Appendix D: Performance Measures

Oregon Bicycle and Pedestrian Plan

Performance Measures

White Paper

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PEDESTRIAN AND BICYCLE PERFORMANCE MEASURES

This white paper describes and recommends several performance measures for consideration in the Oregon Bicycle and Pedestrian Plan. The paper provides information needed to determine appropriate Plan performance measures that are also realistic and measurable.

Six areas of pedestrian and bicycle performance measurement are discussed below:

1) safety,
2) utilization,
3) system performance,
4) facility implementation,
5) state and local recognition, and
6) data

Taken together, these six performance measure areas will provide an assessment of progress toward Plan goals.

The *safety* performance measure area addresses the safety of walking and bicycling. Safety outcomes are an important public health concern which, along with perceptions of safety, also influence the choice to walk or ride a bicycle.

Utilization performance measures seek to quantify the extent to which Oregon residents use bicycling and walking for transportation. Higher utilization of walking and bicycling is needed to achieve a number of Plan goals. Additionally, utilization provides context for monitoring other performance measures such as safety outcomes.

System performance is concerned with measuring how well the transportation network serves the needs of pedestrians and bicyclists. Performance measures within this category reflect that the network must serve a variety of users with differing needs and abilities in varying contexts.

Facility implementation performance measures provide insight into progress made toward the creation of a comprehensive bicycling or walking network. Recommended performance measures within this category are targeted toward linkages between transit and bicycling and walking.

State and Local Recognition performance measures offer an objective third-party assessment of progress made by the State and local communities toward the creation of safe and comfortable bicycling

and walking environments. These performance measures reflect a wide range of factors including infrastructure, education, and policy, among other topics.

Data collection, management, and analysis is critical to the ongoing success of pedestrian and bicycle planning in Oregon. Categories of data needed to enhance implementation, management and evaluation of the plan are: serious injury and fatality data, usage data, and network data.

For each performance measure considered, a concise definition is provided, along with a brief description of its purpose, the level of effort, and any challenges involved in reporting the performance measure or set of measures. Optional reporting levels, such as by geographic region or demographic group, are also proposed for consideration as appropriate.

In addition, emerging performance measures are discussed where appropriate. These emerging performance measures may not be immediately feasible given current data limitations or would entail a very high level of effort, but are nonetheless worthy of consideration.

Pedestrian and Bicyclist Safety

Performance Measures Considered

- **Safety (1): Number of pedestrian fatalities (five-year average)**: the average annual number of pedestrians killed in crashes with motor vehicles over a five-year period.
- **Safety (2): Number of bicyclist fatalities (five-year average)**: the average annual number of bicyclists killed in crashes with motor vehicles over a five-year period.
- **Safety (3): Number of pedestrian serious injuries (five-year average)**: the average annual number of pedestrians seriously injured in crashes with motor vehicles in a given year. [1]
- **Safety (4): Number of bicyclist serious injuries (five-year average)**: the average annual number of bicyclists seriously injured in crashes with motor vehicles in a given year.
- **Safety (5): Perceived safety of walking**: the percent of the public that feels they have the necessary facilities to walk safely in their neighborhood.
- **Safety (6): Perceived safety of bicycling**: the percent of the public that feels they have the necessary facilities to bike safely in their community.

Purpose

The safety of pedestrians and bicyclists is among ODOT's and local agencies' highest priorities. In 2013, pedestrians and bicyclists accounted for less than 2 percent of people involved in all crashes, but 17.5 percent of people killed.[2] Not only are the individual pedestrians and bicyclists involved in a crash

[1] A 'serious injury' is defined as an incapacitating injury, as reported by the responding law enforcement officer.
[2] Out of 313 traffic fatalities in 2013, there were 52 pedestrians (16.6%) and 3 bicyclists (0.95%). 2013 Oregon Motor Vehicle Traffic Crashes. Quick Facts.
http://www.oregon.gov/ODOT/TD/TDATA/car/docs/2013_QuickFacts.pdf

affected, but the perceived risk of walking and bicycling can have a deterrent effect, suppressing greater use of walking and cycling and impeding achievement of other statewide goals.

The proposed performance measures track pedestrian and bicyclist safety outcomes, which will allow ODOT and other agencies to monitor progress towards creation of a safer system. Additionally, the perceived safety of walking and bicycling (as reported in the Oregon Transportation Needs and Issues Survey) accounts for factors that affect rates of walking and bicycling, but may not directly impact crash totals.

Level of Effort and Data Needs

The level of effort associated with collecting and reporting the proposed pedestrian and bicycle safety performance measures is minimal. The required injury data is already reported in a convenient format by ODOT's Transportation Safety Division. Additionally, pedestrian and bicycle fatalities are reported by every state in the National Highway Traffic Safety Administration's Fatality Analysis Reporting System. The safety perception data is reported through the Oregon Transportation Needs and Issues Survey.

Optional Reporting Levels

In addition to the recommended performance measures above, Oregon may wish to measure pedestrian and bicyclist safety with respect to a few additional factors. For example, it may be desirable to report pedestrian and bicyclist fatalities or crashes on a geographic basis, by population, by age or other demographic factors, or by relative crash severity (fatalities per 100 persons involved). Reporting by these factors would not require a great deal of additional effort and would provide additional insight into the safety of bicycling and walking; however, these measures are not strictly necessary to determine progress at a statewide level.

Challenges

Although the crash data needed to report on the proposed performance measures is currently available, this data does not include crashes that do not involve a motor vehicle, such as those involving a single bicycle or a bicycle and a pedestrian. Another challenge is that some portion of all crashes (including an unknown percentage of those involving a pedestrian or bicyclist and a motor vehicle) are not reported to the state's crash database. Since Oregon relies on self-reporting of minor injury and property damage crashes, underreporting of these crashes is likely higher than in other states.

To fully account for these gaps, it would be necessary to collect data from EMS, trauma, and hospitalization datasets on a statewide basis. Oregon Health Authority databases include single-bike crashes and provide more accurate pedestrian and bicyclist injury data than crash data (e.g. traffic incident) alone. However, linking health data with crash reports remains a challenge throughout the country and is an emerging area of interest and opportunity. Challenges include privacy concerns, data sharing protocols, as well as data definitions and possible overlaps. Few, if any, states have successfully implemented a comprehensive program to account for all pedestrian and bicycle crashes and injuries.

An emerging area of research to address the challenge of severity reporting is developing statistical models to estimate the number of severe crashes involving a pedestrian or bicyclist (including unreported pedestrian or bicycle crashes with motorists and those not involving motorists). This specialized modeling is feasible but requires substantial expertise and data collection.

Emerging Performance Measures

Accounting for exposure is another potential way to monitor progress in pedestrian and bicycle safety. Although difficult to collect, pedestrian and bicycle exposure information is needed to normalize pedestrian and bicycle crash rates across geographies and over time. As levels of pedestrian and bicycle activity increase, it is possible that the total number of crashes may increase while the actual risk of a crash declines relative to miles traveled or number of trips made. Additionally, development of pedestrian and bike fatality rates (by trip or distance) would shed light on the relative risks of bicycling or walking as compared to the risks of using other modes.

Adequately accounting for pedestrian and bicycle exposure would entail a much higher level of effort than what is required to report the above-recommended safety performance measures. Ideally, exposure would be reported on the basis of pedestrian and bicycle trips made or hours traveled.

Pedestrian and bicycle volume models have been developed in a number of cities (including Portland) and states, and could be worth exploring as a means to develop estimates of pedestrian and bicycle trips. However, as these datasets do not currently exist on a statewide basis, pedestrian and bicycle commute trips reported in the American Community Survey (ACS) could be used as a proxy for exposure, though it is not known how accurate this data would be for such a purpose.

Emerging performance measures that may be considered in the future include:

- **Pedestrian crashes per pedestrian mile traveled (or other exposure measure)**
- **Bicyclist crashes per bicycle mile traveled (or other exposure measure)**

Pedestrian and bicycle safety performance measures considered but not recommended at this time are included in Appendix A.

Utilization

Performance Measures Considered

- **Utilization (1): Utilization of walking for short trips**: the percentage of commute trips less than 1 mile that are accomplished by walking.
- **Utilization (2): Utilization of bicycling for short trips**: the percentage of commute trips less than 3 miles that are accomplished by biking.

Purpose

How well the system is used can help to measure the relative success of providing people the opportunity to bike or walk. There are numerous individual and society-level benefits associated with higher levels of bicycling and walking, including better air quality, improved public health outcomes, lower individual transportation costs, and reduced congestion, among others. While the Plan focuses on biking and walking, it recognizes the need for a range of transportation choices and that biking and walking are especially appropriate for shorter trips. Spreading the demand for short trips across modes can help to reduce roadway congestion. For instance, an analysis of data from the 2011 Oregon Household Activity Survey found that 40 percent of trips in the Portland Metro region are 2 miles or less.

Although challenging to measure in a comprehensive way, the utilization of walking and bicycling are key indicators of the success of the plan. It is necessary to understand utilization in order to provide context for related goals such as improved safety and public health. For instance, pedestrian and bicyclist fatalities could be compared to utilization of these modes in order to more accurately quantify the risk of bicycling and walking. Similarly, trends in obesity rates can be compared to levels of bicycling and walking to determine whether policies that encourage these modes are having a measureable impact on reducing obesity and related health concerns.

In the absence of a comprehensive measurement of pedestrian and bicycle volume and travel distance, data from the Oregon Transportation Needs and Issues Survey can be used to provide an indication of bicycling and walking utilization. The survey asks respondents which mode they use for their commute along with the distance traveled. Since short trips offer the best opportunity for walking and bicycling, the percentage of such trips accomplished by walking or bicycling is a good measure of the willingness of commuters to walk or bike. It is a direct reflection of progress toward greater utilization of walking and bicycling.

The one- and three-mile distance thresholds proposed for evaluation of walking and bicycling trips, respectively, are reasonable and consistent from a time standpoint. A walking trip of one mile can be completed by most individuals in 20 minutes or less and a three-mile cycling trip takes a similar length of time. While many cyclists commute greater distances, a significant portion of the population cannot be expected to make a long bicycle commute on a regular basis.

Level of Effort and Data Needs

The data needed to report the percentage of short trips accomplished by walking and bicycling is collected through the Oregon Transportation Needs and Issues Survey. This particular result is not reported in the published survey results, but can be computed from the raw data. As a result, reporting of the proposed utilization performance measures involves a low level of effort from ODOT.

Optional Reporting Levels

Walking and bicycling utilization trends within subgroups may imply important changes with significance to the overall success of the plan. As an example, higher levels of bicycling among women is thought to

indicate significant progress in developing a system with a high level of perceived safety. The following optional reporting levels are recommended for consideration:

- Age Range
- Gender

Challenges

The Oregon Transportation Needs and Issues Survey provides information related only to the work or school commute trip. Nationally, such trips account for around 25 percent of all trips.[3] Additionally, respondents do not have the option of selecting multiple modes. Rather, they are instructed to choose only the mode which they used most often. As a result, multimodal trips, such as pedestrian or bike trips to transit, may be poorly accounted for in the data.

Emerging Performance Measures

Work is underway to develop a consolidated bicycle and pedestrian count archive in Oregon. There are approximately 50 permanent counters in place in various jurisdictions around the state and the archive would allow access to the count data from a single source. It is possible that a subset of these counts could be used to monitor facility utilization over time. Further work would be needed to determine whether such an approach would be reliable and representative of the entire state.

As an alternative to count estimates, non-motorized travel modeling is an approach that could be used to estimate system utilization. Travel modeling lends itself to other uses such as project prioritization, health assessments, and safety evaluation, but requires a significant effort.

Utilization performance measures considered but not recommended at this time are included in Appendix A.

System Performance

Performance Measures Considered

- **System Performance (1): Bicycle level of traffic stress:** Percentage of urban collector and arterial roadway miles with a bicycle level of traffic stress rating of 3 or less.

Purpose

Bicycle level of traffic stress (LTS) is a measurement that can be used to quantify the perceived comfort of bicycling on a given street.[4] It is a relatively new concept and the underlying formulas may need to be tested and validated or recalibrated over time. LTS allows each segment to be assessed on a scale of 1 to 4, where LTS 1 represents streets suitable for all cyclists, including small children; LTS 2 includes streets

[3] US DOT. Summary of Travel Trends: 2009 National Household Travel Survey. http://nhts.ornl.gov/2009/pub/stt.pdf
[4] Oregon DOT. Analysis Procedures Manual, Chapter 14: Multimodal Analysis. http://www.oregon.gov/ODOT/TD/TP/pages/APM.aspx

suitable for inexperienced teen and adult cyclists; LTS 3 is reserved for experienced adult cyclists; and LTS 4 represents high stress roadways only suitable for advanced cyclists.

To encourage higher levels of bicycling and walking, streets must be designed and operated to meet the needs of a broad range of users. For instance, the '8 to 80' concept suggests that a successful bicycle and pedestrian network is good for an 8 year old or an 80 year old. By extension, it is thought that streets that serve these two ends of the spectrum are good for everyone and contribute to the creation of better cities and regions.

In general, lower classification streets are more comfortable for cyclists in comparison to collector and arterial streets, which can serve as a barrier to less experienced cyclists. As a result, the recommended performance measure for system performance is focused on higher classification streets. As the level of traffic stress on collector and arterial roads in urban areas declines, the network becomes easier to traverse for a broad range of users.

Level of Effort and Data Needs

In comparison to other network-level evaluation measures, such as pedestrian or bicycle level-of-service, the data requirements for LTS are modest. It does not require traffic volume data (except for evaluation of high-speed rural segments), and is suitable for planning-level evaluation. Further, LTS data is already being collected by ODOT on a statewide level. Ongoing maintenance and reporting of LTS data on a statewide basis will entail a moderate level of effort.

Optional Reporting Levels

In addition to the recommended reporting of LTS on urban collectors and arterials, it would be possible to report LTS at a variety of other reporting levels, including:

- Regions
- Cities
- School Zones
- Corridors
- Other Functional Classes

Challenges

Although there has been a great deal of work completed on Bicycle LTS in Oregon, some challenges associated with developing and reporting the recommended performance measure on a statewide basis remain. The data requirements are less burdensome than other network measures, but still require a detailed inventory of bike lanes, on-street parking, turn lanes, and speed limits. These inventory features may need to be estimated in certain instances to develop the performance measure across the entire urban collector and arterial roadway network.

Another challenge or drawback is that a pedestrian LTS has not yet been developed. ODOT has begun to develop a pedestrian LTS method, but it is not clear when such a measure will be available for use.

Emerging Performance Measures

Pedestrian LTS should be considered for future use. A pedestrian LTS measure would enable the State to identify facility gaps for pedestrians and to prioritize projects that contribute to a more connected network, including those which provide access to transit.

Multimodal level-of-service (MMLOS) is another performance measure that could be considered for future development. Calculating MMLOS requires additional data relative to LTS, but may more accurately reflect walking and bicycling conditions. ODOT is currently exploring the use of a MMLOS with reduced data requirements.

System performance measures considered but not recommended at this time are included in Appendix A.

Facility Implementation

Performance Measures Considered

- **Facility Implementation (1): Pedestrian access to transit.** The percent of streets within ½ mile of a transit stop that have sidewalks.
- **Facility Implementation (2): Bicycle access to transit.** The percent of streets within 1 mile of a transit stop with a Bicycle LTS 2 rating.

Purpose

Construction and enhancement of facilities is necessary to increase the use of bicycling and walking. While facilities are important in a variety of contexts, they are especially useful to provide and enhance access to transit stops.

Facilities that link walking and bicycling to transit expand the effective reach of transit services and afford users greater options for accessing transit. This is particularly important for the portion of the public who are unable or choose not to drive a car, including the disabled and young children. The recommended performance measures will provide a way of tracking progress toward the provision of a seamless public transit, bicycle, and pedestrian transportation system.

As explained above, Bicycle LTS 2 includes streets that are suitable for inexperienced teen and adult cyclists, whereas LTS 3 is reserved for experienced adult cyclists. Bicycle LTS 3 is recommended for the system performance measure, but Bicycle LTS 2 is proposed for the facility implementation measure since transit riders may exhibit a wider variety of skillsets as compared to those who typically bike on urban collectors and arterials. Additionally, a significant portion of streets within a mile of a transit stop are likely to be lower-volume residential streets, where a Bicycle LTS 2 rating is more appropriate and feasible.

Level of Effort and Data Needs

The feasibility of calculating the proposed performance measures is dependent on the availability of transit stop, sidewalk, and bicycle LTS data. Transit agencies are likely to have stop location data in some format, but collecting and assimilating this data for the purpose of calculating the facility implementation performance measures will require a moderate to difficult level of effort.

The availability of sidewalk data is potentially more problematic. It is likely that several municipalities have completed sidewalk inventories, but the accuracy, timeliness, and completeness of those datasets is likely to vary.

As discussed above, ODOT has begun to assemble bicycle LTS data and plans to maintain this data for other purposes. As a result, there is a low level of effort associated with the collection of bicycle LTS data specifically for this performance measure.

In addition to data collection, a moderate level of effort will be required to integrate the various datasets and calculate the recommended performance measures.

Optional Reporting Levels

Provision of bicycling and walking facilities in relation to transit may vary in different regions or cities, or by demographic factors. Tracking and reporting facility implementation for these different areas or groups may shed light on important equity or other policy considerations.

Implementation of walking and bicycling facilities could also be reported with respect to transit service characteristics (e.g., ridership or frequency), or by transit stop characteristics. For example, it may be desirable to track facility implementation near stops with greater ridership or that serve more routes.

Challenges

The availability of data is a potentially significant challenge associated with the recommended facility implementation performance measures. Additional research is needed to determine whether the performance measures can be calculated with existing data resources.

In addition to data challenges, it should be noted that giving equal weight to all transit stops may not be appropriate. Facility improvements near stops or stations with greater strategic importance are likely to be a higher priority, but additional data would be required to account for this. Along with this, data on the presence or absence of sidewalks does not account for the full range of factors that affect the comfort and safety of walking. If and when pedestrian LTS can be calculated, it may serve as a better metric for facility implementation with respect to transit stops.

Emerging Performance Measures

Another option for measuring bicycle and pedestrian access to transit is to calculate the percentage of transit stops that are connected to bicycle and pedestrian facilities. For bicyclists, this could be defined

as ‘stops that are served by streets (or paths) with Bicycle LTS 2 or lower’, while for pedestrians, the measure would consider stops with sidewalk access. This would provide a more meaningful representation of access to transit from the user’s perspective. It would also address accessibility concerns related to the interface between public transit and sidewalks. To develop a measure for the percentage of facilities that are connected to the bicycle and pedestrian network, additional data beyond a mere inventory of transit stops and bicycling and walking facilities would be needed.

Facility implementation performance measures considered but not recommended at this time are included in Appendix A.

State and Local Recognition

Performance Measures Considered

- **Recognition (1): Bicycle Friendly State ranking**: Oregon’s annual rank in the League of American Bicyclists’ Bicycle Friendly State Ranking program.
- **Recognition (2): Bicycle Friendly Communities**: Number of local jurisdictions with a Bicycle Friendly Community Designation at any level.
- **Recognition (3): Walk Friendly Communities**: Number of local jurisdictions with a Walk Friendly Community Designation at any level.

Purpose

The Bicycle Friendly Community, Bicycle Friendly State, and Walk Friendly Community programs provide a third-party assessment of progress made toward improving conditions for bicyclists and pedestrians. These rankings can help Oregon understand its performance from a national perspective and to gauge the degree to which cities and towns are accommodating pedestrians and bicyclists in their infrastructure, policies, and programs. The recognition may also be used to promote community values, and to demonstrate a commitment to providing transportation choices.

The Bicycle Friendly ranking programs are part of the League of American Bicyclists’ Bicycle Friendly America program, which is overseen by a National Advisory Group consisting of representatives from government agencies, advocacy organizations, and consulting companies. Every state is ranked by the League, but the Bicycle Friendly Community evaluation process is voluntary.

The Walk Friendly Community program operates in a similar fashion as the Bicycle Friendly Community program. It is administered by the Pedestrian and Bicycle Information Center and assesses progress toward the creation of better walking environments at the community level.

Each of these programs relies on an extensive questionnaire that accounts for a range of factors relating to bicycling or walking, such as education and encouragement programs, enforcement activities, evaluation, engineering, and planning. In addition to helping states and communities understand how they compare to their peers, feedback from the ranking programs can serve as a useful diagnostic tool.

Level of Effort and Data Needs

Data collection for the bicycle and walk friendly ranking programs can be time-consuming for community applicants and state questionnaire respondents. Depending on staff knowledge and existing data, answering some questions could require developing new datasets (e.g., bicycle facilities or bike rack inventory) or consulting with staff from other departments or agencies. Nonetheless, the state's level of effort to track and report on the recommended performance measures would be minimal.

Optional Reporting Levels

In addition to the overall number of walk and bike friendly community programs in Oregon, the rankings could be aggregated and reported by designation level (e.g., Diamond, Platinum, Gold, etc.). Additionally, results from the state rankings could be reported for each topic area (e.g., Education & Encouragement, Legislation & Enforcement, etc.).

Challenges

An overarching challenge related to the use of third-party assessments as a performance measure is that the ranking system may place a strong emphasis on factors that are beyond the control of ODOT and its partner agencies. For example, feedback from the 2014 Bicycle Friendly State ranking suggested that Oregon repeal its statute that requires bicyclists to use bicycle lanes or paths where available (ORS 814.420). The recommendations also suggest that Oregon require certain state buildings and facilities to provide bike parking. Both of these actions would require legislative changes, which ODOT may not be in a position to facilitate.

Additionally, while the Bicycle Friendly State and Community ranking programs offer guidance on how states and communities can improve their rankings, the specifics of the ranking process are not published. A related challenge specific to the Bicycle Friendly State program is that annual changes may be difficult to interpret. For example, Oregon's score fell from 57.7 in 2013 to 55.2 in 2014, but it is not known exactly what contributed to this decline.

A final consideration is that 10 communities in Oregon have already achieved a bicycle friendly community status. While there are many other cities and towns in Oregon beyond these 10, smaller communities are less likely or capable of taking the time and having the resources needed to fill out the application. As a result, the number of bicycle friendly communities may not change significantly in the coming years.

Data

Performance Measures Considered

- **Data Key Initiative (1):** ODOT, in consultation with local jurisdictions and other agencies when appropriate, will develop and complete the Pedestrian and Bicycle Data Key Initiative by December 31, 2020.

Purpose

The data key initiative will provide ODOT and partner agencies an opportunity to identify ways to collect and standardize data that relates directly to decision making, identified Plan performance measures, and those program level performance measures to be identified in Plan implementation. Enhanced data collection and analysis programs are needed to more fully understand the serious and fatal injury data, the number of people walking and biking, and the facilities available to pedestrians and bicyclists. Example considerations are:

- **Serious Injury and Fatality Data** – ODOT maintains a database of pedestrian and bicycle crashes involving motor vehicles, but it does not include single-bicycle crashes or crashes between pedestrians and bicyclists. The extent of these crash types in Oregon is currently unknown. Data collection in this category would answer the following questions: How many pedestrian and bicycle fatalities and serious injuries not involving a motor vehicle are occurring?; How many pedestrian or bicycle serious injury crashes involving motor vehicles are in trauma or emergency services databases, but unrecorded in the motor vehicle crash database? Where and why are these crashes occurring? How is this information available and how can it be integrated with data involving motor vehicles?

- **Usage Data** – There is research underway at ODOT to understand appropriate methods and equipment for counting bicycle trips and for storing and retrieving this data. Research is also necessary to understand pedestrian usage. As such there is no clarity yet around the most appropriate metrics for measuring pedestrian and bicycle usage in Oregon. There are many optional considerations such as: How many and where are pedestrians and bicyclists traveling? How long is the trip? Is the trip measured in miles, minutes? Who is using which facilities? Are these facilities shared with or separated from motor vehicles? What is the best way to collect the data – counting, user surveys, or modeling?

- **Network Data** – ODOT Region 1 is completing a comprehensive pedestrian and bicycle network inventory. This inventory will inform facility investment decision making and could serve as a model for other ODOT Regions. In order to improve the pedestrian and bicycle facilities network it will be important to understand: What is extent of bicycle and pedestrian network facilities in each Region? What are the facility conditions? Are these facilities consistent with user demands? What are the gaps? How does this vary by region?

Level of Effort and Data Needs

Recording progress toward completing the data key initiative will require a relatively low level of effort to assess current status and progress in developing and implementing the pedestrian and bicycle data strategic plan activities.

Optional Reporting Levels

As the data key initiative is undertaken ODOT and partner agencies, where appropriate, could develop additional performance measures related to progress collecting specific data elements.

Challenges

Data collection and compilation can be expensive. ODOT and partner agencies will need to commit to ongoing funding and management of data in order to support more enhanced analysis and/or performance measurement. Given funding constraints, ODOT and partner agencies will face competing priorities for data collection and management.

RECOMMENDATIONS

The performance measures recommended for inclusion in the Bicycle and Pedestrian Plan were developed in consultation with the project Policy Advisory Committee, Technical Advisory Committee, and ODOT Project Staff. The recommended performance measures are shown in Table 1.1. Table 1.2 shows performance measures which could be considered for implementation with additional data or funding. Additional measures considered are discussed in Appendix A.

Table 1.1 Recommended Performance Measures

Performance Measure #	Performance Measures	Description
Safety (1)	Number of pedestrian fatalities (five-year average)	Average annual number of pedestrians killed in crashes with motor vehicles over a five-year period.
Safety (2)	Number of bicyclist fatalities (five-year average)	Average annual number of bicyclists killed in crashes with motor vehicles over a five-year period.
Safety (3)	Number of pedestrian serious injuries (five-year average)	Average annual number of pedestrians seriously injured in crashes with motor vehicles in a given year.
Safety (4)	Number of bicyclist serious injuries (five-year average)	Average annual number of bicyclists seriously injured in crashes with motor vehicles in a given year.
Safety (5)	Perceived safety of walking	Percent of the public that feels safe walking in their neighborhood.
Safety (6)	Perceived safety of bicycling	Percent of the public that feels safe bicycling in their community.
Utilization (1)	Utilization of walking for short trips	Percent of commute trips less than 20 minutes that are accomplished by walking.
Utilization (2)	Utilization of bicycling for short trips	Percent of commute trips less than 20 minutes that are accomplished by biking.
Data Key Initiative (1)	Identifying data needs for pedestrian and bicycle performance measures	ODOT, in consultation with local jurisdictions and other agencies when appropriate, will complete the Data Key

Performance Measure #	Performance Measures	Description
		Initiative by December 31, 2020.

Table 1.2 Possible Future Performance Measures

Performance Measure #	Performance Measures	Description
System Performance (1)	Bicycle level of traffic stress	Percent of urban collector and arterial roadway miles with a bicycle level of traffic stress rating of 3 or less.
Facility Implementation (1)	Pedestrian access to transit	The percent of streets within ½ mile of a transit stop that have sidewalks.
Facility Implementation (2)	Bicycle access to transit	The percent of streets within 1 mile of a transit stop with a Bicycle LTS 2 rating.
Recognition (1)	Bicycle Friendly State ranking	Oregon's annual rank in the League of American Bicyclists' Bicycle Friendly State Ranking program.
Recognition (2)	Bicycle Friendly Communities	Number of local jurisdictions with a Bicycle Friendly Community Designation at any level.
Recognition (3)	Walk Friendly Communities	Number of local jurisdictions with a Walk Friendly Community Designation at any level.

Appendix A. Other Performance Measures Considered

Several potential performance measures were researched and discussed, but ultimately not recommended. These are discussed briefly below.

Safety

- **Total number of motor vehicle crashes involving pedestrians or bicyclists.** The total number of crashes involving pedestrians or bicyclists is an important statistic that is already monitored by ODOT. However, as a statewide performance measure, measuring total crashes has significant drawbacks resulting from under-reporting of less severe crashes.
- **Pedestrian Score**. The ODOT Pedestrian and Bicycle Safety Implementation Plan uses a 'Pedestrian Score' to evaluate and prioritize corridors for potential implementation of safety improvements. The score takes into account crash history, traffic volume, number of lanes, posted speed, intersection and midblock crossing characteristics, the presence of signals, and the presence of transit stops. These factors were determined to have an influence on pedestrian safety through an analysis of crashes and roadway features. Applying pedestrian score as a performance measure for the Bicycle and Pedestrian Plan would entail a very high level of effort. Most importantly, it is noted in the Pedestrian and Bicycle Safety Implementation Plan that several important data elements are not available on a consistent basis (e.g., sidewalk presence, median presence, and number of lanes). Additionally, to use the pedestrian score as a performance measure, a process for aggregating scores to a higher level, such as regional or statewide, would need to first be developed. Some of the individual criteria that are used in the Pedestrian Score (e.g., number of undivided 4-lane segments) could be considered for performance measures, but more research is needed to determine their appropriateness and the level of effort required.

Utilization

- **Bicycle and pedestrian counts.** Bicycle and pedestrian count programs have been established in several cities and regions in Oregon. Approximately 50 permanent counters have been installed throughout the state. While counts from these locations could be used to establish a performance measure, it is not clear that the locations are representative of the entire state or that the data collection protocols are sufficiently robust and consistent to allow this data to be used as a performance measure. An effort is currently underway to develop a centralized count repository. Upon its completion, the feasibility of using count data to measure utilization should be re-evaluated.

System Performance

- **Roadway Characteristics.** Some states have considered pedestrian and bicycle performance measures based on roadway characteristics. For example, a report completed for CalTrans recommended the use of urban arterial performance measures such as the percent of signalized intersections with certain crossing features or bicycle pavement markings, and the percent of

arterials with an 85th percentile speed below 25mph.[5] Performance measures such as these could be aggregated to a regional or statewide level; however, it is not clear that a single measure such as this would adequately represent walking or bicycling conditions. Additionally, data may not be available for the measures of interest.

- **Pedestrian Level of Service.** Pedestrian level of service (PLOS) is a quantitative measure of the perceived safety of walking. There are separate formulas for street segments, intersections, and crossings, which take into account a wide range of factors, such as traffic volume, number of lanes, lane width, presence and type of horizontal buffer, and sidewalk width, among others. In order to calculate PLOS, a substantial number of data elements are required. As a result, PLOS is not recommended as a performance measure for statewide implementation.
- **Access to transit**
    - **Street connectivity**. A 2013 research report conducted for ODOT, OTREC, and FHWA found that street connectivity (measured as the number of intersections within a quarter-mile of a given transit stop) was an important indicator variable for transit ridership.[6] This is an important finding for transit agencies that may use this information for route optimization or stop location decisions, but the measure does not lend itself well to inclusion as a performance measure in the Plan since urban street networks are largely built out and unlikely to change significantly over time.
    - **Access shed**. The term 'access shed' refers to the distance a person can travel in a set amount of time by a given mode of travel.[7] The access shed for walking and bicycling to transit is a function of the street network characteristics (connectivity and block length) around a transit stop. Although the access shed concept is very relevant to pedestrian and bicycle access to transit, its utility as a performance measure is limited for the same reasons that street connectivity is not recommended: street networks in urban areas with transit are largely already built.
    - **Bicycle boardings.** The number of transit riders who access transit by bike would provide insight into the integration of the transit and bicycle networks. Unfortunately, this data is not currently collected on a routine basis. Portland's TriMet system has very limited information about bicycle access to transit.

Facility Implementation

- **Percent of projects that include pedestrian and bicycle facilities.** Inclusion of pedestrian and bicycle facilities within other roadway projects is an important part of a comprehensive effort to develop a network of facilities. For example, repaving, capacity expansion, and bridge replacement projects

[5] Macdonald et al. Performance Measures for Complete, Green Streets: A Proposal for Urban Arterials in California. http://www.uctc.net/research/papers/UCTC-FR-2010-12.pdf
[6] Schlossberg et al. 2013. Measuring the Performance of Transit Relative to Livability. http://www.oregon.gov/odot/td/tp_res/docs/reports/2013/spr735.pdf
[7] Los Angeles Metro. First and Last Mile Strategic Plan and Design Guidelines. http://media.metro.net/docs/sustainability_path_design_guidelines.pdf

provide an opportunity to integrate pedestrian and bicycle facilities as part of these larger projects. Oregon's 'Bike Bill' (ORS 366.514) already requires pedestrian and bicycle facilities to be included in the construction or rebuilding of streets or highways, making this performance measure unnecessary.

- **Percent of urban state highways with bike lanes and sidewalks.** Tracking the coverage of bike lanes, sidewalks, or other facilities across the state may provide some insight into the state's progress toward developing a comprehensive network of facilities. However, without a better understanding of context, it is questionable whether facility mileage alone is a meaningful indicator of progress.
- **Sidewalk coverage and conditions.** Sidewalks are necessary for safe and comfortable walking on most streets. In order to benefit all pedestrians (including those who use mobility aids), they must also be in a state of good repair. While sidewalk condition and coverage measures would be informative, a greater understanding of context is needed to determine whether progress is being made. For instance, construction of new sidewalks that do not connect to a broader network offer little benefit to pedestrians whereas repair of a short segment in an extensive network could impact many. Along with this shortcoming, the availability, quality, and ease of reporting of sidewalk data on a statewide level is unknown.

State and Local Recognition

- **Number of university campuses and businesses with a Bicycle Friendly designation**. Along with the community and state rankings, the League of American Bicyclists evaluates and recognizes businesses and university campuses that accommodate bicyclists. These designations may provide an indication of efforts being made across Oregon to accommodate bicyclists; however, since the decisions of universities and businesses are not controlled by ODOT or its partner agencies, this performance measure is not well suited for the Plan.