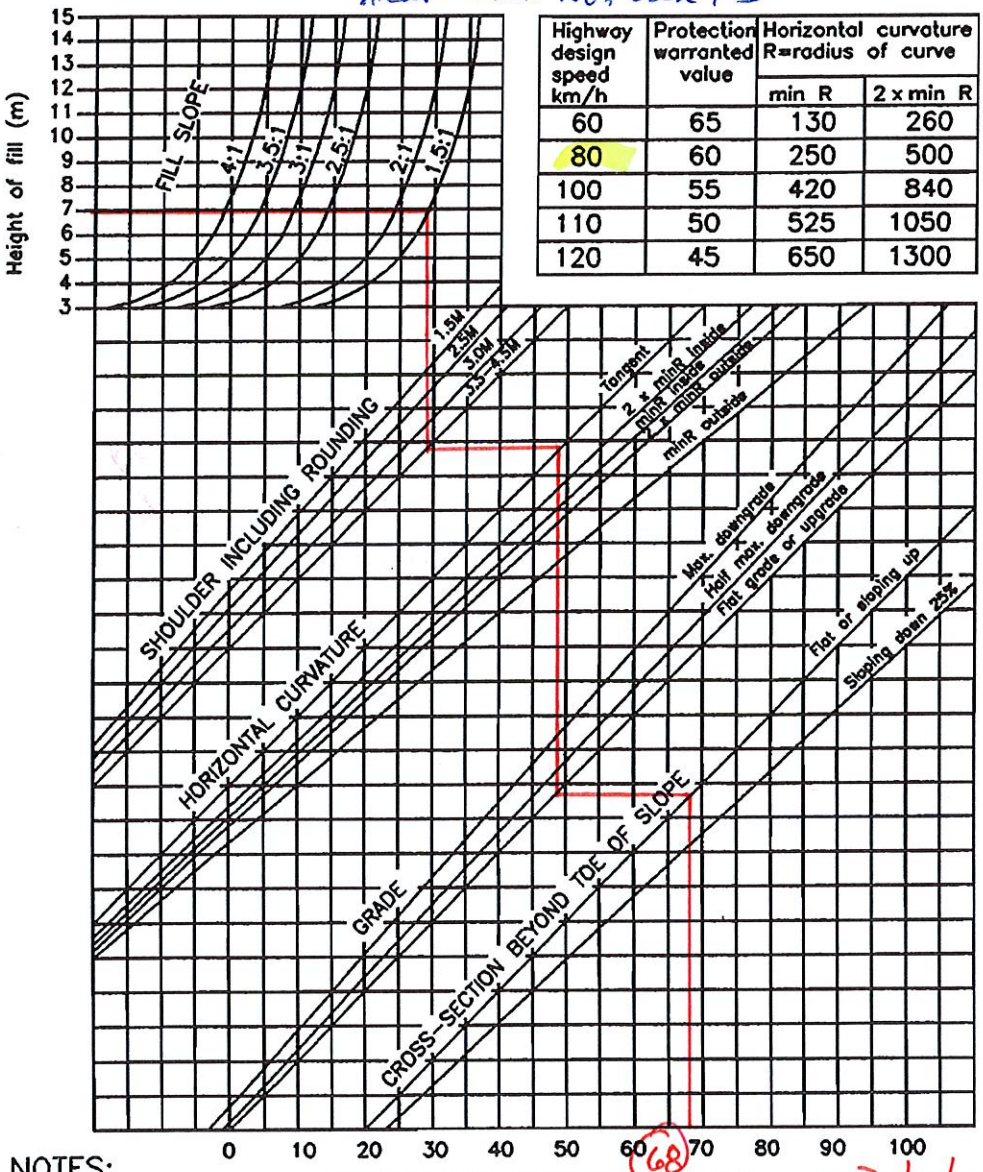
Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.6m x 2 = 7.2m - Shoulder(s): (-0m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	6.5m 1 to 1.5m OK OK.	Width
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK. Gravel Culdesac.	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	K_{CREST}<24 @ Sta 6+400, 7+000,	Kcrest fail x2
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	R=73m west of culdesac.	Radius
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	Chalet Line / Carter Road - Intersection control: - Stopping sight distance: 155-210m	Stop sign. Stopping distance, sight lines OK	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	Hydropoles in clear zone	@ Hum. No 52773.
	Embankments	- Slope? - Height? - Protection required? Limits?	Embankment warrant guide. Failed.	Protection required @ 52773
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK	
Visual Aids		- Line painting: - Signage?	Solid Line "No exit" sign.	

Chalet Line
E. of Carter Road
near Mun. No. 52273

April 2, 2020

H = 7m
Shoulder = 4.5m
Slope = 1:1

Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300



EMBANKMENT PROTECTION WARRANT GUIDE

> Protection Warranted Value.
∴ Protection Recommended.

NOTES:

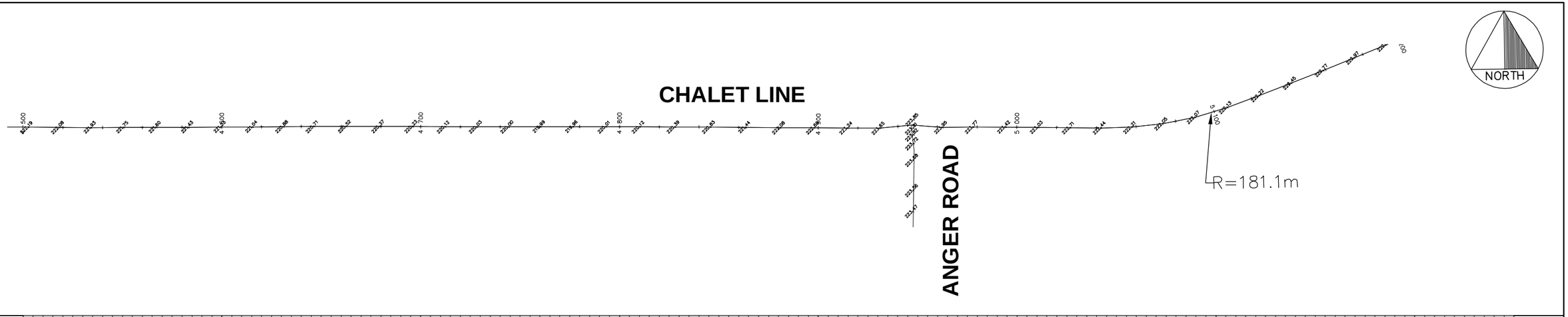
1 Guide rail is not required for:
Undivided Hwys
–On fill heights less than 3 metres.
–Slopes 3:1 or flatter.

Divided Hwys
–On fill heights less than 2 metres.
–Slopes 4:1 or flatter.

2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

FIGURE 2.5.1 Embankment Warrant Guide

Chalet Line – faded hazard sign and hydro pole in clear zone at Mun No 52220.



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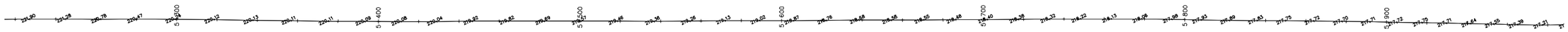
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

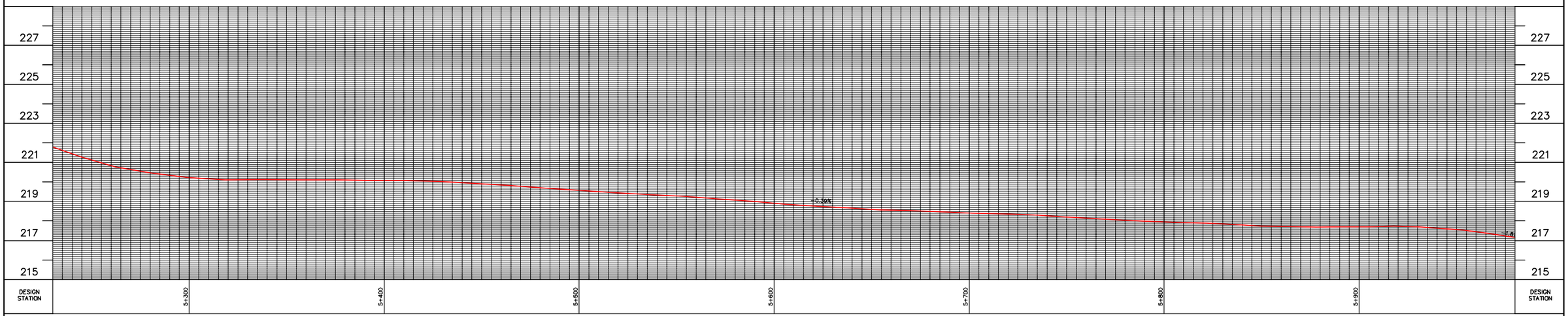
CHALET LINE

STA 4+500 TO STA 5+250

DRAWING No. **14**

CHALET LINE





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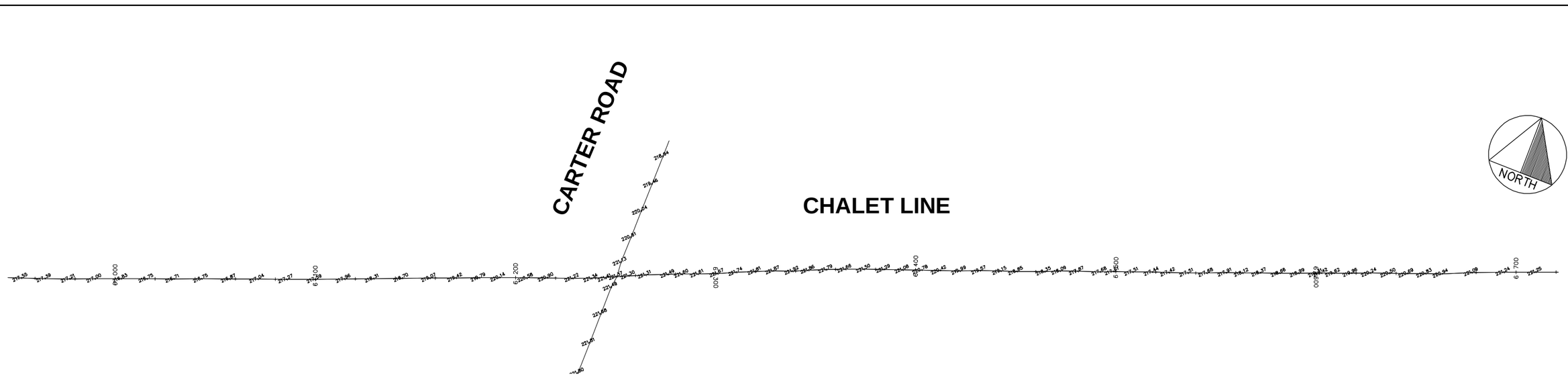
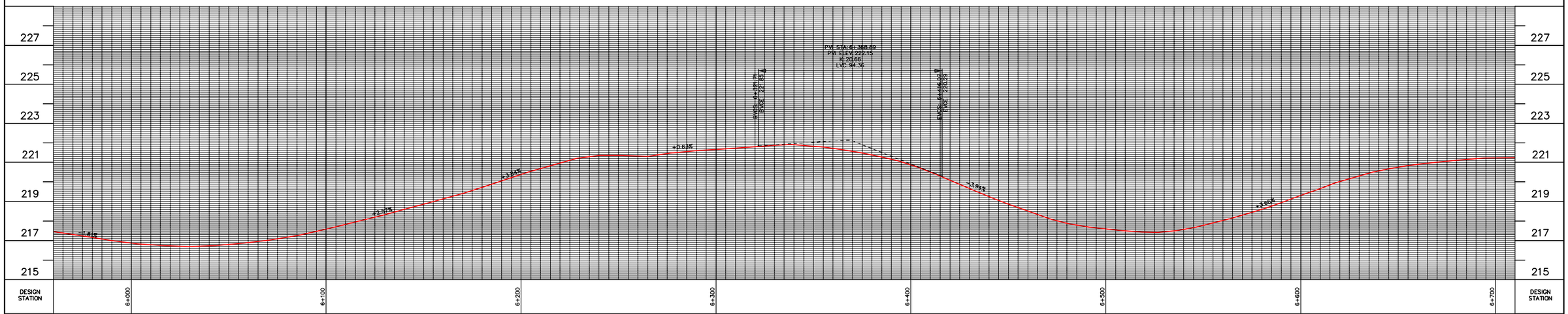
TOWNSHIP OF MALAHIDE
ROAD SAFETY AUDIT – PHASE 2
CHALET LINE
STA 5+230 TO STA 5+980

DESIGN BY: CC DJL	DRAWN BY: TWM	CHECKED BY: CC DJL
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

DRAWING No. 15





METRIC SCALE HORIZ 1:2000, VERT. 1:200

No.	REVISION	DATE	BY

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PROJECT NO. 19031 | SURVEY BY: TPM | DATE: MAR. 2021

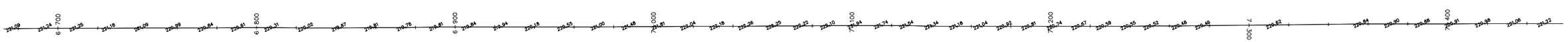
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

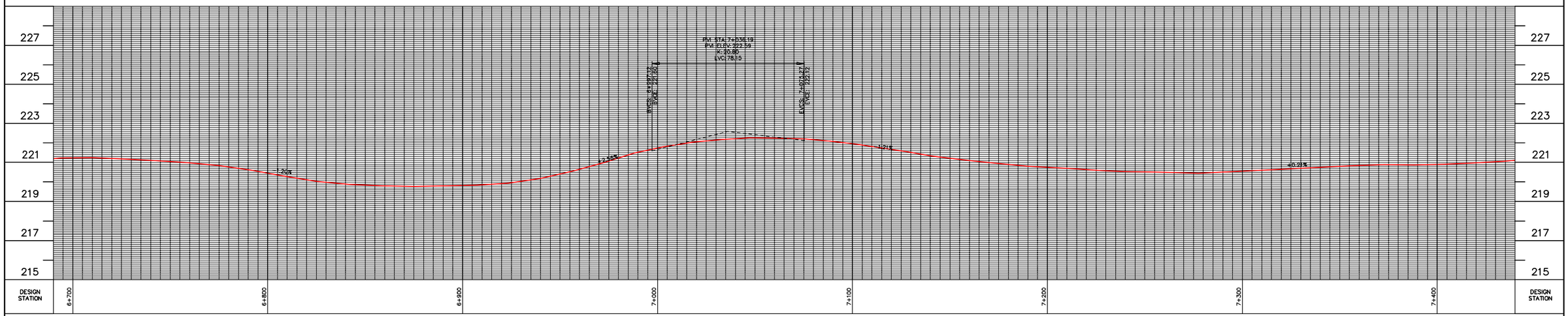
CHALET LINE

STA 5+560 TO STA 6+710

DRAWING No. **16**

CHALET LINE





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METRIC SCALE HORIZ 1:2000, VERT. 1:200

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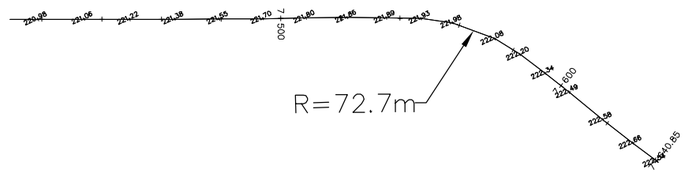
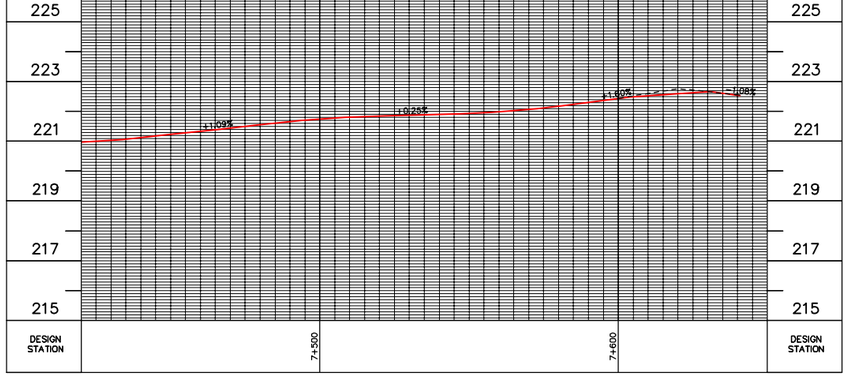
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
CHALET LINE
STA 6+690 TO STA 7+440

DRAWING No. 17

CHALET LINE





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METRIC SCALE HORIZ 1:2000, VERT. 1:200

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PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
CHALET LINE
STA 7+420 TO STA 7+650

DRAWING No. **18**

Church Street
Springwater Road to Norton Street

- Criteria Review Sheet

2.0 Criteria Review

Road Name: *Church Street*	Study Section: *Springwater Road to Norton Street*
Direction of Travel: *East to West*	Total Distance Analysed: *0.11 km*
Posted Speed: *N/A Asphalt; Assume 60km/h*	AADT: *100 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 23, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.3m Shoulder OK. OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **150 to 120m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **200-410m**	N/A	
	Decision Sight Distance	- Min decision sight distance: **95-175m**	N/A	
Intersections	List of intersections within project limits	Church Street / Springwater Road - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. Stopping distance, sight lines OK.	
	List of intersections within project limits	Church Street / Norton Street - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. Stopping distance, sight lines OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	Hydro pole in clear zone @ Main No. 47343	Hydro pole
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	No lines painted.	

College Line

Springwater Road to Springer Hill Road

- Criteria Review Sheets
- Centreline Profile Drawings (19-23)

2.0 Criteria Review

Road Name: *College Line*	Study Section: *Springwater Road to Dorchester Road*
Direction of Travel: *East to West*	Total Distance Analysed: *0.62 km*
Posted Speed: *80km/h*	AADT: *387 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x ? = 7.2m** - Shoulder(s): **2.0 ı wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0 m 2.0m OK OK	Width -
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Hartemink Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	College Line / Springwater Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ↔ sign sight lines, stopping distance OK	
	List of intersections within project limits	College Line / Dorchester Road - Intersection control: - Stopping sight distance: **155-210m**	Through Street Stopping distance sight lines, OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) **4m** (excluding cut or fill slopes) (MTO, 2020) **3.5m**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culvert OK	
Visual Aids		- Line painting: - Signage?	Solid line.	

2.0 Criteria Review

Road Name: *College Line*	Study Section: *Dorchester Road to Rogers Road*
Direction of Travel: *East to West*	Total Distance Analysed: *0.62 km*
Posted Speed: *80km/h*	AADT: *387 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	6.8 1.5 OK OK	Width Shoulder
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Catfish Creek	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	College Line / Dorchester Road - Intersection control: - Stopping sight distance: **155-210m**	Through St. Sight lines & stopping distance OK.	
	List of intersections within project limits	College Line / Rogers Road - Intersection control: - Stopping sight distance: **155-210m**	Through St. Sight lines & stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **(MTO, 1993) 4m** (excluding cut or fill slopes) **(MTO, 2020) 3.5m**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	Cable wire protection @ Embankment. OK.	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culvert OK	
Visual Aids		- Line painting: - Signage?	Solid yellow line.	

2.0 Criteria Review

Road Name: *College Line*	Study Section: *Rogers Road to Imperial Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.05 km*
Posted Speed: *80km/h*	AADT: *501 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	6.7 1-3 OK OK	Width Shoulder
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	College Line / Rogers Road - Intersection control: - Stopping sight distance: **155-210m**	Through Street. Sight lines & stopping distance OK.	
	List of intersections within project limits	College Line / Imperial Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **(MTO, 1995) 4m** (excluding cut or fill slopes) **(MTO, 2020) 3.5m**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line.	

2.0 Criteria Review

Road Name: *College Line*	Study Section: *Imperial Road to Hacienda Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.07 km*
Posted Speed: ~~*80km/h*~~ 60 km/h	AADT: *795 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.5 x 2 = 7.2m - Shoulder(s): 1.9m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.0 1.5 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Laidlaw Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	Kcrest<24 @ Sta 57500.	Kcrest fail.
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	College Line / Imperial Road - Intersection control: - Stopping sight distance: 155-210m	Stop sign. Stop sign ahead. Sight lines, stopping distance OK.	
	List of intersections within project limits	College Line / Hacienda Road - Intersection control: - Stopping sight distance: 155-210m	Stop sign. Sight lines & stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO,1993) 4m (excluding cut or fill slopes) (MTO,2020) 5m	Hydropoles on north side of road, in clear zone & hydropole on south side @ Hwy No 49856	Hydropoles
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line. 60km/h Posted speed.	

2.0 Criteria Review

Road Name: *College Line*	Study Section: *Hacienda Road to Springfield Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.02 km*
Posted Speed: ~~80~~km/h 60 km/h Community Safety Zone	AADT: *657 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **1.5 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	6.8m 2.0m OK OK	Width
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	College Line / Hacienda Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Sight lines, stopping distance OK.	
	List of intersections within project limits	College Line / Springfield Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Stop sign ahead. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid Yellow Line "Rural Settlement Area"	

2.0 Criteria Review

Road Name: *College Line*	Study Section: *Springfield Road to Walker Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.04 km*
Posted Speed: ~~80km/h~~ 60 km/h	AADT: *512 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.5m x 2 = 7.2m - Shoulder(s): 1.5m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	6.4m 1.8m OK OK	Width <
	Surface Treatment	- Comment on surface treatment	Shoulder raveling in areas.	Shoulder condition.
	Drainage	- Roadside swales? - Municipal Drains: Simpson Creek, Stirton Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	College Line / Springfield Road - Intersection control: - Stopping sight distance: 155-210m	Stop sign. Sight line, stopping distance OK.	
	List of intersections within project limits	College Line / Walker Road - Intersection control: - Stopping sight distance: 155-210m	Through Street Sight line, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	OK	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culvert @ Mun 51414, No steep slopes (4:1 or steeper) transverse to traffic. No protection required.	
Visual Aids		- Line painting: - Signage?	Solid yellow line! Horse & buggy sign. Pedestrian sign - FADED.	Faded pedestrian sign @ Mun. No. 51385

Culvert @ Springfield Road.
- transverse slopes 1:1 to 2:1 ditch ~4 to 4.5m deep from edge of road.

Requires Protection

2.0 Criteria Review

Road Name: *College Line*	Study Section: *Walker Road to Carter Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.07 km*
Posted Speed: ~~*80km/h*~~ 60 km/h	AADT: *489 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: ~~3.5~~ m x 2 = 7.2m - Shoulder(s): 1.5 m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	6.7 m 1.4m OK OK	Width Shoulder
	Surface Treatment	- Comment on surface treatment	Shoulder raveling, narrowing lane width even more. Shoulder conditions *	
	Drainage	- Roadside swales? - Municipal Drains: Catfish Creek	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	College Line / Walker Road - Intersection control: - Stopping sight distance: 155-210m	Through street. Sight lines, stopping distance OK.	
	List of intersections within project limits	College Line / Carter Road - Intersection control: - Stopping sight distance: 155-210m	Through street. Sight lines & stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line. School zone.	

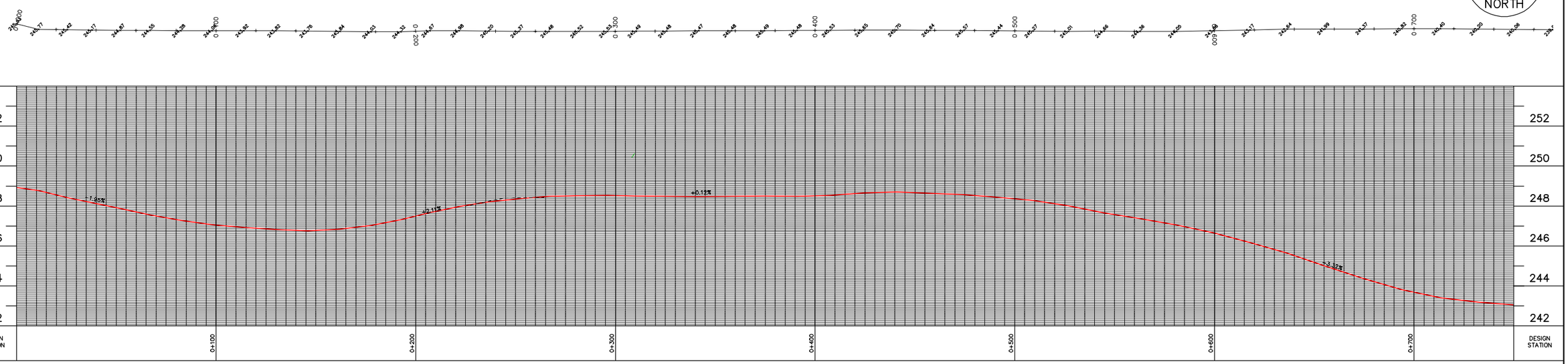
* Shoulder failure & pothole @ 524604 - Marked with orange cone.

2.0 Criteria Review

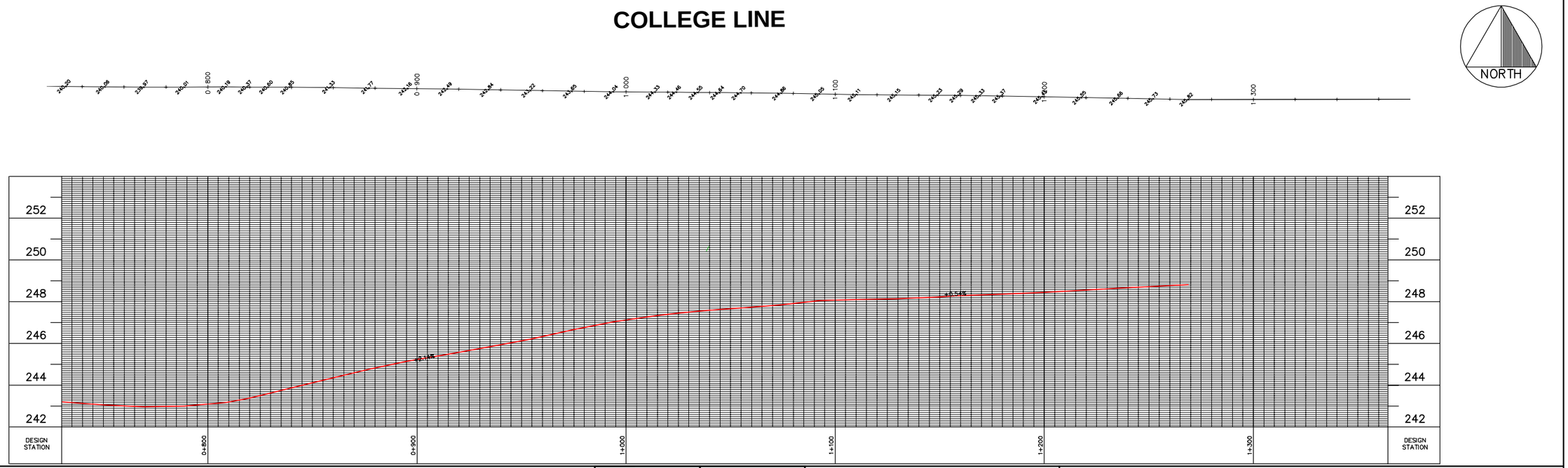
Road Name: *College Line*	Study Section: *Carter Road to Springer Hill Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.00 km*
Posted Speed: ~~80km/h~~ 60km/h	AADT: *381 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: ~~3.5~~ n x 2 = 7.2m - Shoulder(s): ~~1.5~~ n wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.5 1.5 OK OK	
	Surface Treatment	- Comment on surface treatment	Shoulder ravelling in areas.	Shoulder condition.
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	Krest K 24 @ Sta 13+100	Krest fail.
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	College Line / Carter Road - Intersection control: - Stopping sight distance: 155-210m	Through Street. Sight lines, stopping distance OK.	
	List of intersections within project limits	College Line / Springer Hill Road - Intersection control: - Stopping sight distance: 155-210m	Stop sign. ↔ Warning sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	Embankment @ R.W. OK.	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line. R.W. crossing, R.W. markings on road, Signalled R.W. crossing. 60km/h posted speed.	

COLLEGE LINE



COLLEGE LINE



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METRIC SCALE HORIZ 1:2000, VERT. 1:200

No.	REVISION	DATE	BY

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DESIGN BY: CC DJL | DRAWN BY: TWM | CHECKED BY: CC DJL

PROJECT NO. 19031 | SURVEY BY: TPM | DATE: MAR. 2021

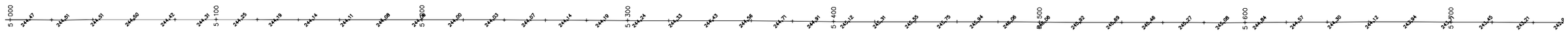
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

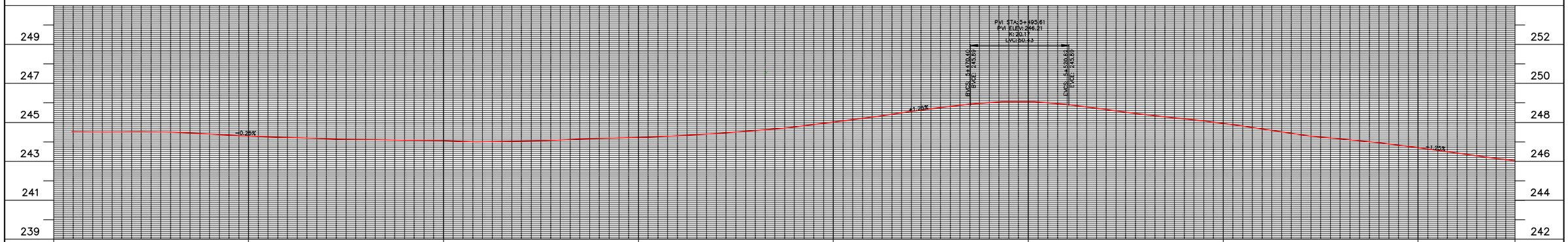
COLLEGE LINE
STA 0+000 TO STA 1+300

DRAWING No. 19

NORTH

COLLEGE LINE





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METRIC SCALE HORIZ 1:2000, VERT. 1:200

No.	REVISION	DATE	BY

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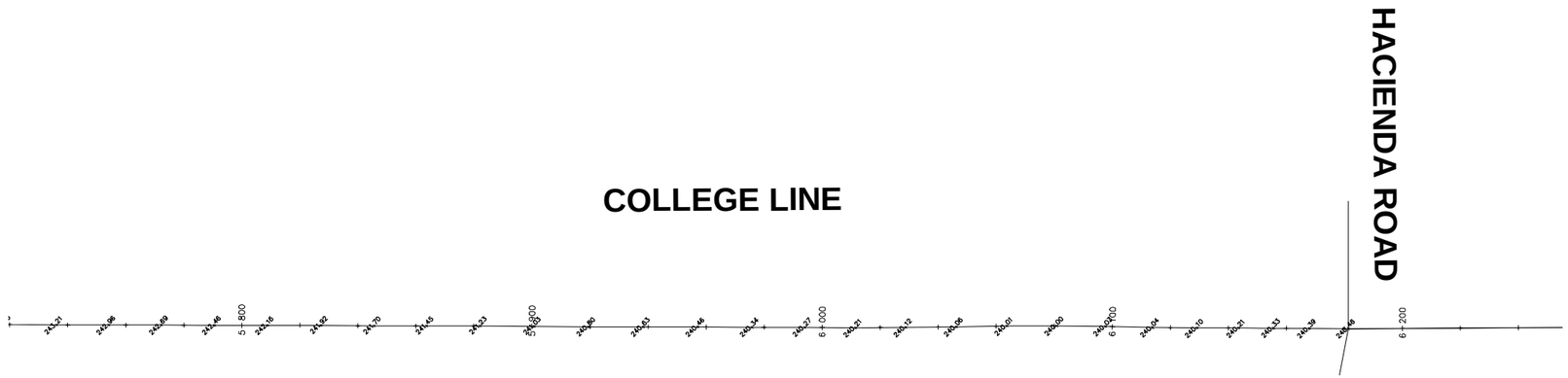
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

COLLEGE LINE
STA 5+000 TO STA 5+750

DRAWING No. **20**

COLLEGE LINE



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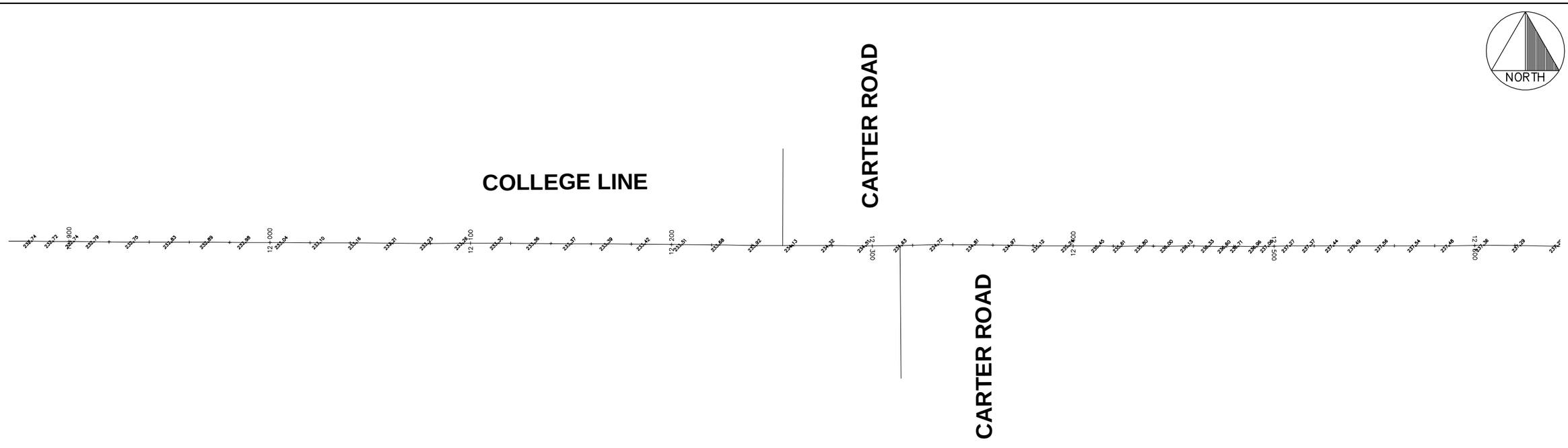
ROAD SAFETY AUDIT – PHASE 2
COLLEGE LINE
STA 5+730 TO STA 6+200

DRAWING No. **21**



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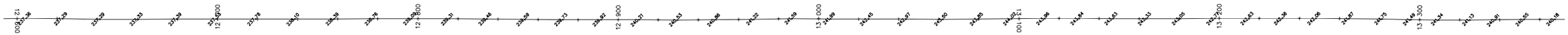
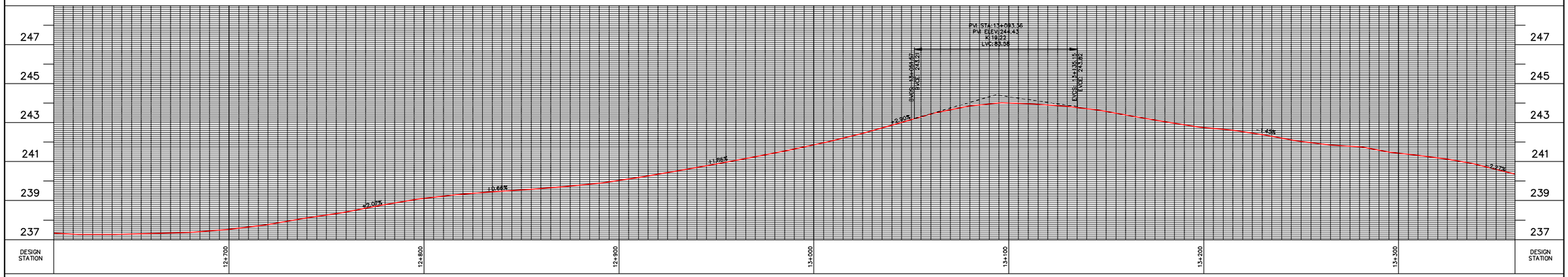
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

COLLEGE LINE
STA 11+900 TO STA 12+630

DRAWING No. 22

COLLEGE LINE





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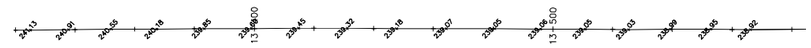

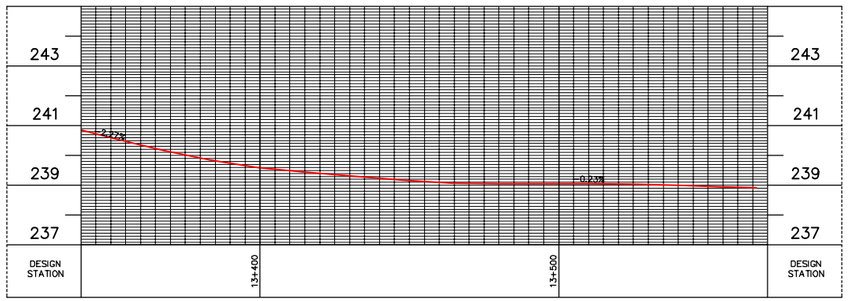

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TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
COLLEGE LINE
STA 12+630 TO STA 13+570

DRAWING No. 23

Conservation Line
Springwater Road to Imperial Road

- Criteria Review Sheets
- Embankment Protection Warrant Guide
- Centreline Profile Drawings (24-25)

2.0 Criteria Review

Road Name: *Conservation Line*	Study Section: *Springwater Road to Rogers Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.06 km*
Posted Speed: *50km/h*	AADT: *314 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

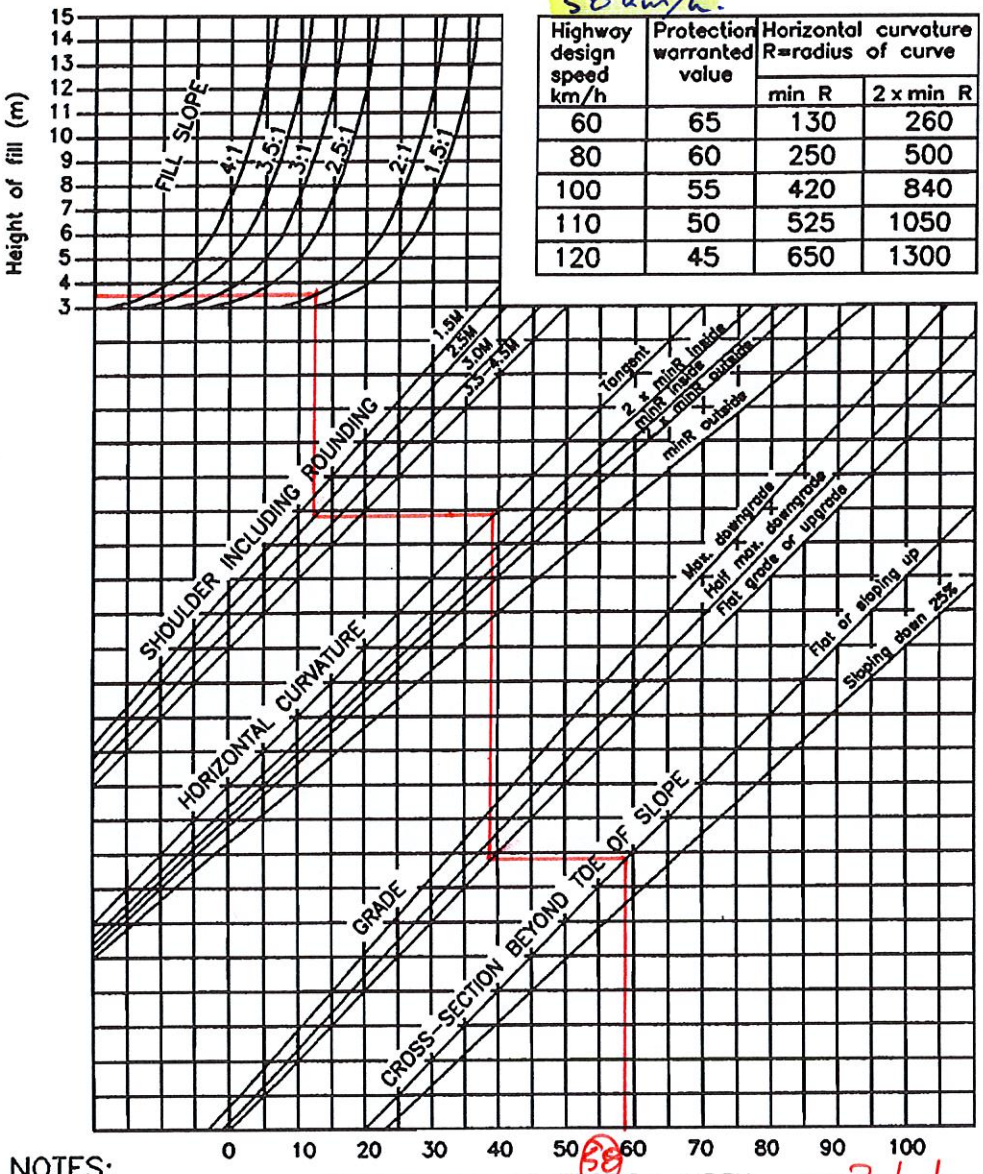
Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.3 1.5 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Lower Catfish 2	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **8-12%** -Vertical curve 'K' value	OK.	
	Horizontal Alignment	- Minimum design radius: **100 to 80m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **160-350m**	OK	
	Decision Sight Distance	- Min decision sight distance: **75-145m**	OK	
Intersections	List of intersections within project limits	Conservation Line / Springwater Road - Intersection control: - Stopping sight distance: **60-110m**	Stop sign. ↔ Warning sign. Stopping distance, sight lines OK.	
	List of intersections within project limits	Conservation Line / Rogers Road - Intersection control: - Stopping sight distance: **60-110m**	Stop sign. Stop sign ahead. 4-way stop. Stopping distance, sight lines OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	Embankment Warrant Guide OK. x2.	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK	
Visual Aids		- Line painting: - Signage?	Share the road (Cycling) Solid yellow line.	

Conservation Line
West of Mun. 48 110
April 2, 2020

50 km/h.

Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300

H = 3.5m
Shoulder = 2.5m
Slope = 2:1



OK.
< Protection Warranted Value
∴ No Protection Recommended.

NOTES:

1 Guide rail is not required for:
Undivided Hwys
–On fill heights less than 3 metres.
–Slopes 3:1 or flatter.

Divided Hwys
–On fill heights less than 2 metres.
–Slopes 4:1 or flatter.

2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

FIGURE 2.5.1 Embankment Warrant Guide

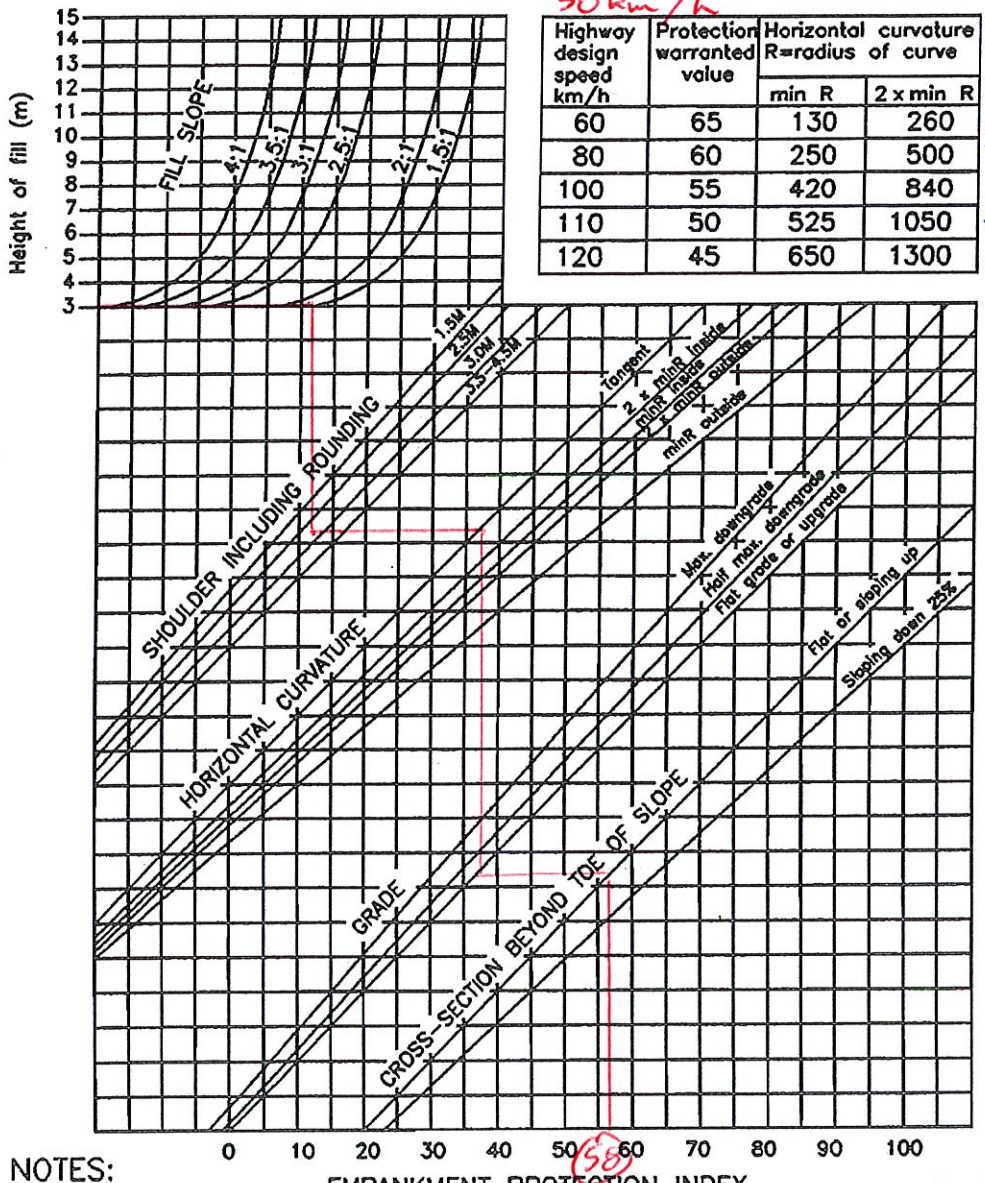
Conservation Line
East of Mun No 47719.

May 7.2021

50km/h

Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300

H = 2.3m
Shoulder = 2.8
Slope = 1.75:1



EMBANKMENT PROTECTION WARRANT GUIDE

Height = 3m
Index = 65.
∴ No protection required.

NOTES:

1 Guide rail is not required for:

Undivided Hwys
–On fill heights less than 3 metres.
–Slopes 3:1 or flatter.

Divided Hwys
–On fill heights less than 2 metres.
–Slopes 4:1 or flatter.

2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

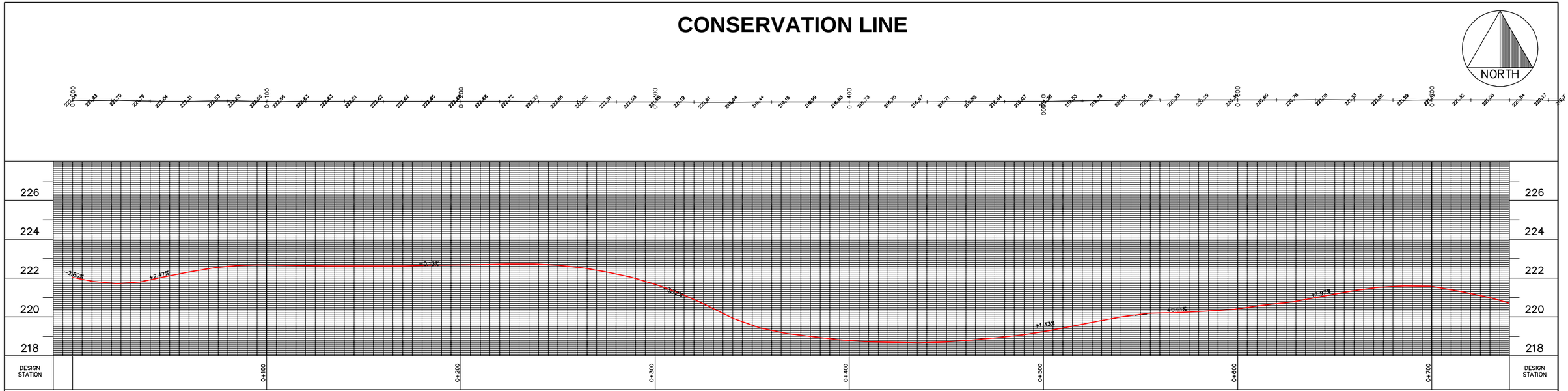
FIGURE 2.5.1 Embankment Warrant Guide

2.0 Criteria Review

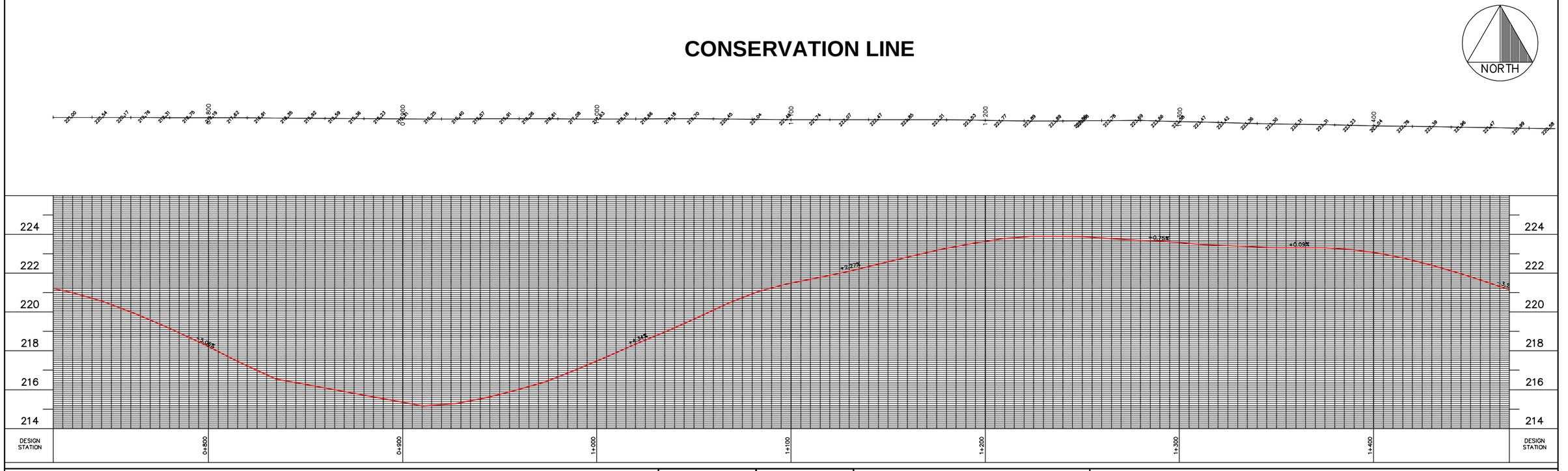
Road Name: *Conservation Line*	Study Section: *Rogers Road to Imperial Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.06 km*
Posted Speed: *80km/h*	AADT: *408 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.5 1.5 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Lee Drain 2006	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Conservation Line / Rogers Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Stop sign ahead. 4-way stop. Sight lines & stopping distance OK.	
	List of intersections within project limits	Conservation Line / Imperial Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culvert @ Lee Drain. East embankment steeper than 4:1 deeper than 0.75m. Within Clear zone.	Protection Required on east side.
Visual Aids		- Line painting: - Signage?	Solid yellow line.	

CONSERVATION LINE



CONSERVATION LINE



METRIC SCALE HORIZ 1:2000, VERT. 1:200

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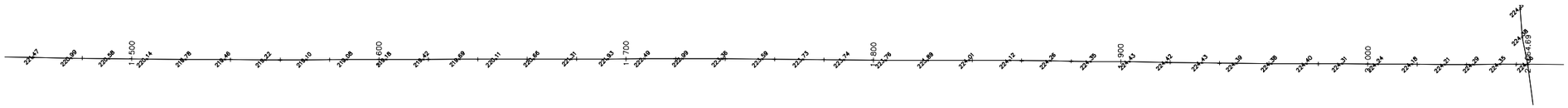
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

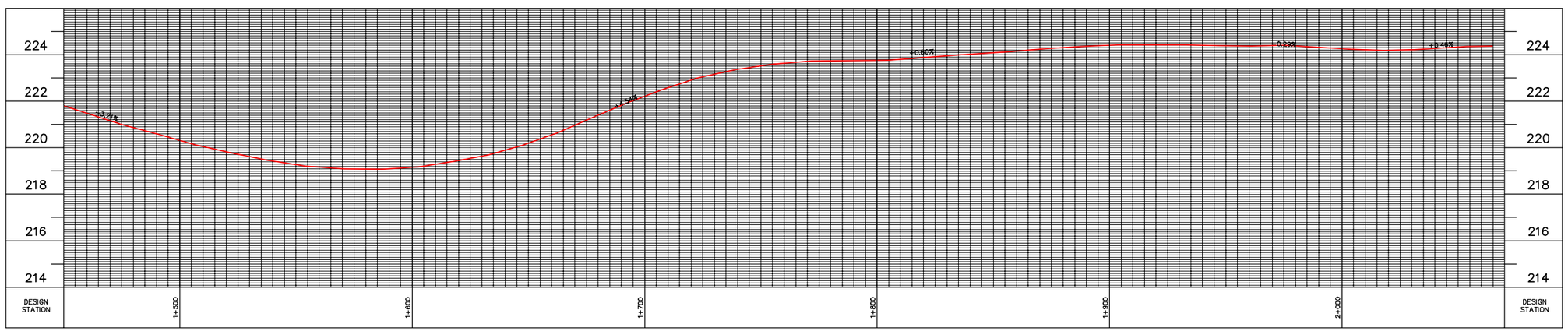
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

CONSERVATION LINE
STA 0+000 TO STA 1+480

DRAWING No. 24

CONSERVATION LINE





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METRIC SCALE HORIZ 1:2000, VERT. 1:200

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TOWNSHIP OF MALAHIDE
ROAD SAFETY AUDIT – PHASE 2
CONSERVATION LINE
STA 1+460 TO STA 2+070

DRAWING No. 25

Dingle Street

Aylmer Town Limit to Springfield Road

- Criteria Review Sheets
- Site Photographs
- Centreline Profile Drawings (26-30)

2.0 Criteria Review

Road Name: *Dingle Street*	Study Section: *Aylmer Town Limit to Hacienda Road*
Direction of Travel: *East to West*	Total Distance Analysed: *1.32 km*
Posted Speed: *50km/h*	AADT: *802 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.2 1.5 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Lower Catfish 2	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **8-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **100 to 80m** - Maximum super elevation: **4-8%** (TAC, 1999)	R= 107 to 133m. OK.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **160-350m**	OK	
	Decision Sight Distance	- Min decision sight distance: **75-145m**	OK	
Intersections	List of intersections within project limits	Dingle Street / Hacienda Road - Intersection control: - Stopping sight distance: **60-110m**	Stop sign. Stop sign ahead. sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) **3m** (MTO, 2020) **3.5m** (excluding cut or fill slopes)	Hydro poles in clear zone	HP# ② 49894 & 49908
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK	
Visual Aids		- Line painting: - Signage?	"Share the road" sign. Solid yellow line,	

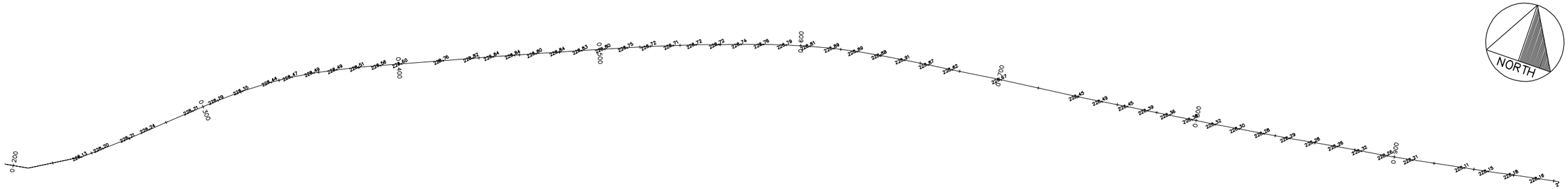
2.0 Criteria Review

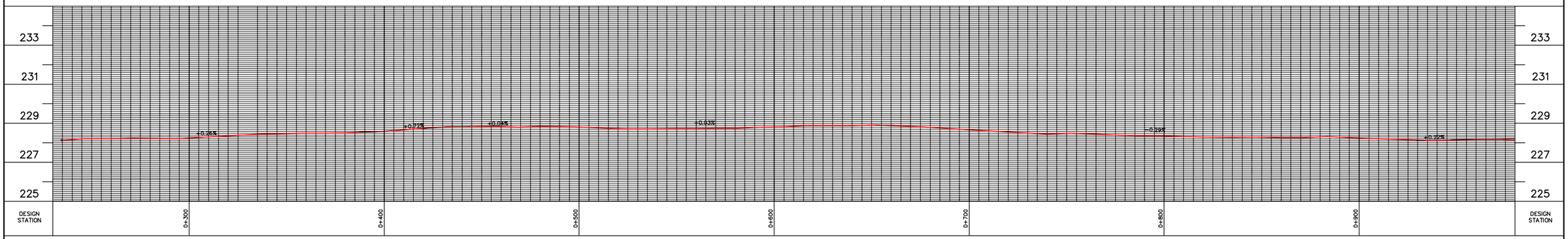
Road Name: *Dingle Line*	Study Section: Hacienda Road to Springfield Road.
Direction of Travel: *East to West*	Total Distance Analysed: *2.42 km*
Posted Speed: *60km/h*	AADT: *133 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	6.0m 1.0m OK OK.	Width.
	Surface Treatment	- Comment on surface treatment	Shoulder ravelling on south side of bridge.	Shoulder condition.
	Drainage	- Roadside swales? - Municipal Drains: Teeple Drain, Catfish Creek, Staley Drain (x2), GA Summers Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **150 to 120m** - Maximum super elevation: **4-8%** (TAC, 1999)	R= 34 to 73m. 30km/h speed reduction. Curve warning signs in both directions. OK.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **200-410m**	OK	
	Decision Sight Distance	- Min decision sight distance: **95-175m**	OK.	
Intersections	List of intersections within project limits	Dingle Line / Hacienda Road. - Intersection contr - Stopping sight distance: **75-130m**	Stop sign. stopping distance, sight lines OK.	
	List of intersections within project limits	Dingle Line / Springfield Road. - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	Hydropoles in clear zone.	HP @ 50144
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Bridge w/ guard rails, OK.	
Visual Aids		- Line painting: - Signage?	Solid yellow line. Hazard sign on one of the HP's in clear zone. 60 km/h posted speed.	

Dingle Street - Hazard sign blocked by vegetation

DINGLE STREET





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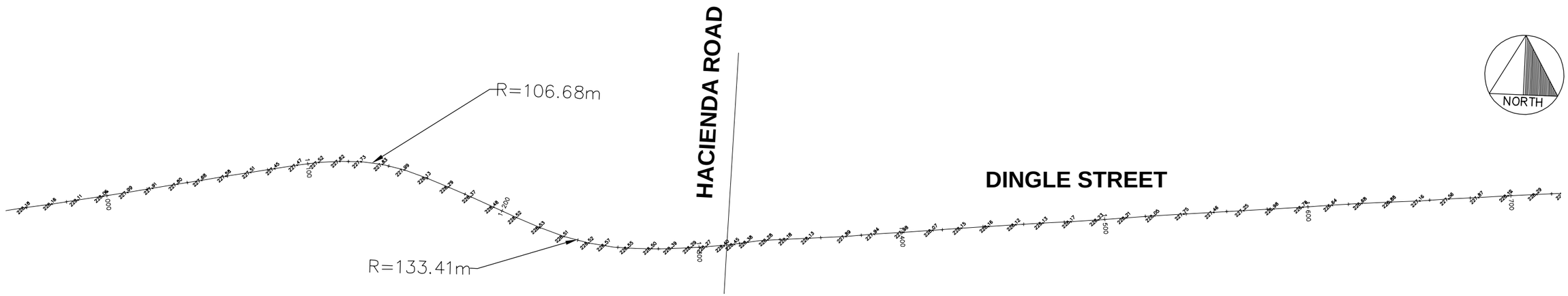
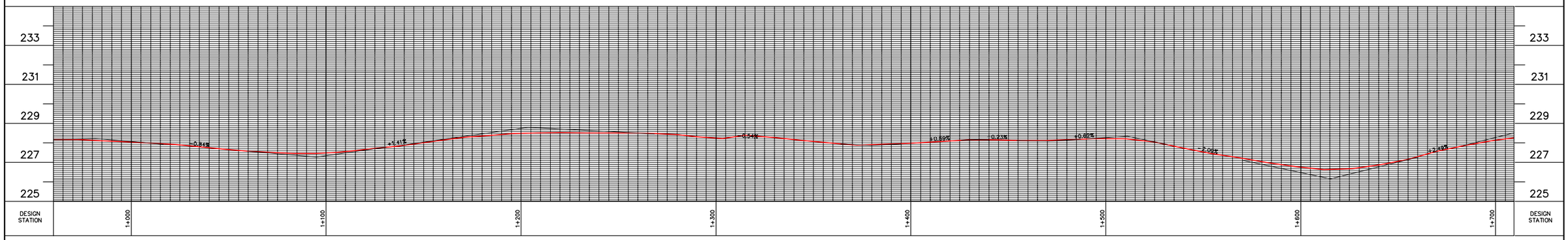
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
DINGLE STREET
STA 0+230 TO STA 0+980

DRAWING No. **26**





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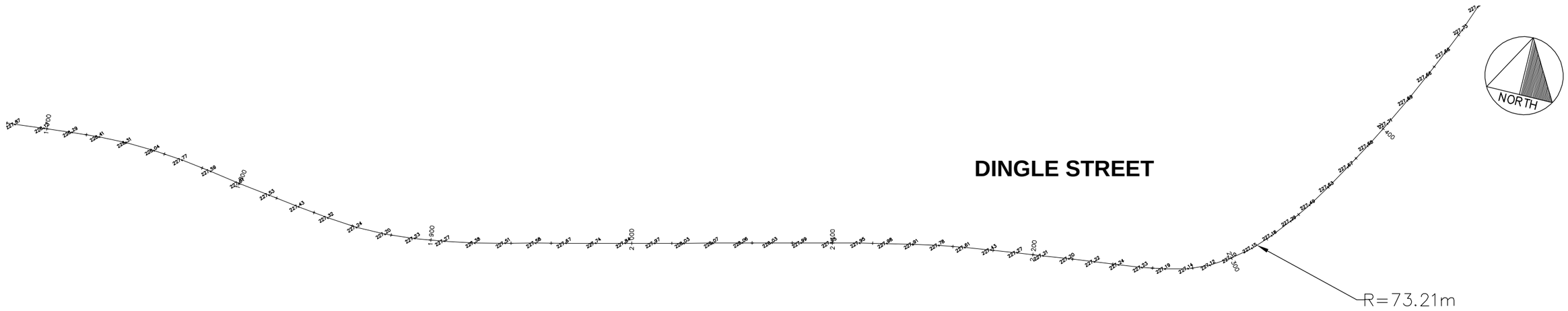
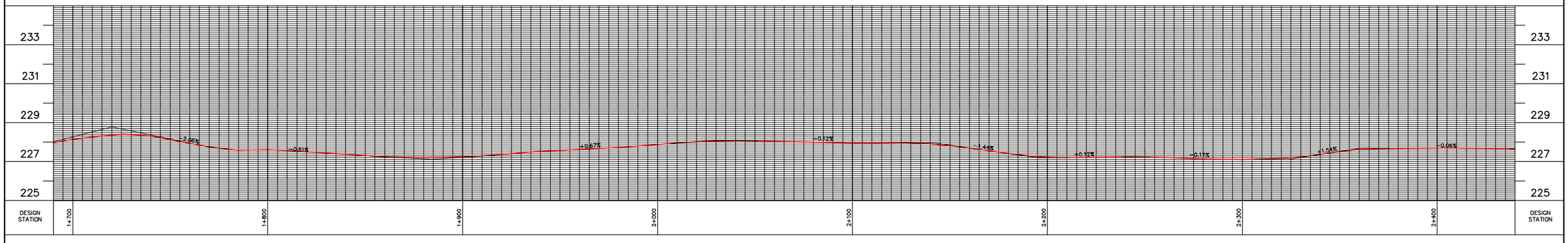
ROAD SAFETY AUDIT – PHASE 2

DINGLE STREET

STA 0+960 TO STA 1+710

DRAWING No. **27**





C. CLUETT 100214735 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

D.J. LYLE 100174772 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

METRIC SCALE HORIZ 1:2000, VERT. 1:200

No.	REVISION	DATE	BY

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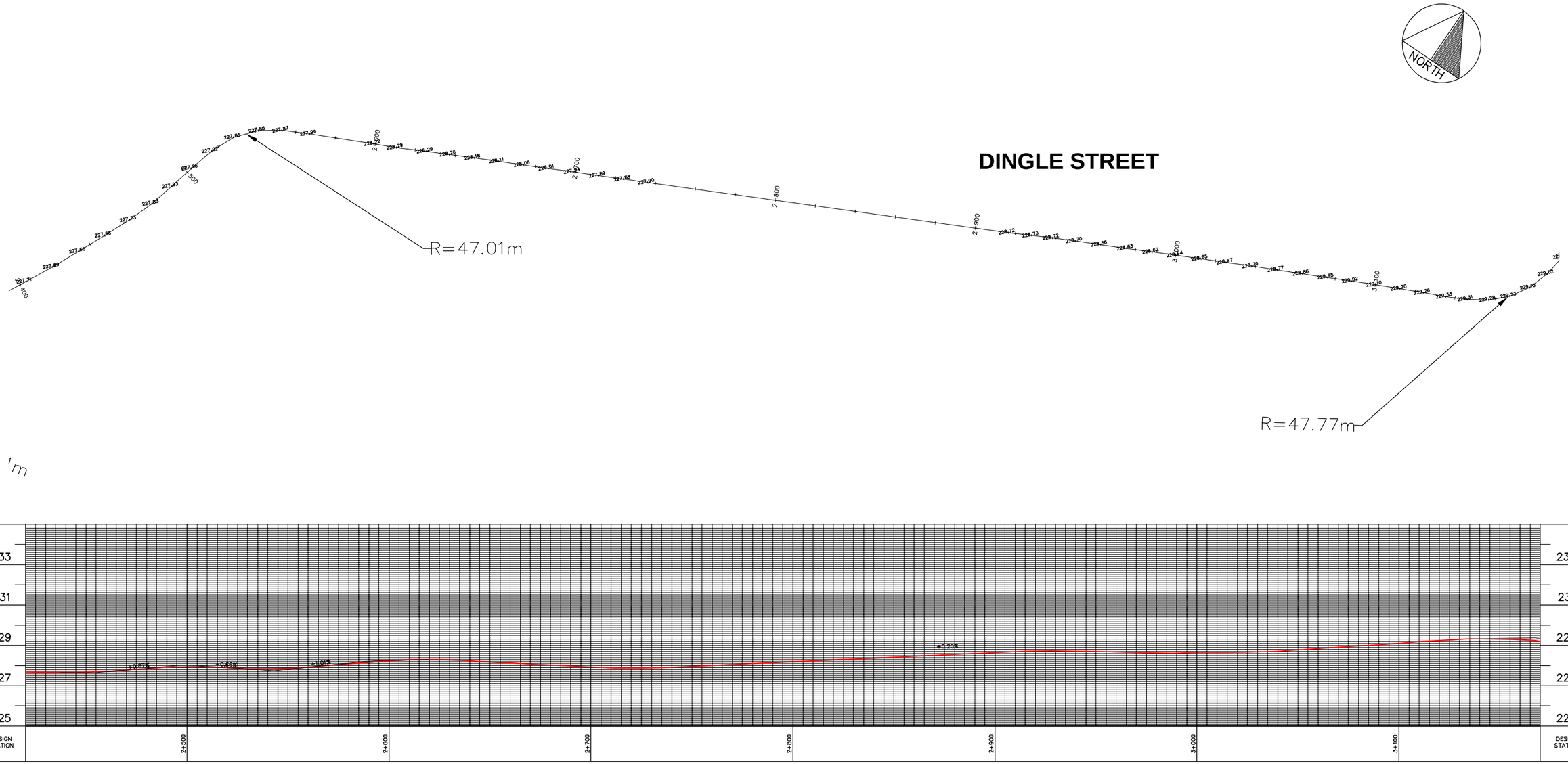
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
DINGLE STREET
STA 1+690 TO STA 2+440

DRAWING No. **28**



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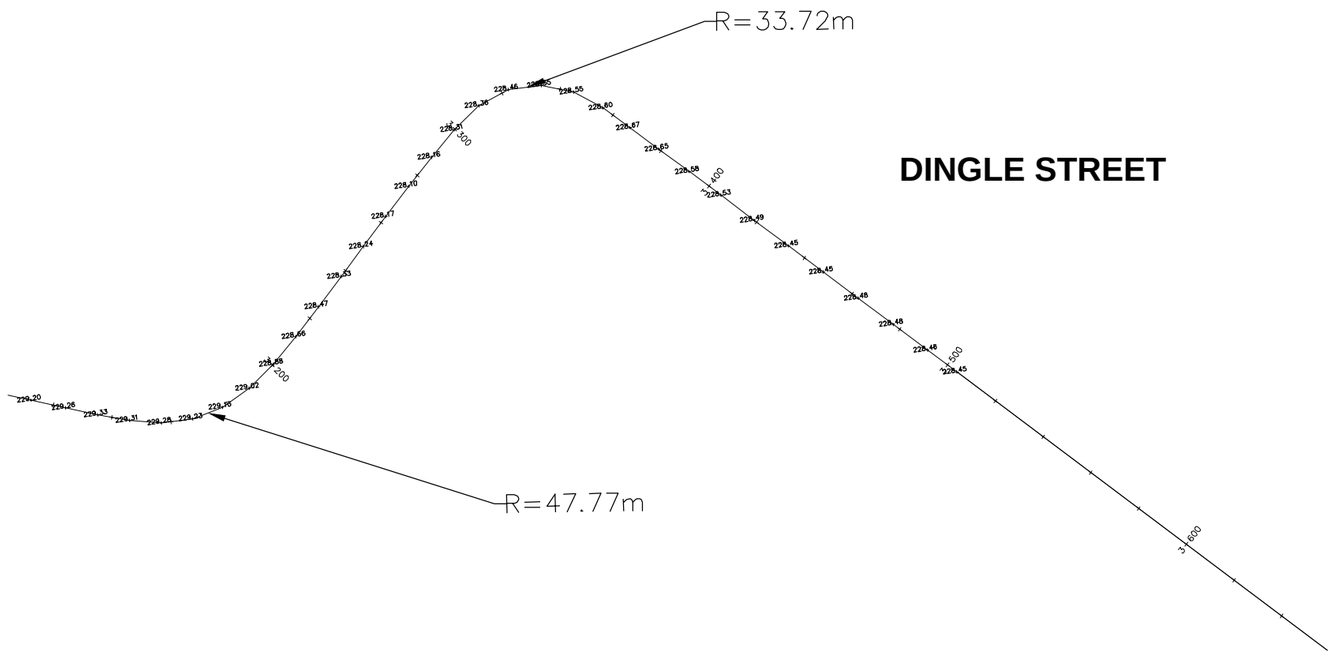
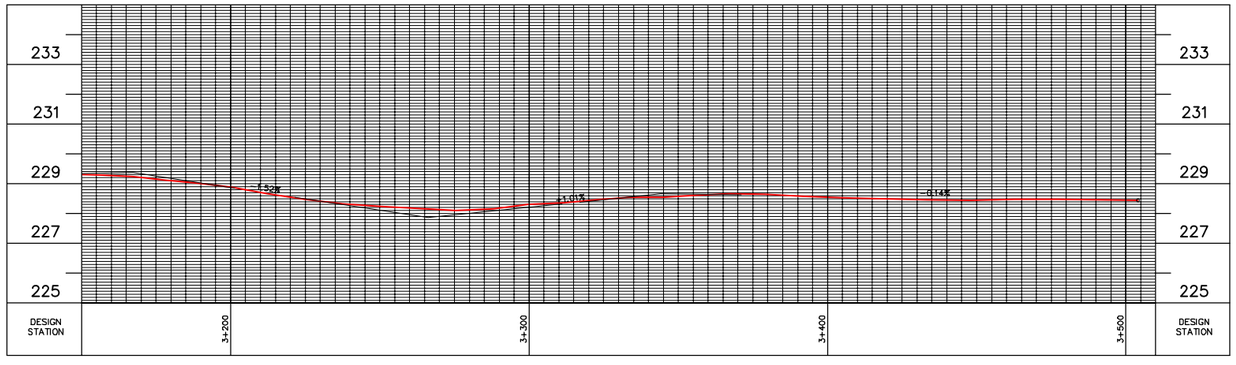
ROAD SAFETY AUDIT – PHASE 2

DINGLE STREET

STA 2+420 TO STA 3+150

DRAWING No. **29**





METRIC SCALE HORIZ 1:2000, VERT. 1:200

No.	REVISION	DATE	BY

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TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

DINGLE STREET
STA 3+150 TO STA 3+310

DRAWING No. **30**

Dorchester Road
College Line to Ron McNeil Line

- Criteria Review Sheet

2.0 Criteria Review

Road Name: *Dorchester Road*	Study Section: *College Line Ron McNeil Line*
Direction of Travel: *North to South*	Total Distance Analysed: *0.4 km*
Posted Speed: *80km/h*	AADT: *178 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: May 7, 2021

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.48m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.5 2-0 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: N/A	OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Dorchester Road / College Line - Intersection control: - Stopping sight distance: **75-130m**	Stopping Distance, Sight lines OK. Stop sign. ⟷ Warning Sign	
	List of intersections within project limits	Dorchester Road / Ron McNeil Line - Intersection control: - Stopping sight distance: **75-130m**	Stop Sign. Stopping Distance, sight lines OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3.5m** (excluding cut or fill slopes)	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow centreline	

Glencolin Line
Springwater Road to Springfield Road

- Criteria Review Sheets
- Site Photographs
- Centreline Profile Drawings (31-35)

2.0 Criteria Review

Road Name: *Glencolin Line*	Study Section: *Springwater Road to Rogers Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.07 km*
Posted Speed: *80km/h*	AADT: *1011 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.2m 2.5m OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Snelgrove Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	OK. Adequate signage @ horizontal curves.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Glencolin Line / Springwater Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ↔ Warning sign. Stopping distance, sight lines OK.	
	List of intersections within project limits	Glencolin Line / Rogers Road - Intersection control: - Stopping sight distance: **155-210m**	Through St. Sight lines > stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 5m	Hydropoles in clear zone @ Mun No 48102. 1 on south side, row of poles on the north	Hydropoles
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A 1 on south side @ Mun No. 48265 Row of poles on south side @ Rogers Rd	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culverts OK	
Visual Aids		- Line painting: - Signage?	"Share the road" Solid yellow line, Dashed yellow line.	

2.0 Criteria Review

Road Name: *Glencolin Line*	Study Section: *Rogers Road to Imperial Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.05 km*
Posted Speed: *80km/h*	AADT: *1424 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.2 2.6 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment - OK.	
	Drainage	- Roadside swales? - Municipal Drains: Skinner Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Glencolin Line / Rogers Road - Intersection control: - Stopping sight distance: **155-210m**	Through St. Stopping distance, sight lines OK.	
	List of intersections within project limits	Glencolin Line / Imperial Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Stopping distance, sight lines OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **(MTO, 1993) 4m** (excluding cut or fill slopes) **(MTO, 2020) 5m**	Hydro pole on north side @ Mun 48813	Hydro pole
	Embankments	- Slope? - Height? - Protection required? Limits?	OK	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Hazard signs @ unprotected culvert crossing. Mun No 49145	
Visual Aids		- Line painting: - Signage?	Share the road. Deaf Child in area. Solid & Dashed yellow lines.	

10m length
0.9m shoulder
4:1 embankment
1.8-2m vertical drop

2.0 Criteria Review

Road Name: *Glencolin Line*	Study Section: *Hacienda Road to Springfield Road (south leg)*
Direction of Travel: *East to West*	Total Distance Analysed: *2.06 km*
Posted Speed: ~~80km/h~~ 60km/hr	AADT: *1140 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.5m × 2 = 7.2m - Shoulder(s): 1.5 m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.5 2.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Upper Catfish 2	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	Glencolin Line / Hacienda Road - Intersection control: - Stopping sight distance: 155-210m	Stop sign. stopping distance, sight lines OK.	
	List of intersections within project limits	Glencolin Line / Springfield Road - Intersection control: - Stopping sight distance: 155-210m	Through Street. Stopping distance, sight lines OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) ~~3~~ 5m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	Culvert @ Sta 0+727. Less than 3.0m high. South side ditch slopes flatter than 4:1. North side steeper.	Protection @ North side on flatter ditch slopes.
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Bridge @ Springfield Road. Guard rails & hazard signs. OK	
Visual Aids		- Line painting: - Signage?	Railway Crossing RW crossing markers on road. Double solid line @ bridge Signalled RW crossing. Solid white lines on shoulders 60 km/h posted speed	

2.0 Criteria Review

Road Name: *Glencolin Line*	Study Section: *Springfield Road (south leg) to Walker Road*
Direction of Travel: *East to West*	Total Distance Analysed: *1.95 km*
Posted Speed: ~~*80km/h*~~ 60 km/hr	AADT: *646 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.5 m x 2 = 7.2m - Shoulder(s): 1.5 m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.3 2.1 OK OK	-
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Eggleton Drain, Pound Drain, St. Claire Drain, Catfish Creek Municipal Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	Glencolin Line / Springfield Road - Intersection control: - Stopping sight distance: 155-210m	Through St. Sight lines, stopping distance OK.	
	List of intersections within project limits	Glencolin Line / Walker Road - Intersection control: - Stopping sight distance: 155-210m	Through St. Sight lines & stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 30m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Cycling, horses keep right. Share the road. Solid yellow line. Railway Crossing ahead. 60 km/h posted speed	

2.0 Criteria Review

Road Name: *Glencolin Line*	Study Section: *Walker Road to Carter Road (south leg)*
Direction of Travel: *East to West*	Total Distance Analysed: *2.06 km*
Posted Speed: ~~*80km/h*~~ 60 km/hr	AADT: *532 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.5 m x 2 = 7.2m - Shoulder(s): 1.5 m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.3 2.1 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment. OK	
	Drainage	- Roadside swales? - Municipal Drains: St. Claire Drain (x2)	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK.	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	Glencolin Line / Walker Road - Intersection control: - Stopping sight distance: 155-210m	Through Street. Sight lines, Stopping distance OK.	
	List of intersections within project limits	Glencolin Line / Carter Road - Intersection control: - Stopping sight distance: 155-210m	Through street. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.0m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culvert OK.	
Visual Aids		- Line painting: - Signage?	Cycling, horses keep right. Share the road. School zone. Faded Pedestrian sign 60 km/h posted speed.	Faded sign @ Mun. No. 52313.

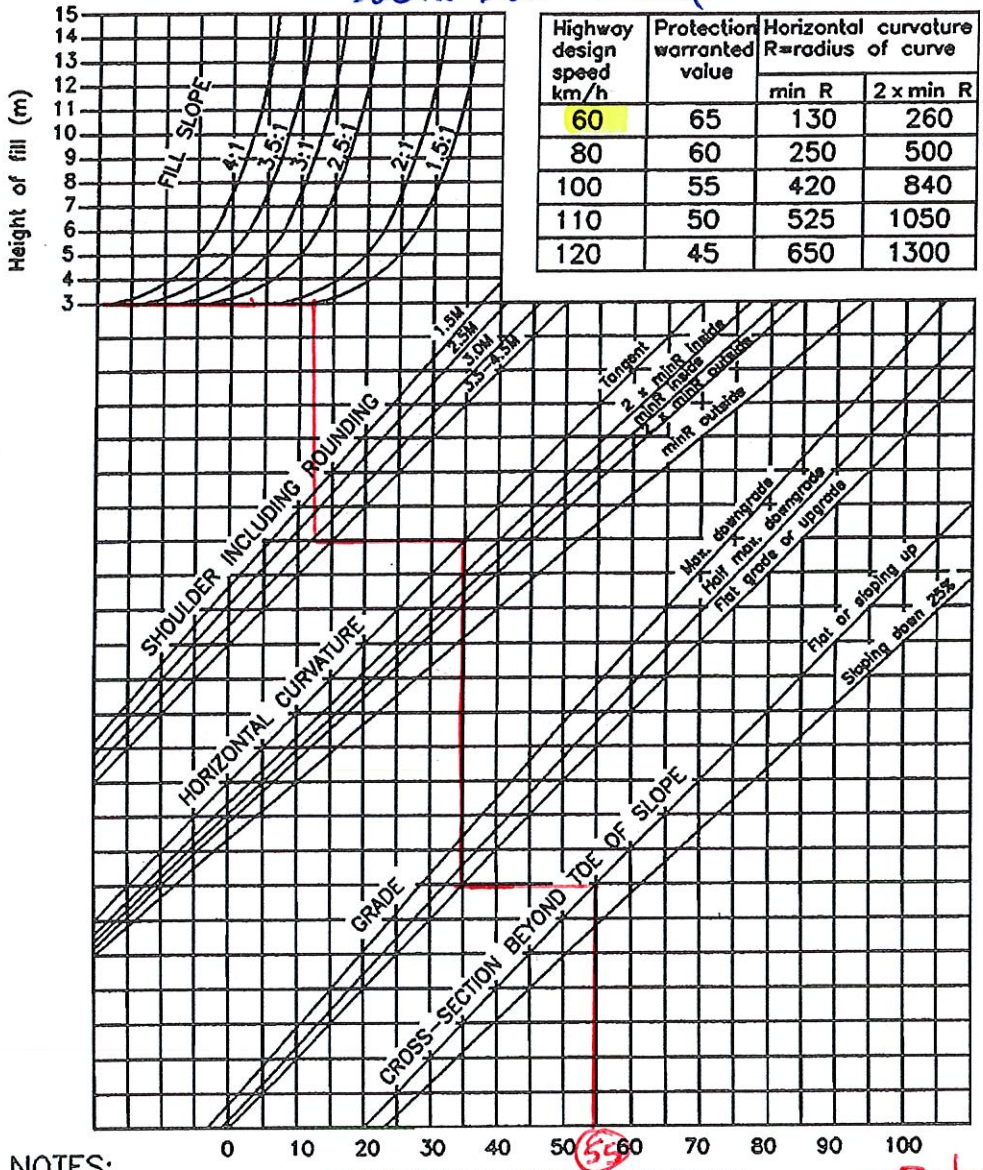
2.0 Criteria Review

Road Name: *Glencolin Line*	Study Section: *Carter Road (south leg) to Springer Hill Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.00 km*
Posted Speed: ~~80km/h~~ 60 km/hr	AADT: *361 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.5m x 2 = 7.2m - Shoulder(s): 1.5m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.5 2.1 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Patton Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	Glencolin Line / Carter Road - Intersection control: - Stopping sight distance: 155-210m	Through St. Sight lines & stopping distance OK.	
	List of intersections within project limits	Glencolin Line / Springer Hill Road - Intersection control: - Stopping sight distance: 155-210m	Stop sign. ↔ Warning sign. Stopping distance OK. 95m sight line for southbound Springer Hill traffic. "Intersection ahead" sign present for Springer Hill Road OK	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.0m		
	Embankments	- Slope? - Height? - Protection required? Limits?	OK.	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Unprotected culvert crossing, 1.8m vertical drop. OK.	
Visual Aids		- Line painting: - Signage?	Cycling & horses keep right Horse & buggy sign. Pedestrian sign. Solid White line on shoulder. Solid yellow line. 60km/h posted speed.	

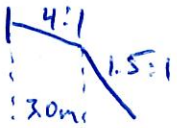
Glencolin Line
near Hwy No. 53042, Culvert Crossing.
South side of road.

May 7, 2021



Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300

H = 3.0m
Shoulder = 3.0m
Slope = 4:1 to 1.5:1



EMBANKMENT PROTECTION WARRANT GUIDE

NOTES:

1 Guide rail is not required for:
Undivided Hwys
–On fill heights less than 3 metres.
–Slopes 3:1 or flatter.

Divided Hwys
–On fill heights less than 2 metres.
–Slopes 4:1 or flatter.

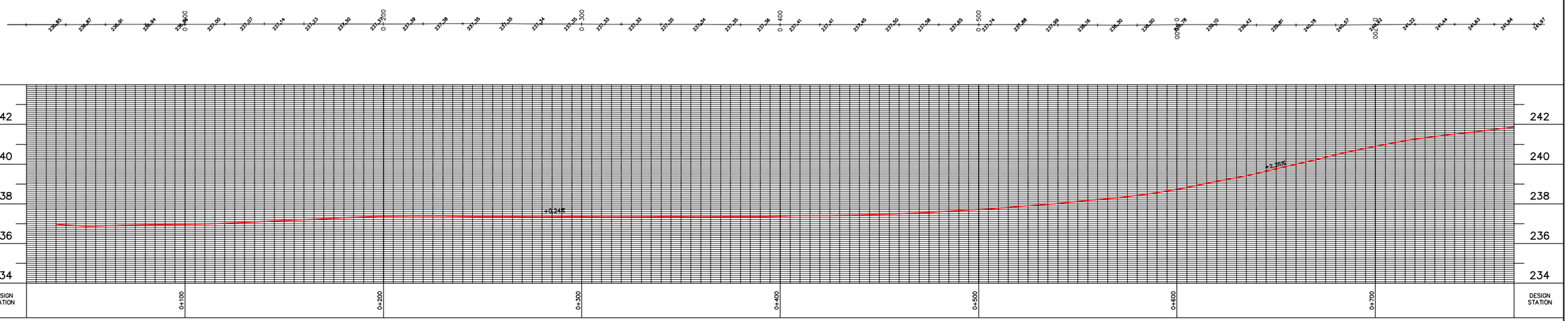
2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

< Protection Warranted Value
∴ No protection required.

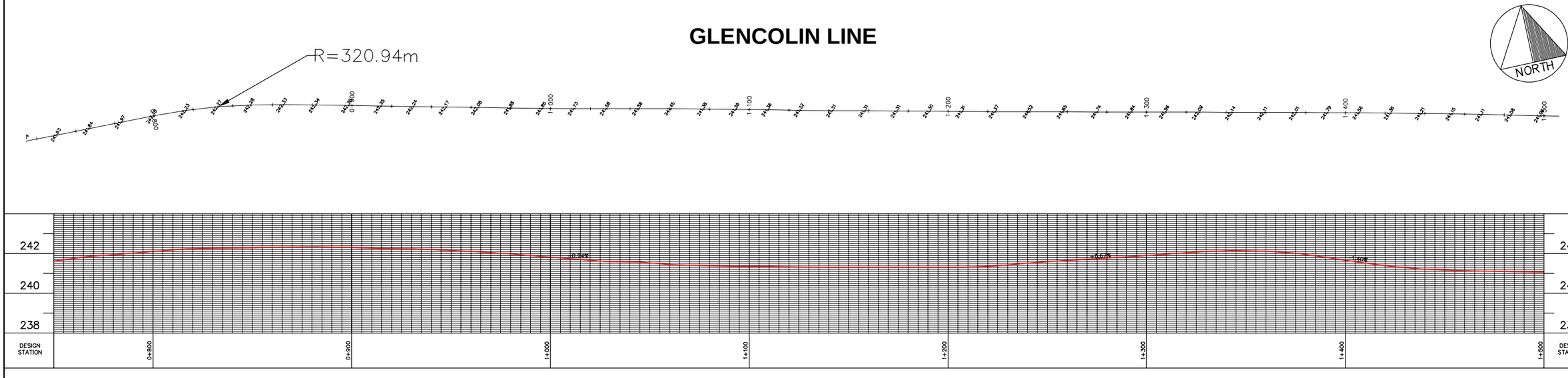
FIGURE 2.5.1 Embankment Warrant Guide

Faded pedestrian sign at 52313 Glencolin Line

GLENCOLIN LINE



GLENCOLIN LINE



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TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
GLENCOLIN LINE
STA 0+020 TO STA 1+500

DRAWING No. 31

GLENCOLIN LINE

ROGERS ROAD

METRIC SCALE HORIZ 1:2000, VERT. 1:200

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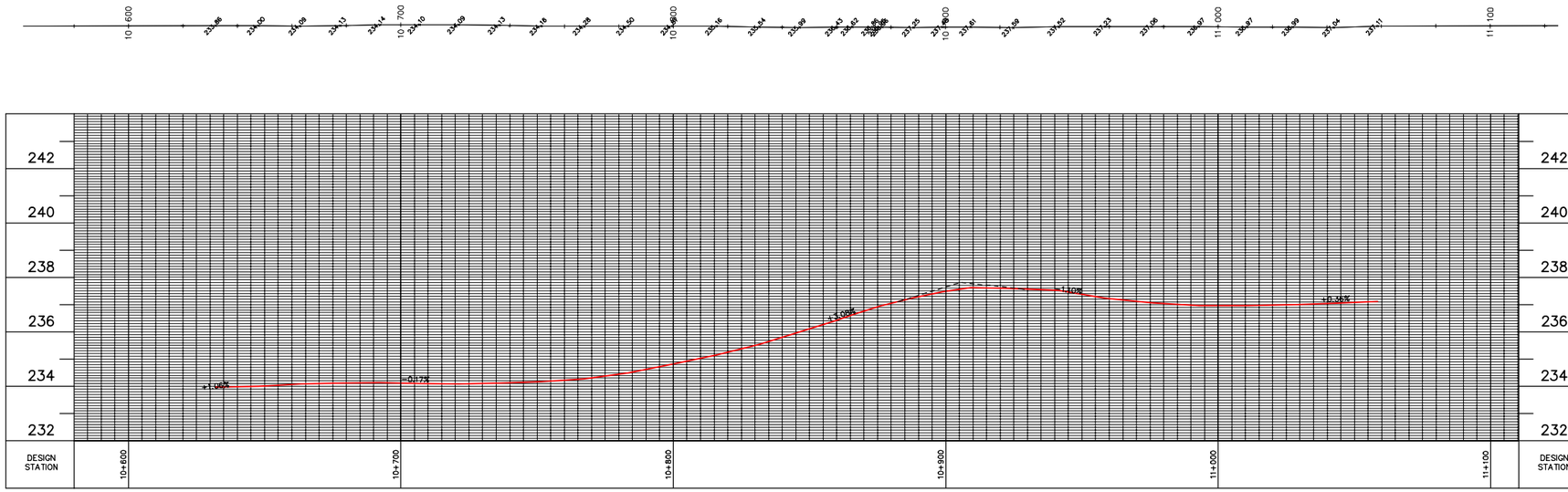
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

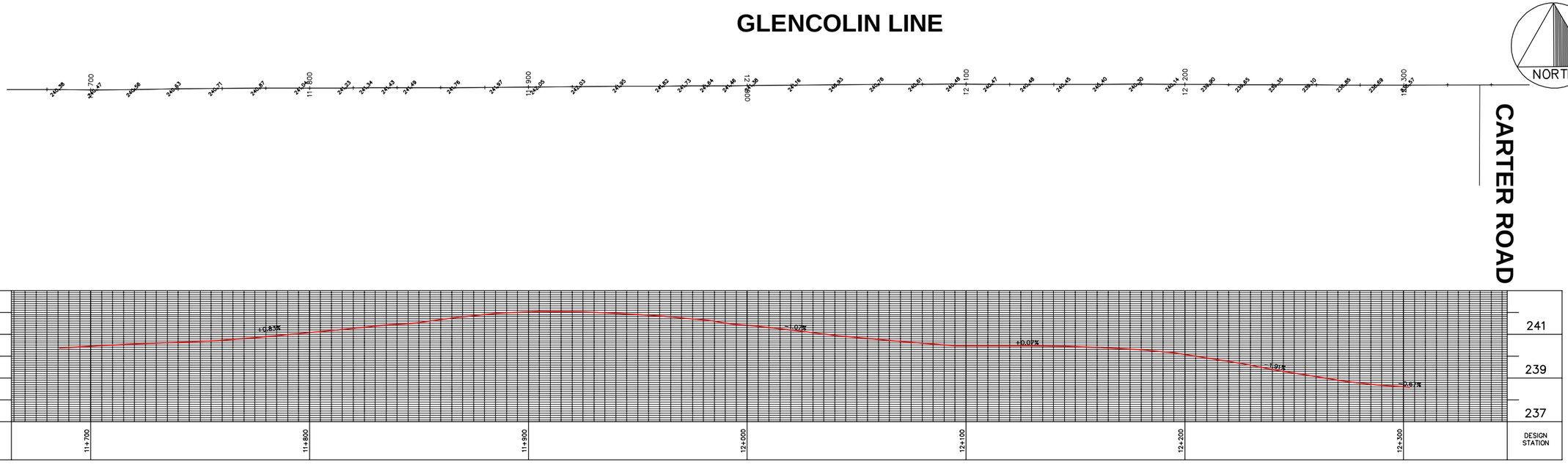
GLENCOLIN LINE
STA 1+480 TO STA 2+100

DRAWING No. **32**

GLENCOLIN LINE



GLENCOLIN LINE



CARTER ROAD

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METRIC SCALE HORIZ 1:2000, VERT. 1:200

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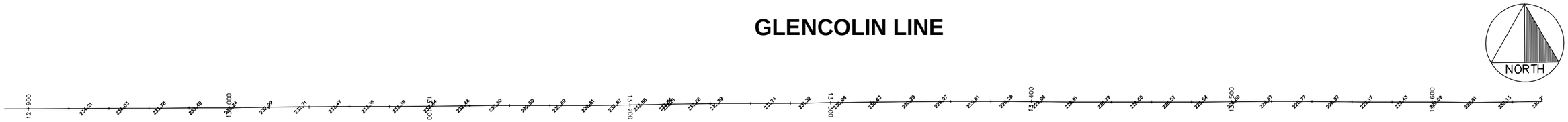
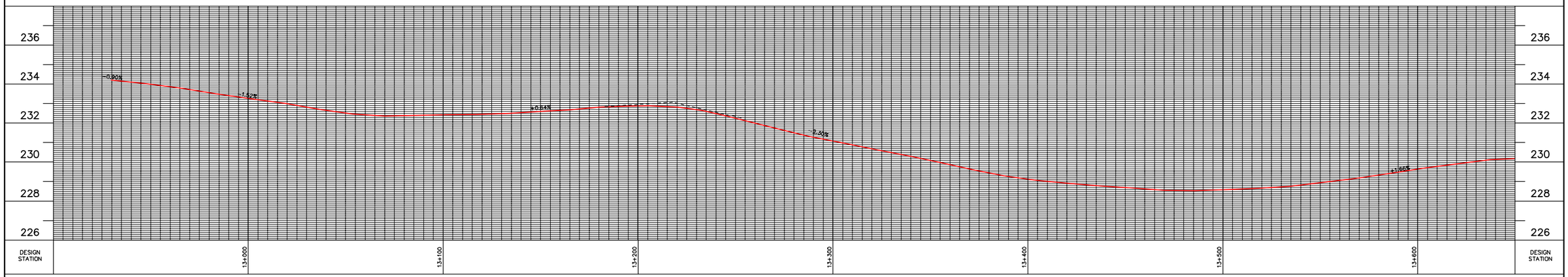
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
GLENCOLIN LINE
STA 10+600 TO STA 12+300

DRAWING No. 33

GLENCOLIN LINE





METRIC SCALE HORIZ 1:2000, VERT. 1:200

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PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

GLENCOLIN LINE

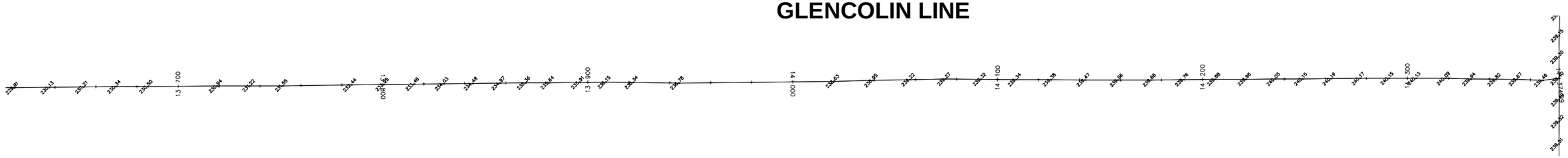
STA 12+900 TO STA 13+650

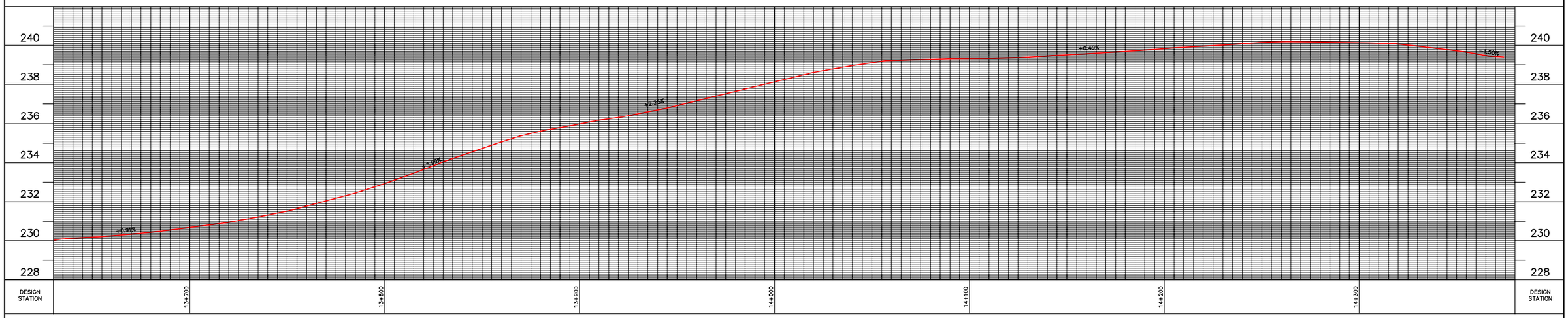
DRAWING No. **34**

NORTH

GLENCOLIN LINE

SPRINGER HILL ROAD





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TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

GLENCOLIN LINE

STA 13+630 TO STA 14+380

DRAWING No. **35**

Hacienda Road

John Wise Line to Glencolin Line

- Criteria Review Sheets
- Centreline Profile Drawings (36-39)

2.0 Criteria Review

Road Name: *Hacienda Road*	Study Section: *John Wise Line to Van Patter Line*
Direction of Travel: *North to South*	Total Distance Analysed: *1.02 km*
Posted Speed: *80km/h*	AADT: *1040 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.5 2.5 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	K crest < 24 @ Stc 0+600.	K crest fail.
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Hacienda Road / John Wise Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ↔ Warning sign. Stopping distance, sight lines. OK.	
	List of intersections within project limits	Hacienda Road / Van Patter Line - Intersection control: - Stopping sight distance: **155-210m**	Through St. Stopping distance OK. Sight line for left turn to Van Patter width.	Sight line.
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 5m	Hydroplex E & W sides in Ctr.	Hydroplex
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Shave the road. Solid yellow line.	

2.0 Criteria Review

Road Name: *Hacienda Road*	Study Section: *Van Patter Line to Chalet Line*
Direction of Travel: *North to South*	Total Distance Analysed: *1.65 km*
Posted Speed: *80km/h*	AADT: *1106 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x2 = 7.2m** - Shoulder(s): **2.0 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	8.0 2.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK.	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Hacienda Road / Van Patter Line - Intersection control: - Stopping sight distance: **155-210m**	Through St.	Stopping distance Recommend intersection ahead sign for Southbound traffic
	List of intersections within project limits	Hacienda Road / Chalet Line - Intersection control: - Stopping sight distance: **155-210m**	Through street. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 5m	2 of 3 trees on west side, near Hwy 8 in CZ. Hydropoles in CZ	2 trees Hydropoles
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line.	

2.0 Criteria Review

Road Name: *Hacienda Road*	Study Section: *Chalet Line to Bradley Creek Line*
Direction of Travel: *North to South*	Total Distance Analysed: *1.00 km*
Posted Speed: *80km/h*	AADT: *N/A*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	8.0m 2.0m OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Hacienda Road / Chalet Line - Intersection control: - Stopping sight distance: **155-210m**	Through street. Sight lines, stopping distance OK.	
	List of intersections within project limits	Hacienda Road / Bradley Creek Line - Intersection control: - Stopping sight distance: **155-210m**	Through street. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) **4m** (excluding cut or fill slopes) (MTO, 2020) **5m**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Horse-buggy sign. Solid yellow line.	

2.0 Criteria Review

Road Name: *Hacienda Road*	Study Section: *Bradley Creek Line to Talbot Line*
Direction of Travel: *North to South*	Total Distance Analysed: *1.03 km*
Posted Speed: *80km/h*	AADT: *1230 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.8 2.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Hacienda Road / Bradley Creek Line - Intersection control: - Stopping sight distance: **155-210m**	Through Street. Sight lines, stopping distance OK.	
	List of intersections within project limits	Hacienda Road / Talbot Line - Intersection control: - Stopping sight distance: **155-210m**	Stop Sign. Stop sign ahead. stopping distance & sight lines OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) **4m** (excluding cut or fill slopes) (MTO, 2020) **5m**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	Embankment warrant Filled @ pond on east side of road, south of Talbot Line.	Protection Required.
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line. Speed limit posted. Speed limit becomes 60km/h ± 100m of Talbot Line.	

Hacienda Road - South of Talbot Line
East Side

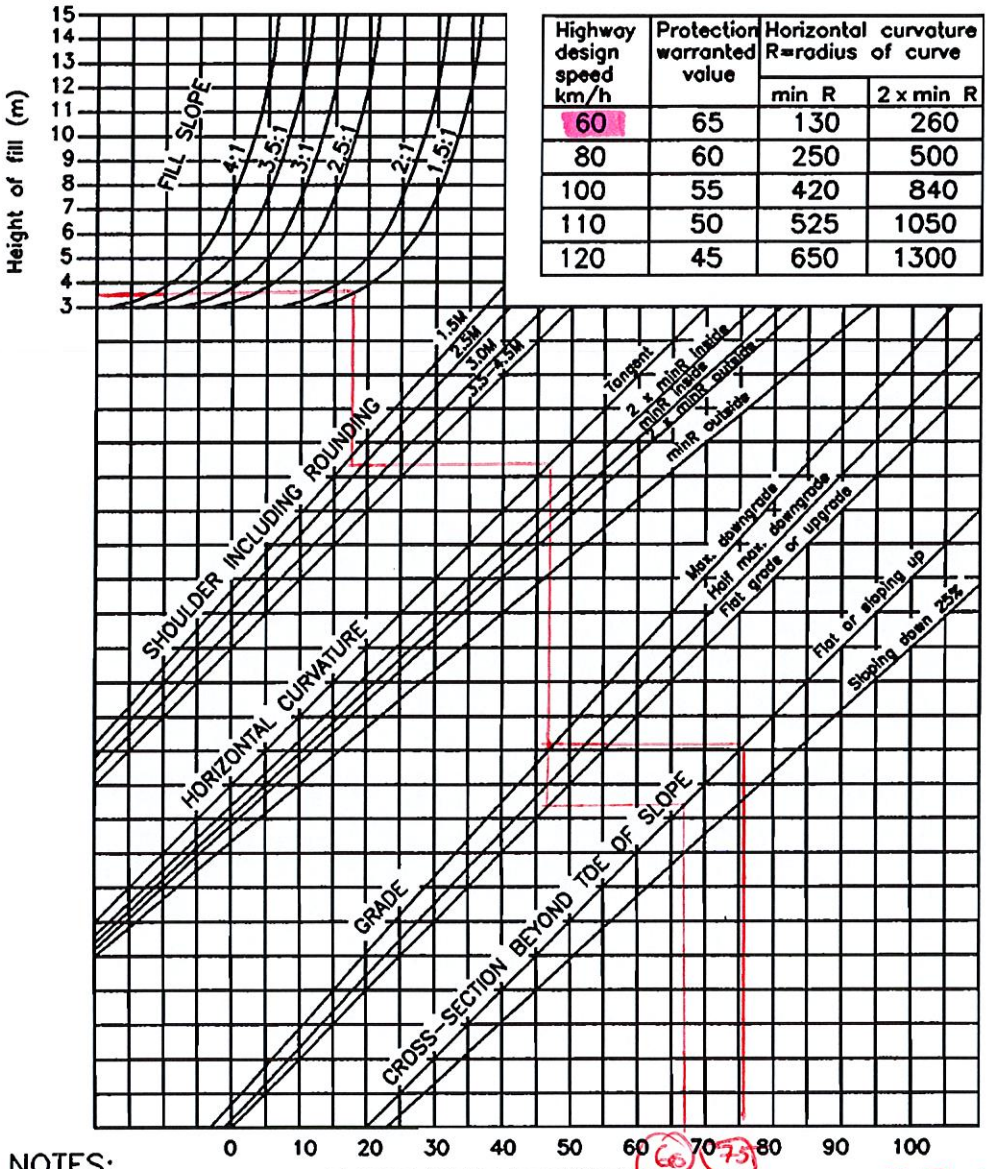
May 7, 2021

H = 3.5m

Shoulder = 2.2

Slope = 2:1

Road @ Bottom,



Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300

EMBANKMENT PROTECTION WARRANT GUIDE

NOTES:

1 Guide rail is not required for:

Undivided Hwys
-On fill heights less than 3 metres.
-Slopes 3:1 or flatter.

Divided Hwys
-On fill heights less than 2 metres.
-Slopes 4:1 or flatter.

2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

> Protection Warranted Value.
∴ Protection Recommended

FIGURE 2.5.1 Embankment Warrant Guide

2.0 Criteria Review

Road Name: *Hacienda Road*	Study Section: *Talbot Line to Dingle Line*
Direction of Travel: *North to South*	Total Distance Analysed: *1.28 km*
Posted Speed: *60km/h*	AADT: *1000 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.5 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.5 2.0 OK OK.	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Teeple Drain, Catfish Creek, Staley Drain (x2), GA Summers Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **150 to 120m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **200-410m**	OK	
	Decision Sight Distance	- Min decision sight distance: **95-175m**	OK.	
Intersections	List of intersections within project limits	Hacienda Road / Talbot Line - Intersection control: - Stopping sight distance: **75-130m**	Stop sign ahead. Stop sign Stopping distance, sight lines OK.	
	List of intersections within project limits	Hacienda Road / Dingle Road - Intersection control: - Stopping sight distance: **75-130m**	Through Street. Stopping distance, sight lines OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) **3m** (excluding cut or fill slopes) (MTO, 2020) **3.5m**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Bridge w/ guard rails & hazard signs. OK.	
Visual Aids		- Line painting: - Signage?	Single or Double solid yellow line. Dashed line north of Talbot. Horse & buggy sign.	

2.0 Criteria Review

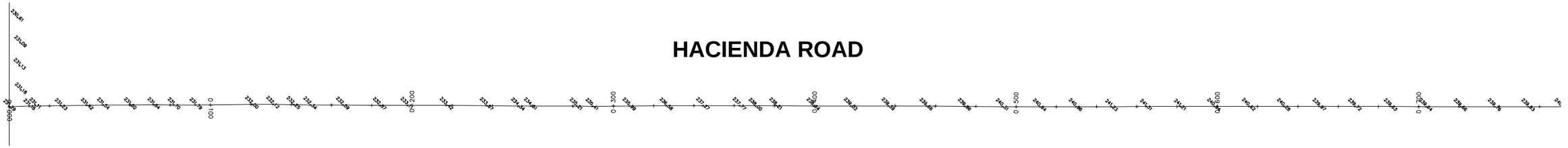
Road Name: *Hacienda Road*	Study Section: *Dingle Line to Glencolin Line*
Direction of Travel: *North to South*	Total Distance Analysed: *1.90 km*
Posted Speed: *80km/h*	AADT: *1228 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.5 m x 2 = 7.2m - Shoulder(s): 2.0 m wide - Boulevard(s): 5.40m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	8.0m 2.0m OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: McEwan Drain, Dingle Street Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	Curve @ Glencolin intersection. Adequate signage.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK.	
Intersections	List of intersections within project limits	Hacienda Road / Dingle Line - Intersection control: - Stopping sight distance: 155-210m	Through St. Sight lines, stopping distance OK.	
	List of intersections within project limits	Hacienda Road / Glencolin Line - Intersection control: - Stopping sight distance: 155-210m	Through Street. Sight lines & stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO 2020) 5m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culvert OK.	
Visual Aids		- Line painting: - Signage?	Dashed yellow line, Double dash yellow line, R.W. Crossing sign & road markings. Signalled R.W. Crossing.	

JOHN WISE LINE

NORTH

HACIENDA ROAD



METRIC SCALE HORIZ 1:2000, VERT. 1:200

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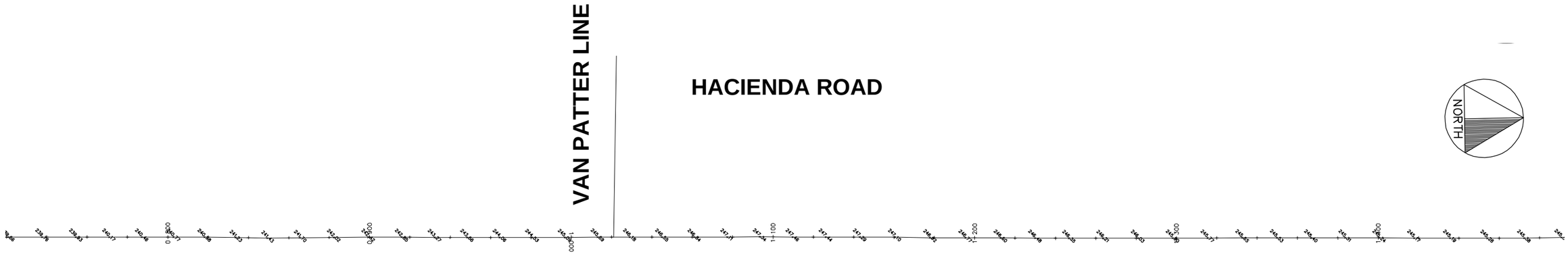
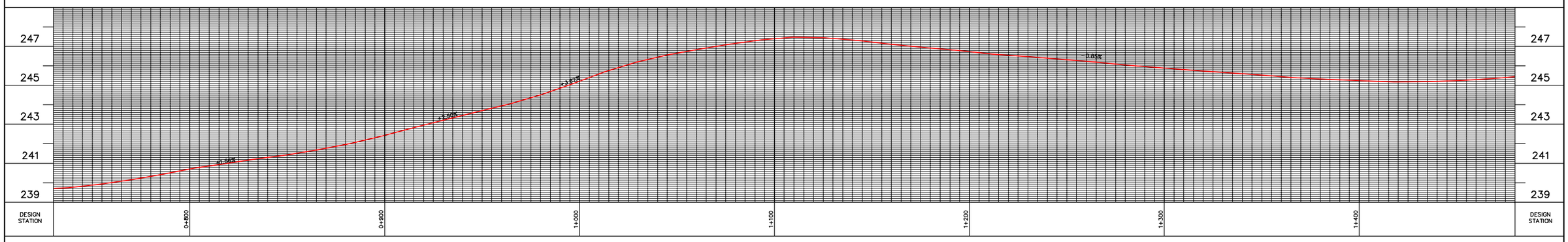
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
HACIENDA ROAD
STA 0+000 TO STA 0+750

DRAWING No. 36





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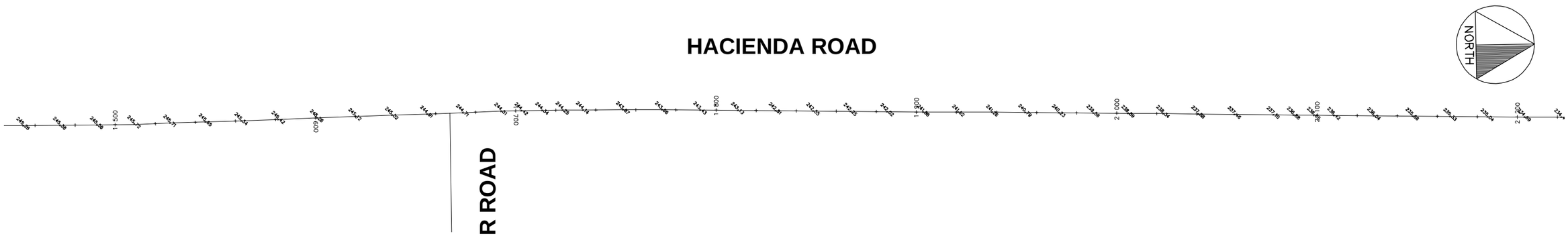
ROAD SAFETY AUDIT – PHASE 2

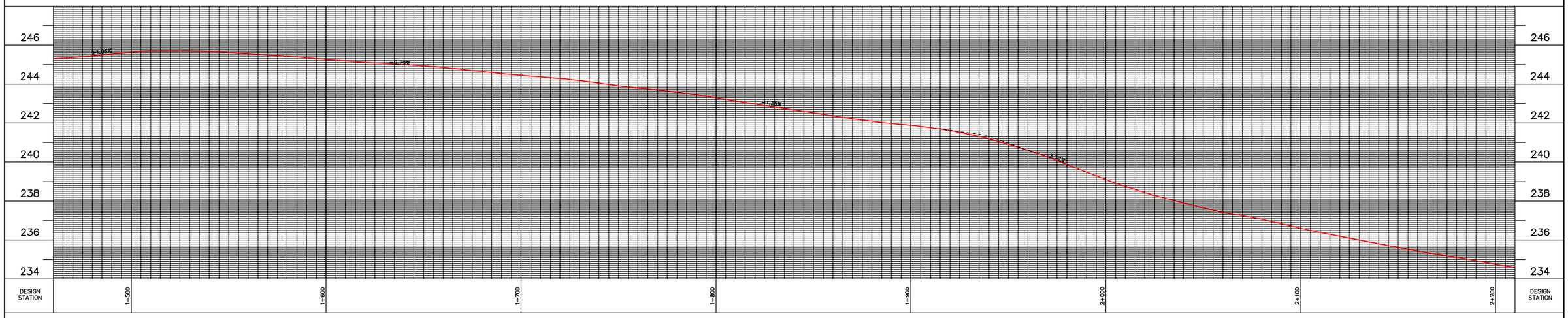
HACIENDA ROAD

STA 0+730 TO STA 1+480

DRAWING No. **37**

HACIENDA ROAD





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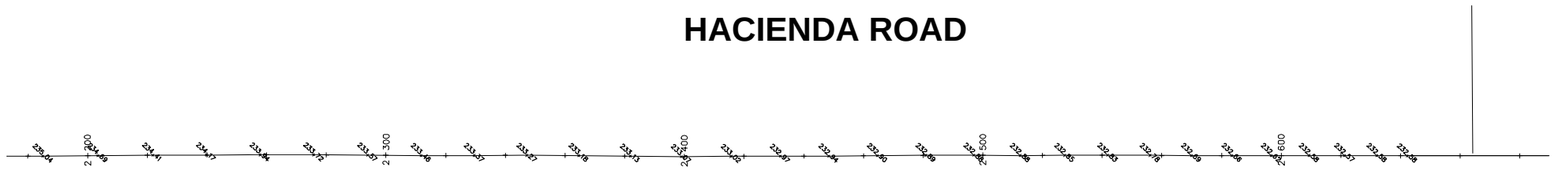
ROAD SAFETY AUDIT – PHASE 2
HACIENDA ROAD
STA 1+460 TO STA 2+210

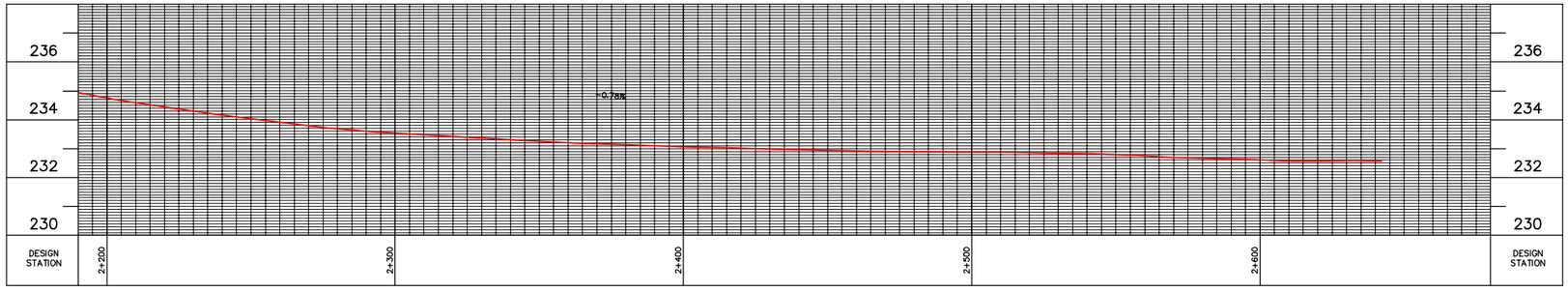
DRAWING No. **38**

HACIENDA ROAD



BRADLEY CREEK LINE

NORTH



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ROAD SAFETY AUDIT – PHASE 2
HACIENDA ROAD
STA 2+190 TO STA 2+700

DRAWING No. **39**

Hilltop Lane
West End to Springfield Road

- Criteria Review Sheet

2.0 Criteria Review

Road Name: *Hilltop Lane*	Study Section: *West End to Springfield Road*
Direction of Travel: *East to West*	Total Distance Analysed: *0.27 km*
Posted Speed: *50km/h*	AADT: *N/A*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: May 7, 2021

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.4m 1.5m. OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Staley Drain Wellman Branch	OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **8-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **100 to 80m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **160-350m**	N/A	
	Decision Sight Distance	- Min decision sight distance: **75-145m**	N/A.	
Intersections	List of intersections within project limits	Hilltop Lane / Springfield Road - Intersection control: - Stopping sight distance: **60-110m**	Stop sign. sightlines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A.	
Visual Aids		- Line painting: - Signage?	No painted Centreline.	

John Wise Line
Springfield Road to Richmond Road

- Criteria Review Sheets
- Embankment Protection Warrant Guide
- Centreline Profile Drawing (40)

2.0 Criteria Review

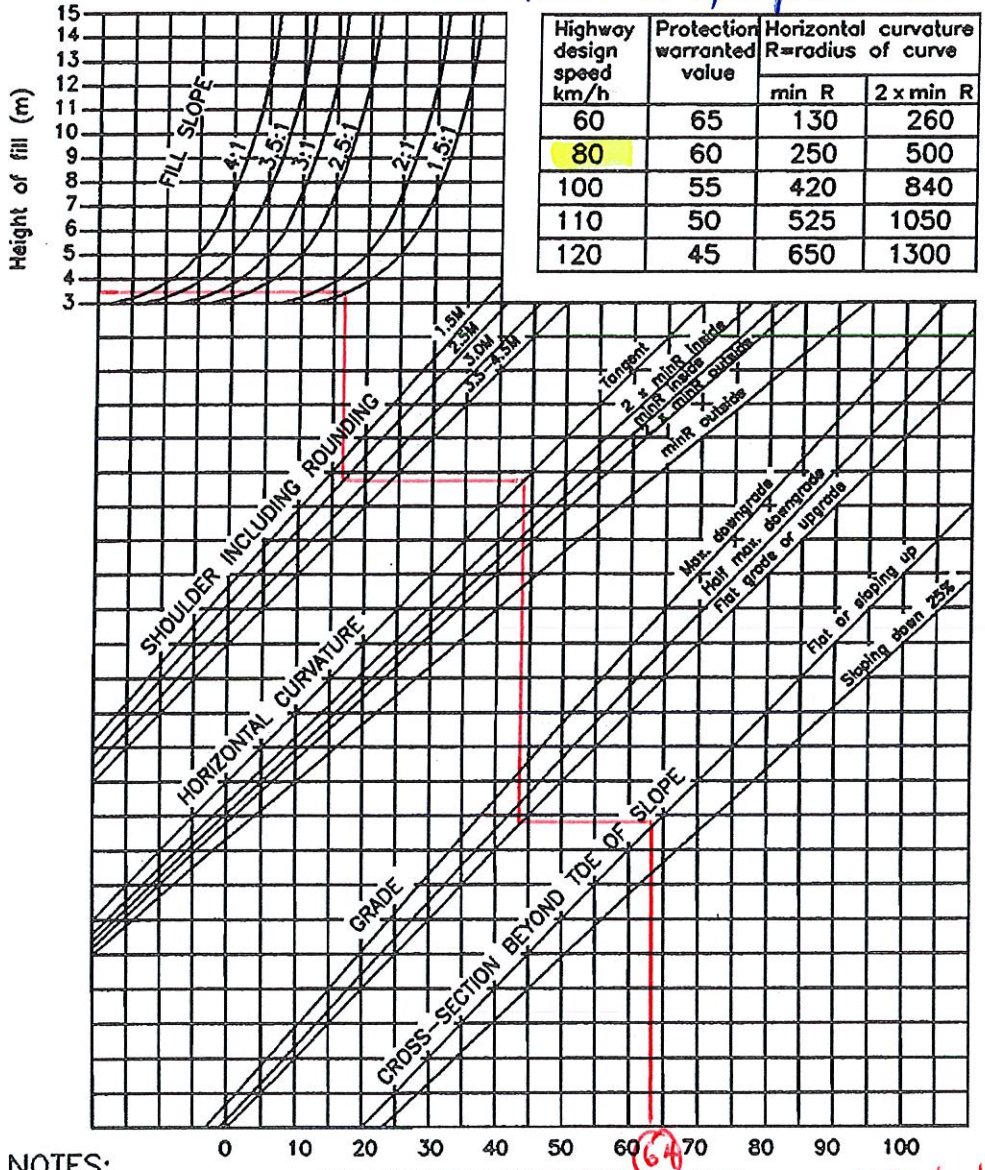
Road Name: *John Wise Line*	Study Section: *Springfield Road to Sawmill Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.06 km*
Posted Speed: *80km/h*	AADT: *1326 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.5m 2.0m OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Lake Eire Trib 10, Harmon Drain (x2), Parker Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK.	
Intersections	List of intersections within project limits	John Wise Line / Springfield Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Sight lines & stopping distance OK.	
	List of intersections within project limits	John Wise Line / Sawmill Road - Intersection control: - Stopping sight distance: **155-210m**	Through St. Sight lines & stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **(MTO, 1993) 4m** (excluding cut or fill slopes) **(MTO, 2020) 5m**	Hydropoles on N side of road.	Hydropoles
	Embankments	- Slope? - Height? - Protection required? Limits?	Embankment Warrant Guide. Fail ① Gully west of Springfield Road.	Embankment Protection Warranted.
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Concrete culvert. 2.0m high, 1.5 to 1.9m Hazard signs. No protection. ~ shoulder.	
Visual Aids		- Line painting: - Signage?	Solid yellow line. ATV trail. Ditch slopes flatter than 4:1.	

John Wise Line
Silver Creek
near Mun No. 5108, west of Springfield Road.

April 3, 2020
H = 3.3 m
Slope = 1.5 : 1
Shoulder = 2.5 m.

Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300



EMBANKMENT PROTECTION WARRANT GUIDE

NOTES:

1 Guide rail is not required for:
Undivided Hwys
–On fill heights less than 3 metres.
–Slopes 3:1 or flatter.

Divided Hwys
–On fill heights less than 2 metres.
–Slopes 4:1 or flatter.

2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

> Protection Warranted Value
∴ Protection Recommended

FIGURE 2.5.1 Embankment Warrant Guide

2.0 Criteria Review

Road Name: *John Wise Line*	Study Section: *Sawmill Road to Anger Road*
Direction of Travel: *East to West*	Total Distance Analysed: *0.80 km*
Posted Speed: *80km/h*	AADT: *1174 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.5 2.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Parker Drain (x2)	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	John Wise Line / Sawmill Road - Intersection control: - Stopping sight distance: **155-210m**	Through street. Sight lines + stopping distance OK.	
	List of intersections within project limits	John Wise Line / Anger Road - Intersection control: - Stopping sight distance: **155-210m**	Through street. Sight lines + stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 5m	Hydropoles on N+S sides of road within clear zone.	Hydropoles.
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line. Deer crossing sign. ATV trail sign.	

2.0 Criteria Review

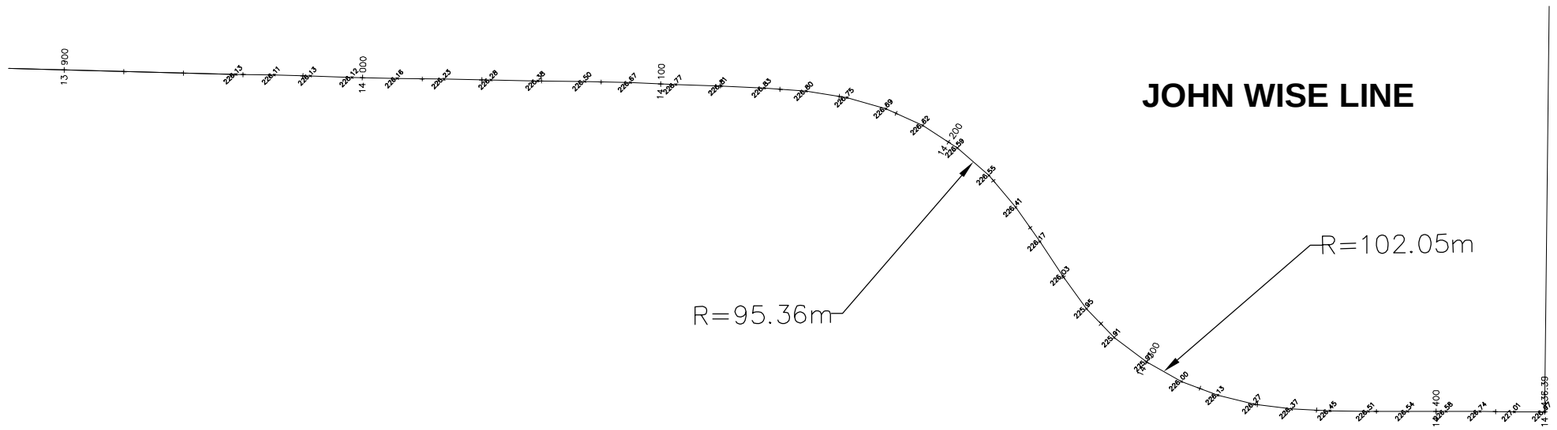
Road Name: *John Wise Line*	Study Section: *Anger Road to Carter Road*
Direction of Travel: *East to West*	Total Distance Analysed: *1.25 km*
Posted Speed: *80km/h*	AADT: *1174 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

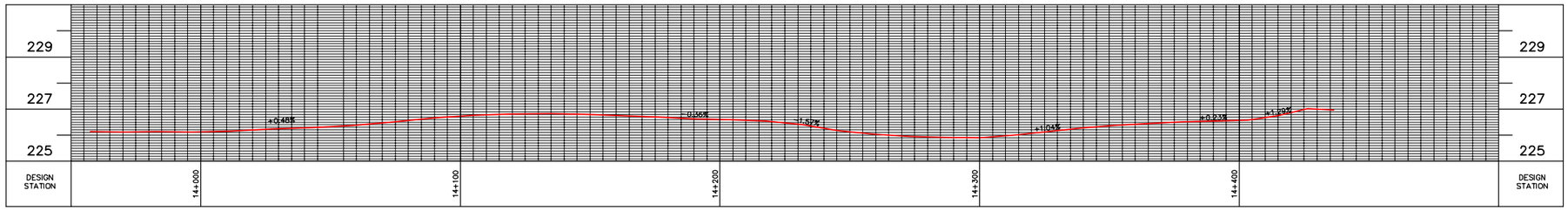
Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.5 2.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Parker Drain, Versnick Drain, Branch A & B of the PRessy Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	John Wise Line / Anger Road - Intersection control: - Stopping sight distance: **155-210m**	Through Street. Stopping distance, sight lines OK.	
	List of intersections within project limits	John Wise Line / Carter Road - Intersection control: - Stopping sight distance: **155-210m**	Through Street. Stopping distance, sight lines OK	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **(MTO, 1993) 4m** (excluding cut or fill slopes) **(MTO, 2020) 5m**	*Hydropoles on south side are within clear zone.	Most hydro poles
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line ATV trail sign.	

2.0 Criteria Review

Road Name: *John Wise Line*	Study Section: *Carter Road to Richmond Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.11 km*
Posted Speed: *80km/h*	AADT: *727 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.5m 2 m OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Ellis Drain Branch A, John Wise Line Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	R= 95 to 102m Chevron signs, S bend signs.	No speed reduction posted. Radii too small.
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	John Wise Line / Carter Road - Intersection control: - Stopping sight distance: **155-210m**	Through street Sight lines, stopping distance OK.	
	List of intersections within project limits	John Wise Line / Richmond Road - Intersection control: - Stopping sight distance: **155-210m**	Stop sign ↔ warning sign. Stop sign ahead. Stopping distance, sight lines OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	OK	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line Signs for horizontal curves.	





NORTH

C. CLUETT
100214735
LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

D.J. LYLE
100174772
LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

METRIC SCALE HORIZ 1:2000, VERT. 1:200

No.	REVISION	DATE	BY

TOWNSHIP OF MALAHIDE

CJDL Consulting Engineers
Cyril J. Demeyere Limited
P.O. Box 460, 261 Broadway
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DESIGN BY: CC DJL	DRAWN BY: TWM	CHECKED BY: CC DJL
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

JOHN WISE LINE

STA 13+960 TO STA 14+440

DRAWING No. **40**

Louisa Crescent
Hacienda Road to Catherina Street

- Criteria Review Sheet

2.0 Criteria Review

Road Name: *Louisa Crescent*	Study Section: *Hacienda Road to Catherina Street*
Direction of Travel: *North to South/East to West*	Total Distance Analysed: *0.13 km*
Posted Speed: *50km/h*	AADT: *50 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7-2 Curb OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage to CBs.	
Alignment	Vertical Alignment	- Maximum road segment grades: **8-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **100 to 80m** - Maximum super elevation: **4-8%** (TAC, 1999)	OK	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **160-350m**	N/A	
	Decision Sight Distance	- Min decision sight distance: **75-145m**	N/A	
Intersections	List of intersections within project limits	Louisa Crescent / Hacienda Road - Intersection control: - Stopping sight distance: **60-110m**	Stop sign. Sight lines, stopping distance OK.	
	List of intersections within project limits	Louisa Crescent / Catherina Street - Intersection control: - Stopping sight distance: **60-110m**	Stop sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	No lines on road.	

Norton Street
Talbot Line to North End Cul-de-sac

- Criteria Review Sheet

2.0 Criteria Review

Road Name: *Norton Street .*	Study Section: *Talbot Line to North End Culdesac*
Direction of Travel: *North to South*	Total Distance Analysed: *0.28 km*
Posted Speed: *N/A Asphalt; Assume 50km/h*	AADT: *200 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: *April 23, 2020*

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.2m Shoulder OK OK OK	
	Surface Treatment	- Comment on surface treatment	OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **150 to 120m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **200-410m**	N/A	
	Decision Sight Distance	- Min decision sight distance: **95-175m**	N/A	
Intersections	List of intersections within project limits	Norton Street / Talbot Line - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. Sight lines, stopping distance OK. Through street @ Church. OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	All hydro poles in the clear zone.	Hydro poles
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	No line painted. "No exit" signs	

Pigram Road
Ron McNeil Line to Pressey Road

- Criteria Review Sheet

2.0 Criteria Review

Road Name: *Pigram Road*	Study Section: *Ron McNeil Line to Pressey Road*
Direction of Travel: *North to South*	Total Distance Analysed: *0.09 km*
Posted Speed: *80km/h*	AADT: *673 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.6m x2 = 7.2m - Shoulder(s): 2.0 m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.2m 2 m OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Cady/Bear Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	Pigram Road / Ron McNeil Line - Intersection control: - Stopping sight distance: 155-210m	Through st. sight lines, stopping distance OK.	
	List of intersections within project limits	Pigram Road / Pressey Road - Intersection control: - Stopping sight distance: 155-210m	Stop sign w/ flashing light. Stop sign ahead with flashing light. *	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	~~Concrete~~ Unprotected culvert crossing. Ditches steeper than 4:1	Requires Protection
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	11m unprotected length, 1.8m shoulder, 2.2m vertical drops.	
Visual Aids		- Line painting: - Signage?	Dashed yellow line. Dashed/solid yellow line combination @ municipal drain crossing.	

* Crops to west of intersection could pose sight line problems. Appears planting limits have been staked to fix this.

Pressey Line
Springfield Road to Springer Hill Road

- Criteria Review Sheets
- Centreline Profile Drawing (41)

2.0 Criteria Review

Road Name: *Pressey Line*	Study Section: *Springfield Road to 400 m E of Springfield Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.03 km*
Posted Speed: *50km/h*	AADT: *946 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: *April 6, 2020*

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x2 = 7.0m** - Shoulder(s): **2.0 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0 2.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Lower Catfish 2	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **8-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **100 to 80m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **160-350m**	OK	
	Decision Sight Distance	- Min decision sight distance: **75-145m**	OK	
Intersections	List of intersections within project limits	Pressey Line / Springfield Road - Intersection control: - Stopping sight distance: **60-110m**	Stop sign. Sight lines, stopping distance OK	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) **3m** (excluding cut or fill slopes) (MTO, 2020) 3.5m	Hydropoles in CZ on south side of road.	Hydropoles
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line. Stop the road sign	

2.0 Criteria Review

Road Name: *Pressey Line*	Study Section: 400 *m E of Springfield Road to Walker Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.03 km*
Posted Speed: *80km/h*	AADT: *946 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0 m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0 2.0 OK OK	Width
	Surface Treatment	- Comment on surface treatment	Shoulder raveling in areas.	Shoulder condition.
	Drainage	- Roadside swales? - Municipal Drains: Stover Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Pressey Line / Walker Road - Intersection control: - Stopping sight distance: **155-210m**	Through Street. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 5m	Hydrospeed in CZ on north side of road.	Hydrospeed
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line Shows the road.	

2.0 Criteria Review

Road Name: *Pressey Line*	Study Section: *Walker Road to Carter Road*
Direction of Travel: *East to West*	Total Distance Analysed: *1.96 km*
Posted Speed: *80km/h*	AADT: *1024 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	6.6m 2.0m OK OK	Width
	Surface Treatment	- Comment on surface treatment	Shoulder ravelling in areas.	Shoulder condition.
	Drainage	- Roadside swales? - Municipal Drains: Lindsey Drain, Shively Drain, Pettman Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Pressey Line / Walker Road - Intersection control: - Stopping sight distance: **155-210m**	Through Street. Sight lines, stopping distance OK.	
	List of intersections within project limits	Pressey Line / Carter Road - Intersection control: - Stopping sight distance: **155-210m**	Through street. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 5m	Hydropoles in CZ on south side	Hydropoles
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Bridge w/ Guard rails cable wire. OK.	
Visual Aids		- Line painting: - Signage?	Share the road. "One lane, Narrow Bridge" Solid yellow line.	

2.0 Criteria Review

Road Name: *Pressey Line*	Study Section: *Carter Road to Pigram Road*
Direction of Travel: *East to West*	Total Distance Analysed: *0.29 km*
Posted Speed: *80km/h*	AADT: *1150 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

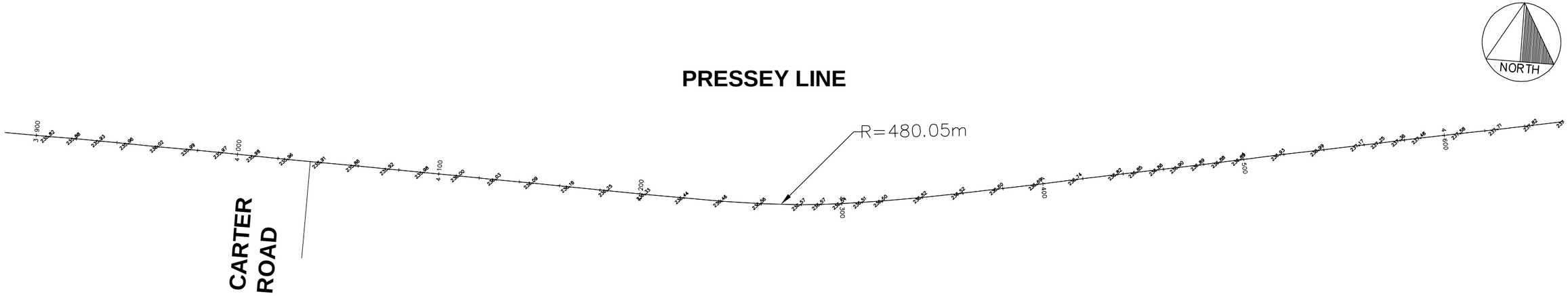
Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.9 2.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	R = 480m. OK. Chevrons & horizontal curve signs adequate.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Pressey Line / Carter Road - Intersection control: - Stopping sight distance: **155-210m**	Through st. sight lines & stopping distance OK	
	List of intersections within project limits	Pressey Line / Pigram Road - Intersection control: - Stopping sight distance: **155-210m**	Through st. sight lines & stopping distance OK	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 5m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line White solid lines on shoulder @ horizontal curve.	

2.0 Criteria Review

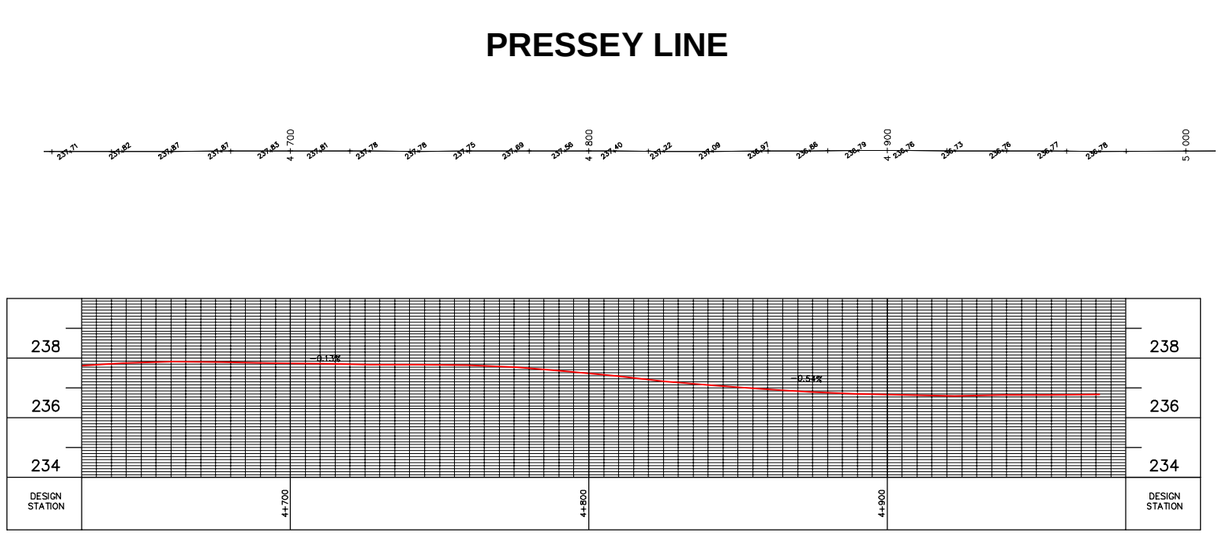
Road Name: *Pressey Line*	Study Section: *Pigram Road to Springer Hill Road*
Direction of Travel: *East to West*	Total Distance Analysed: *1.8 km*
Posted Speed: *80km/h*	AADT: *1748 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.3 1.7 OK OK	Shoulder
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Germuska Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Pressey Line / Pigram Road - Intersection control: - Stopping sight distance: **155-210m**	Through Street. Sight lines + stopping distance OK.	
	List of intersections within project limits	Pressey Line / Springer Hill Road - Intersection control: - Stopping sight distance: **155-210m**	Through street. Sight lines & stopping distance OK	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 5.5m	Row of trees west of Hwy No 123251	Trees
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Bridge w/ guard rails + hazard signs.	
Visual Aids		- Line painting: - Signage?	Solid yellow line Share the road.	

PRESSEY LINE



PRESSEY LINE



C. CLUETT 100214735 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO	D.J. LYLE 100174772 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO	METRIC SCALE HORIZ 1:2000, VERT. 1:200	**TOWNSHIP OF MALAHIDE**

No.	REVISION	DATE	BY

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PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

PRESSEY LINE
STA 3+900 TO STA 5+000

DRAWING No. **41**

Rogers Road

John Wise Line to Ron McNeil Line

- Criteria Review Sheets
- Centreline Profile Drawings (42-48)

2.0 Criteria Review

Road Name: *Rogers Road*	Study Section: *John Wise Line to Conservation Line*
Direction of Travel: *North to South*	Total Distance Analysed: *2.06 km*
Posted Speed: *80km/h*	AADT: *872 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.4 2.5 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Lower Catfish 2 (x3)	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	Kcrest<24 @ Sta 1+300, 1+550, 1+800 Ksag<12 @ Sta 1+450	3 Kcrest, 1 Ksag fail,
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Rogers Road / John Wise Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ↔ Warning sign. Sight lines, Stopping distance OK.	
	List of intersections within project limits	Rogers Road / Conservation Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. 4-way - Sight lines; stopping distance ok.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 5m	Tree in CZ @ Mun. 7707. Hydropoles E+W side of road near 7707.	Tree, Hydropole Wood lot
	Embankments	- Slope? - Height? - Protection required? Limits?	OK	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culverts OK.	
Visual Aids		- Line painting: - Signage?	Share the road, deer crossing Solid yellow line.	

Woodlot north of Mun. 7881, east side within clear zone
Hydropoles in this area ok.

Hydropoles near Mun 8122 in clear zone

2.0 Criteria Review

Road Name: *Rogers Road*	Study Section: *Conservation Line to Catt Line*
Direction of Travel: *North to South*	Total Distance Analysed: *1.18 km*
Posted Speed: *80km/h*	AADT: *1195 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0 m 1.2 m OK OK	Width Shoulder
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Lower Catfish (x2)	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Rogers Road / Conservation Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign ahead. Stop sign. 4-way sight lines, stopping distance OK.	
	List of intersections within project limits	Rogers Road / Catt Line - Intersection control: - Stopping sight distance: **155-210m**	Through street. Sight lines stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (MTO, 2020) 5m (excluding cut or fill slopes)	Trees (x2) in clear zone south of Hwy No 8692	Tree x2.
	Embankments	- Slope? - Height? - Protection required? Limits?	Embankment protection in place. OK.	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK	
Visual Aids		- Line painting: - Signage?	Solid yellow line. Share the road sign.	

2.0 Criteria Review

Road Name: *Rogers Road*	Study Section: *Catt Line to Brook Line*
Direction of Travel: *North to South*	Total Distance Analysed: *0.16 km*
Posted Speed: *80km/h*	AADT: *1195 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.4m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.5 2-5 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Rogers Road / Catt Line - Intersection control: - Stopping sight distance: **155-210m**	Through Street. Sight lines, stopping distance OK.	
	List of intersections within project limits	Rogers Road / Brook Line - Intersection control: - Stopping sight distance: **155-210m**	Through Street. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) **4m** (MTO, 2020) **5m** (excluding cut or fill slopes)	Hydropole @ Catt Line, east side of road.	Hydropole
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line.	

2.0 Criteria Review

Road Name: *Rogers Road*	Study Section: *Brook Line to Talbot Line*
Direction of Travel: *North to South*	Total Distance Analysed: *1.23 km*
Posted Speed: *80km/h*	AADT: *1195 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.6m x 2 = 7.2m - Shoulder(s): 2.0m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.5 2.5 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Ferguson Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	Rogers Road / Talbot Line - Intersection control: - Stopping sight distance: 155-210m	Stop sign. ↔ Warning sign. Stopping distance, sight lines OK.	
	List of intersections within project limits	Rogers Road / Brook Line. - Intersection control: - Stopping sight distance: 155-210m	Through street. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 5m	Tree on east side of road, adjacent to natural gas pipeline sign. In CZ.	Tree.
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK	
Visual Aids		- Line painting: - Signage?	Solid yellow line. Posted speed limit = 60 km/h.	

2.0 Criteria Review

Road Name: *Rogers Road*	Study Section: *Talbot Line to Glencolin Line*
Direction of Travel: *North to South*	Total Distance Analysed: *2.08 km*
Posted Speed: *80km/h*	AADT: *511 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m × 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.2 1.5 OK OK	Shoulder
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Catfish Creek	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	$K_{CREST} < 24$ @ Sta 5+100.	K_{CREST} fail
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	R = 204 to 237. Speed limit reduction posted. 50km/hr. Proper signage in place	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Rogers Road / Talbot Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ⟷ Warning sign. Sight lines, stopping distance OK.	
	List of intersections within project limits	Rogers Road / Glencolin Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (MTO, 2020) 3.5m (excluding cut or fill slopes)	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	OK.	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Bridge @ Talbot. Guard rails & cable wire protection OK	
Visual Aids		- Line painting: - Signage?	Solid yellow line. Unsignalled R.W. Crossing Stop sign @ R.W. R.W ahead, Stop sign ahead. "Active trains as of Dec 19, 2016 sign."	

2.0 Criteria Review

Road Name: *Rogers Road*	Study Section: *Glencolin Line to College Line*
Direction of Travel: *North to South*	Total Distance Analysed: *2.21 km*
Posted Speed: *80km/h*	AADT: *251 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.2 1.4 OK OK	shoulder
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Skinner Drain (x2), Smit Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Rogers Road / Glencolin Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Stop sign ahead. Sight lines, stopping distance OK.	
	List of intersections within project limits	Rogers Road / College Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) **4m** (MTO, 2020) **3.5m** (excluding cut or fill slopes)	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line.	

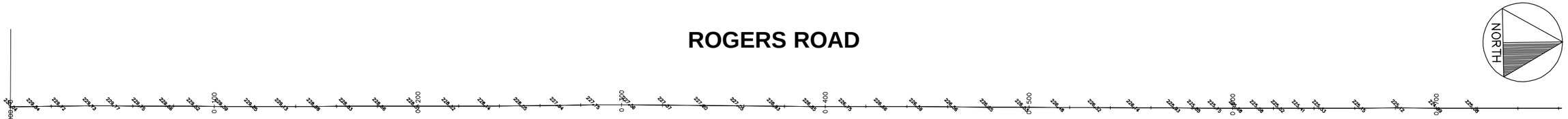
2.0 Criteria Review

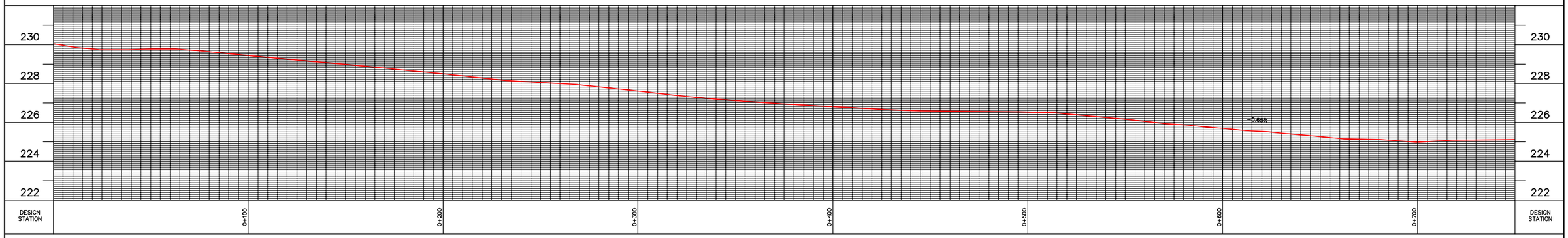
Road Name: *Rogers Road*	Study Section: *College Line to Ron McNeil Line*
Direction of Travel: *North to South*	Total Distance Analysed: *0.74 km*
Posted Speed: *80km/h*	AADT: *101 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.2 1.2 OK OK	Shoulder
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Foster Drain (x2)	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK.	
Intersections	List of intersections within project limits	Rogers Road / College Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Sight lines, stopping distance OK.	
	List of intersections within project limits	Rogers Road / Ron McNeil Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) **4m** (MTO, 2020) **3.5m** (excluding cut or fill slopes)	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line.	

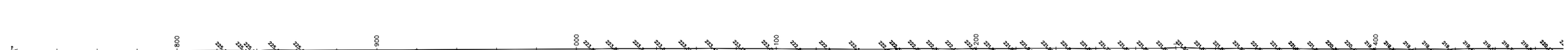
JOHN WISE LINE

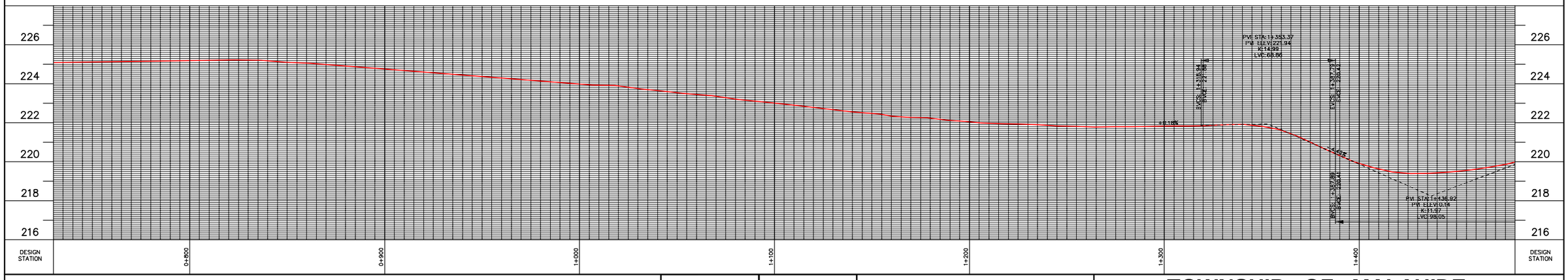
ROGERS ROAD





ROGERS ROAD





METRIC SCALE HORIZ 1:2000, VERT. 1:200

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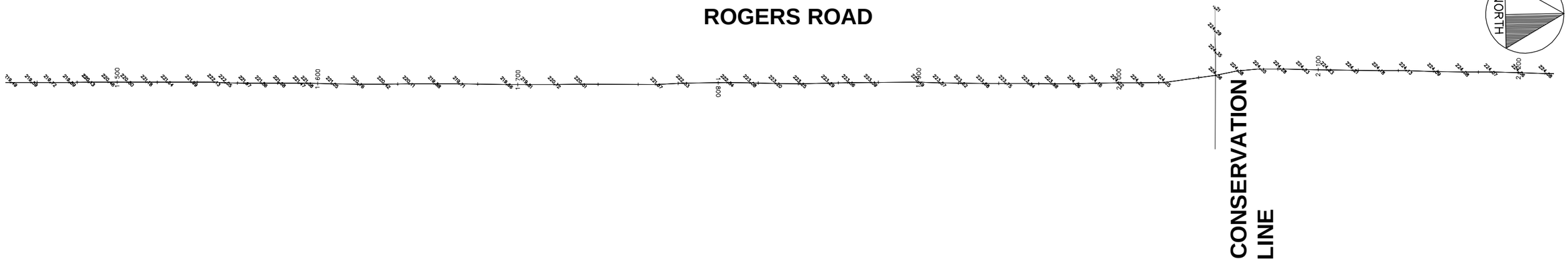
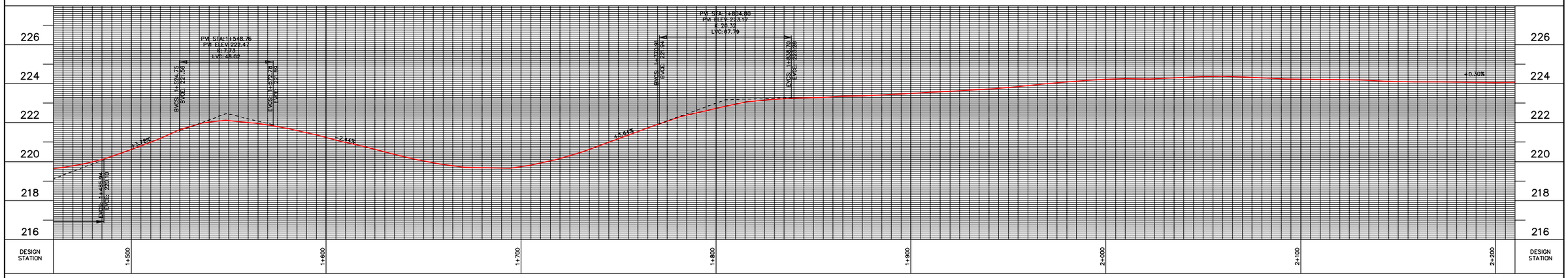
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
ROGERS ROAD
STA 0+000 TO STA 1+480

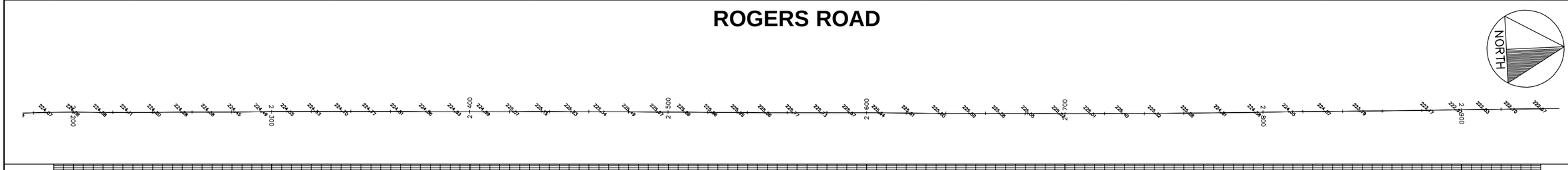
DRAWING No. 42

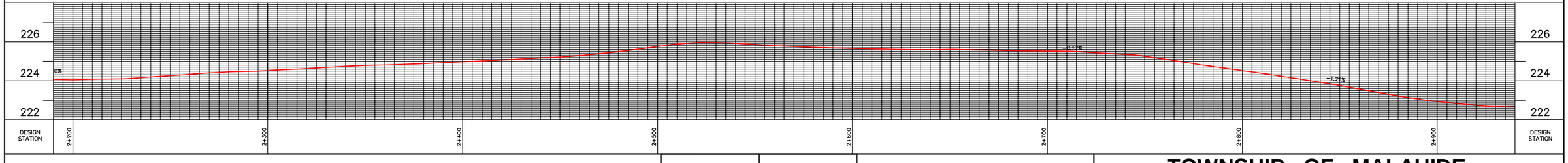
ROGERS ROAD





ROGERS ROAD





METRIC SCALE HORIZ 1:2000, VERT. 1:200

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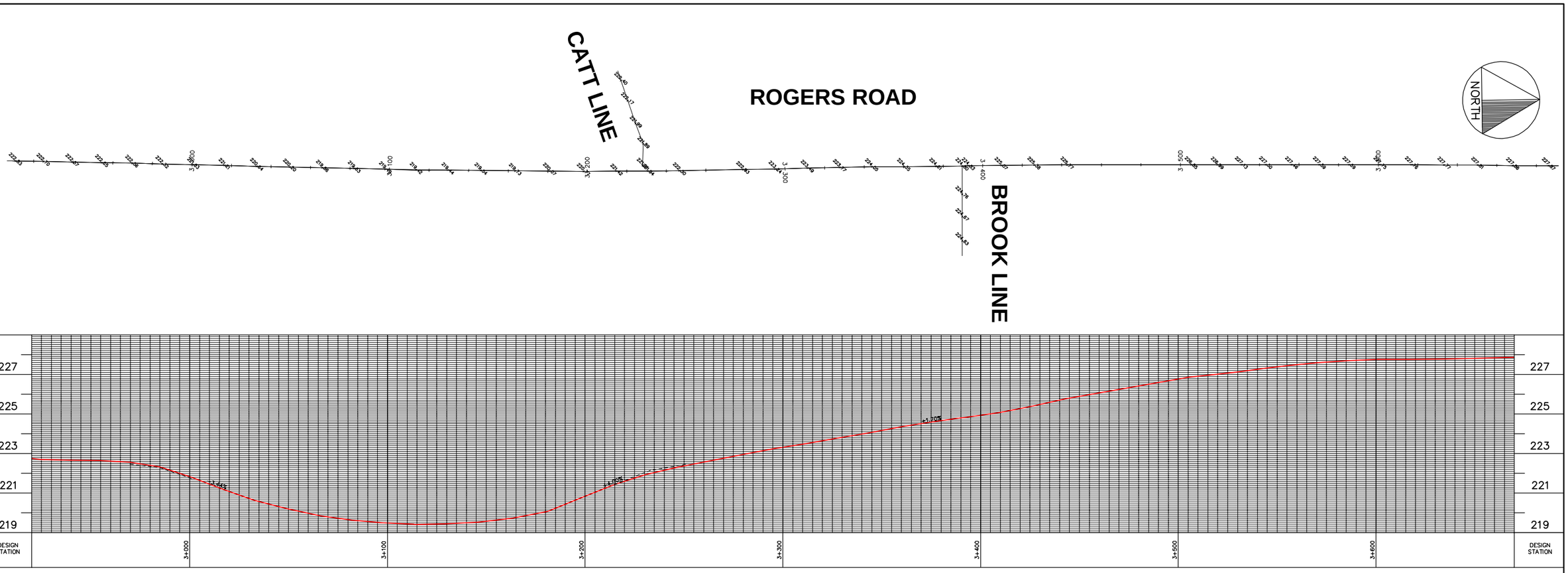
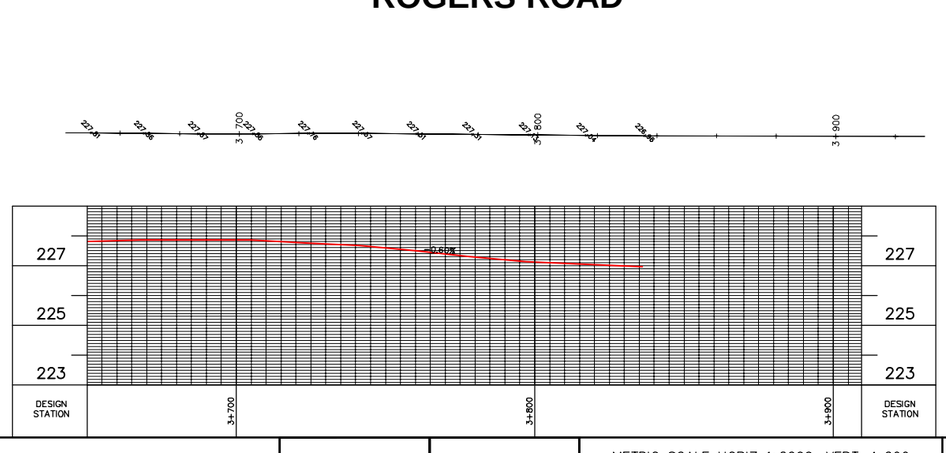
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

ROGERS ROAD
STA 1+460 TO STA 2+940

DRAWING No. 43



ROGERS ROAD



	METRIC SCALE HORIZ 1:2000, VERT. 1:200		
No.	REVISION	DATE	BY

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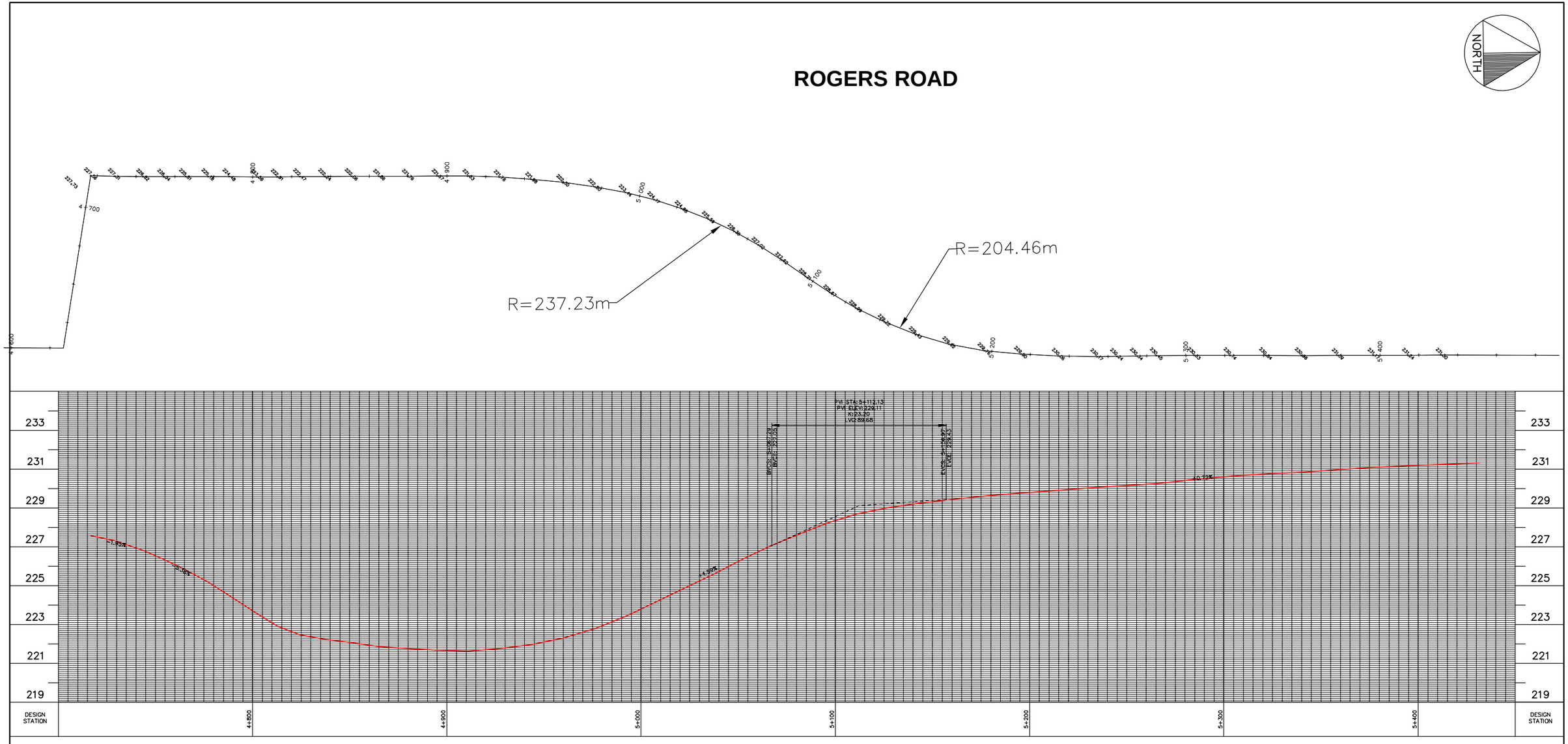
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
ROGERS ROAD
STA 2+920 TO STA 3+910

DRAWING No. 44

ROGERS ROAD



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METRIC SCALE HORIZ 1:2000, VERT. 1:200

No.	REVISION	DATE	BY

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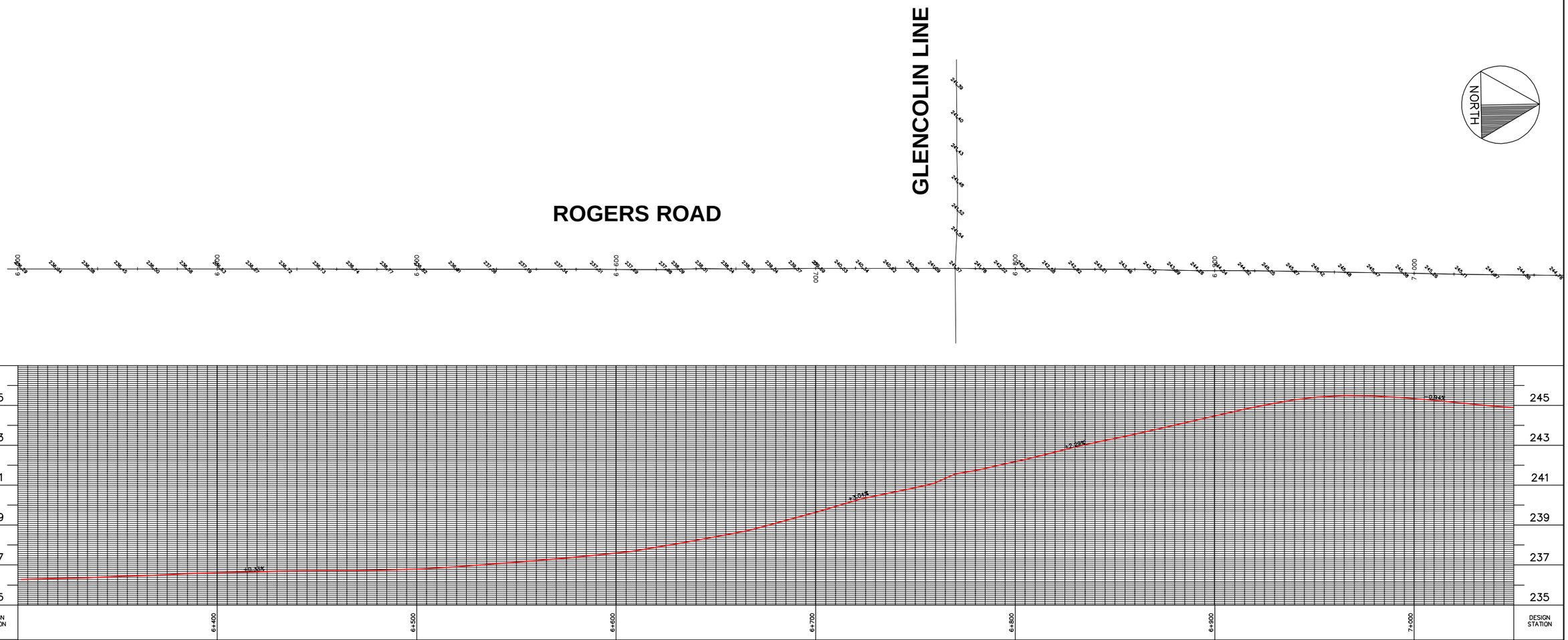
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

ROGERS ROAD
STA 4+700 TO STA 5+450

DRAWING No. 45



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ROAD SAFETY AUDIT – PHASE 2

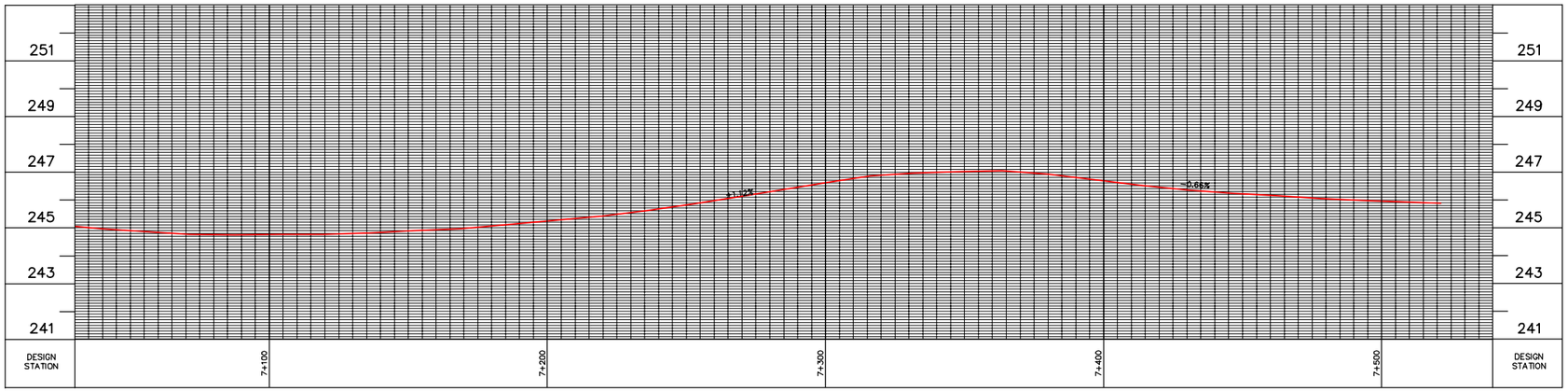
ROGERS ROAD

STA 6+300 TO STA 7+050

DRAWING No. 46

NORTH

ROGERS ROAD



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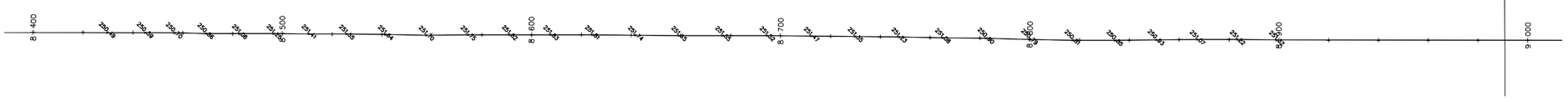
TOWNSHIP OF MALAHIDE
ROAD SAFETY AUDIT – PHASE 2
ROGERS ROAD
STA 7+030 TO STA 7+540

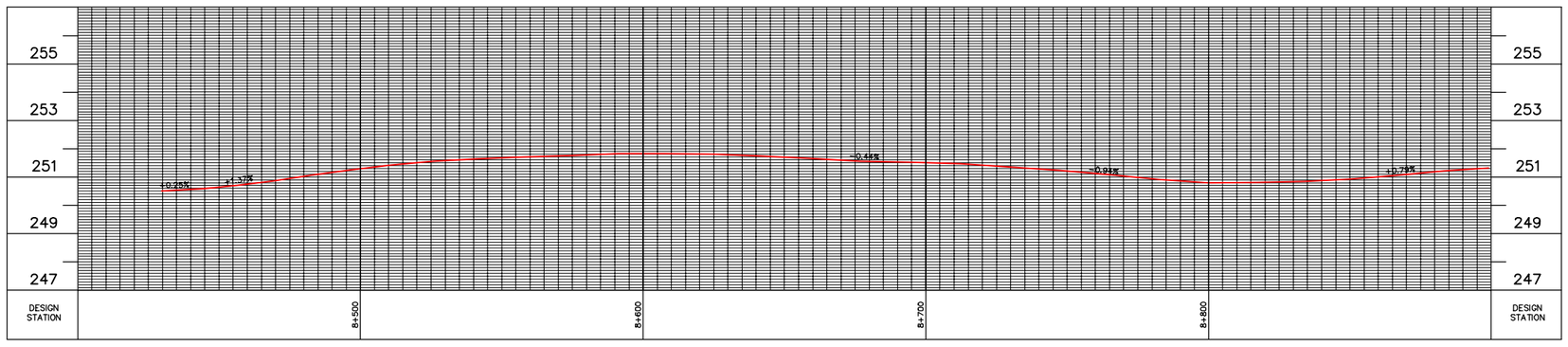
DRAWING No. **47**

NORTH

COLLEGE LINE

ROGERS ROAD





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TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
ROGERS ROAD
STA 8+400 TO STA 8+900

DRAWING No. 48

Springer Hill Road
South End to Pressey Line

- Criteria Review Sheets
- Embankment Protection Warrant Guides
- Centreline Profile Drawings (49-52)

2.0 Criteria Review

Road Name: *Springer Hill Road*	Study Section: *South End to Heritage Line*
Direction of Travel: *North to South*	Total Distance Analysed: *0.40 km*
Posted Speed: *N/A Gravel; Assume 60km/h*	AADT: *10 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m × 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0 1-2 OK OK	
	Surface Treatment	- Comment on surface treatment	Gravel OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **150 to 120m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **200-410m**	Ok	
	Decision Sight Distance	- Min decision sight distance: **95-175m**	OK	
Intersections	List of intersections within project limits	Springer Hill Road / Heritage Line - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. Right turn lane. 130m sight line of Eastbound Heritage line traffic. Signed properly	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Dead end.	

2.0 Criteria Review

Road Name: *Springer Hill Road*	Study Section: *Heritage Line to Talbot Line*
Direction of Travel: *North to South*	Total Distance Analysed: *0.75 km*
Posted Speed: *80km/h*	AADT: *411 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.2 2.5 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Springer Hill Road / Heritage Line - Intersection control: - Stopping sight distance: **155-210m**	130m sight line to Eastbound Heritage traffic. Properly signed.	
	List of intersections within project limits	Springer Hill Road / Talbot Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	"Share the road" sign. Solid yellow line.	

2.0 Criteria Review

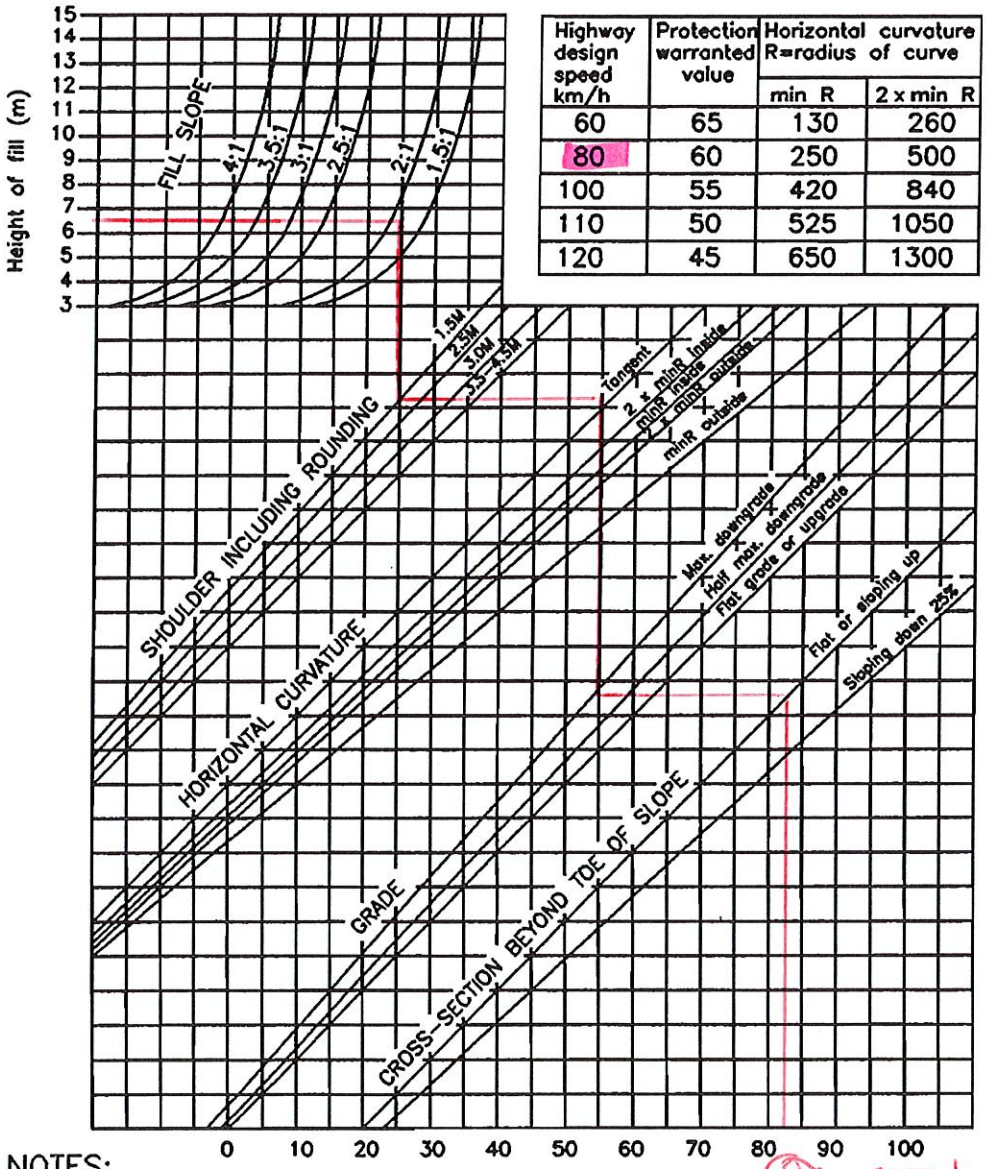
Road Name: *Springer Hill Road*	Study Section: *Talbot Line to Glencolin Line*
Direction of Travel: *North to South*	Total Distance Analysed: *1.84 km*
Posted Speed: *80km/h*	AADT: *416 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x ? = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.4bm± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0 2.5 OK OK	Width.
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	$K_{CREST} < 24$ @ Sta 5+900	Kcrest fail
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK.	
Intersections	List of intersections within project limits	Springer Hill Road / Talbot Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign, sight lines, stopping distance OK.	
	List of intersections within project limits	Springer Hill Road / Glencolin Line - Intersection control: - Stopping sight distance: **155-210m**	Through street. Stopping distance, sight lines OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) **4m** (excluding cut or fill slopes) (MTO, 2020) **3.5m**	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	Embankment Warrant Guide failed @ Mun No. 9851 & 9931 & 9822.	Protection required @ 3 locations
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Culverts Not Talbot St; Pitch deeper than 0.75m slopes 2.5:1, but @ Stop s.ign.	Protection not required because traffic stopping @ intersection.
Visual Aids		- Line painting: - Signage?	Solid yellow line. "Share the road sign". Horse & buggy sign.	

Springer Hill Road - East Side May 7, 2021
Mun. No 9822.

H = 6.5m
Shoulder = 1.5m
Slope = 1.75 : 1

Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300



EMBANKMENT PROTECTION WARRANT GUIDE

(83) > Protection Warrant Value
∴ Protection Recommended.

NOTES:

1 Guide rail is not required for:
Undivided Hwys
–On fill heights less than 3 metres.
–Slopes 3:1 or flatter.

Divided Hwys
–On fill heights less than 2 metres.
–Slopes 4:1 or flatter.

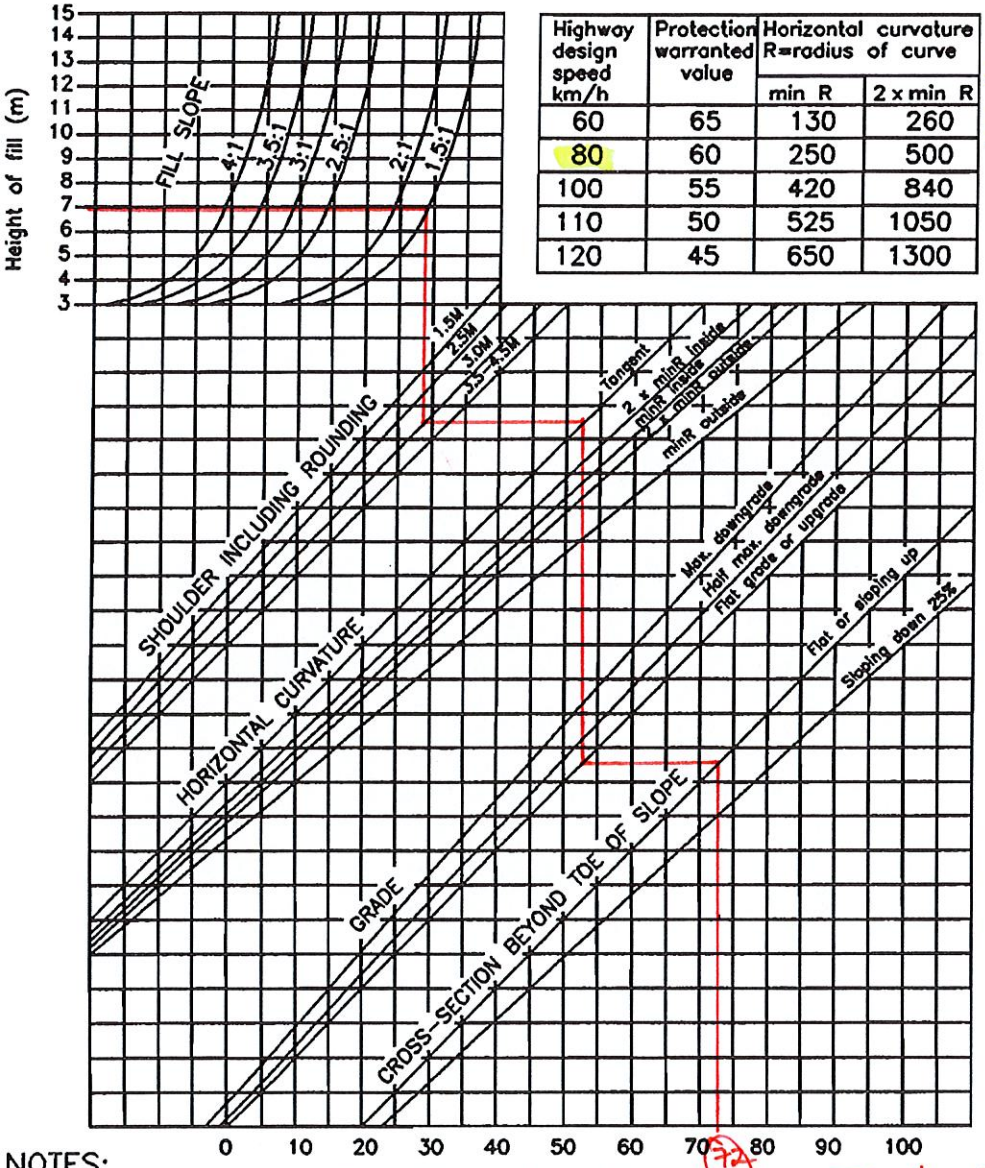
2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

FIGURE 2.5.1 Embankment Warrant Guide

Springer Hill Road
near Mun. No. 9851
Apr. 16, 2020

H = 7m
Shoulder = 3.0m
Slope = 1.5:1

Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300



EMBANKMENT PROTECTION WARRANT GUIDE

NOTES:

1 Guide rail is not required for:

Undivided Hwys
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–Slopes 3:1 or flatter.

Divided Hwys
–On fill heights less than 2 metres.
–Slopes 4:1 or flatter.

2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

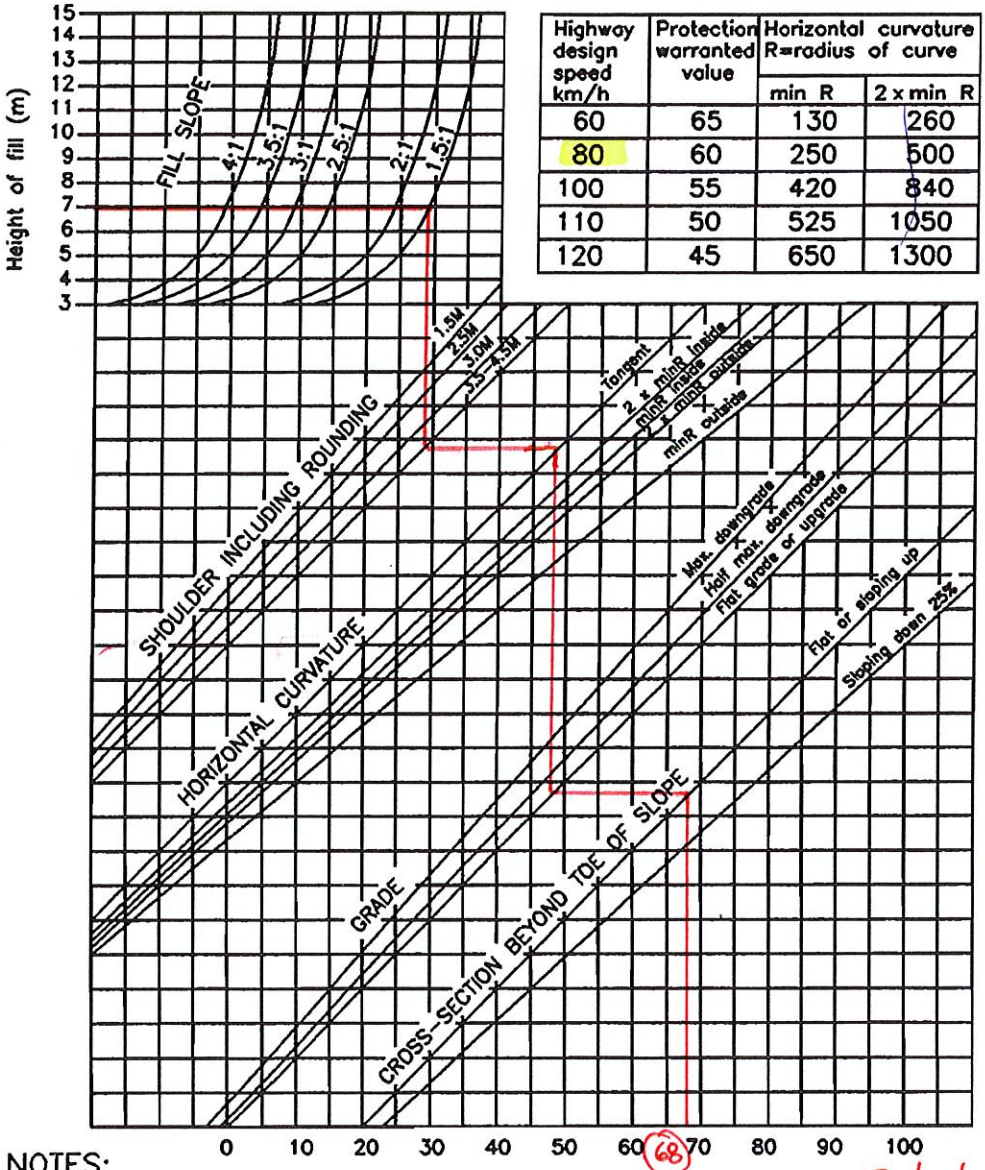
> Protection Warranted Value.
∴ Protection Recommended.

FIGURE 2.5.1 Embankment Warrant Guide

Springer Hill Road.
near Mun No. 9931
April 6, 2020

H= 7m
Shoulder = 4.5m
Slope = 1:1 to 1.5:1

Highway design speed km/h	Protection warranted value	Horizontal curvature R=radius of curve	
		min R	2 x min R
60	65	130	260
80	60	250	500
100	55	420	840
110	50	525	1050
120	45	650	1300



EMBANKMENT PROTECTION WARRANT GUIDE

> Protection Warranted Value.
∴ Protection Recommended.

NOTES:

1 Guide rail is not required for:
Undivided Hwys
–On fill heights less than 3 metres.
–Slopes 3:1 or flatter.

Divided Hwys
–On fill heights less than 2 metres.
–Slopes 4:1 or flatter.

2 When the embankment protection index is greater than the protection warranted value guide rail or slope flattening is required.

FIGURE 2.5.1 Embankment Warrant Guide

2.0 Criteria Review

Road Name: *Springer Hill Road*	Study Section: *Glencolin Line to College Line*
Direction of Travel: *North to South*	Total Distance Analysed: *2.06 km*
Posted Speed: *80km/h*	AADT: *469 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

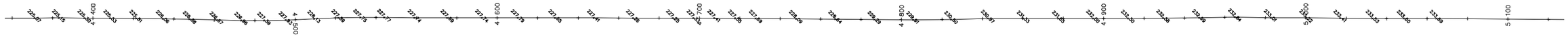
Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.6m x 2 = 7.2m - Shoulder(s): 2.0m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.2 2.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: Anderson Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	K CREST < 24 @ Sta 7+200	K crest fail
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK.	
Intersections	List of intersections within project limits	Springer Hill Road / Glencolin Line - Intersection control: - Stopping sight distance: 155-210m	Through Street. Intersection ahead sign. Sight lines & stopping distance OK.	
	List of intersections within project limits	Springer Hill Road / College Line - Intersection control: - Stopping sight distance: 155-210m	Through St. Intersection ahead sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (MTO, 2020) 3.5m (excluding cut or fill slopes)	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	Cable wire protection in place @ embankment. OK.	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK.	
Visual Aids		- Line painting: - Signage?	No lines on road.	

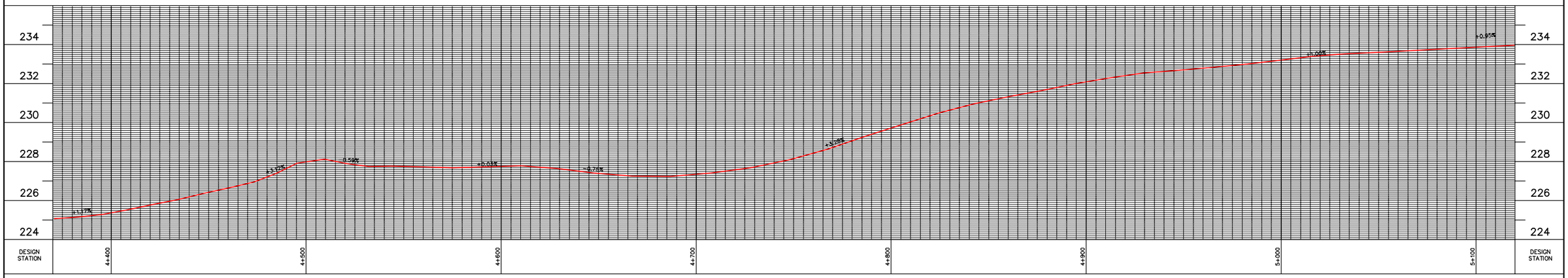
2.0 Criteria Review

Road Name: *Springer Hill Road*	Study Section: *College Line to Pressey Line*
Direction of Travel: *North to South*	Total Distance Analysed: *2.44 km*
Posted Speed: *80km/h*	AADT: *409 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 6, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.6m x 2 = 7.2m - Shoulder(s): 2.0m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.2 2.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage Ok	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	Springer Hill Road / College Line - Intersection control: - Stopping sight distance: 155-210m	Through street. Sight lines, stopping distance OK.	
	List of intersections within project limits	Springer Hill Road / Pressey Line - Intersection control: - Stopping sight distance: 155-210m	Stop sign. Stop sign ahead. ↔ Warning sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (MTO, 2020) 3.5m (excluding cut or fill slopes)	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A.	
Visual Aids		- Line painting: - Signage?	No line painted on road. "Rural Community. Please Slow Down" Unsignalled R.W. Crossing. Stop sign @ R.W. R.W. crossing markings "Stop @ Crossing" on road.	

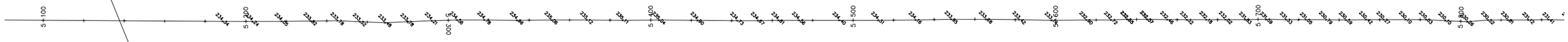
SPRINGER HILL ROAD

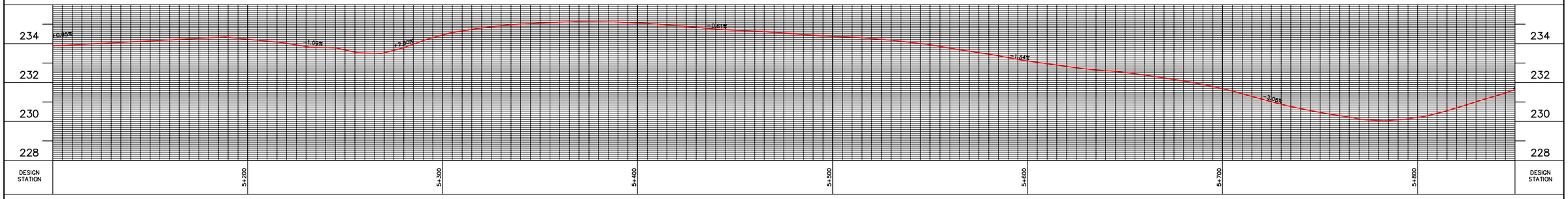




TALBOT LINE

SPRINGER HILL ROAD





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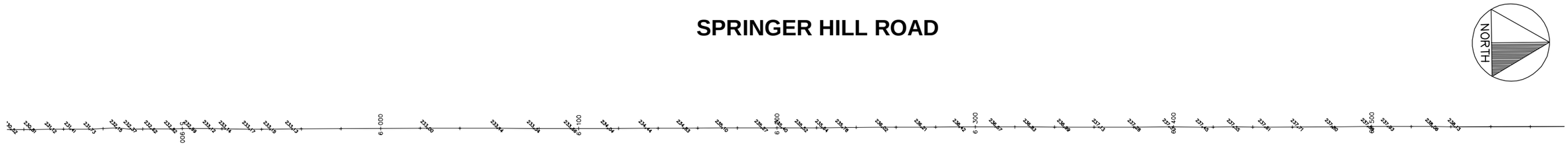
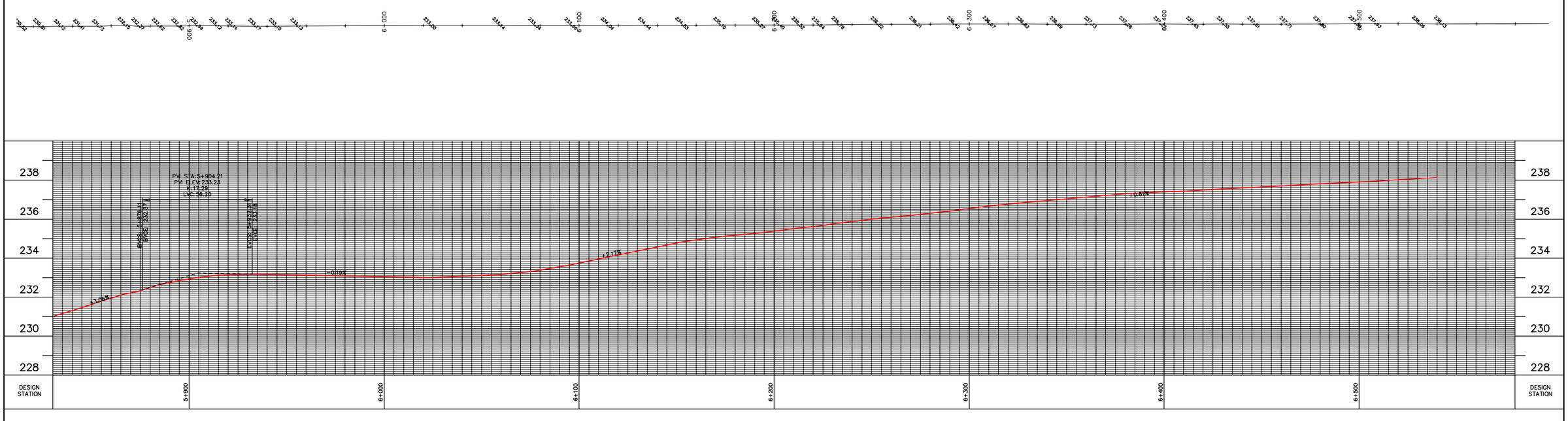
ROAD SAFETY AUDIT – PHASE 2
SPRINGER HILL ROAD
STA 4+400 TO STA 5+850

DRAWING No. **49**

SPRINGER HILL ROAD





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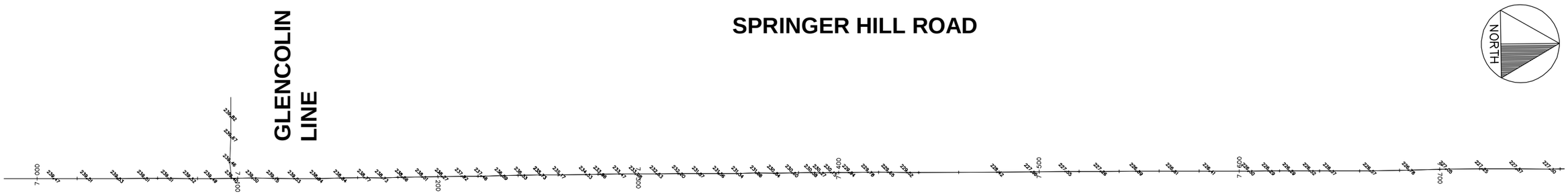
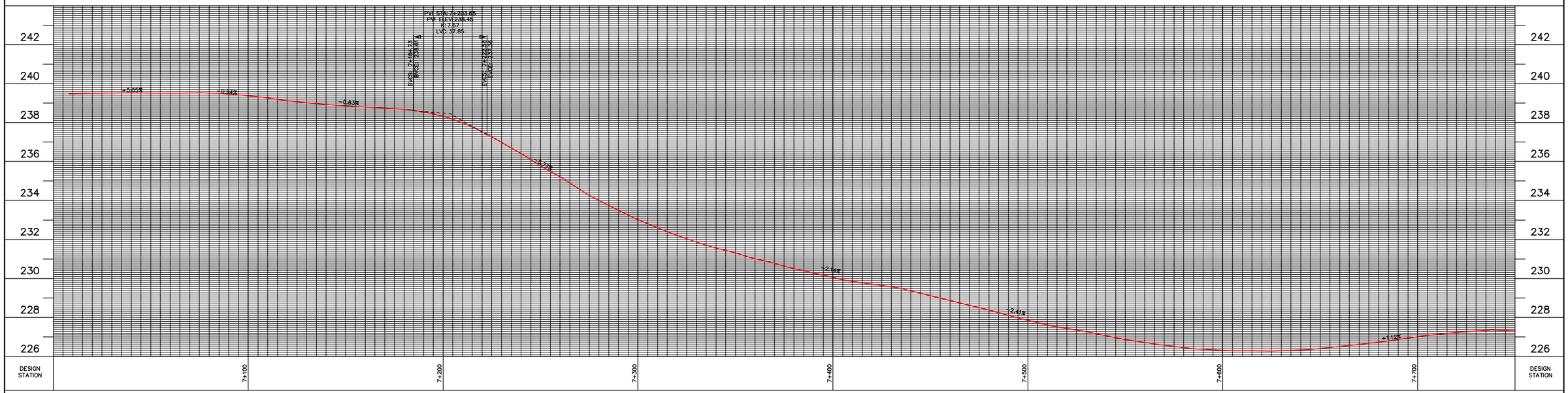
ROAD SAFETY AUDIT – PHASE 2
SPRINGER HILL ROAD
STA 5+830 TO STA 6+580

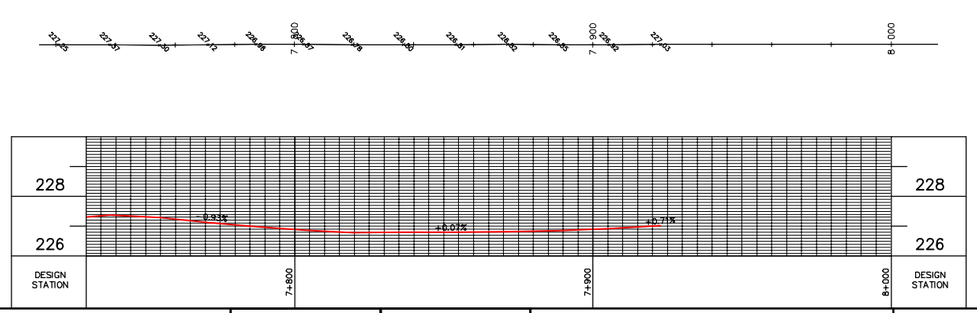
DRAWING No. **50**

SPRINGER HILL ROAD





SPRINGER HILL ROAD



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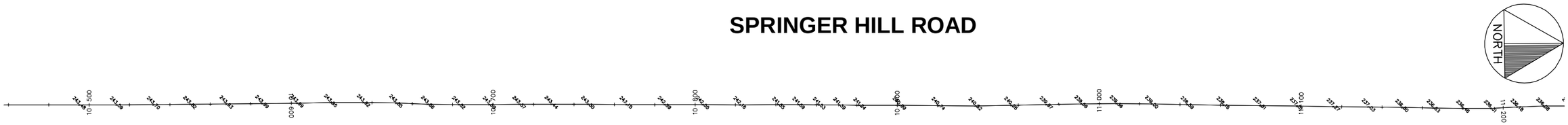
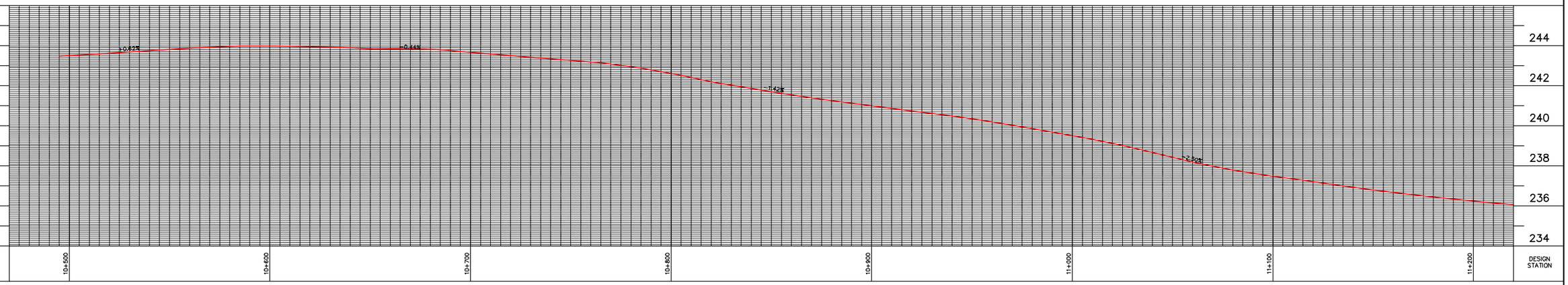
CC DJL	TWM	CC DJL
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
SPRINGER HILL ROAD
STA 7+000 TO STA 8+000

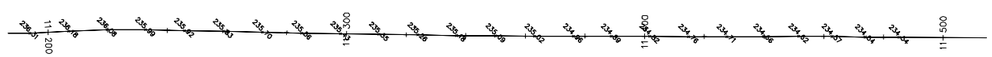
DRAWING No. 51

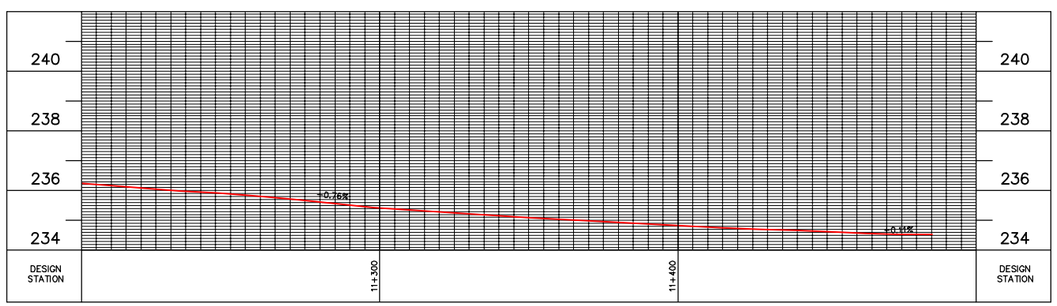
SPRINGER HILL ROAD





SPRINGER HILL ROAD





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METRIC SCALE HORIZ 1:2000, VERT. 1:200

No.	REVISION	DATE	BY

TOWNSHIP OF MALAHIDE

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PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

TOWNSHIP OF MALAHIDE
ROAD SAFETY AUDIT – PHASE 2
SPRINGER HILL ROAD
STA 10+500 TO STA 11+500

DRAWING No. **52**

Van Patter Line
Imperial Road to Hacienda Road

- Criteria Review Sheet
- Site Photographs
- Centreline Profile Drawings (53-54)

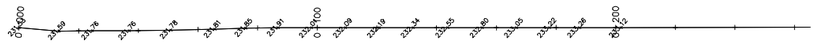
2.0 Criteria Review

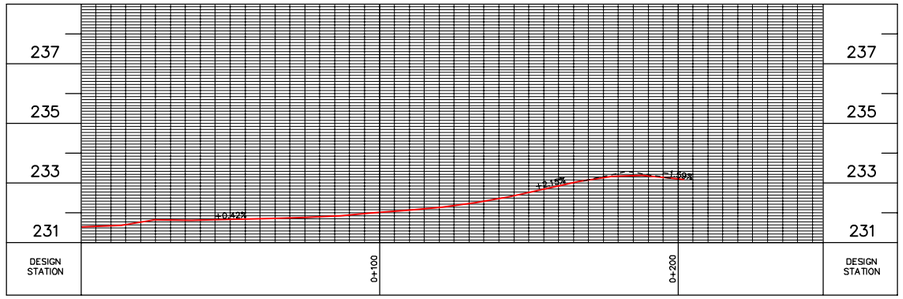
Road Name: *Van Patter Line*	Study Section: *Imperial Road to Hacienda Road*
Direction of Travel: *East to West*	Total Distance Analysed: *2.05 km*
Posted Speed: Gravel - 60km/h Assumed.	AADT: *106 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 2, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.5 m x 2 = 7.2m - Shoulder(s): 1.0m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.0 1.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Gravel OK.	
	Drainage	- Roadside swales? - Municipal Drains: Vanderendonck Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	Van Patter Line / Imperial Road - Intersection control: - Stopping sight distance: 155-210m	Stop sign. ↔ Warning sign. Sight lines, stopping distance OK.	
	List of intersections within project limits	Van Patter Line / Hacienda Road - Intersection control: - Stopping sight distance: 155-210m	Stop sign. ↔ Warning sign. Poor sightline to Southbound Hacienda.	No signage for Southbound Hacienda to Hidden intersection - HPS @ Mun No 49512
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: 3m (excluding cut or fill slopes)	Hydropole in clear zone @ 49512. Hydropole North side of road, west end	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK.	
Visual Aids		- Line painting: - Signage?	"No parking on road" @ soccer park	

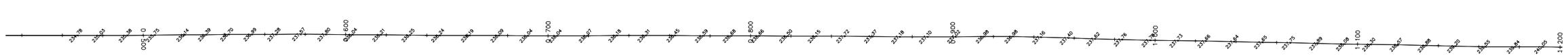
Van Patter Line – Intersection with Hacienda Road facing north. 80m sightline for southbound Hacienda Road traffic.

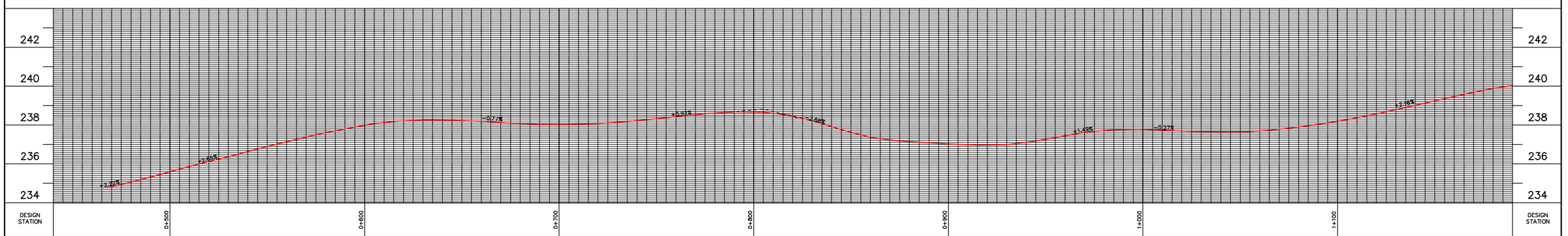
VAN PATTER LINE





VAN PATTER LINE





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No.	REVISION	DATE	BY

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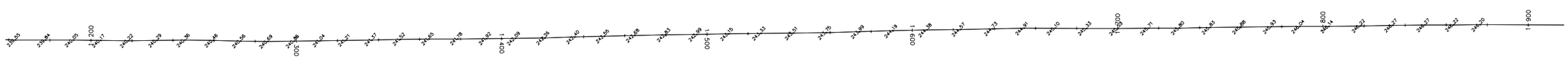
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

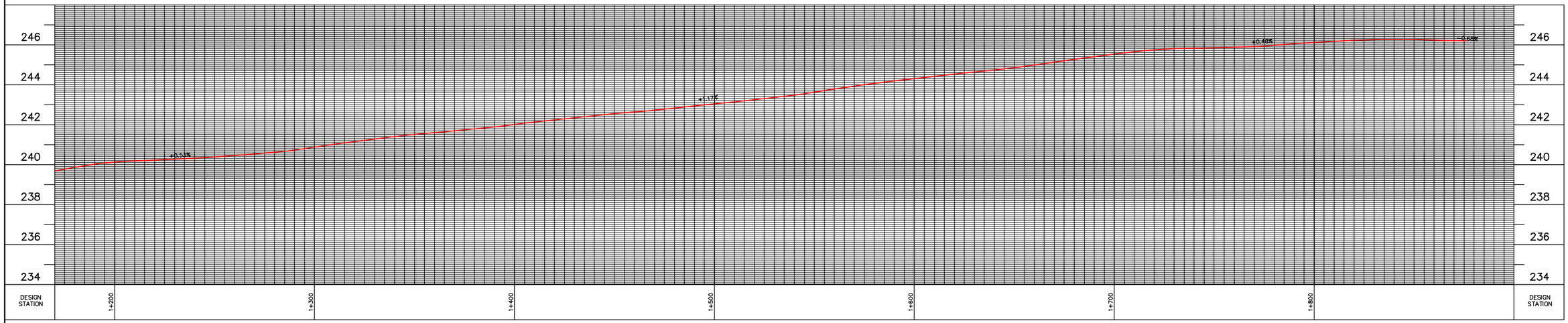
VAN PATTER LINE
STA 0+000 TO STA 1+190

DESIGN BY: CC DJL	DRAWN BY: TWM	CHECKED BY: CC DJL
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

DRAWING No. 53

VAN PATTER LINE





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No.	REVISION	DATE	BY

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TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

VAN PATTER LINE
STA 1+170 TO STA 1+900

DESIGN BY: CC DJL	DRAWN BY: TWM	CHECKED BY: CC DJL
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

DRAWING No. 54

Walker Road
Chalet Line to Ron McNeil Line

- Criteria Review Sheets
- Site Photographs
- Centreline Profile Drawings (55-58)

2.0 Criteria Review

Road Name: *Walker Road*	Study Section: *Chalet Line to Talbot Line*
Direction of Travel: *North to South*	Total Distance Analysed: *2.01 km*
Posted Speed: *80km/h*	AADT: *394 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **2.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.5 1.5 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: Partlow Drain, Learn Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	K_{CREST} <24 @: 3+600	K_{CREST} fail
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Walker Road / Chalet Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ↔ Warning sign. 100m Sight line of westbound Chalet traffic	Not deficient. could benefit from intersection ahead sign.
	List of intersections within project limits	Walker Road / Talbot Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Stopping distance OK. No signage present. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (excluding cut or fill slopes) (MTO, 2020) 3.5m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	OK	
Visual Aids		- Line painting: - Signage?	Solid yellow line. ATV Trail.	

2.0 Criteria Review

Road Name: *Walker Road*	Study Section: *Talbot Line to Glencolin Line*
Direction of Travel: *North to South*	Total Distance Analysed: *3.20 km*
Posted Speed: ~~80km/h~~ 60km/h	AADT: *240 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: 3.6m x 2 = 7.2m - Shoulder(s): 2.0m wide - Boulevard(s): 5.46m± to PL - Typ. cross-fall (lanes): 2% - Max shoulder crossfall: 4-6% - Cross-Section CL alignment: Crown Centered	7.5 1.5 OK OK	Shoulder
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK.	
	Drainage	- Roadside swales? - Municipal Drains: St. Claire Drain, Roay Drain, JW Harris Drain	Drainage OK.	
Alignment	Vertical Alignment	- Maximum road segment grades: 6-8% -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: 280 to 230m - Maximum super elevation: 4-8% (TAC, 1999)	R=426 to 665m. OK	
	Passing Sight Distance	- Min passing sight distance (AASHTO): 275-550m	OK	
	Decision Sight Distance	- Min decision sight distance: 155-230m	OK	
Intersections	List of intersections within project limits	Walker Road / Talbot Line - Intersection control: - Stopping sight distance: 155-210m	Stop sign. Sight lines, stopping distance OK	
	List of intersections within project limits	Walker Road / Glencolin Line - Intersection control: - Stopping sight distance: 155-210m	Stop sign. Sight lines, stopping distance OK	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4m (MTO, 2020) 3.5m (excluding cut or fill slopes)	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line. "Rural Settlement Area. Please Slow Down" Posted 60km/h speed limit.	

2.0 Criteria Review

Road Name: *Walker Road*	Study Section: *Glencolin Line to College Line*
Direction of Travel: *North to South*	Total Distance Analysed: *2.08 km*
Posted Speed: *Gravel. Assume 60km/h*	AADT: *134 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.0 1.5 to 1.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Gravel OK	
	Drainage	- Roadside swales? - Municipal Drains: S. Ryan Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **150 to 120m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **200-410m**	OK	
	Decision Sight Distance	- Min decision sight distance: **95-175m**	OK	
Intersections	List of intersections within project limits	Walker Road / Glencolin Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. Stopping distance, sight lines OK.	
	List of intersections within project limits	Walker Road / College Line - Intersection control: - Stopping sight distance: **155-210m**	Stop sign. ↔ Warning sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes)	OK.	
	Embankments	- Slope? - Height? - Protection required? Limits?	Embankment @ R.W. crossing. OK.	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	Bridge w/ Guard rails. OK.	
Visual Aids		- Line painting: - Signage?	No line on road. Unsignalled R.W. crossing. Stop sign @ R.W., stop sign ahead. R.W. Crossing sign.	

60km/h posted speed.

"Attention trains operating effective Dec 19, 2016"

2.0 Criteria Review

Road Name: *Walker Road*	Study Section: *College Line to Pressey Line*
Direction of Travel: *North to South*	Total Distance Analysed: *2.06 km*
Posted Speed: *Gravel. Assume 60km/h*	AADT: *93 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.2 1.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Gravel OK	
	Drainage	- Roadside swales? - Municipal Drains: S. Ryan Drain	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **150 to 120m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **200-410m**	OK	
	Decision Sight Distance	- Min decision sight distance: **95-175m**	OK	
Intersections	List of intersections within project limits	Walker Road / College Line - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. Sight lines, stopping distance OK, Pylons marking shoulder failure.	Steep drop to CB marked by temporary Pylons.
	List of intersections within project limits	Walker Road / Pressey Line - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. ↔ warning sign. Sight lines stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	No line on road.	

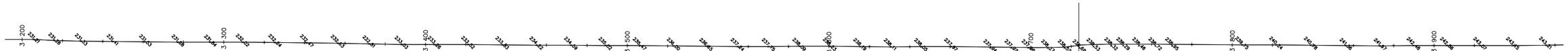
2.0 Criteria Review

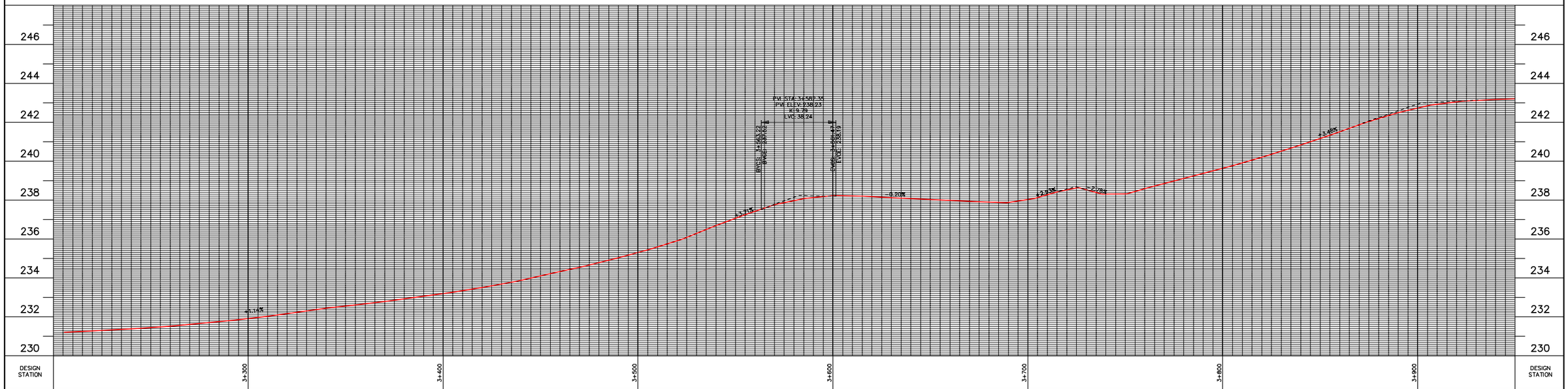
Road Name: *Walker Road*	Study Section: *Pressey Line to Ron McNeil Line*
Direction of Travel: *North to South*	Total Distance Analysed: *0.51 km*
Posted Speed: *80km/h*	AADT: *138 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.6m x 2 = 7.2m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	7.2 1.0 OK OK	
	Surface Treatment	- Comment on surface treatment	Surface treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-8%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **280 to 230m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **275-550m**	OK	
	Decision Sight Distance	- Min decision sight distance: **155-230m**	OK	
Intersections	List of intersections within project limits	Walker Road / Pressey Line - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. ↔ Warning sign. Sight lines, stopping distance OK.	
	List of intersections within project limits	Walker Road / Ron McNeil Line - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. ↔ Warning sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: (MTO, 1993) 4 m (excluding cut or fill slopes) (MTO, 2020) 3.5 m	OK	
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	Solid yellow line.	

Walker Road – Intersection with College Line

WALKER LINE





TALBOT LINE

NORTH

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No.	REVISION	DATE	BY

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PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

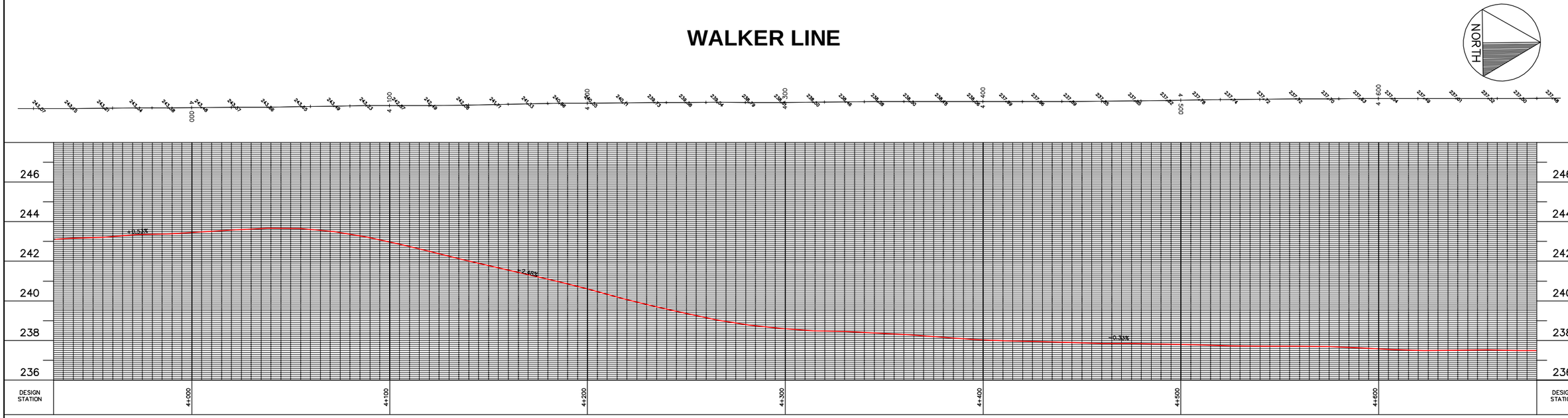
TOWNSHIP OF MALAHIDE
ROAD SAFETY AUDIT – PHASE 2

WALKER LINE

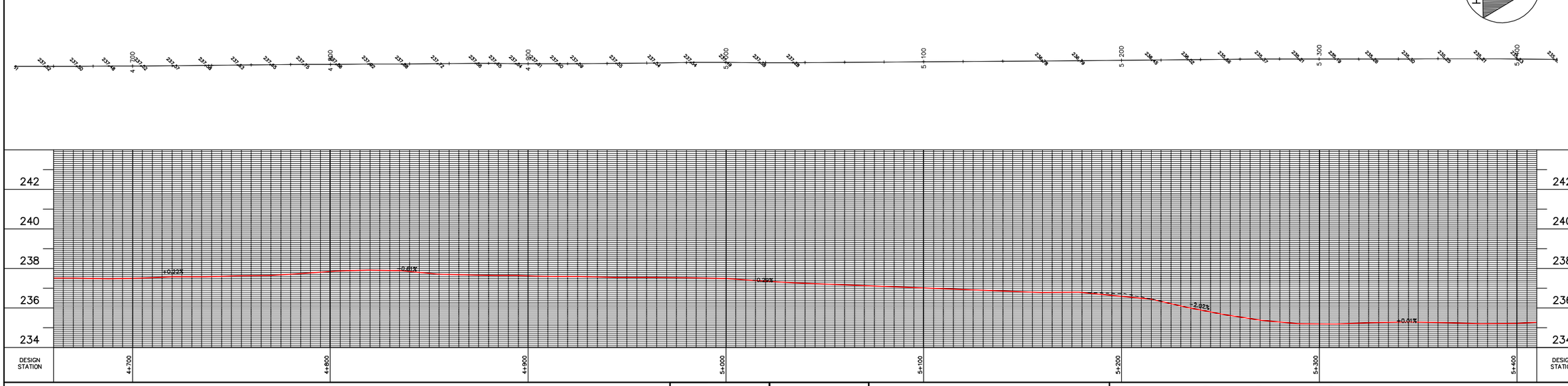
STA 3+200 TO STA 3+950

DRAWING No. **55**

WALKER LINE



WALKER LINE



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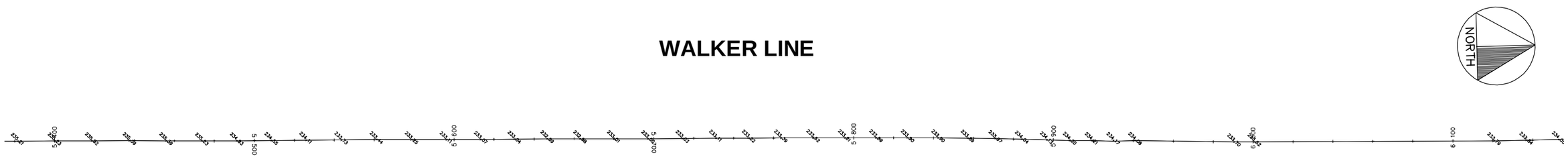
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
WALKER LINE
STA 3+930 TO STA 5+410

DESIGN BY: CC DJL	DRAWN BY: TWM	CHECKED BY: CC DJL
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

DRAWING No. **56**

WALKER LINE



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No.	REVISION	DATE	BY

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DESIGN BY: CC DJL | DRAWN BY: TWM | CHECKED BY: CC DJL

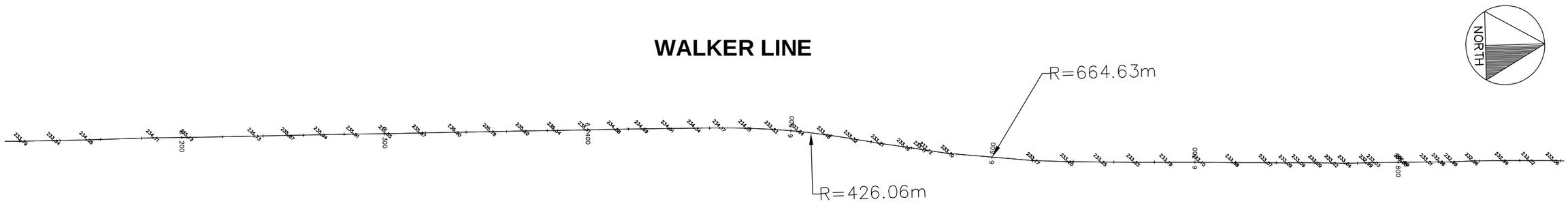
PROJECT NO. 19031 | SURVEY BY: TPM | DATE: MAR. 2021

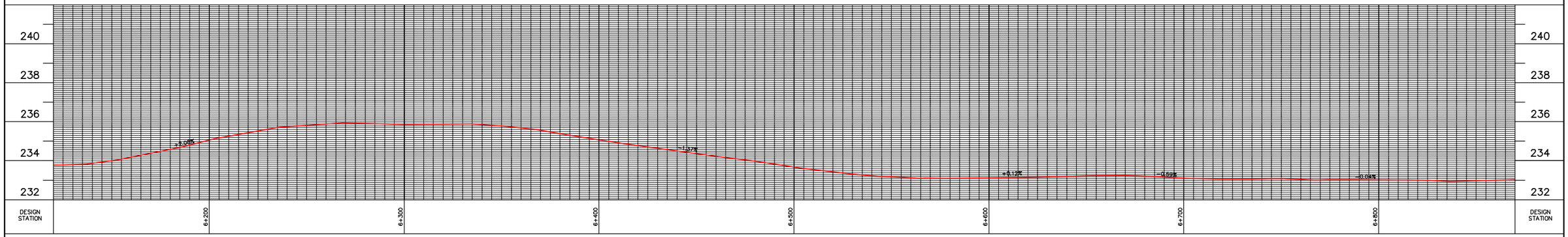
TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2

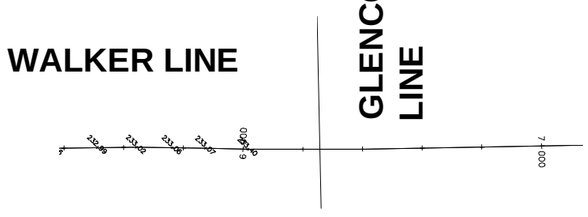
WALKER LINE
STA 5+390 TO STA 6+140

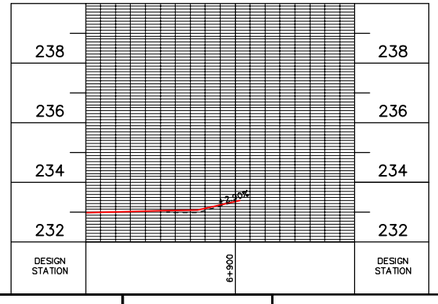
DRAWING No. 57

WALKER LINE









C. CLUETT 100214735 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

D.J. LYLE 100174772 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

METRIC SCALE HORIZ 1:2000, VERT. 1:200

No.	REVISION	DATE	BY

TOWNSHIP OF MALAHIDE

CJDL Consulting Engineers
Cyril J. Demeyere Limited
P.O. Box 460, 261 Broadway
Tillsonburg, Ontario. N4G 4H8
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TOWNSHIP OF MALIHIDE
ROAD SAFETY AUDIT – PHASE 2
WALKER LINE
STA 6+120 TO STA 6+900

DESIGN BY: CC DJL	DRAWN BY: TWM	CHECKED BY: CC DJL
PROJECT NO. 19031	SURVEY BY: TPM	DATE: MAR. 2021

DRAWING No. **58**

Weldon Street
Springwater Road to East End

- Criteria Review Sheet

2.0 Criteria Review

Road Name: *Weldon Street*	Study Section: *Springwater Road to East End*
Direction of Travel: *East to West*	Total Distance Analysed: *0.22 km*
Posted Speed: *N/A Asphalt; Assume 60km/h*	AADT: *50 (Year: 2015)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 23, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	4.6m Shoulder OK OK OK.	Width
	Surface Treatment	- Comment on surface treatment	Surface Treatment OK	
	Drainage	- Roadside swales? - Municipal Drains: N/A	Drainage OK	
Alignment	Vertical Alignment	- Maximum road segment grades: **6-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **150 to 120m** - Maximum super elevation: **4-8%** (TAC, 1999)	N/A	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **200-410m**	OK	
	Decision Sight Distance	- Min decision sight distance: **95-175m**	OK	
Intersections	List of intersections within project limits	Weldon Street / Springwater Road - Intersection control: - Stopping sight distance: **75-130m**	Stop sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	Small tree in clear zone @ Mun No 47373.	Small tree.
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	No line painted.	

Woolleyville Line
Springfield Road to East End

- Criteria Review Sheet

2.0 Criteria Review

Road Name: *Wolleyville Line*	Study Section: *Springfield Road to East End*
Direction of Travel: *East to West*	Total Distance Analysed: *1.22 km*
Posted Speed: *50km/h*	AADT: *216 (Year: 2018)*
Right-of-Way Width: *20m (66')*	Date of Site Inspection: April 3, 2020

Criteria		Design Recommendations	On-Site Observations	Deficiencies
Cross-Section	Geometry	- Cross-section lane widths: **3.5m x 2 = 7.0m** - Shoulder(s): **1.0m wide** - Boulevard(s): **5.46m± to PL** - Typ. cross-fall (lanes): **2%** - Max shoulder crossfall: **4-6%** - Cross-Section CL alignment: **Crown Centered**	6.5m 1.0 OK OK.	Width.
	Surface Treatment	- Comment on surface treatment	Surface treatment & Gravel. Some shoulder raveling.	Shoulder condition
	Drainage	- Roadside swales? - Municipal Drains: Staley Drain Wellman Branch	No roadside ditches at east end of road.	Lack of drainage for road.
Alignment	Vertical Alignment	- Maximum road segment grades: **8-12%** -Vertical curve 'K' value	OK	
	Horizontal Alignment	- Minimum design radius: **100 to 80m** - Maximum super elevation: **4-8%** (TAC, 1999)	S-bend properly marked with signs.	
	Passing Sight Distance	- Min passing sight distance (AASHTO): **160-350m**	OK	
	Decision Sight Distance	- Min decision sight distance: **75-145m**	OK	
Intersections	List of intersections within project limits	Wolleyville Line / Springfield Road - Intersection control: - Stopping sight distance: **60-110m**	Stop sign. ↔ Warning sign. Sight lines, stopping distance OK.	
Physical Objects	Clear Zone (Poles, Trees, etc.)	- Recommended clear zone: **3m** (excluding cut or fill slopes) **(0.5m if curb present)**	Hydropoles + trees in clear zone.	Hydropoles + trees.
	Embankments	- Slope? - Height? - Protection required? Limits?	N/A	
	Structures (Bridges, Culverts, etc.)	- Culverts? - Bridges?	N/A	
Visual Aids		- Line painting: - Signage?	No exit. "Pavement Ends" "Children playing" No lines painted on road.	

Posted 50km/h speed limit.