

APPENDIX I: PERFORMANCE MEASURES

TRPA uses performance measures to track and report on the implementation and outcomes of the projects and programs proposed in the regional transportation plan. Performance measures provide consistent reporting, show transparency of publicly funded investments, and assess and demonstrate progress towards achieving the goals of the plan and the Regional Plan.

Results Chain

The performance measure framework uses a results chain approach. By assessing and tracking the “output” associated with the strategies of the plan, future transportation plans can better link investments to desired outcomes. For example, if increased transit service results in more people using transit and results in an increase in the Non-Auto Mode Share, then additional transit service could be prioritized for funding.

The following figures display the results chain approach for each focus area of the plan and demonstrates the connection between proposed projects and programs to intermediate data collection and analysis and to the performance measures for each.

TRANSIT RESULTS CHAIN

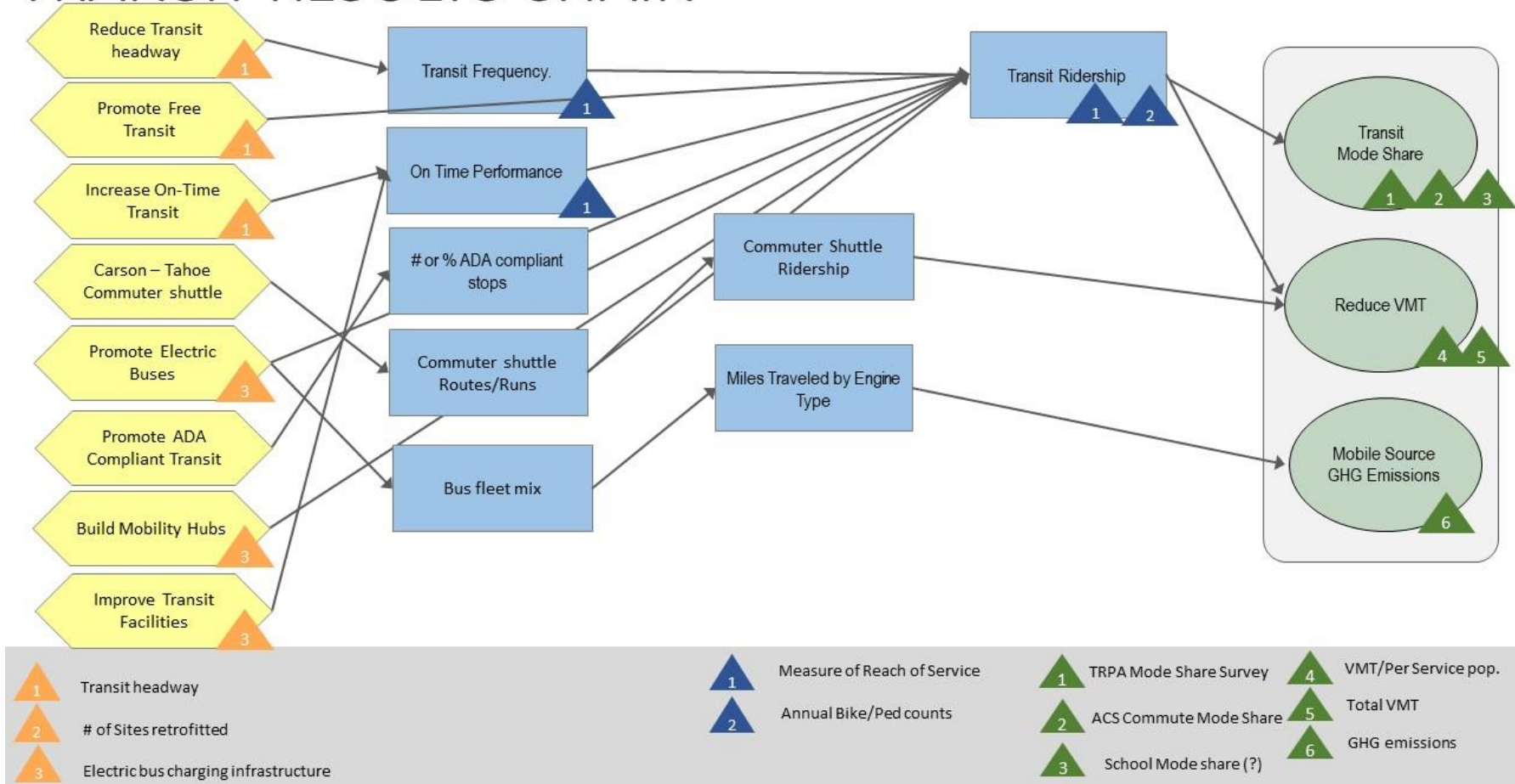


Figure 128: Transit Results Chain

TRAILS RESULTS CHAIN

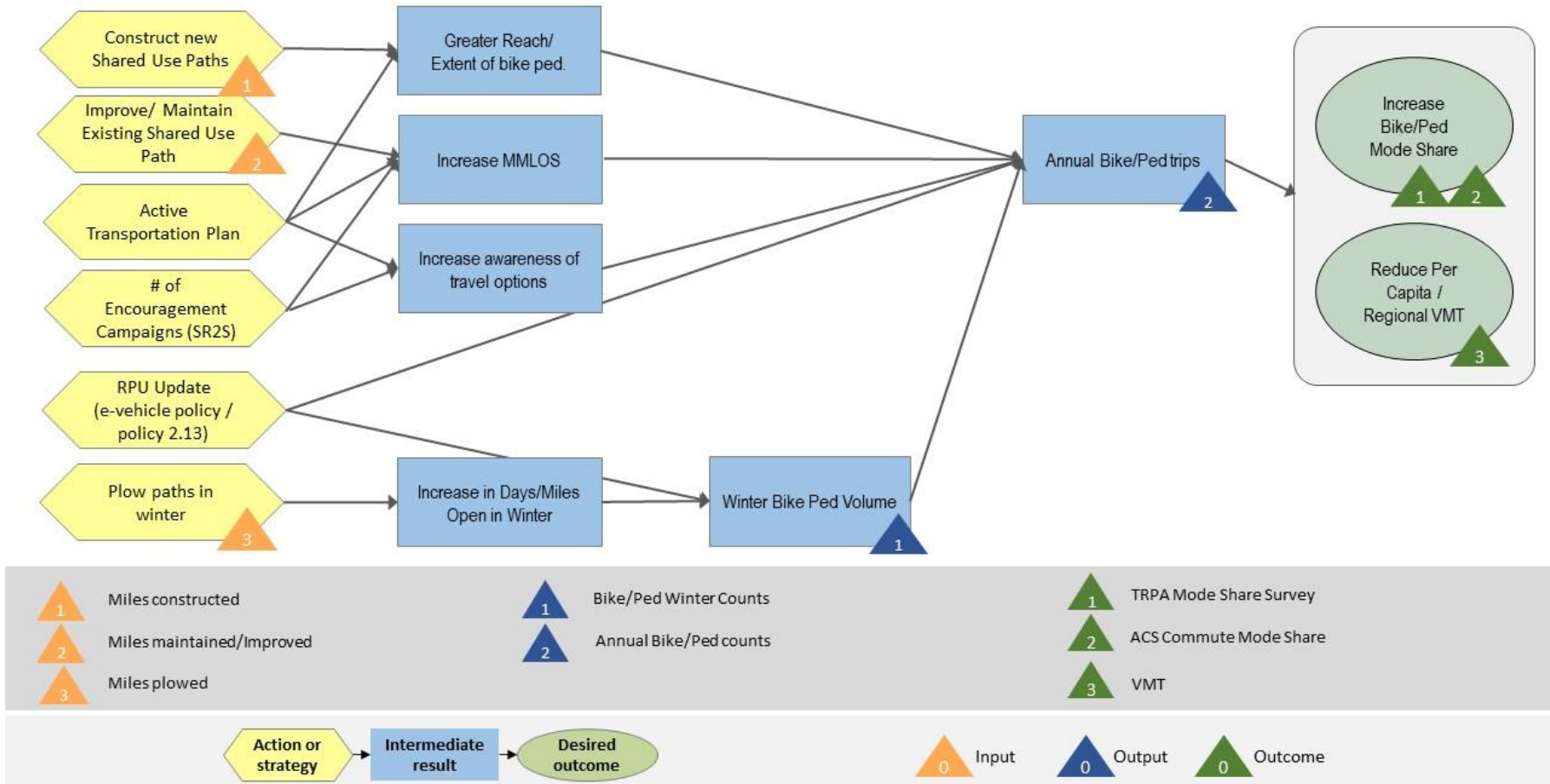


Figure 129: Trails Results Chain

TECHNOLOGY RESULTS CHAIN

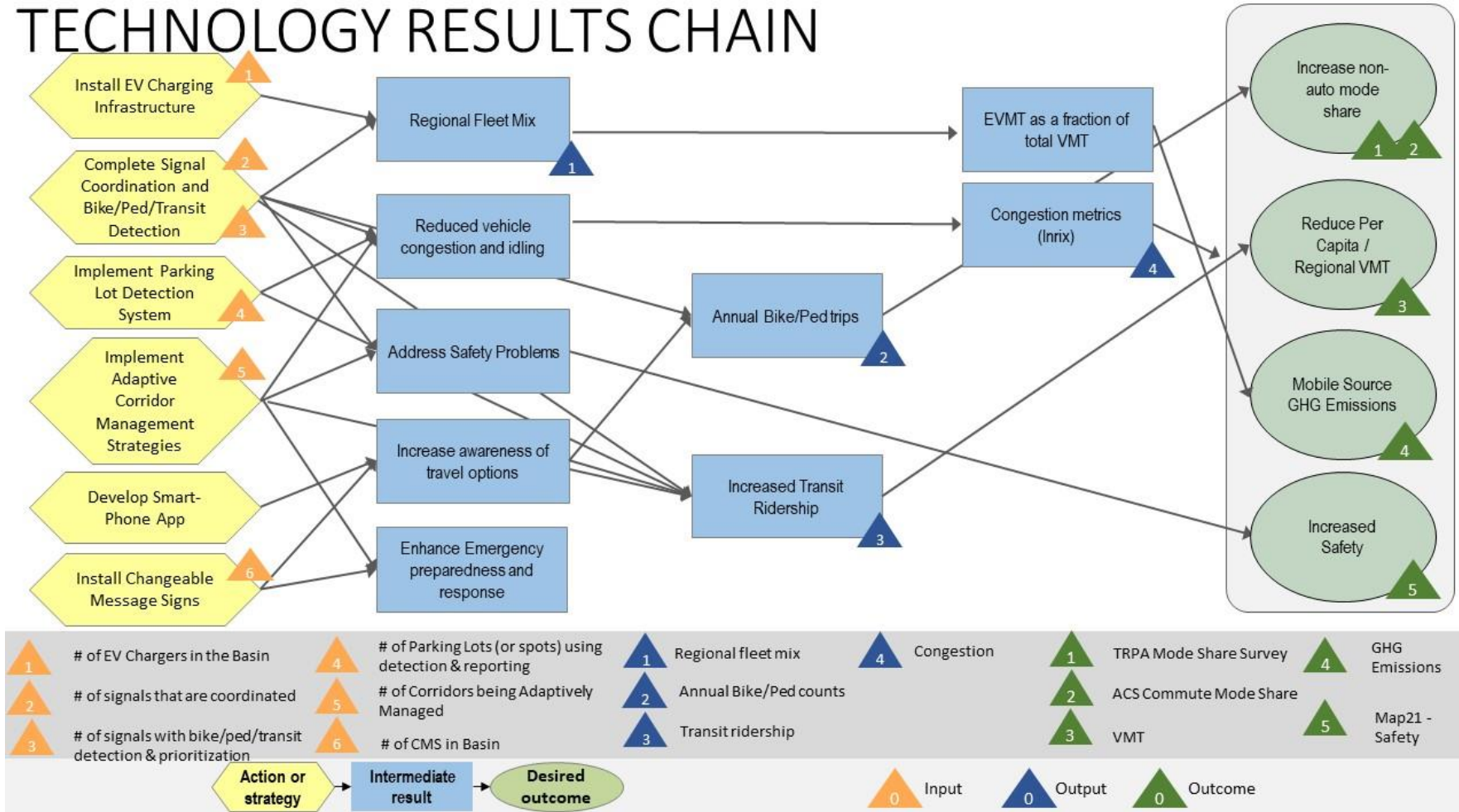


Figure 130: Technology Results Chain

COMMUNITIES RESULTS CHAIN

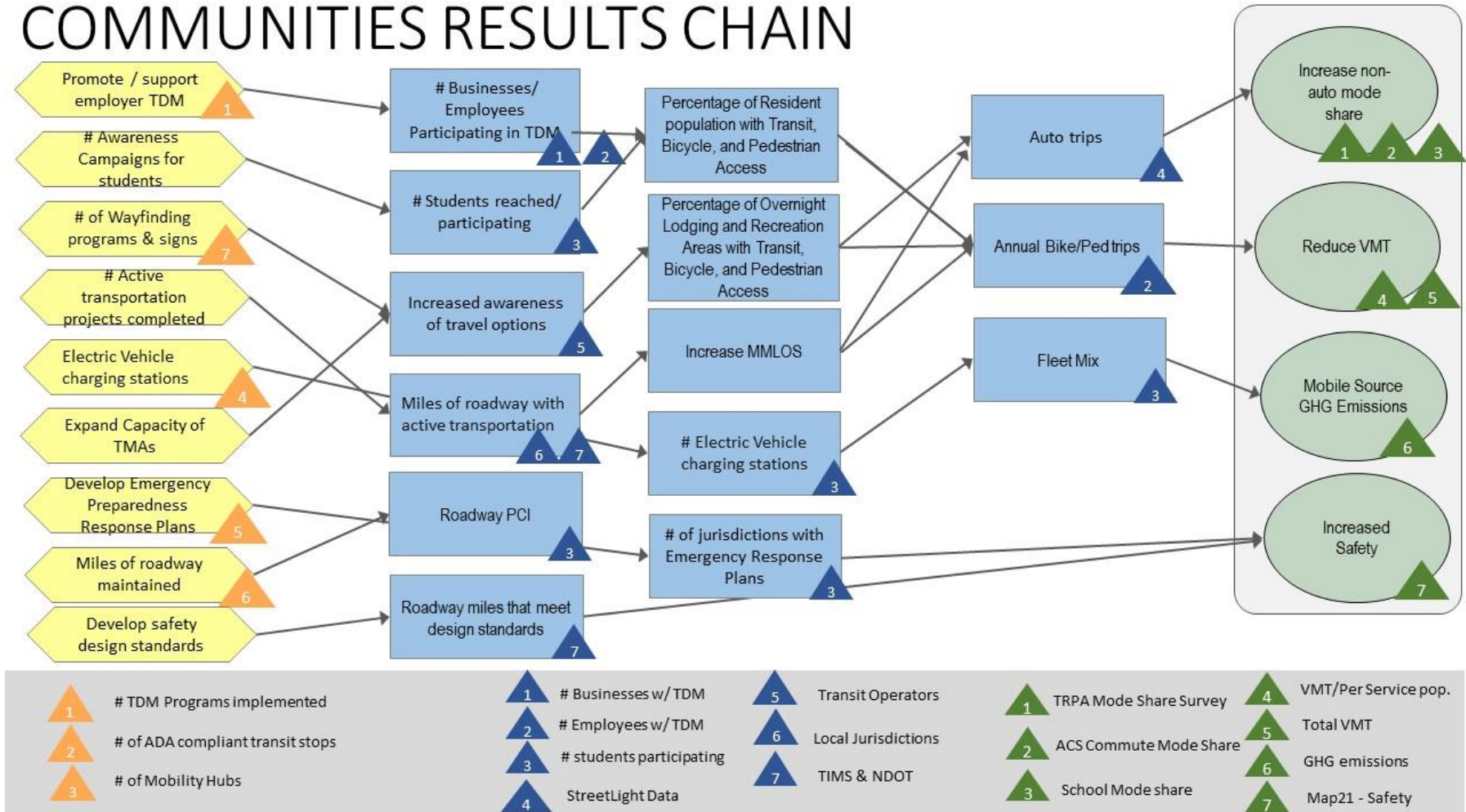


Figure 131: Communities & Corridors Results Chain

What Is Measured

TRPA collects and analyzes a variety of transportation data and information to better connect projects and investments to outcomes and performance measures, and to manage success by informing future planning and project design.

Some of this data measures inputs, such as miles of roadway maintained; other data measures outputs from implemented projects and programs, such as the pavement condition rating for the Region’s roadways; and other data measures the outcome, such as the Rate of Serious Injuries per 100 Million VMT.

Some of these measures are called for by regional goals, others by state and/or federal requirements, and some to support TRPA’s environmental thresholds for transportation. Data is collected according to transportation industry best practices and standards, and for some modes of transportation, per TRPA developed monitoring protocols, such as the Lake Tahoe Region Bicycle and Pedestrian Monitoring Protocol, Transit Monitoring Protocol, and Safety Strategy. The following table summarizes the measures tracked for transportation planning in Tahoe.

Table 38: Performance Measures

<i>Measure</i>	TRPA Threshold	Regional Goal	State Requirement	Federal Requirement
<i>% of Overnight Lodging & Recreation Areas with Transit (1/4 mile), Bicycle (1/2 mile), & Pedestrian (1/4-mile, Class I) Access</i>		X		
<i>Average Travel Time to Work</i>		X		
<i>Bicycle and Pedestrian Trail Use (Mid-Week Average Hourly Count Volumes)</i>		X		
<i>Bicycle and Pedestrian Trail Use (Mid-Week Hourly Count Volumes)</i>				
<i>Bridge Condition in Good Condition (National Highway)</i>				X
<i>Bridge Condition in Poor Condition (National Highway)</i>				X

<i>Measure</i>	TRPA Threshold	Regional Goal	State Requirement	Federal Requirement
<i>Cost-Effectiveness</i>			X	X
<i>Daily VMT Per Capita Traveled</i>	X			
<i>Deadhead Miles and Hours</i>		X		
<i>Environmental Justice Communities Transportation Access</i>				
<i>Equipment Condition (Transit)</i>				X
<i>Facilities (Transit)</i>				X
<i>Farebox Recovery</i>			X	
<i>GHG per capita</i>	X		X	X
<i>Interstate Travel Time Reliability</i>				X
<i>Miles of Bike/Ped Facilities Constructed</i>		X		
<i>Miles Traveled by (Transit) Engine Type</i>	X			
<i>Non-Auto Mode Share</i>		X		
<i>Non-Interstate Travel Time Reliability</i>				X
<i>Number of Fatalities per 100 million VMT</i>				X
<i>Number of Non- Motorized Fatalities and Serious Injuries</i>				X

<i>Measure</i>	TRPA Threshold	Regional Goal	State Requirement	Federal Requirement
<i>Number of Serious Injuries</i>				X
<i>On Time Performance (Transit)</i>		X		
<i>Pavement Condition</i>		X		X
<i>Rate of Fatalities per 100 million VMT</i>				X
<i>Rate of Serious Injuries per 100 million VMT</i>				X
<i>Regional Daily Average Annual Traffic Volume Percentage Variation</i>			X	
<i>Regional Monthly Average Annual Traffic Volume Percentage Variation</i>			X	
<i>Rolling Stock</i>				X
<i>Transit Cost per Revenue Hour</i>				X
<i>Transit Cost per Revenue Mile</i>				X
<i>Transit Farebox Recovery Rate</i>				X
<i>Transit Passengers per Revenue Hour</i>				X
<i>Transit Passengers per Revenue Mile</i>				X
<i>Transit Ridership</i>		X		X
<i>VMT per Capita</i>	X			

Transit Monitoring Protocol

TRPA implemented the transit productivity improvement program and adopted the Lake Tahoe Region Transit Monitoring Protocol. The protocol identifies transit performance measures, establishes targets, and outlines data collection methods for each transit operator, some of which are regulated per TDA Public Utilities Code (PUC) Section 99244.

Under this protocol, the Region's transit operators must submit data to TRPA to inform the following transit performance measures which aid in the determination of federal funding allocations:

- **Deadhead Miles and Hours** – The miles and hours transit vehicles travel when out of revenue service
- **Ridership** – Unlinked passenger trips, or the number of total boardings not including transfers
- **Transit Mode Share** – The percentage of all daily trips that use public transit service
- **Productivity** – The number of transit users per hour or mile of the transit service
- **On Time Performance** – The frequency transit arrives or leaves on time, or within one minute early and five minutes late
- **Cost Effectiveness** – The total cost the operator must pay per revenue hour or mile
- **Farebox Recovery** – Revenue obtained by transit services, calculated by determining the ratio of fare and local revenue to operating costs
- **Rolling Stock** – Percentage of revenue vehicles (by type) that exceed useful life benchmarks

- **Equipment** – Percentage of non-revenue service vehicles (by type) that exceed useful life benchmarks
- **Facilities** – Percentage of facilities (by group) rated less than 3.0 on the Transit Economic Requirements Model (TERM) Scale

Bicycle and Pedestrian Monitoring Protocol

TRPA adopted the Lake Tahoe Region Bicycle and Pedestrian Monitoring Protocol to build on prior monitoring efforts and to create an on-going monitoring program to track changes in bicycle and pedestrian volumes in a consistent manner.

The protocol defines seasonal count periods, winter-spring and summer, and data collection procedures for existing manual and automatic count locations on sidewalks, Class I pedestrian/bicycle shared-use paths, and Class II facilities in the Region. The Bicycle and Pedestrian Monitoring Protocol has been in use for multiple years so that comparisons year-over-year are now possible.

The following performance measures are collected through the Bicycle and Pedestrian Monitoring Protocol:

- Average Hourly Bicycle and Pedestrian Trail Use by Season (automatic count locations only)
- Average Daily Bicycle and Pedestrian Trail Use
- Average Weekly Bicycle and Pedestrian Trail Use
- Average Monthly Bicycle and Pedestrian Trail Use
- Total Volume Bicycle and Pedestrian Trail Use
- Gender of Bicyclists and Pedestrians (manual count locations only)

- Individual Intersection Movement Counts (manual count locations only)

CARB GHG

CARB established new, more aggressive GHG reduction targets for the Tahoe Region. Under these new targets the Tahoe Region is required to meet GHG reduction targets of 8 percent by 2020 and 5 percent by 2035, based on 2005 emission levels. The projects and programs in the plan meet these reductions with an estimated 8.8 percent reduction in 2020 and a 5 percent reduction in 2035.

Table 39: Per Capita Carbon Dioxide Emission Comparison - Passenger Vehicles

	2005 Baseline (per SB 375)	2035	2045
<i>Annual Average Daily Total VMT per Capita</i>	21.59	19.94	19.68
<i>Passenger Vehicle GHG Emissions (tons/day)</i>	388.8	345.5	352.9
<i>Population</i>	41,340	41,951	43,468
<i>Per Capita Passenger Vehicle GHG Emissions (pounds/person/day)</i>	18.81	16.47	16.24
<i>Percent Change in Per Capita GHG Emissions from 2005</i>		-12.4%	-13.7%
<i>SB 375 Target</i>		-5%	n/a
<i>SB 375 Target Met?</i>		Yes	n/a

Federal Performance Management Targets

Performance management is a strategic approach to connect investment and policy decisions to help achieve performance goals as noted above. The federal measures identified above are part of a larger requirement of the MPO. Performance measures are indicators of progress toward attaining a goal, objective or target (a desired level of future performance). Current federal legislation requires state departments of transportation (state DOTs), metropolitan planning organizations (MPOs), and transit agencies to conduct performance-based planning by setting data-driven performance targets for several transportation performance measures, and program transportation investments that are expected to result in achievement of the targets (23 CFR Parts 450 and 771 and 49 CFR Part 613). The transportation performance measures, which were prescribed through rulemaking, address these national goal areas and overlap with RTP/SCS goals/policies:

- Improving Safety.
- Maintaining Infrastructure Condition.
- Reducing Traffic Congestion.
- Improving the Efficiency of the System and Freight Movement.
- Protecting the Environment; and
- Reducing Delays in Project Delivery.

Reporting Requirements

The Federal Highway Administration and Federal Transit Administration are tasked with developing and issuing guidance for each of the national performance measures. After each Final Rule is issued, each state is required to develop targets for each performance measure within one year (unless otherwise specified). MPOs are then required to either adopt the state's targets or develop their own regionally specific targets

within six months (180 days) of the adoption of state targets. MPOs are also required to incorporate the performance measure targets in their regional transportation plan and [transportation improvement programs \(TIPs\)](#).

Coordination

MAP-21 requires that state Departments of Transportation coordinate with MPOs, local agencies, and public transportation providers when setting performance targets. MPOs, to the extent practicable, must coordinate with relevant State and public transportation providers when setting regional targets. TRPA meets monthly with NDOT to coordinate performance measures and regularly with Caltrans, transit operators, and local agencies when setting targets.

TRPA has developed and will continue to refine performance measures and targets for the regional transportation planning process for federally required Safety, Pavement, Bridge, System Performance, Freight and applicable Congestion Mitigation and Air Quality measures, Transit Asset Management and Safety Plans. This performance-based planning approach informs the Regional Transportation Plan (RTP) and Federal Transportation Improvement Program (FTIP) to implement regional, state, and federal projects selected in the TIP. It includes a process where performance in achieving regional goals is weighted to ensure projects funded will help us toward achieving existing and future goals that improve safety.

Performance Measures

TRPA plays a leading role in identifying and planning solutions for its transportation challenges. Created through a Bi-State Compact between California and Nevada, TRPA leads the cooperative effort to preserve, restore, and enhance the Lake Tahoe Region, while improving local communities and visitors' interactions with its irreplaceable environment.

Background

Transportation Performance Management represents a strategic approach to transportation planning

that uses transportation system information to make investment and policy decisions to achieve transportation goals. Performance-based planning defines current transportation performance levels, establishes target performance levels, and identifies strategies for achieving these targets. The FAST Act requires Transportation Performance Management be incorporated in to plans and programs that Metropolitan Planning Organizations produce.

In California and Nevada, the Department of Transportation (DOT) is directly responsible for submitting performance targets and periodic progress reports to federal agencies on an annual basis. MPOs are required to establish targets for the same performance measures on all public roads in the MPO planning area within 180 days after the state establishes each target. MPOs may elect to support the statewide targets, establish numerical targets specific to their region, or use a combination of both approaches. Furthermore, each MPO must incorporate these short-range targets into their planning and programming processes, including long-range plan and FTIP.

FHWA Performance Measures

The federal performance measures under the Federal Highway Administration (FHWA) are categorized into three performance management (PM) groups

PM 1: Safety

PM 2: Transportation Asset Management

PM 3: System Reliability, Freight, Congestion, and Air Quality

FTA Performance Measures

In addition to the three PM groups, the FTA has established performance measures and reporting requirements for transit asset management (TAM) and transit safety. Performance metrics for TAM focus on the maintenance of our regional transit system in a state of good repair. Transit assets to be monitored under this provision include:

1. Non-revenue support equipment and maintenance vehicles
2. Revenue vehicles (rolling stock)
3. Rail infrastructure including tracks, and signals, and guidance systems; and
4. Transit facilities including stations, parking structures, and administrative offices. Transit safety performance monitoring is focused on assessment of the number of transit incidents resulting in fatalities or serious injuries and transit system reliability.

The Federal Transit Administration (FTA) issued the TAM Final Rule (49 CFR §625 et seq.), effective October 1, 2016, to implement MAP-21's asset management provisions. This final rule mandates a National TAM System, defines 'State of Good Repair' (SGR), and requires transit providers to develop TAM plans. The Metropolitan Transportation Planning Final Rule (23 CFR §450.206) outlines the timelines and processes by which states, MPOs, and transit providers must coordinate in target setting.

Public Transportation Agency Safety Plan

On July 19, 2018, the FTA published the Public Transportation Agency Safety Plan (PTASP) Final Rule (49 CFR §673.15) regulating how Chapter 53 grantees would have to implement federally mandated safety standards. The rule's effective date is July 19, 2019, and the compliance date is July 20, 2020. Considering the extraordinary operational challenges presented by the COVID-19 public health emergency, FTA issued a Notice of Enforcement Discretion effectively extending the PTASP compliance deadline from July 20, 2020, to December 31,

2020. The MPO's initial transit safety targets are set within 180 days of receipt of the safety performance targets from the transit agencies. The MPO then revisits its targets based on the schedule for preparation of this system performance report that is part of the RTP.

The final rule specifically requires transit agencies employing federal funds to develop a safety plan and annually self-certify compliance with that plan. The National Public Transportation Safety Plan identifies four performance measures that must be included in the transit agency safety plans: fatalities, injuries, safety events, and system reliability. Each transit agency must make its safety performance targets available to MPOs to assist in the planning process, and coordinate, to the maximum extent practicable, with the MPO in selecting regional safety targets.

Metrics and Targets

Each of the federal performance management focus areas include an associated set of metrics for which statewide and regional targets must be set. TRPA is required to adopt performance measures targets for both states.

The projects contained within the 2020 RTP have been developed in accordance with the applicable provisions and requirements and are expected to support the achievement of targets. The targets will be achieved through the implementation of investment priorities through the selection of projects in the TRPA Regional Grant Program and the programming of transportation projects in the 2021 FTIP and subsequent FTIP Amendments and Administrative Modifications.

Specific performance metrics, targets and projects that support the targets for both states are listed on the following pages.

TRANSPORTATION SYSTEM SAFETY (PM 1)

TRPA opted to support the adopted California Department of Transportation and Nevada Department of Transportation Safety Performance Measure Targets below.

Performance Target	California - Percent Reduction (2020)	Nevada - Reduction Rate (2018)
Number of Fatalities	3.3%	1
Rate of Fatalities (per 100M VMT)	3.03%	.05
Number of Serious Injuries	1.5%	1
Rate of Serious Injuries (per 100M VMT)	1.5%	.05
Number of Non-Motorized Fatalities and Non-Motorized Severe Injuries	3.03%/1.5%	1

The following are some of the projects worth highlighting that will help further the region in meeting these targets to promote safety and reduce congestion through the implementation of investments in transportation projects.

- *US 50 Corridor Collision Reduction (CA)* – lighting, improved crossings, and high visibility green paint
- *Round Hill Pines Resort Highway Intersection Improvements (NV)* – reconfigure entrance/intersection
- *SR28 Central Corridor Improvements (NV)* – SR28 Central Corridor Improvements – relocation of roadside parking and bike trail connections
- *Kings Beach Western Approach (CA)* - multi-benefit project improving mobility & walkability

NATIONAL HIGHWAY SYSTEM PAVEMENT AND BRIDGE CONDITION (PM 2)

TRPA opted to support the adopted California Department of Transportation and Nevada Department of Transportation Highway System Pavement and Bridge Condition Performance Measure Targets below.

Pavement and Bridge Performance Measures	2-Year NHS Targets		4-Year NHS Targets	
	California Good/Poor	Nevada Good/Poor	California Good/Poor	Nevada Good/Poor
Pavement on NHS				
• - Interstate	45.1% / 3.5%	NA	44.5% / 3.8%	74.7% / 1.4%
• - Non-Interstate	28.2% / 7.3%	67.6% / 5.7%	29.9% / 7.2%	55.8% / 6.5%
Bridges on the NHS	69.1% / 4.6%	35% / 7%	70.5% / 4.4%	35% / 7%

The following are some of the projects within the RTP worth highlighting that will help further the region in meeting these performance targets to promote maintaining and upgrading of bridges and preservation of existing resources through the implementation of investments in transportation projects. Projects often have multiple benefits like the safety project below has upgrades to signing and striping as well as a safety component. The Echo Summit Bridge Replacement was most certainly related to safety as well.

- *Pavement Perseveration (CA)* - SR28/SR89 Junction to Nevada State Line
- *Pioneer Trail Safety Improvement Project (CA)* – includes upgrades to striping and signage

NATIONAL HIGHWAY SYSTEM (NHS) PERFORMANCE (PM 3)

TRPA opted to support the adopted California Department of Transportation and Nevada Department of Transportation Highway System Performance Measure Targets below.

Traffic Congestion	2-Year NHS Targets		4-Year NHS Targets	
	California	Nevada	California	Nevada
Percent of reliable person-miles traveled on the Interstate	65.1% (.5% above 2017 Baseline)	86.9%	65.6% (1% above 2017 Baseline)	87%
Percent of reliable person-miles traveled on the Non-Interstate	N/A	N/A	74% (+1% above 2017 Baseline)	87%
Percent of Interstate system mileage providing for reliable truck travel time (Truck Travel Time Reliability Index)	1.68 (baseline -.01)	1.28	1.67 (baseline -.02)	1.26

1. CMAQ emissions reduction measure, the first performance period begins on October 1, 2017, and ends on September 30, 2021. For all other measures, including the CMAQ traffic congestion measure, the first performance period begins on January 1, 2018, and ends on December 31, 2021. [23 CFR 490.105]

2. Freight movements and CMAQ Program metrics are *only applicable to urban MPOs at this time; these include:* Percent of interstate system mileage reporting reliable truck travel times, Annual hours of peak-hour excessive delay per capita, Total emissions reduction by criteria pollutant (PM10, PM2.5, Ozone, CO), Non-Single Occupancy Vehicle mode share

The following are some of the projects within the RTP worth highlighting that will help further the region in meeting these performance targets that improve air quality with ensuring reliable travel times and non-auto travel options.

- *Lake Tahoe Boulevard Class 1 Bicycle Trail (Viking Way to South Wye) CA* - bike trail connecting a transit hub and town center to affordable housing projects and the local high school
- *Meyers Corridor Operational Improvement Project (CA)* – multimodal complete street
- *US 50 South Shore Community Revitalization Project (CA/NV)* – road realignment creating a complete street with bicycle and pedestrian amenities in the region’s largest town center
- *North Tahoe Regional Bike Trail (NV)* - Class 1 bike trail that will link the Dollar Hill Multi-Use Trail with the North Tahoe Regional Park in Tahoe Vista.

TRANSIT ASSET MANAGEMENT (TAM)

Each MPO must establish regional performance targets for transit agencies within the MPO boundary. Individual transit agencies may also set targets specific to their assets, but they also must comply with regional targets. TRPA established targets and will reassess every four years collaboratively with the Tahoe Transportation District (TTD) and Tahoe Truckee Area Regional Transit (TART).

Asset Category	Performance Measure	Estimated Current % (TART)	Estimated Current % (TTD)	Regional Target for 2020 RTP Cycle
ROLLING STOCK				
Bus (BU)	Percentage of buses that exceed ULB of 12 years	36%	38%	42%
Cutaway bus (CU)	Percentage of cutaway buses that exceed ULB of 7 years	100%	0%	100%
Small Cutaway/Van (VN)	Percentage of small cutaway buses and vans that exceed ULB of 5 years	N/A	58%	80%
EQUIPMENT				
Automobile (AO)	Percentage of automobiles that exceed ULB of 8 years	0%	0%	50%
Other rubber tire vehicles	Percentage of other rubber tire vehicles that exceed ULB of 10 years	0%	33%	50%
FACILITIES				
Administrative and maintenance facilities	Percentage of administrative and maintenance facilities rated less than 3.0 on the TERM scale	0%	N/A	0%
Passenger facilities	Percentage of passenger facilities rated less than 3.0 on the TERM scale	16%	22%	30%

1. For more information on the Lake Tahoe TAM targets see the [Regional Transit Asset Management Targets and Tahoe Fleet Replacement Fund](#).

The following are some of the projects within the RTP worth highlighting that will help further the region in meeting these performance targets.

- *Transit Operations, TTD and TART (CA/NV)* – transit service with critical regional connections for employment and medical trips
- *New Fleet Facility for TTD*- preventive maintenance; fleet and facilities improvements; safety and security enhancements to both the fleet and facilities

TRANSIT SAFETY

The Tahoe Transportation District (TTD) recently completed a Safety Plan. The adopted safety performance targets are reviewed and updated during the annual review. The specific performance targets are based on the safety performance measures established under the National Public Transportation Safety Plan and any additional performance goals set by TTD. These targets are specific numerical targets set by TTD and must be based on the safety performance measures established by FTA in the National Public Transportation Safety Plan. Tahoe-Truckee Area Regional Transit has also recently adopted a Transit Safety Plan and targets as noted below.

TTD

Mode of Transit Service	Fatalities (Total)	Fatalities (Rate)	Injuries (Total)	Injuries (Rate)	Safety Events (Total)	Safety Events (Rate)	System Reliability (miles)
Motor Bus (MB)	0	0	4	1/381,539	1	1/381,539	10,000
Commuter Bus (CB)	0	0	1	1/48,802	1	1/48,802	10,000
Demand Response (DR)	0	0	1	1/13,309	1	1/13,309	10,000

TART

Mode of Transit Service	Fatalities 2020 Target	Injuries 2020 Target	Safety Events 2020 Target	System Reliability (VRM/Failures) 2020 Target
Fixed Route Integer	0	7	53.33	-
Fixed Route Vehicle Rev Miles	0	.48	3.65	31,182
Demand Response Integer	0	.33	2.33	-
Demand Response Vehicle Rev Miles	0	.15	1.09	11,023

GENERAL RESOURCES:

1. [Caltrans' PM1 Targets and Target-Setting Whitepaper \(Year Two 2019\) \(PDF\)](#)
2. Federal Liaison: <https://dot.ca.gov/programs/federal-liaison>
3. Federal Highway Transportation Performance Management <https://www.fhwa.dot.gov/tpm/>
4. State Highway Safety Report (2018) - California <https://www.fhwa.dot.gov/tpm/reporting/state/safety.cfm?state=California>
5. Tahoe Safety Strategy: [Tahoe-Safety-Plan- Final 02-20-2019 reduced_size.pdf \(trpa.org\)](#)
6. 2020 Tahoe Regional Transportation Plan - <https://gis.trpa.org/rtp/>
7. FTA TAM Final Rule [Fact Sheet](#)
8. General [FTA FAQs on TAM](#) – specifically here please see the last Q&A on the page that frequency with which MPOs must update their TAM targets
9. MPO Specific [FAQs on TAM](#) – this resource outlines what exactly the MPOs are responsible for per the TAM Rule which was finalized in 2016
10. FTA Performance-Based Planning [Timeframe Overview](#)
11. FTA Safety Final Rule [Fact Sheet](#)