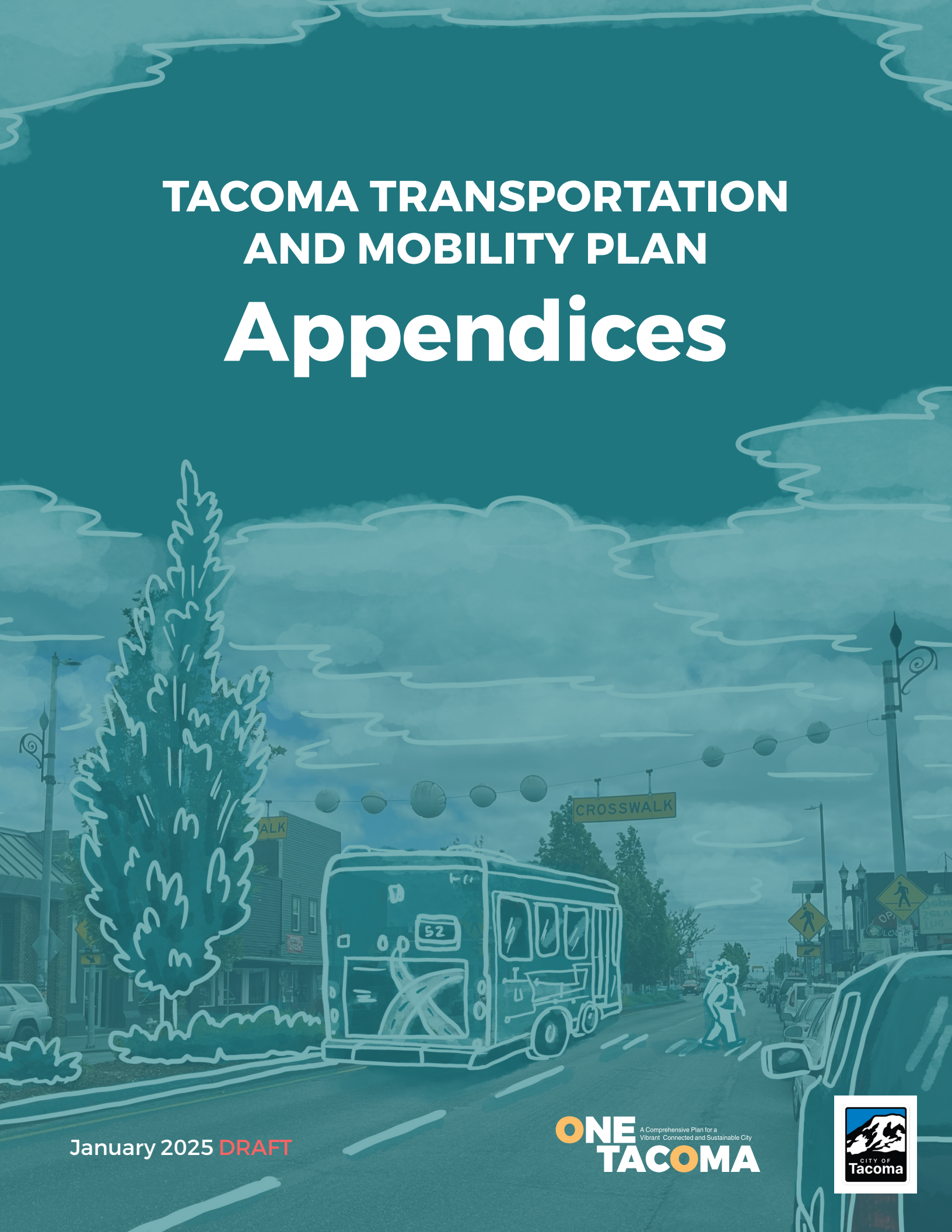
TACOMA TRANSPORTATION AND MOBILITY PLAN

Appendices



January 2025 DRAFT

ONE TACOMA
A Comprehensive Plan for a Vibrant Connected and Sustainable City

CITY OF Tacoma

Appendix C: Multimodal Level of Service

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Table of Contents

Page

Table of Figures

Page

STATE GUIDANCE AND REQUIREMENTS FOR MULTIMODAL LEVEL OF SERVICE (MMLOS)

Methodology

To meet the requirements of the Washington State's Growth Management Act (GMA) (Figure 2), Tacoma maintains level-of service standards for pedestrian, bicycle, transit and auto networks. The cumulative effect of the targets is to evaluate and monitor the transportation systems' person trip capacity and its relationship to planned land use growth. Identified deficiencies in different modal networks will inform the TMP's project list as well as project prioritization.

This appendix provides Tacoma's draft methodology for assessing MMLOS. This methodology is guided by the Washington State Department of Transportation (WSDOT) recommendations, incorporates peer reviews of other similar cities in Washington, and leverages available data to ensure that evaluating LOS remains manageable for city officials. As more data becomes available, Tacoma will reassess its LOS methodology. Each mode's level of service is evaluated based on roadway characteristics and existing facility types (Table 1).

Table 1 Multimodal Level of Service Standard Metrics

Mode	Level of Service Standard Metric(s)
Pedestrian	▪ Along roadways: Level of traffic stress ▪ As a network: Crosswalk density ▪ At intersections: Intersection ADA accessibility
Bicycle	▪ Level of traffic stress
Transit	▪ Frequency of transit service, ability for riders to access the stations and amenities at stations
Auto	▪ Volume capacity ratios at PM Peak time

The transit level of service metric also considers frequency of buses. Pedestrian and bicycle level of service standards are based on traffic stress and were determined by applying WSDOT's guidance[1] to the facility types available in the City of Tacoma.

Originally developed for WSDOT's Active Transportation Plan, the guidance sets thresholds for roadway speed, number of lanes, and average daily traffic that determine the level of traffic stress a person may experience on a roadway based on existing facilities.

The faster the vehicles move on a roadway and the wider that roadway is, the more traffic stress people walking or biking experience. Dedicated space for bicyclists and pedestrians, like sidewalks and bike lanes can reduce the level of stress experienced by roadway users. Barriers between moving traffic and walkers and bikers also reduce the stress they experience.

[1] Development Division Multimodal Development and Delivery Design Bulletin #2022-01

Figure 1 WSDOT Growth Management Act language relevant to MMLOS

Mandatory elements of the Comprehensive Plan related to MMLOS per 36.70A.365:

- *(ii) Estimated multimodal level of service impacts to state-owned transportation facilities resulting from land use assumptions to assist in monitoring the performance of state facilities, to plan improvements for the facilities, and to assess the impact of land-use decisions on state-owned transportation facilities;*
- *Multimodal level of service standards for all locally owned arterials, locally and regionally operated transit routes that serve urban growth areas, state-owned or operated transit routes that serve urban areas if the department of transportation has prepared such standards, and active transportation facilities to serve as a gauge to judge performance of the system and success in helping to achieve the goals of this chapter consistent with environmental justice. These standards should be regionally coordinated;*
- *(C) For state-owned transportation facilities, multimodal level of service standards for highways, as prescribed in chapters 47.06 and 47.80 RCW, to gauge the performance of the system. The purposes of reflecting multimodal level of service standards for state highways in the local comprehensive plan are to monitor the performance of the system, to evaluate improvement strategies, and to facilitate coordination between the county's or city's six-year street, road, active transportation, or transit program and the office of financial management's ten-year investment program. The concurrency requirements of (b) of this subsection do not apply to transportation facilities and services of statewide significance except for counties consisting of islands whose only connection to the mainland are state highways or ferry routes. In these island counties, state highways and ferry route capacity must be a factor in meeting the concurrency requirements in (b) of this subsection;*
- *(D) Specific actions and requirements for bringing into compliance transportation facilities or services that are below an established multimodal level of service standard;*
- *(E) Forecasts of multimodal transportation demand and needs within cities and urban growth areas, and forecasts of multimodal transportation demand and needs outside of cities and urban growth areas, for at least ten years based on the adopted land use plan to inform the development of a transportation element that balances transportation system safety and convenience to accommodate all users of the transportation system to safely, reliably, and efficiently provide access and mobility to people and goods. Priority must be given to inclusion of transportation facilities and services providing the greatest multimodal safety benefit to each category of roadway users for the context and speed of the facility;*
- *(F) Identification of state and local system needs to equitably meet current and future demands. Identified needs on state-owned transportation facilities must be consistent with the statewide multimodal transportation plan required under chapter 47.06 RCW. Local system needs should reflect the regional transportation system and local goals, and strive to equitably implement the multimodal network*

Peer Review for Developing MMLOS

To help inform their approach and ensure they were meeting the spirit of the GMA, Tacoma reviewed the following cities to see how their comprehensive plans were incorporating MMLOS:

- City of Bellevue
- City of Burien
- City of Seattle
- WSDOT
- City of Bellingham
- Puget Sound Regional Council (PSRC)
- City of Vancouver
- City of Spokane
- City of Redmond

Many cities were still in the process of finalizing their MMLOS standards. All cities plan to calculate person trips (sometimes referred to as mobility units) available in their transportation system so they can determine how much capacity they needed to provide in the future.

PEDESTRIAN LEVEL OF SERVICE

Tacoma's Pedestrian Level of Service (LOS) standards consist of three elements:

1. Along roadways, Tacoma uses the level of traffic stress a person experiences walking or rolling in that segment.
2. At intersections, Tacoma ranks the LOS based on accessibility of curbs.
3. At a network level, Tacoma ranks the LOS based on prevalence of marked crossings and assigns appropriate LOS based on pedestrian demand, land use, and safety considerations .

Using the level of stress thresholds set by WSDOT, Tacoma ranks its pedestrian network from 1 to 4, with 1 indicating the least stressful environment for pedestrians and 4 indicating the most stressful (Table 2). These rankings are applied differently to intersections where the most important factor is accessibility. At intersections, Tacoma considers the curb infrastructure to determine its LOS rating.

Table 2 Pedestrian Level of Service

Pedestrian Level of Service	Roadway Definition	Intersection Definition	Crosswalk Density Definition
Level 1 – **Best**	A level that most people would find comfortable, accessible, and safe (youth, most individuals with disabilities, elderly)	Fully ADA accessible curb ramp	Appropriately designed marked crosswalks present every 300 feet or less.
Level 2	Little traffic stress, but requires more attention, especially for children	NA	Appropriately designed marked crosswalks present every 600 feet or less (based on pedestrian demand, land use, and safety considerations)
Level 3	Moderate traffic stress	Curb ramp present, but not fully ADA compliant	Appropriately designed marked crosswalks > 600 feet.
Level 4 – **Worst**	High traffic stress, not comfortable or accessible for most people	No Curb Ramp	No marked crosswalks present.

Combining roadway characteristics (Number of lanes, posted speed limit, and average daily traffic) with the existing facility type, Figure 2 shows how Tacoma ranks its pedestrian facilities along roadways – this considers sidewalk presence and width (standard 5 feet, wide >5 feet, extra wide >5 feet with buffer).

In general roadways with slower speeds require fewer facilities to be less stressful for pedestrians. For example, a neighborhood street where a small number of vehicles travel 25 MPH does not require that a facility have a LOS of 1. Conversely, a very high-quality pedestrian facility – like a separated pedestrian facility (or shared use path) will always earn a pedestrian LOS of 1.

The pedestrian LOS at intersections is determined using the status of the curb ramps (Figure 3).

Crosswalk density LOS identifies how often people have a way to cross the street using a marked crosswalk meeting the standards outlined in the City's Right-of-Way Design Manual. A high level of service allows pedestrians to easily access destinations without diverting their trips. The more a pedestrian has to go out of their way to comfortably cross a street to reach their destination, the lower the LOS is in that area. Figure 4 shows how this is driven by crossing density and potential crossing distance. Land use context will determine what level of crosswalk density is appropriate for an area. For example, mixed use centers should have a LOS of 1 while other arterials will have a goal of LOS 2 allowing for more space between marked crossings.

Figure 2 Pedestrian Level of Service along roadway based on Roadway Characteristics and Existing Pedestrian Facility

Roadway Characteristics			Pedestrian Facility – Along Roadways					
Lanes	Speed Limit (MPH)	ADT	No Ped facility with shoulder	5 ft Sidewalk, no buffer	> 5 ft Sidewalk, no buffer	Sidewalk with landscaped buffer	Sidewalk with robust buffer	Separated Pedestrian Pathway
1 thru lane per direction (or 1 lane one-way street)	<=25	0-750	1	1	1	1	1	1
	20	750-1,500	1	1	1	1	1	
	25	750-1,500	2	1	1	1	1	1
	<=25	1,500-3,000	2	1	1	1	1	1
	20	>3,000	2	2	2	2	2	1
	25	>3,000	3	2	2	2	2	1
	30	Any	3	2	2	2	2	1
	35	Any	4	4	2	2	2	1
	40	Any	4	4	3	3	2	1
	45	Any	4	4	4	3	2	1
	>=50	Any	4	4	4	4	2	1
2 thru lanes per direction	<=25	Any	3	2	2	2	2	1
	30	<7,000	3	2	2	2	2	1
	30	>7,000	4	3	2	2	2	1
	35	Any	4	4	2	2	2	1
	40	Any	4	4	3	3	2	1
	45	Any	4	4	4	3	2	1
	50 or more	Any	4	4	4	4	2	1
3+ thru lanes per direction	<=25	Any	4	2	2	2	2	1
	30	Any	4	3	2	2	2	1
	35	Any	4	4	3	2	2	1
	40	Any	4	4	3	3	2	1
	45	Any	4	4	4	3	2	1
	50 or more	Any	4	4	4	4	2	1

Figure 3 Pedestrian Level of Service at Intersections

Roadway Characteristics			Pedestrian Facility – At Crossing		
Lanes	Speed Limit (MPH)	ADT	No Ramps	Non-ADA ramp	ADA Ramp
1+ thru lane per direction (or 1 lane one-way street)	<=25	0-750	4	3	1
	<=25	<1,500	4	3	1
	<=25	1,500-3,000	4	3	1
	<=25	>3,000	4	3	1
	30	Any	4	3	1
	35	Any	4	3	1
	40	Any	4	3	1
	45	Any	4	3	1
	>=50	Any	4	3	1

Figure 4 Pedestrian Level of Service based on Crosswalk Density

Roadway Characteristics			Crosswalk Density			
Lanes	Speed Limit (MPH)	ADT	Marked crosswalk every 300 feet or less	Marked crosswalk every 600 feet or less	Marked crosswalks More than 600 feet apart	No marked crosswalks Present
1 thru lane per direction (or 1 lane one-way street)	20-25	0-750	1	1	2	2
	20-25	<1,500	1	2	2	2
	20-25	1,500-3,000	1	2	3	3
	20-25	>3,000	1	2	3	4
	30	Any	1	2	3	4
	35	Any	1	2	3	4
	40	Any	1	2	3	4
	45	Any	1	2	3	4
	>=50	Any	1	2	3	4
2+ thru lanes per direction	25	Any	1	2	3	4
	30	<7,000	1	2	3	4
	30	>7,000	1	2	3	4
	35	Any	1	2	3	4
	40	Any	1	2	3	4
	45	Any	1	2	3	4
	50 or more	Any	1	2	3	4

BICYCLE LEVEL OF SERVICE

Bicycle Level of Service (LOS) also uses level of traffic stress as part of its ranking process. A LOS of 1 indicates a low level of traffic stress where most riders of all ages will feel comfortable. A LOS of 4 indicates high traffic stress situations where most riders will not be comfortable.

Table 3 Bicycle Level of Service

Bicycle Level of Service	Definition
Level 1 – **Best**	A level that most riders of all ages and abilities feel safe using
Level 2	Comfortable for most adults but requires more attention, especially for children
Level 3	Moderate traffic stress, tolerable for confident riders
Level 4 – **Worst**	High traffic stress, not comfortable for most riders

Bicycle LOS uses the same roadway characteristics as pedestrian LOS including posted speed limit, number of travel lanes, and average daily traffic on the roadway. In general, more separation between bicycle facilities and moving traffic reduce conflicts and promotes less stressful biking conditions. Figure 6 on the following page provides a detailed look at the Bicycle LOS based on roadway characteristics and facility type.

In general, a completely separated facility like a Shared Use Path will always have a bicycle LOS of 1 and slower roadways with less heavy traffic will require less separation for cyclists to feel comfortable biking there.

Figure 5 Bicycle Level of Service based on Roadway Characteristics and Existing Bicycle Facility Type

Roadway Characteristics			Bicycle Facility					
Lanes	Speed Limit (MPH)	ADT	No Treatment (with or without shoulder)	Neighborhood Greenway	5 - 7 ft Bike Lane	Separated Bike Lane (Paint only)	Separated Bike Lane (Physical Barrier)	Shared Use Path
1 thru lane per direction (or 1 lane one-way street)	20	0-1,500	1	1	1	1	1	1
	20	>1,500	2	2	1	1	1	1
	25	0-750	1	1	1	1	1	1
	25	750-1,500	2	1	2	1	1	1
	25	1,500-3,000	2	1	2	1	1	1
	20-25	>3,000	3	2	2	2	2	1
	30	<3,000	3	2	2	2	1	1
	30	>3,000	3	3	2	2	2	1
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	45	Any	4	4	4	4	2	1
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2 thru lanes per direction	20	<7,000	3	3	2	2	2	1
	20	>7,000	3	3	3	2	2	1
	25	<7,000	3	3	2	2	2	1
	25	>7,000	3	3	3	2	2	1
	30	<7,000	3	3	3	2	2	1
	30	>7,000	4	4	3	3	2	1
	35	Any	4	4	4	3	2	1
	40	Any	4	4	4	4	2	1
	45	Any	4	4	4	4	2	1
	50 or more	Any	4	4	4	4	2	1
3+ thru lanes per direction	20 - 25	Any	4	4	3	3	2	1
	30	Any	4	4	4	3	2	1
	35	Any	4	4	4	4	2	1
	40	Any	4	4	4	4	2	1
	45	Any	4	4	4	4	2	1
	50 or more	Any	4	4	4	4	2	1

TRANSIT LEVEL OF SERVICE

To determine Transit Level of Service the City of Tacoma considers how people get to a transit station and how frequently service operates at that station. A Transit LOS of 1 is considered the highest LOS and must be accessible and have frequent service (20 minutes or less).

Pedestrian LOS on the roadway is used to determine if a station is accessible. The ranking then considers existing transit service frequency (headways) to determine that stop's Transit LOS. Only stops that are fully ADA accessible and have frequent service can score a 1.

Table 4 Transit Level of Service

Transit Level of Service	Definition
Level 1 – **Best**	Frequent service and easy, accessible pedestrian access to stations or stops
Level 2	Stops that have either frequent service (20 minutes or better) but may not have good pedestrian access
Level 3	Stops with infrequent service (30 minutes or more) or stops with frequent service but poor access
Level 4 – **Worst**	Stops with very low service and poor pedestrian access to stations. Any stop that is inaccessible automatically gets a LOS of 4.

Figure 7 shows the City of Tacoma's system for assigning LOS to transit stops. In the future the city may consider dedicated transit facilities (bus lanes, transit signal priority) in their assessment of Transit LOS.

Figure 6 Transit Level of Service based on Service Frequency, Pedestrian Access, and Bus Stop Characteristics

Transit Service	Pedestrian Access	Bus Stop Accessibility	
Frequency of Transit Service (Peak)	Lowest Pedestrian LOS within 1/2 mile of station	Accessible stop	Inaccessible stop
<15 minute headways	1	1	4
	2	1	4
	3	2	4
	4	2	4
15 - 20-minute headways	1	1	4
	2	2	4
	3	2	4
	4	2	4
30-minute headways	1	3	4
	2	3	4
	3	3	4
	4	3	4
30 minute - 1 hour headways	1	3	4
	2	3	4
	3	3	4
	4	3	4
> 1 hour headways	1	4	4
	2	4	4
	3	4	4
	4	4	4

AUTO LEVEL OF SERVICE

In line with WSDOT, Tacoma uses the Highway Capacity Manual and AASHTO Geometric Design of Highways and Streets to determine auto LOS for their roadways. Auto LOS is typically based on PM peak-hour travel data on the roadway. This is used to calculate volume capacity (V/C) ratios which is a comparison of the number of vehicles using a roadway to its designed capacity. These "V/C" ratios are then used to "grade" (A through F) the operation of the roadway (Figure 8).

Unlike traditional grades in school a score of an "A" is not always ideal. It may indicate a roadway that has been overbuilt for the traffic needs in the area. Efficient roadways are ones that operate near, but not over capacity. Auto LOS of E or below indicates the roadway is overused from an auto perspective and increasing capacity on the overall multimodal transportation system can help stem this congestion and preserve the overall operation of the transportation system.

Figure 7 Auto Level of Service Definitions

Auto Level of Service	Definition
A	Free Flow
B	Reasonably Free Flow
C	Stable Flow
D	Approaching Unstable Flow
E	Unstable Flow
F	Forced Flow or Flow Breakdown

How Auto LOS will be applied

The City will accept an Auto LOS as low as E on their roadways. WSDOT and the Puget Sound Regional Council (PSRC) will set the acceptable LOS for Highways of Statewide Significance that fall inside city limits.

Tacoma also recognizes elements of multimodal level of service (MMLOS) to consider their transportation network as a whole, so roadways' auto LOS that fall below LOS E (i.e., LOS F/volume-to-capacity ratio > 1.0) may be permissible if mitigated (with resulting V/C ratio not exceeding 1.1) by increasing people-throughput capacity via additional transit service or dedicating more roadway space to walking and biking. Methodology for calculating auto LOS is well documented and not included here.

NEXT STEPS: PERSON TRIP CAPACITY

The City of Tacoma is reviewing their transportation network to calculate the person-trip capacity of existing facility. This is done through modeling work.

The requirements of the GMA suggest that in the Transportation Element of their Comprehensive Plan, the City of Tacoma must:

- Establish LOS standards for all locally owned arterials, existing transit routes, and active transportation facilities
- Estimate multimodal impacts to State facilities
- Provide forecasts of multimodal transportation demand and needs within and outside the city for at least 10 years. The draft project list developed through the TMP anticipates inadequacies and includes projects for those facilities/locations.
- Create specific actions and requirements for bringing into compliance transportation facilities and Services that are below the required LOS

In this update the City of Tacoma:

- Has established LOS service standards for Bike, Pedestrian, Transit, and Autos
- Will assign a minimum LOS on each facility in the city by mode based on land use context and presence of modal network (for example, Transit LOS targets will only apply to the Frequent Transit Network).
- Plans to project demand on facility and create an impact fee for facilities that are not going to meet this standard. This is currently under development. The main CMP document already lists the few state route intersections that fail in 2050.