

Memo



Date: April 14, 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: Most Promising Mobility Measures for Testing – DISCUSSION DRAFT

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. There is also a need to update the 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. The updated policy will 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 transportation system in the Portland area.

The ‘Potential Mobility Policy Elements’ memorandum (**Supporting Document A**) 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 updated 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.
- **Travel Options** - People can get where they need to go by a variety of travel options or modes.

The ‘Best Practices’ memorandum (**Supporting Document B**) identified measures for each of the five policy elements. The memorandum identified 38 measures, which served as the starting point for this

memorandum. This memorandum describes the screening and selection of the most promising performance measures to test on case studies. The screening process utilized the screening criteria established in the ‘Performance Measure Screening and Evaluation Criteria’ memorandum (**Supporting Document C**). The memorandum identified 10 screening criteria categories, which were then pared down to access, travel choices, reliable and efficient mobility, safety, and other regional goals based on the policy elements that moved forward. Although equity is part of the “other regional goals” category, each measure that gets tested during the case studies will be further to determine if it can be utilized to verify equitable outcomes.

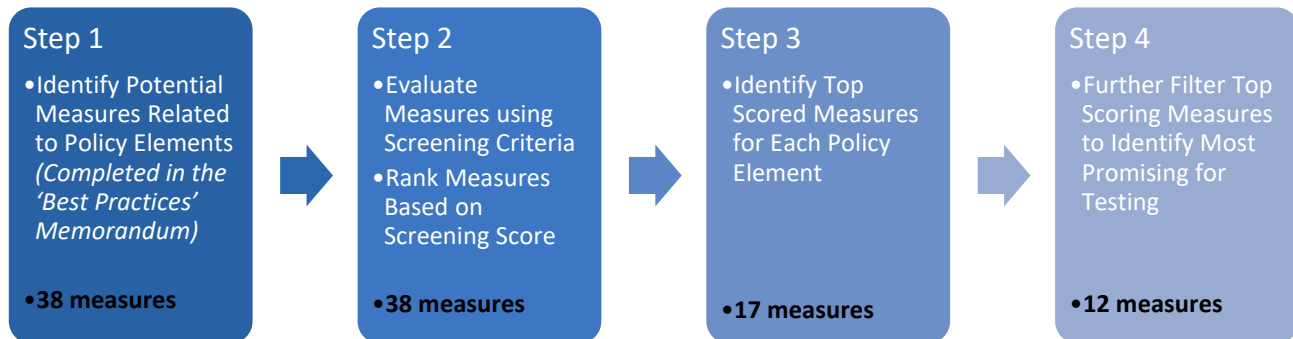
Considerations for the case studies include:

- Measures may be used differently for different applications (i.e. system planning versus plan amendments).
- Although there can be multiple targets that the region is measuring against, it is recommended to only have one standard per specific planning context. When there are multiple standards, it becomes more difficult to meet all.
- Not all measures are easily applied as a standard. At the system-level, a measure may be applied as a target, with assessment whether a system is trending appropriately or if a project is projected to move the system closer to the target.

SCREENING PROCESS

TPAC and MTAC provided feedback on criteria to be used to screen and select potential mobility performance measures for testing. The Consultant team applied the criteria through a four-step process (shown in **Figure 1**) to narrow the 38 potential mobility measures to 12 potential mobility measures that appear most promising for testing through case studies.

Figure 1: Screening Process to Inform Selection of Most Promising Measures for Testing



As shown in **Figure 1**, the first step was completed in the **Supporting Document B** when measures for each policy element were identified. Step 1 resulted in a list of 38 potential measures. Steps 2 through 4 were then conducted and are reported in this memorandum.

In **Step 2**, the Consultant team conducted an initial screening of the 38 potential measures. **Figure 2** highlights the screening criteria used, established in **Supporting Document C**. The full screening

matrix is provided in **Attachment A**. The outcome of the screening process in Step 2 was a score for each potential measure, shown in **Table 1**.

In **Step 3**, the Consultant team ranked the measures according to their screening evaluation score and the top scored measures for each policy element were identified. A number of measures that scored higher than others were not moved forward in Step 3 in order to include at least four measures per policy element. For example, accessibility to employment was a highly scored measure overall but was the seventh ranked access policy element measure and not moved forward. Because there are measures that relate to more than one policy element, the list from Step 3 was checked to include at least the top four scores from each policy element group. Step 3 resulted in a reduced list of 17 potential measures from 38.

In **Step 4**, the Consultant team further refined the list to reduce the list to the most promising measures to move forward for testing with case studies. As further described in the following tables, the team reduced the list to 12 measures based on a high-level review of four additional factors:

- **Ease of analysis** - Are the measures reasonably simple to analyze?
- **Direct correlation to mobility** – Do the measures evaluate mobility or do they evaluate outcomes of mobility?
- **Lack of overlap with other measures** – Are the measures unique and evaluate different aspects of mobility?

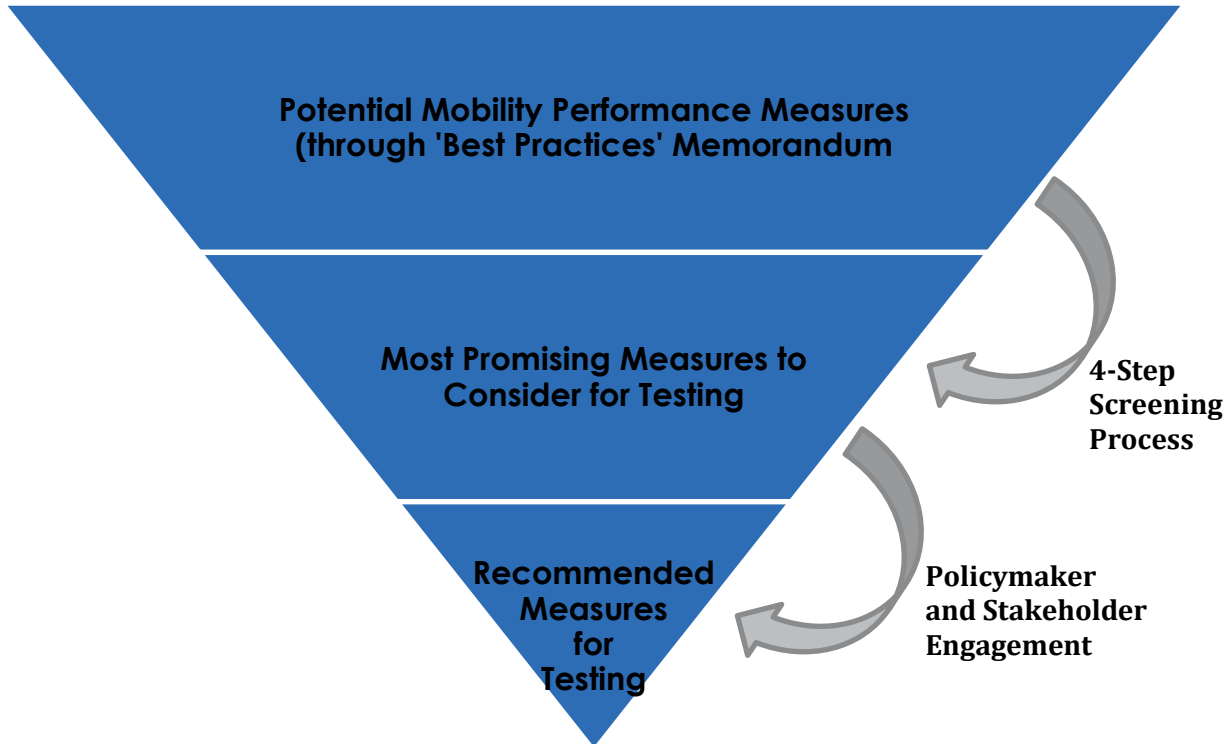
Step 4 can be considered an initial qualitative analysis of several key future evaluation criteria, but all evaluation criteria from **Supporting Document C** will be applied and scored through the case studies. Exact methodologies for the measures for testing will be determined, measure output will be created, and scorings based on the evaluation criteria will be completed in the case studies. This information will then guide development of the updated mobility policy.

The most promising measures from Step 4 in order by highest screening score are:

Score	Measure	ID
4.00	Multimodal Level of Service (MMLoS)	13A
4.00	Level of Traffic Stress (LTS)	13B
3.33	Pedestrian Crossing Index	15
3.33	System Completeness	24
3.00	Accessibility to Destinations	2
2.75	Travel Speed	27
2.17	VMT per Capita	36
2.00	Hours of Congestion/Duration of Congestion	10
1.92	Travel Time Reliability (Planning and Buffer Travel Time Indexes)	29
1.75	Travel Time	28

1.75	V/C for Roadway Links	38
0.92	Volume-to-Capacity Ratio (V/C) at Intersections	37

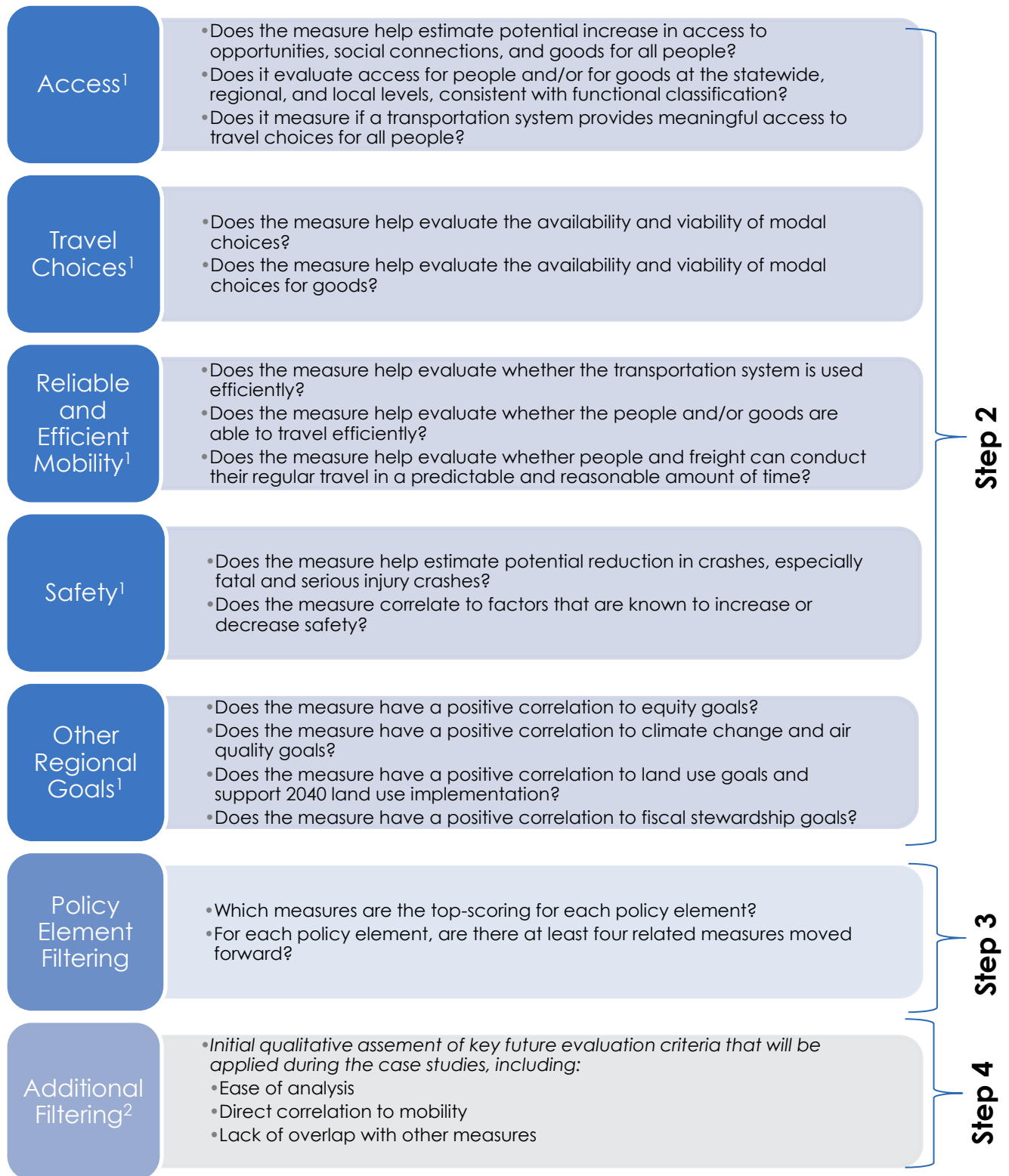
After feedback from policymakers, practitioners, community leaders, and other stakeholders, a further reduced list of measures will be evaluated through the case studies to determine which will be incorporated into the updated regional mobility policy.



Many of the measures that were not advanced through this four-step process are good measures for system planning that should continue to be used in system planning even if not being considered for incorporation into the mobility policy.

The following sections are organized by policy element and describe the screening steps completed to identify the most promising performance measures. **Figures 3 through 7** show the measures that moved forward for each screening step and the reasoning for specific measures being removed from the list. **Tables 2 through 6** describe the most promising performance measures by mobility policy element, including measure descriptions, related policy elements, and applicable planning applications.

Figure 2: Screening Criteria Applied



1. The screening process utilized the screening criteria established in **Supporting Document C**. The memorandum identified 10 screening criteria categories, which were then pared down to those shown in Figure 2.
2. The full initial list of future evaluation criteria is shown in **Supporting Document C**. Similar to the screen criteria, the evaluation criteria applied in the case studies may be modified from those shown as the project moves forward.

Table 1. Performance Measure Screening Ranking – Total and Subtotal Scores

ID	Measure	Subtotal Access	Subtotal Travel Choices	Subtotal Reliable and Efficient	Subtotal Safety	Subtotal Other Regional Goals	Screening Total
13A	Multimodal Level of Service (MMLOS)	1.00	0.50	1.00	0.50	1.00	4.00
13B	Level of Traffic Stress (LTS)	1.00	0.50	1.00	0.50	1.00	4.00
15	Pedestrian Crossing Index	1.00	0.50	0.33	0.50	1.00	3.33
24	System Completeness	1.00	0.50	0.33	0.50	1.00	3.33
2	Accessibility to Destinations	0.67	1.00	0.33	0.00	1.00	3.00
6	Bicycle/Pedestrian Network Directness/Connectivity	1.00	0.50	0.33	0.00	1.00	2.83
21	Person and Goods Throughput	0.33	0.50	1.00	0.00	1.00	2.83
27	Travel Speed	0.00	1.00	1.00	0.50	0.25	2.75
5	Accessibility to Transit	0.67	0.50	0.33	0.00	1.00	2.50
3	Accessibility to Employment	0.67	0.50	0.33	0.00	1.00	2.50
36	VMT per Capita	0.33	0.00	0.33	0.50	1.00	2.17
12	Mode Share	0.33	0.50	0.00	0.50	0.75	2.08
34	Vehicle-Bicycle Crashes	0.00	0.50	0.33	1.00	0.25	2.08
35	Vehicle-Pedestrian Crashes	0.00	0.50	0.33	1.00	0.25	2.08
10	Hours of Congestion/Duration of Congestion	0.00	0.00	1.00	0.50	0.50	2.00
4	Accessibility to Freight Terminals, Ports, and Industry	0.67	0.50	0.33	0.00	0.50	2.00
9	Freight Delay	0.00	0.50	0.67	0.00	0.75	1.92
14	Access to Opportunity Index	0.67	0.50	0.00	0.00	0.75	1.92
29	Travel Time Reliability (Planning and Buffer Travel Time Indexes)	0.00	1.00	0.67	0.00	0.25	1.92
26	Transit Ridership	0.33	0.50	0.00	0.00	1.00	1.83
33	Vehicle Miles Traveled (VMT)	0.00	0.00	0.33	0.50	1.00	1.83
1	AADT/Capacity	0.33	0.00	1.00	0.00	0.50	1.83
28	Travel Time	0.00	0.50	1.00	0.00	0.25	1.75
38	V/C for Roadway Links	0.00	0.00	1.00	0.00	0.75	1.75
7	Congestion Extent	0.00	0.00	0.67	0.50	0.50	1.67
17	Percent System Reliable	0.00	1.00	0.67	0.00	0.00	1.67
18	Person Capacity	0.00	0.50	0.67	0.00	0.50	1.67
19	Person Hours of Travel (PHT)	0.00	0.50	0.67	0.00	0.50	1.67
22	Queuing	0.00	0.00	0.67	0.50	0.50	1.67
23	Recurring Delay/Non-Recurring Delay	0.00	0.00	0.67	0.50	0.50	1.67
31	Vehicle Hours of Delay (VHD)/Peak Hour Excessive Delay	0.00	0.50	0.67	0.00	0.50	1.67
8	Fatal and Serious Injury Crashes and Crash Rates	0.00	0.00	0.33	1.00	0.25	1.58
20	Person Miles Traveled (PMT)	0.00	0.50	0.33	0.00	0.75	1.58
25	Total Crashes	0.00	0.00	0.33	1.00	0.25	1.58
16	Percent of Congested Traffic	0.00	0.00	0.67	0.00	0.50	1.17
37	Volume-to-Capacity Ratio (V/C) at Intersections	0.00	0.00	0.67	0.00	0.25	0.92

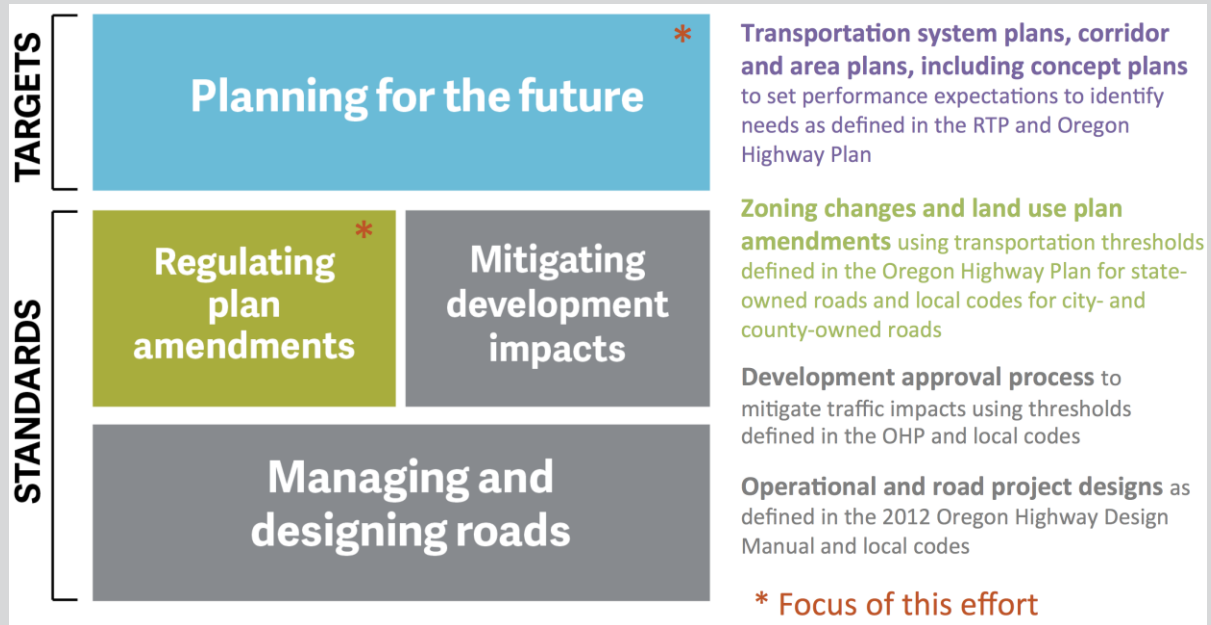
ID	Measure	Subtotal Access	Subtotal Travel Choices	Subtotal Reliable and Efficient	Subtotal Safety	Subtotal Other Regional Goals	Screening Total
30	Trip Length/Trip Length Distributions	0.00	0.00	0.33	0.00	0.50	0.83
11	Level of Service	0.00	0.00	0.67	0.00	0.00	0.67
32	Vehicle Hours Traveled (VHT)	0.00	0.00	0.33	0.00	0.25	0.58

Bolded measures are the identified most promising mobility measures for testing.

PLANNING APPLICATIONS

The graphic below summarizes the various planning applications that the mobility policy is applied to. The current mobility policy measure (volume-to-capacity ratio) is applied as a target during system planning and as a standard during plan amendments. During system planning, a variety of measures are typically used that can be applied to evaluate performance of the system as a whole or in more targeted areas or locations to help identify needs and identify projects that can help address those needs.

Applications of the current mobility policy



The ideal measure or suite of measures for the updated regional mobility policy will both support a multimodal standard and can be applied at the different application levels. It is important to consider how the multimodal standard will feed up into the RTP system-wide analysis and how it could inform project design or development approval.

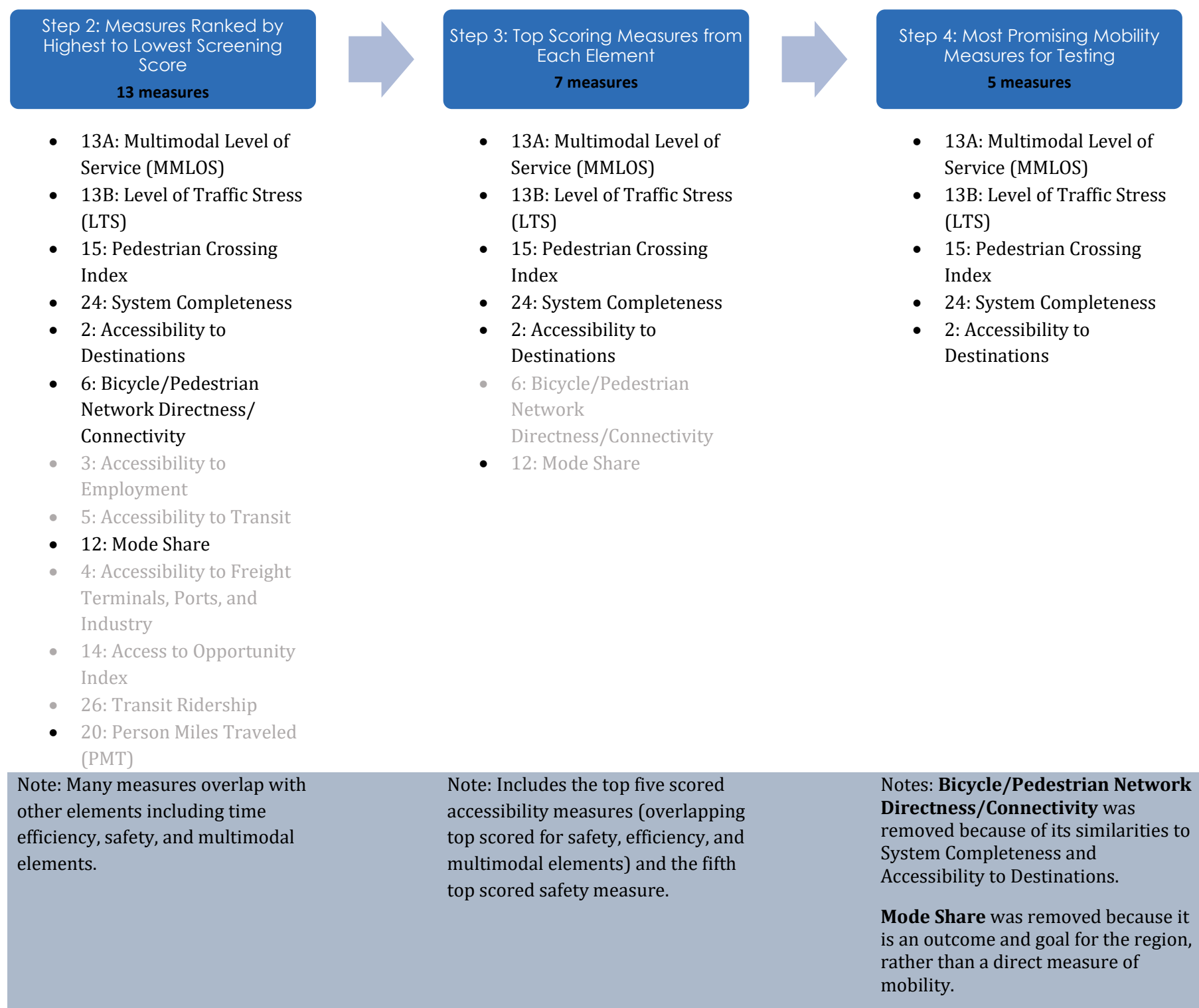
At the regional scale, Metro needs a measure(s) that can be quantified and compared across the whole region and can be used to set a target that is responsive to RTP projects and policies. **At the plan amendment scale**, agencies need a measure(s) to assess the transportation impacts of a proposed land use change based on a threshold that considers anticipated trip generation based on surrounding land use and transportation network characteristics. The measure(s) also need to support identification of mitigation if the threshold is exceeded. **At the project design level**, design teams use measures to quantitatively assess and compare different design alternatives. Design teams also use measures to identify development requirements and mitigation based on development-level assessment of trip generation and surrounding transportation network characteristics.

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. **Figure 3** shows the stepped process used to reduce the potential measures down to the most promising measures. Measures with overlapping policy elements are shown in all policy element figures and tables.

As noted in Figure 3, two measures were removed in Step 4 (Bicycle/Pedestrian Network Directness/Connectivity and Mode Share) based on coverage by other metrics and indirect correlation to mobility, respectively.

Figure 3: Screening Process to Identify Most Promising Measures– Access Element



Gray measures are not moved forward in the next screening process step.

Table 2 below depicts the recommended performance measures to test for the access mobility policy element. As a group, the measures cover all modes, relate to three other policy elements, and can be used for multiple planning applications from system performance to plan amendments.

Table 2. Most Promising Performance Measures – Access Element

ID	Measure	Definition	Mobility Policy Elements					Planning Applications		
			Access	Time Efficiency	Reliability	Safety	Travel Options	System Performance/ Scenario Testing/Target	Needs Identification/ Project Identification	Plan Amendments/ Standard
13A	Multimodal Level of Service (MMLOS)	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.	●			○	All modes	●	●	●
13B	Level of Traffic Stress (LTS)	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.	●	○		●	Bike, Pedestrian	●	●	●
15	Pedestrian Crossing Index	The distance between pedestrian crossings compared to a target maximum distance.	●	●		●	Pedestrian	●	●	●
24	System Completeness	The percent of planned facilities that are built within a specified network.	●	○		○	All modes	●	●	●
2	Accessibility to Destinations	The number of essential destinations within a certain travel time or distance, by different modes.	●	○	○		All modes	●	●	●

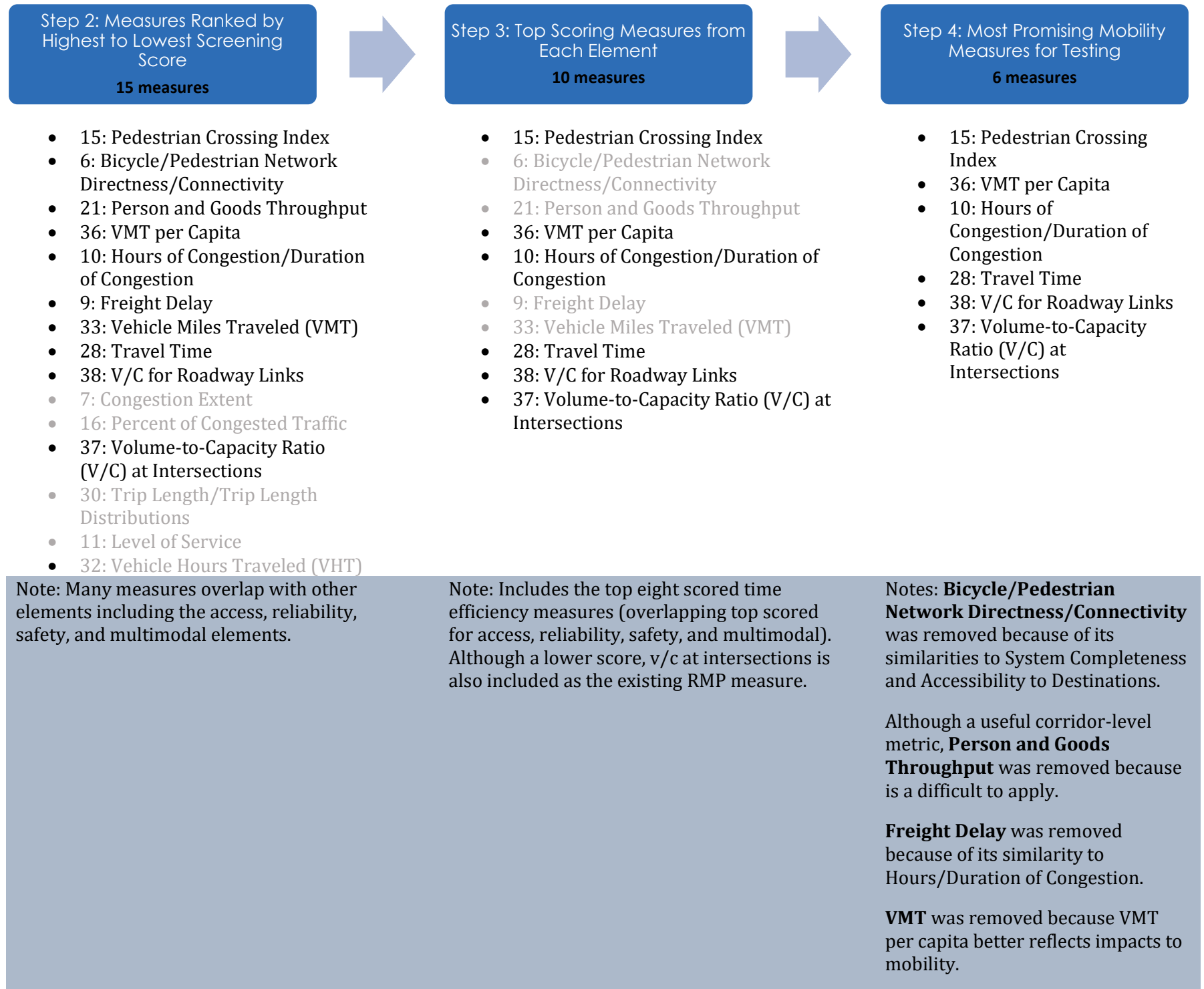
● direct measure; ○ indirect measure

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). **Figure 4** shows the stepped process used to reduce the potential measures down to the most promising measures. Measures with overlapping policy elements are shown in all policy element figures and tables.

As noted in Figure 4, four measures were removed in Step 4 (Bicycle/Pedestrian Network Directness/Connectivity, Person and Goods Throughput, Freight Delay, and VMT) based on coverage by other metrics, difficulty of analysis, and indirect correlation to mobility.

Figure 4: Screening Process to Identify Most Promising Measures - Time Efficiency Element



Gray measures are not moved forward in the next screening process step.

Table 3 below depicts the recommended performance measures to test for the time efficiency mobility policy element. As a group, the measures cover all modes, relate to all policy elements, and can be used for multiple planning applications from system performance to plan amendments.

Table 3. Most Promising Performance Measures – Time Efficiency Element

ID	Measure	Definition	Mobility Policy Elements					Planning Applications		
			Access	Time Efficiency	Reliability	Safety	Travel Options	System Performance/ Scenario Testing/Target	Needs Identification/ Project Identification	Plan Amendments/ Standard
15	Pedestrian Crossing Index	The distance between pedestrian crossings compared to a target maximum distance.	●	●		●	Pedestrian	●	●	●
36	VMT per Capita	The number of miles traveled by motorists within a specified time period and study area, per the study area’s population.	○	●		○	Vehicle, Freight, Transit	●	●	●
10	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.		●	●		Vehicle, Freight, Transit	●	●	●
28	Travel Time	Average or a percentile time spent traveling between key origin-destination pairs, during a specific time period.		●			All modes	●	●	●
38	V/C for Roadway Links	The ratio of traffic volume to the capacity of a roadway link during a specified analysis period.		●	○		Vehicle, Freight	●	●	●
37	Volume-to-Capacity Ratio (V/C) at Intersections	The ratio of traffic volume to the capacity of an Intersection during a specified analysis period.		●	○		Vehicle, Freight	●	●	●

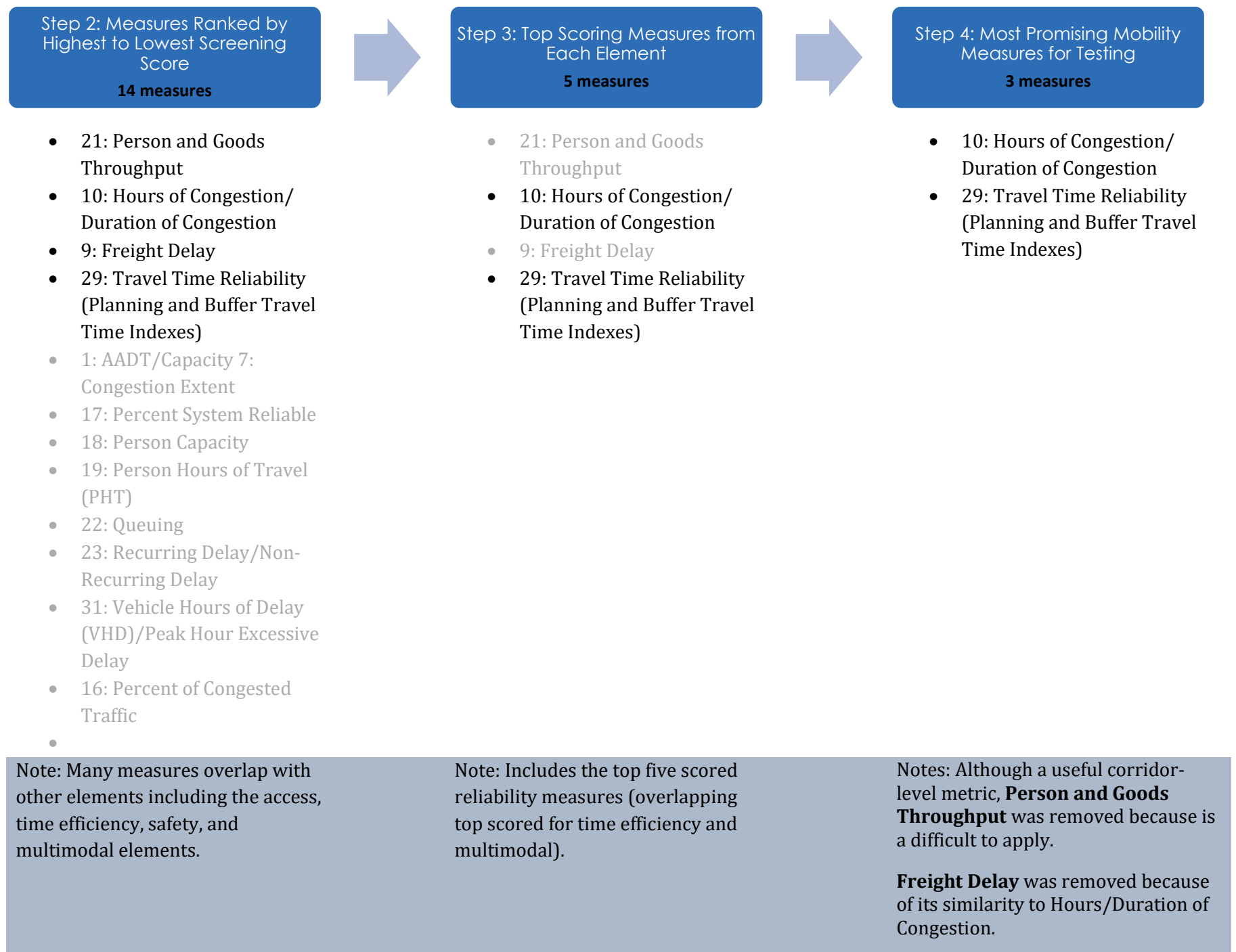
● direct measure; ○ indirect measure

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). When travel time is reliable, it is also more predictable for travelers planning their routes or modal choices. **Figure 5** shows the stepped process used to reduce the potential measures down to the most promising measures. Measures with overlapping policy elements are shown in all policy element figures and tables.

As noted in Figure 5, two measures were removed in Step 4 (Person and Goods Throughput and Freight Delay) based on coverage by other metrics and difficulty of analysis.

Figure 5: Screening Process to Identify Most Promising Measures - Travel Time Element



Gray measures are not moved forward in the next screening process step.

Table 4 below depicts the recommended performance measures to test for the reliability mobility policy element. As a group, the measures cover vehicle, freight, and transit modes, relate to two other policy elements, and can be used for multiple planning applications from system performance to plan amendments.

Table 4. Most Promising Performance Measures – Reliability Element

ID	Measure	Definition	Mobility Policy Elements					Planning Applications		
			Access	Time Efficiency	Reliability	Safety	Travel Options	System Performance/ Scenario Testing/Target	Needs Identification/ Project Identification	Plan Amendments/ Standard
10	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.		●	●		Vehicle, Freight, Transit	●	●	●
29	Travel Time Reliability (Planning and Buffer Travel Time Indexes)	Indicators of congestion severity that assess on-time arrival and travel time variability.		○	●		Vehicle, Freight, Transit	●	●	●

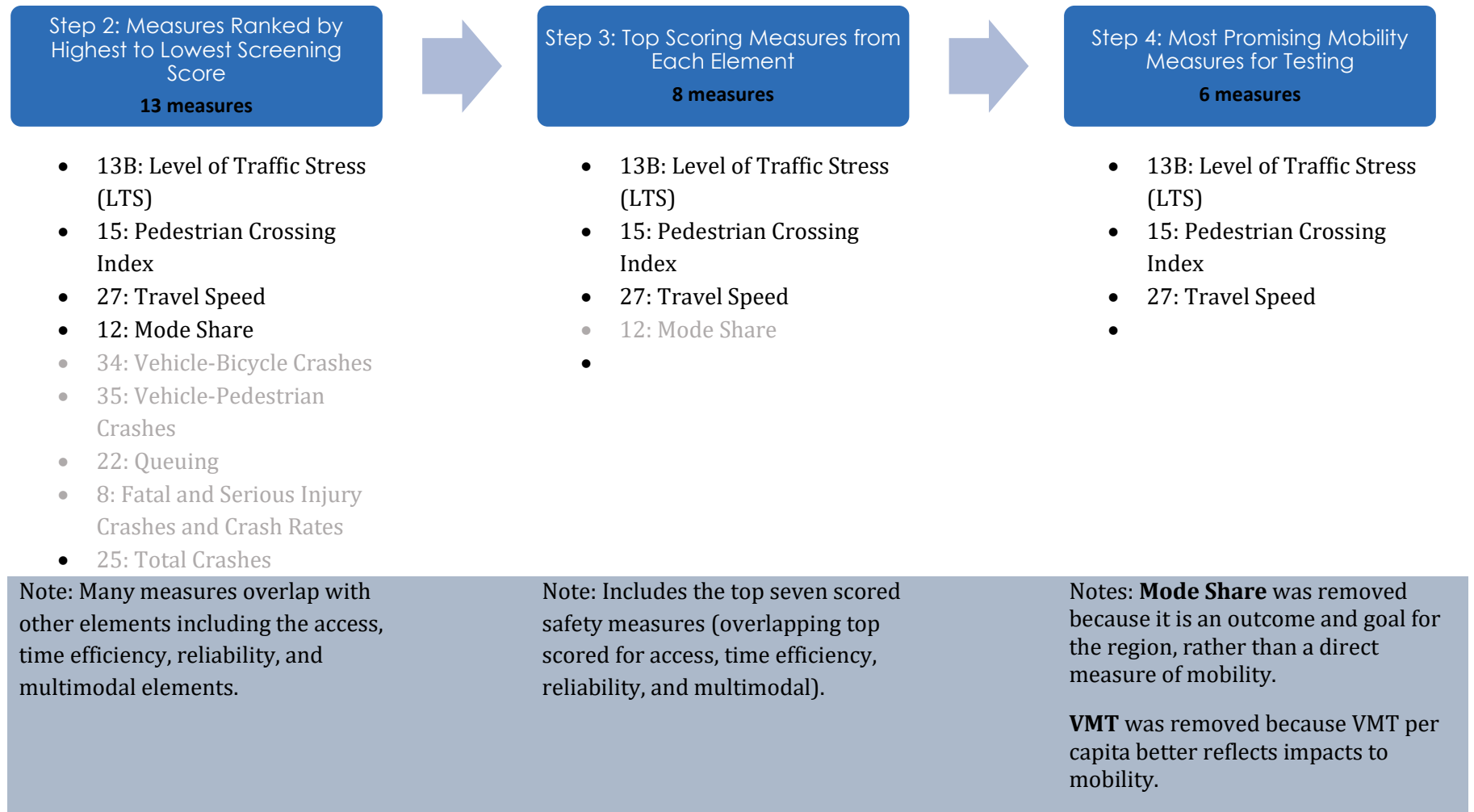
● direct measure; ○ indirect measure

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

This potential mobility policy element acknowledges that people do not have mobility if they are not or do not feel safe using their available travel options. While direct safety measures such as total crashes is not recommended as part of the mobility policy, the team will utilize case studies to explore the ability to incorporate context such as high injury locations or areas with high exposure of vulnerable users. In addition, there are a number of measures that have known correlations to safety that are most promising. For these measures, **Figure 6** shows the stepped process used to reduce the potential measures down to the most promising measures. Measures with overlapping policy elements are shown in all policy element figures and tables.

As noted in Figure 6, two measures were removed in Step 4 (Mode Share and VMT) based on coverage by other metrics and indirect correlation to mobility.

Figure 6: Screening Process to Identify Most Promising Measures - Safety Element



Gray measures are not moved forward in the next screening process step.

Table 5 below depicts the recommended performance measures to test for the safety mobility policy element. As a group, the measures cover all modes, relate to three other policy elements, and can be used for multiple planning applications from system performance to plan amendments.

Table 5. Most Promising Performance Measures – Safety Element

ID	Measure	Definition	Mobility Policy Elements					Planning Applications		
			Access	Time Efficiency	Reliability	Safety	Travel Options	System Performance/ Scenario Testing/Target	Needs Identification/ Project Identification	Plan Amendments/ Standard
13B	Level of Traffic Stress (LTS)	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.	●	○		●	Bike, Pedestrian	●	●	●
15	Pedestrian Crossing Index	The distance between pedestrian crossings compared to a target maximum distance.	●	●		●	Pedestrian	●	●	●
27	Travel Speed	Average or a percentile speed for a network segment or between key origin-destination pairs, during a specific time period.			○	●	Vehicle, Freight, Transit	●	●	●

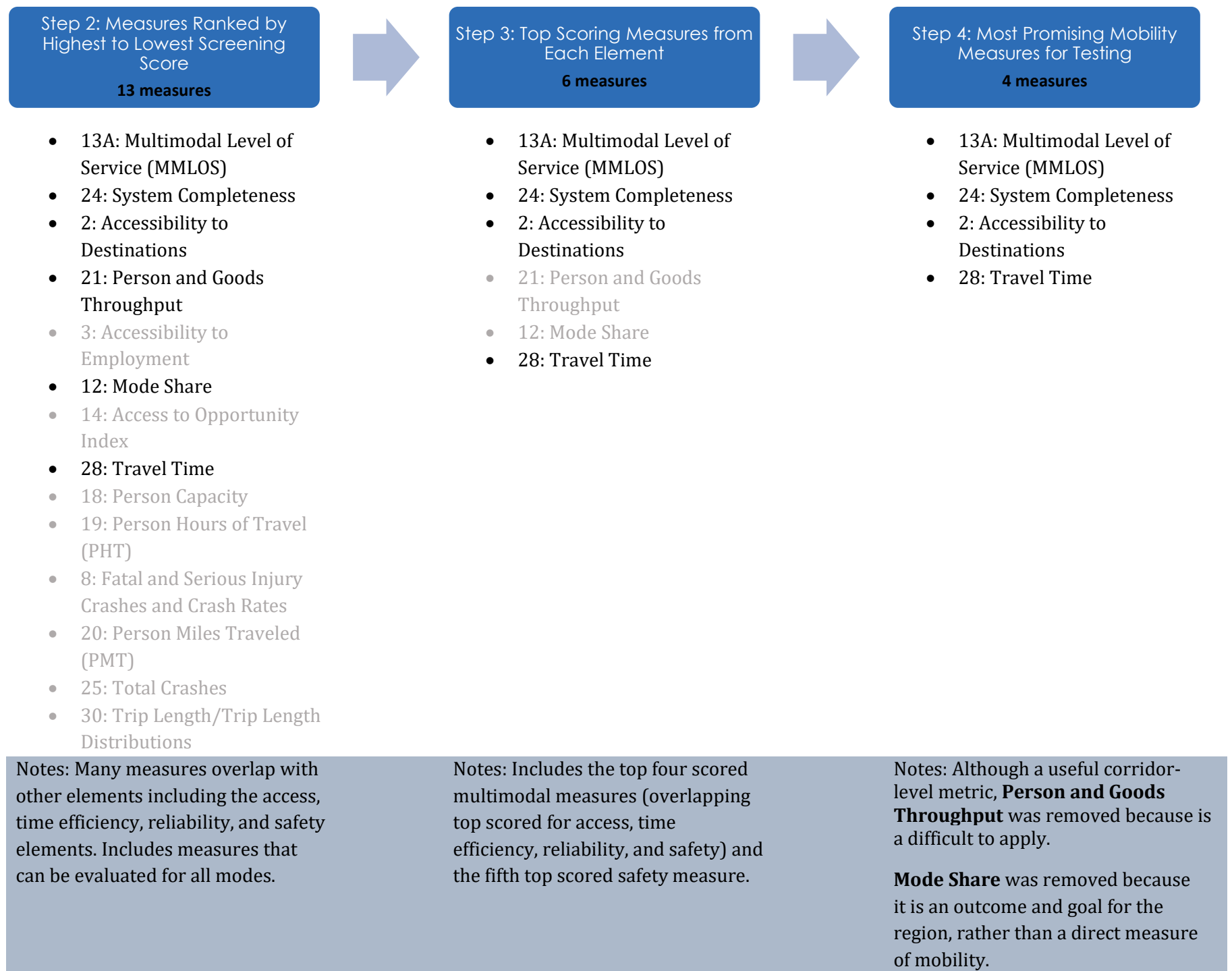
● direct measure; ○ indirect measure

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 likely be to maintain acceptable mobility on the regional roadway network for all modes, including bicycle, freight, pedestrian, transit, and vehicle. While not every measure in the policy must address each mode in each context, all modes must be represented to fully measure and improve mobility for all system users. **Figure 7** shows the stepped process used to reduce the potential measures down to the most promising measures. Measures with overlapping policy elements are shown in all policy element figures and tables.

As noted in Figure 7, two measures were removed in Step 4 (Person and Goods Throughput and Mode Share) based on difficulty of analysis, coverage by other metrics, and indirect correlation to mobility.

Figure 7: Screening Process to Identify Most Promising Measures - Travel Options Element



Gray measures are not moved forward in the next screening process step.

Table 6 below depicts the recommended performance measures to test for the travel options mobility policy element. As a group, the measures cover all modes, relate to three other policy elements, and can be used for multiple planning applications from system performance to plan amendments.

Table 6. Most Promising Performance Measures – Travel Options Element

ID	Measure	Definition	Mobility Policy Elements					Planning Applications		
			Access	Time Efficiency	Reliability	Safety	Travel Options	System Performance/ Scenario Testing/Target	Needs Identification/ Project Identification	Plan Amendments/ Standard
13A	Multimodal Level of Service (MMLOS)	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.	●			○	All modes	●	●	●
24	System Completeness	The percent of planned facilities that are built within a specified network.	●	○		○	All modes	●	●	●
2	Accessibility to Destinations	The number of essential destinations within a certain travel time or distance, by different modes.	●	○	○		All modes	●	●	●
28	Travel Time	Average or a percentile time spent traveling between key origin-destination pairs, during a specific time period.		●			All modes	●	●	●

● direct measure; ○ indirect measure

MEASURES EVALUATION PROCESS SUMMARY

As outlined in the preceding sections, a four-step process was completed to select evaluate and identify the most promising measures. **Table 7** below shows the initial list of 38 potential performance measures that were identified in **Supporting Document B**.

Table 7. Potential Performance Measures Before Screening

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
13A	Multimodal Level of Service (MMLOS)	●			○	All modes
13B	Level of Traffic Stress (LTS)	●	○		●	Bike, Pedestrian
14	Access to 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
19	Person Hours of Travel (PHT)			●		All modes
20	Person Miles Traveled (PMT)	●				All modes
21	Person and Goods 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

ID	Measure	Access	Time Efficiency	Reliability	Safety	Travel Options
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) at Intersections		●	○		Vehicle, Freight
38	V/C for Roadway Links		●	○		Vehicle, Freight

● direct measure; ○ indirect measure

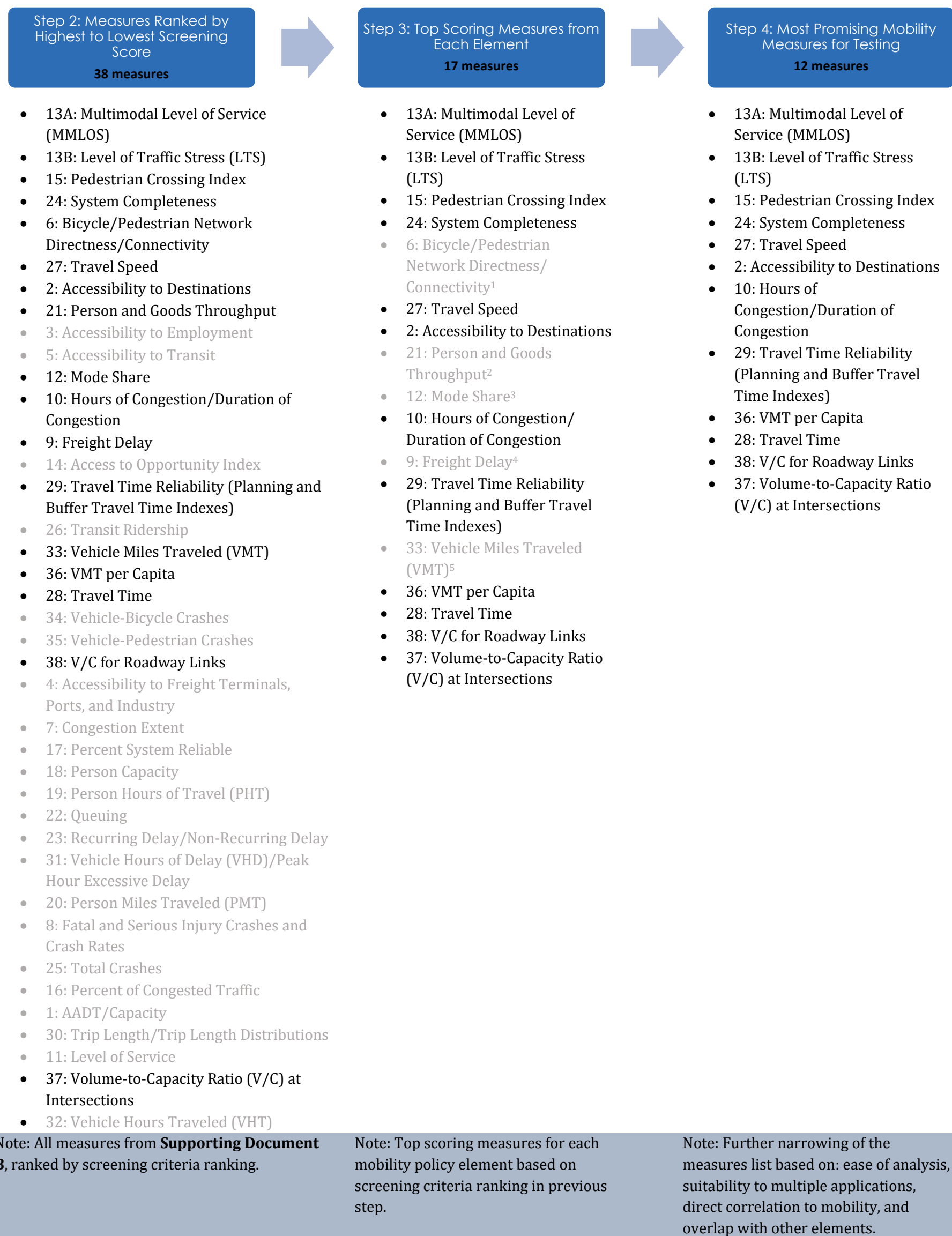
Figure 8 below shows the progress of Steps 2 through 4 for the full list of measures. In Step 2 of the screening process, an initial screening of the potential measures was conducted, resulting in a score for each measure and then a ranked list.

Step 3 identified the top scored measures per policy element (i.e. not all of the top scored measures for the full list are moved forward, but the top scored within each policy element). This reduced the list of potential measures from 38 to 17.

An additional evaluation of the measures was conducted in Step 4 based on ease of analysis, suitability to multiple applications, direct correlation to mobility, and overlap with other policy elements. This evaluation resulted in 12 measures identified as most promising to test with case studies. Two of the five measures not advanced were similar, at least in part, by other measures being moved forward (Bicycle/Pedestrian Network Directness/ Connectivity and Freight Delay). Two of the measures not advanced did not have as strong of a direct correlation to mobility as other measures (Mode Share and VMT). One of the five measures not advanced lacked ease of analysis (Person and Goods Throughput).

Many of the measures not identified as the most promising are still good measures for system planning but were not found to be the best correlated to the draft mobility policy and policy elements (access, time efficiency, reliability, safety, and multimodal). The mobility policy is only one of many policies that are considered in system planning.

Figure 8: Screening Process for All Policy Elements



Gray measures are not moved forward in the next screening process step.

¹ Removed because of its similarities to System Completeness and Accessibility to Destinations.

² Although a useful corridor-level metric, removed because is a difficult to apply.

³ Removed because it is an outcome and goal for the region, rather than a direct measure of mobility.

⁴ Removed because of its similarity to Hours/Duration of Congestion.

⁵ Removed because VMT per capita better reflects impacts to mobility.

The most promising performance measures to consider for testing are shown in **Table 8** below. As a group, the measures cover all modes. Seven of the 12 measures relate to more than one policy elements. Seven of the measures can be used for both system planning and plan amendments, the focus of this regional mobility policy update.

Table 8. Most Promising Mobility Performance Measures to Consider for Testing

ID	Measure	Definition	Mobility Policy Elements					Planning Applications		
			Access	Time Efficiency	Reliability	Safety	Travel Options	System Performance/ Scenario Testing/Target	Needs Identification/ Project Identification	Plan Amendments/ Standard
13A	Multimodal Level of Service (MMLOS)	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.	●			○	All modes	●	●	●
13B	Level of Traffic Stress (LTS)	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.	●	○		●	Bike, Pedestrian	●	●	●
15	Pedestrian Crossing Index	The distance between pedestrian crossings compared to a target maximum distance.	●	●		●	Pedestrian	●	●	●
24	System Completeness	The percent of planned facilities that are built within a specified network	●	○		○	All modes	●	●	●
27	Travel Speed	Average or a percentile speed for a network segment or between key origin-destination pairs, during a specific time period.			○	●	Vehicle, Freight, Transit	●	●	●
2	Accessibility to Destinations	The number of essential destinations within a certain travel time or distance, by different modes.	●	○	○		All modes	●	●	●
10	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.		●	●		Vehicle, Freight, Transit	●	●	●
29	Travel Time Reliability (Planning and Buffer Travel Time Indexes)	Indicators of congestion severity that assess on-time arrival and travel time variability.		○	●		Vehicle, Freight, Transit	●	●	●
36	VMT per Capita	The number of miles traveled by motorists within a specified time period and study area, per the study area's population.	○	●		○	Vehicle, Freight, Transit	●	●	●
28	Travel Time	Average or a percentile time spent traveling between key origin-destination pairs, during a specific time period.		●			All modes	●	●	●
38	V/C for Roadway Links	The ratio of traffic volume to the capacity of a roadway link during a specified analysis period.		●	○		Vehicle, Freight	●	●	●
37	Volume-to-Capacity Ratio (V/C) at Intersections	The ratio of traffic volume to the capacity of an Intersection during a specified analysis period.		●	○		Vehicle, Freight	●	●	●

● direct measure; ○ indirect measure

NEXT STEPS

Stakeholders will review and provide feedback on the identified most promising mobility measures before the project team moves forward with the case studies. Feedback will be used to further reduce the list of measures that moves forward. Through the case studies, the team will evaluate which measures are most feasible and useful in measuring mobility. Following the case studies, the team will craft draft policy language and guidance related to use and applicability of the recommended performance measures.

ID	Measure	Other Regional Goals			Scoring Subtotals					
		Does the measure have a positive correlation to land use goals and support 2040 land use implementation ?	Does the measure have a positive correlation to fiscal stewardship goals?	Other Regional Goals Subtotal	Subtotal Access	Subtotal Travel Choices	Subtotal Reliable and Efficient	Subtotal Safety	Subtotal Other Regional Goals	Screening Total
1	AADT/Capacity	1	0	0.50	0.33	0.00	1.00	0.00	0.50	1.83
2	Accessibility to Destinations	1	1	1.00	0.67	1.00	0.33	0.00	1.00	3.00
3	Accessibility to Employment	1	1	1.00	0.67	0.50	0.33	0.00	1.00	2.50
4	Accessibility to Freight Terminals, Ports, and Industry	1	1	0.50	0.67	0.50	0.33	0.00	0.50	2.00
5	Accessibility to Transit	1	1	1.00	0.67	0.50	0.33	0.00	1.00	2.50
6	Bicycle/Pedestrian Network Directness/Connectivity	1	1	1.00	1.00	0.50	0.33	0.00	1.00	2.83
7	Congestion Extent	0	1	0.50	0.00	0.00	0.67	0.50	0.50	1.67
8	Fatal and Serious Injury Crashes and Crash Rates	0	1	0.25	0.00	0.00	0.33	1.00	0.25	1.58
9	Freight Delay	1	1	0.75	0.00	0.50	0.67	0.00	0.75	1.92
10	Hours of Congestion/Duration of Congestion	0	1	0.50	0.00	0.00	1.00	0.50	0.50	2.00
11	Level of Service	0	0	0.00	0.00	0.00	0.67	0.00	0.00	0.67
12	Mode Share	0	1	0.75	0.33	0.50	0.00	0.50	0.75	2.08
13	Level of Traffic Stress (LTS)	1	1	1.00	1.00	0.50	1.00	0.50	1.00	4.00
13	Multimodal Level of Service (MMLoS)	1	1	1.00	1.00	0.50	1.00	0.50	1.00	4.00
14	Access to Opportunity Index	1	1	0.75	0.67	0.50	0.00	0.00	0.75	1.92
15	Pedestrian Crossing Index	1	1	1.00	1.00	0.50	0.33	0.50	1.00	3.33
16	Percent of Congested Traffic	0	1	0.50	0.00	0.00	0.67	0.00	0.50	1.17
17	Percent System Reliable	0	0	0.00	0.00	1.00	0.67	0.00	0.00	1.67
18	Person Capacity	1	1	0.50	0.00	0.50	0.67	0.00	0.50	1.67
19	Person Hours of Travel (PHT)	0	1	0.50	0.00	0.50	0.67	0.00	0.50	1.67
20	Person Miles Traveled (PMT)	0	1	0.75	0.00	0.50	0.33	0.00	0.75	1.58
21	Person and Goods Throughput	1	1	1.00	0.33	0.50	1.00	0.00	1.00	2.83
22	Queuing	0	1	0.50	0.00	0.00	0.67	0.50	0.50	1.67
23	Recurring Delay/Non-Recurring Delay	0	1	0.50	0.00	0.00	0.67	0.50	0.50	1.67
24	System Completeness	1	1	1.00	1.00	0.50	0.33	0.50	1.00	3.33
25	Total Crashes	0	1	0.25	0.00	0.00	0.33	1.00	0.25	1.58
26	Transit Ridership	1	1	1.00	0.33	0.50	0.00	0.00	1.00	1.83
27	Travel Speed	1	0	0.25	0.00	1.00	1.00	0.50	0.25	2.75
28	Travel Time	0	0	0.25	0.00	0.50	1.00	0.00	0.25	1.75
29	Travel Time Reliability (Planning and Buffer Travel Time Indexes)	0	1	0.25	0.00	1.00	0.67	0.00	0.25	1.92
30	Trip Length/Trip Length Distributions	1	0	0.50	0.00	0.00	0.33	0.00	0.50	0.83
31	Vehicle Hours of Delay (VHD)/Peak Hour Excessive Delay	0	1	0.50	0.00	0.50	0.67	0.00	0.50	1.67
32	Vehicle Hours Traveled (VHT)	0	0	0.25	0.00	0.00	0.33	0.00	0.25	0.58
33	Vehicle Miles Traveled (VMT)	1	1	1.00	0.00	0.00	0.33	0.50	1.00	1.83
34	Vehicle-Bicycle Crashes	0	1	0.25	0.00	0.50	0.33	1.00	0.25	2.08
35	Vehicle-Pedestrian Crashes	0	1	0.25	0.00	0.50	0.33	1.00	0.25	2.08
36	VMT per Capita	1	1	1.00	0.33	0.00	0.33	0.50	1.00	2.17
37	Volume-to-Capacity Ratio (V/C) at Intersections	0	0	0.25	0.00	0.00	0.67	0.00	0.25	0.92
38	V/C for Roadway Links	1	1	0.75	0.00	0.00	1.00	0.00	0.75	1.75