Memorandum

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1. Executive Summary

This memo summarizes the Multi-Modal Level of Service (MMLOS) framework and analysis prepared to inform the Reconnecting Fairview Corridor Plan.

The industry-standard framework for traffic forecasting and analysis has historically relied on Level of Service (LOS) criteria, which primarily measures roadway performance through vehicle delay and throughput.[1,2]

The use of LOS criteria that focuses on private vehicles has implications for roadway design and traffic forecasting. LOS provides a single letter grade that oversimplifies system performance, ignoring environmental impacts, social equity, and community priorities. It fails to directly capture multimodal needs for cyclists, pedestrians, and transit users. It can misrepresent actual user experience, especially in urban contexts where accessibility and mode share are frequently valued more than vehicle speed.

The emphasis on vehicle flow and trip generation often leads to wider roads and higher capacity projects that conflict with pedestrian safety, transit efficiency, and livability, as LOS does not typically account for these factors. While pedestrian, bicycle, and transit considerations are required as part of Alaska's TIA checklist[3], no standardized framework or criteria are detailed at the Municipal or State level.

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[1] At the state level, Alaska's Administrative Code 17 AAC 10.060 mandates that a traffic impact analysis (TIA) be prepared when a proposed development is projected to generate more than 100 vehicle trips on a highway during any hour of the day, or the traffic generated is expected to detract from the safety of the highway. The TIA must be developed in accordance with the Institute of Traffic Engineers' Trip Generation Manual, which primarily relies on vehicle trip generation rates. Alaska's Administrative Code 17 AAC 10.070 specifies acceptable LOS targets based on forecasted vehicle trip generation and requires mitigation – but not targeted LOS – for pedestrians and cyclists.

[2] At the local level, the Municipality of Anchorage (MOA) follows an approach similar to that of the state, with LOS targets and analysis requirements specified in MOA's Design Criteria Manual (Chapter 6 – Traffic Control).

[3] Alaska TIA Checklist: https://dot.alaska.gov/stwddes/dcstraffic/tia/index.shtml.

To better consider the integration of multiple modes, a Multi-Modal Level of Service (MMLOS) framework and analysis was prepared for the Reconnecting Fairview Corridor Plan. The assessment of the baseline condition was completed for the Gambell, Ingra, and Hyder Street corridors from 4th to 15th Avenue in Fairview. In this methodology, level of service (LOS) is individually scored by mode (Pedestrians, Bikes, Transit, Trucks, Cars) and location (Unsignalized Intersection, Signalized Intersection, Segment). These findings were then assessed against proposed LOS target values per street type within the corridor.

Results of the assessment indicate that Gambell, Ingra, and Hyder are poorly designed for all modes. No location in the corridor scores better than LOS D for pedestrians, bikes, or transit. Gambell and Ingra currently lack transit infrastructure or service. Hyder Street, in particular, overperforms for trucks and cars (LOS B) but does not serve the needs of other modes. Curb lane conflicts are a safety concern throughout the corridor, and narrow curb lanes on Gambell and Ingra are not designed for trucks. There is limited or poorly built infrastructure for pedestrians, cyclists, and transit throughout the corridor (e.g., narrow and obstructed sidewalks, no bike lanes, bus stops without amenities).

The MMLOS assessment will help guide design recommendations for the corridor. Scoring the existing conditions develops a baseline for which future roadway designs in Fairview can be compared against. Additionally, it enables designers to assess the performance and tradeoffs between different road users. Finally, the MMLOS methodology and assessment rubric developed for this project could be used to repeat measurement and performance scoring for future corridor design efforts led throughout the Municipality or State.

2. Introduction

Vehicular Level of Service (VLOS), the standard framework for traffic forecasting and roadway capacity analysis, often lacks the ability to prioritize cyclists, pedestrians, and transit users. VLOS standards have also been recognized as limited in their ability to incorporate factors that affect non-auto users such as user comfort, safety, and efficiency.

The Multi-Modal Level of Service (MMLOS) approach is an emerging framework increasingly adopted in traffic studies across North America. It is recognized for its ability to evaluate the performance and tradeoffs among various road users, rather than focusing solely on vehicular traffic. MMLOS has gained traction as a more holistic approach to understanding the relationship between different modes of transportation, with more flexibility and context-sensitive metrics for traffic studies.

Level of Service (LOS)

Level of Service	Cars
A	Drivers *never* experience delay due to congestion
B	Drivers *rarely* experience delay due to congestion
C	Drivers *occasionally* experience delay due to congestion
D	Drivers *often* experience delay due to congestion
E	Drivers *very often* experience delay due to congestion
F	Drivers *always* experience delay due to congestion

Multi-Modal Level of Service (MMLOS)

Level of Service	Pedestrians	Cyclists	Transit	Trucks	Cars
A	Provides the highest quality *experience* for a given mode				
B	Provides a high-quality *experience* for a given mode				
C	Provides a good-quality *experience* for a given mode				
D	Provides a moderate-quality *experience* for a given mode				
E	Provides just above the minimal targeted *standard* for a given mode				
F	Provides the minimal targeted *standard* for a given mode				

Figure 1: (Left) Framework for the traditional Level of Service analysis based on delay. (Right) Multi-Modal Level of Service analysis evaluates user experience and assesses tradeoffs between road users.

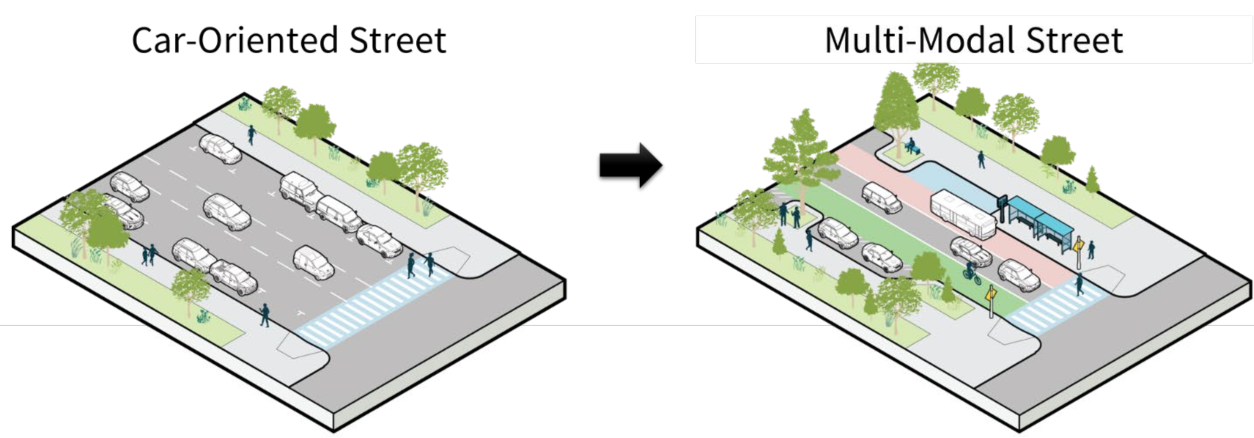


Figure 2: Expanding the framework for street design

The assessment was completed to support the following goals:

1. **Assess the performance and tradeoffs between road users**. MMLOS evaluates the user experience to identify where improvements are needed and/or balance across different modes can benefit overall street safety and comfort.
2. **Guide the corridor design**. Evaluating the current conditions establishes a baseline against which future designs can be measured. Thus, this assessment supports work completed in other project tasks.
3. **Overlay MMLOS with other scoring criteria to develop a prioritization framework and impact assessment**. Future analysis can build off this assessment to layer information (e.g., user vulnerability, project cost) that enables identification of corridors and intersections that may have significant benefit to cost.

This memorandum outlines the MMLOS framework and accompanying rubric employed to assess the baseline conditions for the Reconnecting Fairview Corridor Plan. It also displays the results of the baseline performance and discusses results by mode, facility type, and corridor. The corridors evaluated include Gambell St. from 4th Ave. to 15th Ave., Ingra St. from 4th Ave. to 15th Ave., and Hyder St. from 5th Ave. to 15th Ave. The appendix contains a summary of the literature review (see memo from March 2025 for full review), select limitations, and detailed scoring rubrics developed for the MMLOS assessment.

3. Defining Multimodal Level of Service

MMLOS analysis can generally be approached in two ways. The first is a **delay-based approach**, where delay is standardized across all modes. Delay is typically calculated solely for automobile passengers; in this approach, it is assessed for transit passengers, cyclists, and pedestrians. Then, delay between modes is compared to balance the needs for each mode by intersection and corridor. Reducing delay for active modes (e.g., walking, bicycling) may increase delay for vehicular modes, thus requiring a traffic analyst to incorporate professional judgement and local, contextual knowledge to identify thresholds for throughput by mode.

The second and preferred method is scoring via a **facility-based approach**. Scores are calculated by mode based on their usage and the provided infrastructure. This approach focuses on the aspects important to each mode. It is not limited to delay and can capture more comprehensive indicators such as bicycle level of traffic stress, pedestrian crossing length, and transit schedule adherence. The facility-based approach is most appropriate for this assessment as it focuses on the quality of facilities and better aligns with community priorities (e.g., safety, infrastructure quality). For example, snow storage and snow maintenance – highly impactful to mobility in Anchorage – is a limited metric in industry LOS analysis but can be captured via a facility-based approach.

Arup reviewed a variety of methodologies to recommend one that is most suitable to the Reconnecting Fairview Corridor Plan, including methodologies adopted at the national, state, and local levels. After review, the project team adapted the Ontario Traffic Council's (OTC) methodology to meet the needs of Fairview. This methodology was chosen because it allows for the most flexibility in terms of metrics and thresholds, enabling analysts to identify metrics that best fit with Fairview's local context. Additionally, the OTC methodology is straightforward, ensuring that results are clearly presented without complex calculations, thereby enhancing transparency throughout the planning process. Meetings with NWAK, local community members, and the project's Technical Advisory Committee solicited feedback on the metrics to reflect goals for the study area and local design guidance.

4. Multi-Modal Level of Service Rubric

Selected metrics to be used in the MMLOS methodology were identified based on their relevance to Fairview and the project's goals. The scoring rubric and criteria – how metrics are assigned a grade – were defined following refinement and input from stakeholders. The following sections describe the process for measuring and assessing baseline MMLOS for the project.

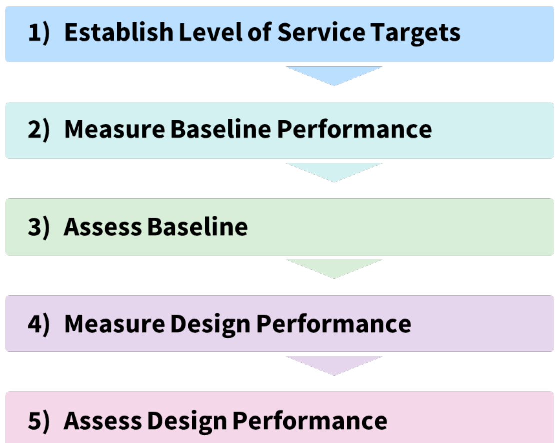


Figure 3: MMLOS Methodology Approach

4.1 Step 1: Establish Level of Service Targets

First, level of service targets for each mode were determined using the OTC methodology. This method recognizes the unique qualities of every street, so it uses distinct criteria to assess each one's level of service performance. Figure 4 displays the targets set for the three main street types identified in the project area: Connector, Main Street, and Boulevard. Descriptions of each to align with the study corridors (Gambell, Ingra, Hyder St) are described below.

Street Type	Pedestrian	Bicycle	Transit	Truck	Car
Main Street	C	C	D	D	D
Neighborhood Street	B	B	D	D	E

Figure 4: Proposed MMLOS Targets for Fairview

4.1.1 Main Street

The "Main Street" typology is the preferred design for Ingra and Gambell. They currently move high volumes of vehicles with priority given to cars and trucks, but based on stakeholder feedback these corridors are preferably utilized as a community "Main Street" where the street balances mobility and access. It should be able to move moderate to high volumes of cycling, transit, and vehicle movements, thereby providing equal opportunity to all modes. This typology is traditionally an auto-oriented land use but often subject to intensification or redevelopment. It is likely to have mixed but predominantly commercial land-use.

4.1.2 Neighborhood Street

The "Neighborhood Street" typology is the categorization identified for Hyder St. It is a multimodal corridor through a suburban neighborhood that moves low to moderate volumes of cycling and vehicle movements. On an ideal neighborhood street, the priority is given to cycling and pedestrian modes; however, on Hyder St., there is currently more dedicated space and movement of vehicles. Adjacent land uses can vary including residential, light commercial, schools, parks, and community centers.

4.2 Step 2: Measure Baseline Performance and Assess Baseline

Next, measurement of MMLOS performance is completed along the project corridor by type (Segment, Signalized Intersection, Unsignalized Intersection) and mode (Pedestrian, Bicyclist, Transit, Truck, Car). Performance is assigned a level of service grade – from A (best) to F (worst) – where grades are compared across locations, modes, and benchmarks to identify locations for improvement.

See the Appendix for complete details of the MMLOS performance scoring rubric, metrics, measurements, and criteria.

4.3 Measure Design Performance and Assess Design

The MMLOS rubric can be used to repeat measurement and performance scoring for future corridor designs. Assessing grades against the baseline and benchmarks can support design improvements in line with project goals, identification of project prioritization (e.g., what corridors require improvements first or are operating with sufficient service as-is), and identification of project impact (e.g., what improvements may have largest benefits relative to cost).

5. Baseline MMLOS Performance

The following sections detail the baseline (existing) MMLOS performance for the study corridors. The corridors evaluated include Gambell St. from 4th Ave. to 15th Ave., Ingra St. from 4th Ave. to 15th Ave., and Hyder St. from 5th Ave. to 15th Ave. Results were assessed by mode and facility type.

5.1.1 Pedestrian Level of Service

For pedestrians, all corridors scored at LOS D or E along Gambell, Ingra, and Hyder. See Figure 5.

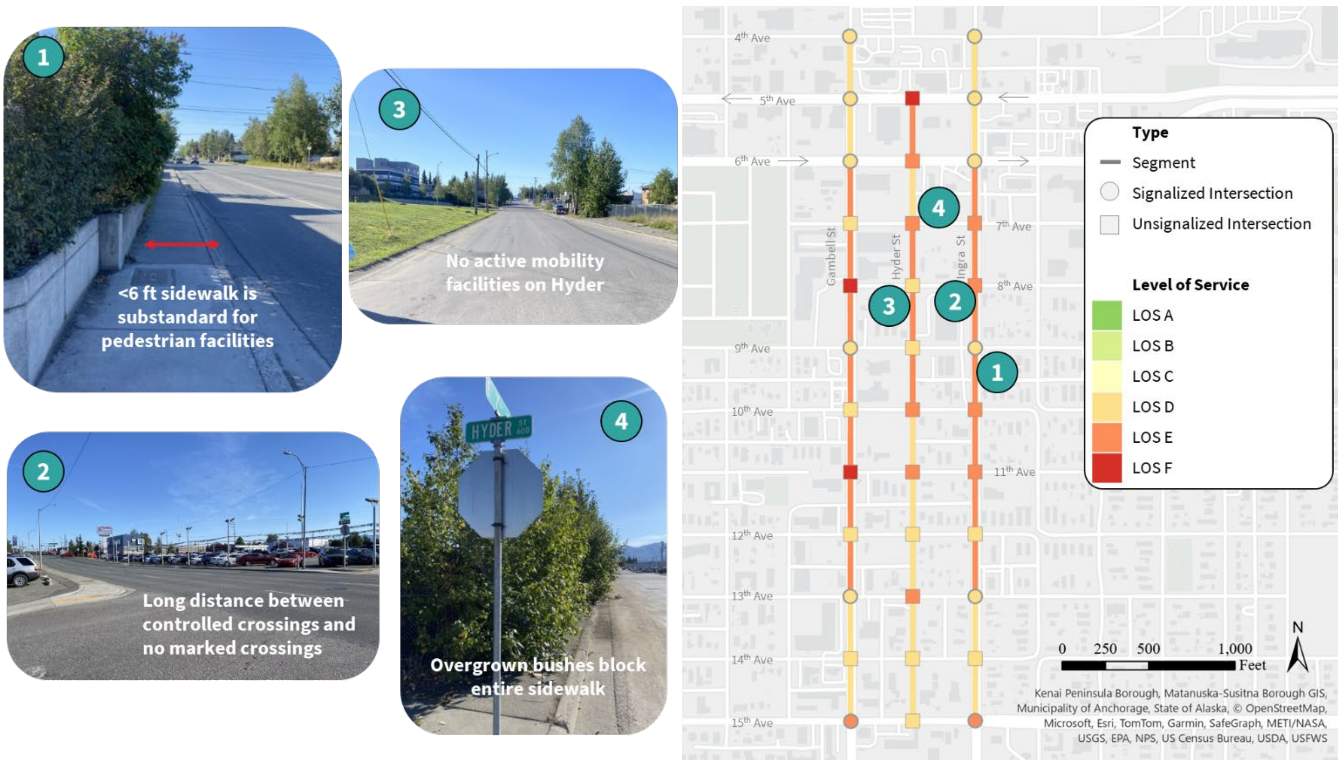


Figure 5: Pedestrian MMLOS Baseline Performance

On segments, pedestrian level of service was failing for facility width, buffer width, and snow maintenance. As seen in Figure 5, the 6 foot-wide sidewalk is substandard for pedestrian facilities, with many segments impeded by utility poles or even overgrown bushes. There is limited to no buffer width between the sidewalk and vehicular traffic, which creates an uncomfortable experience. In the winter, this results in snow plowed onto the sidewalk, further obstructing mobility.

The posted speed limit is 35mph on Gambell and Ingra, and 25 mph on Hyder, which improves the level of service score. However, this may not reflect the actual speed as the wide and straight corridors have been observed to enable much faster average vehicle traffic.

Variation in scoring for segments is mostly driven by two factors. The first is noise, with more occurring by the Merrill Field Airport. The second is distance between controlled crossings, which occurs every block at the northern and southern ends of the corridor, but over 1,000 ft for some blocks between 6th and 13th. Long crossing distances limit connectivity and are unsafe when people cross mid-block.

Signalized intersections on Gambell and Ingra have few to no enhanced pedestrian measures, long crossing distances, poorly marked crossings, and long cycle lengths. All these factors contribute to poor pedestrian level of service. Notably, the sharp turns reduce the average effective turn radius, which makes vehicle slow down to turn and thereby improves safety at intersections. However, these turns can also create blind spots; for example, at 9th and Ingra, a concrete berm and shrubs obscure the turn.

Unsignalized intersections received poor pedestrian level of service scores for similar reasons as the signalized intersections. Long crossing distances and lack of marked crossing make the pedestrian experience uncomfortable and unsafe.

5.1.2 Bicycle Level of Service

Bicycle mobility, like that of pedestrians, is failing on all corridors with LOS E or F. See Figure 6.

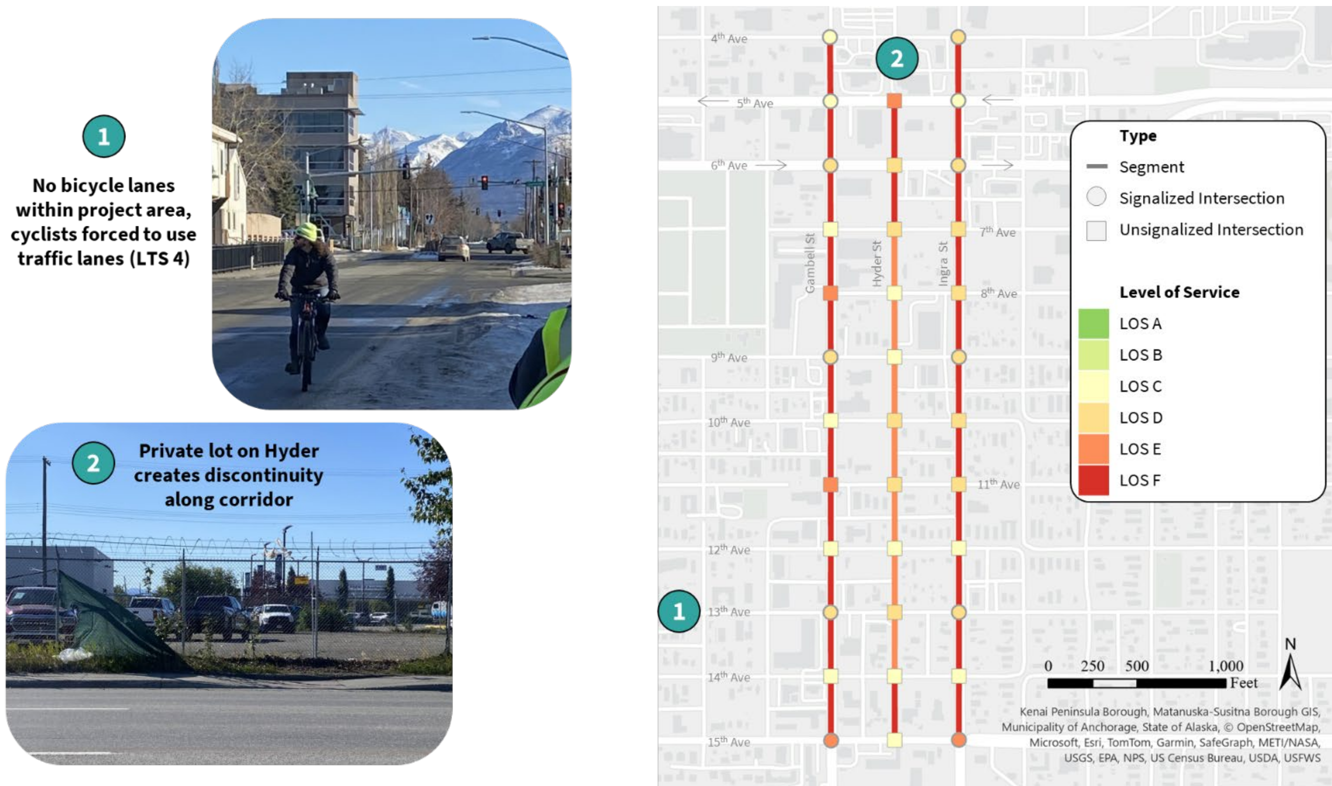


Figure 6: Bicycle MMLOS Baseline Performance

There are no bicycle facilities, no buffer space, and significant number of conflicts with other modes on Gambell, Ingra, and Hyder streets. For Level of Traffic Stress (LTS), AMATS scored a value of 4 for Gambell and Ingra – the worst score for LTS ranked from 1 (best) to 4 (worst) – and indicates that these segments are highly unsafe for bicyclists. As seen in Figure 6, bicyclists must join traffic and thus are only accessible for the most experienced riders.

There is no bicycle infrastructure at signalized intersections. Additionally, long cycle lengths create delays and reduce level of service. Unsignalized intersections on Hyder are better for bicyclists due to reduced vehicle traffic. However, they are still not operating at acceptable conditions because the street design has not been designed for or to accommodate cyclists. Discontinuities along Hyder St. (e.g., the private lot between 4th and 5th Ave.) prevent through movement and limits connectivity.

5.1.3 Transit Level of Service

Transit was difficult to score because of the lack of service along the corridors. As seen in Figure 7, there are a few People Mover buses (Routes 11, 20, 30, 92) that traverse Gambell and Ingra streets, but none run along it. Route 11 operates on Hyder St., but we were unable to identify transit movement delay from the available data and therefore unable to score some intersections.

Where scoring was possible, transit was operating at LOS D or E. Transit access is a function of pedestrian access, which is poor and thus creates difficulty for transit to induce demand. Additionally, there is limited transit infrastructure; many stops lack seating, and when there is seating, there may not be a shelter present.

Figure 7: Transit MMLOS Baseline Performance

5.1.4 Car Level of Service

Vehicular mobility was scored at LOS C on Gambell and Ingra streets, and at LOS B on Hyder St. See Figure 8.

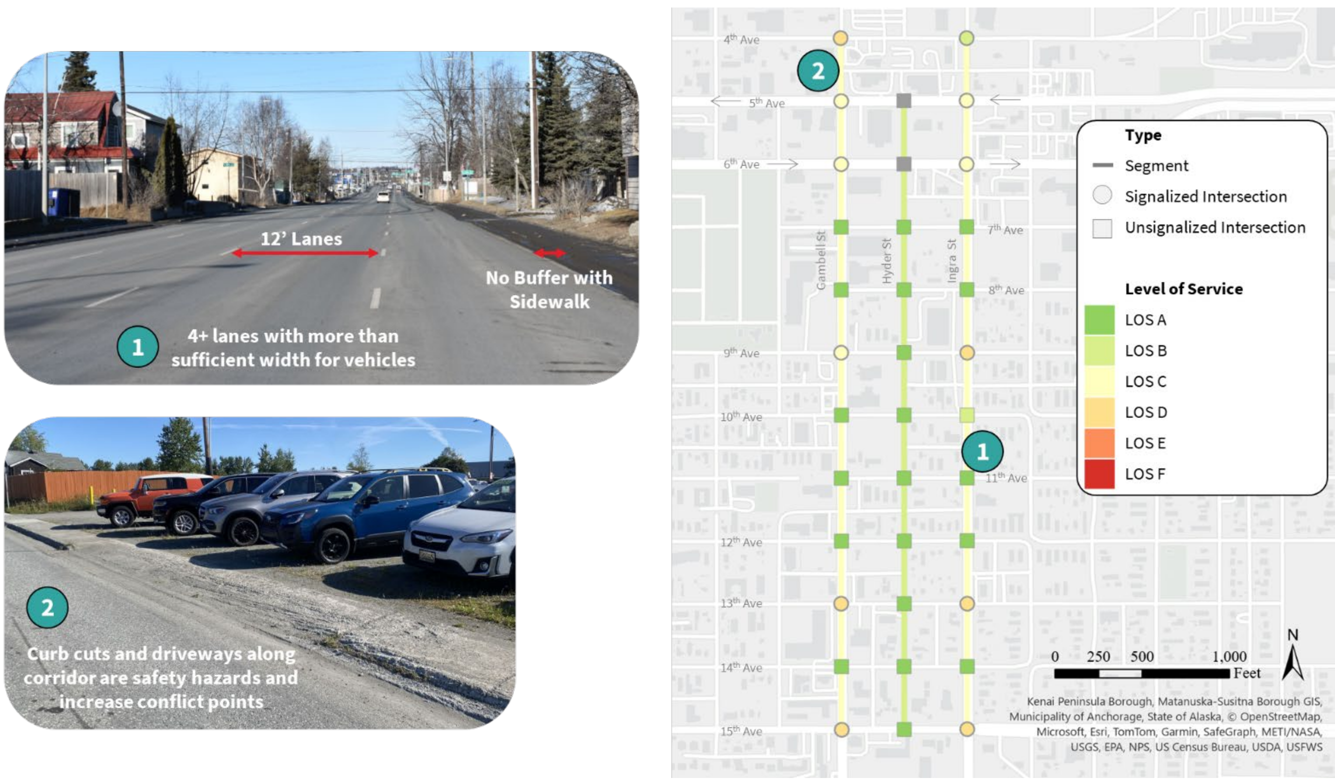


Figure 8: Car MMLOS Baseline Performance

This LOS is better than that identified in the PEL Study. Car LOS is traditionally measured as only the V/C (ratio of volume to capacity) with a focus on maximizing vehicle throughput. The MMLOS rubric incorporates more metrics to capture the built design.

On the metric of V/C alone all three corridors are significantly under capacity:

- V/C on Gambell = 0.18 (LOS A)
- V/C on Ingra = 0.23 (LOS A)
- V/C on Hyder = 0.35 (LOS A)

This indicates that all corridors are overbuilt. Additionally, the PEL Study used V/C for their future demand forecast, showing that the streets continue to operate at LOS A (<=0.6), and therefore will be under capacity, out through 2050.

The reduction in Car MMLOS is due to the presence of many curb lane conflicts. All the driveways, parking lots, and side street access creates potential incident locations.

For intersections, there is little to no delay along the corridor. The corridor is timed to optimize through-movement, which can be seen by the scores of LOS A and B for unsignalized segments. Some signalized intersections operate at LOS C or D, which is acceptable, because they lack turning movements with dedicated lanes.

5.1.5 Truck Level of Service

Truck LOS is predominantly a function of three metrics: width of the curb lane, effective turning radius, and car level of service.

Wider curb lanes improve truck mobility by increasing vehicle throughput. The curb lane width is poor on Gambell and Ingra streets, but excessively wide on Hyder St., thereby improving the LOS for trucks on that corridor despite its lower speed.

Gambell and Ingra streets are on the state freight network so there is truck movement, which has a negative impact on the comfort of other users and the road pavement quality. Wide turns, such as those at 3rd Ave. and Gambell St., are "designed for" trucks and enable vehicle movement over other modes (Figure 10). Most of the corridor is capable of "accommodating" trucks, especially on Hyder St. with the wide street width.

As noted in the previous section, car LOS is B or C throughout the study area. Trucks can safely travel within the general stream of traffic, improving overall LOS.

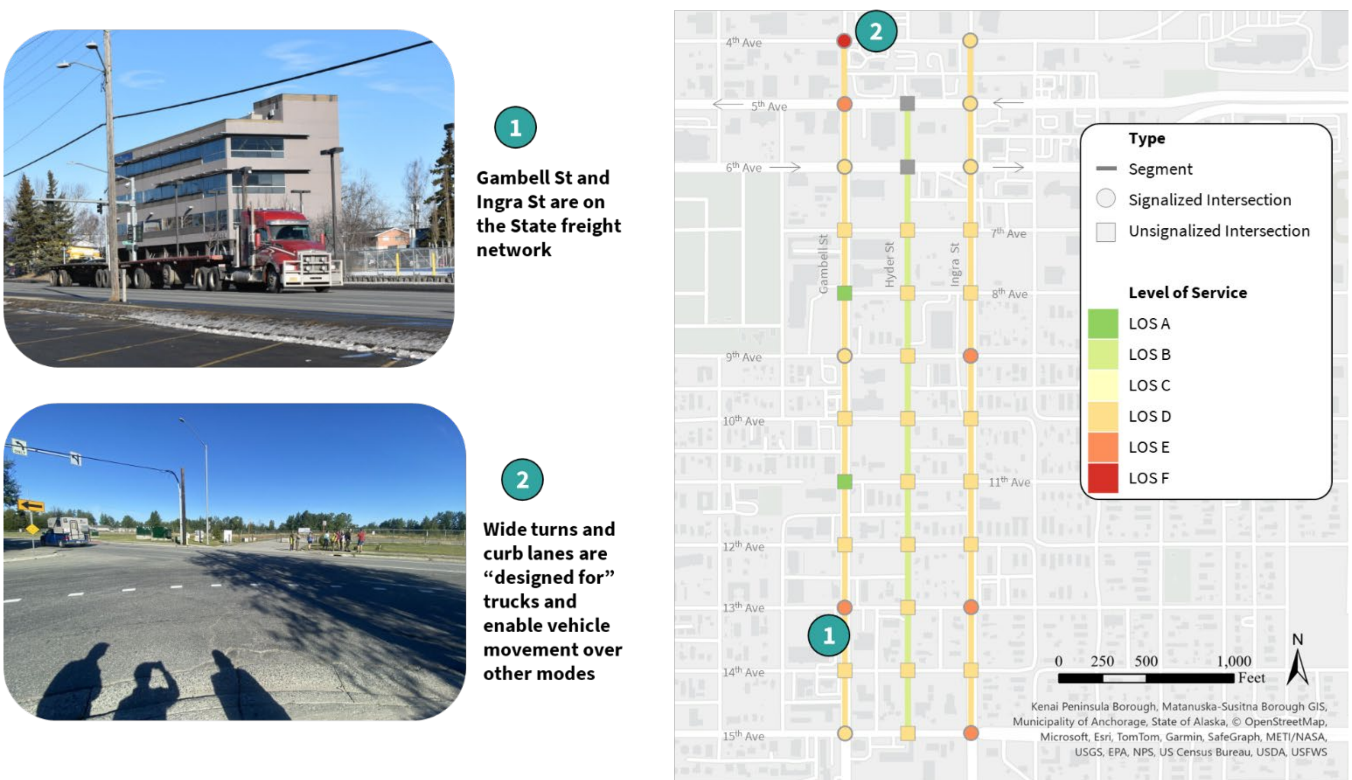


Figure 9: Truck MMLOS Baseline Performance

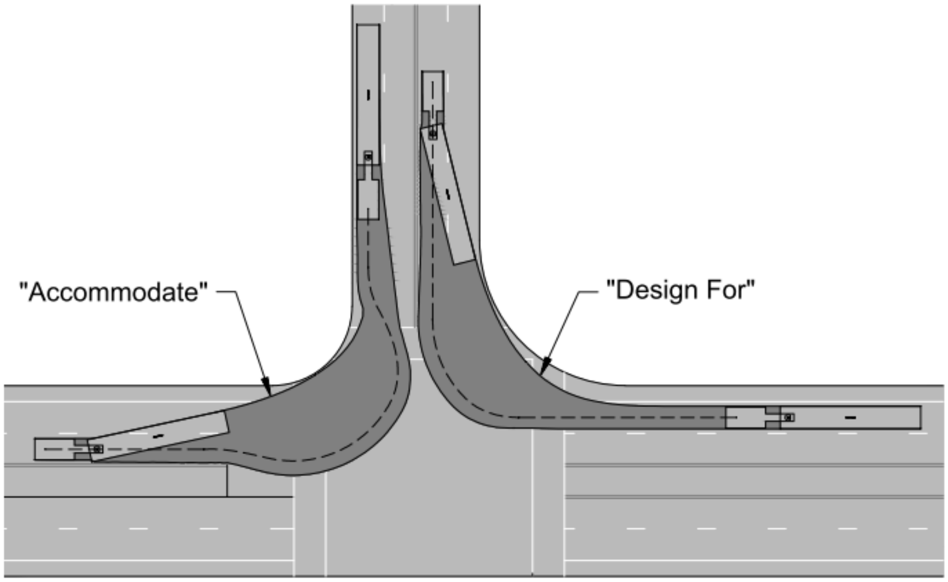


Figure 10: "Accommodate" and "Design For" intersection design for trucks. Source: https://streetsillustrated.seattle.gov/wp-content/uploads/2016/08/Design-vs-Accomodate.png

5.1.6 Baseline MMLOS Performance Summary

Gambell, Ingra, and Hyder streets are poorly designed for all modes.

- **Pedestrian**
  - Infrastructure does not meet target LOS, indicating a need for improvement along the entire corridor.
  - Facility width is substandard, buffer space is minimal, and snow maintenance is poor, resulting in uncomfortable and sometimes obstructed walking conditions.
  - Connectivity is limited by long blocks and infrequent crossings, with many segments lacking enhanced pedestrian measures at intersections.
  - Improvements could include widening sidewalks, increasing buffer zones, and adding more frequent and safer crossings.
- **Bicycle**
  - Infrastructure does not meet target LOS and is failing (LOS F) on many segments and intersections.
  - There are no dedicated bicycle facilities, no buffer space, and frequent conflicts with other modes, making cycling unsafe except for the most experienced riders.
  - Improvements could include protected bike lanes, physical separation from vehicles, and better intersection treatments to reduce conflicts and delays.
- **Car**
  - Performance meets or exceeds the target LOS on all corridors, with ample capacity and low volume-to-capacity ratios.
  - Road diets will reduce vehicle throughput but can provide additional space to other modes and better balance access and mobility on the corridor.
  - Curb lane conflicts are a safety concern and worsen LOS; new designs should address these conflicts.
- **Truck**
  - Hyder Street's wide corridor accommodates trucks, but it is not a through-road for freight. Gambell and Ingra are on the State freight network but have narrow curb lanes not designed for trucks; truck volumes are present but low.
  - Improvements should not restrict trucks but do not need to be designed-for through-movement of heavy vehicles.
- **Transit**
  - Additional information is needed on transit vehicle delay to fully assess transit LOS.
  - Service is already limited in the project area. Additional transit infrastructure may be needed to induce ridership.

The selection of LOS targets directly influences design decisions—such as lane widths, crossing distances, and buffer zones—and shapes the overall character and function of the corridor. Higher LOS targets for pedestrians and cyclists often require reallocating space from vehicles, which can reduce vehicle throughput but improve safety, comfort, and accessibility for active modes. Conversely, prioritizing vehicle LOS may maintain or increase capacity but can conflict with community priorities. Recommended targets for a Main Street (Gambell and Ingra) and a Neighborhood Street (Hyder) were guided by project goals, stakeholder input, and the desired balance between mobility, access, and safety for all users. The alignment of these targets with the baseline MMLOS performance is summarized below in Figure 11.

	Mode	Recommended Target	Segment Average LOS		Intersection Average LOS	
GAMBELL	Pedestrians	C	E	X	D	X
	Bikes	C	F	X	D	X
	Transit	D	N/A	-	E	X
	Trucks	D	E	X	D	✓
	Cars	D	C	✓	B	✓
INGRA	Pedestrians	C	E	X	D	X
	Bikes	C	F	X	D	X
	Transit	D	N/A	-	E	X
	Trucks	D	E	X	D	✓
	Cars	D	C	✓	B	✓
HYDER	Pedestrians	B	D	X	E	X
	Bikes	B	E	X	D	X
	Transit	D	E	X	N/A	-
	Trucks	D	B	✓	D	✓
	Cars	E	B	✓	A	✓

Figure 11: Baseline MMLOS Performance

6. Conclusion

The MMLOS assessment for Fairview and proposed framework represents a shift in how transportation projects are considered in Anchorage. This methodology expands the scope of project evaluation from optimizing for vehicle efficiency (e.g., travel time, congestion) to incorporate factors that affect all users (e.g., safety, comfort, accessibility, etc.). It provides a framework for urban development and transportation planning that evaluates and prioritizes investments across different modes. It supports healthier and more equitable communities by promoting active transportation options and accessibility, it helps planners prioritize safety through street redesign projects or complete streets initiatives, and it asks if existing level of service standards accomplish the community's goals.

This report outlined the MMLOS assessment framework and the steps followed to score level of service for multiple modes (Pedestrian, Bicycle, Transit, Truck, Car) along the Gambell St., Ingra St., and Hyder St. corridors. Results of the MMLOS assessment indicate that Gambell, Ingra, and Hyder streets are poorly designed for all modes. Pedestrian and bicycle infrastructure do not meet target LOS, transit infrastructure is limited, streets provide ample capacity for cars but curb lane conflicts are a safety concern, and narrow curb lanes on Gambell and Ingra streets are not designed for trucks.

The baseline assessment will help guide the corridor design. Scoring the existing conditions develops a baseline for which future designs can be compared against. Additionally, it enables designers to assess the performance and tradeoffs between different road users.

The next steps are to utilize this MMLOS rubric to support additional analysis for this and future projects in Anchorage. The baseline MMLOS results can be overlaid with other scoring criteria to develop a prioritization framework and impact assessment. Future analyses can build off this assessment to layer information (e.g., vulnerability, project cost) that enables identification of corridors and intersections where design changes may have significant benefit to cost. A standardized MMLOS framework may be integrated into MOA or State-led planning initiatives by embedding MMLOS scoring criteria within revisions to the Design Criteria Manual, as well as in project prioritization, cost evaluation, and benefit assessment processes that guide funding allocation in the upcoming Metropolitan Transportation Plan.

7. Appendix A: Literature Review and Works Cited

Please refer to the "Task 5 – Multimodal Level of Service Literature Review" from March 2025 for the detailed literature review completed for this project. An executive summary of the literature review and works cited are below.

7.1 Literature Review

As the standard framework for traffic forecasting and analysis often lacks the ability to prioritize cyclists, pedestrians, and transit users, MMLOS is being used to better consider the integration of multiple modes on the corridor. As there is no consensus on a universally applicable MMLOS approach, Arup has reviewed a variety of methodologies to recommend one that is most suitable to the Reconnecting Fairview Corridor Plan project.

Planning documentation from Anchorage and Alaska shows that while there are multiple multimodal planning documents from Muni, AMATS, and AK DOT&PF, an existing approach for calculating MMLOS is not defined at the local or state level.

National guidelines represent a standard methodology for MMLOS. Documents such as the Highway Capacity Manual (HCM) and NCHRP Report 616 have highly technical methodologies for level of service metrics for automobiles, bicyclists, pedestrians, and transit. However, the metrics are primarily based on throughput and delay. This does not capture the quality of facilities, nor does it support assessment of community priorities (e.g., safety, winter accessibility). More focused criteria are needed to address the unique urban landscape and climate in Anchorage.

Thus, MMLOS guidelines from other jurisdictions in North America were reviewed while carefully considering their more nuanced methodology. This includes the original MMLOS guidance from Fort Collins, CO, a mode and location assessment framework from the Ontario Traffic Council (OTC) in Canada, and multiple innovative approaches within Washington State. Also reviewed were pedestrian and micromobility planning documents from other winter cities that assist in identifying metrics that capture Anchorage's unique climate.

After review, the OTC's methodology was chosen to be adapted for this project. OTC's methodology was chosen because it allows for the most flexibility in terms of metrics and thresholds that will fit Fairview's local context and goals. In this methodology, level of service is individually scored by mode (Pedestrians, Bikes, Transit, Truck, Car) and location (Unsignalized Intersection, Signalized Intersection, Segment), then assessed against target values to ensure that performance fits the land use context. Selected metrics to be used in the MMLOS methodology are identified based on their relevance to Fairview and the project goals.

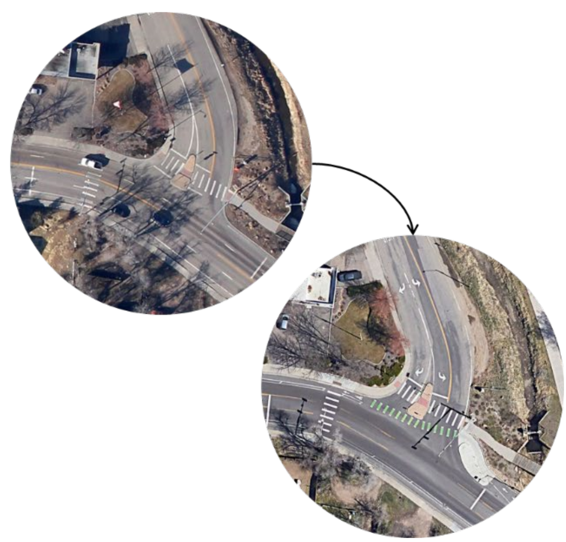
7.2 MMLOS Implementation Examples and Limitations

There are some outstanding limitations of the methodology. First, the MMLOS rubric developed is adapted from an existing methodology. All streets and cities are different, so the approach is not one-size-fits all. The project team has done extensive literature review and worked with stakeholders to ensure that the selected metrics capture local needs, but it may not be complete.

Furthermore, there are data gaps that limit the number of metrics that can be included. While significant amounts of road attribute information are available or has been provided, some aspects are not readily available (e.g., location of curb ramps, presence of lane striping following plowing). This includes user-experience-based criteria (e.g., street lighting, presence of trees) that enable flexibility but would require significant ground truthing to establish baseline information across the corridor. Data collection and future analysis led by MOA or the State to support additional metrics to the rubric may be warranted.

Additionally, the MMLOS approach differs from that of other transportation entities in Anchorage. The literature review endorses the MMLOS methodology, though more research is required to find successful use cases. A preliminary review highlights select instances where MMLOS supported street redesign:

- Fort Collins, Colorado. The City Park Ave. and West Mulberry St. projects leveraged the City's MMLOS methodology to re-design corridors and intersections to prioritize safety for non-motorists. (https://www.fortcollins.gov/Government/City-Plans-and-Projects/Public-Improvement-Projects).



- OR62 Vilas Road Interchange Area Management Plan, Oregon. This Oregon DOT project used a simplified MMLOS (Bike, Ped & Transit) and included analysis in the final traffic report. MMLOS was used to ensure sidewalks improved pedestrian LOS to C or better and advocated for separated multi-use paths. (https://digitalcollections.library.oregon.gov/nodes/view/205019).

Table M-1: No Build / No Mitigation Simplified MMLOS Segment LOS Output Summary[1]

Roadway	Dir	From-To	Pedestrian LOS	Bicycle LOS	Transit LOS
Vilas Rd	W	E Project Limit-Crater Lake Ave	C-E	F	
Vilas Rd	E	Crater Lake Ave-E Project Limit	C-E	F	
Vilas Rd	W	Crater Lake Ave-Crater Lake Hwy	E	F	
Vilas Rd	E	Crater Lake Hwy-Crater Lake Ave	E	F	
Vilas Rd	W	Crater Lake Hwy-Lear Wy	C	C-D	
Vilas Rd	E	Lear Wy-Crater Lake Hwy	E	C-D	
Vilas Rd	W	Lear Wy-Peace Ln	E	C-D	

Table M-5: Tier 1 Scenario 3 Simplified MMLOS Segment LOS Output Summary[1]

Roadway	Dir	From-To	Pedestrian LOS	Bicycle LOS
Vilas Rd	W	E Project Limit-Crater Lake Ave	B-C	C-D
Vilas Rd	E	Crater Lake Ave-E Project Limit	B-C	C-D
Vilas Rd	W	Crater Lake Ave-Crater Lake Hwy	A	A
Vilas Rd	E	Crater Lake Hwy-Crater Lake Ave	C	C-D
Vilas Rd	W	Crater Lake Hwy-Lear Wy	C	C-D
Vilas Rd	E	Lear Wy-Crater Lake Hwy	C	C-D
Vilas Rd	W	Lear Wy-NB OR 62 On Ramp	C	C-D

- Lombard Great Streets, Oregon. Signalized intersection Ped/Bike MMLOS used in project evaluation. Extends the sidewalk upgrades and protected bike lanes to connect to the bicycle network. Replaces an existing right turn "slip lane" with green stormwater treatment areas and a pedestrian plaza. Improves intersection safety and timing. (https://www.oregon.gov/odot/Programs/Pages/Great-Streets-Program.aspx).

7.3 Works Cited

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8. Appendix B: Multi-Modal Level of Service Scoring Rubric

The following rubric was used to score the baseline conditions. The rubric was adapted from the Ontario Traffic Council (OTC) methodology. Measurement is completed along the project corridor by infrastructure type (Segment, Signalized Intersection, Unsignalized Intersection) and mode (Pedestrian, Bicyclist, Transit, Truck, Car). Assessing LOS by mode and location enables the assessment of modal priorities in each location, even with planned changes (e.g., adding a signal to an intersection, converting a signalized intersection to a roundabout).

Metrics were selected based on their relevance to Fairview and the project goals. Preference was given to measures that best capture vision planning processes (e.g., presence of crosswalk markings), as opposed to specific infrastructure measures with data that is not readily available or accessible (e.g., stop bar location, buffer width at intersection) or metrics that are not applicable. Additionally, measures that are outside the scope of this facility-based analysis (e.g., transit passenger load, pedestrian walking speed) were omitted. Metrics were presented to stakeholders at multiple meetings to solicit feedback, which was used to expand metrics and best capture local priorities.

Thresholds provided by OTC or developed for this study were used to assign performance a level of service grade from A (best) to F (worst). LOS is converted to a numerical value (A=1, B=2, C=3, D=4, E=5, F=6) and averaged by type and mode (equally weighted, except where noted in the description) to calculate overall scores.

Data used for this analysis was provided or accessed from the following sources:

- Traffic Counts from AK DOT&PF (https://alaskatrafficdata.drakewell.com/publicmultinodemap.asp)
- Signal Timing and Phasing (provided by the City of Anchorage)
- AMATS Level of Traffic Stress
- Site Visits (e.g., identification of pedestrian facility obstacles)
- Aerial Imagery (e.g., measurements of curb radii, buffer width)
- Noise Map (https://noise-map.com/home/)
- Snow Maintenance (from Muni GIS: https://moa-muniorg.hub.arcgis.com/pages/data)

The Synchro traffic demand simulation software was used to calculate V/C (volume/capacity) ratios for segments and assess signal timing and delay for intersections. Historical traffic count data was balanced by Arup staff to enable network-wide comparison of vehicle demands.

8.1 Segment Measures

Type	Measure	Description	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
Pedestrian	Pedestrian Facility Width (ft)	Minimum width along segment, accounting for obstacles such as utility poles	> 10	8.5 - 10.0	7 - 8.4	6 - 7.4	5 - 6.4	< 5
	Pedestrian Buffer Width / Snow Storage Space (ft)	Width of space between pedestrians and motorized traffic	> 8	7 - 8	5.5 - 6.9	4.5 - 5.4	3.5 - 4.4	< 3.5
	Max Distance between Controlled Crossings (ft)	Detour required for pedestrians to safely access destinations on opposite site of street	< 650	651 - 750	751 - 850	851 - 950	951 - 1050	> 1050
	Posted Speed Limit	Vehicle speed impacts pedestrian safety and comfort	< 25	25 - 30	30 - 35	35 - 40	40 - 45	> 45
	Snow Maintenance	Facility maintenance by public agency during winter months	Both sides maintained	-	One side maintained	-	-	No public maintenance
	Noise (dB)	Noise impacts on pedestrian experience (from Noise Map)	< 50	50 - 55	55 - 60	60 - 65	65 - 70	> 70
Bicycle	Bike Facility Width per Direction (ft)	Dedicated space available for cyclists	> 8	7 - 7.9	6 - 6.9	5 - 5.9	4 - 4.9	< 4
	Bike Buffer Width / Snow Storage Space (ft)	Width of space between cyclists and motorized vehicles	Has physical measures and buffer width > 3	Has physical measures and buffer width 1.5 - 3	-	Has physical measures and buffer width 1- 1.5 OR	-	No physical measures and buffer width < 1.5

Type	Measure	Description	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
						No physical measures and buffer width > 1.5		
	Conflicts with Other Modes [4]	Frequency of crossing point conflicts per mile and in-lane conflicts per traffic volume	0 High 0 Moderate 2 Low	0 High 1 Moderate 1 Low	0 High 2 Moderate 0 Low	1 High 0 Moderate 1 Low	1 High 1 Moderate 0 Low	2 High 0 Moderate 0 Low
	AMATS Level of Traffic Stress	Measure of cyclist experience and comfort	1	-	2	-	3	4
	Posted Speed Limit	Vehicle speed impacts pedestrian safety and comfort	< 25	25 - 30	30 - 35	35 - 40	40 - 45	> 45
	Noise (dB)	Noise impacts on cyclist experience (from Noise Map)	< 50	50 - 55	55 - 60	60 - 65	65 - 70	> 70
Transit	Transit Facility Type	Space dedicated to transit vehicles	Dedicated lanes	Intersection priority measures	-	Mixed traffic with > 1 lane per direction	-	Mixed traffic with 1 lane per direction
Transit	Transit Passenger Amenities	Determines comfort and convenience. Amenities include shelters, seating, shade trees, etc.	Abundance of amenities	Moderate presence of amenities	-	Low presence of amenities	-	No presence of amenities
Transit	Pedestrian Level of Service	Comfort, safety, delay for riders accessing or leaving transit system	A	B	C	D	E	F

[4] From OTC: "Conflicts are caused by driveway crossings on a separated facility or by in-lane conflicts with vehicles sharing (loading), crossing, blocking a lane or bus stops." See charts in OTC methodology (page 64) for determination of 'Low,' 'Medium,' or 'High' indicator for each type of conflict.

Type	Measure	Description	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
Truck	Width of Curb Lane (ft)	Safety and driving comfort experienced by trucks (40%)	> 13	12.8 - 12.9	12.2 - 12.7	11.2 - 12.1	-	< 11.2
	Car Level of Service	Safety and delay experienced by trucks traveling within general traffic stream (60%)	A	B	C	D	E	F
Car	Mid-block V/C Ratio	Freedom of movement for cars along segment (60%)	< 0.60	0.60 - 0.69	0.70 - 0.79	0.80 - 0.89	0.90 - 1.00	> 1.00
	Curb Lane Conflicts (number per km)	Includes on-street parking, cycling facilities, driveways, and bus stops (40%)	0	1-3	4-6	7-10	11-14	15+

8.2 Signalized Intersection Measures

Type	Measure	Description	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
Pedestrian	Enhanced Pedestrian Measures [5]	Enhanced pedestrian measures at intersection divided by number of approaches	> 1	0.76 - 1	0.51 - 0.75	0.26 - 0.5	0.01 - 0.25	0
	Average Effective Turning Radius (ft) [6]	Average effective turning radii of all right-turns at the intersection, where vehicle movement is permitted	< 30	30.0 - 35.9	36.0 - 42.9	43.0 - 48.9	49.0 - 58.9	>= 59
	Signal Cycle Length (s)	Time to complete one full cycle of all signal phases at intersection	< 60	61 - 75	76 - 90	91 - 105	106 - 120	> 120
	Number of Uncontrolled Conflicts [7]	Uncontrolled conflicts at intersection divided by number of legs at intersection	1	1.1 - 1.5	1.6 - 2.0	2.1 - 2.5	2.6 - 3.0	> 3
	Average Crossing Distance (ft)	Length of each crossing from curb to curb, averaged across all marked crosswalks	< 23	23 - 28.9	-	29.0 - 36.0	-	> 36

[5] From OTC: "Enhanced facilities are considered anything beyond the presence of a standard pedestrian facility and can include (but are not limited to) refuge islands, pedestrian storage space, raised intersections, leading pedestrian intervals (LPIs) and protected phases."

[6] From OTC: "Effective turning radius is the radius of the vehicle's traveled path from the turning lane of the departing leg to the first available lane of the receiving leg."

[7] From OTC: "Uncontrolled conflicts may include right turns on green and red when a pedestrian phase coincides, permitted left turns, and right turn channels (slip lanes)."

Type	Measure	Description	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
	Presence of Marked Crossing	Percent of movements with marked pedestrian crosswalks	-	-	100%	75%	50%	< 50%
Bicycle	Enhanced Bicycle Measures [8]	Enhanced bicycle measures at intersection divided by number of approaches	> 1	0.76 - 1	0.51 - 0.75	0.26 - 0.50	0.01 - 0.25	0
	Average Effective Turning Radius (ft)	Average effective turning radii of all right-turns at the intersection, where vehicle movement is permitted	< 30	30.0 - 35.9	36.0 - 42.9	43.0 - 48.9	49.0 - 58.9	>= 59
	Signal Cycle Length (s)	Time to complete one full cycle of all signal phases at intersection	< 60	61 - 75	76 - 90	91 - 105	106 - 120	> 120
	Number of Uncontrolled Conflicts	Uncontrolled conflicts at intersection divided by number of legs at intersection	1	1.1 - 1.5	1.6 - 2.0	2.1 - 2.5	2.6 - 3.0	> 3
Transit	Transit Priority Measures [9]	Approaches with transit priority measures	At all approaches	-	At one or more approaches	-	-	None
	Transit Movement Delay (s)	Average delay experienced by transit	0 - 10	11 - 20	21 - 35	36 - 55	56 - 80	> 80

[8] From OTC: "Enhanced facilities are considered anything beyond the presence of a basic bike facility, and can include (but are not limited to) crossrides, green conflict markings, dedicated intersection features, protected intersection features, bicycle signal heads, leading bike intervals (LBIs) and protected phases."

[9] A transit measure can be infrastructure (e.g. dedicated transit lanes, queue jumps) or signal priority measures (transit signal priority).

Type	Measure	Description	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
	Pedestrian Level of Service	Comfort, safety, delay for riders access or leaving transit system	A	B	C	D	E	F
Truck	Average Effective Turning Radius (ft)	Average effective turning radii of all right-turns at the intersection, where vehicle movement is permitted	> 59	55 - 59	49 - 55	42 - 48	36 - 41	< 36
	Car Level of Service	Safety and delay experienced by trucks traveling within general traffic stream	A	B	C	D	E	F
Car	Turning Movements with Dedicated Lanes	Turning movements with exclusive lanes at intersection divided by the number of turning movements	100 - 85%	84 - 60%	59 - 35%	34 - 10%	-	< 10%
	Intersection Delay (s)	Average delay experienced by automobiles	0 - 10	11 - 20	21 - 35	36 - 55	56 - 80	> 80

8.3 Unsignalized Intersection Measures

Type	Measure	Description	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
Pedestrian	Average Crossing Distance (ft)	Distance a pedestrian must walk to cross the intersection at a marked crossing	< 23	23 - 28.9	-	29.0 - 36.0	-	> 36
	Marked Crossings	Percent of intersection legs with marked crossings	100%	-	-	-	99 - 50%	< 50%
	Average Effective Turning Radius (ft)	Average effective turning radii of all right-turns at the intersection, where vehicle movement is permitted	< 30	30.0 - 35.9	36.0 - 42.9	43.0 - 48.9	49.0 - 58.9	>= 59
Bicycle	Presence of Bicycle Facilities	Percent of approaches with bicycle facilities	100%	75 - 50%	-	50% - 25%	-	0%
	Requirement to Stop	Percentage of cyclists required to stop at intersection [10]	0 - 15 %	16 - 30 %	31 - 50 %	51 - 70 %	71 - 85 %	> 85%
	Average Effective Turning Radius (ft)	Average effective turning radii of all right-turns at the intersection, where vehicle movement is permitted	< 30	30.0 - 35.9	36.0 - 42.9	43.0 - 48.9	49.0 - 58.9	>= 59
Transit	Transit Movement Delay (s)	Average delay experienced by transit	0 - 10	10 - 20	21 - 35	36 - 55	56 - 80	> 80

[10] From OTC: "The intent of this measure is to evaluate the convenience and level of delay for cyclists at intersections. Cyclists will experience less delay at intersections where they are not required to stop. In some states it is common law to allow bicyclists to treat stop signs as yield signs (e.g., Idaho Stop).

Type	Measure	Description	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
	Pedestrian Level of Service	Comfort, safety, delay for riders access or leaving transit system	A	B	C	D	E	F
Truck	Average Effective Turning Radius (ft)	Average effective turning radii of all right-turns at the intersection, where vehicle movement is permitted	> 59	55 - 59	49 - 55	42 - 48	36 - 41	< 36
	Car Level of Service	Safety and delay experienced by trucks traveling within general traffic stream	A	B	C	D	E	F
Car	Intersection Delay (s)	Average delay experienced by automobiles	0 - 10	11 - 20	21 - 35	36 - 55	56 - 80	> 80