

Memo



Date: April 9, 2021
To: Kim Ellis, Metro and Lidwien Rahman, ODOT
From: Susie Wright, PE and Molly McCormick, Kittelson & Associates, Inc.
Project: Regional Mobility Policy Update
Subject: Best Practices

INTRODUCTION

Metro and the Oregon Department of Transportation (ODOT) are working together to update the regional mobility policy and related mobility measures for the Portland metropolitan area. The goal of this update is to better align the policy and measures with the comprehensive set of shared regional values, goals, and desired outcomes identified in Metro’s Regional Transportation Plan (RTP) and 2040 Growth Concept, as well as with local and state goals. ODOT has also identified the need to update their mobility policy to better define expectations about mobility for different travel modes based on land use context and state and regional functional classification(s) of roads in the Oregon Highway Plan and Regional Transportation Plan. An updated policy should describe the region’s desired mobility outcomes and more robustly and explicitly define “acceptable and reliable” levels of mobility for people and goods using the region’s transportation system.

The ‘Potential Mobility Policy Elements’ memorandum identified outcomes related to mobility that could be reflected in an updated mobility policy. Based on stakeholder feedback during the project’s scoping phase in 2019 and two workshops with the TPAC and MTAC in 2020, five key transportation outcomes were identified as integral to how we view mobility in an urban environment, specifically in the Portland region. These five outcomes and potential measures by which to evaluate them will be further explored through case studies to evaluate their potential for being part of the mobility policy:

- **Access** - All people and goods can get where they need to go.
- **Time Efficiency** – People and goods can get where they need to go in a reasonable amount of time.
- **Reliability** - Travel time is reliable or predictable for all modes.
- **Safety** - Available travel options are safe for all users.

Direction Received and Next Steps:

The revised draft of this memorandum was completed in February 2021. Feedback was received from the Project Executive Team and ODOT and Metro staff. The memorandum identifies 38 measures related to the potential mobility policy elements. These measures were then screened to identify the most promising measures for testing using the project’s Screening Criteria. The screening process is documented in the Draft Measures for Testing Memorandum.

- **Travel Options** - People can get where they need to go by a variety of travel options or modes.

This memorandum will inform the screening and selection of mobility performance measures for testing by identifying:

- lessons learned related to performance measurement in transportation planning;
- contexts that the policy and its measures need to be responsive to; and,
- best practice measures associated with the potential mobility policy elements above.

The best practice measures identified for each potential mobility policy element were informed by reviewing best practices from jurisdictions around the country, review of Portland State University’s synthesis research report on the subject,¹ and regional stakeholder and project team feedback.

The best practice measures identified for each policy element are summarized in Table 1. These measures will be screened using the evaluation criteria established previously.

Table 1. Best Practice Performance Measures by Policy Element

ID	Measure	Access	Time Efficiency	Reliability	Safety	Travel Options
1	AADT/Capacity			●		Vehicle, Freight
2	Accessibility to Destinations	●				All modes
3	Accessibility to Employment	●				All modes
4	Accessibility to Freight Terminals, Ports, and Industry	●				Freight
5	Accessibility to Transit	●				Bike, Pedestrian
6	Bicycle/Pedestrian Network Directness/Connectivity	●	●			Bike, Pedestrian
7	Congestion Extent		●	●		Vehicle, Freight, Transit
8	Fatal and serious injury crashes and crash rates				●	All modes
9	Freight delay		●	●		Freight
10	Hours of Congestion/Duration of Congestion		●	●		Vehicle, Freight, Transit
11	Level of Service		●			Vehicle, Freight
12	Mode Share	●			●	All modes
13	Multimodal Level of Service (MMLOS), including Level of Traffic Stress (LTS)	●			●	All modes
14	Opportunity index	●				All modes
15	Pedestrian Crossing Index	●	●		●	Pedestrian
16	Percent of Congested Traffic		●	●		Vehicle, Freight, Transit
17	Percent system reliable			●		Vehicle, Freight, Transit
18	Person Capacity			●		All modes

¹ Regional Mobility Policy Background Report: Policy Analysis and Best Practices, Transportation Research and Education Center (TREC) Portland State University, June 8, 2020

ID	Measure	Access	Time Efficiency	Reliability	Safety	Travel Options
19	Person Hours of Travel (PHT)			●		All modes
20	Person Miles Traveled (PMT)	●				All modes
21	Person Throughput		●	●		All modes
22	Queuing			●	●	Vehicle, Freight
23	Recurring Delay/Non-Recurring Delay			●		Vehicle, Freight, Transit
24	System Completeness	●			●	All modes
25	Total crashes				●	All modes
26	Transit Ridership	●				Transit, Transit Mode
27	Travel Speed			●	●	Vehicle, Freight, Transit
28	Travel Time		●			All modes
29	Travel Time Reliability (Planning and Buffer Travel Time Indexes)			●		Vehicle, Freight, Transit
30	Trip Length/Trip Length Distributions		●			All modes
31	Vehicle Hours of Delay (VHD)/Peak Hour Excessive Delay			●		Vehicle, Freight, Transit
32	Vehicle Hours Traveled (VHT)		●			Vehicle, Freight, Transit
33	Vehicle Miles Traveled (VMT)		●		●	Vehicle, Freight, Transit
34	Vehicle-bicycle crashes				●	Vehicle, Bicycle
35	Vehicle-pedestrian crashes				●	Vehicle, Pedestrian
36	VMT per capita		●		●	Vehicle, Freight, Transit
37	Volume-to-Capacity Ratio (V/C)		●			Vehicle, Freight

LESSONS LEARNED

The Portland metropolitan area is not alone in reevaluating the effectiveness of its mobility policy to show progress toward regional or agency goals. The following sections highlight lessons learned by agencies and practitioners for selecting useful and outcome-based mobility policy performance measures. The performance measures identified later in this memorandum will go through an evaluation process to screen and select measures for testing and evaluating through case studies to inform decision making on the mobility policy and its measures. The evaluation criteria are based, in part, on these lessons learned.

Technical Feasibility and Clarity

Straight-forward and easy-to-grasp measures that directly relate to desired outcomes are preferred because they are easily understood by the public and decision-makers. Travel time is an example of a measure that is growing in use because it allows for engagement with the public and non-technical decision makers, especially with public familiarity increasing through apps like Google Maps and Waze. Conversely, while complex measures may be more accurate or precise, they can be challenging for the public and decision-makers to connect the decision they are making to the measured outcome and can create long-term obstacles for data collection, modeling tools and establishing repeatable assessments for performance tracking.

Technical feasibility covers whether a measure has a proven analysis process and if it relies on readily available data and analysis tools. For example, accessibility performance metrics, such as accessibility to employment or transit, have become easier to measure as advanced geographic information system (GIS) tools continue to be developed. Volume-to-capacity ratio (v/c) is another example of a measure that is used throughout the country, providing an established methodology and widespread acceptance of the output.

Flexibility for Intended Applications and Different Scales

The mobility policy and its measures need to be applicable to a diverse set of land uses, densities, and system maturities that reflect different stages of implementing the 2040 Growth Concept across the region. With the varying contexts throughout the Portland metropolitan area, more than one measure or standard will likely be needed to implement the policy for different planning processes (i.e. system planning, plan amendments, and development review). The measures and/or regulatory standards may differ by mode, facility type, and/or land use designation. Policy language and visuals will need to provide clarity, describing which measures to use for the many processes and land use and transportation contexts, and how to identify the applicable regulatory standard.

For areas that are still building out, measures that help define the system needs, such as network connectivity or v/c for vehicles, may be important for planning the future system. For areas that are built up or transitioning to a denser urban form, system completeness can highlight needs and show changes over time.

Measure Already in Use

Common and/or tested measures provide the benefit of established methodologies as well as available data. Jurisdictions and research institutions throughout the country have explored different mobility metrics and therefore provide a technical community with which to collaborate around data needs and modeling tools.

When considering potential new mobility measures, ODOT and Metro can look within their organizations for inspiration. The RTP monitors and defines needs based on multiple performance measures, and the Regional Transportation Functional Plan (RTFP) already requires evaluation of measures other than v/c, such as system completeness, connectivity, mode share, and vehicle miles traveled per capita (VMT/capita). Most TSPs use multiple measures to define transportation needs and to evaluate the adequacy of the planned systems. Similarly, ODOT uses a variety of measures to manage their roadways. These measures are already established in the region, are relatively cost-effective as they rely on existing data and tools and are already familiar to decision-makers and practitioners.

Ability to Impact Outcomes and/or Show Progress

Performance measures need to be able to show measurable change as a result of implementing planning strategies, such as projects, programs, and policies. One issue with the mobility policy is that the regulatory standard for plan amendments is focused solely on vehicle capacity while the transportation plan was developed balancing multiple goals and constraints and based on a multi-modal transportation system. In some contexts, progress cannot be made towards achieving the standard. As described above, v/c may be a useful measure for planning where the roadway network is not built out but can overestimate vehicle trips in a multi-modal environment and lead to overbuilding of roadways. It also puts undue emphasis on vehicular capacity in built-out areas where the jurisdictions may not be looking to invest in significant vehicular capacity projects. One potential approach is to have a regulatory standard for each specific context (based on facility type, network maturity, etc.) that is supported by additional measures and targets. This helps jurisdictions show progress toward targets or evaluate alternatives in system planning and then also have a standard² that is applied for plan amendments based on context.

Some measures are well suited to showing progress or measurable impact at the system level and some are better at a more localized plan amendment level. Performance measures that do not show measurable change from localized land use or transportation network changes do not lend themselves to a standard; however, they may do well as a system-level target as they are good for tracking trends over time, are forecastable, and/or can be modeled. System performance measures can help to frame a policy discussion about whether the community is investing in the right types of transportation projects and programs to achieve their goals or if the land use plans need to be further adjusted. A prime example is mode share. It is a useful measure to track system progress towards a target. If the target is to increase non-single-occupancy-vehicle (SOV) mode share and the community has not been trending in the right direction, there may be a need to focus on investments, programs and/or policies that will increase walking, biking, and use of transit and other shared modes, or land use changes. These can be tested and measured at the system level; however, when evaluating the impact of a plan amendment at a local level, for example, one may not be able to forecast a measurable change in mode share with currently available data and analysis tools. In that case, it may be possible to measure change in other things that are accepted as having an impact on achieving the mode share system target, such as accessibility to transit.

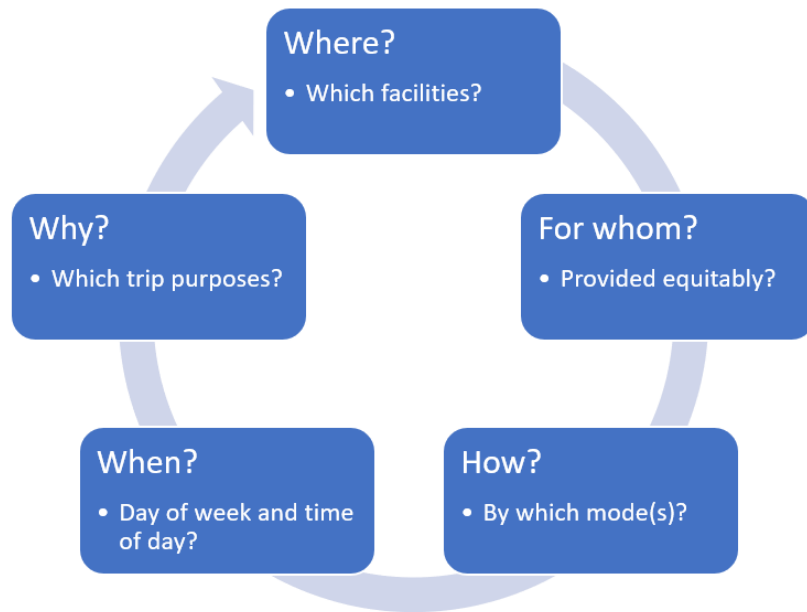
² Consideration must be given for potential conflicting targets when selecting a regulatory standard. For example, multimodal level of service (MMLoS) is not a good candidate for establishing a regulatory standard because the desired LOS targets for each mode cannot always be achieved at the same time. System completeness, for example, while also a multimodal measure, allows for non-competing targets that can show progress of providing infrastructure to support land use and travel options.

PERFORMANCE MEASURE CONSIDERATIONS

Performance measures for the Portland region mobility policy need to measure progress towards the potential policy elements described previously. In addition to addressing the selected policy elements, including modal options, the mobility policy and its measures need to be:

- Context-sensitive
- Able to be evaluated for equity impacts and benefits
- Flexible for use in different planning applications.

The policy and its measures should consider **who** is traveling or being impacted, **when** they are traveling, **where** they are going or how far they are traveling, **how** they are traveling, and **why** they are traveling, as described further in the graphic below.



Considerations for these key questions are included with the potential performance measures provided below.

PERFORMANCE MEASURES BY POTENTIAL MOBILITY POLICY ELEMENT

The following sections and Tables 2 through 6 identify performance measures for each of the potential mobility policy elements and describe how they may apply to different contexts, scales, and planning applications. The potential mobility policy elements are:

1. **Access** - All people and goods can get where they need to go.
2. **Time Efficiency** – People and goods can get where they need to go in a reasonable amount of time.
3. **Reliability** - Travel time is reliable or predictable for all modes.
4. **Safety** - Available travel options are safe for all users.
5. **Travel Options** - People can get where they need to go by a variety of travel options or modes.

A glossary for the potential performances measures is provided in **Attachment A**.

Policy Element 1: Access – All People and goods can get where they need to go

This mobility policy element would support the Portland metropolitan region in providing adequate access to jobs, services, opportunities, and connections through a robust multimodal transportation system. Table 2 below depicts potential performance measures to evaluate this element.

Table 2. Performance Measures Summary – Access

Performance Measure	Where?	For Whom?	How?	When?	Why?	Applications
Accessibility to Destinations** 3	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All modes	N/A	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Accessibility to Employment* 3	Full Network	Demographic/Equity Analysis to Job Type and/or By Mode	All modes	N/A	Commute	TSP, Plan Amendment, Development Review, Performance Monitoring
Accessibility to Freight Terminals, Ports, and Industry	Arterials and Collectors, Designated Freight Network	Demographic/Equity Analysis by Equity Focus Area and/or by Trip Length	Freight	N/A	Freight	TSP, Plan Amendment
Accessibility to Transit**+	Arterials and Collectors, Designated Transit Network	Demographic/Equity Analysis by Equity Focus Area, Transit Mode, and/or by Trip Length	Bike, Pedestrian	N/A	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Bicycle/ Pedestrian Network Directness/ Connectivity¹	Arterials and Collectors, Designated Ped/Bike Networks	Demographic/ Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Bike, Pedestrian	N/A	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Mode Share* 2, 3	Full Network	Demographic/Equity	All modes	Peak	Commute or all	TSP, Plan

Performance Measure	Where?	For Whom?	How?	When?	Why?	Applications
		Analysis by Equity Focus Area, Mode, and/or by Trip Length		periods or all day	trip purposes	Amendment, Performance Monitoring
Multimodal Level of Service (MMLOS), including Level of Traffic Stress (LTS)* 2, 3	Arterials and Collectors, Designated Ped/Bike Networks	Demographic/Equity Analysis at Service Levels	All modes	All day	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Opportunity Index³	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All modes	All day	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Pedestrian Crossing Index^{1, 2}	Arterials and Collectors, Designated Ped/Bike Networks	Demographic/Equity Analysis by Equity Focus Areas	Pedestrian	N/A	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Person Miles Traveled (PMT)^{+ 3}	Full Network	Demographic/ Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All Modes	All Day	All trip purposes	TSP, Performance Monitoring
System Completeness^{+ 2, 3}	Full Network	Demographic/Equity Analysis by Equity Focus Area and/or Mode	All modes	N/A	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Total Transit Ridership*⁺	Arterials and Collectors, Designated Transit Network	Demographic/Equity Analysis by Equity Focus Area, Transit Mode, and/or by Trip Length	Transit/Transit mode	All day	All trip purposes	TSP, Performance Monitoring

* Measure has been or is currently used by ODOT.

+ Measure is used in the RTP.

Measures that are **bolded** are relevant for two or more policy element.

1: Also listed in Table 3 (Time Efficiency)

2: Also listed in Table 5 (Safely)

3: Also listed in Table 6 (Travel Options)

Jurisdictions that employ accessibility performance measures such as these include Metro, MnDOT through its Minnesota GO vision (<https://minnesotago.org/learn-about-plans/minnesota-go-vision>) and FDOT through its Source Book (<https://www.fdot.gov/planning/fto/default.shtm>). Accessibility performance metrics are rapidly gaining momentum as the ability to quickly evaluate a large number of origins and destinations has become technically more feasible with advanced GIS tools and databases. These access performance metrics excel at linking transportation and land use, although the challenges of forecasting where specific destinations will be in the future presents a barrier. These metrics can be advanced with both transportation investments and changing land uses, which allows for a more flexible way to improve the ability for people to get to the places they need to go.

Jurisdictions that employ multimodal level of service as a performance measure include the City of Bellevue through its comprehensive plan³, Central Oregon jurisdictions through the TRIP97 Partnership⁴, City of Charlotte through its Urban Street Design Guidelines⁵, and DDOT through the District Mobility Project.

Policy Element 2: Time Efficiency – People and goods can get where they need to go in a reasonable amount of time

This mobility policy element would support the Portland region maintaining reasonable travel times on the regional transportation system (including bike, pedestrian, road, transit, and freight networks). Table 3 relays potential performance measures to expand this policy approach with different measures.

Table 3. Performance Measures Summary – Time Efficiency

Performance Measure	Where?	For Whom?	How?	When?	Why?	Applications
Bicycle/ Pedestrian Network Directness/ Connectivity¹	Arterials and Collectors, Designated Ped/Bike Networks	Demographic/ Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Bike, Pedestrian	N/A	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Congestion Extent²	Full Network	Demographic/Equity Analysis by Equity	Vehicle, Freight,	Peak periods or All Day	All trip purposes	TSP, Plan Amendment,

³ City of Bellevue. *Comprehensive Plan*. 2015.

⁴ Various Jurisdictions. *Transportation Reinvestment Innovation and Planning for US 97 in Central Oregon*. 2013.

⁵ City of Charlotte. *Urban Street Design Guidelines*. Adopted October 2007.

REGIONAL MOBILITY POLICY UPDATE | Best Practices Memorandum

Performance Measure	Where?	For Whom?	How?	When?	Why?	Applications
		Focus Area, Mode, and/or by Trip Length	Transit			Performance Monitoring
Freight Delay^{+ 2}	Arterials and Collectors, Designated Freight Network	Demographic/Equity Analysis by Equity Focus Area and/or by Trip Length	Freight	All Day	Freight	TSP, Plan Amendment, Performance Monitoring
Hours of Congestion/ Duration of Congestion^{*+2}	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	Peak periods or All Day	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Level of Service	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight	Peak periods	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Pedestrian Crossing Index^{1, 3}	Arterials and Collectors, Designated Ped/Bike Networks	Demographic/Equity Analysis by Equity Focus Areas	Pedestrian	N/A	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Percent of Congested Traffic²	Full Network	Demographic/Equity Analysis by Equity Focus Area	Vehicle, Freight, Transit	Peak periods or All Day	All trip purposes	Performance Monitoring
Person Throughput^{* 2, 4}	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All Modes	Peak periods or All Day	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Travel Time^{* +4}	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All Modes	Peak periods or All Day	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Trip Length/Trip Length Distributions^{+ 4}	Full Network	Demographic/Equity Analysis by Equity	All Modes	Peak periods or All Day	All trip purposes	TSP, Plan Amendment,

REGIONAL MOBILITY POLICY UPDATE | Best Practices Memorandum

Performance Measure	Where?	For Whom?	How?	When?	Why?	Applications
		Focus Area, Mode, and/or by Trip Length				Development Review, Performance Monitoring
Vehicle Hours Traveled (VHT)	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	Peak periods or All Day	Commute or all trip purposes	TSP, Plan Amendment, Performance Monitoring
Vehicle Miles Traveled (VMT) ^{**+3}	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	N/A	Commute or all trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
VMT per capita ^{**+3}	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	N/A	Commute or all trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Volume-to-Capacity Ratio*	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight	Peak periods	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring

* Measure has been or is currently used by ODOT.

+ Measure is used in the RTP.

Measures that are **bolded** are relevant for two or more policy element.

1: Also listed in Table 2 (Accessibility)

2: Also listed in Table 4 (Reliable Travel Time)

3: Also listed in Table 5 (Safely)

4: Also listed in Table 6 (Travel Options)

Several of these potential performance metrics are well-established and already used by ODOT and/or in the region, including VMT/capita, v/c, travel time, and duration of congestion.

Policy Element 3: Reliability - Travel time is reliable or predictable for all modes

This mobility policy element supports maintaining reliable travel times on the regional transportation system (including bike, pedestrian, road, transit and freight networks). Although the RTP goals and Oregon Highway Plan (OHP) policy references reliable mobility, the policy does not include performance measures to address travel time reliability. Table 4, below, shows potential performance measures to measure reliable travel times.

Table 4. Performance Measures Summary – Reliability

Performance Measure	Where?	For Whom?	How?	When?	Why?	Applications
AADT/Capacity*	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight	All Day	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Congestion Extent ¹	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	Peak periods or All Day	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Freight Delay ⁺¹	Arterials and Collectors, Designated Freight Network	Demographic/Equity Analysis by Equity Focus Area and/or by Trip Length	Freight	All Day	Freight	TSP, Plan Amendment, Performance Monitoring
Hours of Congestion/ Duration of Congestion ⁺¹	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	Peak periods or All Day	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Percent of Congested Traffic ¹	Full Network	Demographic/Equity Analysis by Equity Focus Area	Vehicle, Freight, Transit	Peak periods or All Day	All trip purposes	Performance Monitoring
Percent System Reliable*	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	N/A	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Person Capacity ³	Full Network	Demographic/Equity Analysis by Equity	All Modes	Peak periods or All Day	All trip purposes	TSP, Performance Monitoring

REGIONAL MOBILITY POLICY UPDATE | Best Practices Memorandum

Performance Measure	Where?	For Whom?	How?	When?	Why?	Applications
		Focus Area and/or Mode				
Person Hours of Travel (PHT)³	Full Network	Demographic/Equity Analysis by Equity Focus Area and/or Mode	All Modes	Peak periods or All Day	All trip purposes	TSP, Performance Monitoring
Person Throughput^{*1, 3}	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All Modes	Peak periods or All Day	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Queuing ^{*2}	Full Network	Demographic/Equity Analysis by Equity Focus Area	Vehicle, Freight	Peak periods	All trip purposes	Development Review
Recurring Delay/Non-Recurring Delay *	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	Peak periods or All Day	All trip purposes	Performance Monitoring
Travel Speed ^{*+2}	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	Peak periods or All Day	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Travel Time Reliability (Planning and Buffer Travel Time Indexes) *	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	Peak periods or All Day	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Vehicle Hours of Delay (VHD)/Peak Hour Excessive Delay ^{*+}	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	Peak periods or All Day	All trip purposes	TSP, Plan Amendment, Performance Monitoring

* Measure has been or is currently used by ODOT.

+ Measure is used in the RTP.

Measures that are **bolded** are relevant for two or more policy element.

1: Also listed in Table 3 (Reasonable Amount of Travel Time)

2: Also listed in Table 5 (Safely)

3: Also listed in Table 6 (Travel Options)

Numerous state and local agencies have employed travel time reliability as a performance measure. Among these are ODOT through its key performance measures, Florida Department of Transportation (FDOT) through its Source Book,⁶ Maryland Department of Transportation (MDOT) through its State Highway Mobility Report⁷, and the District Department of Transportation (DDOT) through its District Mobility Project⁸. FHWA also requires the analysis of a travel time reliability metric under MAP-21 and the FAST Act.

⁶ Florida Department of Transportation. *The FDOT Source Book*. February 2019.

⁷ Maryland Department of Transportation. *Maryland State Highway Mobility Report*. 2018.

⁸ District Department of Transportation. *District Mobility Project*. Ongoing.

Policy Element 4: Safety - Available travel options are safe for all users

This mobility policy element acknowledges that people do not have mobility if they are not or do not feel safe using their available travel options. The team will utilize case studies to explore the ability to incorporate context such as high injury locations, areas with high exposure of vulnerable users or system completeness. Table 5 shows potential performance measures that could measure the safety context related to how the mobility policy is applied.

Table 5. Performance Measures Summary – Safety

Performance Measure	Where?	For Whom?	How?	When?	Why?	Applications
Fatal and serious injury crashes and crash rates*+4	Full Network	Demographic/ Equity Analysis by High Crash Corridors	All modes	N/A	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Mode Share*1, 4	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All modes	Peak periods or all day	Commute or all trip purposes	TSP, Plan Amendment, Performance Monitoring
Multimodal Level of Service (MMLOS), including Level of Traffic Stress (LTS)*1, 4	Arterials and Collectors, Designated Ped/Bike Networks	Demographic/Equity Analysis at Service Levels	All modes	All day	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Pedestrian Crossing Index^{1, 2}	Arterials and Collectors, Designated Ped/Bike Networks	Demographic/Equity Analysis by Equity Focus Areas	Pedestrian	N/A	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Queuing *³	Full Network	Demographic/ Equity Analysis by Equity Focus Area	Vehicle, Freight	Peak periods	All trip purposes	Plan Amendment, Development Review, Performance Monitoring
System Completeness*+1, 4	Full Network	Demographic/Equity Analysis by Equity Focus Area and/or Mode	All modes	N/A	All trip purposes	TSP, Plan Amendment, Development Review,

REGIONAL MOBILITY POLICY UPDATE | Best Practices Memorandum

Performance Measure	Where?	For Whom?	How?	When?	Why?	Applications
						Performance Monitoring
Total crashes**+ 4	Full Network	Demographic/ Equity Analysis by High Crash Corridors	All modes	N/A	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Travel Speed **+3	Full Network	Demographic/ Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	Peak periods or All Day	Commute or all trip purposes	TSP, Plan Amendment, Performance Monitoring
Vehicle-bicycle crashes*+	Full Network	Demographic/ Equity Analysis by High Crash Corridors	Vehicle, Bike	N/A	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Vehicle-pedestrian crashes*+	Full Network	Demographic/ Equity Analysis by High Crash Corridors	Vehicle, Pedestrian	N/A	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Vehicle Miles Traveled (VMT) **+2	Full Network	Demographic/ Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	N/A	Commute or all trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
VMT per capita **+2	Full Network	Demographic/ Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	Vehicle, Freight, Transit	N/A	Commute or all trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring

* Measure has been or is currently used by ODOT.

+ Measure is used in the RTP.

Measures that are **bolded** are relevant for two or more policy element.

1: Also listed in Table 2 (Accessibility)

2: Also listed in Table 3 (Reasonable Amount of Travel Time)

3: Also listed in Table 4 (Reliable Travel Time)

4: Also listed in Table 6 (Travel Options)

Measures related to reduction in VMT on local and regional roads and reducing modal conflicts could be surrogates for incorporating safety into the mobility policy. The RTP designates high injury corridors that are arterials with higher occurrences of fatal and serious injury crashes. These are the priority corridors for safety-related investments and countermeasures. Many are located in RTP designated equity focus areas (areas with greater concentrations of people of color, people with low-income and people with limited English proficiency). Depending on which performance measures move forward into the mobility policy, focusing on the RTPs high-injury corridors may be a way to incorporate safety without specifically tracking crashes through this policy.

Jurisdictions that employ safety performance measures such as these include ODOT through its key performance measures, Metro through its RTP and Regional Transportation Safety Strategy, MnDOT through its Minnesota GO vision, and FDOT through its Source Book, among many others.

Policy Element 5: Travel Options – People can get where they need to go by a variety of travel options or modes

This mobility policy element supports people being able to get where they need to go by a variety of travel options or modes. A main focus of the updated mobility policy will be to maintain acceptable mobility on the regional roadway network for all modes, including bicycle, freight, pedestrian, transit, and vehicle. Table 6 shows potential performance measures that could be applied across the different travel options.

Table 6. Performance Measures Summary – Travel Options

Performance Measure	Where?	For Whom?	How?	When?	Why?	Applications
Accessibility to Destinations*+1	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All modes	N/A	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Accessibility to Employment+1	Full Network	Demographic/Equity Analysis to Job Type and/or By Mode	All modes	N/A	Commute	TSP, Plan Amendment, Development Review, Performance Monitoring
Fatal and serious injury crashes and crash rates*+4	Full Network	Demographic/ Equity Analysis by High Crash Corridors	All modes	N/A	All trip purposes	TSP, Plan Amendment, Performance

Performance Measure	Where?	For Whom?	How?	When?	Why?	Applications
						Monitoring
Mode Share *1, 4	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All modes	Peak periods or all day	Commute or all trip purposes	TSP, Plan Amendment, Performance Monitoring
Multimodal Level of Service (MMLOS), including Level of Traffic Stress (LTS) *1, 4	Arterials and Collectors, Designated Ped/Bike Networks	Demographic/Equity Analysis at Service Levels	All modes	All day	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
Opportunity Index ¹	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All modes	All day	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Person Capacity ³	Full Network	Demographic/Equity Analysis by Equity Focus Area and/or Mode	All Modes	Peak periods or All Day	All trip purposes	TSP, Performance Monitoring
Person Hours of Travel (PHT) ³	Full Network	Demographic/Equity Analysis by Equity Focus Area and/or Mode	All Modes	Peak periods or All Day	All trip purposes	TSP, Performance Monitoring
Person Miles Traveled (PMT) ⁺¹	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All Modes	All Day	All trip purposes	TSP, Performance Monitoring
Person Throughput * 2, 3	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All Modes	Peak periods or All Day	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring
System Completeness *1, 4+	Full Network	Demographic/Equity Analysis by Equity Focus Area and/or Mode	All modes	N/A	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring

Performance Measure	Where?	For Whom?	How?	When?	Why?	Applications
Total crashes*+4	Full Network	Demographic/ Equity Analysis by High Crash Corridors	All modes	N/A	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Travel Time*+2	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All Modes	Peak periods or All Day	All trip purposes	TSP, Plan Amendment, Performance Monitoring
Trip Length/Trip Length Distributions*+2	Full Network	Demographic/Equity Analysis by Equity Focus Area, Mode, and/or by Trip Length	All Modes	Peak periods or All Day	All trip purposes	TSP, Plan Amendment, Development Review, Performance Monitoring

* Measure has been or is currently used by ODOT.

+ Measure is used in the RTP.

Measures that are **bolded** are relevant for two or more policy element.

1: Also listed in Table 2 (Accessibility)

2: Also listed in Table 3 (Time Efficiency)

3: Also listed in Table 4 (Reasonable Amount of Travel Time)

4: Also listed in Table 5 (Reliable Travel Time)

ATTACHMENT A: GLOSSARY

Measure	Description
AADT/Capacity	The ratio of average annual daily traffic volume to the capacity of a facility during a specified analysis period.
Accessibility to Destinations	The number of essential destinations within a certain travel time or distance, by different modes.
Accessibility to Employment	The number of jobs that can be reached within a certain travel time, cost or distance, by different modes.
Accessibility to Freight Terminals, Ports, and Industry	The number of freight-specific jobs within a certain distance or truck travel time of ports and intermodal facilities.
Accessibility to Transit	The number or percent of a population, jobs, or households living within a defined distance or travel time from a transit stop.
Bicycle/Pedestrian Network Directness/Connectivity	The shortest and most direct path between origin and destination for bicyclists and pedestrians.
Congestion Extent	The length of a freeway segment, in a certain direction, for which average travel times are longer than free flow travel times.
Fatal and Serious Injury Crashes and Crash Rates	Number and location of fatal and serious injury crashes within a specified time frame. Crash rates are typically expressed as intersection crashes per million entering vehicles or segment crashes per million vehicle-miles traveled for intersections and segments, respectively.
Freight Delay	The cumulative number of hours of delay experienced by freight vehicles within a specified time period and study area.
Hours of Congestion/Duration of Congestion	The number of hours within a time period, most often within a weekday, where a facility's congestion target is exceeded.
Level of Service (LOS)	An A to F rating scale of motorized mobility (typically as a function of delay or density) of a facility, segment, intersection, or approach during a specified analysis period. LOS A represents conditions where traffic moves without significant delays. LOS F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity.
Mode Share	The percentage of trips taken by a specified mode.
Multimodal Level of Service (MMLOS), including Level of Traffic Stress (LTS)	MMLOS is a level of service (LOS) system that measures the quality and level of comfort of facilities per mode based on factors that impact mobility from the perspectives of pedestrians, cyclists, and transit riders, respectively. Level of traffic stress (LTS) classifies points and segments on routes into different categories of stress ranging from 1 (low stress) to 4 (high stress) based on factors that correlate to the comfort and safety of the bicyclist or pedestrian using that facility.
Opportunity Index	Indicator of the number of destination opportunities available to a traveler as a function of population density, opportunity density, and average modal travel time within a modal-specific travelshed.
Pedestrian Crossing Index	The distance between pedestrian crossings compared to a target maximum distance.
Percent of Congested Traffic	The ratio of congested vehicle miles traveled (VMT) to total VMT, where "congested" could be defined using v/c ratio, travel speed, or another measure.
Percent System Reliable	The percentage of the system under "congested" conditions during a specified time period and for a specified study area.
Person Capacity	The maximum number of people, across modes, that can travel through a segment, facility, or specified point in one direction over a specified time period.

Measure	Description
Person Hours of Travel (PHT)	The cumulative number of hours of travel by people, across all modes, in a specific area during a specified time period.
Person Miles Traveled (PMT)	The cumulative number of miles traveled by people, across all modes, within a specified time period and study area.
Person Throughput	The number of people, across modes, traveling through a segment, facility, or specified point in one direction over a specified time period.
Queuing	The extent of vehicles queued on intersection approach lanes, including on and off ramps, during a specified analysis period.
Recurring Delay/Non-Recurring Delay	Recurring delay is typically repeated vehicle delay during a certain time of day and day of the week. Non-recurring delay are vehicle hours of delay in excess of recurring delay.
System Completeness	The percent of planned facilities that are built within a specified network.
Total Crashes	Number, severity, and location of all crashes within a specified time frame.
Transit Ridership	The total boardings for a transit system or transit mode during a specified time period (most often reported by month or year).
Travel Speed	Average or a percentile speed for a network segment or between key origin-destination pairs, during a specific time period.
Travel Time	Average or a percentile time spent traveling between key origin-destination pairs, during a specific time period.
Travel Time Reliability (Planning and Buffer Travel Time Indexes)	Indicators of congestion severity that assess on-time arrival and travel time variability.
Trip Length/Trip Length Distributions	The share of trips that are within a specific range of lengths. The distributions can be separated based on mode, roadway classification, and other factors.
Vehicle Hours of Delay (VHD)/Peak Hour Excessive Delay	The cumulative number of hours of delay experienced by motorists within a specified time period and study area.
Vehicle Hours Traveled (VHT)	The hours traveled by vehicles in a specific area during a specified Time period.
Vehicle Miles Traveled (VMT)	The cumulative number of miles traveled by motorists within a specified time period and study area.
Vehicle-Bicycle Crashes	Number, severity, and location of crashes involving vehicles and bicycles within a specified time frame.
Vehicle-Pedestrian Crashes	Number, severity, and location of crashes involving vehicles and pedestrians within a specified time frame.
VMT per Capita	The number of miles traveled by motorists within a specified time period and study area, per the study area's population.
Volume-to-Capacity Ratio (V/C)	The ratio of traffic volume to the capacity of a roadway or Intersection during a specified analysis period.