TRANSIT LEVEL OF SERVICE GUIDELINES MEMO

DATE: September 8, 2023

TO: Lindsey Channing | City of Sammamish

FROM: Ben Wallach, PE, PTOE | DKS Associates,
Sarah Keenan, PE | DKS Associates

SUBJECT: Sammamish Transit Study – Transit Level of Service Guidelines

The purpose of this memo is to present options for the transit-related level of service (LOS) guidelines for the City of Sammamish to consider incorporating into its current policies and procedures. First, best practices from peer cities in Washington are reviewed and summarized. Next, options are presented for transit-related LOS guidelines in Sammamish, which are organized into three areas: transit operations, access, and rider comfort., The guidelines presented in this memo are intended for use by City staff for planning purposes and would not apply to transportation concurrency standards for new development.

BEST PRACTICES

Several peer communities in Washington have developed standards and guidelines for evaluating the quality of their transit-related infrastructure. A summary of these efforts is presented below:

Bellevue published its Multi-modal LOS (MMLOS) Metrics, Standards & Guidelines final report in April 2017[1]. This document outlines standards and guidelines for each travel mode separately including vehicle, pedestrian, bicycle, and transit. The report includes two performance measures related to transit. The first is Passenger Amenities which evaluates the amenities at transit stops including weather protection, seating, paved bus door passenger zone, wayfinding, and bicycle parking. The second is Transit Speed which is measured between identified activity centers.

As part of its 2016 Comprehensive Plan, **Bellingham** has a multimodal transportation concurrency policy which divides the city into separate concurrency service areas depending on land use context[2]. Within each service area, LOS is calculated according to several performance measures

[1] https://bellevuewa.gov/sites/default/files/media/pdf_document/Bellevue_MMLOS%20FINAL.pdf

[2] https://cob.org/wp-content/uploads/2016-multimodal-transportation.pdf

across all travel modes. The LOS for the transit mode is based on transit capacity, transit route frequency, and transit ridership.

Redmond published its Multimodal Plan-Based Concurrency System Administrative Guidelines in September 2014[3]. This report documents a program which defines LOS by translating a city-wide person-miles traveled value to "mobility units". Redmond tracks the supply of mobility units, i.e., transportation infrastructure investments, against the expected changes in demand resulting from new development. While Redmond's guidelines do not specifically cover transit operations, transit trips are captured as part of the "mobility units" value and therefore transit is captured in the LOS calculation.

Bellingham and Redmond incorporate transit Level of Service into the concurrency program with a multimodal concurrency system. Overall, these concurrency programs take transit into account by using person trips to evaluate concurrency. They also allow developers to fund transit projects as part of transportation mitigation. Bellevue uses transit LOS to track the two different metrics of the transit system, rather than incorporating it into concurrency directly.

PROPOSED GUIDELINES

It is recommended that Sammamish uses a method similar to Bellevue, which allows the City to track the effectiveness of the transit system without tying it to the concurrency system. Some ways to track transit effectiveness are described below, and are grouped into three categories: operations, access, and rider comfort.

TRANSIT OPERATIONS

The first measure relates to transit operations. Transit services within Sammamish are operated by two regional agencies, King County Metro and Sound Transit, which control route, stop location, and frequency. Therefore, it is best to avoid a level of service policy that uses metrics such as headways and frequencies, which are outside of the City's direct control. Bellingham includes transit headway as part of the transit LOS to ensure developers consider nearby transit routes. Since Sammamish's recommended policy is not tied to concurrency, it is better to track metrics the City has more control over.

Instead, transit to auto travel time ratio, described below, relies on how quickly and reliably buses can traverse the city's roadway network compared to general purpose motor vehicle traffic. This metric would require both transit and general purpose motor vehicle travel time data.

> **Transit to auto travel time ratio**: This is the ratio of transit travel time to auto travel time for specific origin-destination pairs with at least one trip end within Sammamish, or along shorter roadway segments. This measure provides an indication of how competitive the transit

[3] https://www.redmond.gov/DocumentCenter/View/2466/Exhibit-Z-31-PDF

mode is compared to private automobiles in terms of travel time. Typically, a ratio of 1.5 or lower represents a "competitive" transit option.

Options are available for travel time data. The simplest and most cost-effective option for calculating this metric would be regularly tracking Google Maps travel time data. Google Maps data provides a range of travel times based on time of day and day of the week based on mode of travel, in this case personal vehicle and public transit. The data should be tracked for the same time period (for example, Thursdays at 4pm) quarterly to understand how transit operations change.

Another option for collecting travel time data is through acquiring data from a vendor, such as INRIX or Streetlight. Purchased data may provide more metrics and a deeper understanding of traffic patterns. However, this option may be cost prohibitive. Data directly from the vendor is typically raw and would need to be aggregated and analyzed. Many consulting firms have contracts with these data vendors and can acquire and analyze the data at a lower cost than directly from the data vendor. The details of the contract would need to be scoped but could range from $8,000- $30,000 for annual or quarterly review of origin-destination pairs.

Another option for transit travel time data is King County Metro's Speed and Reliability Planning Tool. The City would need to have access to data from King County's Speed and Reliability Planning Tool to obtain the necessary transit travel time data for calculating transit to auto travel time ratios. For this option, the City would need to pursue an agreement with King County Metro to regularly obtain segmented transit travel times along the City's transit network.

Regardless of data sources, the proposed LOS standard is shown in Table 1. The values shown here are based on values presented in Exhibit 5-24 of the *Transit Capacity and Quality Service Manual, 3rd Edition*, which categorizes transit to auto travel time ratios by how tolerable they are to transit riders and operators. Again, these ratios would be measured along specific origin-destination pairs with at least one trip end within Sammamish, or along smaller roadway segments.

TABLE 1: PROPOSED LEVEL OF SERIVCE STANDARD FOR TRANSIT OPERATIONS

LEVEL OF SERVICE	TRANSIT TO AUTO TRAVEL TIME RATIO (MIN/MIN)
GREEN	<1.25
YELLOW	1.25-2.0
RED	>2.0

ACCESS

Access refers to the experience of using transit from the time one leaves their point of origin until they are riding on a transit vehicle. Typically, this involves walking or biking to a transit stop or

driving to a park & ride facility. The access-related performance measures track how comfortable, safe, and convenient it is to use transit within the City.

Access-related measures would be applicable to pedestrian and bicycle facilities within designated walksheds and bikesheds. The walkshed is the portion of the City's transportation network that is within a ¼-mile or ½-mile of a transit stop. This proportion increases to a 1-mile distance for the bikeshed. These areas are shown in Figure 1 and Figure 2.

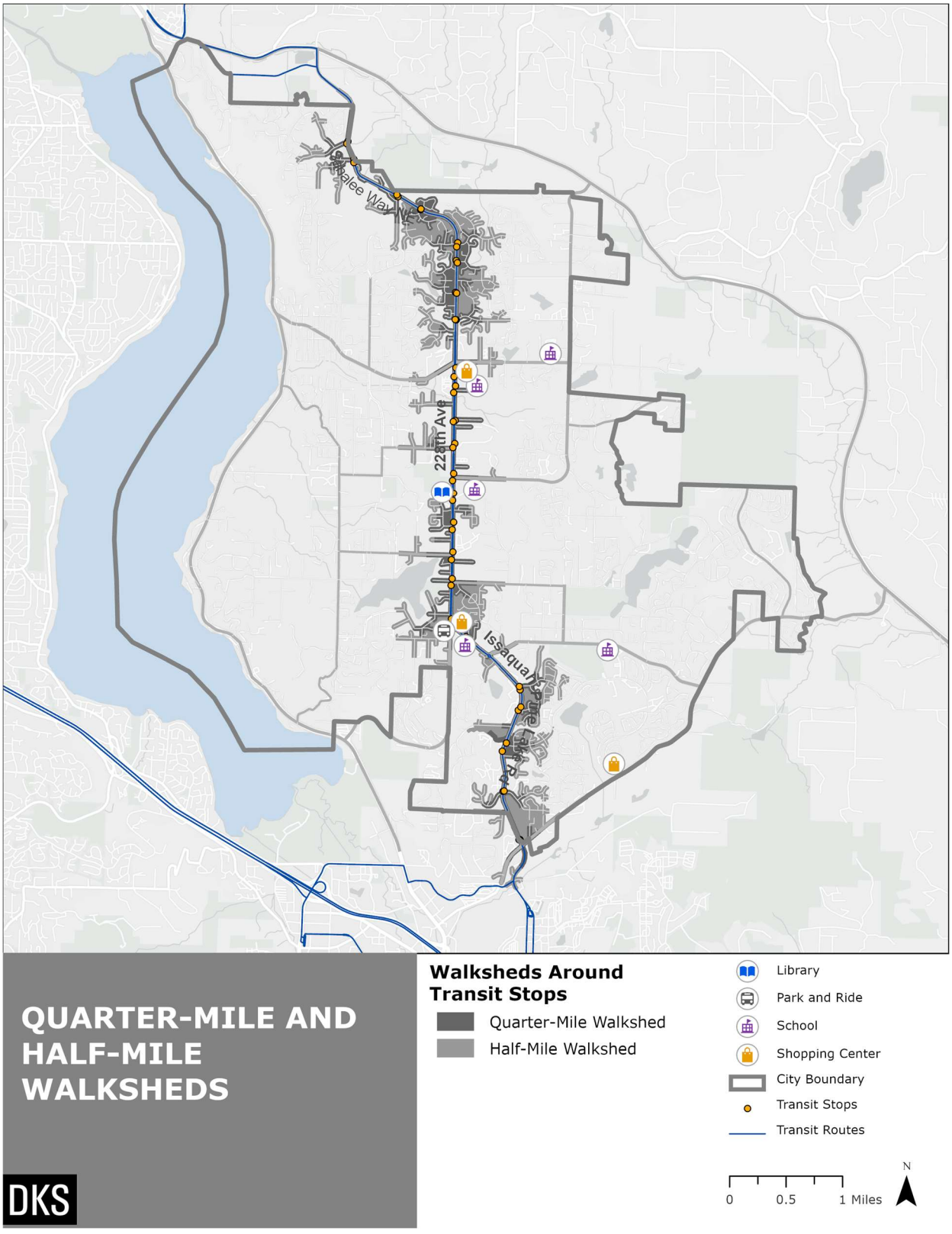

FIGURE 1: TRANSIT STOPS WITHIN A ¼-MILE AND ½-MILE WALKSHED

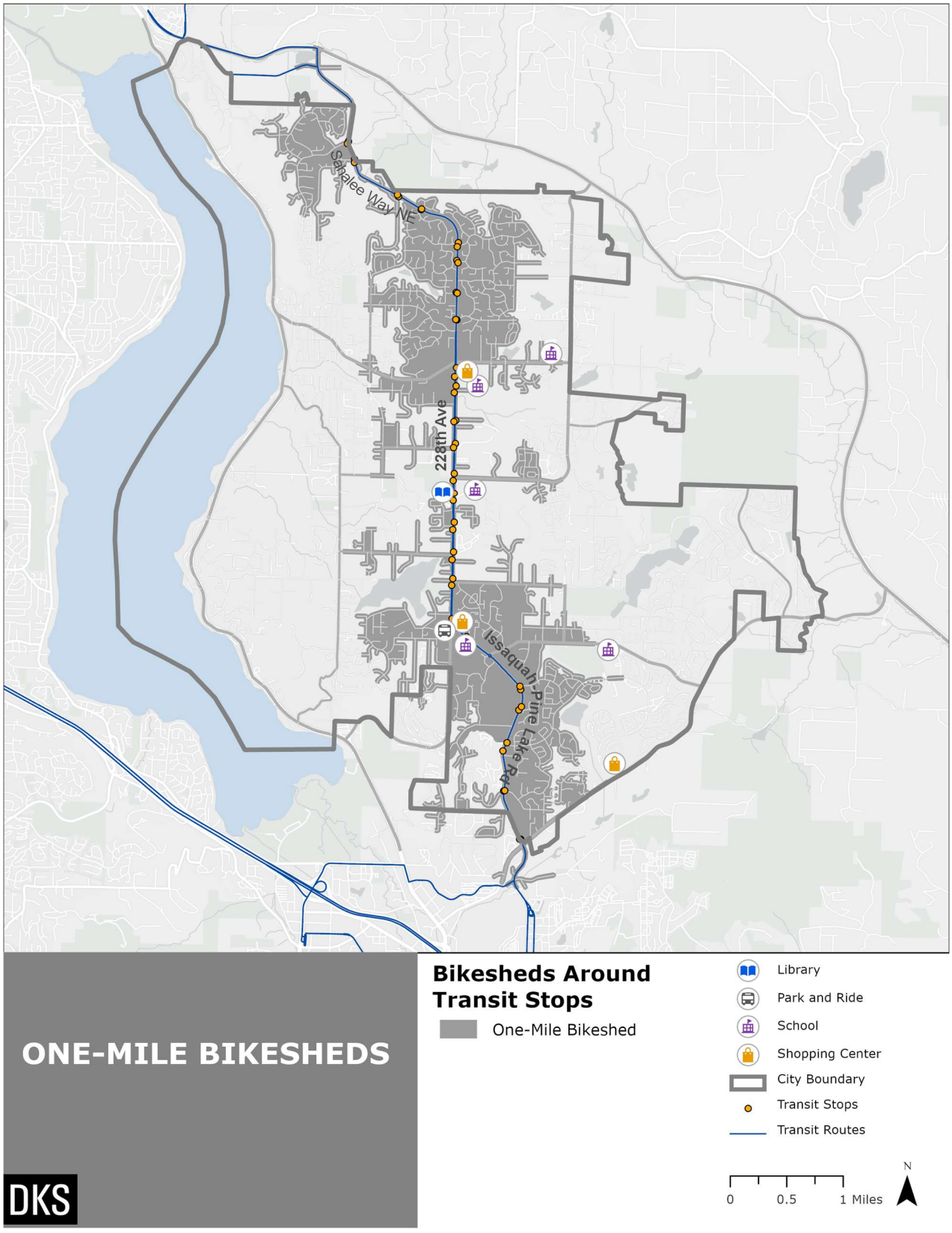

FIGURE 2: TRANSIT STOPS WITHIN A 1-MILE BIKESHED

Proposed measures for determining the LOS for transit access are defined below:

Sidewalk completeness in walksheds: This is the percent completeness of the sidewalk network within the walk sheds of the City's transit stops. Calculating this metric requires a GIS database of the City's sidewalk facilities.

Sidewalk quality in walksheds: This measure describes the condition of the sidewalks within the walk sheds of the City's transit stops. There are several ways to categorize sidewalk quality. Attachment A includes Exhibit 14-20 of the Oregon DOT's Analysis Procedures Manual which shows a sidewalk rating system using a scale of Good, Fair, Poor, Very Poor, and No Sidewalk. It is important to note that the initial categorization of all the City's sidewalks within specified walk sheds would be an intensive data collection effort.

Bike facility completeness in bikesheds: This is the percent completeness of the bicycle network within the bike sheds of the City's transit stops. Calculating this metric requires a GIS database of the City's bicycle facilities. This is incorporated into the bicycle level of stress measurement.

Bike facility level of traffic stress (LTS) in bikesheds: This is a measure of bicycle facility quality ranges from LTS 1 through LTS 4. LTS 1 represents low stress, which indicates that all ages and abilities would feel comfortable riding. LTS 4 represents high stress, which indicates only skilled cyclists would attempt riding. An accessible transit network has low-stress bike facilities surrounding the stops to facilitate multi-modal trips. Bike LTS calculations include bike lane width, separation type, speed and traffic volume of adjacent roadway, and intersection crossing elements[4]. It is important to note that the initial categorization of all the City's bike facilities within specified bike sheds would be an intensive data collection effort.

Distance to nearest marked or protected crossing: This is a measure of how close transit stops are to designated roadway crossings. It is vital that transit users can safely cross the street when accessing or leaving a transit stop. For example, the City of Austin has used a three-tiered criteria with the categories being more than 500 feet from crossing, between 300 and 500 feet from crossing, and less than 100 feet from crossing. A GIS layer of all protected crossings, ideally categorized by crossing type such as signalized, pedestrian hybrid beacon, and rectangular rapid-flashing beacon, is required for tracking this measure.

The proposed guidelines related to transit access are as follows:

- **Guideline 1:** Every roadway within ½-mile of a transit stop should have a sidewalk on at least one side. Arterial streets should have sidewalks on both sides of the roadway. Evaluation is based on review of all roadways in the ½ mile walkshed of transit, as shown in Figure 1:

[4] https://bpb-us-w2.wpmucdn.com/sites.northeastern.edu/dist/e/618/files/2014/05/LTS-Tables1.pdf

    - Percent of roadway-miles with a sidewalk on at least one side, or for arterials with sidewalk on both sides
- **Guideline 2:** All sidewalks within a ½-mile of a transit stop should be in Fair condition or better. Evaluation is based on review of all roadways in the ½ mile walkshed of transit, as shown in Figure 1:
    - Percent of sidewalks-miles in Fair condition or better
- **Guideline 3:** Every roadway within 1-mile roadway of a transit stop should have a bicycle level of stress of 3 or better. Evaluation is based on the LTS of roadways within a 1-mile radius of a transit stop:
    - Percent of roadway-miles with LTS 3 or better

The guidelines proposed are recommended to apply to all roadways in either the walkshed or bikeshed throughout the city. Furthermore, it is recommended that the same level of requirement is applied equally for all roadways throughout the walkshed and bikeshed unless otherwise noted (Guideline 1 differentiates between arterials and non-arterials). The calculation of bicycle level of stress includes inputs related to roadway context such as adjacent street width, traffic volume, and speed limit. The guidelines are proposed to be used as a planning-level assessment of pedestrian and bicycle infrastructure near transit and inform the development of capital projects. For each of these guidelines, a Level of Service can be evaluated based on how well the guideline is met, as described above.

TABLE 3: PROPOSED LEVEL OF SERIVCE FOR TRANSIT ACCESS

LEVEL OF SERVICE	% MEETING GUIDELINE
GREEN	>66%
YELLOW	34-66%
RED	<34%

RIDER COMFORT

Rider comfort captures the quality of amenities at transit stops. This includes the presence of shelters, benches, and trash receptacles. In addition, this category can also include the presence of travel information systems such as screens which display real time arrive times. A database of existing stop amenities is required to accurately track this measure. While King County Metro typically provides bus shelters and real-time information displays, local jurisdictions can provide and maintain trash receptacles and benches.

Table 3 shows a draft rider comfort scoring criteria applied to a hypothetical bus stop with only a trash receptacle and bench. Table 5 shows the proposed LOS guideline based on the described methodology as applied in Table 4.

TABLE 4: EXAMPLE APPLICATION OF RIDER COMFORT SCORING CRITERIA

Amenity Type	Score	Present at Bus Stop
Sidewalk or Landing Area at Stop	5 points	Yes
Trash Receptacle	1 point	Yes
Bench	3 points	Yes
Shelter	4 points	No
Real-time information display	2 points	No
Total Rider Comfort Score for Example Bus Stop = 9 points		

TABLE 5: PROPOSED LEVEL OF SERIVCE STANDARD FOR TRANSIT OPERATIONS

LEVEL OF SERVICE	RIDER COMFORT SCORE
GREEN	>10
YELLOW	6-10
RED	<6

CONCLUSION

Several peer communities measure transit-related LOS as part of their multimodal planning efforts. Sammamish transit LOS guidelines will be based on access and amenities. Service frequency and reliability could be used with data from King County Metro The measures presented align with the transportation goals set forth in the City's Comprehensive Plan. It is intended that Sammamish will evaluate its Transit system on an annual basis using the evaluation criteria listed in this memo.

ATTACHMENT A: SIDEWALK QUALITY RATING EXAMPLE

Exhibit 14-20 Sidewalk Condition Rating

Rating	Facility Properties	Example
Good	• No minor cracking • No patching or raveling and has a very smooth surface • No faulting • New construction	
Fair	• Minor cracking (generally hairline) • Minor patching and possibly some minor raveling evident. Surface is generally smooth • Minor faulting (less than ¼")	
Poor	• Minor cracking in several locations • Rough areas present but not extensive • Faulting may be present but less than ½" (No major faulting)	
Very Poor	• Major cracking patterns • Rough conditions (major deterioration, raveling, loose aggregate, missing pavement, etc.) • Faulting greater than ½"	
No sidewalk	• No solid and smooth surface is present on the side of the roadway. Pedestrians use the travel lane, paved shoulder, or soil shoulder to travel along the roadway.