METROPLAN
ORLANDO
A Regional Transportation Partnership

Planning It Safe:
Effective Traffic Safety Tools and Strategies

November 2005

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n Introduction

The purpose of "Effective Traffic Safety Tools and Strategies" is to provide METROPLAN ORLANDO board members and staff with a compendium of actions that, if taken, will reduce the serious and growing number of traffic crashes on the region's roadways. The human and economic consequences of these crashes continue to mount at an unacceptable pace, and the agency has committed to aggressively address the problem.

Amendment:

Information provided in this document has been used by METROPLAN ORLANDO staff to develop a conceptual proposal for a Safety Conscious Plan. The concept was presented as an action item, subsequent to the completion of this document, at the METROPLAN ORLANDO Board Meeting on October 12, 2005. The concept was approved by a unanimous vote of the Board. It is included with the final document as an amendment and entitled METROPLAN ORLANDO Safety Conscious Plan (SCP).

n Background

Injury is the leading cause of death in the United States for those from about six months to 45 years of age and, because it so disproportionately strikes the young, it also is the leading cause of lost years of productive life. Motor vehicle injury is overwhelmingly the largest component of these losses.

Safety improvement requires progress toward reducing crashes involving drivers, passengers, and other more vulnerable road users. In 2004, 42,636 people died on the nation's roadways and nearly three million were injured in motor vehicle-related crashes. Over the past few years, the number of fatalities has remained essentially unchanged. The human and economic consequences of these crashes are unaffordable and unacceptable. In the absence of substantial progress, it can be expected that more than 400,000 people will die on the roadways during the current decade at a cost to society of nearly $2.0 trillion. The majority of motor vehicle crashes are preventable.

The major focus and most visible commitment to safety in the United States over at least the past two decades has been on vehicle crash worthiness, i.e. installation of collapsible steering columns, safety belts, air bags, padded dashes, etc. and driver behavior; yet, the effectiveness of those strategies appears to have reached a plateau in terms of reducing the *number* of crashes, injuries, and fatalities.

A number of strategies are being implemented across the nation to drive down the human and economic costs of motor vehicle crashes and meet the goal of 1.0 fatalities per 100 million vehicle miles of travel (VMT) by 2008 recommended by the American Association of State Highway and Transportation Officials (AASHTO) Strategic Highway

Plan. One initiative focuses on the explicit consideration of safety in traditional state department of transportation (DOT) and metropolitan planning organization (MPO) transportation planning processes. This action was mandated by the Transportation Equity Act for the 21st Century (TEA-21) and confirmed in the Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU), the 2005 reauthorization of the transportation bill.

A second relevant and important initiative is the American Association of State Highway and Transportation Officials (AASHTO) Strategic Highway Safety Plan, which will, upon completion, include 22 countermeasure areas and guidebooks designed to assist states and communities in identifying their priority safety problem areas. SAFETEA-LU mandates the development of strategic highway safety plans (SHSP) by all states and requires participation by the MPOs and other agencies. Many states are already participating in this activity, including Florida. The Federal Highway Administration (FHWA) Office of Safety is targeting its efforts on states where it is believed the most progress can be made. Florida is on virtually all of the targeted lists. For example, Florida is one of the FHWA's "Opportunity States"; i.e., states where a large number of fatalities and the fatality rate or trend is worse than the national average and where using discretionary resources to leverage safety improvements should result in positive effects.

◻ Current Practice

In January 2005, the METROPLAN ORLANDO Board of Directors established traffic safety as a priority emphasis area and hosted a Traffic Safety Summit in March 2005 to announce the 10 worst traffic crash locations and 10 worst driver behaviors in the region. The summit was well attended and generated interest and enthusiasm for moving forward to address traffic safety issues in the region. Research, road safety audits, and other initiatives have led to engineering and behavioral countermeasure implementation at the identified sites that experience a high incidence of traffic crashes. Meanwhile, METROPLAN ORLANDO staff began reaching out to established traffic safety partners in the area to identify appropriate regional traffic safety strategies.

The following discussion lists only a few of the numerous safety related activities that are currently being carried out by METROPLAN ORLANDO.

- Traffic incident management. METROPLAN ORLANDO coordinated a traffic incident management forum to develop and implement a "quick response" incident management program, which was the first such regional application of this strategy in the state. The goal (FDOT policy) is to achieve a 90 minute clearance time after the first responding vehicle arrives at the scene.

- Road Rangers. Removing vehicles that have been in a crash or have broken down from the road is important for improving safety as they are a major contributor to both

secondary crashes and traffic congestion. Road Rangers assist motorists with broken down vehicles and other issues that may obstruct traffic.

- The "Worst First" program. The MPO has identified and announced the 10 worst traffic crash sites in the region, organized multidisciplinary teams to conduct road safety audits of these locations, partnered with FDOT to identify and implement safety improvements, and monitors progress towards improvement on a regular basis.

- Pedestrian/Bicycle Coordinator. The MPO's Pedestrian/Bicycle Coordinator develops and implements a range of safety education programs, e.g., crosswalk enforcement training, and encourages infrastructure improvements to make walking and biking safer.

◻ Recommended Strategies

The MPO hosted a Peer Exchange in August 2005 bringing together leaders from the county Community Traffic Safety Teams (CTSTs), local and state law enforcement, the Florida Department of Transportation (FDOT) District 5 office, traffic safety advocates, and other stakeholders to "build a better partnership." The dialogue led to the development of a list of strategies that METROPLAN ORLANDO should undertake to not only improve traffic safety in the region but also to strengthen the partnership between the MPO and other safety agencies and advocacy groups. While the effectiveness of these strategies is difficult if not impossible to estimate in most cases, they are listed below as a reminder of the input from the safety partners.

Institutional Roles and Responsibilities

- Use crash data analysis, input from the CTSTs and FDOT, public involvement, and other appropriate information to ensure that safety is <u>explicitly</u> addressed in all MPO planning documents.

- Establish an institutionalized traffic safety committee within the MPO's organizational structure.

- Serve as a clearinghouse for regional traffic safety information and activities.

Policy Development

- Approach FDOT and encourage a change to the policy regulating the use of Variable Message Signs (VMS) to include appropriate, consistent traffic safety messages across the region.

- Review state policy with respect to driver education in public schools. If appropriate, encourage expansion or revision of the policy to promote public school-based driver education.

- Review state traffic laws as they apply to pedestrians to determine if additional or different legislative action is needed.

Coordination and Collaboration

- Keep the elected officials informed and focus their attention on traffic safety issues and activities being carried out by the MPO as well as the CTSTs. Provide regular briefings and examples of regional and local safety initiatives.

- Continue to attend the CTST monthly meetings to keep them informed about activities and to identify common programs and projects that can be coordinated across the region.

- Establish a BLOG to enhance communication among the regional traffic safety agencies and advocates.

- Implement a public information campaign to explain the purpose of confirmation lights to the public. Evaluate the installation of confirmation lights for effectiveness and publicize the results.

Regionwide Comprehensive Actions and Campaigns

- Research, design, implement, and coordinate a regionwide effort to improve the collection, management, and analysis of crash data.

- Coordinate traffic safety campaigns across the region, such as "Click It or Ticket," and impaired driving, red light running, and aggressive driving campaigns. Delivering a consistent, unified message is more likely to gain media and public attention.

- Implement a regionwide public information program to inform the public about traffic laws, especially new or changed ordinances and state statutes.

- Develop a "Four E" approach (engineering, education, enforcement, and emergency medical services) to improve the pedestrian environment.

- Design and implement a bicycle public information campaign to inform riders about safe riding techniques and the importance of wearing helmets. Encourage participation in classes to learn safe riding techniques.

- Identify appropriate regionwide issues and seek funding for deployment in cooperation with the CTSTs.

- Develop a regional strategy for approaching and working with the judiciary to ensure that traffic infractions are associated with serious consequences.

◻ Effective Traffic Safety Strategies: Planning and Institutional Requirements

To effectively reduce traffic crashes requires the implementation of several strategies. Some of these are institutional in nature, i.e., METROPLAN ORLANDO may want to enhance its efforts to incorporate an <u>explicit</u> consideration of safety in the traditional transportation planning processes.

The most obvious strategy may be to introduce safety into the traditional transportation planning process in a substantive and meaningful way. Planning goes to the very heart of what MPOs are designed to accomplish; however, planners are expected to use data to identify problems and drive investment decisions. Therefore, data improvements rank high on the list of things that need to be done. MPOs regularly work with elected officials and deal with policy issues. Policy represents a third "institutional" area of work where the MPO can be expected to contribute. Finally, MPOs are accustomed to planning transportation improvements. In Florida, these are most often related to capital improvements rather than safety. METROPLAN ORLANDO may consider negotiating the distribution of safety assets with FDOT and increasing the weight given to safety factors when generating project lists may be a consideration for future planning efforts.

MPOs, for the most part, lack experience in the design and implementation of behavioral safety countermeasures; however, METROPLAN ORLANDO intends to engage in some of these efforts as well. The strategies recommended in the remainder of this document outline actions for consideration.

◻ Safety Conscious Planning (SCP)

In July 2005, Congress passed SAFETEA-LU which continued the TEA-21 safety planning requirement. States and metropolitan planning organizations (MPO) must incorporate safety as a priority factor in their transportation planning processes and activities. Prior to TEA-21, safety was sometimes a prominent factor in project development and design, but this legislation calls for safety consciousness in a more comprehensive, systemwide, multimodal context. It implies collaboration with the safety communities, transit operators, local jurisdictions, and others. More and more MPOs across the nation are adopting safety as a priority planning factor. Although planning tools are lacking at present and data is always an issue, creative thinking is overcoming these barriers. METROPLAN ORLANDO is poised to play a leadership role in the state by fully integrating safety into the planning process. SCP requires:

> *The metropolitan planning process for a metropolitan planning area shall provide for consideration of projects and strategies that will increase the safety of the transportation system for motorized and nonmotorized users.*
>
> SAFETEA-LU

1. Leadership – Agency administrators and elected officials must support safety integration and provide resources to ensure its success. Additionally, one or more "champions" must be continuously available to guide the process, assess progress, and identify and address challenges.

2. Collaboration – A collaborative approach based on continuing dialogue among the transportation planning community at all levels, highway and motor carrier safety professionals, transit agencies and operators, law enforcement, the public, elected officials, and others.

3. Data Driven – Transportation planners should utilize data driven strategies for problem identification using historical data and modeling technologies to identify not only current "hot spots" but also future "sites with promise" for preventing crashes. Data should also be used for program/project prioritization and selection and to evaluate results.

4. Comprehensive – Effective programs include at a minimum the traditional 4Es of safety (engineering, enforcement, education, and emergency medical services). The strategy also takes system level planning into account and adopts multimodal approaches that address transit, non-motorized road users, and freight movement.

5. Effective Implementation – A focus on effective implementation strategies at the beginning and throughout the safety planning process is necessary to ensure measurable and ongoing safety actions are taken.

Cambridge Systematics, Inc.

SCP requires a change in the planning culture and mandates new ways of thinking. The future of safety is to identify strategies that prevent crashes from occurring. This requires "out of the box" thinking at its best.

■ Best Practices and Performance Measures in Transportation Planning and Safety Integration

There are six essential steps for integrating safety into the traditional transportation planning process:

Step 1: Understand the Problem – What do the data say?

Step 2: Develop a Vision – What are we trying to achieve? By the year 2025 to have a regional, integrated, multimodal transportation system that <u>safely</u> and efficiently moves people and goods to, through, and within the urban area and which enables the Central Florida community to flourish in the global marketplace.

Step 3: Establish Goals and Objectives and Performance Measures – How does the vision link to reality, e.g., goals and objectives, and how do we measure our success in achieving them?

Step 4: Use the Data – What analysis methods and tools are available for understanding the problem and identifying alternative improvement strategies?

Step 5: Evaluate Tradeoffs and Investments – How can we evaluate tradeoffs to determine investments in specific strategies, such as infrastructure, law enforcement, policies, operations, etc.

Step 6: Implementation of Strategies – How do we implement and monitor the safety goals and objectives in the long- and short-range transportation plans and evaluate for effectiveness?

Vision

If safety is not explicitly included in an organization's vision statement, then it will not likely be reflected later in the planning process. Research has shown that few MPOs and DOTs currently include safety as part of their vision or mission statements. The visioning process also includes the need to educate the public and elected officials.

> *Best Practice: Vision Statement*
>
> *California has a <u>safe</u> sustainable transportation system that is environmentally sound, socially equitable, economically viable, and developed through collaboration; it provides for the mobility and accessibility of people, goods, services, and information through an integrated, multimodal network.*

> *Best Practice: Educating Elected Officials*
>
> *Compare the costs of crime and/or congestion in the region to the costs of traffic crashes. Show them the enormous human and economic costs of crashes on a continuing basis.*

As stated above, safety is a priority planning requirement according to Federal law, but there are other legitimate reasons to address safety issues.

Data Collection, Management, and Analysis

FDOT collects and manages crash data on the state road system; however, METROPLAN ORLANDO needs local and regional data to effectively identify abnormal crash locations, evaluate alternative strategies, and assess the effectiveness of countermeasures and strategies. Therefore, it is highly recommended that the MPO coordinate the effort to implement electronic data capture among all the policy jurisdictions in the region. FDOT has an established program for supporting police departments in electronic data capture. The Department provides software, equipment and training through an agreement with Florida State University (FSU). Through collaboration with the CTSTs and support from the FDOT Division Office, METROPLAN ORLANDO could coordinate the program and provide technical and political assistance for establishing a regional safety data warehouse. In fact, if effectively implemented in cooperation with FDOT, a regional warehouse may not prove necessary as METROPLAN ORLANDO may be able to access the data directly from the state database.

Development of the data will take time and patience, but, in the meantime, there are alternatives to consider. For example, if crashes cannot be located for identifying hot spots, interviews with the CTST coordinators, law enforcement, the public, local engineers, and others may reveal crash problems based on observation and experience. Knowing the characteristics of the safety challenge is a basic point of departure.

Best Practice: Houston/Galveston Council of Governments and the Southeast Michigan Council of Governments (SEMCOG) are able to integrate, analyze and display their crash data. They disaggregate by type of crash and safety issue, e.g., truck/pedestrian/bicyclist safety, location (hot spots), impaired driving, etc. They also provide safety services, such as training for local engineers, mayors, and judges and school education programs; form partnerships with government at all levels, the private sector, nonprofits and community groups; review project designs for safety; and encourage their constituents to include safety in designs.

Analytical Tools and Models

Transportation planners are accustomed to using "tools" in their work. At present, safety analysis tools are lacking but some are in various stages of development. Although METROPLAN ORLANDO has data analysts on staff, the agency may consider seeking technical assistance from a contractor to learn and improve its safety analytic capabilities. Tools used by other agencies include:

- Before/after analysis tools.

- Hot spot identification methods.

- Road safety audits.

- The Crash Outcome Data Evaluation System (CODES).

- Software Packages such as Intersection Magic, the Interactive Highway Safety Design Model (IHSDM, FHWA), SafeNET (UK Department of Transport), SafetyAnalyst (FHWA), PEDSAFE (University of North Carolina at Chapel Hill), and the Pedestrian and Bicycle Analysis Tool (FHWA).

- Forecasting crashes at the traffic analysis zone (TAZ) level. This tool shows promise, and further development is in process.

- Level of Service of Safety (LOSS) – Software developed by Kononov and Allery (Colorado Department of Transportation) to quantify the degree of safety/unsafety of roadway segments; communicate safety to other professionals and elected officials; define safety performance; and provide a frame of reference for decision-making and planning. The Denver Regional Council of Governments (DRCOG) is beginning to use LOSS to award points to projects associated with crash history, conflict factors, facility lighting, etc. to understand the level of safety involved.

Safety Integration Methods

Safety prioritization criteria can be used to ensure safety is a consideration in state transportation improvement programs (STIP) and MPO transportation improvement programs (TIPs). Little consistency among states and regions exists at present for determining the "weight" that safety projects are given. However, the following examples in Figures 1 through 3 from DRCOG serve to illustrate the point.

Figure 1. Roadway Operational Improvements
Denver

Evaluation Criteria	Points	Scoring
Congestion	0-16	Up to 16 points based on the current degree of congestion (V/C ratio) on the existing roadway
RTP Emphasis Corridors	0-4	4 points to projects on *emphasized* freeways or major regional arterials 2 points to projects on *emphasized* principal arterial segments
Safety	0-6	Up to 6 points based on weighted crash rate in comparison to statewide average and estimated crash reduction
Usage	0-9	Current AWDT > 11,000 = 9 points, < 2,500 = 0 points

Figure 2. Safety Points for Roadway Reconstruction or Roadway Operational Improvement Projects
Denver

	Estimated Number of Crashes Eliminated per 3 Years, per Mile			
	Low *0-15 Fewer*	Medium *15-35*	High *36-59*	Very High *60+*
Crash Range	Safety Points to Be Awarded			
State Average	0	1	3	4
1-2 x State Average	1	2	4	5
2-3 x State Average	2	4	5	6

Figure 3.   Bicycle and Pedestrian Projects
             Denver

Evaluation Criteria	Points	Scoring
RTP Priority Corridors	0-4	4 points for bike projects on RTP Regional Bicycle Corridors 2 points for bike projects on Community Bicycle Corridors 4 points for pedestrian projects along RTP major regional arterials 2 points for pedestrian projects along RTP principal arterials
Safety	0-12	Projects evaluated on the anticipated improvement of existing safety problems
Potential Need	0-23	Up to 23 points for specific project attributes that address existing local or regional needs on non-motorized travel

Effective methods for rating safety in project prioritization schemes are elusive; furthermore, there is the question of how to integrate non-infrastructure projects into traditional transportation plans.

There are steps in the planning process where all safety stakeholders can and should come together and reach agreement. Figure 4 illustrates one way in which to integrate safety related visions, goals, objectives, performance measures, and data analyses. Non-infrastructure projects also could receive consideration at the stage where alternative improvement strategies are addressed.

Figure 4. Comprehensive Safety Strategies

Comprehensive Safety Strategy

Including as one product…

Leads to…

Policies
Operations strategies
Infrastructure projects
Studies
Regulations
Education and awareness
Enforcement
Financing strategies
Partnerships
Collaborative undertakings

Implementation of Strategies

TIP

Plan

Evaluation

Other Sources for Project Ideas

Alternative Improvement Strategies

Analysis Methods

System Operations

Performance Measures

Data

Goals and Objectives

Prosperity

Vision

Environmental Quality

Social Equity/ Quality of Life

A Checklist for Assessing the Planning Process[1]

- Is safety addressed in the organization's vision statement?

- Is safety included in at least one planning goal and at least two objectives?

- Does the plan include safety-related performance measures?

- Are crash data and other information sources used to identify problems and potential solutions?

- Are one or more analysis tools used to analyze impacts?

- Are safety evaluation criteria used?

- Do products/plans include at least some actions that focus on safety?

- To the extent that a prioritization scheme is used to develop programs, is safety a priority factor?

- Is there a systematic monitoring process?

- Are all the key safety stakeholders involved in the planning process?

Partnerships

Multidisciplinary, multimodal safety plans require partnerships with a range of agencies and advocacy groups. METROPLAN ORLANDO has already begun the process of building these relationships. Others may be suggested in future planning efforts. A list of potential partners is listed in Table 1.

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[1] See Appendix A for a complete list of self-assessment questions.

Table 1. Current and Potential Safety Partners in the METROPLAN ORLANDO Region

Regional/Local Agencies
- Chambers of Commerce
- Departments of Public Works
- Elected officials
- City and County Traffic Engineers
- Fire departments
- Law enforcement (police, judges, prosecutors, clerk magistrates)
- Schools
- Transit operators

State Government
- Elected officials
- Education
- Department of Motor Vehicles and Safety
- Department of Transportation
- Emergency Medical Services
- Department of Public Heath
- Highway Patrol

Federal Government
- FHWA
- Homeland Security
- NHTSA
- FMCSA
- Federal Transit Administration

Advocacy Groups
- AAA
- AARP
- Mothers against Drunk Driving (MADD)

Private Sector
- Attorneys
- Automobile dealers
- Alcohol distributors and establishments
- Insurance companies
- Media
- Trucking companies and associations
- School bus companies
- Utilities

Individuals
- Young people
- Traffic violators
- Consultants

Policy Initiatives

The METROPLAN ORLANDO Board of Directors represents a powerful source for policy advocacy at both the state and community level. As noted above, several safety policy initiatives have been proposed by the current partners. Others will undoubtedly arise as safety planning continues. In addition to the policy strategies already covered, METROPLAN ORLANDO should encourage the elected officials to lobby on behalf of a standard safety belt law. This would define the failure of a driver and all passengers to wear a seat belt as a primary traffic violation, allowing police agencies to stop and ticket offenders for this violation alone. SAFETEA-LU includes financial incentives for states that pass seat belt laws with such provisions that would bring millions of dollars to Florida. The effectiveness of these laws is proven and METROPLAN ORLANDO should lead the way in encouraging the other MPOs in Florida to proactively support an appropriate change in state law.

Another policy initiative that METROPLAN ORLANDO may want to pursue concerns the distribution of SAFETEA-LU, Section 148 funding for safety improvements. MPOs do not currently have access to these funds, with the distribution of these funds being controlled directly by Florida DOT and the Governor's Highway Traffic Safety Representative. However, the new highway bill increases the dollar amount as well as the initiatives that can be funded through the use of Section 148 hazard elimination funding. A more balanced and collaborative relationship between FDOT and the MPOs could lead to more effective safety improvements.

Additional policy initiatives of interest to METROPLAN ORLANDO are standardization of engineering factors throughout the region, e.g., signal timing, and coordination of regionwide enforcement and education programs and campaigns. METROPLAN ORLANDO may want to establish subgroups, committees, or task forces with the expertise necessary to develop strategic approaches for accomplishing these initiatives.

∩ Effective Traffic Safety Strategies and Tools: Infrastructure Improvements

The "Worst First" program identified several infrastructure related improvements that merit consideration: intersection turn lanes, sidewalks, signage, and lighting. An in depth discussion of traffic engineering techniques is beyond the purview of this report; therefore, the problems identified in the "Worst First" analysis will be addressed with a more theoretical and general approach.

Historically, engineers have relied on the Manual on Uniform Traffic Control Devices (MUTCD), the AASHTO Policy on Geometric Design of Highways and Streets (commonly referred to as the "Green Book"), and the Florida DOT's version of the AASHTO Green Book for guidance in all transportation engineering decisions. However, the discipline has changed dramatically over the past two decades. Emphasis in the past has been on *nominal safety* where engineers relied on compliance with standards, warrants, guidelines, and sanctioned design procedures. It was simply assumed that the application of standard engineering practice automatically produced safe conditions. Conformance with the established (nominal) standards of the MUTCD and the guidelines of the Green Book can be expected to result in nominal (minimal) safety performance and not necessarily the "safest" performance.

Strategies and Tools

For the past 15-20 years, however, emphasis has been moving to *substantive safety* which examines the expected crash frequency and severity for a specific segment of highway or roadway when making engineering judgments and decisions. Establishing the expected crash frequency and severity has led to research and evaluation that establishes crash

modification factors (CMFs). These CMFs then allow the user to determine the expected reduction in crashes given a specific action or countermeasure.

Low Cost Safety Improvements

FHWA has developed an entire one-day course on low cost safety improvements to link the application of traffic control devices (signs, signals, and pavement markings) to safety. The course provides attendees with an understanding of a wider range of interim measures to capital construction to address identified problems at high crash locations. Recent highway safety research has identified a multitude of "low-cost" commonly employed traffic control devices and practices suitable for application in reducing crashes, and quantified the safety benefit of "low-cost" best practices.

Intersections, Sidewalks, Signs, Lighting

The majority of the "Worst First" locations in the Orlando region involved an intersection. This is not particularly unusual because national statistics show a substantial portion of fatal and injury crashes occur at intersections. Intersections are natural points of conflict as vehicles, bicycles, and pedestrians are required to share the use of a limited physical space on an alternating basis. Improvements in intersection geometry such as separated turn lanes, the pedestrian environment (sidewalks, signal timing, etc.) and enhanced visibility (signs, lighting, etc.) have all been demonstrated to be effective for reducing crashes. Examples of recommended strategies are outlined in Figure 5.

Recommendations

- Most transportation planners are not engineers; however, planners across the country are recognizing the need for a basic, rudimentary understanding of engineering practice and principles to properly guide the implementation of safety related engineering countermeasures. Therefore, it is recommended that METROPLAN ORLANDO work with FHWA to sponsor one or more courses on low cost safety improvements for MPO staff with transportation planning responsibilities as well as traffic engineers at all levels of government and in the private sector. The training ensures that participants are able to identify high crash locations and appropriate low cost countermeasures.

- It is further recommended that the MPO assume a leadership role in establishing consistent standards across the region for signage, signal timing, and street naming. If all road users in the metro area are presented with consistent roadway patterns and messages, safety will improve. In some cases, police crash reports list "careless" or "distracted" driving as the cause of a crash when, in reality, the driver was simply confused and failed to react swiftly to a potential hazard.

Figure 5.   Intersection Countermeasures

EXHIBIT 17.2-5
Emphasis Area Objectives and Strategies

Objectives	Strategies
17.2 A Reduce Frequency and Severity of Intersection Conflicts Through Traffic Control and Operational Improvements	**17.2 A1. Employ multiphase signal operation**
	17.2 A2. Optimize clearance intervals
	17.2 A3. Restrict or eliminate turning maneuvers (including right turns on red)
	17.2 A4. Employ signal coordination
	17.2.A5 Implement emergency vehicle preemption at signals
	17.2 A6. Improve intersection traffic control of pedestrian and bicycle facilities
17.2 B Reduce Frequency and Severity of Intersection Conflicts Through Geometric Improvements	**17.2 B1. Provide/improve left-turn lane channelization**
	17.2 B2. Provide/improve right-turn lane channelization
	17.2 B3. Improve geometry of pedestrian and bicycle facilities
	17.2 B4. Revise geometry of complex intersections
	17.2 B5. Construct special solutions
17.2 C Improve Sight Distance at Signalized Intersections	**17.2 C1. Clear sight triangles at intersections**
	17.2 C2. Redesign approaches to intersections
17.2 D Improve Driver Awareness of Intersections and Signal Control	**17.2 D1. Improve visibility of intersections on approach(es)**
	17.2 D2. Improve visibility of signals and signs at intersections

Source: FHWA Low Cost Safety Improvement Course.

n Effective Traffic Safety Strategies and Tools: Behavioral Countermeasures

METROPLAN ORLANDO's assessment of the "Worst First" identified not only crash locations with abnormally high crash rates, but also the behavioral characteristics associated with crashes at these locations. These include the failure to use safety belts and child car seats, distracted driving, aggressive driving (red light running, failure to yield, and blatant crosswalk signal violations), pedestrian and bicyclist education (wrong way cycling and cycling without lights on at night), impaired driving, and driving on

suspend/revoked licenses. There are a number of reasons why a driver's license may have been suspended or revoked. The driver may have committed too many or very serious traffic offenses, failed to show proof of insurance, or forgot to renew the license. However, 20 percent of all traffic fatalities involved at least one driver with a suspended or revoked license.

To address each of these subjects in depth could fill volumes; therefore, the following discussion outlines only countermeasures for which there is some evidence of effectiveness. Much of the information is taken from a recent compendium (Hedlund, 2005) developed by the Governors Highway Safety Association (GHSA). GHSA hired a consultant to review all the literature, interview a number of highway safety professionals, and document the most effective countermeasures. The reader is encouraged to review that document for additional resources and countermeasure suggestions.

A Caveat

To begin this discussion it is important to note what <u>does not</u> work. A requirement that drivers attend traffic school in lieu of fines or other penalties has never been demonstrated to be effective in reducing crash rates. In fact, at least one study (IIHS, 2004) showed the use of traffic school actually <u>increased</u> crashes because the violator starts out with a clean record; and hence there are no deterrent consequences for future unsafe driving behavior. In addition, public education campaigns alone have not been demonstrated to be effective; however, they seem to work only when accompanied with a vigorous law enforcement initiative.

Occupant Protection

Safety belts are the most effective way to reduce injuries and fatalities in motor vehicle crashes. NHTSA estimates that belts in passenger cars reduce serious injuries by 69 percent and fatalities by 45 percent.

Strategies and Tools

Proven strategies for increasing safety belt use include strong laws, enforcement, and publicity. These actions are far more effective when applied in combination rather than as stand alone strategies.

A "primary" or "standard" safety belt law has been demonstrated to be effective in reducing crashes. This means that law enforcement can stop a person for failure to wear a safety belt. In "secondary" law states, the driver must commit some other traffic infraction to establish probable cause and then the officer can issue a citation for failure to wear a safety belt if this is also observed. In the 2005 legislative session, Florida passed a primary law applying to only those vehicle drivers 18 and under. SAFETEA-LU provides large

dollar incentives for states that pass primary laws. Florida will lose this opportunity if it does not pass a primary law applying to all occupants and all ages or achieves a safety belt compliance rate of 85 percent over a two year period. Some communities have passed an ordinance mandating safety belt use in states with secondary laws.

States are reluctant to pass primary safety belt laws because citizens complain that it is an infringement on their civil liberties. All traffic laws "infringe" to some extent; therefore, it is a matter of balance, e.g., individual rights vs. public good. With such strong evidence of effectiveness in preventing the human and economic consequences of traffic crashes, passing this law just makes sense. Others have argued that it will give law enforcement too much discretion which will be used against minority groups. Several studies have found no evidence of such harassment.

Short bursts of high visibility enforcement have been proven effective for increasing belt use rates at both the state and community level. Studies have shown substantial increases during the campaigns. It is not clear how much the rate regresses to the mean after the end of the enforcement campaign but studies have shown that the safety belt use rate never goes back to the starting point.

Recommendations

- Educate the elected officials on the effectiveness of primary safety belt laws and encourage their support.

- Coordinate high visibility safety belt enforcement campaigns across the region to ensure a consistent message.

- Consider education programs for target groups with low belt use.

- Design and conduct a safety belt education program for older persons. (Although older persons are more likely than any other age cohort to wear safety belts, there is room for improvement. Because senior citizens are frailer due to the normal aging process, it is even more important that they use belts to protect them in the event of a crash.)

Distracted Driving

Highway safety professionals have known for a long time that distracted driving is a serious issue and the root cause of many traffic incidents. The proportion of crashes attributable to distracted driving varies from study to study. The official NHTSA estimate is 25 percent but many researchers suspect the percentage is far higher. As vehicles become easier and quieter to drive and roadways become smoother, drivers increasingly attempt to multitask while driving. Recent attention to the use of cell phones while driving has brought renewed attention to the issue. However, cell phone use is just the tip of the proverbial iceberg and there are many other causes of distraction, both inside and outside the vehicle, as well as the mental distraction a driver may encounter due to family

and work issues, etc. A final element to this difficult problem is the growing array of in-vehicle technologies that are on the market. A person can cook, eat, drink, answer e-mail, return phone calls, watch movies, and enjoy many other activities while moving down the road.

Strategies and Tools

"The standard behavioral countermeasures of laws, enforcement, and sanctions, which are used successfully for alcohol impairment, safety belt use, aggressive driving, and speeding are unlikely to be effective for distracted drivers (Hedlund, 2005)." The aim is to remove the underlying causes or distraction and/or change driver behavior which is exceedingly difficult to accomplish.

Some communities and states have passed cell phone laws. These laws generally require "hands free" cell phone use. However, "hands free" is not risk free and substantial research shows that it is the content of the conversation rather than the use of the instrument itself that contributes to a crash.

Behavioral Strategies and Tools

Public education campaigns seem to be the only countermeasure recommended in the literature. General "pay attention" messages are probably not effective. To be successful, public education campaigns have to target specific audiences, send strong messages, and be well funded.

Graduated driver licensing laws often limit the number of teen passengers a novice driver is allowed to have in the vehicle to reduce distractions. These laws have been proven effective. It is interesting to note, however, that older drivers are usually <u>safer</u> with a companion because they help identify hazards, street signs, etc.

Infrastructure Strategies and Tools

Edge line, center line, and cross lane rumble strips may serve to alert drivers and help them focus on upcoming intersections, school zones, etc.

Flashing lights or signals can be used at particularly hazardous locations to ensure drivers are focused on the driving task.

Recommendation

- The author is hesitant to recommend the application of strategies or tools relative to distracted driving given that there is only limited evidence of effectiveness associated with any specific action. However, if the CTSTs are interested, a public information campaign could be designed and implemented. Providing employers with information regarding the costs of traffic crashes might also generate a partnership for educating the public.

Aggressive Driving

"Aggressive driving is generally understood to mean driving actions that markedly exceed the norms of safe driving behavior and that place the driver or other road occupants in unnecessary danger (Hedlund, 2005)." Florida law (316.1923) defines aggressive careless driving as committing two or more acts included in the following list:

§   Exceeding the posted speed

§   Unsafely or improperly changing lanes

§   Following another vehicle too closely

§   Failing to yield the right-of-way

§   Improperly passing

§   Violating traffic control and signal devices

Aggressive driving is increasing. For example, in a recent survey conducted by the North Jersey Transportation Planning Authority, aggressive driving outranked all other behavioral characteristics in terms of perceived dangerousness.

Strategies and Tools

Behavioral Strategies and Tools

The basic behavioral strategy to address aggressive driving is high visibility enforcement as described with respect to impaired driving and occupant protection. While targeted enforcement strategies have been reported, they have not been evaluated for effectiveness. One example is the Milwaukee, WI use of specialized patrols: the "angel patrol" for those drivers who drive faster than their guardian angel can fly; the "flasher patrol" for those drivers who do not use their turn signals when turning or switching lanes, and the "basket patrol" for drivers who weave in and out of traffic.

Probably the most often used strategy is enhanced penalties for repeat offenders and aggressive drivers who cause a crash that involves injury or death. The ability to track repeat offenders through a citation and conviction database is essential for enhanced penalties to work.

Infrastructure Strategies and Tools

There are several measures to affect the roadway network that serve to reduce aggressive driving. The relationship between congestion and crashes is not well documented or understood. However, many believe that congestion increases driver frustration and anger; hence, they are more likely to drive aggressively.

Traffic calming measures, such as reducing or narrowing lanes, on-street parking, roundabouts, etc. are effective in slowing down traffic. Well coordinated signal timing can reduce red light running and improve traffic flow; hence, less frustration for drivers. "Adequately designed turn bays and entrance and exit ramps can reduce improper merging and driving on the shoulder (Hedlund, 2005)."

Recommendations

- Support enhanced penalties for aggressive drivers.

- Work with the CTSTs and local law enforcement agencies to develop a regional database that include driver histories.

- Investigate the use of traffic schools and other diversion programs. Encourage judges to assess penalties even when diversion programs are used to ensure driver histories are complete and accurate.

- Support law enforcement and CTSTs campaign efforts to address aggressive driving.

- Consider implementing traffic calming techniques to slow the flow of traffic.

Older Drivers, Passengers, and Pedestrians (Note: This section also addresses pedestrian safety issues for all road users.)

Florida is well aware of the phenomenon known as "The Graying of America. The state has one of the highest proportions of ≥65 age citizens in the country. Population estimates predict that by 2030, one in four U.S. residents will be ≥65 years of age and the proportion may be even greater in Florida. The impact in terms of transportation safety, however, is not as clear.

The safety implications of an aging driving population depend upon how "safety" is defined. As the number of older drivers and pedestrians increases, there clearly will be an increase in the number of older adults injured and killed on our streets and highways, and these numbers will make up a growing proportion of overall traffic casualties. As shown in Figure 6, it has been estimated that, by the year 2030, drivers age 65 and older will account for 25 percent of fatal crashes, compared to just 14 percent today. These numbers are more a reflection of the growth in size of the elderly population, along with their increased exposure as drivers and passengers in vehicles. They do not speak directly to their safety as road users; nor do they suggest opportunities for improving safety.

Figure 6.   Projected Fatal Crash Involvements

Fatal Crashes
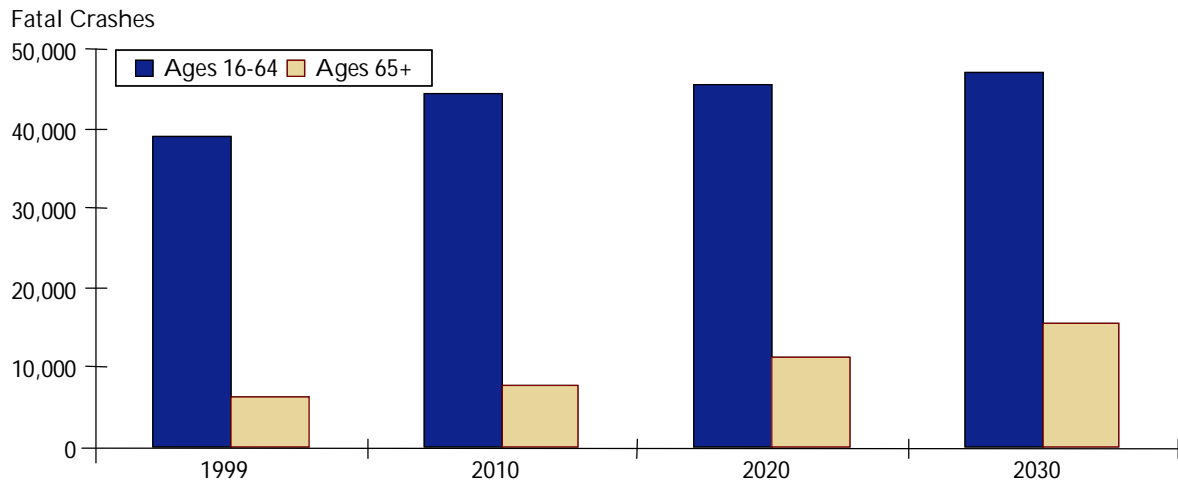
It is important to consider the safety of older adults as motor vehicle occupants and pedestrians, as well as drivers. As noted earlier, as persons age, they are less likely to drive and more likely to ride as passengers or to walk. In 2003, 1,561 of the total 5,588 (28%) of motor vehicle occupants ages 65+ killed in crashes were passengers rather than drivers. An additional 974 adults ages 65+ were killed as pedestrians. Although adults age 65+ make up only 12% of the population, they constitute one in every five pedestrian fatalities (Herbel, et al 2005).

In addressing issues of pedestrian safety, it is important to realize that, especially for non-fatal pedestrian injuries, police-reported crash data do not reveal the true magnitude and scope of the problem, especially with respect to elderly pedestrians. A recent FHWA study found that the pedestrian injuries we know most about, i.e., crashes between a motor vehicle and a pedestrian, account for only one third of all serious pedestrian injuries. Two-thirds of older pedestrian injuries serious enough to require emergency medical treatment result from "simple" falls due to uneven sidewalks, poor lighting and contrast along the route, obstacles and tripping hazards, inappropriate street furniture and untreated ice and snow. The study concluded:

> "In light of the U.S. goal of increasing levels of bicycling and walking...efforts need to move beyond the roadway and beyond thinking about bicyclists and pedestrians only as they interact with motor vehicles. Sidewalks and trails need to be viewed as important transportation facilities in their own right, parking lots need to be built with pedestrians and bicyclists in mind, and all facilities accommodating non-motorized transportation need to be well designed and well-maintained (Stutts and Hunter 1999)."

The elderly are also extremely affected by weather conditions and at serious risk of injury when snow or ice is present. The FHWA study found that over one fourth of all older patients admitted to an emergency room for any kind of pedestrian injury in a one <u>year</u> period were injured falling on icy surfaces. As a result the study recommended that:

> "In addition to clearing roadways and making them safe for motor vehicle travel, sidewalks, driveways, and parking lots need to be made as safe as possible for pedestrian travel. Too often, roadways are cleared at the expense of sidewalks, and little, if anything is done to help pedestrians negotiate parking lots once they arrive at their destinations (Stutts and Hunter 1999)."

Police records show that older pedestrians are substantially more likely to be seriously injured or killed at intersections; almost 40 percent of serious pedestrian injuries involving a vehicle occur at intersections. Most measures designed to improve the safety of intersections generally focus on changing driver behavior although some attempt to affect pedestrian activities as well.

Strategies and Tools

Behavioral Strategies and Tools

Use existing tools, such as the CD available through AAA, to educate and encourage older drivers to assess their driving skills on a regular basis and reduce driving under certain circumstances or altogether if necessary

Encourage older drivers to update their skills through training and take advantage of retrofit technologies available in the market place.

Educate families, law enforcement, physicians, elder lawyers, and others to appropriately assess and address declining driving skills.

Increase safety belt use among older persons.

Provide mobility managers to educate older persons about transportation alternatives.

Perhaps the most successful strategy involves the driver licensing process which is outside the purview of an MPO.

Infrastructure Strategies and Tools

A large number of infrastructure related countermeasures have been developed and documented by FHWA. These include such strategies as installing protected left turn lanes and signals, larger and more visible signage, more visible roadway marking, rumble strips, etc. These strategies are documented in the following FHWA publications: Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians, and Highway Design Handbook for Older Drivers and Pedestrians. A detailed analysis of these strategies is outside the purview of this report.

Recommendations

- Consider strategies from the FHWA design guidelines in all capital improvement, hazard elimination, maintenance, and 3R (reconstruction, rehabilitation, and replacement) programs.

- Provide a mobility manager on staff, e.g., one-stop-shopping for older persons seeking information about transportation alternatives.

- Implement a public education program that teaches older persons how to self assess their driving skills and effective measures to take as their skills decline due to the normal aging process.

- Retrofit the transportation infrastructure to the extent possible to ensure a safe and secure walking and bicycling environment for all citizens, e.g., install countdown signals, center medians, reduce the width of avenues where pedestrian and bicyclist crashes occur, etc.

Impaired Driving

Impaired driving is a serious problem in all states and regions; however, some areas have a much better track record than others.

Strategies and Tools

It is well known that good laws, high visibility enforcement, prevention and education programs, and treatment for offenders are the basic ingredients of a DWI control system. However, the system itself, rather than any of the component parts, seems to have the greatest impact. An effective DWI control system has the following essential characteristics:

1. Training and education for law enforcement, prosecutors, judges, and probation officers.

2. Record systems that are accurate, up-to-date, easily accessible, and able to track each DWI offender from arrest through the completion of all sentence requirements.

3. Adequate resources of staff, facilities, training, equipment, and new technology.

4. Coordination and cooperation within and across all components.

Recommendations

The CTSTs and other partners have recommended that METROPLAN ORLANDO seek to accomplish the following objectives with respect to impaired driving:

1. Coordinate a regionwide approach for educating the judiciary and enlisting their aide in solving this problem.

2. Coordinate regionwide high visibility enforcement campaigns.

3. Inform and educate elected officials and the public about the dangers of driving impaired and appropriate behaviors and countermeasures to address the problem.

4. Encourage alternative forms of transportation and designated driver programs to prevent impaired individuals from driving home.

n References

AASHTO Strategic Plan 17-18(3) Implementation Guide – Unsignalized Intersection Accidents. Note: Implementation of the AASHTO Strategic Highway Safety Plan is supported by NCHRP 17-18. The support includes the development of 22 countermeasure guidebooks that compile the latest research and knowledge in a wide variety of countermeasure areas. These guidebooks can be found on-line at www.safety.transportation.org.

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Appendix A

Self-Assessment Questions

Safety Conscious Planning (SCP): A Self Assessment Tool for Planning It Safe

Based on the Draft NCHRP-8-44: Guidebook for Integrating Safety into Transportation Planning and Decision-making

∩ What is Safety Conscious Planning?

Safety conscious planning is a comprehensive, systemwide, multimodal, and proactive process that better integrates safety into the planning and decision-making processes. But what does this mean in practice? Examples of safety conscious planning include:

- *Identify safety as a major goal of the agency, with commitment to it at the highest level.*

- *Develop a good multi-disciplinary safety management process, with a strong emphasis on roadway safety.*

- *Emphasize safety on all projects.*

- *Designate a safety engineer/coordinator and/or a designated safety division within a State DOT as the focal point for the Highway Improvement Safety Program*

- *Assist local governments with safety issues.*

- *Use current technologies (i.e., GIS and web-based systems) to display data.*

- *Develop community-based traffic safety programs.*

- *Create a traffic records coordinating committee.*

- *Develop systematic and well-documented processes.*

- *Collect and use timely and accurate crash data.*

- *Select hazardous locations for corrective actions based on multidisciplinary factors.*

n Why is This Issue Important?

- Societal costs associated with motor-vehicle related fatalities and vehicle crashes are staggering.

- Motor vehicle fatalities and crashes are a leading public health problem in the U.S.

- Crashes represent a major source of congestion (non-recurring congestion).

- There is evidence from studies and research that crashes can be prevented.

- A comprehensive safety program includes a range of strategies and actions and involves many different agencies, groups, and partners.

- One of the eight planning factors from SAFETEA-LU states that states and MPOs must emphasize safety – *"increase the safety and security of the transportation system for motorized and nonmotorized users…"*

n Assessing Your Planning Process…

1. Does the vision statement in your planning process include safety? (Step 1)

2. Are there at least one planning goal and at least two objectives related to safety? (Step 2)

3. Are safety-related performance measures included in the set being used by the agency? (Step 3)

4. Are safety-related data used in problem identification and for identifying potential solutions? Are safety analysis tools used regularly to analyze the potential impact of prospective strategies and actions? (Step 4)

5. Do the evaluation criteria used for assessing the relative merits of different strategies and projects include safety? (Step 5)

6. Do the products of the planning process include at least some actions that focus on safety? (Step 6)

7. To the extent that a prioritization scheme is used to develop a program of action for the agency, is safety one of the priority factors? (Step 7)

8. Is there a systemic monitoring process that collects data on the safety-related characteristics of the transportation system performance, and feeds this information back into the planning and decision-making process? (Step 8)

9. Are all key safety stakeholders involved in the planning process? (Step 9)

A series of question are presented below to assess how well your agency has incorporated and/or integrated safety into the transportation planning process:

Step 1: Incorporating Safety into the Vision Statement

"The highest aim of the Metropolitan Transportation Commission is to plan for, deliver, and manage a safe, efficient, integrated, multimodal transportation system for the San Francisco Bay Area."

MTC, Transportation Plan 2003

- Is safety incorporated into the current vision statement of your transportation plan?

- Is safety an important component of your enabling legislation?

- Is safety important to your general public and planning stakeholders?

- How is safety defined by the community?

- What information and/or education is needed or desired to educate the community on the importance of a safe transportation system?

Step 2: Incorporating Safety into Goals and Objectives

Goal 1: Reduce congestion and improve access to jobs, markets, and services.

Goal 2: Preserve and maintain the existing transportation infrastructure.

Goal 3: Improve transportation safety and security.

Goal 4: Be environmentally responsible.

Achieve the safety and security goal by …
- *Increasing funding to reduce high crash levels in the region*
- *Undertaking safety studies throughout the region*
- *Mitigating 344 major crash hot spots at a cost of $172M but with an annual benefit of $392M*
- *Support traffic safety education and traffic enforcement efforts*
- *Building an information system that will identify crime incidents on transportation facilities to support strategies and security investments*

Houston-Galveston Area Council

- Is safety incorporated into the current goals and objectives identified in the jurisdiction's transportation plan? If not, why not? If so, what, if anything, needs to be changed in the way safety is represented?

- How does the safety goal relate to the community understanding of safety as discovered through the vision development process?

- Does the safety goal lead only to recommended project construction and facility operating strategies, or does it also relate to strategies for enforcement, education, and emergency service provision?

- Does the safety goal reflect the safety challenge of all modes of transportation, that is, is it defined in a multimodal way?

- Are there goal-related objectives that provide more specific directions of how the goal is going to be achieved? Are these objectives measurable?

- Do the objectives reflect the most important safety-related issues facing a jurisdiction?

- Can the desired safety-related characteristics of the transportation system be forecasted or predicted? If not, is there a surrogate measure or characteristic that will permit one to determine future safety performance?

- What type of information is necessary and desired to educate the community on the importance of a safe transportation system as it relates to planning goals and objectives?

- If target values are defined in objective statements (for example, fatal crashes will be reduced by 20 percent), have these targets been vetted through a technical process that shows that the target value can be reached?

Step 3: Incorporating Safety into Performance Measures

U.S. DOT Department-wide has a goal of reducing fatalities and injuries 20 percent by 2008.

Objective: Reduce roadway departure (run-off-the-road and head-on) fatalities by 10 percent by FY2007.

U.S. Department of Transportation

- What are the most important safety-related characteristics of the transportation system that have resulted from community outreach efforts to date? Are these characteristics reflected in the articulated set of performance measures?

- Will the safety performance of the transportation system (as defined in the performance measures) likely respond to the types of strategies and projects that will result from the planning process? That is, are the performance measures sensitive enough to discern changes in performance that will occur after program implementation?

- Is the number of safety performance measures sufficient to address the safety concerns identified in the planning process? Alternatively, are there too many safety measures that could possibly "confuse" interpretation of whether safety is improving?

- Does the capability exist to collect the data that are related to the safety performance measures? Is there a high degree of confidence that the data and the data collection techniques will produce valid indicators of safety performance? Who will be responsible for data collection and interpretation?

- Can the safety performance measures link to the evaluation criteria that will be used later in the planning process to assess the relative benefits of one project or strategy over others? If so, can the safety performance measures be forecast or predicted for future years?

Step 4: Incorporate Safety into Technical Analysis – Data

- Given the definition of safety that resulted from the visioning and goals/objectives phases of the planning process, what types of data are needed to support the safety desires of the community?

- Are the data currently available? If not, who should collect the data? Are there ways of collecting the data, or are there surrogate data items that can be used to reduce the cost and burdens of data collection?

- Does the State (or region) have a systematic process or program for collecting safety-related data? If not, who should be responsible for developing one?

- Is there a quality assurance/quality control strategy in place to assure the validity of the data collected? If not, who should develop one?

- Are there opportunities to incorporate data collection technologies into new infrastructure projects or vehicle purchases, e.g., surveillance cameras or speed sensors?

- Does the safety database include safety data for all modes of transportation that are relevant to the planning process (e.g., pedestrians, bicyclists, transit, intermodal collisions, etc.)? If not, what is the strategy for collecting such data? Who should be responsible?

- What types of database management or data analysis tools are available to best use the data, e.g., a geographic information system? Are such tools available to produce the type of information desired by transportation decision-makers?

- Are there other sources of data in your state or region that might have relevant data for safety-related planning, e.g., insurance records, hospital admissions, nonprofit

organizations, etc.? If yes, who should approach these groups to negotiate the sharing of data?

- Are there any liability risks associated with the collection and/or reporting of crash data? If so, how can your agency manage such risk?

Figure A.1   Number of Fatalities

Source: Mn/DOT Office of Traffic Engineering
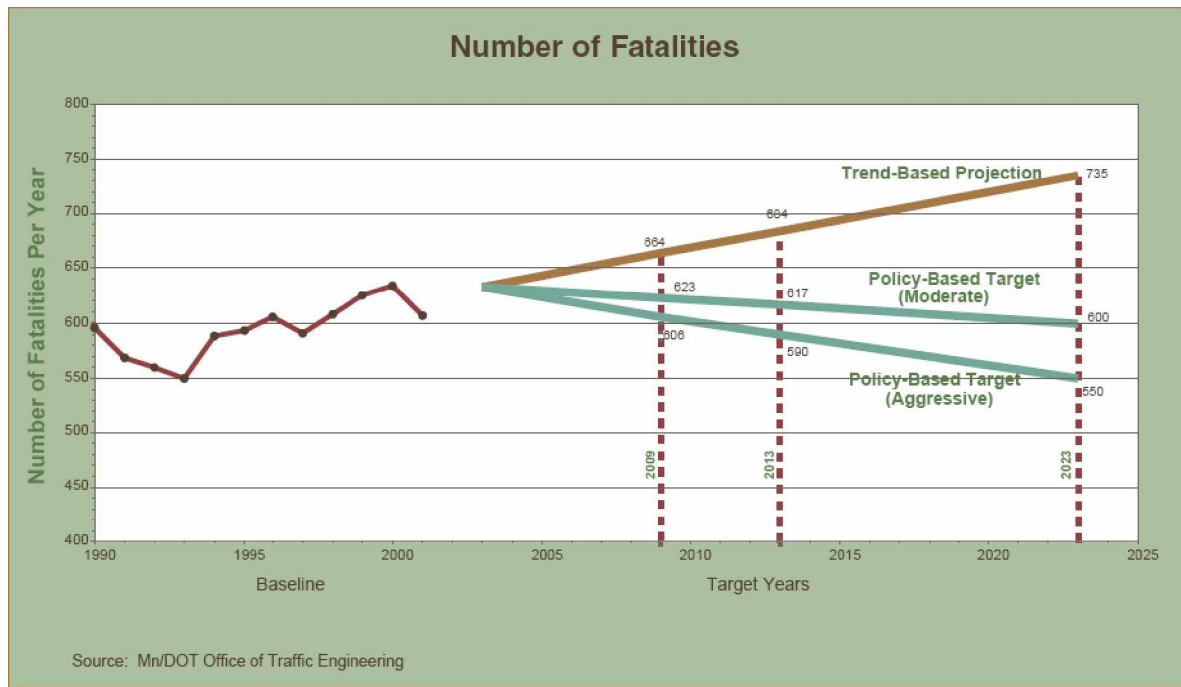
Step 5: Analysis Tools

- What is the scale of the safety problem being faced? Regional? Corridor? Site-specific? Are tools available that analyze safety problems at the same scale of analysis?

- What is the information needed and desired by decision-makers? Can existing analysis tools produce this information with reasonable levels of validity?

- What are the possible types of strategies that could be implemented to deal with the safety problem? Are there analysis tools currently available in the agency or in partner agencies that can be used to determine the effectiveness of these types of strategies? If not, are there analysis tools available elsewhere?

- Is the safety planning challenge one that requires predicting or forecasting the future safety characteristics of a transportation system or facility? If so, what approach will be taken to predict such future performance? What are the underlying assumptions in this approach, e.g., future crash rates will be the same as they are today? Or, in other terms, what are the sources of uncertainty associated with safety predictions?

- Can current analysis tools, or the process of developing new ones, be undertaken in the timeframe associated with when decisions have to be made? If not, is there a more timely analysis procedure that can be used to produce information that is relevant to decision-makers?

- If the safety challenge includes problems associated with multiple modes of transportation, are there tools that can address multimodal safety issues? For example, most available analysis tools focus on road safety. If the State or region is facing safety problems with pedestrian, bicycle, transit, or freight trip-making, are there analysis tools available for analyzing these types of problems? If not, how will these problems be addressed in the safety-related planning effort?

Step 6: Evaluating Alternative Projects and Strategies

- For the types of evaluation decisions that have to be made, is an evaluation methodology in place that produces the type of information that will be useful? Will this methodology have to deal with tradeoffs among many different types of projects and strategies or will the methodology be dealing primarily with a single type of category or project?

- Is a simple rating sufficient to provide the type of information desired? Or is there a need to have a more sophisticated assessment of benefits compared to dollars expended?

- How will non-infrastructure-related strategies and actions be evaluated? For example, if dollars are to be expended on safety education programs, how will the relative effectiveness of these programs be assessed, if at all?

- Does the State or metropolitan area have values associated with the cost to society of different crash types? If not, where can such values be obtained?

- Who will be conducting the evaluation, that is, who will be assigning the points in a scoring scheme or estimating discounted benefits in a benefit/cost methodology? Does the capability exist to undertake such efforts in a fair and unbiased way?

- Are there computer-based tools that can conduct the evaluation process in an efficient manner?

- How are the underlying assumptions in the evaluation process, e.g., value of life, discount factors, etc., best explained to decision-makers and the general public?

- Will the evaluation results be so sensitive to these assumptions that a sensitivity analysis must be conducted by varying uncertain inputs to see what happens to the corresponding results?

- What is the best way of presenting evaluation results to decision-makers?

Figure A.2 Scoring for Pedestrian and Bicycle Projects in the Denver Region

Evaluation Criteria	Points	Scoring
RTP Priority Corridors	0-4	4 points for bike projects on RTP Regional Bicycle Corridors 2 points for bike projects on Community Bicycle Corridors 4 points for pedestrian projects along RTP major regional arterials 2 points for pedestrian projects along RTP principal arterials
Safety	0-12	Projects evaluated on the anticipated improvement of existing safety problems
Potential Need	0-23	Up to 23 points for specific project attributes which address existing local or regional needs of non-motorized travel

For Safety Points….
- ❑ Crash History
  1 point award for each applicable injury crash, up to a maximum of 5

- ❑ Conflict Factor
  1 point if < 25 mph
  2 points if 26-34 mph

Step 7: Develop Plan and Program

Abridged Content of Iowa's Safety Management System's Toolbox
- *Reducing Impaired Driving*
- *Sustaining Safe Mobility in Older Drivers*
- *Preventing Drowsy and Distracted Driving*
- *Making Walking and Street Crossing Safer*
- *Reducing Farm Vehicle Crashes*
- *Reducing Head-On and Across-Median Crashes*
- *Reducing Train-Vehicle Crashes*
- *Improving Information and Decision Support Systems*
- *Developing and Encouraging Multidisciplinary Safety Teams*

Iowa Department of Transportation

- Does the transportation plan and program include safety-related projects and strategies? Are they so indicated in the documents?

- If other comprehensive safety plans exist for the State or region, are the transportation plan and program consistent with the goals, performance measures, actions, and strategies as indicated in these comprehensive plans?

- If some form of prioritization scheme is used to rank projects in the programming process, is safety included in this scheme? If so, what is the relevant weight of safety compared to other factors?

- Are key safety stakeholders involved in the final development of the transportation plan and program?

Step 8: Monitoring System Performance

- Is there a systematic program or strategy for monitoring the safety performance of the transportation system? If so, is it effective? If such a program does not exist, how can it be developed?

- Is the feedback provided by the monitoring system used in refining goals, objectives, performance measures, problem identification, project analysis, and evaluation? Is this feedback provided in a timely manner?

- Are there new vehicle or system management technologies that can be used to provide the desired data more cost-effectively? Can such data collection be integrated into other efforts by the State or region to collect system performance data? For example, if the State has intelligent transportation system (ITS) architecture, is safety an important feature of this strategy?

- Who are the major players in a safety management system? What are their responsibilities? Is there a need to define in more formal terms these responsibilities and interrelationships?

Figure A.3   Phoenix Safety Management System
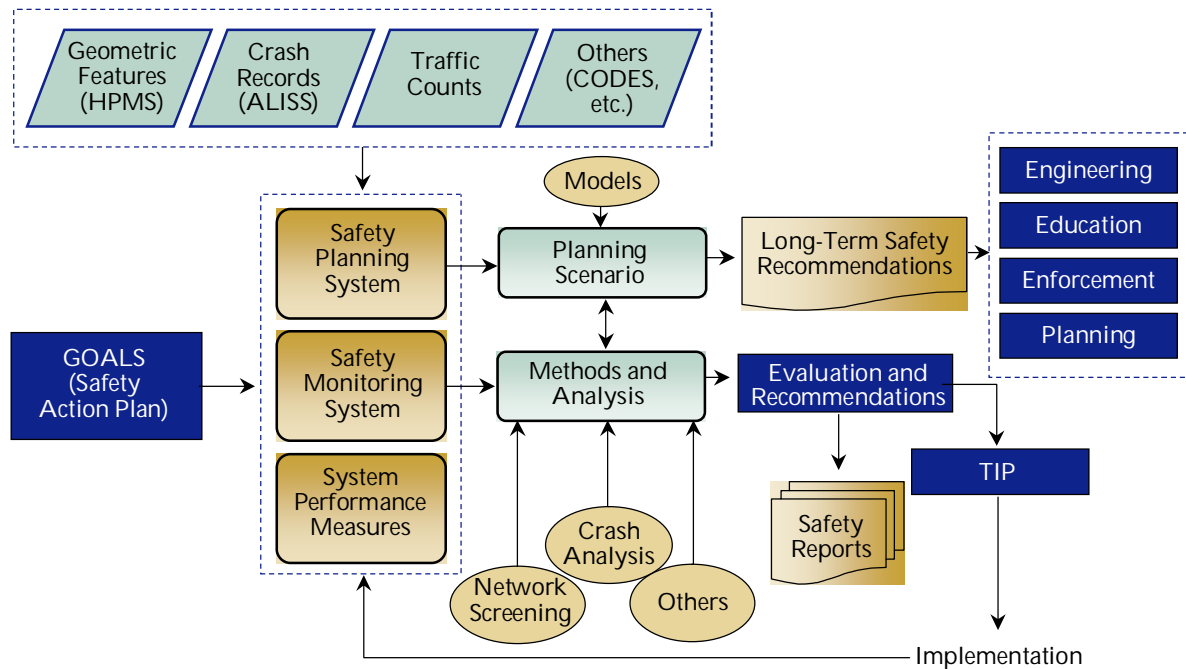
Step 9: Collaboration and Partnership

- Does your agency have a partnership or collaborative process with key safety professionals, e.g., safety advocacy and interest groups, transit operators, bike/pedestrian specialists, law enforcement, emergency medical service (EMS) managers, data managers, motor carriers, and traffic operations planners?

- Has your agency considered forming a safety work group, and using their input on safety within the planning and programming process?

Figure A.4 Steps in Transportation Planning

METROPLAN ORLANDO
A Regional Transportation Partnership
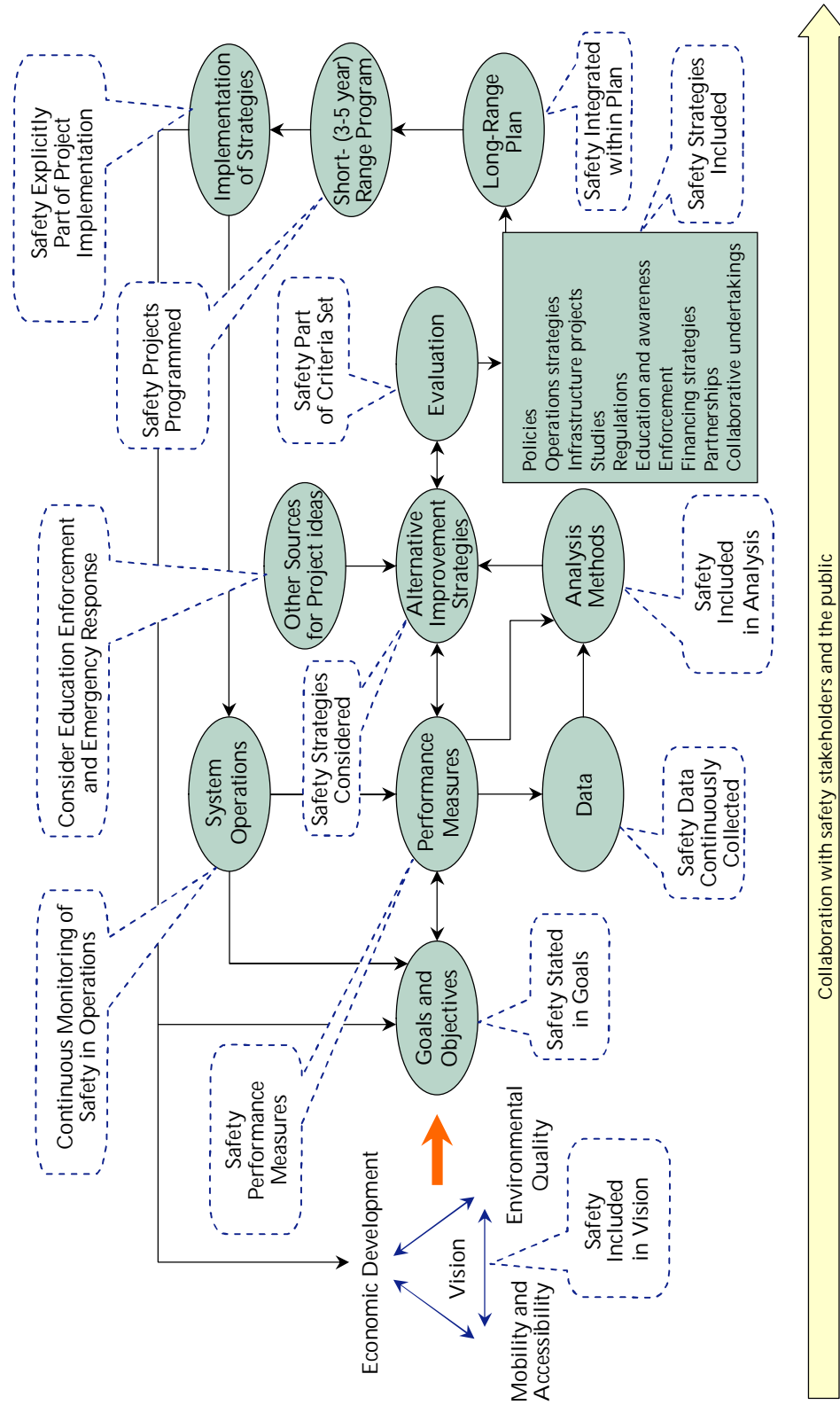
Amendment

METROPLAN ORLANDO

Safety Conscious Plan (SCP)

Vision Statement:

"By the year 2025 to have a regional, integrated, multimodal transportation system that _safely_ and efficiently moves people and goods to, through and within the urban area and which enables the Central Florida community to flourish in the global marketplace."

GOAL: System Safety[2]

Safety – Consider public safety in the development and preservation of the transportation system.

Safety Enhancements – Identify and implement safety enhancements to reduce the rates of crashes, injuries, and fatalities.

System Preservation – Provide appropriate monitoring and maintenance to preserve and enhance system safety.

Objective/Performance Measurements:

- Reduce the rate of crashes on state roads to .90 per million vehicle miles of travel (VMT) by 2010.
- Reduce the rate of fatalities on state roads to 1.33 per 100 million vehicle miles of travel (VMT) by 2010.
- Reduce the number of pedestrian fatalities.
- Assess perception of safety and understanding of safety laws in Transportation Issues in Central Florida: A Survey of Public Opinion.

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[2] *Community Connections:* A Transportation Vision for the Next 25 Years FINAL REPORT

Implementation:

- Establish safety as <u>a</u> criterion for <u>the</u> Project Prioritization List.

- Support traffic safety education and traffic enforcement efforts through coordination with region's Community Traffic Safety Team (CTST) Program.

- Identify and coordinate safety improvement projects within the region with Florida Department of Transportation, District Five.

- Encourage a change to the policy regulating the use of Variable Message Signs (VMS) to include appropriate, consistent traffic safety messages across the region.

- Keep the elected officials informed and focus their attention on traffic safety issues and activities being carried out by the MPO as well as the CTSTs. Provide regular briefings and examples of regional and local safety initiatives.

- Coordinate traffic safety campaigns across the region, such as "Click It or Ticket," and impaired driving, red light running, aggressive driving campaigns, and awareness of pedestrians.

- Encourage standardization of engineering factors throughout the region, e.g., signal timing, signage, and street naming.

- Champion legislative initiatives such as a "primary" or "standard" safety belt law and driver education program.

- Partner with CTSTs to sponsor quarterly forums such as the Peer Exchange to network and share information on safety improvements strategies. .

- Seek opportunities to increase funding to reduce high crash levels in the region.

- Research, design, implement, and coordinate a region-wide effort to improve the collection, management, and analysis of crash data.

- Public awareness campaign.

- Strongly encourage coordination of driver education programs in public schools.

    Evaluation and Recommendations:

- Report on safety performance measurements.

- Assessment of:

  - Institutional roles and responsibilities

  - Policy development

  - Coordination and collaboration