

APPENDIX H

ROAD SAFETY AUDIT (CIMA+)

**If technical reports are required in an alternative format for accessibility needs,
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Region of Niagara

Road Safety Audit – Preliminary Design Stage

Regional Road 20 - Lundy's Lane

Montrose Road to Highland Avenue



CIMA+ file number: Z0015947
November 2024 – Final Report



Region of Niagara

Road Safety Audit – Functional Design Stage

Regional Road 20 - Lundy's Lane

Montrose Road to Highland Avenue

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1. Introduction

CIMA Canada Inc. (CIMA+) has completed a preliminary design stage road safety audit (RSA) for the proposed widening of Regional Road 20 – Lundy’s Lane between Montrose Road and Highland Avenue in the City of Niagara Falls that was developed as part of a Municipal Class Environmental Assessment. This report documents the findings of this audit and any suggested improvements associated with these findings.

1.1 Project Background

A section of Regional Road 20 – Lundy’s Lane is undergoing a Municipal Class Environmental Assessment. The study limits are between Montrose Road and Highland Avenue in the City of Niagara Falls. This 1.7 km section is characterized as a high-volume multi-lane arterial roadway that carries two through lanes in each direction. Major crossing roadways are signalized, and auxiliary turn lanes are provided, specifically at Montrose Road, Belmont Avenue/Niagara Falls Inn, Royal Manor Drive, Dorchester Road and Highland Avenue/No Frills Plaza. Lundy’s Lane crosses the QEW and a hydro canal in the west end of the study limits. Sidewalks are provided on both sides of the corridor; however no dedicated cycling facilities are provided. Adjacent lane use is characterized as being predominantly commercial and caters to tourists with a large number of hotels, motels and restaurants. As a result, there are many accesses located along the corridor.

A Long-Term Transportation Needs Assessment prepared by Paradigm Transportation Solutions identified safety and operational enhancements to the corridor, as outlined in **Table 1**.

Table 1 – Safety and operational enhancements

Item	Enhancement
Safety	• Pedestrian signal or crossover installed on Regional Road 20 between Dorchester Road and Highland Avenue • Two-way centre left-turn lane • Shadow lane on the eastbound approach to improve visibility for left-turn movements on Lundy’s Lane at Dorchester Road • Increased storage for eastbound and westbound movements on Lundy’s Lane at Montrose Road • Removal of the westbound channelized right turn lane on Lundy’s Lane at Montrose Road • Elimination of closely spaced accesses
Operational	• Five lane cross section (two through lanes with two-way centre left-turn lane) • Improvements to auxiliary turn lane storage at Montrose Road, Belmont Avenue/Niagara Falls Inn, Royal Manor Drive, Dorchester Road, Highland Avenue/No Frills Plaza • Northbound and southbound right turn lane at Dorchester Road

Separate facilities for cyclists, while considered desirable, were not considered feasible to implement given right of way constraints. Share the road signing or alternate wayfinding signing directing cyclists to use alternate parallel routes was identified as a possible solution.

1.2 Road Safety Audit Focus

2. The Road Safety Audit Process

This RSA was undertaken in accordance with the Transportation Association of Canada's *Canadian Road Safety Audit Guide* (December 2001). The steps to the RSA process were as follows:

- + Step 1 – Audit start-up meeting on July 9th, 2024 with the project owner (Region of Niagara) to exchange project information, (i.e., functional plans and supporting documents, project constraints, construction status, known deficiencies, and other information).
- + Step 2 – Site visit by the audit team completed on July 18, 2024. Video footage was captured along Lundy's Lane and major crossing roadways to supplement observations made during the site visit allowing the audit team to revisit the study area and identify other potential concerns outside of making observations during live traffic.
- + Step 3 – Audit analysis by the RSA team in a workshop setting. There are no members of the design team present during this analysis to ensure the required independence of the RSA team and process.
- + Step 4 – Preparation of the audit report to highlight the safety issues and provide suggestions. This audit report becomes part of the project documentation.
- + Step 5 – Presentation of findings at a meeting with the project owner (Region of Niagara).
- + Step 6 – Preparation of responses by the project owner (Region of Niagara) outlining actions or justification for implementing or not implementing the suggested improvements/revisions to the current design.

Ultimately, the implementation of any suggested improvements are the responsibility of the Region of Niagara. An important aspect to this audit is for the Region to prepare a response to the suggested improvements within the context of the overall project constraints (budget, risk management, etc.) outlining what action will be taken to address each of the audit findings. This response report becomes part of the project documentation.

The presentation of the audit findings documented in this report under Step 5, allows for Step 6 to be incorporated as part of this report documentation for a single point of source.

2.1 Road Safety Audit Team

The RSA team was made up of qualified individuals who have experience in roadway design, traffic engineering, safety audits/assessments, human factors considerations, and active transportation requirements. The individual team members are:

- + Jeffrey Suggett, M.Sc., Senior Project Manager and Road Safety Auditor, CIMA+
- + Sheetal Thukral, P. Eng., Project Engineer and Road Safety Auditor, CIMA+

Team members employed by CIMA+ are transportation specialists who have not been involved in the work completed by the design team (UEM) or the Region. Each senior team member has completed RSA training courses of two days or longer and have greater than 15 years of experience in their relevant transportation fields.

2.2 Available Documents

Several documents were provided by the Region to the audit team for review and consideration as part of this audit. These documents include those following:

- + Paradigm Traffic Solutions, Reconstruction of Regional Road 20 between Highland Avenue and Montrose Road, Environmental Assessment, City of Niagara Falls – Long-Term Transportation Needs Assessment, May 2024
- + ARA Ltd, Cultural Heritage Assessment Report, January 2022
- + Detritus Consulting Ltd, Stage 1 Archaeological Assessment, April 2022
- + UEM, Property Entrance/Exit Consolidation Evaluation Memo, February 2022
- + Driveway Consolidation Letters, various dates
- + Preliminary Design Drawing Package prepared by UEM, July 2023
- + Lundy's Lane at Dorchester Road design drawings – Options A and D, undated

2.3 Step 1 – Start-Up Meeting Notes

A meeting was held on July 9th, 2024 with the project owner to gain a better understanding of the study site, scope of the road safety audit and constraints. The following was noted:

- + The existing roadway has a narrow right of way (19.0 metres), with the preferred design, the right of way has been widened to 26.2 metres (labelled as 'current needs ROW' and marked in red) and the ultimate right of way is 30.5 metres and is marked in blue
- + With the expanded right of way, parking will be impacted in front of several buildings
- + The right of way is constrained across the QEW, the hydro canal and in front of the cemetery located on the north side of Lundy's Lane east of Montrose Road and there is limited opportunity for improvements in these areas
- + CIMA+ was directed to identify any additional driveway closures that should be considered; a few locations have already been identified as a result of negotiations with property owners along the study corridor and are indicated in the drawing package
- + Four alternative options have been proposed for the intersection of Lundy's Lane and Dorchester Road that include the addition of medians, on street cycling lanes and a right turn lane; CIMA was directed to evaluate the options from a safety prespective

3. Evaluation of Options at Lundy's Lane and Dorchester Road

CIMA+ reviewed the four alternative design options provided at the intersection of Lundy's Lane and Dorchester Road from a safety perspective along with the preferred option in consideration of a number of criteria. The preferred option shows no change to the cross section on the four approaches to the intersection, however the curb radius on the four approaches has been widened to 14.0 metres. None of the options show any change to the cross section on the east and west approaches (Lundy's Lane), all of the options impact the cross section on the north and south approaches (Dorchester Road), therefore the focus of the review was on the Dorchester Road approaches. The following differences were noted with the four design options:

- + **Option A** – Centre medians added to north and south approaches
- + **Option B** – Centre medians and cycling lanes added to north and south approaches
- + **Option C** – Centre medians and right turn lanes added to north and south approaches

- + **Option D** – Centre medians, cycling lanes and right turn lanes added to north and south approaches

The following criteria were used in the evaluation:

- + **Pedestrian Safety** – Exposure to traffic while crossing intersection, potential for right turn on red conflicts
- + **Bicycle Safety** – Dedicated space for cyclists, potential for conflicts between turning vehicles and cyclists
- + **Sightlines** – Sightlines for opposing left turns on north and south approaches
- + **Heavy Vehicles and Transit** – Potential for off tracking into an adjacent lane / conflict with medians with introduction of median on north and south approaches
- + **Traffic Operations** – Impact on congestion under future conditions and congestion related collisions (i.e. rear end collisions)
- + **Accesses Conflicts** – Access related conflicts (i.e. accesses to 5900 Dorchester Road immediately south of intersection)

Table 2 on the following page presents our evaluation of the preferred option together with the four alternative options. Each option was scored as either **PREFERRED** (offering the highest degree of safety for the criteria being evaluated), **LESS PREFERRED** (offering a lesser degree of safety) for the criteria being evaluated or **LEAST PREFERRED** (offering the least degree of safety) for the criteria being evaluated. The evaluation did not consider other factors unrelated to safety, such as cost implications or constructability.

Of the options evaluated, the option that has the most favourable outcome was Option B (Median and Bicycle Lanes). This option scored as the **PREFERRED** option for the bicycle safety and sightline criteria and **LESS PREFERRED** for pedestrian safety, heavy vehicles and transit, traffic operations and access conflict criteria. This option did not score as **LEAST PREFERRED** for any criteria.

If the Region wished to proceed with this option, some further considerations to further improve safety would be to:

- + Review the need to decrease the curb radius to minimize (to the extent possible) the pedestrian crossing distance and vehicle turning speeds. This could be done in conjunction with implementing the stop bar for vehicular traffic at a greater setback relative to the stop bar for bicycles.
- + Review the potential of providing a painted buffer between the bicycle lane and the vehicular traffic lane.
- + Review the swept path of commercial vehicles in the context of heavy vehicles and transit (with the addition of the median on the north and south approaches)
- + Review opportunities to reduce northbound and southbound congestion through signal timing adjustments
- + Eliminate the northernmost access to 5900 Dorchester Road to mitigate conflicts between cyclists and motorists and highlight the presence of cyclists at the southern access through pavement markings and signs

Further safety improvements to this intersection are presented in the findings table attached as **Appendix A**.

Table 2 – Evaluation of Options

Criteria	Preferred Alternative	Option A (Median)	Option B (Median and Bicycle Lanes)	Option C (Median and Right Turn Lane)	Option D (Median, Bicycle Lanes and Right Turn Lanes)
Pedestrian Safety	• Shortest pedestrian crossing distance on north and south legs	• Slightly increased pedestrian crossing distance due to median	• Increased pedestrian crossing distance due to median and bicycle lanes	• Increased pedestrian crossing distance due to median and right turn lane • Higher likelihood of right turn on red conflicts	• Significantly increased pedestrian crossing distance due to median, bicycle lanes and right turn lanes • Higher likelihood of right turn on red conflicts
	PREFERRED	LESS PREFERRED	LESS PREFERRED	LESS PREFERRED	LEAST PREFERRED
Bicycle Safety	• No on-street facilities provided for cyclists	• No on-street facilities provided for cyclists	• Dedicated on-street facilities for cyclists	• No on-street facilities provided for cyclists	• Dedicated on-street facilities for cyclists, however higher potential for conflicts between right turning vehicles and cyclists
	LEAST PREFERRED	LEAST PREFERRED	PREFERRED	LEAST PREFERRED	LESS PREFERRED
Sightlines	• No change in offset for opposing left turn lanes	• Increase in offset for opposing left turn lanes (providing improvement in sightlines for opposing left turns)	• Increase in offset for opposing left turn lanes (providing improvement in sightlines for opposing left turns)	• Increase in offset for opposing left turn lanes (providing improvement in sightlines for opposing left turns)	• Increase in offset for opposing left turn lanes (providing improvement in sightlines for opposing left turns)
	LESS PREFERRED	PREFERRED	PREFERRED	PREFERRED	PREFERRED
Heavy Vehicles and Transit	• Lowest potential for off tracking for heavy vehicles and transit	• Highest potential for off tracking for heavy vehicles and transit	• Increased potential for off tracking for heavy vehicles and transit	• Highest potential for off tracking for heavy vehicles and transit	• Increased potential for off tracking for heavy vehicles and transit
	PREFERRED	LEAST PREFERRED	LESS PREFERRED	LEAST PREFERRED	LESS PREFERRED

Criteria	Preferred Alternative	Option A (Median)	Option B (Median and Bicycle Lanes)	Option C (Median and Right Turn Lane)	Option D (Median, Bicycle Lanes and Right Turn Lanes)
Traffic Operations	Increased potential for congestion given no dedicated northbound and southbound right turn lane	Increased potential for congestion given no dedicated northbound and southbound right turn lane	Increased potential for congestion given no dedicated northbound and southbound right turn lane	Decreased potential for congestion given presence of northbound and southbound right turn lane	Increased potential for congestion given no dedicated northbound and southbound right turn lane
	LESS PREFERRED	LESS PREFERRED	LESS PREFERRED	PREFERRED	PREFERRED
Access Conflicts (5900 Dorchester Road)	Lowest potential for access related conflicts	Lowest potential for access related conflicts	- Increased potential for access related conflicts - Additional requirement to cross bicycle lane to access northbound left turn lane	- Increased potential for access related conflicts - Additional requirement to cross right turn lane to access northbound left turn lane	- Highest potential for access related conflicts - Additional requirement to cross right turn lane and bicycle lane to access northbound left turn lane
	PREFERRED	PREFERRED	LESS PREFERRED	LESS PREFERRED	LEAST PREFERRED

4. Findings and Suggested Improvements

The findings of this audit have been provided in tabular format to aid in the organization of comments and facilitation of discussion. There are seven columns that document the audit findings and associated design team responses. The issues identified through this audit process have been presented in terms of the progressing through the study corridor from west to east, following the same progression as the preliminary plans.

- + **Column 1:** Issue # – identifies the issue number. Issues are presented in no order of preference or perceived safety concern.
- + **Column 2:** Location – identifies the specific location to which an issue applies or in the case of widespread application to many locations or the entire study corridor, 'Various locations' or 'General' has been used.
- + **Column 3:** Safety Issue – states the audit findings in terms of perceived safety issues or concerns related to the current facility that could be improved upon beyond baseline conditions.
- + **Column 4:** Photo – provides a screenshot or photo to illustrate the identified safety issue or design concern (where applicable).
- + **Column 5:** Suggested Action – indicates a suggested improvement measure that the Project Owner should consider addressing the perceived safety issue.
- + **Column 6:** Project Owner Response – captures comments that justify the current facility and infrastructure choices or need to consider a modification based on the audit findings and/or project constraints.
- + **Column 7:** Resolution (completed by the Audit Team) – provides an opinion from the audit team indicating whether the desired course of action to resolve the safety issue appears appropriate. This might include the Owner's full acceptance, partial acceptance, rejection of the suggested action, or deferral to a later and more appropriate stage of the design process.

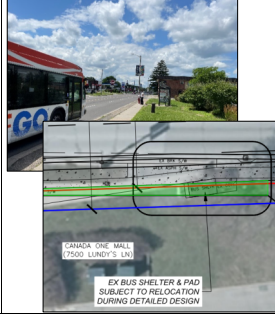
A copy of the project owner responses and subsequent opinion of resolution has been captured in this report. It indicates completion of the entire audit process and finalization of the audit documentation for the portion to which this audit has focused on.

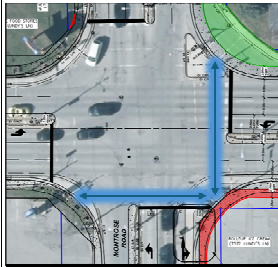
The audit findings are contained in the table format and are appended to the back of this report as **Appendix A**.

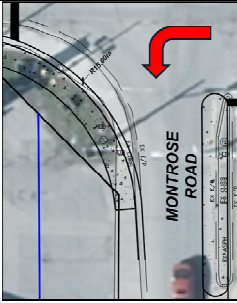
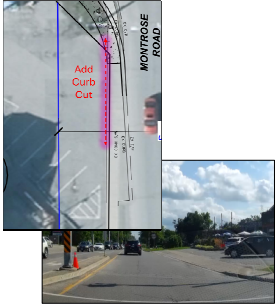
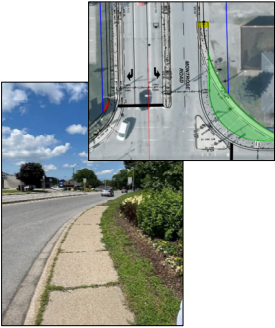
5. Concluding Statement

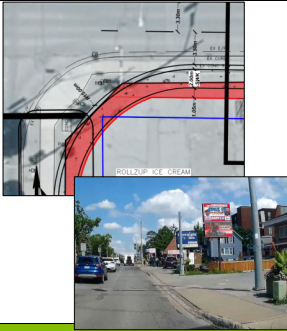
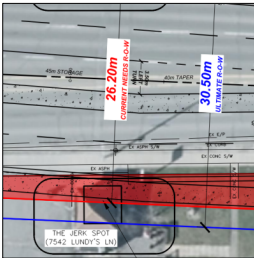
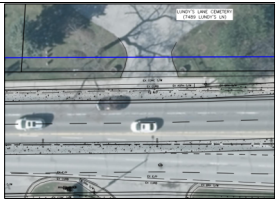
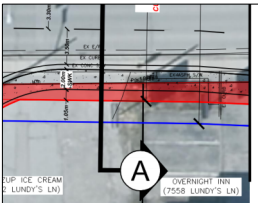
An RSA at the functional design stage has been completed. The auditors have identified potential safety issues related to road user expectations and workload, clarifications with respect to various aspects of the existing facility, and elements that could contribute to collisions if remedial action is not taken. The auditors have provided suggestions to correct noted issues; however, it is at the discretion of the Owner to determine the appropriate mitigation measures and corrective actions to be taken based on tangible and intangible project constraints.

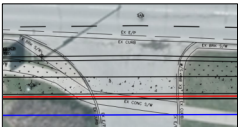
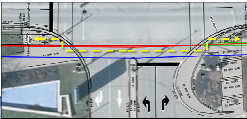
APPENDIX A – FINDINGS TABLE

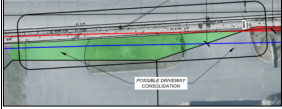
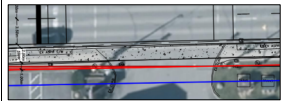
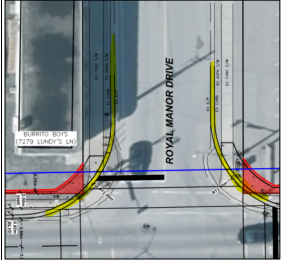
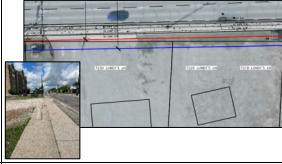
Issue #	Sheet #	Location	Safety Issue	Photo	Suggested Action/Proposed Concept	Project Owner Response	Resolution
LUNDY'S LANE - GENERAL							
1	All	All Intersections	Drop curbs and tactile strips are not shown in the drawing package at any of the intersections. In many cases, their location will need to be adjusted. Currently, there are little or no tactile strips present at the crosswalk locations throughout the study corridor.		Ensure in detailed design that drop curbs and tactile strips will be included to facilitate safe and accessible pedestrian movements across the legs at each intersection.	Agree with Suggested Action/Proposed concept, detailed design consultant will include drop curbs and tactile plates within the proposed project area/reconstruction	Resolved
2	All	Bus stop locations	Throughout the drawing package, notes are provided indicating that bus stops, bus shelters and pads are subject to relocation during detailed design. To discourage unsafe pedestrian movements across Lundy's Lane at midblock locations (to catch a bus), effort should be put into relocating the bus stops as close as feasible to a controlled crossing. During the site visit, pedestrians were observed crossing Lundy's Lane at uncontrolled locations prior to embarking on a bus/after disembarking from a bus.		Ensure as part of the detailed design that bus stops are reviewed in the context of nearby controlled crossing locations. Every effort should be made to place bus stops near intersections to discourage midblock pedestrian movements.	Agree with Suggested Action/Proposed concept, detailed design consultant will evaluate possible improvements to bus stop locations will be made when/where possible in coordination with Niagara Transit.	Resolved
3	All	All commercial accesses	With the widened cross section and the relocation of the sidewalk, existing commercial signs and vegetation may introduce a sight line issue (for vehicles exiting accesses and pedestrians crossing accesses).		Ensure as part of the detailed design that existing commercial signs and vegetation do not present a sightline issue for vehicles exiting an access or pedestrians crossing an access.	Agree with Suggested Action/Proposed concept, detailed design consultant will evaluate and remediate locations with sightline issues, inventory of potential problematic signs required (will be produced during detailed design)	Resolved
4	All	Midblock sections	Existing commercial signs and other fixed objects may now be within the clear zone as a result of the widening of Lundy's Lane.		Ensure as part of the detailed design that existing commercial signs and other fixed objects are reviewed in context of the expanded clear zone.	Agree with Suggested Action/Proposed concept, detailed design consultant will evaluate locations with signs/objects/clear zone issues, pylon signs on private property have permits. As part of the project, may need to identify which signs and the Region relocate at Region cost.	Resolved

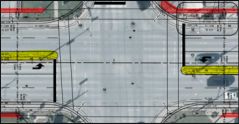
Issue #	Sheet #	Location	Safety Issue	Photo	Suggested Action/Proposed Concept	Project Owner Response	Resolution
5	All	Various - Brookfield Avenue (north and south leg), Moulnd Avenue, Depew Avenue, Corwin Avenue, Carlton Avenue, Prince Edward Avenue, Byng Avenue, Franklin Avenue and Glenholme Avenue.	At a number of local unsignalized intersections along the corridor, the curb radius has been increased to 10.0 metres. While this may reflect current Regional standards, as a result of this, vehicle turning speeds to/from Lundy's Lane at these locations will increase and pedestrian's exposure to traffic will significantly increase. These locations lead into residential areas and there is no evidence of the need for a larger footprint to accommodate commercial vehicles (i.e. no evidence of trucks mounting the existing curbs). Stop bars and crosswalks are generally not shown at the local intersections. The relocation of sidewalks, while benefitting from a placement set back from the roadway, will mean that the stop bar needs to be set back a significant distance from the roadway. Finally, increasing the radius at these local intersections will decrease the distance to nearby commercial accesses, increasing the potential for conflicts between vehicles proceeding east and west on Lundy's Lane and vehicles turning into and out of accesses.		Revisit the need for a 10.0 metre curb radius at all local intersections in the context of the swept path of the design vehicle and consider keeping the existing curb radius in place. Review the placement of the crosswalk and the stop bar in the context of sightlines for turning movements (left and right turns from the local intersection onto Lundy's Lane) and corner clearance to adjacent commercial accesses. This comment applies to the following locations: Brookfield Avenue (north and south leg), Moulnd Avenue, Depew Avenue, Corwin Avenue, Carlton Avenue, Prince Edward Avenue, Byng Avenue, Franklin Avenue and Glenholme Avenue.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) will reduce all curb radii to minimum allowable as determined by RMN Transportation Planning, Target 6m radii.	Resolved
6		East and west approaches to Dorchester Road and Highland Avenue	The hatched area within medians on the approaches to Dorchester Road and Highland Avenue appears to suggest that left turns are prohibited in this area, leading to an increased risk of driver expectancy violations. Left turns from the accesses located close to these two intersections are not ideal given their location in relationship to the signalized intersections, as they do not meet minimum or desired corner clearance requirements. Corner clearance standards for arterial roads (upstream of intersection) are in advance of the left turn storage (as a minimum) according to TAC Geometric Design Guide for Canadian Roads (Figure 8.8.2). Corner clearance standards for arterial roads (downstream of intersection) are 70 metres downstream according to TAC Geometric Design Guide for Canadian Roads (Figure 8.8.2).		Consider extending the raised median on the east and west approaches, replacing the hatched areas. Note: this will reinforce the NO LEFT TURN prohibition at the Multi-Brands Outlet at 6510 Lundy's Lane (west of Highland Avenue).	Agree with Suggested Action/Proposed concept, EA consultant (UEM) will extend median as recommended, notify affected property owners	Resolved
7		Overall	Separate cycling facilities will not be provided along the study limits. The Paradigm Report recommended either providing signs indicating that the travel lanes as a shared use lane or wayfinding signs directing cyclists to use alternative parallel routes on local roadways or off-road cycling facilities. No information is provided in the drawing package relating to either recommendation. From a safety viewpoint, it is more desirable to direct cyclists to use alternative parallel routes on local roadways or off-road cycling facilities using wayfinding signs.	As part of detailed design, provide wayfinding signs that direct cyclists to use alternative parallel routes on local roadways or off-road cycling facilities.	Agree with Suggested Action/Proposed concept, detailed design consultant will determine alternate route(s) and include signage for parallel cycling routes in coordination with City of Niagara Falls	Resolved	
LUNDY'S LANE @ MONTROSE ROAD							
8	01	All approaches	With the removal of the westbound right turn channel and the addition of a northbound through lane on Montrose Road, the intersection radius has significantly widened on the southwest, southeast and northeast corners of intersection, dramatically increasing pedestrian crossing distance and their subsequent exposure to traffic. Vehicle speeds for turning vehicles will likely significantly increase, increasing the likelihood of injury for any pedestrian collision. Crosswalk markings are not shown on any of the legs. It is not clear how a crosswalk could be accommodated on the south and east legs of the intersection, given that crosswalks should be placed 1.0 metre in advance of the stop bars.		Tighten the radius on the southwest, southeast and northeast corners of the intersection to ensure that crosswalks can be properly accommodated on all four legs of the intersection. The stop bars may need to be shifted back on the south and east approaches to properly accommodate the crosswalks.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) will tighten radii on identified corners to minimum allowable as determined by RMN Transportation Planning. Check swept paths with WB-19, determine if 10m radius is possible	Resolved

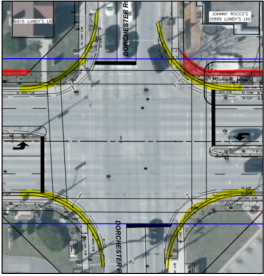
Issue #	Sheet #	Location	Safety Issue	Photo	Suggested Action/Proposed Concept	Project Owner Response	Resolution
9	01	Southbound departing lane	The median on Montrose Road has been shifted to the west making the southbound departing lane narrower. It is not clear if the design would be able to accommodate commercial vehicles making westbound left turns.		Verify that the design would be able to accommodate the appropriate design vehicle that would need to make the westbound left turn and modify the median as required.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) to adjust location of median as required and check with proper design vehicle (anticipate using WB19 for Regional-to-Regional road intersections)(consider possible truck aprons)(check with turning template)	Resolved
10	01	Southbound departing lane	Access to 7600 Lundy's Lane from Montrose Road is excessively wide (approximately 35 metres). No note is provided indicating any change to this access. Corner clearance standards for arterial roads (downstream of intersection) are 70 metres downstream according to TAC Geometric Design Guide for Canadian Roads (Figure 8.8.2). The placement of this access increases the likelihood of conflicts between vehicles turning into and out of this access and southbound through vehicles and eastbound right turning vehicles.		Mitigate this issue by introducing a curb cut to discourage movements into and out of the access so close to the intersection. It would be preferable to place the access as far as practicable from the intersection. It would also be desirable to remove some of the angled parking stalls at the south end of the parking lot.	Agree with Suggested Action/Proposed concept, detailed design consultant will reduce width's of driveway entrances to RMN standard, as practicable, EA consultant (UEM) to produce preliminary design show affect on parking spaces, consider not allowing reversing onto Montrose Road as well	Resolved
11	01	South leg	Access to 7572 Lundy's Lane from Montrose Road is excessively wide (approximately 40 metres). A note provided in the drawings indicates that the driveway access will be narrowed to 7.5 metres, however it appears that the exact location is still to be determined. Corner clearance standards for arterial roads (upstream of intersection) are in advance of the left turn storage (as a minimum) according to TAC Geometric Design Guide for Canadian Roads (Figure 8.8.2). Placement of the access downstream of the beginning of the left turn storage introduces conflicts between through vehicles and vehicles exiting the driveway access attempting to access the left turn lane.		Place driveway access as far away from the intersection as practicable.	Agree with Suggested Action/Proposed concept, detailed design consultant will move driveway access as far from the intersection as practicable	Resolved
12	01	North leg	The sidewalk on the east side of Montrose Road north of Lundy's Lane ends about 10 metres north of the intersection. The design indicates that the sidewalk will not be extended. Transit with bus stops are provided on the east side of Montrose Road north of this location.		Review the feasibility of providing a sidewalk on the east side of Montrose Road north of Lundy's Lane.	Extend the sidewalk to match the limit of construction - that way future works will not impact the intersection. This approach should be confirmed with Niagara Falls	Resolved

Issue #	Sheet #	Location	Safety Issue	Photo	Suggested Action/Proposed Concept	Project Owner Response	Resolution
13	01	East leg	Access to 7572 Lundy's Lane from Montrose Road will continue to be provided at its current location. With the increased radius on the southeast corner of the intersection, this access will be immediately downstream of the intersection, exacerbating conflicts between vehicles turning into and out of this access and eastbound through vehicles and northbound right turning vehicles.		Consider eliminating this access in conjunction with the access improvements detailed above.	The preliminary design will be amended to reduce the current curb radii based on comment in Row 11 and that we'll move the access as far from the intersection as possible.	Resolved
LUNDY'S LANE between MONTROSE ROAD and BELMONT AVENUE							
14	02	Near 7542 Lundy's Lane	There is a pronounced kink in the alignment of the median east of Montrose Road. The kink may encourage drivers to encroach into an adjacent lane while travelling eastbound.		Provide a more gradual change in alignment for the eastbound lanes.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) to smoothen kink in the road	Resolved
15	01-02	North side of Lundy's Lane fronting cemetery	A curb face sidewalk is indicated in the drawing. The 'current needs' ROW indicates that there is opportunity to shift the sidewalk further away from the curb face.		Consider shifting the sidewalk away from curb face and providing a boulevard between the sidewalk and the westbound travel lanes.	Detailed design consultant will determine if sidewalk can be moved closer to cemetery (ground penetrating radar may be required, historical information and projects have determined the close proximity of burials to the existing sidewalk, Charles Green memorial grave possibly partially under current sidewalk location), proximity to cemetery/burial plots is prohibitive at this location, will evaluate the remainder of the corridor as required,	Resolved
16	01-02	Between Montrose Road and 7542 Lundy's Lane	A curb face sidewalk is indicated in the drawing. The current needs ROW indicates that there is opportunity to shift the sidewalk further away from the curb face.		Consider shifting the sidewalk away from curb face and providing a boulevard between the sidewalk and the eastbound travel lanes.	EA consultant (UEM) to investigate moving curbface sidewalks if/where possible	Resolved

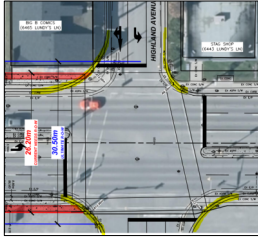
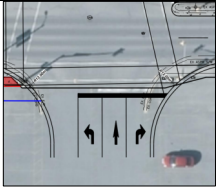
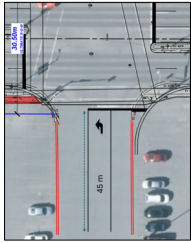
Issue #	Sheet #	Location	Safety Issue	Photo	Suggested Action/Proposed Concept	Project Owner Response	Resolution
17	01-02	7500 Lundy's Lane (west access)	There is a large radius curb return at the west access to 7500 Lundy's Lane. This access is one-way inbound and while the access will be narrowed, there appears to be opportunity to narrow it further. The sidewalk will be shifted closer to the street. A narrower entrance provides an opportunity to lower vehicle turning speeds in the design and decrease the exposure of pedestrians to turning vehicles.	 	Consider narrowing the access to lower vehicle speeds/decrease pedestrian exposure to turning vehicles.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) will tighten radii if possible, use turning template to determine minimum curb radii. This might be a good location for a truck apron instead - but look to understand the volume of truck traffic. Determine if WB19 accommodation is required.	Resolved
LUNDY'S LANE @ BELMONT AVENUE							
18	03	South leg	While there is a brick crosswalk on the south leg, crosswalk markings are not shown. If the brick crosswalk is to be maintained, the sidewalk approaches to the crosswalk are not well aligned and may encourage pedestrians to cross the south leg outside of the crosswalk.	 	Clarify the intended location of the crosswalk on the south approach. Shift the sidewalk approaches to the crosswalk to align with the crosswalk location (if the brick crosswalk is being maintained).	Agree with Suggested Action/Proposed concept, EA consultant (UEM) will clarify the intended location of the crosswalk	Resolved
19	03	South leg	A truck apron is currently provided on the southeast corner of the intersection. In the design, it appears that a raised curb will be provided instead. It is unclear if truck movements out of the access immediately south of the intersection can be accommodated without the truck apron.	 	If a raised curb is being provided, ensure that truck movements out of the access immediately south of the intersection can be accommodated based on swept path analysis.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) to confirm raised curb/truck movements, expect that truck apron will be required.	Resolved
LUNDY'S LANE between BELMONT AVENUE and ROYAL MANOR DRIVE							
20	04	South side of QEW flyover	Across the QEW, the eastbound curb lane currently widens to approximately 5.2 metres. In the design, the eastbound lanes have been narrowed to 3.3 metres, leaving an area immediately adjacent to the sidewalk as a wide urban shoulder (roughly 2.0 metres) in width. While the lane narrowing will help control speeds, there is an opportunity to widen the 1.2 m sidewalk across the QEW to increase pedestrian comfort.	 	Review the feasibility of widening the south sidewalk across the QEW.	EA Consultant to contact MTO with possibility of modifications over the bridge	Resolved
21	04	North side of QEW flyover	Across the QEW, a white edgeline has been provided to narrow the cross section (leaving a 2.2 m area). While the lane narrowing will help control speeds, there is an opportunity to widen the 1.2 m sidewalk across the QEW to increase pedestrian comfort. While the lane narrowing will help control speeds, there is an opportunity to widen the 1.2 m sidewalk across the QEW to increase pedestrian comfort.	 	Review the feasibility of widening the north sidewalk across the QEW.	EA Consultant to contact MTO with possibility of modifications over the bridge	Resolved

Issue #	Sheet #	Location	Safety Issue	Photo	Suggested Action/Proposed Concept	Project Owner Response	Resolution
22	04	7280 Lundy's Lane	The design shows a note indicating that the two driveways providing access to 7280 Lundy's Lane are to be consolidated.		From a safety perspective, closing the driveway located closest to the signalized intersection at Royal Manor Drive is preferred in the context of maintaining corner clearance.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) to confirm that driveway entrance being removed/consolidated via site plan development	Resolved
LUNDY'S LANE @ ROYAL MANOR DRIVE							
23	05	South sidewalk	On the approaches to this intersection a curb face sidewalk is indicated in the drawing. The 'Current Needs' ROW indicates that there is opportunity to shift sidewalk further away from the curb face.		Consider shifting sidewalk away from the curb face and providing a boulevard between the eastbound travel lanes and the sidewalk.	EA consultant (UEM) to investigate moving curbface sidewalks	Resolved
24	05	North leg	The curb radius on north leg of intersection has been increased to 12.0 metres, encouraging higher turning speeds for vehicles and increasing pedestrian exposure to traffic. As Royal Manor Drive leads into a residential area, there is no evidence of the need to widen the intersection to accommodate commercial vehicles. Currently, there is a bulb out on both sides of the intersection that has been eliminated. The raised curbs shown in the design will however eliminate some undesirable angle parking in front of 7241 Lundy's Lane (that do not meet minimum corner clearance requirements).		Consider keeping the layout of the north leg as is, as the proposed design will increase turning movement speeds and pedestrian exposure to traffic. However, consider extending the raised curb on the east side to eliminate a few of the angle parking stalls in front of 7241 Lundy's Lane as shown below. 	Agree with Suggested Action/Proposed concept for curb radius, EA consultant (UEM) will tighten radii on identified corners to minimum allowable (10m or less). Royal Manor Drive width looks overly wide, investigate reduction of width to 7m and include curb bump outs/layby space for on road parking, discourage parking near intersection.	Resolved
25	05	Southeast corner	The crosswalk on east leg does not currently line up with the pedestrian waiting area on the southeast corner of intersection and the design does not address this issue.		Consider extending the curb on southeast corner of intersection to provide a proper waiting area for pedestrians and to provide better alignment with the crosswalk on the east leg.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) to adjust design accordingly	Resolved
LUNDY'S LANE between ROYAL MANOR DRIVE and DORCHESTER ROAD							
26	05	7230, 7220 and 7218 Lundy's Lane	In this section, there are vacant parcels of land with curb cuts provided for future access to Lundy's Lane. If these properties are developed with the indicated accesses, there will be an increase in the potential for access related conflicts in this mid-block section.		As a condition of development, require that these three properties use the existing signalized intersection at Royal Manor Avenue to access Lundy's Lane, through an agreement with the owner of 7280 Lundy's Lane.	EA Consultant (UEM) to explore this, likely not possible. May be able to provide access where required.	Resolved
27	05-06	7070 Lundy's Lane	The design shows a note indicating that the two driveways providing access to 7070 Lundy's Lane are to be consolidated.		From a safety perspective, closing the driveway directly in front of the motel office (west driveway) is preferred (given the lack of a throat at this location).	Agree with Suggested Action/Proposed concept, EA consultant (UEM) already included removal of the west driveway in the Driveway Consolidation report	Resolved

Issue #	Sheet #	Location	Safety Issue	Photo	Suggested Action/Proposed Concept	Project Owner Response	Resolution
28	06	7060 Lundy's Lane	There is a vacant parcel of land on southwest corner of Lundy's Lane and Brookfield Avenue (south leg). However, no curb cuts are provided on Lundy's Lane.		As a condition of development, require that access to this property be provided on Brookfield Avenue as far as practicable from Lundy's Lane.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) identified in Driveway Consolidation report, recommend access review if property is developed	Resolved
29	06	7225 Lundy's Lane	The curb cut at this property extends across the entire frontage, leading to undesirable and higher speed movements in and out of this access.		Narrow access and place as far away from Royal Manor Drive as practicable.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) identified in Driveway Consolidation report, driveway to be narrowed during detailed design	Resolved
30	06	7241 Lundy's Lane	Location of curb cuts allow for uncontrolled movements into and out of property directly adjacent to signalized intersection.		Eliminate access to Lundy's Lane from this property (access provided on Royal Manor Drive).	Agree with Suggested Action/Proposed concept, EA consultant (UEM) identified in Driveway Consolidation report to remove access to Lundy's Lane	Resolved
31	08	6941, 6933 and 6925 Lundy's Lane	The widening of Lundy's Lane and the northward shift of the sidewalk will result in a significant reduction in the size of the parking areas provided in front of these three properties, increasing the likelihood of conflicts between vehicles backing out across the sidewalk and into the travel lanes on Lundy's Lane. The drawings do not indicate the removal of these parking areas.		Restrict parking to the areas behind these three properties.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) to investigate, safety issues given proximity to intersection.	Resolved
LUNDY'S LANE @ DORCHESTER ROAD (PREFERRED ALTERNATIVE)							
32	18	East and west legs	The Paradigm report recommended that sightlines be improved for eastbound-westbound left turns by increasing the offset between the two lanes. The eastbound left turn has been slightly shifted to the north; however sightlines for vehicles making both movements will continue to be limited.		Consider further increasing the offset between the eastbound westbound left turn lanes to improve visibility for eastbound and westbound left turns. Note: If proceeding with Option B, the offset between the northbound and southbound left turn lanes will be improved.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) to investigate increasing this offset as reasonably possible	Resolved

Issue #	Sheet #	Location	Safety Issue	Photo	Suggested Action/Proposed Concept	Project Owner Response	Resolution
33	18	South leg	Two accesses on the south approach do not meet minimum corner clearance standards. Traffic was observed be regularly queued past both accesses, even during off peak periods.		Consider closing the northernmost of the two accesses.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) to investigate/approach owner about removing second(north) driveway access on Dorchester Road.	Resolved
34	08	All corners	The curb radius on all four approaches has been increased to 14.0 metres (although this presumably reflects Regional standards). As a result of this vehicle turning speeds will likely increase and pedestrian's exposure to traffic (while crossing each leg) will increase (particularly across the south and east legs), increasing the risk of right turn on red collisions with pedestrians.		Revisit the need to increase the curb radius to 14.0 metres in the context of the swept path of the design vehicle. Note: Crosswalks should be set back from the travel lanes on the crossing leg by a minimum of 0.6 metres.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) will tighten radii on identified corners to minimum allowable, 10m radius may be possible, check with WB19. Turning templates required.	Resolved
35	08	North leg	The raised curb on the northeast corner of the intersection (along Dorchester Road) currently does not continue along the frontage of 6889 Lundy's Lane. Continuing a raised curb along this section would increase safety for pedestrians walking along the sidewalk and further discourage parking (NO PARKING signs noted in this area).		Continue raised curb along the frontage of 6889 Lundy's Lane.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) change design accordingly	Resolved
36	08	Northeast corner	The pedestrian display is not lined up with the crosswalk on the east leg and may be overlooked by pedestrians. In addition, branches from a nearby tree are partially blocking the view of the primary signal head on the north leg.		Review placement of pedestrian display in detailed design to ensure proper alignment with crosswalk. Trim tree branches to ensure visibility of signal heads.	Agree with Suggested Action/Proposed concept, to be addressed by detailed design consultant	Resolved

Issue #	Sheet #	Location	Safety Issue	Photo	Suggested Action/Proposed Concept	Project Owner Response	Resolution
37	08	Northwest corner	The current design does not indicate how the shifted sidewalk shown on the north side of Lundy's Lane will connect to the existing sidewalk on the west side of Dorchester Road.		As above, it is recommended that the curb radius not be increased on all four corners of the intersection. However, if the Region wishes to increase the radius to 14.0 m, the sidewalk on the north side of Lundy's Lane should continue to connect to the sidewalk on the west side of Dorchester Road.	Agree with Suggested Action/Proposed concept, the continuation of the sidewalks is shown in the Dorchester Lane configuration options (4). UEM to update design when we select the lane configuration we are moving forward with. 10m radius may be possible, check with WB19 and turning templates.	Resolved
LUNDY'S LANE between DORCHESTER ROAD and HIGHLAND ROAD							
38	08		No dedicated crossing facility is provided in the 650 metre section between Dorchester Road and Highland Avenue. Numerous instances of pedestrians crossing the roadway were observed in this section. A dedicated crossing facility would be desirable for this location. This recommendation was also made in the report by Paradigm Transportation Consultants.		Review the feasibility of installing a mid-block pedestrian signal at an appropriate midpoint between these two signalized intersections.	Agree with Suggested Action/Proposed concept, RMN Transportation Planning completed a IPS Warrant, IPS is warranted at this location, exact location to be determined/finalized during detailed design, UEM to provide analysis and possible crossing locations	Resolved
39	08		The widening of Lundy's Lane and the northward shift of the sidewalk will result in a significant reduction in the size of the parking area in front of this business. Continued provision of parking (or a laneway for pick up and drop off) will introduce unnecessary conflicts between pedestrians and motorists.		Eliminate parking or pick up/drop off area in front of 6863 Lundy's Lane.	Agree with Suggested Action/Proposed concept, UEM to update design to remove access	Resolved
40	09	6801 and 6791 Lundy's Lane	The widening of Lundy's Lane and the northward shift of the sidewalk will result in a significant reduction in the size of the parking area in front of these two businesses, increasing the likelihood of conflicts between vehicles backing out across the sidewalk and into the travel lanes on Lundy's Lane. The drawings do not indicate the removal of these parking areas.		Remove these parking stalls and require that owners and customers park behind the business.	Agree with Suggested Action/Proposed concept, UEM to update design to remove parking stalls	Resolved
41	12	6530 Lundy's Lane	The widening of Lundy's Lane and the southward shift of the sidewalk will result in a significant reduction in the size of the parking area in front of this business, increasing the likelihood of conflicts between vehicles backing out across the sidewalk and into the travel lanes on Lundy's Lane. The drawings do not indicate the removal of these parking areas.		Remove parking areas in front of 6530 Lundy's Lane.	Agree with Suggested Action/Proposed concept, UEM to follow up	Resolved

Issue #	Sheet #	Location	Safety Issue	Photo	Suggested Action/Proposed Concept	Project Owner Response	Resolution
LUNDY'S LANE @ HIGHLAND ROAD							
42	13	Whole intersection	The curb radius on three corners has been increased to 12.0 metres (although this presumably reflects Regional standards) with the fourth being increased to 6.5 metres. As a result of this vehicle turning speeds will likely increase and pedestrian's exposure to traffic (while crossing each leg) will increase (particularly across the south and east legs), increasing the risk of right turn on red collisions with pedestrians. Additional issues noted with the increased curb radius are lack of integration with the sidewalks on the north leg, no apparent connection between the sidewalk on the west side of Highland Avenue and the sidewalk on the north side of Lundy's Lane, no defined pedestrian waiting area on the southeast corner of the intersection and the south and east crosswalks intersecting on the road).		Reconsider the need to provide a larger curb radius on the four corners in the context of the design vehicle being considered (also considering that the north leg leads into a residential area with likely very little truck traffic. Ensure that the sidewalks on Lundy's Lane connect to sidewalks on Highland Avenue. Ensure that the crosswalks lead to a pedestrian waiting area that is adequate on all four corners of the intersection.	Agree with Suggested Action/Proposed concept, EA consultant (UEM) will tighten radii to 10m where possible, this will allow for better pedestrian refuge.	Resolved
43	13	South leg	The intersection has been widened to accommodate a right turn lane. The report completed by Paradigm Transportation Solutions Limited did not indicate the need for a right turn lane, unnecessarily widening the south approach to the intersection and increasing the exposure of pedestrians to traffic. The northbound left turn storage is recommended to be 45 metres by Paradigm, however the design does not show this. The current layout of this approach lacks controls (such as raised curbs) to prevent undesirable movements between the parking stalls and the south leg of the intersection. Motorists were regularly observed ignoring the hatched areas on either side of the south leg, crossing between the parking lot and the south leg of the intersection. Raised curbs are indicated in the drawing, however, they terminate a short distance into the parking lot. Finally, the westbound left turn movement should be reviewed to ensure that a commercial vehicle can make this movement without tracking over the stop bar on the south approach.	 	Remove the northbound right turn lane and provide a raised curb on both sides of the south leg that extends back into the parking lot, providing a proper throat for this access, eliminating undesirable movements from/to the parking lot and the south leg of the intersection. The northbound left turn lane should have a storage of 45 m. Also verify that a commercial vehicle can complete a westbound left turn without tracking over the stop bar on the south approach. 	Agree with Suggested Action/Proposed concept, EA consultant (UEM) to investigate	Resolved
44	13	East leg	Two accesses are located in close proximity to the signalized intersection at Highland Avenue and do not meet corner clearance requirements (70 metres), increasing the likelihood of access related conflicts.	 	Consider closing these two accesses and requiring that motorists exit the plaza by means of the signalized intersection.	Only the east entrance will be removed after meeting with Jim's No Frills staff and witnessing requirements for trucks/shipping. The median is also being extended at this location	Resolved