



City of Guelph Complete Streets Design Guidelines

Appendix: MMLoS Companion



Overview

Multi-modal level of service, or MMLOS, is a tool used to score the performance of a street for all of its users. Traditionally, level of service has only been applied to measure a street's performance with respect to traffic. MMLOS allows designers to assess and compare an existing or proposed street's performance for all modes of travel objectively, using data that is easy to collect.

MMLOS assigns scores to each mode of travel on a scale of "A" (which represents the highest quality experience for a given mode) to "F" (which represents a failing score where comfort, safety, accessibility, or operational performance conditions are not met).

The MMLOS procedure assigns a separate LOS score to walking, cycling, transit, vehicles, trucks, curbside activity, and green streets. The procedure makes it possible for planners and designers to directly compare how a design decision introduces trade-offs for all modes of travel; for example, reducing the number of travel lanes on a street may reduce the vehicle LOS but could introduce more space to provide wider sidewalks and buffers, thus trading a reduced vehicle LOS for an improved pedestrian LOS. The context and goals for the given street will dictate which modes are given more priority.

No street should aspire to receive a score of "A" for every mode; in fact, measures that benefit one mode may lower the score for another mode. The key value in using MMLOS is that it allows trade-offs in the design process to be compared objectively.

In 2022, the Ontario Traffic Council (OTC) developed an MMLOS Guide intended to be used by Ontario municipalities. As part of the development of the Guelph Complete Streets Design Guide, the OTC MMLOS Guide was adapted to suit Guelph's policy context with adjustments to targets and scoring criteria. **This appendix is intended to be a "living document" to be updated over time based on policy changes and the City's experience applying it to projects, and consists of two sections:**

- **[Part 1: Procedure](#)**: a step-by-step process for conducting an MMLOS assessment including scoring metrics and tables.
- **[Part 2: Rationale](#)** explains how targets and scoring criteria were developed for this Guide.



Part 1: Procedure

This section lays out a step-by-step process for conducting an MMLOS assessment for any street in Guelph.

Step #1: Identify the street to be assessed

Step #2: Select the typology most relevant to the street

Input data required at this stage, for example:

- Is the street in Downtown?
- If in Downtown, what is its functional classification according to the [Official Plan](#) (Downtown Local, Downtown Main, Downtown Primary, Downtown Secondary)?
- Is the street in the [TMP's \(Transportation Master Plan\)](#) Pedestrian Priority Network?
- Is the land use (as specified in the [Zoning Bylaw](#)) dominantly residential?

Use the [Flow Chart](#) to identify a recommended typology. Note that the flow chart is intended to represent most contexts in Guelph, however, professional judgement and local knowledge should be applied when selecting the typology based on a street's unique context.

Step #3: Identify the baseline targets for each mode based on the typology

Input data required at this stage:

- Is the street on the [TMP's Goods Movement Network \(pg. 173\)](#)?

Identify the targets for each mode from the [Baseline Targets](#) table. If the street is not on the Goods Movement Network, there is no target LOS for trucks.

Step #4: Adjust the targets based on the priority network(s)

Input data required at this stage:

- Is the street in an Equity Priority Neighbourhood, based on Equity Mapping produced by the City (see **Figure A-1**)?
- Is the street part of the [TMP's](#):
 - Pedestrian Priority Network? (TMP, pg. 170)
 - Cycling Spine Network? (TMP, pg. 171)
 - Quality Transit Network? (TMP, pg. 172)
 - Car Priority Network? (TMP, pg. 175)

Adjust the baseline targets as described in the [Baseline Targets](#) table footnotes.

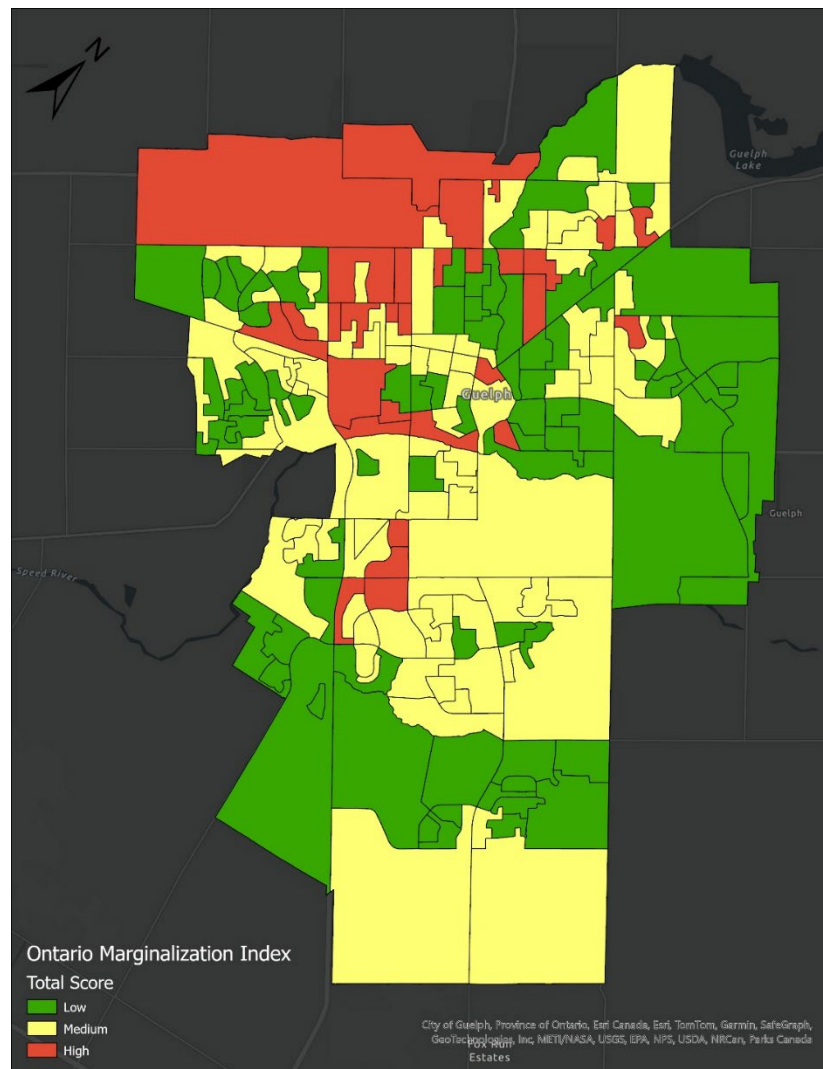


Figure A-1. City of Guelph Equity Map based on Ontario Marginalization Index.



Step #5: Measure the MMLOS of the street's existing condition

Input data required at this stage from the typical mid-block for each side of the road:

- Sidewalk width and total separation width from traffic (note: cycling facility should be included as part of the buffer)
- Cycling facility width, buffer width, and type of physical separation used
- Presence of a mixed pedestrian/cycling facility (e.g., multi-use pathway)
- Presence of transit priority measures and quality of passenger amenities (including presence of street furniture, such as shelters)
- Number of vehicle travel and turn lanes
- Width of curb lanes
- Presence of curbside uses (parking, patios, etc.)
- Presence of street trees

Go through the [Scoring Table](#) and identify the score most applicable to each row.

Calculate the overall MMLOS for each mode by averaging the score across all measures. When evaluating for both sides of the roadway, use the lower score of the two (for example, a street with a 1.5 m sidewalk on one side and 2.0 m sidewalk on the other should receive a score based on the 1.5 m sidewalk).

Step #6: Compare the target values to the measured values

Identify which modes are falling short of their targets and which ones are exceeding their targets (for example, Pedestrian LOS might fall two points short of the target while the Vehicle LOS target is exceeded by one point). This will help to identify what street elements should be prioritized.



Step #7: Identify design interventions that can achieve the target score

Example questions to consider:

- Could vehicle lanes be narrowed or removed to increase the sidewalk buffer and create more space for cycling facilities?
- Could vehicle lanes be converted to dedicated transit lanes?
- Is there opportunity to add transit shelters?
- Depending on the context, is there opportunity to convert road space into time-limited or permanent parking or patio space?
- Is there a possible configuration of facilities and utilities that could create enough boulevard space for trees?

Flow Chart



Figure A-2. Flow chart to determine typical typologies; judgement may be required for unique situations.

Scoring Table

Mode	Measure	A – Outstanding	B – Excellent	C – Good	D – Fair	E – Poor	F – Very Poor	Overall Score	
Walking	Facility width	3.0 m or greater	2.6 - 2.9 m	2.1 - 2.5 m	1.8 - 2.0 m	1.5 - 1.7 m	under 1.5 m		
	Buffer width	2.5 m or greater	2.1 - 2.4 m	1.6 – 2.0 m	1.3 - 1.5 m	1.0 - 1.2 m	under 1.0 m		
	Other user conflict	If cyclists and pedestrians are separated, no change to score. If mixed, reduce score by one grade							
Cycling	Meets Book 18?	If cycling facility is not consistent with the minimum desirable cycling facility in the OTM Book 18 pre-selection nomograph, then "F"							
	Facility separation	Physical separation			Non-physical separation				
	Facility width (per direction, exclude buffer)	2.4 m or greater	2.1 - 2.3 m	1.8 – 2.0 m	1.8 m or greater	1.5 – 1.7 m	Under 1.5 m		
	Buffer width	1.0 m or greater	0.6 – 0.9 m	0.3 m – 0.5 m	0.5 m or greater	Under 0.5 m	No buffer		
	Other user conflict	If cyclists and pedestrians are separated, no change to score. If mixed, reduce score by one grade							
Transit	Facility Type	Dedicated bus lane (24/7) and transit signal priority corridor	Dedicated bus lane (24/7) or transit signal priority corridor	Dedicated bus lane (time-based), queue jump lanes	Mixed traffic, bus stops in-line with traffic	Mixed traffic, buses must merge into traffic after stop	No service		
	Passenger amenities	Real-time arrival information, off-board payment, heated shelter, seating, lighting	Shelter, waste bin, seating, connection to sidewalk, and at least one of: heating, real-time arrival information, off-board payment	Shelter, waste bin, seating, connection to sidewalk	Shelter, connection to sidewalk	No shelter, pad, connection to sidewalk	No pad and/or no connecting sidewalks (inaccessible)		
Vehicles	Mobility capacity	2 lanes per direction with median or two-way left-turn lane (TWLTL)	2 lanes per direction, no median or TWLTL	1 lane per direction, with TWLTL or median	1 lane per direction, no TWLTL	Two-way roadway, no marked centreline	No vehicular access permitted		
Trucks <i>If the street is not on the Goods Movement Network, there is no target LOS for trucks.</i>	Curb lane width (measured to face of curb)	3.8 m or greater	3.6 – 3.7 m	3.4 - 3.5 m	3.3 m	3.0 - 3.2 m	under 3.0 m		
Curbside Activity	Curbside space	Mix of parking, patio, loading zone along both sides	Mix of parking, patio, loading zone along one side	Off-peak parking along one or both sides	Permanent or off-peak parking at limited locations	No parking (stopping/loading may be permitted)	No stopping		
Green Streets	Street trees	3 or more lines of trees inside the ROW or within 2 m of the ROW on each side	2 lines of trees inside the ROW or within 2 m of the ROW on each side	1 line of trees inside the ROW or within 2 m of the ROW	Discontinuous, many locations with trees provided inside the ROW or within 2 m of the ROW on each side	Discontinuous, few locations with trees provided inside the ROW or within 2 m of the ROW on each side	No trees inside the ROW or within 2 m of the ROW on each side		



Baseline Targets

Guelph Typology	Walking ^{1,2}	Cycling ^{1,3}	Transit ^{1,4}	Vehicles ^{1,4,5}	Trucks ⁶	Curbside Activity	Green Streets
Downtown Local Street	D	N/A	N/A	E	N/A	B	B
Downtown Main Street	A	B	D	D	N/A	A	B
Downtown Primary Street	A	C	D	C	D	A	B
Emerging Main Street	C	C	D	A	D	F	A
Pedestrian Mew	A	N/A	N/A	F	N/A	N/A	C
Neighbourhood Street	D	N/A	N/A	E	N/A	B	B
Residential Connector	D	C	D	D	N/A	B	B
Residential Boulevard	D	C	D	A	D	F	A
Residential Boulevard - Historic	D	E	E	C	E	F	F
Employment Avenue	B	B	D	D	B	F	B
Employment Boulevard	B	B	D	A	B	F	A

¹ If the street is in an **Equity Priority Neighbourhood**: adjust baseline target **Walking +1**, **Cycling +1**, **Transit +1**, and **Vehicles -1**.

² If the street is in the **Pedestrian Priority Network**: adjust baseline target for **Walking +1**.

³ If the street is in the **Cycling Spine Network**: adjust baseline target for **Cycling +1**.

⁴ If the street is in the **Quality Transit Network**: adjust baseline target for **Transit +2** and **Vehicles -1**.

⁵ If the street is in the **Car Priority Network**: adjust baseline target for **Vehicles +1**.

⁶ If the street is not in the **Goods Movement Network**: set baseline target for **Trucks** to “N/A”.



Part 2: Rationale

City of Guelph Supplement to the OTC MMLOS Guide

This section discusses the rationale for the adaptation of the OTC Multimodal Level of Service (MMLOS) guidelines to suit Guelph's policy and design context so that it can be used by street planners and designers as a decision-making tool to apply the Complete Streets Design Guide.

Relationship to OTC MMLOS Guide

The OTC MMLOS Guidelines provide a framework that can be used and adapted province-wide to apply a multimodal level of service approach to new construction and retrofit roadway projects for both street segments and intersections. The guidelines include two main components:

- **Setting Targets:** The OTC MMLOS guide establishes **baseline targets** for each mode for various street contexts and encourages municipalities to **adjust these targets** based on planning directions or strategic policies.
- **Measuring Performance:** The OTC MMLOS guide establishes a methodology to score the performance of a segment or intersection for each mode based on the street design attributes. By measuring the performance of an existing or proposed design, practitioners can easily identify whether a street is underserving and overserving different modes.

Scoring

The OTC MMLOS Guide includes a scoring framework for both **segments** and **intersections**. The application of this framework is labour-intensive and requires collection of large amounts of data. To assist in planning and conceptual level decisions expected to arise in the application of the Complete Streets Design Guide, a “**Simplified MMLOS**” was developed that only evaluates scores for cross sections (i.e.,



intersections are not evaluated) and relies upon input data that can be easily measured or gathered from a desktop assessment.

The changes made to the OTC method for the Guelph CSDG are as follows:

- For **Pedestrian LOS**, the “max distance between controlled crossings” metric was removed to allow the assessment to focus only on a representative cross section. A new metric “other user conflict” was added to reduce the score by one grade if cyclists and pedestrians operate in shared space (i.e., a multi-use pathway).
- For **Cycling LOS**, the “conflicts with other modes” measure was removed to allow the assessment to focus only on a representative cross section. A new metric “other user conflict” was added to reduce the score by one grade if cyclists and pedestrians operate in shared space (i.e., a multi-use pathway). The measures are also generally partitioned into two sets based on physical separation, with facilities physically separated in LOS A to LOS C and non-physical separation in LOS D to LOS F.
- For **Transit LOS**, the “pedestrian level of service” metric was removed to avoid redundancy. The “passenger amenities” scoring criteria was updated such that scores consider accessibility through the presence of connecting sidewalks and bus pads, bus shelters, heating, seating, and other amenities. The score assigned to a street with mixed traffic and one lane in each direction was also improved from “F” to “E” based on the judgement that this condition should not be seen as “failing”. Further, this score was adjusted to de-emphasize the number of vehicle lanes and to focus on delays to buses caused by vehicles through not having to merge with traffic, queue jump lanes, transit signal priority, and dedicated lanes.
- For **Vehicle LOS**, the OTC metrics were replaced with one simple metric based on the amount of travel and turn lanes provided to vehicles, which represents the mobility function assigned to the street.
- For **Truck LOS**, the “car level of service” metric was removed to simplify the calculations. The lane width ranges corresponding to each score were adjusted



based on the TAC Geometric Design Guide, which states that lane widths exceeding 4.0 m may cause driver confusion and should be avoided, and minimum widths of 3.3 m are recommended for streets carrying truck volumes.

- **Curbside Activity LOS** is not measured in OTC and was added based on Guelph's context. A score is assigned based on the quality of curbside use.
- **Green Streets LOS** is not measured in OTC and was added based on Guelph's context. A score is assigned based on the number of rows of trees in the typical cross section.

Typologies and Targets

The table below matches the typologies in the OTC MMLOS guide with the typologies for the Guelph CSDG and applies the baseline modal targets established in the OTC MMLOS guide to each. Where changes are made to the baseline targets from OTC, a note is provided below the table with rationale.

As the OTC MMLOS guide is not intended to be used for local streets, these typologies (Neighbourhood Street, Downtown Local Street, and Pedestrian Mew) have been excluded from the table. The OTC methodology also does not score Curbside Activity and Green Streets, which have been added to reflect Guelph's policy context and priorities.



Guelph CSDG Typology	Equivalent OTC MMLOS Typology	Walking	Cycling	Transit	Vehicles	Trucks*	Curbside Activity	Green Streets	Notes/Rationale
Downtown Local Street	N/A	D	N/A	N/A	E	N/A	B	B	Downtown Local Streets have constrained width with modest pedestrian volumes, no need for dedicated cycling facilities, no transit routes, limited vehicle volume, and local delivery trucks only.
Downtown Main Street	Urban Main Street	A¹	B	D	D	N/A²	A	B	¹ The highest LOS for pedestrians should be targeted on Downtown Main Streets ² There are no Downtown Main Streets on the Goods Movement Network, so there is no target LOS for trucks (local deliveries only)
Downtown Primary Street	Downtown Avenue	A¹	C	D	C²	D	A	B	¹ Downtown Primary Streets have sufficient ROW for walking LOS A to support high pedestrian volumes. ² The proposed cross-section allocates one lane per direction for vehicles with a centre left turn lane, which is LOS C.
Emerging Main Street	Neighbourhood Main Street	C	C	D	A¹	D	F	A	¹ The proposed cross-section allocates two lanes per direction for vehicles with a centre left turn lane, which is LOS A.
Pedestrian Mew	N/A	A	N/A	N/A	F	N/A	N/A	C	Similar to Downtown Local Street with additional restrictions on vehicle access and curbside activity (with the potential exception of deliveries, accessible transit, etc.)



Guelph CSDG Typology	Equivalent OTC MMLOS Typology	Walking	Cycling	Transit	Vehicles	Trucks*	Curbside Activity	Green Streets	Notes/Rationale
Neighbourhood Street	N/A	D	N/A	N/A	E	N/A	B	B	Similar to Downtown Local Streets.
Residential Connector	Neighbourhood Boulevard	D	C¹	D	D²	N/A	B	B	¹ Generally 1.8 m is the target cycle track width for this typology resulting in a score closer to LOS C. ² The proposed cross-section would include one lane each way for cars with a centreline, which is LOS D.
Residential Boulevard	Neighbourhood Connector	D¹	C²	D³	A⁴	D	F	A	¹ The proposed cross-section includes sufficient sidewalk space to achieve walking LOS D. ² The proposed cross-section has 2.0 m cycle tracks which is LOS C. ³ Recommend using baseline target level of service of D for transit on all street types, which will be increased based on the Quality Transit Network in the next step. LOS D is equivalent to mixed traffic and basic passenger amenities. ⁴ The proposed cross-section would include two lanes each way for vehicles with a centre left turn lane, which is LOS A.



Guelph CSDG Typology	Equivalent OTC MMLOS Typology	Walking	Cycling	Transit	Vehicles	Trucks*	Curbside Activity	Green Streets	Notes/Rationale
Residential Boulevard - Historic	N/A	D	E	E	C	E	F	F	These targets reflect what is achievable based on the highly constrained context of these streets. Basic sidewalk infrastructure, minimum width cycling facility with limited separation, mixed traffic transit, substandard lane widths for trucks, and one lane per direction plus a centre left turn lane for cars.
Employment Avenue	Industrial Boulevard	B¹	B²	D	D³	B	F	B	^{1, 2} The multi-use paths in the proposed cross-section are sufficiently wide for LOS A, with a reduction for shared pedestrian and cyclist space. ³ LOS D for vehicles is proposed in the cross-section as there is one lane each way with centreline.
Employment Boulevard	Industrial Connector	B¹	B²	D	A³	B	F	A	^{1, 2} The multi-use paths in the proposed cross-section are sufficiently wide for LOS A, with a reduction for shared pedestrian and cyclist space. ³ The ROW width is sufficient to include two lanes each way and centre left turn lane, which corresponds to LOS A for vehicles.

**Target LOS for trucks only applies for streets on the Goods Movement Network. Streets not on the Goods Movement Network are not evaluated for Truck LOS.*



Adjustments to Targets

After establishing baseline targets for each mode and typology, targets must be adjusted based on the street's planning context, with the proposed approach based on Guelph's policy priorities summarized in the table below.

- Adjustments can only raise a score as high as “A” and lower it as low as “E”
- If a segment is not on the Goods Movement Network, there is no target LOS for trucks
- Curbside Activity and Green Streets are omitted from the table below as there are no adjustments.

Priority Typology	Walking	Cycling	Transit	Vehicles	Trucks	Rationale
Equity Priority Neighbourhood (Highest 33% Marginality)	+1	+1	+1	-1		People in the highest marginalization are presently more dependent on walking and taking transit and are more vulnerable to traffic violence. Prioritizing walking, cycling, and transit while deprioritizing cars helps deliver equitable transportation solutions.
Pedestrian Priority Network	+1					The LOS on the Pedestrian Priority Network should be increased, though it cannot exceed LOS A for those streets whose typology may have a high baseline target and be in the Pedestrian Priority Network.
Cycling Spine Network		+1				While the Cycling LOS includes consideration for compliance with OTM Book 18, inclusion on the Cycling Spine Network suggests a need for higher comfort facilities that can also support higher cycling volumes.
Quality Transit Network			+2	-1		Quality Transit Network seeks to prioritize transit on select streets. Increasing target LOS from D to B is equivalent to adding intersection priority measures or dedicated lanes as well as high-quality bus stop amenities. Where transit is prioritized, cars will naturally be deprioritized, hence a lower LOS for vehicles.
Goods Movement Network						Truck LOS should only be evaluated for streets on the Goods Movement Network; therefore, no specific point adjustment is needed.
Car Priority Network				+1		Car Priority Network seeks to improve vehicle LOS through intersection improvements and optimization; therefore, a higher LOS is targeted along this network.



Examples of Target Setting

Segment:	Silvercreek Pkwy N (Speedvale to Willow)			
Typology:	Emerging Main Street			
	Baseline Target	Adjustment	Rationale	Adjusted Target
Walking	C	+1	Equity (+1)	B
Cycling	C	+3	Equity (+1)	B
Transit	D	-2	Quality Transit Network (+2), Equity (+1)	A
Vehicles	A	-2	Quality Transit Network (-1), Equity (-1)	C
Trucks	D			D
Curbside Activity	F			F
Green Streets	A			A

Segment:	Gordon Street, College to Wellington			
Typology:	Residential Connector			
	Baseline Target	Adjustment	Rationale	Adjusted Target
Walking	D			D
Cycling	C			C
Transit	D	+2	Quality Transit Network (+2)	B
Vehicles	D		Quality Transit Network (-1), Car Priority Network (+1)	D
Trucks	N/A			N/A
Curbside Activity	B			B
Green Streets	B			B



Segment:	Norfolk Street, Waterloo to Quebec			
Typology:	Downtown Primary Street			
	Baseline Target	Adjustment	Rationale	Adjusted Target
Walking	A			A
Cycling	C			C
Transit	D	+2	Quality Transit Network (+2)	B
Vehicles	C	-1	Quality Transit Network (-1)	D
Trucks	D		Not on Goods Movement Network	N/A
Curbside Activity	A			A
Green Streets	B			B



Blank Template Sheet

Segment:				
Typology:				
	Baseline Target	Adjustment	Rationale	Adjusted Target
Walking				
Cycling				
Transit				
Vehicles				
Trucks				
Curbside Activity				
Green Streets				

Segment:				
Typology:				
	Baseline Target	Adjustment	Rationale	Adjusted Target
Walking				
Cycling				
Transit				
Vehicles				
Trucks				
Curbside Activity				
Green Streets				

