

# Strategic Transportation Safety Plan

MAG Contract No. 529 Project No. SP13-01

## Technical Memorandum No. 5 – Incorporating Safety into the Regional Transportation Plan

### 5.1 INTRODUCTION

The Maricopa Association of Governments is developing a comprehensive update of the 2005 Strategic Transportation Safety Plan (STSP) with oversight by the MAG Transportation Safety Committee and the Transportation Safety Stakeholders Group (TSSG). The new STSP will establish regional vision, goals, objectives, strategies, countermeasures, and performance measures for transportation safety. It is a data-driven, multi-year comprehensive plan that establishes goals, objectives, and key action areas and integrates the four E's of highway safety – engineering, education, enforcement and emergency medical services (EMS). The STSP allows MAG safety programs and member agencies to work together in an effort to align goals, leverage resources and collectively address the region's safety challenges. The STSP will also identify strategies for addressing new areas of transportation safety. The development of the STSP will be closely coordinated with the ongoing development of the state's Strategic Highway Safety Plan (SHSP) by the Arizona DOT.

This STSP will be a comprehensive and workable multi-modal plan that identifies needed system improvements, recommends potential legislative initiatives, and financial needs to institutionalize safety as a key consideration in the MAG transportation planning process. This Plan will provide guidance for future investment decisions that are reflected in the MAG Regional Transportation Plan (RTP) and the MAG Transportation Improvement Program (TIP) as shown in Figure 1. MAP-21 requires FHWA to develop safety related performance measures. The ADOT and MAG strategic plans will need to be consistent with MAP-21 federal directives and, correspondingly, with each other. The coordination between ADOT's and MAG's various plans and programs will primarily occur at the TIP (short-range) level. The STSP will identify current effective programs and initiate new programs that will result in reducing the number and severity of traffic crashes within the MAG region.

This technical memorandum is the fifth in a series to document the effort on the Plan. Technical Memorandum No. 5 summarizes the work completed on Task 5: Incorporating Safety into the Regional Transportation Plan. However, the effort summarized in the report goes beyond the RTP and reviews the relationship of safety to the transportation planning process, long-range and short-range. Thus, this relationship includes the Transportation Improvement Program (TIP) component, as well as other significant plans and policies that are part of MAG's transportation program.

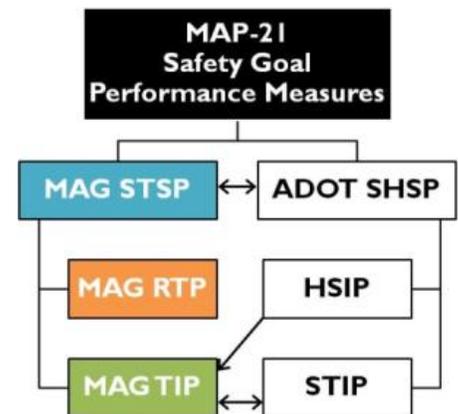


Figure 1 - Coordination of Federal, ADOT, and MAG Plans and Programs

Requirements presented in MAP-21, the current federal transportation legislation, significantly influence transportation safety in MAG's planning process. In addition, there are influences resulting from state (i.e., ADOT) and existing regional plans and programs. These influences are reviewed in this report.

Finally, there are transportation safety-related practices in the planning process being developed and being used by others external to MAG that could have practical application to MAG. Review of the state-of-the-practice with regard to safety efforts was performed on two fronts: (1) recent research activities on the subject were examined; and (2) case studies of five MPOs were completed. From these reviews potential new, pragmatic ideas were identified that should be considered by MAG.

## 5.2 INPUT FROM STSP TASKS 2 AND 3

A Visioning Workshop was held on September 24, 2013. Discussion for the MAG STSP Vision Statement was conducted by Transportation Safety Stakeholder's Group (TSSG) after presentation of crash history in the MAG Planning Area. Consensus was reached on the following vision statement for all road users: **Zero Deaths – Zero Injuries.**

At the Visioning Workshop, the TSSG also identified a number of potential Action Areas to address multiple safety issues in the region. Numerous strategies were identified for each potential Action Area and the TSSG members met again at a November 19, 2013 meeting to develop and rank individual strategies that they considered to be the most effective measures to meet the vision of "**Zero Deaths – Zero Injuries.**"

At a March 25, 2014 meeting, the TSSG members prioritized the potential Action Areas and identified the following list of five regional road safety Action Areas related to relevant safety issues occurring in the MAG Planning Area. Consideration was given to crash history and whether data for each Action Area can be successfully measured. The MAG STSP Action Areas are data driven and will be adopted and promoted by MAG.

- ***Eliminate Impaired Driving***
- ***Eliminate Death and Injury from Speeding and Aggressive Driving Behavior***
- ***Eliminate Death and Injury Related to Intersections***
- ***Eliminate Death and Injury for Vulnerable Road Users – Pedestrians, Bicyclists, and Persons with Disabilities***
- ***Eliminate Death and Injury Involving Young Road Users***

One Support Action Area will also be carried over from the 2005 STSP as an on-going priority of transportation safety planning in the MAG region:

- ***Improve Data Collection, Quality, Availability, Integration, and Analysis for Decision Making***

Following the March 25, 2014 meeting, TSSG members also identified a realistic set of performance measures that will be used by MAG to report on progress. Each performance measure identified is a good measure of its Action Area and has data that are currently available or can be obtained for the MAG Planning Area. The resulting summary of these performance measures for the Action Area strategies is provided in Technical Memorandum #3.

### 5.3 MAG 2035 REGIONAL TRANSPORTATION PLAN (RTP)

The MAG 2035 *Regional Transportation Plan* (RTP) was approved by the MAG Regional Council in January 2014.<sup>1</sup> The 2035 RTP is a comprehensive, performance-based, multi-modal and coordinated regional plan, covering the period through 2035. The RTP covers all major modes of transportation from a regional perspective, including freeways/highways, streets, public mass transit, airports, bicycles and pedestrian facilities, goods movement, and special needs transportation. In addition, key transportation related activities are addressed, such as transportation demand management, system management, safety, security and air quality conformity analysis.

The report documenting the 2035 RTP is organized into three major sections:

*Section One: Planning Process (Chapters 1-6).* This section addresses the approach taken in developing the Plan, including organizational relationships, federal and state planning mandates, public involvement, Title VI and Environmental Justice considerations, consultation efforts, planning goals and objectives, and the regional development outlook.

*Section Two: Transportation Modes (Chapters 7-16).* This section covers modal investment strategies, including planned transportation facilities, capital investments by mode, programs such as special needs and enhancement activities, and a financial plan.

*Section Three: System Operations and Management. (Chapters 17-23).* This section describes programs that monitor and improve the performance of the existing system, including performance monitoring and assessment, demand and congestion management, and transportation safety (Chapter 21) and security. Air quality conformity is also covered in Section Three.

#### 5.3.1 Transportation Safety as Part of MAG's Transportation Planning Process

Transportation Safety is considered a major focus of the MAG's adopted Regional Transportation Plan (RTP) (Update, January 2014). Examples of this focus in the RTP development process are the following:

- **Transportation Safety Chapter** — As noted above, Chapter 21 of the RTP specifically discusses the subject of transportation safety. The information is organized under the following sections:
  - Safety Planning Process
  - Coordination with State Strategic Highway Safety Planning
  - Status of Transportation Safety in the MAG Region
  - Funding for Transportation Safety
- **Safety Goal and Objective** — The policy foundation of the RTP is a set of four goals and 15 objectives. One of the goals and one of the objectives directly relate to safety:
  - Goal 1: System Preservation and Safety.*
  - Objective 1B: Provide a safe and secure environment for the traveling public, addressing roadway hazards, pedestrian and bicycle safety, and transit security.*

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<sup>1</sup> MAG, *Regional Transportation Plan (RTP)*, January 2014.

- **Transportation Safety Committee** — As one of MAG’s five standing committees, this committee provides ongoing leadership and oversight on current and future safety planning and implementation issues.
- **Safety as a Performance Measure** — One of the facility/service performance example measures expressed in the RTP is “accident rate per million miles of passenger travel.”

In addition to the RTP, and within MAG’s overall transportation planning process, safety is addressed through various activities:

- Inclusion of safety assessments of transportation alternatives at both the regional level and project level.
- Preparation of a Strategic Transportation Safety Plan (STSP) — the first one was completed in 2005 and this Technical Memorandum is a part of the current comprehensive update.
- Establishment of Road Safety Assessments (RSA) program.
- Sponsorship of regional road safety public information activities.
- Provision of program and technical support of the Safe Routes to School (SRTS) program.
- Inclusion of safety on the MAG website with a special area solely for performance monitoring called MAGnitude. The pages provide current performance information on major modes and projects in the region. One of the pages deals with corridors and contains a graph labelled “safety” charting the annual number of crashes for six freeway corridors since 1998.

### 5.3.2 Transportation Safety as part of the MAG Transportation Improvement Program Process

The Transportation Improvement Program (TIP) contains the program of projects, mostly capital in nature, to be implemented in the region over a five-year period. As such it essentially serves as the short-range implementation element of the RTP. The projects are defined to be regionally significant and include all federal and state funded projects, and those from the Proposition 400 life-cycle programs. MAG’s current TIP covers the period FY 2014-2018.<sup>2</sup> Guiding the process is a *Guidebook* that spells out the submittal and evaluation process.<sup>3</sup>

The programming process involve MAG’s technical advisory committees reviewing and evaluating project submittals eventually sending recommendations through to the Transportation Policy Committee, and from there to the Management Committee, and finally to the MAG Board of Directors. The technical committees, including the Transportation Safety Committee, represent modal and program interests (i.e., Streets, Transit, ITS, and Bicycles and Pedestrians). The primary transportation project and program categories are: freeway, transit, arterials, bicycle and pedestrian, Intelligent Transportation Systems (ITS), bridge replacement and rehabilitation, Highway Safety Improvement Program, railroad crossings, and the Transportation Alternatives Program.

From a multi-modal view it might be easy to conclude that the multi-modal interest only relate to transit, and pedestrians and bicycles. However, taking a larger view of multi-modal safety, especially as it concerns the

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<sup>2</sup> MAG, *FY 2014-2018 Transportation Improvement Program (TIP)*, January 2014.

<sup>3</sup> MAG, *Fiscal Year 2013 Transportation Programming Guidebook*, August 2012.

facilities used by pedestrians and bicyclists, a case can be made that there is a substantive safety relationship between pedestrian and bicyclist safety and all ground-based transportation facilities. In Table 1, MAG’s safety objective is divided into its three safety components: roadway, pedestrians and bicycles, and transit security. The table points out that a safety interest exists for each category. For example, freeway interchanges have to consider pedestrian and bicycle movements alongside ramps and at ramp crossings.

*Table 1 - Relationship of MAG RTP Safety Goal to TIP Project/Program Categories*

RELATIONSHIP OF MAG RTP SAFETY GOAL TO TIP PROJECT / PROGRAM CATEGORIES			
MAG Transportation Improvement Program (TIP) Primary Transportation Project / Program Categories	MAG Regional Transportation Plan (RTP) Goal #1: System Preservation and Safety		
	Objective 1B: Provide a safe and secure environment for the traveling public, addressing...		
	roadway hazards	pedestrian and bicycle safety	transit security
Freeway / Highway	XX	X	-
Transit	X	X	XX
Arterials	XX	X	-
Bicycle & Pedestrian	X	XX	X
ITS	X	X	X
Bridge Replacement & Rehabilitation	XX	X	-
Highway Safety Improvement	XX	X	-
RR Crossings	XX	X	-
Transportation Alternatives	X	XX	-

*XX - indicates primary relationship*

*X - indicates a secondary relationship*

A linkage exists between the RTP goals and objectives and the TIP in terms of short-range and long-range. However, transportation safety is another example of the linkage between the two and provides the basis for transportation safety to be a consideration in every project and program. How does this safety basis get transferred to projects? It should be expressed in TIP project submittals and in the TIP evaluation criteria.

***Transportation Alternatives Program (TAP) and MAG Design Assistance Program<sup>4</sup>***

With regard to evaluation process features, two MAG programs that focus on pedestrians and bicycles are reviewed below.

TAP is a federal program created under MAP-21. It consolidated several existing programs—primarily, Safe Routes to School, Transportation Enhancements, and Recreational Trails programs—into one, now called Transportation Alternatives Program.

<sup>4</sup> MAG, 2015 MAG Design Assistance Program Guidebook.

In order to evaluate and set priorities for proposed MAG projects to be funded with TAP funds, goals and objectives were developed and approved by a Transportation Alternatives Stakeholders working group. Of the resulting three goals, two were specific to safety:

- Assist in providing a safe environment for the bicyclists and pedestrians on both the on-street and the off-street transportation networks.
- Make bicycling and walking to K-8 schools a safer and more desirable transportation alternative to motorized vehicles.

The final agreed-upon prioritization process included three primary safety components:

1. *Safety represented on the Evaluation Team*—two of the nine members of the team were representatives from the Transportation Safety Committee.
2. *Criteria includes safety*—four of the 26 criteria were specific to safety.
3. *Weighted criteria*—the four safety criteria added to 10% of the total maximum score.

A second process reviewed was for the Design Assistance Program. This program is defined for (1) pedestrian and bicycle facilities, including shared-use facilities, and (2) projects that can proceed only to the preliminary engineering phase. The intent of this program has been to stimulate integration of facilities into the planning and design of all types of infrastructure and development. The total amount available for 2015 was 300,000.

Eligible project categories include: completion of the regional shared-use path and canal network, bicycle and pedestrian access to transit, and bicycle and pedestrian facilities. As part of the evaluation process there are 16 evaluation criteria with safety being one, weighted at 5%;

The TAP process exemplifies three significant features as a way to represent safety in the review and evaluation process: safety representation on the evaluation team, criteria that includes safety, and a weighting process that allows for priority to be assigned to safety-beneficial projects. The Design Assistance Program is a relatively minor program in terms of the scale of financial assistance available. Even so, safety was included in the criteria and weighted.

## 5.4 FEDERAL, STATE AND REGIONAL INFLUENCES

### 5.4.1 Federal: MAP-21

The most recent federal legislation goes under the title: “Moving Ahead for Progress in the Twenty First Century” or as it is commonly referred to “MAP-21.” It was signed into law on July 6, 2012 and went into effect on October 1, 2012. It is a two-year transportation reauthorization bill and provides federal funding of transportation programs through September 2014. Uncertainty surrounds the specifics of future Federal funding levels from FY 2015 and beyond.

Despite the funding uncertainties there are MAP-21 rules and regulations being developed by Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) that are expected to be finalized during the course of this study effort. However, what is known is that MAP-21 requires a performance-based and fact-driven process for developing and implementing transportation improvement projects. As a

result, the foundation for the STSP will be a consistency with federal safety goals and performance measures, and coordination with ADOT's SHSP.

### ***Transportation Safety and Transportation Planning***

Safety was especially prominent in the MAP-21 legislation. National performance goals for Federal highway programs were set and the safety goal was at the top of the list:

“Safety – To achieve significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned public roads and roads on tribal lands”

The legislation supports an aggressive safety agenda by continuing the successful Highway Safety Improvement Program, doubling funding for infrastructure safety, strengthening the linkage among modal safety programs, and creating a positive agenda to make significant progress in reducing highway fatalities. It also continues to build on other aggressive safety efforts, including the Department's fight against distracted driving and its push to improve transit and motor carrier safety.

In MAP-21, the metropolitan and statewide transportation planning processes are continued and enhanced to incorporate six elements of performance-related provisions:

1. National goals—safety being one as mentioned above.
2. Performance Measures
3. Targets—for each of the performance measures
4. Plans
5. Reports—document progress toward achievement of targets
6. Accountability—to “make significant progress” toward achieving targets

Requirements for a long-range plan and a short-term transportation improvement plan (TIP) continue, with the long-range plan to incorporate performance plans required by the Act for specific programs. The long-range plan must describe the performance measures and targets used in assessing system performance and progress in achieving the performance targets. The TIP must also be developed to make progress toward established performance targets and include a description of the anticipated achievements. With regard to safety MPOs must coordinate, to the maximum extent practical, with the relevant State's Strategic Highway Safety Plan (SHSP).

**Safety Performance Measures.** FHWA is required to establish measures to assess performance in 12 areas, four of which are safety-related:

1. Serious injuries per VMT
2. Fatalities per VMT
3. Number of serious injuries
4. Number of fatalities

Each of the measures would be representative of a five-year rolling average, i.e., rolling average of five individual, consecutive annual points of data.

States need to establish targets for the safety performance measures by April 2015. MPOs are required to establish targets for safety performance measures by October 2015. MPOs are required to report on progress toward achievement of their targets in their System Performance Report.

There is more FHWA rulemaking in progress, and three rules will have a specific reference to safety:

- Updates to the Highway Safety Improvement Program Regulations
- Transit Safety Plan Rule
- Highway Safety Grant Programs Rule

Definitions are also provided for the following:

*Metric:* quantifiable indicator of performance or condition, e.g., annual number of fatalities.

*Measure:* an expression based on a metric that is used to establish targets and to assess progress toward achieving the established targets, e.g., the 5-year rolling average of the metric.

*Target:* a quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within the time period required by FHWA.

### **Public Transportation Rulemaking**

In October 2013 proposed new rulemaking was published in the *Federal Register* that was devoted to a National Public Transportation Safety Plan.<sup>5</sup> Emphasis was centered around a Safety Management System (SMS) approach. It notes that SMS "...supports continuous improvement in safety performance through a positive safety culture founded on four key priorities: safety policy, safety risk management, safety assurance, and safety promotion."

The proposed new rule is long and complicated. It proposes several new plans—all revolving around the subject of safety—plans that will generally be the responsibility of the region's transit operators. However, MAG will be in an active role with regard to these multiple safety plan development processes resulting from their RTP and TIP responsibilities.

In the draft rule FTA was seeking comments on its many questions. While this is not a final rule, and substantial changes are likely, the safety emphasis, as expressed through the SMS, will in all probability be maintained.

The National Public Transportation Safety Program has four components, one of which calls for preparation of a *Public Transportation Agency Plan*, or *Transit Agency Safety Plan*. This plan must include:

- A requirement that the agency's board of directors approve the plan.
- Methods for identifying and evaluating safety risks throughout the transit system.
- Strategies to minimize the exposure to the public, personnel, and property to hazards and unsafe conditions.
- Process and timeline for conducting an annual review.

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<sup>5</sup> FTA, *Federal Register*, Advance Notice of Proposed Rulemaking, "The National Public Transportation Safety Plan, The Public Transportation Safety Plan, and the Public transportation Safety Certification Training Program; Transit asset Management," published October 3, 2013.

- Performance targets based on safety performance criteria and State of Good Repair (SGR) standards.
- Assignment of an adequately trained safety officer who reports to the GM/CEO.
- Comprehensive staff training program for operations personnel directly responsible for safety.

Complementing the Transit Agency Safety Plan is a Transit Asset Management (TAM) Plan. Both of these plans will be relevant to MAG. The proposed rule indicates that “MPOs and States must consider, and integrate recipients’ TAM Plans and targets, as well as Transit Agency Safety Plans and targets, into the planning process. Thus, as proposed in the rulemaking, MAG will be responsible for integrating into the RTP and TIP processes the goals, measures and targets adopted by the region’s transit operators resulting from the Safety Plan and TAM. While the working definition of “integrating” is yet to be determined it is critical that the policy framework be established by MAG to ensure consistency with the RTP goals and objectives.

#### **5.4.2 State: ADOT Strategic Highway Safety Plan (STSP) and Highway Safety Improvement Program (HSIP)**

Arizona's first SHSP was completed in 2007. The SHSP is a comprehensive, collaborative, high level, statewide safety strategy to guide Arizona’s safety change initiative. The Plan can be regarded as an “umbrella” for all existing and future safety planning and programming processes for transportation in Arizona. The 2007 Arizona SHSP identified six Emphasis Areas:

1. Restraint Usage
2. Speeding
3. Young Drivers
4. Impaired Driving
5. Roadway / Roadside (lane departure and intersections)
6. Data improvement

It is currently being updated and scheduled for completion in 2014. The MAG STSP effort is working in parallel with the Arizona SHSP Update process. The Arizona SHSP Task Forces identified twelve (12) Emphasis Areas and two (2) Emphasis Support Areas for the implementation phase of the Arizona SHSP Update. Table 2 shows the Arizona SHSP Emphasis Areas and the MAG STSP Action Areas and how they align.

*Table 2 - Arizona Strategic Highway Safety Plan Update Emphasis Areas and MAG STSP Action Areas*

Arizona SHSP Emphasis Areas	MAG STSP Action Areas
Age Related (Younger/Older Drivers)	Eliminate Death and Injury Involving Young Roadway Users
Distracted Driving	*
Heavy Vehicles/Buses/Transit	*
Impaired Driving (Alcohol, Illegal Drugs, Medication, Fatigued)	Eliminate Impaired Driving
Motorcycles	*
Natural Risks (Weather, Animals)	*
Non-Motorized Users (Pedestrians, Bicyclists, Transit Users, School Zone Users)	Eliminate Death and Injury Involving Vulnerable Road Users – Bicyclist, Pedestrians, Persons with Disabilities
Occupant Protection (Safety Belts, Child Safety Seats, Helmets)	*
Roadway Infrastructure & Operations Improvement (Lane Departure, Intersections, Rural Roads, Rail Crossings)	Eliminate Death and Injury Related to Intersections
Speeding & Aggressive Driving	Eliminate Death and Injury from Speeding and Aggressive Driving Behavior
Traffic Incident Management (Secondary Collisions, Work Zones)	*
Arizona Emphasis Area Support	MAG Action Area Support
Data Analysis Improvements	Improve Data Collection, Quality, Availability, Integration, and Analysis for Decision Making
Policy Initiatives	*

\* The MAG region has a unique set of issues that may not have associated Action Area(s) that align with all the State SHSP Emphasis areas.

The potential MAG STSP Action Areas fall under the umbrella of the Arizona SHSP Emphasis Areas. Projects must be identified within a Statewide Emphasis Area to be eligible for HSIP funds. Specifically, the FHWA states an eligible use of funds includes a:

*“highway safety improvement project that is any strategy, activity or project on a public road that is consistent with the data-driven State Strategic Highway Safety Plan (SHSP) and corrects or improves a hazardous road location or feature or addresses a highway safety problem.”*

Additional areas that are specifically not in the State SHSP may not be eligible for HSIP funds, although other regional funding sources may be available. If other funding sources are identified outside of Federal Aid safety funding, MAG may prioritize projects to utilize that funding (i.e., sales tax, bonds, etc.) based on the goals outlined in the MAG STSP.

### 5.4.3 MAG and Valley Metro/RPTA Plans and Programs

#### *MAG, Designing Transit Accessible Communities Study*<sup>6</sup>

This recently completed effort focused improving the safety and comfort of the pedestrian experience for transit users when accessing transit stops and stations in the MAG region. The purposes of this study were to:

- identify challenges faced by users getting to transit,
- recommend improvement concepts, policies, and guidelines to enhance transit accessibility,
- provide a toolkit of measures and strategies for local governments to create transit accessible and livable neighborhoods, and
- identify options and provide a regional framework for applying for federal grants.

Workshop participants identified a host of challenges, barriers, and ideas associated with these issues related to transit access Americans with Disabilities (ADA), bicycle, sidewalk and walkability, street crossings, funding, policy, environment, information systems, transit operations and stops.

Case studies were utilized to examine five locations representing a variety of different transit, land use, and street traffic conditions. The resulting effort resulted in a plan of transit accessibility improvements for each of the five locations.

A Transit Accessibility Toolkit was prepared to be used by the local jurisdictions. Measures were organized into 11 improvement categories, listed below with example improvement considerations:

- **Lighting**—provide pedestrian-level lighting near transit facility
- **Information signage**—install improved signage at bus stops to notify riders of the bus schedule and the geography of the route(s)
- **Wayfinding**—provide signs to direct pedestrians and bicyclists to stops, as well as, to nearby destinations and to pedestrian-/bicycle-friendly routes
- **Seating**—provide high visibility seating under nearby shade (e.g., tree, shelter)
- **Shelter**—add shelters as a way to enhance rider comfort, via shade, weather protection and seating
- **Landscape shading**—provide shade trees
- **Adjacent land use**—create pedestrian passageways in cases where the street network provides few connection choices
- **Bicycle access**—create bicycle lanes to serve as an additional route of travel for bicyclists
- **Bicycle parking**—provide bicycle racks or other parking facilities where bicycle ridership is high
- **Pedestrian crossing**—provide pedestrian refuge islands, mid-block pedestrian-activated signals, or pedestrian hybrid beacons (HAWKs)
- **Sidewalk**—provide wider sidewalks and sidewalks that are detached (buffered) from traffic lanes when adjacent to major street intersections or when adjacent to a bus stop

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<sup>6</sup> MAG, *Designing Transit Accessible Communities*, 2013.

It was estimated that the costs for an individual bus stop location could range to as high as \$100,000, not including any unique costs, such as for right-of-way or utility relocation. At the low end it was estimated that stops having minimal improvements would cost about \$20,000 to upgrade.

**MAG Complete Streets Guide (2011)**

A Complete Street accommodates all modes of transportation: pedestrian, bicycles, vehicular and transit at an appropriate level to the street type and transportation context.<sup>7</sup> This *Guide* describes elements of a Complete Streets plan and the planning process involved developing a plan. Figure 2 shows the process which includes six basic steps:

1. Identify the transportation context.
2. Identify current transportation modes and facilities.
3. Identify Complete Street gaps.
4. Determine other priorities.
5. Identify right-of-way width/number of lanes.
6. Select Complete Streets—Other elements (from Pedestrian Policies and Design Guidelines, Regional Bike Plan and Regional Transportation Plan).

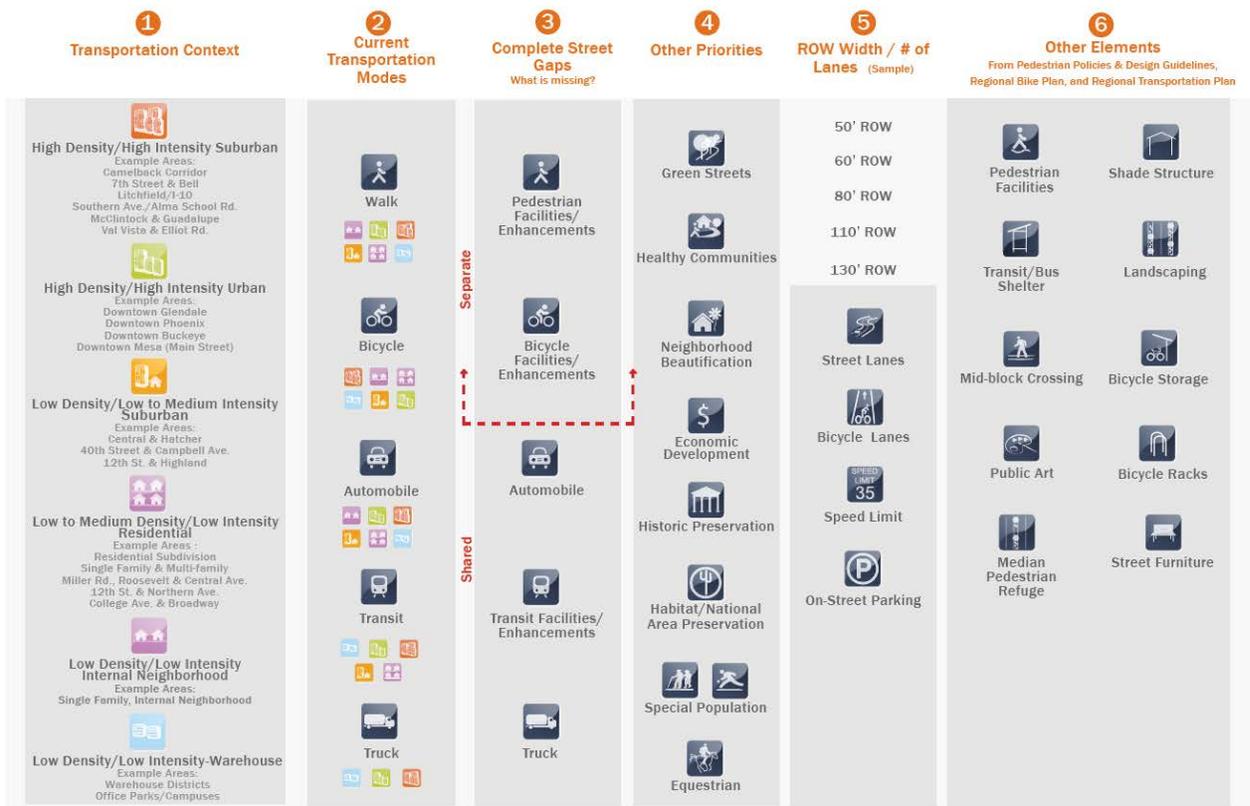


Figure 2 - MAG Complete Streets Planning Process

<sup>7</sup> MAG, *Complete Streets Guide*, 2011, p. 26.

The Complete Streets approach does not explicitly address safety, yet improved pedestrian and bicycle safety is an outcome of a Complete Streets project. Example performance measures could include the number of enhanced crossings with a pedestrian refuge and the number of miles of wide (8 ft+) sidewalks. An example of an outcome measure could be an assessment of crash rates on streets that have become Complete Streets.<sup>8</sup>

Page 70 the *Guide* notes that the MAG transportation plan prioritization process “may” receive additional consideration for projects that are committed to planning, designing, and constructing in accordance with Complete Streets goals and process.

### **MAG Pedestrian Policies and Design Guidelines<sup>9</sup>**

Any driver becomes a pedestrian the moment he or she leaves a vehicle or bicycle. The document provides policy and design guidance to make all pedestrian areas and facilities safe, comfortable, and a destination for people who use them. This Guide defines what pedestrian facilities are, identifies twelve principles of pedestrian areas and conditions needed to encourage or allow people to choose to walk, and provides policy recommendations for local agencies. The recommendations directly relating to safety include the following:

- Enforce traffic laws
- Establish a “Safe Routes to School” program in the community
- Establish a regular maintenance schedule for facilities adjacent to pedestrian areas

The Guide supports use of the AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities and the MUTCD to determine where pedestrian facilities are “warranted” and how to establish pedestrian signal timing. It encourages infrastructure improvements such as traffic calming, enhanced pedestrian crossings, and walkways to transit stops and connections to light rail stations.

Two tools are defined to identify and prioritize pedestrian facility need; (1) Pedestrian Latent Demand Model, and (2) Roadside Pedestrian Conditions Model. The latter method includes safety characteristics such as the amount of motor vehicle traffic and posted speed limit, but neither incorporates crash history.

Minimum levels of safety were identified to include:

- Providing a defined walkway for exclusive pedestrian use that is a minimum 6-foot wide.
- A walkable surface that is clear of impediments.
- Has ramps where needed.
- Is physically or horizontally separated from vehicular traffic.
- Is lit at roadway crossings.<sup>10</sup>

Additionally, the document includes checklists to guide local agencies through a Pedestrian Review, Pedestrian Zoning Review, and Safe Route to School Review.

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<sup>8</sup> MAG, *Complete Streets Guide*, 2011, p. 68.

<sup>9</sup> MAG, *Pedestrian Policies and Design Guidelines*, April 2005.

<sup>10</sup> MAG, *Pedestrian Policies and Design Guidelines*, April 2005, p. 3.

### **MAG Regional Bikeway Master Plan (2007)<sup>11</sup>**

The *Plan's* mission was to “provide an interconnected regional system of bikeways that contributes to a vibrant, healthy, livable community.” Safety was a paramount concern as evidenced by a safety: To develop a bicycle transportation system that increases user safety along routes and crossings by relying upon industry standards (e.g., American Association of State Highway and Transportation Officials).<sup>12</sup>

The report contains descriptions of design tools and traffic engineering measures for various bicycle problem areas, such as mid-block crossings treatments, and multi-modal connectivity. Further, a set of pragmatic recommended policies included:

- Routine accommodation and Complete Streets
- Regional connectivity
- Roadway restriping
- Shared-use path grade separation
- At-grade mid-block crossings
- Connectivity at freeways
- Connectivity along freeways
- End-of-trip bicycle facilities<sup>13</sup>

### **RPTA, Bus Stop Program and Standards, Final Report, Findings and Recommendations, 2008<sup>14</sup>**

The study produced recommendations for a region-wide bus stop program covering: data management, guidelines for design and implementation, and a system of warrants to qualify sites for regional funding. As with most studies of this type, safety was an inherent consideration but not addressed directly. For example, one of 17 design guidelines deals with integrating bus stop facilities and development. Various factors are discussed pertaining to the desirability of providing pedestrian access from nearby uses and working with the developer during the early stages of project design. Thus, planning guidance is provided but it is silent with regard to specific design details.

To a certain degree it was found that the bus stop inventories vary across the region by city and in some cases do not exist. The inventories that are maintained largely deal with amenities and facilities at each stop.

Another product of the study was a bus stop warrants program to guide the allocation of resources for amenities at stops. Warrants include considerations related to safety but are very general. For instance, siting should be in a safe and convenient place for patrons and should have good pedestrian connectivity.

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<sup>11</sup> MAG, prepared by Sprinkle Consulting, Inc., et al, *MAG Regional Bikeway Master Plan*, 2007.

<sup>12</sup> MAG, prepared by Sprinkle Consulting, Inc., et al, *MAG Regional Bikeway Master Plan*, 2007, p. 51.

<sup>13</sup> MAG, prepared by Sprinkle Consulting, Inc., et al, *MAG Regional Bikeway Master Plan*, 2007, pp. 92-103.

<sup>14</sup> Regional Public Transportation Authority, prepared by PB, *RPTA Bus Stop Program and Standards Final Report, Findings and Recommendations*, March 2008.

### **Valley Metro Regional Transit Standards and Performance Measures (on-going)<sup>15</sup>**

This project is underway and into its second phase. Phase 1 focused on identifying service types, minimum operating standards for each type, initial performance measures, and process for evaluating and recommending service changes. Phase 2 will cover standards for service implementation and for Valley Metro's facilities.

#### **5.4.4 Summary**

Federal, State, and local laws, rules, policies, and plans influence the ability of MAG and its member agencies to carry forward with implementation of transportation safety projects. MAP-21 has provided significant support for transportation safety to be a more prominent part of MAG's planning process. Its performance-based provisions provide incentives to measure and track performance throughout the entire planning and programming process beginning with the RTP.

With regard to ADOT its current effort to update the SHSP is important to MAG as it relates to project programming and use of HSIP funding. Consistency of the defined Action Areas with the State's SHSP Emphasis Areas will enhance the region's ability to obtain HSIP funds.

Within the region well developed, state-of-the-practice plans exist for planning and designing transit, pedestrian and bicyclist facilities, and for providing safe and comfortable connections between these modes. In particular, the Complete Streets Guide, designing transit accessible communities, the regional bikeway and pedestrian plans, and bus stop standards provide the tools to design safety into intermodal facilities.

The key now is to develop a plan to focus on standards, policies, and resources needed for MAG, ADOT, Valley Metro, and the member local agencies to carry plans forward to implementation.

## **5.5 STATE-OF-THE-PRACTICE—RESEARCH**

This state-of-the-practice review examined recent federal and non-federal research efforts devoted to the subject of multimodal transportation safety.

### **5.5.1 Cooperative Research Programs**

There are two cooperative research programs that are devoted to multimodal ground passenger transportation: National Cooperative Highway Research Program (NCHRP) and Transit Cooperative Research Program (TCRP). These programs are managed by the Transportation Research Board (TRB) under the auspices of the National Research Council, and provide leading edge research into multimodal transportation problem areas. Several recent efforts pertinent to transportation safety are reported in the following section.

#### ***NCHRP 08-76, Framework for Institutionalizing Safety in the Transportation Planning Process***

National Cooperative Highway Research Project (NCHRP) 08-76 is scheduled to be complete in late 2014. Its purpose is to prepare a guide for integrating and institutionalizing safety into the traditional transportation planning process. The study produced a June 2012 report offering a "*framework for institutionalizing safety in the transportation planning process.*" Seven principles or steps were defined needed to effectively establish safety as a convention or norm for an MPO:

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<sup>15</sup> Valley Metro, *Phase I Recommendations Regional Transit Standards and Performance Measures*, November 2013.

1. Ensure that MPO committee, policy boards and other planning structures include safety expertise, e.g., safety professionals, practitioners, and stakeholders.
2. Define and include safety in the vision, goals, and objectives of planning documents
3. Address safety issues, such as pedestrian and bicycle safety, safe mobility for older citizens, etc., in planning programs and products.
4. Integrate safety performance measures into the overall performance management system.
5. Collect and analyze data for identifying and prioritizing safety issues, projects, and programs.
6. Establish safety as a decision factor to prioritize safety issues, projects, and programs and allocate funds.
7. Implement a monitoring system to track the transportation system's safety performance and regularly evaluate the effectiveness of safety programs and policies.<sup>16</sup>

#### **TCRP Report 19, Bus Stop Design and Location Guidelines<sup>17</sup>**

This report provides a good foundation for safety to be part of guidelines for design and location of bus stops. It noted that pedestrian safety issues include the nearness of a bench to the flow of traffic and safely crossing the street to reach or depart from a stop. It offered a list of safety elements that need to be considered in the placement of a stop related to pedestrian access, among them:

- Proximity to passenger crosswalks
- Convenient passenger transfers to routes with nearby stops
- Proximity of the stop for the same transit route in the opposite direction

#### **TCRP Report 88, A Guidebook for Developing a Transit Performance-Measurement System**

This Guidebook provides a thorough review of a menu of performance measures for any transit operator, large or small, rail or bus, fixed-route or demanded-responsive. The measures cover all aspects of a transit operation.

Typical performance measures for a transit operator under the category of "safety and security" were noted:

- *Vehicle accident rate* (e.g., number of vehicle-miles between traffic collisions)
- *Passenger accident rate* (e.g., number of passenger injuries per 100,000 passenger boardings)
- *Crime rate* (e.g., number of crimes committed at stations and stops)
- *% vehicles with safety devices<sup>18</sup>* (e.g., number of vehicles with on-board cameras)

The report covers the passenger environment (bus and rail) without attention to the access to stations and stops. It provides description of passenger safety and associated target values and concludes with this assessment of desired measures without mention of access:

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<sup>16</sup> NCHRP 08-76, *Framework for Institutionalizing Safety in the Transportation Planning Process*, Phase 1 Final Report, June 2012, pp. 4-1 to 4-16.

<sup>17</sup> TCRP Report 19, *Bus Stop Design and Location Guidelines*, 1996.

<sup>18</sup> TCRP 88, *A Guidebook for Developing a Transit Performance-Measurement System*, 2003, p. 6.

*“...accidents stratified by cause and contribution factors (e.g., physical condition of operation, unsafe operation, operator error, equipment failure, and facility condition).”<sup>19</sup>*

Examples of safety-related measures were: fatal, injury, and property-damage-only accidents on a per passenger-miles/vehicle-miles traveled basis. Other measures were: response time, and incident/accident durations.

#### **TCRP Synthesis 110, Commonsense Approaches for Improving Transit Bus Speeds**

While this TCRP Synthesis did not deal directly with safety, the study’s conclusions reinforce the need for the transit operators to maintain a close partnership with the local agency(ies) traffic engineering department(s). Stop consolidation, stop location, and traffic operational strategies all can benefit the service speed. One of the conclusions pointed to a study of *“ways to encourage closer liaison or better working relationships between transit agencies and traffic engineers.”<sup>20</sup>*

This transit operator-traffic engineer partnership can benefit the transit operation on the street (i.e., speeds), at the stop (i.e., bus stop location) and access to the stop (i.e., pedestrian and bicycle access within 500-1,000 feet)

#### **TCRP Report 125, Guidebook for Mitigating Fixed-Route Bus-and-Pedestrian Collisions, 2008.**

This Guidebook offers preventative and remedial strategies for reducing the frequency and severity bus-and pedestrian collisions. It does not include bus stop-related pedestrian clashes that do not involve transit vehicles. Four primary collision types are discussed: turning right, turning left, pulling into a stop, and pulling away from a stop.

One of the seven strategies listed for mitigating collisions is under the subject of traffic engineering and roadway design. The other strategies deal with operator-managed subjects (e.g., training, defensive driving techniques and policies).

With regard to traffic engineering, the Guidebook describes applications that can benefit safety such as: traffic operational devices (e.g., signals, pavement markings) and physical devices (e.g., bollards, channelization). Interestingly, under the discussion of pedestrian bridges and tunnels, it is noted that:

*“Agency partnering is also a good idea and can result in a better, more successful product.”<sup>21</sup>*

There is also a section on bus stop planning and the following comments are offered:

*“Better bus stop planning, in general, was recommended by many stakeholders. It was reported that, in some instances, bus stop placement is a ‘second thought’ and not part of the overall planning process. Bus stops are sometimes developed as a result of citizen requests and do not include sufficient collaboration or design analysis. Older stops are often not updated to integrate with new roads, traffic volumes, or routes.”<sup>22</sup>*

<sup>19</sup> TCRP Report 88, *A Guidebook for Developing a Transit Performance-Measurement System*, 2003, p. 277.

<sup>20</sup> TCRP Synthesis 110, *Commonsense Approaches for Improving Transit Bus Speeds*, 2013, p.53.

<sup>21</sup> TCRP Report 125, *Guidebook for Mitigating Fixed-Route Bus-and-Pedestrian Collisions*, 2008, p.34.

<sup>22</sup> TCRP Report 125, *Guidebook for Mitigating Fixed-Route Bus-and-Pedestrian Collisions*, 2008, p.42.

A “big issue” reported by pedestrian groups was the need for pedestrian-friendly transit stop environments. The most common hazards reported about sidewalks were those that were broken, uneven, and too narrow.

### 5.5.2 Federal Research Studies

Related to multimodal functions, federal research is developed by two agencies: the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA).

#### ***FTA, Transit Safety Management and Performance Measurement, Volume 1: Guidebook***<sup>23</sup>

This Guidebook is useful for transit agencies as a resource toward creating an internal safety culture and Safety Management System (SMS). With regard to performance measures and developing a Safety Performance Measurement System (SPMS), the Guidebook provides a practical “how to” accomplish each step. This report is the sort of reference that Valley Metro and the local operators should use as a guide for the Public Transportation Safety Plan required under provisions of MAP-21.

#### ***FHWA, Pedestrian Road Safety Audit Guidelines and Prompt Report***<sup>24</sup>

This report provides guidelines for conducting a road safety audit (RSA) in evaluating pedestrian safety as well as ways to improve a pedestrian problem area. A master list is offered with prompts to use when conducting an audit. This prompt list is for the purpose of identifying the range of design, operational, and policy elements that may affect pedestrian safety. The prompts are stratified for pedestrian facilities, traffic, and traffic control devices cross-classified by RSA zones: streets, street crossings, parking areas/adjacent areas / adjacent developments, and transit areas. A detailed list of 16 prompts for transit stop areas provides a good checklist of the variety of considerations around a stop that affect pedestrians. The report does not provide solutions or countermeasures, but includes a thorough discussion of the questions that need to be addressed in conducting a pedestrian audit.

#### ***FHWA, A Primer on Safety Performance Measures for the Transportation Planning Process***

This Primer provides a tool for aid planners and practitioners to identify, select, and use safety performance measures as part of the transportation planning process. A focus provided by the Primer are the linkages that exist between performance measures and the individual planning steps.

Strong linkages are shown to exist for four of eight elements of the transportation planning process:

- Element 1 — Regional vision and goals.* By incorporating safety in the region’s vision and goals it will lead to more projects with safety components and benefits. This is where the linkages begin.
- Element 3 — Evaluation and prioritization of strategies.* This is where safety takes its rightful place next to the other planning considerations. Effective safety performance measures lead to safety-related evaluation criteria.
- Element 5 — Development of Transportation Improvement Program (TIP).* Safety measures leads to the development of prioritization criteria that include safety. Increased priority to safety can come about by assigning greater weight to the safety criteria.
- Element 8 — Monitor system performance.* Ongoing monitoring of system performance provides data and information that should be fed back into the goals and performance measures. A

<sup>23</sup> FTA, *Transit Safety Management and Performance Measurement, Volume 1: Guidebook*, 2011.

<sup>24</sup> FHWA, *Pedestrian Road Safety Audit Guidelines and Prompt Report*, 2007.

well-designed process can indicate where and when course corrections are needed to improve safety performance.<sup>25</sup>

Explained with examples in the report are three categories of safety performance measures:

- *Core measures, or outcome measures* to measure overall progress toward a goal or objective, e.g., number of crashes
- *Behavioral measures* that relate to direct observations of behavior, e.g., safety belt use.
- *Activity measures* to document safety program implementation and track actions by law enforcement, education to reduce crashes, e.g., miles of guardrail installed.

### **FHWA, Pedestrian Safety Guide for Transit Agencies**

This Guide was prepared for a transit agency audience as an easy-to-use reference for improving pedestrian safety. It notes that:

*“In recent years, courts in several states have ruled that transit agencies are obligated to address the safety of passengers accessing the system, leaving the system, and transferring between vehicles.”*

As a result,

*“Transit agencies should consider the effects of the surrounding environment on pedestrians when planning service and stops, and they should implement changes that will increase the safety of passengers accessing the transit system.”<sup>26</sup>*

Tools for identifying pedestrian safety and access issues include: bus stop audit checklists, pedestrian catchment area facility inventories, pedestrian questionnaires, pedestrian behavior observation surveys, and pedestrian crash analyses.

Approaches that can be taken to enhance pedestrian safety and access can be divided into two broad categories: (1) taking internal action to raise awareness throughout the agency (e.g., creation of a bus stop coordinator position, making bus stop improvement an on-going program), and (2) developing partnerships—with the local, regional and state agencies, and with the local traffic engineers and land use planners

Two sets of actions were described with the objective to increase the safety of pedestrians accessing transit:

- **Engineering actions:**
  - *sidewalk design*, to include width, surface, buffer, driveway crossings, lighting, signage, visual obstructions.
  - *roadway and LRT crossings*, to include marked crosswalks, median islands, curb extensions, reducing curb radii, narrowing travel lanes, pedestrian warning signs, pedestrian signals.

<sup>25</sup> FHWA, *A Primer on Safety Performance Measures for the Transportation Planning Process*, 2009, pp. 10-13.

<sup>26</sup> FHWA, *Pedestrian Safety Guide for Transit Agencies*, 2008, p. 1.

<sup>26</sup> FHWA, *Pedestrian Safety Guide for Transit Agencies*, 2008, p. 1.

- *bicycle considerations*, to include bike lanes, shared-use lanes, safe areas.
- *transit stop location and design*, to include sight lines to approaching buses, positioning of the stop at nearby intersections, proximity to major nearby destinations, ease of transfers location with respect to traffic signals, bus loading zone and landing pad, shelters and waiting facilities, lighting.
- **Education and Enforcement actions** — public information materials and videos, safety education efforts.<sup>27</sup>

### 5.5.3 Summary

#### *Taking Steps to Institutionalize Safety in the Planning Process*

NCHRP project (08-76) is a study of ways to institutionalize transportation safety in the planning process. The project's Phase I report defined seven principles or steps that are needed to effectively establish safety as a convention or norm for a MPO. Examination of MAG's compliance with each of these principles shows it can be judged as in full (e.g., as exemplified by having a Transportation Safety Committee) or partial (e.g., integrate safety into the overall management system) compliance. Further, where there is partial compliance, implementation of the eventual recommendations from this Strategic Transportation Safety Plan will result in full compliance. In comparison with other MPOs, MAG appears to be farther advanced in its efforts to institutionalize safety in the planning process.

The safety culture described above in the NCHRP project related to the planning process has a counterpart for the transit operations in the FTA Transit Safety Guidebook.<sup>28</sup> This report provides a practical guidance on how to develop a desirable safety culture within a transit agency.

#### *Proactively Planning Bus Stops*

TCRP 19,<sup>29</sup> TCRP Synthesis 110,<sup>30</sup> FHWA's Pedestrian Roadway Safety Audit<sup>31</sup> and FHWA's Pedestrians Safety Guide<sup>32</sup> each, in different ways, deal with bus stop planning and design. Several themes are repeated:

- Transit operators should consider each stop as if they "owned" the stop.
- Improvement of existing stops should be a regular ongoing program.
- Design all new transit stops with pedestrians and bicyclists in mind.
- Give more attention to the last 500 feet of the bicyclist and pedestrian journey to the stop.

#### *Partnering among Transportation Functions*

TCRP Synthesis 110 and TCRP 125<sup>33</sup> stressed the importance of partnering between the transit operators and the traffic engineers. Such a working relationship may best be handled by a simple memorandum of understanding (MOU) between the operator and local agency. Another function where partnering is critical

<sup>27</sup> FHWA, *Pedestrian Safety Guide for Transit Agencies*, 2008, pp. 24-46.

<sup>28</sup> FTA, *Transit Safety Management and Performance Measurement, Volume 1: Guidebook*, 2011.

<sup>29</sup> TCRP Report 19, *Bus Stop Design and Location Guidelines*, 1996.

<sup>30</sup> TCRP Synthesis 110, *Commonsense Approaches for Improving Transit Bus Speeds*, 2013.

<sup>31</sup> FHWA, *Pedestrian Road Safety Audit Guidelines and Prompt Report*, 2007.

<sup>32</sup> FHWA, *Pedestrian Safety Guide for Transit Agencies*, 2008.

<sup>33</sup> TCRP Report 125, *Guidebook for Mitigating Fixed-Route Bus-and-Pedestrian Collisions*, 2008.

would be between bicycle planners and traffic engineers. If this involves two different departments within a local agency, it would require a simple protocol being established between the two departments.

### **Improving Pedestrian and Bicyclist Data Collection**

All of the research reports stressed performance measurements. The foundation for accurate measurements are data, typically crash-related and data related to proximity between intersections and bus stops.

## **5.6 PEER AGENCIES STATE-OF-THE-PRACTICE**

### **5.6.1 DRCOG (Denver Regional Council of Governments)**

DRCOG's *Metro Vision 2035 Plan* includes the Denver region's adopted *2035 Metro Vision Regional Transportation Plan* (adopted in February 2011). They are presently generating a new RTP, *2040 Metro Vision Regional Transportation Plan*, and it is scheduled for adoption in late 2014.

#### **Principles Provide the Foundation for the RTP**

DRCOG references safety in the *Metro Vision's* Transportation Vision and Goals and includes as one of 14 policies one that specifically deals with safety:

Policy #7. Safety. Develop and maintain a safe transportation system for all users.

In the RTP the safety policy is expressly related to pedestrian facilities and bicycle facilities, and two action strategies are listed:

- Emphasize projects on existing and future facilities that will reduce the likelihood of severity of crashes involving motor vehicles, trains, bicycles, and pedestrians; and
- Support legislation aimed at cost-effectively improving the safety of drivers, passengers, pedestrians, and bicyclists.

#### **Pedestrian and Bicycle Element of the 2035 Metro Vision RTP (adopted 2009)**

Ten additional specific pedestrian design and planning policies for facility planning and facility design are part of the *DRCOG Pedestrian and Bicycle Element of the 2035 Metro Vision RTP* (adopted 2009). The RTP notes that

*"Comfort and safety are critical factors related to pedestrians. Convenient, safe and well-lighted sidewalks and trails can encourage people to walk instead of drive. In 2009, 26 pedestrians were killed along roadways in the Denver region. When compared to the 157 total traffic fatalities in the region for that year, this is a disproportionately high percentage (17 percent) considering the length of time of travel by walking."*<sup>34</sup>

Directly related to safety, this *Element* includes a subsection of a chapter 3 (regarding data) that is titled "pedestrian and bicycle crashes." The report contains 41 policies that local agencies are encouraged to adopt pertaining to bicycle and pedestrian facilities, plus offers design guidelines.

#### **Reports on Safety in the Denver Region**

Periodic reports have been published specific to safety:

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<sup>34</sup> DRCOG, *2035 Metro Vision*, 2011, p. 63.

- *Report on Traffic Safety in the Denver Region (2011)*. This report contains facts and figures about crashes: data, characteristics, specific types, high incidence locations, and issues related to high risk behavior.
- *Pedestrian and Bicycle Safety in the Denver Region (2012)*. This report contains facts and figures on pedestrian and bicycle crashes—trends, locations, causes, demographics, and time, and concludes with mitigations strategies.
- *Regional Concept of Transportation Operations (2012)*. This report describes the collaborative five-year plan to improve operations performance across the region. Safety forms the basis of two of its three goals:
  - Goal 1. Provide reliable transportation for regional travelers.
  - Goal 2. Provide safe transportation operations for regional travelers and for public safety and construction/maintenance personnel.

For each of the goals they are further defined by: objectives, initiatives and performance measures.

#### **Safety as an Evaluation Factor**

In DRCOG's current RTP update process the project scoring evaluation criteria for regionally significant roadway capacity projects includes a "safety measure" which is weighted at 8% of the total scoring. The number of points are based on weighted crash rate (crashes per vehicle-mile) with injury and fatal crashes factored by 5. The top 10% of projects with the highest values are given 8 points, and the next 15% of projects are given 4 points.

The Draft TIP for 2016-2021 is in preparation and is expected to be approved in Summer 2014. "Crash reduction" is an evaluation criterion for three categories of roadway projects (% represents the weights proposed): capacity (7%), operational improvements (7%), and reconstruction (5%).

Another safety-related criterion in the Draft TIP is "multimodal connectivity." It covers a wide range of transit, HOV, bicycle and pedestrian features. The weights are 18% for each of the three roadway categories. For bicycle and pedestrian projects, safety is weighted 12%. The safety criterion has four measures: crash history, speed limit, facility lighting, and physical protection.

#### **5.6.2 NCTCOG (North Central Texas Council of Governments, Dallas-Fort Worth)**

NCTCOG's Regional Transportation Plan, titled *Mobility 2035: The Metropolitan Transportation Plan for North Central Texas-2013 Update*, was adopted in June 2013.

#### **Safety as Part of the RTP**

There are four goal themes that "support and advance the development of a transportation system that contributes to the region's mobility, quality of life, system sustainability, and continued project implementation."<sup>35</sup> Under these themes there are nine specific goals, one of which specifically addresses safety:

"Ensure adequate maintenance and enhance the safety and reliability of the existing transportation system."

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<sup>35</sup> NCTCOG, *Mobility 2035 – 2013 Update*, June 2013, p. 1.2.



With respect to the NCTCOG MTP development process, it is strategic in nature and safety is not directly a factor. The process includes evaluating each potential project based on its individual merits and how it figures strategically into the rest of the system and the priorities of the NCTCOG policy board.

Chapter 5 of the MTP is titled “Operational Efficiency” and includes a section titled “Transportation System Safety and Transportation System Security.” The section describes four core concepts that the NCTCOG safety program strives to involve partners in the planning and implementation process:

- Safety planning and implementation efforts.
- Data analysis and information system development.
- Safety education and training efforts.
- Innovative funding and partnership agreements.

Each one of these core concepts are detailed in the chapter providing information on related safety policies, programs, and initiatives.

Providing input to the planning process is the NCTCOG Regional Safety Advisory Committee. This technical committee is comprised of members from the local agencies, TxDOT, tollway authority, researchers and consultants. The purpose of the Committee is “...to assist in the development of regional safety policies, programs, procedures, projects, and activities that will help improve traffic safety throughout the region.”<sup>36</sup> In addition, NCTCOG has supplemented the committee with working groups on subjects such as: work zone safety, mobility assistance patrols, Manual on Uniform Traffic Control Devices, and school zone policy.

#### **Other Ways Safety is considered in NCTCOG’s Planning Process**

There are a number of examples where safety has been given prominence at NCTCOG:

- With regard to technical resources, within NCTCOG’s web site there is a page devoted to the Regional Safety Advisory Committee. Within that page there is a “one stop shop” technical library of nearly 50 “safety topic resources” divided into five categories: Highway Safety Improvement Program information, safety countermeasures and techniques, safety references, and traffic safety statistics, and safety newsletters.
- An annual fact sheet of safety program performance is produced and titled *NCTCOG Safety Program Performance Measures*. The fact sheet highlights (1) Crash and fatality data, (2) Contributing factors for fatality and serious injury crashes, (3) limited access roadway crash rates, (4) HazMat incident locations, (5) Freeway Incident Management Training Program course attendance, (6) Mobility Assistance Patrol Program assists, (7) and various updates on special projects that the NCTCOG Safety Program is involved in. NCTCOG plans to convert this fact sheet into what would become an annual state of the region report on transportation safety.
- A region-wide capital program placing a priority on implementation of what is called Veloweb, a network of off-street shared-use paths designed for use by bicyclists, pedestrians, and other non-motorized forms of transportation. NCTCOG also refers to this network as a “regional expressway” for bicycle transportation. There are 318 miles of existing Veloweb paths and 1,728 miles planned in the MTP by 2035.<sup>37</sup>

<sup>36</sup> NCTCOG, website, <http://www.nctcog.org/trans/safety/RegSftyWrkGrp.asp>.

<sup>37</sup> NCTCOG, *Mobility 2035 – 2013 Update*, “Mobility Options,” p. 6.18.



### 5.6.3 RTC (Regional Transportation Commission, Reno)

The RTC of Washoe County is the MPO for the urban area and the transit service provider, and also builds and maintains the regional roadway network. In this role, it prepared the *2035 Regional Transportation Plan* for the Reno-Sparks metropolitan area of Washoe County, Nevada.

#### *Safety as Part of the RTC Planning Process*

The RTP has a set of four Guiding Principles, followed by nine Goals that support those Principles:<sup>38</sup>

*Guiding Principle: Safe and Healthy Communities*

*Goals: Improve Safety*

The discussion in the RTP related to the goal on “improve safety” introduces the subject as follows:

*“RTC seeks to improve safety for all modes of transportation and is committed to Zero Fatalities goal. RTC tracks crash statistics for the region and monitors the safety impacts of transportation improvements. High crash corridors and intersections are prioritized for infrastructure and operational investments in this RTP.”<sup>39</sup>*

With regard to plan development, seven evaluation criteria were used in the RTP Project Prioritization process, one of which was “addresses high crash location or Road Safety Audit (RSA) findings.” Some of the projects were regional programs, for instance, “ADA, Pedestrian & Bicycle Facility Accessibility Improvements.” Each project/program was given one of three ratings: Yes / No / Partially or Further Analysis Needed.

The resulting RTP comprises 12 chapters, one of which is devoted to safety: Chapter 3, “Improving Safety.”<sup>40</sup> Subheadings within the chapter are titled:

- Planning for Safety
- Community Awareness & Education
- Operations
- Safety Design Improvements
- RTP Safety Projects

The RTP says this about safety: “*Planning and building a safe multi-modal transportation system for the traveling public is the most critical goal of the RTC.*”<sup>41</sup> The RTP further states that it works with Nevada DOT “...to create innovative regional and state-wide systems for collecting, analyzing, and sharing important safety information.”

<sup>38</sup> RTC, *2035 Regional Transportation Plan*, 2013, pp.19-22.

<sup>39</sup> RTC, *2035 Regional Transportation Plan*, 2013, p.22.

<sup>40</sup> RTC, *2035 Regional Transportation Plan*, 2013, pp. 42-47.

<sup>41</sup> RTC, *2035 Regional Transportation Plan*, 2013, p.42.

Partnering with the state and the local agencies is a key component of safety in the planning process. This feature is supported in the subsection regarding “planning for safety.” Here the RTP described a variety of partnering efforts that RTC is involved in:

- Incorporation of Nevada DOT’s *Strategic Highway Safety Plan (SHSP)* in the RTP.
- Support for the SHSP’s public service campaign “Zero Fatalities: Drive Safe Nevada.”
- Agency-wide focus on Critical Emphasis Areas (CEA) defined in the SHSP. Noteworthy is the following comment from the RTP: “*Because intersection crashes and incidents involving pedestrians and bicyclists are the most common on roads in the RTC planning areas, these CEAs receive the greatest focus in the RTP.*”<sup>42</sup>
- RTC’s *Pedestrian Safety Action Plan (PSAP)*. Noteworthy features of the PSAP are actions such as:
  - Encouraging the state to spend funds on bike and pedestrian safety improvement projects
  - A proactive approach to safety through both short-term and long-term strategies that will “*...institutionalize pedestrian safety by fostering Complete Streets implementation and equitable funding practices.*”
- Collection and analysis of crash data.
- Staff participation on Roadway Safety Audits.

#### **Other Ways Safety is considered in RTC’s Planning Process**

In addition to the planning process, RTC reflects transportation safety in a number of its other efforts, described below:

- **Pavement Preservation Program**—the desired effects of the program are to slow traffic to designated posted speed, reduce vehicular collisions, and provide space for non-auto users. RTC funds tactical roadway preservation programs while the local governments provide preservation services for non-regional roadways.
- **Web site Menu Item**—“Safety” is represented as one of six individual tabs on RTC’s home page.<sup>43</sup> Numerous safety public information materials are available as well as links to brochures, videos, planning documents and Nevada’s Strategic Highway Safety Plan. Categories include:
  - streets and highways and planning
  - public transportation
  - bicycling
  - walking
- **Performance Plans**—“*Performance plans will track the progress toward achieving these targets and will be used to facilitate a community dialog about the track record of the RTC’s transportation program.*”<sup>44</sup> Spurred on by safety-related provisions of MAP-21 RTC will be developing five performance plans in the future:
  - A chapter in the RTP (to be updated every four years)

<sup>42</sup> RTC, *2035 Regional Transportation Plan*, 2013, p. 43.

<sup>43</sup> RTC, website, <http://www.rtcwashoe.com/>.

<sup>44</sup> RTC, *2035 Regional Transportation Plan*, 2013, p.129.

- Annual Metropolitan System performance Report
- Annual Transit Performance Report
- Transit Asset Management Plan
- Public Transportation Safety Plan

In the current RTP performance measures were identified that included the MAP-21 national goals. Subsequently, in its *2013 Annual Report* RTC provided a status update on each measure and a comparison with the established target as shown in Table 3 taken from RTC's Annual Report.<sup>45</sup>

*Table 3 - Example of Tracking Safety-Related Performance (Reno RTC)*

National Performance Measure	RTP Goal	Annual Transit Performance Measures	Performance Target	2013 Performance Measure Status	2013 Performance Target Status
Safety Performance Measures	Improve Safety	Preventable transit accidents per 100,000 miles of service	• 0 (ongoing)	RTC RIDE 1.67 (Average of July 2013-December 2013)	Working toward goal
				RTC ACCESS 1.01	Working toward goal
		Number of crashes and number of crashes per vehicle miles traveled (VMT)	• Reduce by 50% by 2020	951	Working toward goal
		Number of serious injuries per VMT —	• Reduce by 50% by 2020	551	Working toward goal
		Number of fatalities and fatalities per VMT	• 0; reduce by 50% by 2020	9	Working toward goal
		Miles of bicycle lanes added and percent of the Bicycle Pedestrian Master Plan	• 3-7% of plan implemented per year	The master plan identified 148 miles of existing bicycle lanes and proposed adding 89.3 miles of bike lanes in the Bicycle and Pedestrian Master Plan RTC added: 2012- 2.9 miles of bike lanes - 2% 2013 - 8.4 miles of bikes lanes added-9%	Exceed goal

- **TIP Evaluation Process** —The TIP project prioritization process revolves around seven factors, one of which is safety, and two others are specific to multimodal connectivity, one for pedestrian and bicycle, and the other for transit.

<sup>45</sup> RTC, *2013 Annual Report*, 2013, p.20.

#### 5.6.4 SANDAG (San Diego Association of Governments)

SANDAG's 2050 Regional Transportation Plan (RTP) was adopted in October 2011. An update process is underway called *San Diego Forward: The Regional Plan*. This Plan will be a comprehensive update and will combine the RTP with the Regional Comprehensive Plan. Adoption is scheduled for July 2015. For purposes of the following discussion the focus will be on the on-going Regional Plan development process as opposed to the existing approved RTP.

##### *Safety as Part of the SANDAG Planning Process*

As part of a Regional Vision, three broad goals have been defined for *The Regional Plan*:

- Innovative Mobility and Planning
- Healthy Environment and Communities
- Vibrant Economy

Following the adoption of the goals SANDAG developed six policy objectives that are intended to provide a broad context in which local and regional decisions can be made that foster the above three goals. These six policy objectives are further subdivided into 12 detailed objectives. Safety is addressed in one of the policy objectives:

*Mobility Choices.* Provide safe, secure, healthy, affordable, and convenient travel choices between the places where people live, work, and play.

Within the transportation project ranking component of the Regional Plan there are six categories of projects: highway corridors (managed lanes and highway projects), transit services, active transportation, HOV connector, freeway connector, and rail-grade separations. Through an elaborate peer review and public involvement process evaluation criteria were developed for use in evaluating and prioritizing the transportation projects contained in the multimodal transportation network alternatives. Four of the categories include project safety as an evaluation criterion; the two project categories where safety is not included are transit services and HOV connectors. Table 4 shows the criteria, description, metric, and assigned weight for each of the four categories.<sup>46</sup>

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<sup>46</sup> SANDAG, Board Agenda Item 13-10-2, "San Diego Forward: The Regional Plan: Draft Transportation Project Evaluation Criteria," November 11, 2013.

*Table 4 - SANDAG RTP Project Evaluation Criteria*

Project Category	Weight	Description	Metric
Highway Corridors	5%	How does the project compare against the statewide average for collisions?	Proposed percentage of collisions measured against statewide average
Active Transportation	5%	Is the project located in an area with a high bicycle and pedestrian traffic incident rate?	Number of bicycle and pedestrian traffic incidents within 1/4 mile of project
Freeway Connector	5%	How does the project compare against the statewide average for collisions?	Project percentage of crash rates measured against statewide averages
Rail Grade Separations	11%	Accident history in the past five years	Number of qualifying accidents involving vehicles, pedestrians, and bicycles with trains, not including accidents involved in attempted suicides

**Other Ways Safety is considered in SANDAG’s Planning Process**

**Complete Streets.** A Regional Complete Streets Policy is scheduled to be approved by the SANDAG Board by the end of 2014. Of particular interest to multimodal transportation safety will be to follow what is decided with regard to the eventual regional role of SANDAG in the implementation of Complete Streets throughout the region. Substantive policy choices are being discussed related to the level of involvement SANDAG should have as it works with its member agencies to incorporate Complete Streets policies and practices within the local general planning process and to what extent the policy should influence the project development and implementation process at SANDAG.

**Active Transportation.** Aided by a local sales tax transportation measure which allocates 2% of total funds for pedestrian and bicycle projects, SANDAG promotes an aggressive Active Transportation Program.

One example of the program is related to safety and access to transit: upon adoption of SANDAG’s 2050 RTP, the SANDAG Board of Directors committed to development of a Safe Routes to Transit Regional Plan. The objective of this plan will be to prioritize projects and develop programs that would enhance bicycle and pedestrian access to/from and around existing and planned transit stops and stations. Specifically, the Plan would incorporate active transportation planning in the development of new transit stations, to provide bicycle and pedestrian access improvements in station areas. SANDAG staff work is underway to identify Safe Routes to Transit projects that would be included in *San Diego Forward: The Regional Plan*.

To guide allocation of funds and advise on active transportation projects SANDAG has an Active Transportation Working Group that provides technical oversight. The safety function is represented on the working group through the Safe Routes to School Advocacy, and other local active transportation advocacy organizations.

Further guiding the allocation of funds SANDAG has developed capital project scoring criteria for its Active Transportation Grant program. Safety is one of 16 evaluation categories, weighted at 8%. The criterion for safety is as follows:

Category: Safety Improvements and Overcoming Barriers

Criterion: Completes connection in existing network at location with the documented safety hazard or accident history. (12 points maximum)

- A. 1-2 correctable crashes involving nonmotorized users within the last 7 years (2 points)
- B. 3-4 correctable crashes involving nonmotorized users within the last 7 years (4 points)
- C. 5 or more correctable crashes involving nonmotorized users within the last 7 years (6 points)

and/or

Creates access or overcomes barriers in area where hazardous conditions prohibited safe access for bicyclist and pedestrians. (6 points)<sup>47</sup>

**Safety-Related Services.** While not directly related to transportation planning, SANDAG provides a variety of transportation safety-related services:

- **“511”**—this is a free phone and web service that offers up-to-the-minute information on traffic conditions, incidents and driving times as well as transit information for the San Diego’s regional transportation network.
- **Call Box Program**—this program provides free motorist aid service to help travelers who experience troubles on a highway
- **Freeway Service Patrol**—this is a service provided free to motorists on select freeways in the region that improves safety for stranded motorists and reduces traffic congestion during peak hours. The service is provided by a roving fleet of tow trucks and pickup trucks.

**Performance Measures.** While SANDAG produces an annual *State of the Commute* report the focus is on traffic flow in the region’s major corridors and transit ridership.

In the current Regional Plan process SANDAG has adopted a set of performance measures to be used to evaluate the multimodal transportation network alternatives against one another. The purpose was “...to highlight the performance of the plan in a more clear and easy to understand way...” The system performance will be judged by answering 10 key questions, one of which is about safety:

*Is the transportation system safer?*

To address the question there are two measures that will be used:

1. Annual projected number of vehicle (driver/passenger) injury/fatal collisions per vehicle miles traveled (VMT).
2. Annual projected number of bicycle/pedestrian injury/fatal collisions per bicyclist/pedestrian miles traveled (BPMT).<sup>48</sup>

<sup>47</sup> SANDAG, *Active Transportation Grant Program Guidelines*, 2014, p. 25.

<sup>48</sup> SANDAG, Regional Planning Technical Working Group, Agenda Item No. 6, “San Diego Forward: The Regional Plan: Draft Performance Measures,” October 10, 2013; and <http://www.sdfoward.com/mobility-planning/evaluating-projects>.

### 5.6.5 WFRC (Wasatch Front Regional Commission, Salt Lake City)

The WFRC's current Regional Transportation Plan (RTP) was adopted in May 2011. An update is underway and adoption of a new RTP is scheduled for May 2015.

#### *Safety as Part of the Long-Range Planning Process*

WFRC presents a unique transportation plan development process that begins with a visioning document *Wasatch Choices 2040, a Four-County Land-use and Transportation Vision*. Four alternative growth scenarios were developed and compared. That process led to a set of "growth principles and objectives for transportation planning", one of which was "Ensure Public Health and Safety." These principles and objectives provided the foundation for ten strategies for local governments to consider in the implementation of the principles and objectives.

While not directly titled safety, one of the strategies pertained to the "health and safety" principle. This was "Strategy VIII: Interconnect Roadways and Pedestrian Paths." Three objectives were defined and one was safety-related: "provide safe access to, and use of, all modes of transportation." Seven planning steps were outlined for implementation of this strategy. Two of those steps are:

- *"Develop a strategy for priority modifications to the existing road and pedestrian travel system to improve access to transportation facilities. This strategy should examine both auto and non-auto access.*
- *Plan roads to support many forms of travel, such as auto, bike, pedestrian, transit, and trail systems. With the establishment of a connected street pattern, walkable street cross-sections on many arterials that fit with planned walkable development can be adopted. These include ample sidewalks, parks trips with street trees, on-street parking to provide a safety buffer for pedestrians and to slow traffic, sidewalk bulb-outs, and narrower street widths."*<sup>49</sup>

The RTP is separate document called *Charting our Course, Technical Report 50, 2011-2040 Regional Transportation Plan*. The RTP does not have a chapter devoted to safety.

Thirteen evaluation criteria were used in the plan development process. One was "safety" which was defined as:

*The current average crash rate and severity index on state roads in which roadway and public transit projects are proposed.*

Active living principles are part of the RTP and includes several directly related to safety:

- *Promote Complete Streets designs and ordinances.*
- *Encourage provision of active links to new transit stations/stops as well as improved access for existing transit, including safe convenient bike paths and pedestrian routes.*
- *Recommend a four-foot paved shoulder along new or improved shared roadways to improve the safety and convenience of bicyclists and motorists.*
- *Recommend that new sidewalks provide at least a 3-foot buffer in all urban areas to separate pedestrians from faster moving vehicles, such as bikes and automobiles.*<sup>50</sup>

<sup>49</sup> WFRC, *Wasatch Choices for 2040*, 2011, p. 41

<sup>50</sup> WFRC, *Charting Our Course 2040, Regional Transportation Plan*, 2011, pp. 224-225.

WFRC's RTP includes a set of five recommended actions to accommodate multiple modes in the public right-of-way, among them are these three:

- *“Adopt a Wasatch Front Regional Council Complete Streets Policy.*
- *Encourage jurisdictions to adopt pedestrian, bicycle, and transit elements in their General Plans, policies and ordinances.*
- *Develop a best practices manual for the region.”<sup>51</sup>*

Performance of the recommended plan includes safety; however, a surrogate measure is used, percentage of PM peak period VMT at LOS “D” or better.

The update process includes four long-range development scenarios. A set of 17 evaluation criteria have been used to compare the scenarios. One of the criteria is under “health and safety” and is titled “potential severe crash avoidance.” This a quantitative index that measures the number of severe crashes that could be reduced through the proposed transportation projects in each scenario.

#### **Other Actions Related to Transportation Safety**

WFRC has taken a number of actions that reflect an increased emphasize on transportation safety:

- *“A five-year Wasatch region transportation safety plan is underway.*
- *Under consideration is an annual report on regional transportation system performance that will include crash data from UDOT.*
- *The TIP project submittal forms require five years of accident data by fatality, injury and property damage. The form also includes a note that “accident data information is critical.”*

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<sup>51</sup> WFRC, *Charting Our Course 2040, Regional Transportation Plan*, 2011, pp. 228.

### 5.6.6 Summary

A summary of safety-related practices of the five MPOs reviewed above is provided in Tables 5 and 6.

*Table 5 - Safety in the RTP Development Process -- Comparison of Peer Agencies with MAG*

MPO	RTP		Safety Committee?	Goals/Policies	
	Date Last Adopted	Forecast Year		How is Safety Considered?	Specific Safety Goal(s), Policy(ies), or Objective(s)
MAG	Initially adopted in 2003 with latest Update adopted in January 2014	2035	Yes, Transportation Safety Committee (technical committee)	Safety is included in one of four broad RTP goals; these four goals contain 15 more specific objectives of which one is related to safety.	<i>Goal 1:</i> System Preservation and Safety. <i>Objective 1B:</i> Provide a safe and secure environment for the traveling public, addressing roadway hazards, pedestrian and bicycle safety, and transit security.
Denver Regional Council of Governments (DRCOG)	February 2011; Update scheduled for end of 2014 adoption	2035; Update will be 2040	No Safety Committee; the Regional Transportation Operations Working Group has safety members and is seeking to increase their membership.	Transportation Vision and Goals reference safety, and safety is included as one of 14 policies	Policy #7. Safety. Develop and maintain a safe transportation system for all users.
North Central Texas Council of Governments (NCTCOG, Dallas-Ft. Worth)	June 2013	2035	Yes, Regional Safety Advisory Committee (a technical committee)	Four goal themes. Under "System Sustainability" there is the goal: "Ensure adequate maintenance and enhance the safety and reliability of the existing transportation system."	Four goal themes that "support and advance the development of a transportation system that contributes to the region's mobility, quality of life, system sustainability, and continued project implementation." Under these themes there are nine specific goals, one of which specifically addresses safety: "Ensure adequate maintenance and enhance the safety and reliability of the existing transportation system."
Regional Transportation Commission of Washoe County (RTC, Reno)	April 2013	2035	No Safety Committee; a member of staff serves as the agency safety officer which includes oversight of transit stops/stations	Four Guiding Principles, safety is part of one: Safe and Healthy Communities.	Nine goals were adopted to support the Guiding Principles. One of which is: "Improve Safety."
San Diego Association of Governments (SANDAG)	October 2011; Update scheduled for July 2015 adoption	2050; Update will be 2050	No Safety Committee; Safe Routes to School Advocacy is represented on Active Transportation Working Group	Three broad goals have been defined for the Regional Vision. There are 12 objectives under the goals and safety is contained in one of the objectives.	Objective: Provide safe, secure, healthy, affordable, and convenient travel choices between the places where people live, work, and play.
Wasatch Front Regional Council (WFRC, Salt Lake City)	May 2011; Update scheduled for May 2015 adoption	2040; Update will be 2040	No Safety Committee	Safety is one of eight goals	Goal: Increase transportation safety and security for all modes of travel. Objective: Identify the most critical safety needs in the transportation system and select projects and improvements that will reduce the accident rate at specific locations.

*Table 6 - Safety in the RTP Development Process -- Comparison of Peer Agencies with MAG – Ways Safety is Considered in Planning Process*

MPO	Ways Safety is Considered in Planning Process			
	Separate Chapter in RTP?	Evaluation Criteria	Other	Performance Measures
MAG	Yes, "Chapter 21, Transportation Safety" is one of 23 chapters contained in the RTP.	Safety related criteria were not explicitly used in the RTP plan evaluation process. However, the programming process incorporates safety criteria for evaluating project submittals for funding in these areas: transit, pedestrians and bicycles (federal Transportation Alternatives Program, TAP) and the regional Design Assistance Program. The TAP process is especially exemplary: safety representatives are on the evaluation team, safety measures are included as criteria, and the criteria are weighted.	MAG <i>Strategic Transportation Safety Plan (STSP)</i> completed in 2005; Update is underway and will be completed in January 2015.	The MAG web site includes a web-based dashboard, called <i>MAGnitude</i> , which provides quantitative and visual summaries of transportation performance management in the region. On one of its pages ("Corridor") there is a series of charts displaying annual crash data (focused on arterial streets). The current STSP process (i.e., <i>Technical Memorandum Nos. 3 and 4</i> ) contain a roster of performance measures related to vulnerable users ( <i>TM No. 3</i> ) and network screening ( <i>TM No. 4</i> ).
Denver Regional Council of Governments (DRCOG)	No	Safety measure is one of 10 "project scoring evaluation criteria" for the 2040 RTP regionally significant roadway capacity projects; it receives up to maximum 8 points (i.e., 8% weight). The <i>Draft 2016-2021 TIP</i> includes safety as a criterion for three categories of roadway projects and for bicycle-pedestrian projects.	Additional design policies are contained in the Pedestrian and Bicycle Element of the RTP. Three comprehensive reports published related to safety: (1) <i>Report on Traffic Safety in the Denver Region (2011)</i> , (2) <i>Pedestrian and Bicycle Safety in the Denver Region (2012)</i> , (3) <i>Regional Concept of Transportation Operations (2012)</i> .	Transportation system performance is measured and tracked as part of the <i>Report on Traffic Safety in the Denver Region</i> and provides benchmark statistics on trends, and describes safety related programs. Included are 20 tables and 12 figures/charts.
North Central Texas Council of Governments (NCTCOG, Dallas-Ft. Worth)	No; however, Chapter 5 of the RTP is titled "Operational Efficiency" and includes a section titled "Transportation System Safety and Transportation System Security."	The RTP development process was strategic in nature and safety was not directly a factor.	Transportation Safety Performance Measures Report: crash and fatality statistics, crash rates, freeway incident management program, mobility assistance patrol program, update on safety related projects. An on-line safety technical resource library is maintained on the NCTCOG website. An annual fact sheet of safety program performance is produced.	The annual fact sheet includes facts and figures on the following: (1) Crash and fatality data, (2) Contributing factors for fatality and serious injury crashes, (3) limited access roadway crash rates, (4) HazMat incident locations, (5) Freeway Incident Management Training Program course attendance, (6) Mobility Assistance Patrol Program assists, (7) various updates on special projects the NCTCOG Safety Program is involved in. In future years it is planned that this fact sheet will be converted into an annual summary of transportation safety in the NCTCOG region.

Table 6 - Safety in the RTP Development Process -- Comparison of Peer Agencies with MAG – Ways Safety is Considered in Planning Process Continued

MPO	Ways Safety is Considered in Planning Process Continued...			
	Separate Chapter in RTP?	Evaluation Criteria	Other	Performance Measures
Regional Transportation Commission of Washoe County (RTC, Reno)	Yes, Chapter 3, "Improving Safety"	Seven evaluation criteria were used in the RTP Project Prioritization process, one of which was "addresses high crash location or Road Safety Audit (RSA) findings." Some of the projects were regional programs, for instance, "ADA, Pedestrian & Bicycle Facility Accessibility Improvements." The project/program is given one of three ratings: Yes / No / Partially or Further Analysis Needed.	RTC has numerous partnering projects with the state and the local agencies. A comprehensive <i>Annual Metropolitan System Performance Report</i> on transportation is produced; one chapter deals with Transportation Performance and the status of each performance measure and its target are reported. In addition, the following performance plans are underway as a result of MAP-21: <i>Annual Transit Performance Report</i> , <i>Transit Asset Management Plan</i> , <i>Public Transportation Safety Plan</i> . The RTC web site home page has "safety" as one of six menu items.	Annual Performance Measures- Safety: (1) preventable transit accidents per 100,000 service-miles, (2) number of crashes (vehicle, bike, pedestrian) and number of crashes/VMT, (3) number of serious injuries per VMT, (4) number of fatalities (vehicle, bike, pedestrian) and number of fatalities per VMT, (5) miles of bike lanes added and % of <i>Bicycle Pedestrian Master Plan</i> completed, (6) miles of sidewalks added or enhanced and % of <i>ADA Transition Plan</i> completed. Performance targets for each are set.
San Diego Association of Governments (SANDAG)	No	There are six categories of projects and four include safety as a weighted factor(s): Highway Corridors-5%, Active Transportation-5%, Freeway Connectors-5%, Rail Grade Separations-11%	SANDAG's Active Transportation Program includes a Safe Routes to Transit Master Plan, now under development. \$200 million in local funds have been programmed in the RTP for active transportation projects and plans. Other safety activities include: a 511 phone number for regional traveler information; call box program, freeway service patrols.	An annual State of the Commute report is prepared; however, safety has not been included. In the RTP (in progress), performance will be summarized and for safety the question is asked, "is the system safer?" Measures are: (1) Annual projected number of vehicle injury/fatal collisions per VMT, and (2) Annual projected number of bicycle/pedestrian injury/fatal collisions per BPMT.
Wasatch Front Regional Council (WFRC, Salt Lake City)	No; "Safety and Homeland Security" subheadings are part of Chapters 3 and 7, "Needs Assessment" and "Planned Improvements," respectively	In the Visioning process underway four alternative scenarios were evaluated with safety as one of 17 factors. The criterion was "potential severe crash avoidance" which was an index developed to measure severe crashes that could be reduced as a result of the scenario. The RTP used 13 evaluation criteria for evaluating system alternatives, including one for safety; it was defined as the average crash rate and severity index on state roads in which roadway and transit projects were proposed. In the TIP process safety is one of 11 STP criteria.	A five-year regional transportation safety plan is underway. The TIP project submittal forms require five years of accident data by fatality, injury, and property damage. The form notes that "accident data information is critical."	Performance is reported in the RTP; however, a surrogate measure is used for safety: % of PM peak period VMT at LOS "D" or better.

### **Prominence of Safety throughout the Planning Process**

Some examples of how other MPOs are incorporating a greater emphasis on safety in the planning process:

- *Using Weighted Criteria in the RTP Evaluation Process.* SANDAG includes safety as an evaluation criterion in its regional transportation plan evaluation process for four project categories: highway corridors, active transportation, freeway connector, and rail grade separations. The weights range from 5% to 11% depending on category.
- *Using Weighted Criteria in TIP Project Evaluation Process.* DRCOG's Draft TIP for 2016-2021 is in preparation and is expected to be approved in summer 2014. "Crash reduction" is an evaluation criterion for three categories of roadway projects: capacity (7%), operational improvements (7%), and reconstruction (5%), with weights ranging between 5% and 7%. For bicycle and pedestrian projects, safety is weighted 12%.
- *Requiring Safety be Addressed in all TIP Project Submittals.* WFRC's TIP project submittal forms require five years of accident data by fatality, injury and property damage. The form also includes a note that "accident data information is critical."
- *Establishing Policies that would Promote Enhanced Safety at the State and Local Levels.* Reno's RTC has a *Pedestrian Safety Action Plan*. Actions in the plan call for the state to spend funds on bicycle and pedestrian safety improvement projects. Another action promotes a proactive approach to "institutionalize" pedestrian safety by fostering Complete Streets implementation.
- *Encourage Bicycle and Pedestrian Capital Plans and Projects.* SANDAG is developing a Safe Routes to Transit Master Plan that will be used to prioritize projects and develop programs that would enhance bicycle and pedestrian access to/from and around existing and planned transit stops and stations. NCTCOG is implementing a plan for 1,728 miles of "Veloweb," an off-street system of shared-use bicycle-pedestrian paths.

### **Prominence of Safety through Comprehensive Reporting**

DRCOG produces three comprehensive reports on transportation safety (traffic safety, pedestrian and bicycle safety, transportation operations). In addition, and in response to MAP-21, they will be producing a Public Transportation Safety Plan. NCTCOG has produced an annual multi-page fact sheet on multi-modal safety performance in the region. In future years they plan to convert this fact sheet into an annual state of the region report on transportation safety.

### **Prominence of Safety through Performance Monitoring**

Reno's RTC tracks safety performance in its Annual Report and measures the status toward reaching established targets. In NCTCOG's annual fact sheet they produce facts and figures on a variety of safety-related matters: (1) crash and fatality data, (2) contributing factors for fatality and serious injury crashes, (3) limited access roadway crash rates, (4) HazMat incident locations, (5) freeway incident management-first responder course attendance, (6) mobility assistance patrol program assists, (7) wrong-way driving pilot project, and (8) intersection improvement plan.

### **Prominence of Safety through Availability of Technical Resources**

NCTCOG's web site devotes a page to its Regional Safety Advisory Committee. Within that page there is a technical library of nearly 50 safety topic resources divided into five categories: Highway Safety Improvement Program information, safety countermeasures and techniques, safety references, and traffic safety statistics, and safety newsletters.

## 5.7 RECOMMENDED TRANSPORTATION SAFETY ACTIONS IN THE PLANNING AND PROGRAMMING PROCESS

### 5.7.1 Increasing Transportation Safety Awareness through the Planning and Programming Process

Within MAG the foundation is in already place for instituting an agency-wide “transportation safety culture.” As reported above there are numerous ways safety is already promoted throughout the agency. Even so, more can be done to ensure this safety culture exists in daily practice. How? Primarily by developing—and carrying forward on a continuous basis—safety awareness in every step of the planning process and programming process.

Typically for MPOs, other than safety being included in its RTP goals, transportation safety has resided at the project design level and depended on the design practices being used. That situation, which placed the responsibility for system-wide performance in the hands of the project designers and engineers, is no longer good enough. To be serious about the vision of **Zero Deaths – Zero Injuries** requires a total focus on safety at every level of project development, from the corridor-level in the RTP through the programming in the TIP, to the point where the project is finally being implemented.

#### *The RTP: Establishing the Foundation for Transportation Safety*

At MAG this recommended planning process can be diagrammed as shown in Figure 3. First of all, the process starts with an emphasis in the RTP’s goals and objectives. The current reference to safety in the first goal, shown below, adequately addresses this emphasis.

*Goal 1: System Preservation and Safety.*

On the other hand, it is recommended that the related objective 1B be changed to delete the word “hazards” and replace it with the word “safety.” This use of the word “hazards” is too restrictive whereas “safety” has a broader and more appropriate scope.

*Objective 1B: Provide a safe and secure environment for the traveling public, addressing roadway ~~hazards~~ safety, pedestrian and bicycle safety, and transit security.*

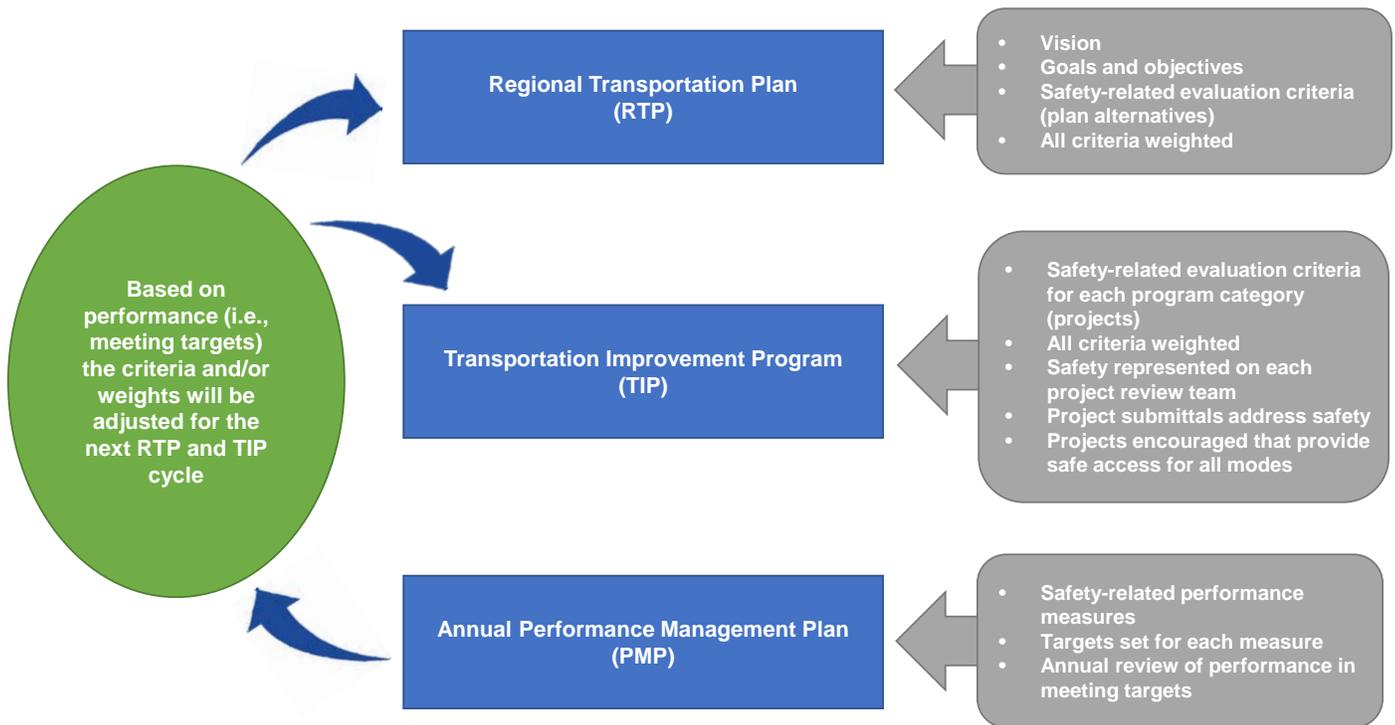


Figure 3 – Recommended MAG Planning Process

Other aspects of the integration of safety at each step include the following:

- Include safety-related criteria in the plan evaluation process of the RTP as well as in all MAG-produced planning documents.
- Include a weighting of criteria.
- Incorporate a formal Performance Management Plan (PMP) that will include measures, targets, and a review of safety performance.
- Reflect the status of achieving the safety-related performance targets resulting from the annual PMP review at the initiation of each RTP update (i.e., with regard to the evaluation criteria used and corresponding weights).
- Consider RTP policies that promote enhance transportation safety, for example:
  - Improved and targeted data collection by encouraging the State to improve the accident data report form as it relates to pedestrian and bicyclist crashes to identify a potential relationship to a nearby transit stop.
  - Expanded safety training by encouraging member police departments to be trained to include any potential relation of a bicycle/pedestrian crash to an adjacent transit stop location on the police report narrative until a check box can be added to the Statewide Accident Report Form.
  - Promoting opportunities, through funding incentives, for local agencies to develop and move forward with an implementation plan for Complete Streets and safe routes to transit policies.

Example evaluation criteria is shown in Table 7. Use of evaluation criteria is common in most MAG planning documents as shown in the table. Other examples are taken from the MPO case studies reviewed above. Within the RTP process the criteria will necessarily be at a broader level, e.g., for a corridor or roadway section. Also, the criteria will normally reflect crash history rather than provide predictive data for the corridor or section.

*Table 7 – Sample Evaluation Criteria*

Sample Evaluation Criteria	
Streets, Roadways, Highways, Freeways	Is the project located along a high crash corridor, or will the project help to mitigate a specific safety problem?
	Is the project located in an area / segment with high vehicular crash rate? Measure: Crash rate exceeds statewide average
	Number of crashes and number of crashes per VMT
	Number of serious injuries per VMT
	Number of fatalities and fatalities per VMT
	The current average crash rate and severity index on state roads in which roadway and public transit projects are proposed.
	Project's estimated crash reduction and weighted crash rate
	Project addresses high crash location or Road Safety Audit (RSA) findings
	Average crash rate and severity index on state roads in which roadway and transit projects were proposed
	Excess proportions of specific crash types (STSP Technical Memorandum No. 4)
Transit	Does this project improve the safety of transit users or providers?
	Directly addresses pedestrian and bicyclists traffic safety concerns
Pedestrians & Bicycles	Number of safety improvements
	Improved safety from residences to K-8 schools/addresses SRTS
	Project reduces bike/vehicle or ped/vehicle conflicts
	Project addresses quantifiable and /or perceived crash risk
	Is the project located in an area with a high bicycle and pedestrian traffic incident rate?
	Number of bicycle and pedestrian traffic incidents within 1/4 mile of project
	Completes connection in existing network at location with documented safety hazard of accident history. Measure: No. of correctable crashes involving nonmotorized users within last 7 years
	Creates access or overcomes barriers in area where hazardous conditions prohibited safe access for pedestrians and bicyclists
	(1) Relevant crash history, (2) Speed limit, (3) Facility lighting, (4) Protected or grade separated facility
	ADA, Pedestrian & Bicycle Facility Accessibility Improvements. Three choices: Yes / No / Partially or Further Analysis Needed
RR Crossings	Accident history in the past five years. Number of qualifying accidents involving vehicles, pedestrians, and bicyclists with trains, not including accidents involved in attempted suicides

Note: Shaded entry reflects MAG programming process

### ***The TIP: Translating Transportation Safety into Project Programming***

In terms of using the region's financial resources in a way to improve transportation safety as quickly as possible it will be by implementing projects through the TIP process. Recommended components of the TIP submittal and evaluation process are the following:

- Include safety-related criteria in all programs and modes that are part of the TIP evaluation process.
- Include a weighting of criteria.
- Establish a safety presence for TIP project review. Include at least one member from the Transportation Safety Committee on each review team. This involvement should extend to the weighting of evaluation criteria.
- Require that safety be addressed on all TIP project submittals.
- Encourage submittal of TIP projects that include safety elements, for improving safer access for all modes, by including safety as an explicit project evaluation criteria for all TIP projects. MAG staff, with oversight by the Safety Committee, will develop the Safety Evaluation Criteria including guidelines for scoring projects. The actual safety scoring could be done by individual modal committees as part of their normal TIP project review process.
- Reflect the status of achieving the safety-related performance targets resulting from the annual PMP review at the initiation of each TIP update (i.e., with regard to the evaluation criteria used and corresponding weights).

For the TIP process evaluation criteria will be project-related. As with the RTP historical data will normally be the basis for the criteria used. Table 8 shows a variety of different ways both quantitative and qualitative criteria can be developed and employed.

### ***The PMP: Continuous Measurement of Transportation Safety Performance***

By virtue of the federal MAP-21 legislation there is increasing attention to performance management and its practical, continuous use in measuring overall transportation system performance. This increased attention fits right in with MAG's existing performance management program. The primary changes can be dealt with through increased emphasis on transportation safety. This increased emphasis can be developed through a additional safety-related performance measures being tracked, and targets set that are measured and reported on each year. Then, depending on how well the targets are being achieved, changes to evaluation criteria (and corresponding weights) will transferred to the RTP and TIP processes.

Table 8 provides a list of example safety-related performance measures, starting with those defined in MAP-21, including some by mode, and adding ones recommended in the STSP Technical memorandum No. 3 for vulnerable road users. The recommended MAG PMP process would be carried out with the following components:

- Preparation of an annual MAG Performance Management Plan that includes (1) safety-related measures covering all modes, (2) corresponding targets, and (3) based upon prior year performance, resulting recommended actions (i.e., RTP, TIP, policies) going forward.

Table 8 – Sample Performance Measures

Sample Performance Measures	
MAP-21	Total number of fatal crashes
	Total number of severe injury crashes
	Fatalities per VMT
	Serious injuries per VMT
Streets, Roadways, Highways, Freeways	Is the system safer? Annual projected number of vehicle injury/fatal collisions per VMT
	Number of crashes (vehicle, bike, pedestrian) and number of crashes/VMT
	Number of serious injuries per VMT
	Number of fatalities (vehicle, bike, pedestrian) and number of fatalities per VMT
	(1) Crash and fatality data, (2) Contributing factors for fatality and serious injury crashes, (3) limited access roadway crash rates, (4) HazMat incident locations, (5) freeway incident management-first responder course attendance, (6) mobility assistance patrol program assists, (7) wrong way driving pilot project, (8) intersection improvement plan
Transit	Preventable transit accidents per 100,000 miles of service
Pedestrians & Bicycles	Miles of bicycle lanes added
	Percent of the Bicycle Pedestrian Master Plan completed
	Percent of ADA Transition Plan completed
	Number of citations issued for jaywalking
	Miles of sidewalks added or enhanced
	Is the system safer? Annual projected number of bicycle/pedestrian injury/fatal collisions per BPMT.
STSP Technical Memorandum No. 3, related to Vulnerable Road Users	Number of pedestrian crossing enhancements installed such as HAWKs, pedestrian crossing islands
	Number or % of MAG member agencies that combine safety with multimodal connectivity reviews in planning and design
	Number or % of MAG member agencies with complete streets policies that rely upon safety analysis and design
	Number or % of traffic signals with bicycle detection
	Number or % of MAG member agencies with bicycle wrong-way riding prohibitions
	Reduction in serious injury and fatal crashes involving a pedestrian
	Number of pedestrian deaths and serious injuries
	Reduction in serious injury and fatal crashes involving a bicyclist
	Number of bicyclist deaths and serious injuries

### 5.7.2 Improving Multimodal Transportation Safety

As a conclusion to Task 5, and input to subsequent STSP tasks, the following section includes suggestions for MAG to consider as projects and practices for improving intermodal safety between transit, pedestrians and bicyclists. These projects and practices will be further discussed with the Task 5 STSP Working Group in July 2014, refined and modified in Tasks 6-8, and implementation actions developed in Task 9 ultimately resulting in a 10-year implementation plan. The suggested projects and practices are separated into three categories—engineering, education, and enforcement—and are as follows:

- Engineering
  - Collection by local agencies of data related to transit stop-related pedestrian/bicycle crashes. For example, conduct a system wide review of transit stops to compare transit boardings to nearby pedestrian and bicyclist crash crossing locations to identify bus stop/crossing locations in need of further study.
  - Encourage the establishment of RSA's for transit stops near pedestrian and bicyclist crash locations.
  - Encourage the use of crossing improvement treatments to assist pedestrian access to transit along arterial streets at non-signalized locations such as median refuge islands, two-stage crossings, two-stage traffic signals, RRFBs, PHBs, and street lighting.
  - Conduct studies at Light Rail Transit platforms to review pedestrian behavior and identify pedestrian safety improvements that would either involve education, enforcement or engineering measures to eliminate the risky behavior.
  - Review Valley Metro Bus Stop location and design procedures to assure the practices in prior years continue to be appropriate and continue to be used for the establishment of new routes or revisions to existing routings/stops.
- Education
  - Develop and fund an annual region-wide program for educating the public as to safe pedestrian and bicyclist practices.
  - Develop a program to educate transit operators to continuously monitor and record transit user behavior for use in developing appropriate education programs on pedestrian/bicyclist safety in and around transit stops.
  - Develop Education programs for implementation regionally or by member agencies to better educate the public on how to safely access transit stops, safely disembark, and safely transfer to other transit lines.
  - Develop a transit user feedback program for transit users to report problem areas or challenges to or from the transit stop they use. This could be in the form of a website or a feedback form (since some transit users do not have access to a computer) that is available on the bus and can be mailed in or given to the driver. This form can be used to identify ADA issues, challenging street crossings, sidewalk repair needs, lack of lighting, or other issues of concern to the transit user.

- Develop Safe Routes to Transit maps for senior citizen centers, adult group homes and medical centers for use by transit users. The development of these route maps, involving field investigations and input by the areas residents, would be input for pedestrian safety improvement treatments.
- Enforcement
  - Develop a program for increased enforcement of pedestrian and bicyclist infractions.
  - Develop enabling legislation for local agencies to establish special pedestrian and bicyclist safety enforcement personnel (with limited enforcement powers similar to local code enforcement personnel).