



Engineering
for people

MEMO

TO : Resort Village of North Grove

COPY TO : Jeffrey Halliday, Justen McArthur

FROM : Marc Christoffel

DATE : July 6, 2022

SUBJECT : Roadway Inspection Report

CIMA+ undertook a roadway inspection on Daniel Drive through the Resort Village of North Grove (RVNG) on June 27, 2022. The roadway was assessed considering several criteria including cross slope, embankment height, ditching, surface condition, and roadside features.

The initial intent of the inspection and this memo was to summarize field observations, provide recommendations and probable costs to improve the existing roadway to meet the same level of service with the increase of traffic generated from the Buffalo Vista development. Without any geometric or cross-sectional improvements, and with an increase in anticipated traffic, maintaining the level of service may not be possible. The intent of this memo will be to make recommendations to improve safety and maintain current operations with the anticipated traffic increase, as well as provide a cost estimate to complete the work of implementing recommendations.

At the time of inspection, the weather was sunny, with a light breeze. The roadway was in a frost-free state. Some maintenance was being completed on the roadway, including spot repairs and placement of gravel.

Within this memo and its attachments, locations are noted. For clarity 0+000 is on Daniel Drive at the centreline of Highway No. 2 and 7+100 (7 kilometres + 100 metres) is at the turnaround in Buffalo Vista.

In general, the roadway is in fair condition. Issues related to the road network in general include:

- Lack of warning and regulatory signage
- Poor lines of sight through both vertical and horizontal curves
- Substandard roadway width
- Lack of a surfacing structure to provide support for the roadway surface
- Insufficient ditch/lack of grade causing a saturated road substructure
- Undersized, improperly functioning, or complete absence of culverts at key drainage locations resulting in a weakened surface and substructure

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Although the absence of culverts and lack of ditch and grade height may cause concerns and may pose a safety risk, they will not be part of this assessment. It should be noted that in instances of inclement weather where overland drainage exists, it is possible that in an emergency circumstance, emergency vehicles may be delayed.

The width of the road varied between approximately 4.0 m and 6.0 m within the RVNG and is comprised of a sealed surface. To the north, the roadway had an approximate width of 8 m which appeared to be partially sealed, and to the south through Buffalo Vista development, a gravel surface of approximately 7.0 m. Roadway widths of less than 4.0 m can not be considered a two-way road, so it is critical that the road maintains its current width and the edges are not allowed to deteriorate. The cross slope of the road appeared to vary but did not appear to have locations that would consistently have water ponding.

There are several regulatory speed signs, as well as some warning signs throughout the roadway. The signs appear to be placed inconsistently and should be adjusted to achieve a more consistent flow. It was also noted that some signs appeared on the left side of the road rather than the right, which is not standard for a two-way road.

There are some traffic calming measures located throughout the roadway by means of pinned rubber speed bumps. It is recommended that if speed bumps are desired, they be constructed of asphalt and include a warning sign with them.

This roadway has several horizontal and vertical curves. There are approximately 23 horizontal curves that have substandard geometry based off a design speed of 50 km/h (posted speed of 40 km/h). Compounding the issue, many of these horizontal curves are located within vertical curves which are also substandard. It is recommended that the posted speed is lowered to 30 km/h from 2+150 to 6+500. This would reduce the number of substandard curves along the roadway. Many of the vertical curves are also substandard, with a lower posted speed of 30 km/h (design speed of 40 km/h) there would be an improved the level of safety.

The following items are recommendations for improvements on Daniel Drive to improve the level of safety.

Guard Rail

The most immediate concern in respect to the roadway is the lack of guard rail at select locations. There are several locations with a steep drop off near the edge of the roadway. A w-beam guard rail is recommended in areas with steep drop offs on the edge of the roadway. A guard rail will increase the likelihood that a vehicle will remain within the limits of the roadway if it is headed astray.

Warning Signage

The roadway through RVNG will require an increased amount of warning signage to make motorists aware of upcoming hazards. Hazards that require identification include:

- Road narrows

- Winding road
- Speed hump
- Low overhead clearance

In addition to the signs installed, the other existing warning signs should be removed. The more signs that exist along the roadway, the more they may begin to be ignored by motorists.

Regulatory Signs

It is recommended that the posted speed be changed from 40 km/h to 30 km/h. This will bring many of the horizontal and vertical curves to an acceptable standard without adjusting the geometry of the roadway. Although many of the curves will still not be within specification, additional measures such as warning signage and guard rails should be implemented.

In addition to the signs installed, the other existing signs should be removed.

Tree and Shrub Pruning

During the site visit, it was very difficult to see around corners where there were trees and shrubs present. It is recommended that trees and shrubs are pruned to at least 2.0 m from the edge of the road edge in all locations. To increase sight distance around the radii of curves, it would be in the best interest of RVNG to prune or clear trees as far as reasonably practical.

Miscellaneous Improvements

Some additional improvements that could be considered by RVNG to improve operations of the roadway include:

Installation of permanent speed humps. Currently there are three locations where a temporary solution exists. Their placement appears to be near the entrance to the resort village, and then perhaps at problem areas. It may also be beneficial to install permanent speed bumps near either edge of the playground. This location is one of the flattest areas without curves and with a higher probability of pedestrian (mainly children) and vehicle conflict

Where practical, some widening around tight curves would be recommended. The extremely tight radii present leave very difficult driving conditions for two vehicles meeting on the curves. With the roadway being of a substandard width in general, any additional width would greatly decrease the likelihood of a collision. In this case, a roadway widening would include some granular base with a seal coat to match the adjacent road.

Near station 3+500 there are two waste disposal bins that are situated just off the edge of the roadway. It would be assumed that when emptied, the waste disposal truck would be blocking the roadway. It is recommended that these bins be moved to a location where the roadway would remain clear. There is a flat area on the opposite side of the road that would provide adequate area for vehicles to stop to empty waste, as well as the waste disposal truck to load and unload the bins. Although not required, a gravel area of approximately 500 m² may provide a better experience if the weather is wet for both the residents and the waste disposal contractor.

There are several locations that have reasonable low overhead lines that may pose problems for delivery vehicles. With the construction of new homes in the Buffalo Vista development, larger loads of varying height may exist, at a minimum these should be signed accordingly, ideally raised if possible.

Finally, installation of poly posts around some tight radii curves where there is adequate distance to the edge of the bank of the lake. These posts would be reflective in nature and aid night conditions, guiding motorists around the curve safely.

A cost estimate breakdown is included for the Resort Village of North Grove. Further details for descriptions and locations of quantities are attached at the end of this memo.

Cost Estimate of Recommendations for Safety Improvements in the Resort Village of North Grove					
NO.	DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	AMOUNT
1	Roadway Improvements				
0.1	Warning Signs	each	\$500	30	\$15,000
0.2	Regulatory Signs	each	\$500	9	\$4,500
0.3	Guard Rail	lin. m	\$275	475	\$130,625
0.4	Speed Hump	each	\$2,500	5	\$12,500
0.5	Pavement Widening	sq. m	\$70	425	\$29,750
0.6	Tree and Bush Pruning	lump sum	\$50,000	1	\$50,000
0.7	Waste Disposal Relocation, including gravel (500m ²)	each	\$1,500	1	\$1,500
0.8	Poly Posts	lin. m	\$20	50	\$1,000
	Total Estimate				\$244,875



Figure 1 - Temporary speed bump that is recommended to be replaced by a permanent speed bump



Figure 2 - Playground location, recommendation to have speed hump and signs located on the correct side of the road



Figure 3 - Location of waste bins recommended to be moved on other side of the road to not obstruct roadway when being loaded/unloaded



Figure 4 - Location where widening can occur with the addition of reflective poly posts



Figure 5 - Location of a low overhead power line, recommended that low clearance warning signs installed in both directions



Figure 6 - Location where a slight widening and guard rail is recommended

Schedule of Recommendations for Safety Improvements in the Resort Village of North Grove						
Warning Signs		Sign	Tab	Location	Direction	Quantity (each)
		Road Narrows		2+100	SB	1
		Speed Hump		2+200	NB/SB	2
		XX Clearance		2+850	NB/SB	2
		Playground		3+025	SB	1
		Speed Hump		3+075	NB/SB	2
		Speed Hump		3+140	NB/SB	2
		Playground		3+190	NB	1
		Winding Road	Next 3 km	3+250	SB	1
		XX Clearance		3+500	NB/SB	2
		Winding Road	Next 3 km	3+550	NB	1
		Winding Road	Next 3 km	3+600	SB	1
		XX Clearance		4+200	NB/SB	2
		XX Clearance		4+800	NB/SB	2
		Speed Hump		5+225	NB/SB	2
		Speed Hump		5+360	NB/SB	2
		Winding Road	Next 1 km	5+990	NB	1
		Road Narrows		6+600	NB	1
					Total	30
Regulatory Signs		Details	Description	Location	Direction	Quantity (each)
		Stop		0+330	Cross Road	1
		Stop		1+740	Cross Road	1
		Stop		1+940	Cross Road	1
		Speed	30	2+140	SB	1
		Weight Restriction	8 tonnes	2+140	SB	1
		Stop		3+400	Cross Road	1
		Stop		3+575	Cross Road	1
		Speed	30	6+500	NB	1
		Weight Restriction	8 tonnes	6+500	NB	1
					Total	9
Guard Rail		Details		Location	Direction	Quantity (lin. m)
		Guard Rail		4+200	SB	150
		Guard Rail		4+375	SB	200
		Guard Rail		5+825	SB	125
					Total	475
Speed Hump		Details		Location	Direction	Quantity (each)
		Speed Hump		2+200	NB/SB	1
		Speed Hump		3+075	NB/SB	1
		Speed Hump		3+140	NB/SB	1
		Speed Hump		5+225	NB/SB	1
		Speed Hump		5+360	NB/SB	1
					Total	5
Pavement Widening		Details		Location	Direction	Quantity (sq. m)
		Pavement Widening		3+730		250
		Pavement Widening		4+075		125
		Pavement Widening		4+660		50
					Total	425
Tree and Bush Pruning		Details		Location	Direction	Quantity (m²)
		Tree and Bush Pruning		Select Areas		1000
					Total	1000
Poly Posts		Details		Location	Direction	Quantity (lin. m)
		Poly Posts		3+730		50
					Total	50
Waste Disposal Relocation, including gravel (500m²)		Details	Comments	Location	Direction	Quantity (each)
		Waste Disposal Relocation		3+470	NB	1
					Total	1