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research report

Incorporating Safety into the Regional Planning Process in Virginia: Volume I: Development of a Resource Guide

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16. Abstract:

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A survey of Virginia MPOs/PDCs conducted in this study revealed a healthy interest in such integration: 83% of respondents included safety in their planning goals and objectives, 61% involved citizens in safety planning, and 86% (of those answering the particular question) indicated safety is a factor (or in the case of one respondent, the only factor) used to prioritize projects in the long-range plan. The survey also identified several barriers to such integration. Although respondents cited a lack of dedicated safety funding as the largest obstacle, other barriers cited included the difficulty of obtaining of crash data and a lack of adequate training for staff in areas such as geometric design, crash data acquisition, and human factors. Further, 44% of respondents [who answered the particular question] noted that before/after studies are not conducted to determine the efficacy of safety-related projects.

Accordingly, this study developed a Virginia-specific resource guide that VDOT district planning staff, MPOs, and PDCs can use to enhance the integration of safety into the planning process. This report (Volume I) describes the process used to develop the guide; the guide itself is provided in Volume II. The guide promotes the incorporation of safety into the planning process by providing numerous, specific examples rather than by exhorting agencies to perform such coordination.

Virginia is a diverse state composed of urban, suburban, and rural regions with varying degrees of reliance on local and state crash data systems. As a consequence, the opportunities to integrate safety and planning are themselves diverse, as reflected in the guide. Many solutions presented in the guide are feasible in some situations but not in others. For example, widening substandard high-speed travel lanes may be productive in a rural area, whereas an urban location might benefit from a reduction in the number of vehicle lanes and the addition of a bicycle path. Further, the guide identifies 16 funding sources for safety-related projects given that no funding source has universal applicability. By necessity, therefore, of the diverse examples provided in the guide, only some may be suitable for a given region.

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FINAL REPORT

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ABSTRACT

The Federal Highway Administration argues that one way to reduce substantially the annual $230 billion national societal cost of motor vehicle crashes is to incorporate safety directly into the long-range transportation planning process. Because much of this planning in Virginia is conducted by metropolitan planning organizations (MPOs) and planning district commissions (PDCs), it is appropriate to determine ways in which the Virginia Department of Transportation (VDOT) (which generally is responsible for roadway safety) may work with these organizations to integrate safety and planning.

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INTRODUCTION

Motor vehicle crashes are a significant health risk: in 2008, almost 69,130 Virginians were injured and 821 were killed (Department of Motor Vehicles, 2009). To reduce this crash risk, federal and state entities have suggested or mandated that safety be explicitly considered in the transportation planning process. For example, Virginia's Strategic Highway Safety Plan (SHSP) calls on Virginia to "integrate safety as a critical component of all statewide, regional, and local transportation planning" (Virginia's Surface Transportation Safety Executive Committee, 2007). Federal rules require that safety influence transportation planning through two mechanisms: (1) that safety is one of the eight planning factors that metropolitan areas consider when developing long-range plans, and (2) that such regional plans be consistent with the state's Highway Safety Plan (§ 450.306(a)(2) and § 450.306(h), respectively, of the Metropolitan Transportation Planning Final Rule). (A long-range plan may be abbreviated as LRP [for long-range plan] or CLRP [for (financially] constrained LRP] to designate that the projects in the plan must be feasible given expected levels of funding.) The literature also supports this integration of safety and planning: Washington et al. (2006) noted that safety should be considered throughout the project development process including establishing the vision statement, goals, objectives, and performance measures; evaluating alternatives; and monitoring a project's impacts.

Although the integration of transportation planning and safety is intellectually desirable, there is no clear process demonstrating how such integration should be accomplished within Virginia's current administrative structure. That is, the specific activities that transportation planners should undertake to consider safety further are not known. This lack of specificity was noted in a research need brought to the attention of the Virginia Transportation Research Council's (VTRC) Transportation Planning Research Advisory Committee [TPRAC] and published in *TPRAC Research Needs* (TPRAC, 2007).

> Transportation safety planning brings significant changes to the traditional planning process and requires new ways of thinking. Currently, there is no standardized process in the transportation safety planning in Virginia. Many agencies in other states have gained some good experiences in this field. Research should be conducted on the best practice available and a framework of safety planning process should be established for Virginia. One issue should be addressed is to set up a mechanism to involve different level of partners (state, region, local, MPO [Metropolitan Planning Organization] in the safety planning process through different aspects like access management, land use strategies and road network planning. An example process and analysis on a smaller MPO with surrounding rural jurisdictions would be performed.

TPRAC Research Needs (TPRAC, 2007) calls for the development of a "template for a safety planning process that can be used at the regional level in both urban and rural areas." This study developed such a template, referred to hereinafter as a resource guide, that can be used to incorporate safety into the planning process. Although the transportation safety area may include a wide variety of topics, the mention of partners in the document (TPRAC, 2007) implies that those aspects of safety that benefit from multi-agency coordination are of interest for this study.

PURPOSE AND SCOPE

The purpose of this study was to develop a resource guide for staff from planning district commissions (PDCs), metropolitan planning organizations (MPOs), and districts of the Virginia Department of Transportation (VDOT) to enhance the integration of safety into the regional transportation planning process in Virginia.

The scope of the study was limited in two ways.

1. The resource guide had to accommodate the existing regional planning process used to develop the LRP.

2. The study focused on developing the structure and content of the resource guide. The implementation of the guide and other dissemination efforts were beyond the scope of the study.

Further, the resource guide was to have the following characteristics:

- be compatible with LRP activities such as goal development, establishment of performance measures, and project selection

- identify sources of crash risk and strategies that can reduce this risk

- describe resources available to Virginia planners such as crash data and analysis tools

- enable a new planner to create a "safety focused" LRP (Sawyer, 2009).

The resource guide developed in this study comprises Volume II of this report (Miller et al., 2010).

METHODOLOGY

The resource guide was developed through accomplishing five tasks:

1. Conduct a literature review.

2. Conduct a survey of Virginia MPOs and PDCs to identify current practices and challenges regarding the incorporation of safety into the regional planning process.

3. Classify MPOs and PDCs as either large, medium, or small since the planning needs for MPOs/PDCs of different sizes are not necessarily the same.

4. Analyze and interpret the survey results.

5. Develop and revise the resource guide.

Interim products were provided to a project steering committee, and their comments were used to revise them. (For example, regarding Task 2, a draft survey instrument was provided to the steering committee and comments from the committee were used to revise the survey instrument before it was deployed.) The committee included one planner from the Hampton Roads Transportation Mobility Organization (formerly known as the Hampton Roads PDC), one representative from the Federal Highway Administration's (FHWA) Virginia Division, two VDOT district planners (Roanoke and Northern Virginia), three staff of VDOT's Traffic Engineering Division, and two staff from VDOT's Transportation and Mobility Planning Division. The committee met several times with the researchers throughout the course of the study. Representatives of VDOT's Staunton District and the Central Shenandoah PDC also reviewed the developed resource guide. Having a breadth of viewpoints was germane to this study owing to its multidisciplinary nature.

Conduct a Literature Review

With more than 19,000 entries in the Transportation Research Information Services (TRIS) World database with the key words "safety" and "planning" (based on a search conducted on October 5, 2009), it was not feasible to review all such literature. Instead, the researchers identified three themes that were germane to the development of the guide:

1. the concept of integrating safety into the planning process
2. best practices for linking safety and planning
3. Virginia practices for linking safety and planning.

Search terms that helped identify relevant literature included *integrating safety into planning* and *safety conscious planning,* with search engines including TRIS, Google, and Bing. The steering committee also provided specific topics for the literature search, such as road safety audits (RSAs), safety ratings as used in Italy and Germany, and Virginia's SHSP. The literature

review also included a few pieces of Virginia-specific literature that illustrated how some of the concepts noted outside Virginia were being used within Virginia.

Conduct a Survey of Virginia MPOs and PDCs

To identify current practices and challenges regarding the incorporation of safety into the regional planning process, a 23-question survey, provided in Appendix A, was developed and distributed to all 23 Virginia MPOs and PDCs. The survey questions are listed in Table 1.

Table 1. Survey Questions

No.	Question
1	What elements of safety are currently incorporated into your MPO's planning process? (check all that apply)
2	How is safety included within the long range planning documents? (check all that apply)
3	(a) To what level of detail does your MPO identify potential safety problems during the planning process? (check all that apply)
	(b) To what level of detail does your MPO identify potential safety solutions during the planning process? (check all that apply)
4	What performance measures are included in the long range planning documents? (check all that apply)
5	Which goals or standards are used in the long range planning documents? (check all that apply)
6	(a) How is safety used to prioritize projects for placement in the Long Range Plan?
	(b) How is safety used to prioritize project scheduling in the Six Year Improvement Program (SYIP) or State Transportation Improvement Program (STIP)?
7	What approaches are used to evaluate the safety impacts of projects in the long range planning documents? (check all that apply)
	Consider the projects in your MPO or PDC where right-of-way (ROW) and/or construction funds have been placed in the SYIP or STIP over the past three years. For approximately what percentage of those projects is it true that:
8	(a) Safety was the sole reason for placing the project in the SYIP or STIP?
	(b) Safety was one of two or more reasons for placing the project in the SYIP or STIP?
	(c) Safety was not the reason for placing the project in the SYIP or STIP?
9	Which of the following are actively involved in the safety planning process? (check all that apply)
10	Through what means are staff from other agencies actually involved in the selection of safety projects? (check all that apply)
11	Is crash data quality sufficient and available for incorporating safety into the planning process?
12	What obstacles do you face in incorporating safety in the planning process? Rank the obstacles from 1 (biggest obstacle) to 11 (smallest obstacle)
13	(a) Expertise in which areas shown below are necessary for incorporating safety into the planning process? (check all that apply)
	(b) To what extent do MPO staff have the necessary training identified in part (a) above?
14	What funding sources are used in your MPO or PDC to include safety related projects for implementation in the planning process? (check all that apply)
15	Is a retrospective analysis (e.g., a before/after study) ever performed to determine the efficacy of safety related projects? (check all that apply)
16	When will the next update of the Constrained Long Range Plan be available?
17	Based on the results of this research effort, we plan to develop an approach to incorporate safety into the regional planning process and test this with one MPO. Would your MPO be willing to participate in this test?
18	Do you have any additional comments, questions, or insights regarding either the survey or the project?

The survey was developed based on three sources of input: consultation with the steering committee, the 10 elements for linking safety and planning suggested by Washington et al. (2006), and other results of the literature review (Task 1). As an example of a consultation with the steering committee, after receiving a revised version of the survey, one steering committee member suggested two changes to Questions 6b, 8a, 8b, and 8c of the survey instrument:

1. Whereas the questions initially only mentioned the SYIP (a Virginia-specific document) they should now also mention the STIP (a document that FHWA recognizes).

2. Another option should be added to each question: the option of indicating "Don't know." At the time of the survey distribution, the intent of this additional option was to determine the extent to which the respondents' agencies knew the extent to which safety is used to prioritize project scheduling (see Question 6) or is a reason for placing the project in the transportation program (see Question 8).

The 23 MPOs and PDCs in Virginia were identified through two email lists maintained in VDOT's Outlook system for all Virginia PDCs and MPOs. (Within VDOT's system, these lists are known as "CO TMPD PDC" and "CO TMPD MPO," respectively.) Prior to the distribution of the survey instrument, recipients were notified by telephone that it was forthcoming and asked through what mechanism they would like to receive the survey: email, fax, or telephone. A 100% response rate was achieved 10 weeks later, after additional telephone and email contacts were made. The survey responses were received via email (16), fax (6), and U.S. mail (1). A cover letter accompanied each survey, and recipients were told that identifying information would not be released (see Appendix A).

Classification of MPOs and PDCs As Large, Medium, or Small

Because the planning needs for MPOs/PDCs of different sizes are not necessarily the same, each survey respondent was classified as either a large, medium, or small MPO/PDC. For example, the initial research need (TPRAC, 2007) expressly suggested that a small, rural MPO/PDC be used as a test case. However, it became clear that it was not always easy to determine what constituted a large or small MPO/PDC. Accordingly, nine characteristics, such as population and daily vehicle miles traveled (VMT), were recorded for each MPO/PDC. Then, groupings of large, medium, and small were developed such that significant differences between groups for as many characteristics as possible were observed. Equation 1 (Garber and Hoel, 2002) illustrates the test of significance using a single characteristic (population). (Equation 1 is a variant of the *t*-test where variances are not pooled [U.S. Department of Commerce, 2006] and hence not assumed to be equal.)

A significant difference is observed if $\left| \overline{u_l} - \overline{u_m} \right| > T\sqrt{\frac{S_l^2}{n_l} + \frac{S_m^2}{n_m}}$ [Eq. 1]

where

T = test statistic with $n_l + n_m - 2$ degrees of freedom

n_1 = sample size for the large regions

n_m = sample size for the medium regions

S_1^2 = population variance for the large regions

S_m^2 = population variance for the medium regions

$\overline{u_1}$ = population mean for the large regions

$\overline{u_m}$ = population mean for the medium regions.

It was initially anticipated that if a breakdown among large, medium, and small such as that shown in Figure 1 applied not only to population but also to the other eight characteristics, then the breakdown was indeed robust. At the time the methodology was applied, the investigators did not seek to develop uncorrelated characteristics—indeed, strong correlations were noted among some characteristics, such as population and population density (correlation coefficient of 0.95). Instead, the investigators sought to determine whether a division of large, medium, and small could be consistently maintained for as many of the nine characteristics as possible.

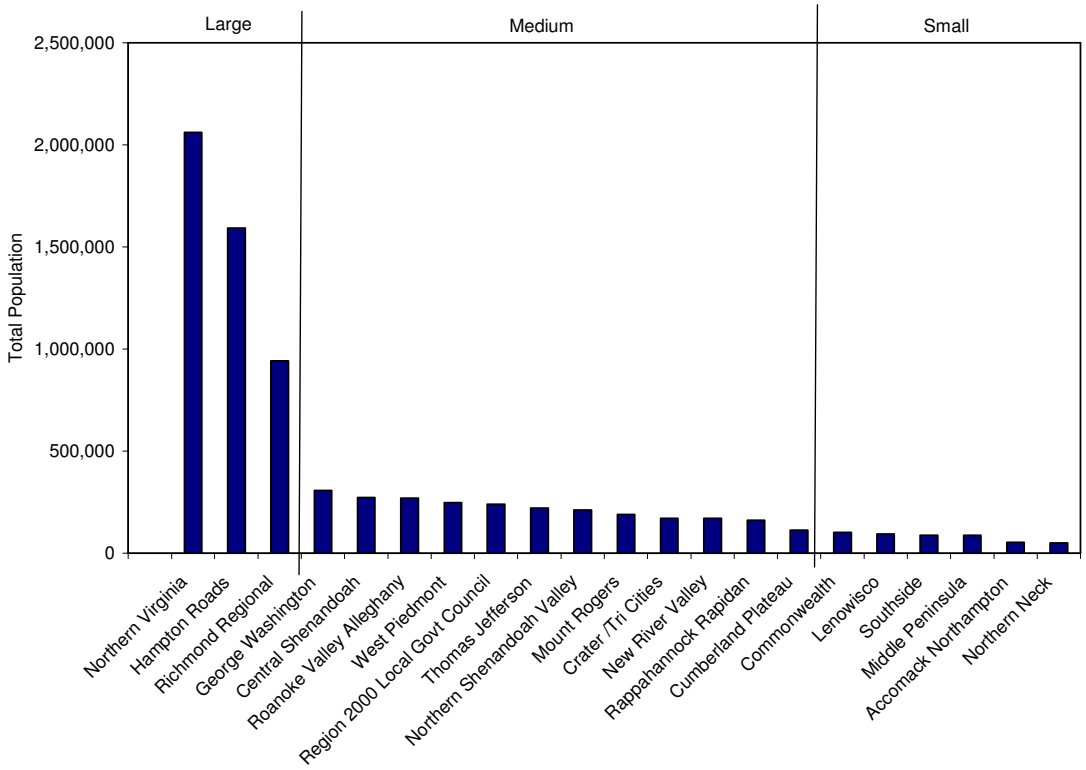

Figure 1. Total Population for Each PDC Region

Five characteristics—number of lane miles, number of lane miles per square mile of land, size of the area in square miles, percentage of the population that drove or carpooled to work, and whether the regional travel demand model classified the area as urban or rural—showed no discernible pattern that could be used to classify the PDCs/MPOs as large, medium or small consistently.

However, four characteristics suggested that PDCs/MPOs could be grouped into the categories of large, medium, and small: population (as shown in Figure 1), population density, VMT, and VMT density (i.e., VMT divided by number of lane miles). (Because these four variables have correlations of 0.88 or higher, it is acknowledged that an interpretation of Table 2 is that the areas are delineated on the basis of one fundamental variable [which could be any of the four], with the other three variables highly correlated with the chosen variable.) Equation 1 showed significant differences between the medium and small MPOs/PDCs and between the large and medium regions for all four characteristics ($p < 0.01$). (Although a pattern was visible in terms of a fifth characteristic [percent population using vehicle or carpool], the differences were not statistically significant [$p = 0.55$ for large versus medium regions, $p = 0.40$ for large versus small regions, and $p = 0.54$ for medium versus small regions] as shown in Table 2.)

As may be seen, PDC boundaries rather than MPO boundaries were used for the computations. For example, the Fredericksburg Area MPO is located within the George Washington PDC; as a consequence, when total population was computed, that MPO was assigned the George Washington PDC population. This ensured that if a region was classified as "small," the classification resulted because the population of the region was small rather than because the MPO boundaries included only a portion of the PDC.

Table 2. Comparison of Characteristics for Small, Medium, and Large Virginia Regions

	Large vs. Medium		**Medium vs. Small**	
Characteristic	**Significant Difference?**	***p* value**	**Significant Difference?**	***P* value**
Population	Yes	0.0017	Yes	< 0.0001
Population Density	Yes	0.0400	Yes	0.0016
VMT	Yes	< 0.0001	Yes	< 0.0001
VMT Density	Yes	< 0.0001	Yes	< 0.0001
Travel to Work[a]	No	0.5500	No	0.5400

[a]Large and small regions show no significant difference for the travel to work characteristic ($p = 0.3950$).

Analysis and Interpretation of Survey Results

The survey results were analyzed based on the large, medium, and small MPO/PDC classifications. Then, interpretations were based on select groupings of these questions. For example, Questions 2, 6, and 8 (see Appendix A) have one characteristic in common: they indicate the relative influence of safety on planning and programming. By examining the results of these three questions—how safety is included in the planning process, how it influences the placement of projects in the program, and how it affects the scheduling of such projects—a general interpretation of safety's role in the planning process could be made.

Development and Revision of the Resource Guide

The results of the literature review, the results of the survey, and feedback from the steering committee were used to develop and revise a resource guide. Table 3 summarizes major comments received from the steering committee and other interviewees.

These results were first used to develop individual steps to integrate safety into the planning process. Then, an outline of the guide, including the necessary components to enable users to fulfill these steps, was developed. This process was highly iterative because of the diverse parties involved. For example, the following interactions led to the development of Step 2 (identification of stakeholders).

Table 3. Summary of Interactions with Project Steering Committee and Other Interviewees

Date	Subject	Select Comments
May 6 and 15, 2008	Initial VTRC reviews	• Survey analysis should distinguish between larger and smaller MPOs • Survey analysis should include question regarding development of Long Range Plan (LRP) • Schedule should be revised to accommodate multiple steering committee meetings
June 24, 2008	Videoconference with steering committee to discuss proposal	
Sept. 9, 2008	Videoconference with steering committee to discuss literature review and proposed survey instrument	• Several additional literature sources were suggested • Survey instrument should refer to Statewide Transportation Improvement Program (STIP) rather than Six-Year Improvement Program (SYIP)
April 3, 2009	Videoconference with steering committee to discuss results of survey and initial outline of template	• A methodology should be developed to classify MPOs/PDCs as large or small • Rename template the "Safety Resource Guide" • Template should have 7 to 10 modules, not 16, and should relate to survey
May 28, 2009	Interview with representatives of VDOT's Staunton District and the Central Shenandoah PDC	• Planning objectives should be quantifiable or measurable • Consider steps to reduce costs, such as removing traffic signals where not warranted • Guide should include comprehensive list of funding sources
July 9 and 27, 2009	Videoconferences with steering committee to discuss proposed template	• Template should place greater emphasis on topics in highway safety plan, such as roadway departure • References should be provided for each step rather than at end of document [to accommodate readers who refer to only one step] • Provide tighter integration with Strategic Highway Safety Plan
August 26, 2009	Teleconferences with steering committee to discuss revised template	• Continue to make resource guide more like a guidebook and less like a report. Find ways to help readers quickly refer to material. • Consider mechanisms to disseminate guide such as quinquennial Surface Transportation Plan meeting with MPOs and upcoming January meeting with Virginia PDCs • Revise Step 8 to apply volume warrant correctly
November 18, 2009	VTRC review	• Revise Step 8 to include more holistic examples pertaining to system monitoring. • Revise warrant analysis in Step 8 so reader will not get lost in details. • Simplify reference notation

- The investigators developed an example of how to involve multiple stakeholders in the prioritization of bicycle-related projects.

- The steering committee noted that the initial version of the guide focused too heavily on bicycle/pedestrian projects at the expense of other initiatives..

- The investigators developed a second example that involved stakeholders to reduce crashes related to driver fatigue, focusing on rest areas as one countermeasure.

- The steering committee expressed concern that rest areas might be an inappropriate countermeasure given Virginia's recent decision to close some.

- The investigators revised this second example to list all conceivable countermeasures for fatigue-related crashes, including but not limited to rest areas. To avoid bias, the literature's indication of effectiveness for each countermeasure was included.

The decision to use an iterative process, rather than a non-iterative process, was deliberate. It was believed that this process of developing a draft step, soliciting feedback, and then making revisions—an iterative process—would lead to a stronger guide than would have been the case had the investigators simply waited for the steering committee to specify what should be covered in each step before proceeding—a non-iterative process.

RESULTS AND DISCUSSION

Literature Review

Concept of Integrating Safety into the Planning Process

The inclusion of safety in the planning process is not a new concept. The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 required the use of safety management systems (SMS) (FHWA, 1995; Depue, 2003), and the subsequent 1998 reauthorization (the Transportation Efficiency Act for the 21st Century, or TEA-21) named safety and security as one of seven factors that MPOs were required to consider in their planning processes. The latest federal reauthorization (Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users [SAFETEA-LU]) continued to name safety as an MPO planning factor. The "final rule" for statewide transportation planning and metropolitan transportation planning that resulted from the passage of SAFETEA-LU required, for both the statewide transportation planning process and the metropolitan planning processes, consistency with the state's SHSP and "other transit safety and security planning and review processes, plans, and programs, as appropriate" ("Part III: Department of Transportation," 2007). SAFETEA-LU thus emphasizes the following two principles: (1) consistency among processes, with safety playing a clear role in decision making; and (2) a systematic review of needs (Depue, 2003) with an implication being that the greatest reduction will occur if all engineering, enforcement, and education countermeasures are considered.

Thorne et al. (2002) suggested that such integration of safety and planning—known as transportation safety planning (TSP) or safety conscious planning (SCP)—may yield crash reduction benefits. Consistent with the SMS concept, TSP emphasizes crash prevention through consideration of all dimensions of safety, such as engineering, education, enforcement, emergency medical services, and public awareness (Roberts, 2001). Roberts (2001) also cited three other attributes of TSP: (1) it considers improvements across the entire system and at specific sites, (2) it considers improvements across multiple modes, and (3) it searches for opportunities to prevent future crashes by better integrating safety into surface transportation decision making. For example, installing a series of T-intersections rather than traditional four-legged intersections may, depending on the traffic volumes, yield a crash decrease (Roberts, 2001) because of the reduction in conflict points. (Replacing a four-way intersection with two T-intersections reduces the number of conflict points from 32 to 18.) Such changes are made more easily during the planning stage prior to roadway construction, rather than after the network has been completed.

Best Practices for Linking Safety and Planning

A variety of best practices for marrying safety and planning has been identified. The most comprehensive may be NCHRP Report 546 (Washington et al., 2006), which presents 10 elements, framed as questions, designed to achieve this integration. A poignant aspect of the elements is that they reflect the full project development cycle such that safety is included at the beginning (e.g., in the vision statement, goals, and objectives), the middle (e.g., the analysis of alternatives), and the end (including a retrospective analysis that may influence future projects or planning efforts). The 10 questions are:

1. Does the vision statement for the planning process include safety?

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

3. Are safety related performance measures part of the set being used by the agency?

4. Are safety related data used in problem identification and for identifying potential solutions?

5. Are safety analysis tools used regularly to analyze the potential impacts of prospective strategies and actions?

6. Are evaluation criteria used for assessing the relative merits of different strategies and projects including safety related issues?

7. Do the products of the planning process include at least some actions that focus on transportation safety?

8. To the extent that a prioritization scheme is used to develop a program of action for an agency is safety one of the priority factors?

9. Is there a systematic monitoring process that collects data on the safety related characteristics of transportation system performance and feeds this information back into the planning and decision making process?

10. Are all of the key safety stakeholders involved in the planning process?

Examples of how to relate safety and planning are also available from literature describing practices in other states. Ohio MPOs used a project prioritization process to identify which safety projects needed immediate attention based on characteristics such as crashes, traffic volume, and presence in the Transportation Improvement Program (TIP) (Young, 2008). In addition, Ohio holds SCP workshops with all 17 MPOs; after the workshops, the MPOs develop countermeasures based on field reviews and then the Ohio DOT decides which MPO safety projects will be funded (Khisty and Mohammadi, 2001). New Jersey used a survey of safety stakeholders to identify topics of interest such as aggressive driving, impaired drivers, reduction of head-on collisions, and highway design improvements (Knezek et al., 2005). The authors reported that the survey results, coupled with SCP forums, increased support for TSP initiatives. FHWA also designed a short course concerning the benefits of TSP (Ritter, 2005). Iowa's process received attention because of its emphasis on using flashing yellow warning signs, improving pavement markings, and installing large street name signs to address the increased number of older drivers and the provision of training for smaller agencies (Cambridge Systematics, n.d.). Iowa's training matches a suggestion by AECOM Consulting Transportation Group et al. (2002) that improved training for all state and local government agencies can improve the understanding of safety-related needs. The Southeastern Michigan Council of Governments developed a manual to help local agencies rank potential crash countermeasures at high-crash locations (Gaines, 2007) through the computation of benefits and costs of these countermeasures (Thorne et al., 2002).

RSAs have been used in the United Kingdom, Australia, New Zealand, and the United States (Epstein and Morgan, 2002). RSAs are performed by an independent team of transportation experts and indicate the safety impacts of the project; RSAs can be performed during the design phase of a project or after it has been built (ARRB Group Ltd., 2003). As is the case with RSAs conducted by the Delaware Valley Regional Commission, a comprehensive checklist may be used to identify a wide variety of potential problems such as whether (1) lighting is needed, (2) landscaping obstructs sight distance, (3) hidden driveways are properly signed, (4) traffic signal clearance time is adequate, and (5) signal heads are large enough to be noticed by motorists (Morgan, 2005). For example, an RSA conducted in Albemarle County, Virginia, found five problems along a 2.5-mile segment of Route 29 that included Seminole Court, Woodbrook Drive, and Branchlands Boulevard/Premier Circle (VDOT, 2007): uncontrolled access; deteriorated pavement markings; vegetation that blocked some signs from view; suboptimal traffic signal operation and turn lane design; lack of overhead lightings, which poses a danger to pedestrians crossing at night time; and lack of pedestrian sidewalks and crosswalks. A technique related to an RSA is a road safety audit review [RSAR] (Owers and Wilson, 2001), which are performed on facilities that have already been constructed.

Sketch-level techniques that allow estimation of crash risk with a minimal amount of data (which is typically the case at the planning stage) are also noted in the literature. For instance in

Texas, safety prediction models are used for various types of facilities to determine the safety impacts of geometric design elements (e.g., turning bays or access points) that may be considered at the project level (Bonneson et al., 2006). Safety performance functions were developed for urban and suburban arterials (Harwood et al., 2007). Crash reduction factors, which help estimate a countermeasure's crash reduction, have been reported (Bahar et al., 2007; Harkey et al., 2008).

The literature also reported several challenges in incorporating safety into the planning process (AECOM Consulting Transportation Group et al., 2002). These include poor quality and consistency of crash data; the difference in planning horizons (safety projects are often done within a period of months or a few years; horizons for long-range planning are typically 20 years); the sharing of responsibilities among agencies; and lack of proper training of safety personnel. Difficulty with securing funds for safety projects if safety is not made an explicit priority is another possible challenge:

> The lack of funding can be a challenge to incorporating safety into long-range planning. Often, transportation planners must allocate limited funding between competing priorities. If safety is not identified as a priority, funds may not be allocated for it, especially for long-range projects and planning (AECOM Consulting Transportation Group et al., 2002).

Resolution of these challenges may be considered, therefore, an implicit best practice.

Virginia Practices for Linking Safety and Planning

Virginia's SHSP acknowledges strategies that have both a safety emphasis and a planning emphasis (Virginia's Surface Transportation Safety Executive Committee, 2007). For example, one strategy to reduce injuries is to "improve relationships between land development and the transportation system by limiting or separating conflict points." Such a strategy's land development function is clearly in the planning domain, whereas the coordination of conflict points clearly has safety implications, suggesting the need to link the two disciplines. (Although not specific to Virginia, FHWA's gap analysis checklist [as provided by the Southern California Association of Governments (2007), Appendix A] emphasizes (1) data adequacy [to develop a safety element of a transportation plan] and (2) the use of criteria to select projects for inclusion in the Transportation Improvement Program [TIP] to address MPO safety priorities.)

At the state level, VDOT's Strategically Targeted Affordable Roadway Solutions (STARS) is a safety and congestion program involving planners, traffic engineers, safety engineers, and operations staff. STARS aids in the identification of critical safety and congestion locations (Detmer, 2008). The STARS program aims for low-cost improvements (e.g., $2 million to $5 million for primary and interstate projects) that can be implemented within 24 months. Examples of countermeasures considered include managing access by consolidating entrances and closing crossovers, increasing bicycle and pedestrian accommodation, improving signage and pavement markings, and extending acceleration and deceleration lanes (Detmer, 2008).

Note also that Virginia has familiarity with some of the practices described in the earlier national literature. For example, consider the concept of safety prediction models (Bonneson et

al., 2006). Safety prediction models are in use with the *Highway Safety Manual,* which will be used to identify the best practices that can be adopted and implemented in Virginia (Li, 2008). In addition, safety performance functions, an example of which is given by Harwood et al. (2007), are being developed for Virginia two-lane highways and Virginia intersections (VTRC, 2010a,b).

Classification of MPOs and PDCs As Large, Medium, or Small

Table 4 shows the classification of the MPOs and PDCs based on population, population density, VMT, and VMT density.

Table 4. Classification of MPOs and PDCs As Large, Medium, or Small

Large	Medium	Small
1. Northern Virginia PDC[a]	5. Fredericksburg Area MPO (located within George Washington PDC)	18. Commonwealth PDC
2. Metropolitan Washington Council of Governments (MWCOG) (MPO)[a]	6. Harrisonburg Rockingham MPO (located within Central Shenandoah PDC)	19. Lenowisco PDC
3. Hampton Roads PDC (includes Hampton Roads MPO)	7. Roanoke Valley Alleghany RC (Regional Commission)	20. Southside PDC
4. Richmond Area MPO	8. West Piedmont PDC (includes Danville MPO)	21. Middle Peninsula PDC
	9. Region 2000 Local Government Council (includes Central Virginia MPO)	22. Accomack Northampton PDC
	10. Thomas Jefferson PDC (includes Charlottesville/Albemarle MPO)	23. Northern Neck PDC
	11. Winchester Fredericksburg MPO (located within Northern Shenandoah Valley PDC)	
	12. Mount Rogers PDC	
	13. Tri Cities Area MPO	
	14. New River Valley PDC[b]	
	15. Blacksburg /Christiansburg /Montgomery MPO[b]	
	16. Rappahannock Rapidan PDC	
	17. Cumberland Plateau PDC	

[a]The area covered by the Northern Virginia PDC overlaps with that covered by MWCOG.
[b]The area covered by the Blacksburg/Christiansburg/Montgomery MPO overlaps with that covered by the New River Valley PDC.

Analysis and Interpretation of Survey Results

As discussed previously, of the 23 MPOs and PDCs who received the survey, 23 responded, for a survey response rate of 100%.

Overview of Survey Tabulations

The survey responses for each question are provided in Appendix B, with the results stratified by large, medium, and small MPOs/PDCs as indicated in Table 4. For example, as shown in Table 5 for Question 1, 8 of the 23 respondents identify road safety deficiencies by visual inspection and 18 use the number of automobile crashes. Appendix B provides a table comparable to Table 5 for each survey question, the responses made by individual respondents, and paraphrases of comments provided by respondents.

Table 5. Results for Question 1: What Elements of Safety Are Currently Incorporated Into Your MPO's Planning Process[a]

Element	No. of Respondents (Total of 22)			
	Large	Medium	Small	Total
Identification of road safety deficiencies by visual inspection	0	5	3	8
Road safety assessments (sometimes referred to as road safety audits)	1	4	1	6
Use of number of pedestrian crashes	1	7	0	8
Use of number of automobile crashes	3	12	3	18
Use of number of bicycle crashes	1	6	0	7
Use of number of truck crashes	1	8	1	10
Interagency cooperation	3	8	3	14
Others (please specify)	0	2	2	4
Not at all	1	0	0	1

[a] Respondent sample sizes are 4 large, 13 medium, and 6 small.

Interpretations of Survey Results

A review of the table-by-table findings provided in Appendix B suggested seven interpretations of the survey data:

1. Although safety is usually included in the planning process, several additional factors influence project development.

2. A minority of respondents explicitly incorporate safety through an analytical mechanism.

3. A majority of respondents use stakeholders or public perception to incorporate safety into the planning process.

4. Some assistance obtaining crash data may be needed.

5. Some assistance with analytical procedures may be appropriate.

6. Some assistance identifying safety funds may be needed.

7. Smaller MPOs/PDCs do not appear to place less emphasis on integrating safety into the planning process than do medium MPOs/PDCs.

Interpretation 1. Although safety is usually included in the planning process, several additional factors influence project development.

Questions 2, 6, and 8 asked respondents how safety is included in the long-range planning documents and its influence on the LRP, SYIP, and STIP. The interpretation of these questions related to the study purpose in that one tenet of linking safety and planning, according to the literature, is to ensure that safety is at least one of the factors used to select or advance projects. For example, Washington et al. (2006) suggested that safety should be a key factor in developing a transportation program and advocated giving projects with safety benefits higher priority in the programming process. FHWA (2007) emphasized the inclusion of safety as a

criterion when projects are selected for the TIP. Niessner (cited in Harwood et al., 2003) noted the option of including safety as a criterion when selecting projects, citing the difficulty in balancing two sometimes competing goals: the "need to rehabilitate the pavement structure and the desire to provide the highest possible level of systemwide safety and traffic-operational efficiency." In short, it is recognized that a variety of factors (e.g., economic development, congestion reduction, environmental improvement) influence the selection of projects for a transportation program, and understanding the relative influence of safety among these other factors appears to be a fundamental component of linking safety and planning.

Most respondents (19 of 23) include safety within the goals and/or objectives; further, 19 respondents indicated safety was a factor in placing a project in the LRP. One respondent commented on the importance of the incorporation of safety into the planning process. Safety is thus a factor in transportation planning but not the only one: only one-third of respondents (8 of 23) explicitly include safety in the vision statement, and only 3 noted safety was the sole factor for placing a project in the LRP. Several comments provided by respondents (in addition to their responses for each question) reinforced the concept that safety is only one of several factors in the planning process.

With one exception, the responses suggest the respondents have greater familiarity with the LRP than the SYIP/STIP: 3 respondents responded that the LRP had no prioritization process (in terms of how safety is used to prioritize projects for placement), whereas 10 of the 22 respondents (answering Question 6b) responded the SYIP/STIP had no prioritization process (in terms of how safety is used to prioritize project scheduling). When responding to Question 8a regarding how often safety was the sole reason for placing a project in the SYIP/STIP, 10 respondents responded "Don't know."

To the extent that respondents who responded "Don't know" were responding on behalf of their agency, the 10, 9, and 13 "Don't know" responses for Questions 8a, 8b, and 8c (of 21 respondents who answered those questions), respectively, inform the reader that there may be a need to document safety's role in project selection. However, as noted by a reviewer of this report, the possibility exists that a respondent could have responded "Don't know" because the respondent did not know the answer even through someone else in the MPO could have known the answer (which would eliminate the aforementioned need to document safety's role.) This possibility cannot be disproved, as the survey information represents the agencies' views only to the extent that the survey respondent had knowledge of these views. That said, the responses of three respondents suggest that at least some respondents' response of "Don't know" did not result from a lack of familiarity with the programming process. One respondent (who responded "Don't know" for Questions 8a, 8b, and 8c) also responded "Don't know" to part of Question 6b, commenting that MPOs have not had programming responsibilities (except for CMAQ [Congestion Mitigation and Air Quality] and RSTP [Regional Surface Transportation Program] funds). A second respondent (who responded "Don't know" for Question 8c but not for Questions 8a and 8b) had commented for Question 6 that VDOT did not communicate the SYIP decision-making process to the MPO but did invite the MPO to the public hearing. A third respondent who responded "Don't know" on Questions 8a, 8b, and 8c commented in Question 8 that the survey instrument did not demonstrate the distinction between the SYIP, for which the

components are controlled by cities, counties, and the state, and the STIP, which is a "body of work" between MPOs, VDOT, and the Department of Rail and Public Transportation [DRPT]).

Interpretation 2: A minority of respondents explicitly incorporate safety through some analytical mechanism.

Questions 3, 4, and 5 concerned the identification of safety-related problems, solutions, performance measures, and standards in the planning process. Problems are identified at the regional/PDC level (9 respondents) more often than at the project level (7 respondents). The reverse is the case for solutions: 11 respondents identify solutions at the project level compared to 5 at the regional/PDC level.

Few respondents use a given performance measure: total injuries and fatalities are used by 6 and 8 respondents, respectively, and other suggested performance measures, such as number of locations with substandard geometric design, are used less frequently. Only about one-third of the 22 respondents to Question 5 have a goal or standard related to crash rate, and 8 of the 22 respondents to Question 4 do not use any performance measures. As commented by one respondent, "safety is only mentioned in a broad-brushed sort of way in one of the factors."

Interpretation 3: A majority of respondents use stakeholders or public perception to incorporate safety into the planning process.

Questions 7, 9, and 10 concerned the role of stakeholders in the planning process. Most respondents use individual citizens (14 of 23 respondents) or VDOT (21 of 23 respondents); 4 respondents use other entities such as private industry. When staff from other agencies are involved in project selection, most respondents to Question 10 (18 of 20) responded that meetings or forums are used. Some respondents commented that it is the responsibility of VDOT or the Commonwealth Transportation Board (CTB) to conduct a retrospective analysis, program safety-related funds, or perform other activities stated in the survey questions.

Respondents emphasize public outreach: in Question 1, 14 of 23 responded that interagency cooperation was a safety-related element of their planning process. Further, of the methods that may be used to evaluate the impacts of safety projects in the CLRP, public perception is used most frequently (15 of 23 respondents); 7 of those 15 respondents use *only* public perception to evaluate the safety impacts of projects.

Interpretation 4: Some assistance obtaining crash data may be needed.

Question 11, and to some extent Questions 1, 12, and 13, concerned crash data availability and quality. In tandem, the responses to these four questions indicate that obtaining crash data poses a challenge for some respondents. A lack of data (or difficulty obtaining crash data) was the second highest obstacle to data and safety integration, and this perception was reinforced by several of the comments provided by respondents in reference to these questions. A possible contributing factor is that it is not possible at present to obtain roadway information for city streets in Virginia, although VDOT is exploring the feasibility of obtaining this

information in the future. Yet 15 of the respondents to Question 13a responded that crash data acquisition was a necessary expertise for the incorporation of safety into the planning process.

Respondents are, however, able to obtain some data given that most (19 of 23) incorporate automobile crashes into the planning process and some (8 of 23) use pedestrian crashes. Further, most (15 of the 22 respondents to Question 11 indicated crash data quality is sufficient and available for incorporating safety into the planning process.

Interpretation 5: Some assistance with analytical procedures may be appropriate.

Of the 18 respondents to Question 15, 10 indicated that a retrospective analysis is performed at some point to determine the efficacy of safety-related projects [on an ad hoc basis for 8 respondents, a systematic basis for 1, and "Other" for 1] compared to 8 respondents who responded that no such studies are undertaken.

Question 13a asked respondents to list the technical areas they thought necessary for incorporating safety into the planning process. Roughly one-half of the 22 respondents to Question 13a checked the areas of geometric design (13 respondents), speed/capacity analysis (13), signal operations (12), human factors (11), and crash scene analysis (10). About one-half of the respondents to Question 13b (11 of 23) responded "Somewhat" with regard to the extent to which MPO staff have the necessary training in the technical areas identified in Question 13a; by comparison, 5, 2, and 5 staff responded this training was "Adequate," "Not at all," and "Other," respectively; no respondents indicated "Fully." If the fact that a small portion of respondents responded "Adequate" signifies a need for greater technical expertise, some additional technical training may be productive—although, because the survey instrument did not ask respondents to respond that they did *not* have adequate technical training, the possibility exists that respondents do not think additional training is needed.

If desired, technical assistance may take the form of MPOs/PDCs sharing best practices, such as RSAs/assessments or identification of road safety deficiencies by visual inspection, both of which are used by less than one-half of the respondents. It may be the case that the MPOs/PDCs have complementary areas of expertise. For example, for Question 3a, of the 20 respondents to the question, 16 identify safety-related problems at some level of detail given in the survey. However, this level of detail at which problems are identified varied by respondent: e.g., 5 respondents identify problems at the jurisdiction level, 3 identify problems by user type, and 7 identify problems at the project level.

Interpretation 6: Some assistance identifying safety funds may be needed.

Question 14, and to a lesser extent Question 12, concerns safety funding, the lack of which is the top obstacle to safety-planning integration. Of the 16 funding sources listed in the survey, no single source is used by a majority of respondents and no source was never used. Although it is possible that respondents are not aware of these sources, it is also possible that (1) some respondents are not eligible for certain sources (e.g., CMAQ funds are used only in nonattainment areas) and (2) some respondents are not fully aware of how funds for safety projects are identified.

Interpretation 7: Smaller MPOs/PDCs do not appear to place less emphasis on integrating safety into the planning process than do medium MPOs/PDCs.

For each of 11 questions, there is one possible answer that implies less emphasis to incorporate safety into the planning process. These answers are "None" (Questions 4, 5, and 7); "Not at all" (Questions 1, 2, and 13b); "Never" (Question 15), and "Don't know" (Questions 6b, 8a, 8b, and 8c). For example, Question 7 asked which methods are used to evaluate safety impacts. One possible answer is that no such methods are used. There could be many possible reasons for such an answer (e.g., the respondent may have a strong desire to address safety but lacks adequate staff for such an undertaking), and the survey did not identify these possible reasons. However, to the extent that respondents are answering the survey on behalf of their PDC or MPO, it appears that an organization whose respondent responded "None" (in response to which methods are used) might place less emphasis on safety/planning integration than an organization whose response included one or more of the specific methods listed in Question 7 such as "Before and after comparison of crashes,"

If it were the case that small MPOs/PDCs placed less emphasis on safety/planning integration than medium MPOs/PDCs, the percentage of smaller MPOs/PDCs giving such responses to the 11 questions would be expected to be higher than the percentage of medium MPOs/PDCs giving such responses. This, however, does not appear to have occurred: the percentage of small MPOs who gave such answers was, on average, 28%, compared to an average of 35% for medium respondents. (The differences are not statistically significant at the 5% level based on the paired sample *t*-test [which presumes normality] and the Wilcoxon signed-rank test (McClave and Dietrich, 1982) [which does not presume normality]. Further, if the questions that include a "Don't know" response (i.e., Questions 6b, 8a, 8b, and 8c) are removed from the analysis, the percentage of small MPOs/PDCs providing responses that might imply a reduced emphasis on safety is *smaller* (14%) than for medium MPOs/PDCs (20%). Thus, on balance, it appears that small MPOs/PDCs do not emphasize the integration of safety into the planning process to a lesser extent than medium MPOs/PDCs.

Development and Revision of the Resource Guide

Identification of Steps for Integrating Safety into the Planning Process

The survey results, which identified challenges MPOs/PDCs face in incorporating safety into the planning process, and the literature review, which indicated how this incorporation may be achieved, were used to identify steps for integrating safety into the regional transportation planning process. The steps are as follows:

1. Develop a vision statement, goals, and objectives that directly incorporate safety.
2. Use diverse stakeholders to identify alternatives and evaluate their utility.
3. Use safety-related performance measures to assess deficiencies.
4. Acquire data within the time constraints faced by the planner.
5. Analyze data with available resources and thus select higher impact projects.

6. Prioritize projects to determine the largest expected crash avoidance given limited funds.
7. Identify alternative funding sources for safety-related projects.
8. Monitor the safety impacts of implemented projects.

Necessary Components of the Resource Guide

The eight identified steps governed the development of the resource guide. For example, only one-third of respondents use safety in their CLRP's vision statement. Yet an interview with one VDOT district planner and one PDC planner suggested that inclusion of safety in the vision statement, goals, and objectives should help stakeholders understand the impacts of projects. Thus, one necessary component of the guide was a set of tangible examples of how safety may be included in the vision statement and how this vision may be translated into specific goals, objectives, and projects.

Table 6 lists necessary components for each step based on the survey findings. In the second column, the impact of the desired effect of the component on a future survey, if one were to be conducted, is noted. For example, if in 5 years the same survey was distributed to MPOs and PDCs, it is hoped that the proportion of respondents indicating they incorporate safety into the vision statement would increase from 8/23 (the proportion indicated in this survey).

The literature indicated how these design principles might be achieved. For example, Washington et al. (2006) identified a variety of stakeholders such as bicycle and pedestrian organizations. The CLRP for the Harrisonburg-Rockingham MPO (HRMPO) (2005) identified advocacy groups in a Virginia-specific context, such as the Harrisonburg City Schools, the James Madison University Police Department, and the Shenandoah Bicycle Company. These two sources, coupled with the responses to Questions 9 and 10, were used to identify types of stakeholders appropriate for Step 2, as shown in Table 7. Each step includes at least one example based on the HRMPO CLRP (2005) [or interviews with VDOT and PDC staff that serve that area]; however, examples from other parts of Virginia are also given in the guide.

Four additional principles guided the development of the eight steps:

1. *Each step should be independent*. No MPO/PDC will necessarily use all eight steps; the resource guide does not constitute a policy or regulation. Thus, an MPO/PDC can use any given step in isolation. For example, an MPO can elect to use Step 2 (stakeholders) without performing the mathematics associated with Step 5 (crash data analysis).

2. *The steps should appeal to both experienced and novice audiences*. Some readers may be new to the safety area and plan to use the guide as a textbook; others may have extensive experience and may use it as a reference. An appropriate amount of detail should be provided to satisfy both audiences. For example Step 4 (data needs) describes how to obtain a dozen different types of data. Some of these data sources, such as crashes by jurisdiction, seat belt use, and roadway video images, may be of interest to persons who are starting to bring safety into the planning process. Other

Table 6. Necessary Components of Resource Guide for Each Step of the Planning Process Based on Survey Findings

Survey Finding [Question No.]	Step in Planning Process	Necessary Component of Guide and Design Goal
8 of 23 total respondents include safety in vision statement [2].	Step 1 (Vision, Goals, and Objectives)	Examples of how to include safety in vision statement and how vision is implemented through specific objectives. Component designed to increase number of MPOs/PDCs that include safety in vision statement.
Although most (21) respondents involve VDOT, fewer involve other stakeholders such as FHWA (9 respondents), Virginia State Police (8), private industry (4), and Department of Motor Vehicles (3) [9].	Step 2 (Stakeholders)	Examples of how stakeholders can be actively engaged in specific decisions. Component designed to show benefits of engaging additional stakeholders; by extension, component should increase use of additional stakeholders where productive.
8 of 22 respondents to question use crash rate and 6 use fatality and injury rate in their long-range planning documents [5].	Step 3 (Performance Measures)	Show how to obtain these data (see Step 4) and indicate other types of performance measures that are feasible for evaluating crash risk when crash data are not readily available. Component designed to increase use of safety-related performance measures.
Although 16 respondents indicated that crash data quality is sufficient [11], MPOs/PDCs indicated that "lack of safety data or difficulty obtaining such data" was second greatest challenge to incorporating safety into planning process [12].	Step 4 (Data Needs)	Show how to obtain safety-related data from variety of sources. Component designed to reduce difficulty of obtaining crash data.
5 respondents indicated staff have "adequate" training necessary to incorporate safety in planning process compared to 11 staff who indicated "somewhat" and 2 who indicated "not at all." [13b].	Step 5 (Data Analysis)	Provide tutorials regarding how data may be analyzed. Tutorials should appeal to both new and experienced planners. Component designed to increase number of respondents who have adequate training.
When asked whether safety was a reason for placing a project in SYIP or STIP,[a] about one-half of respondents to question indicated "Don't know." (This proportion was exactly 50% [8a], 45% [8b], and 65% [8c].)[b]	Step 6 (Prioritization)	Show how to document prioritization process such that it is transparent to others. Components designed to reduce number of "Don't know" responses for at least those projects with PDC/MPO and VDOT involvement.
"Lack of dedicated safety funding" was greatest challenge to incorporating safety into planning process [12].	Step 7 (Funding)	Identify federal and state programs (other than SYIP) that provide safety funds. Component designed to reduce difficulty associated with project funding.
Generally, before/after studies are never used (8 respondents) or are used only on an ad hoc basis (8 respondents) [15].	Step 8 (Monitoring)	Demonstrate that (1) a monitoring process can provide benefits and (2) how such a process can be used with minimal staff time. Component designed to increase number of respondents who perform before/after studies regularly.

[a] SYIP = Six-Year Improvement Program; STIP = State Transportation Improvement Program.

[b] The investigators interpreted these "Don't know" answers as reflecting the views of the agency represented by the respondents. If, however, the investigators are mistaken (e.g., the "Don't know" answers simply reflect an individual's lack of knowledge of the prioritization process), this mistake would lessen the importance of Step 6 since the prioritization process would already be well documented.

Table 7. Information Used to Generate Each Step in Resource Guide

Step No.	Description	Elements Noted by Washington et al. (2006) [a]	Related Literature	Questions from Survey of Virginia MPOs/PDCs [b]
1	Vision, goals, objectives	1,2	Meyer and Miller (2001)	2
2	Stakeholders	10	HRMPO (2005)	9,10
3	Performance measures	3	Landis et al. (1997)	4, 5
4	Data needs	5,4	VDOT (2008)	1(part of),11
5	Data analysis	5,4	Harkey et al. (2008)	3,13
6	Prioritization	6,7,8	Trigueros (2008)	8,6
7	Funding	6	HRMPO (2005)	12, 14
8	Monitoring	9	FHWA (2003)	7,15

[a] Washington et al. (2006) outlined 10 practices for linking safety and planning; the numbers in this column refer to the number of the practice noted in Chapters 6 and 7 of Washington et al. (2006).
[b] The survey instrument is provided in Appendix A.

data sources, such as crash rates for specific roadways, VDOT's Crash Analysis Tools (CAT), and detailed injury data may be of greater interest to persons who have been working on safety/planning integration for a long time.

3. *The steps should complement, not duplicate, existing planning and safety analyses processes*. MPOs/PDCs already follow a standard process for developing CLRPs, and VDOT routinely evaluates safety needs, so the guide must accommodate rather than duplicate these processes. As a consequence, the resource guide should include diverse examples that illustrate the utility of each step. For example, Step 8 (monitoring) demonstrates how to determine the efficacy of a given project. Because before/after studies are well reflected in existing safety analysis literature, Step 8 provides what the investigators believe is an innovative example provided by Central Shenandoah PDC and VDOT Staunton District staff. A rural city (Covington) may be able to save $3,000 to $8,000 per year for each intersection where an existing traffic signal may be removed; population losses suggest the possibility that some of these signals may no longer be necessary. Step 8 demonstrates how to monitor such intersections to ensure that in cases where a signal is removed, crash risk is not increased. Step 8 also builds on existing processes, such as the use of signal warrants (FHWA, 2003).

4. *The steps should provide specific, tangible examples of safety and planning integration that individual staff can implement.* The literature (AECOM Consulting Transportation Group et al., 2002; Washington et al., 2006) emphasizes the need for collaboration among agencies, but the target audience for the guide—VDOT district planners and MPO/PDC district planners—may not necessarily have the authority to implement large scale collaborative efforts by fiat. Thus, the guide identifies a series of smaller scale integrations—such as the types of crash data a planner can obtain from VDOT—that can be implemented within Virginia's existing administrative structure. In such cases, the guide may help planners ask the right questions in order to obtain such data.

Contents of the Resource Guide

Overview

The resource guide contains eight numbered sections that correspond to the eight steps that can be implemented to incorporate safety into the development of the CLRP as suggested by Figure 2. Each numbered section contains four subsections:

1. a *description* of the step
2. a *summary of current practice* regarding the step based on responses to the survey of Virginia MPOs/PDCs
3. at least one *example* of how the step may be performed
4. a list of *selected references that provide additional information* for each step.

The complete resource guide comprises Volume II of this report (Miller et al., 2010). The eight numbered sections of the resource guide are summarized here.

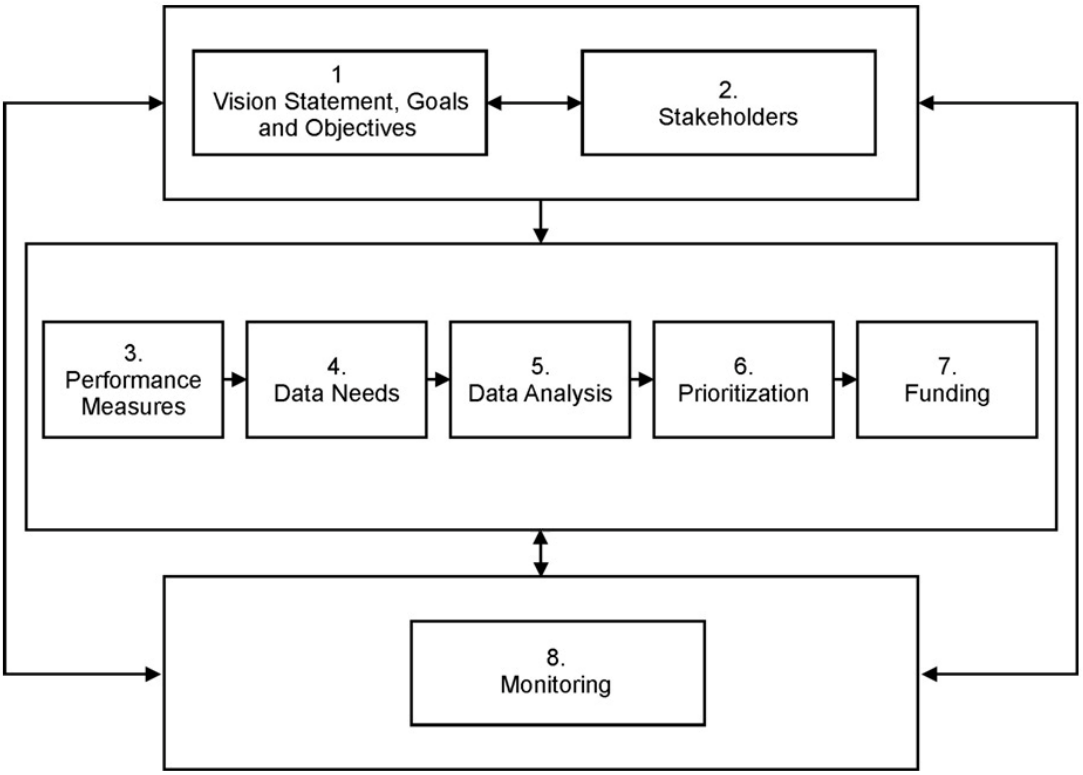

Figure 2. Flowchart Summarizing the Eight Numbered Sections of the Resource Guide

Section 1. Vision Statement, Goals, and Objectives

Because the CLRP invariably includes a vision, this section shows how to incorporate safety into that vision, derive safety-related goals and objectives, and then identify construction projects that support them. For example, with a CLRP goal of developing a safe transportation

system for all modes of travel, two objectives are to reduce motor vehicle crash risk by reducing VMT and to reduce pedestrian crash risk by providing dedicated facilities. Section 1 also suggests other safety-related goals derived from Virginia's SHSP.

Section 2. Stakeholders

This section illustrates how stakeholders may enhance the role of safety in the planning process. Example 1 concerns drowsy driving crashes, listing stakeholders as private sector freight companies, highway maintenance engineers, and operators of privately managed rest areas. Example 2 concerns the prioritization of bicycle and pedestrian facilities; stakeholders include local schools, citizens, law enforcement, the local parks and recreation department, and the local planning commission. Stakeholder roles differ: in the first example, stakeholders brainstorm possible alternatives to reduce drowsy driving crashes such as changing worker hours, installing rumble strips, and providing rest areas and examine what is known about the efficacy of these alternatives. In Example 2, the solution—the construction of nonmotorized facilities—is well understood; stakeholders determine where these facilities should be constructed given the limited funding available.

Section 3. Performance Measures

Although many performance measures are based on crashes (e.g., crashes per population and number of deer crashes), this section lists alternative performance measures such as number of geometric deficiencies. Example 1 evaluates the performance of an intersection using measures such as crashes per million vehicles entering the intersection and number of curb cuts within 150 ft of the intersection. Example 2 evaluates the performance of a nonmotorized facility using the concept of bicycle and pedestrian level of service, which incorporates geometric and operational parameters such as sidewalk width and the speed limit. Both examples show how performance measures can be used to identify locations with the most severe safety deficiencies and, as a consequence, which locations require immediate improvement given limited funds. Although information from the *Nebraska Safety Conscious Planning Forum* (Cambridge Systematics, n.d.) suggests that injuries and fatalities are the only critical metrics, Example 2 demonstrates instances where other measures are helpful.

Section 4. Data Needs

This section describes how to obtain the multiple types of data that an MPO/PDC may need. Some acquisition methods are as straightforward as knowing the appropriate website or person to contact, whereas more detailed methods entail the use of publicly available software. Crash data, for instance, are available through the Statewide Planning System (SPS), CAT, and the crash records database. Each tool has its own strength: CAT gives crashes along the length of a given corridor and requires no programming expertise, whereas the crash records database gives more detailed information, such as crashes at adjacent intersections, but requires additional data manipulation. SPS is available only within VDOT but also provides facility, traffic, and operational characteristics with crash data. Screenshots of the data tools are also shown: Example 1 uses CAT to identify, for a 20-mi corridor, the most severe quarter-mile section in

terms of fatalities and injuries, and Example 2 uses SPS to identify the bicycle level of service and crash data for the same project discussed in Section 3.

Section 5. Data Analysis

The method of data analysis depends on staff availability, modeling resources, and the problem being considered. Example 1 identifies hazardous locations on a roadway using the CAT data from Section 4 and identifies potential contributing factors. Example 2 applies crash reduction factors to determine the crash risk reduction that might be expected from reducing the number of vehicle through lanes, adding bicycle lanes, and replacing the undivided centerline with a two-way left-turn lane. Example 3 uses accident modification factors and traffic volumes to compare the benefits of widening two substandard lanes at different locations. The expected reduction in crashes for a lane widening at one location is found to be more than 4 times that for the lane widening at the another location. Other examples of data analysis methods, such as accident prediction models, are noted in this section.

Section 6. Prioritization

Prioritization methods include benefit-cost analysis, point systems, and RSAs. After showing how a RSA has been used elsewhere, this section describes two applications of the point system. Example 1 prioritizes three intersections based on entering vehicles per day, 3-year crash frequency, and crashes per million entering vehicles. Example 2 prioritizes two roadway improvements based on safety (number of crashes and bicycle level of service), vehicle level of service, and geometric deficiencies. Example 2 shows two realistic considerations: that factors other than safety will influence project selection, and that a contribution planners can make is to document formally the process used to select projects, given that such a process should be transparent to outside readers (Trigueros, 2008).

Section 7. Funding

Section 7 identifies innovative funding sources that MPOs/PDCs can use for safety projects. Conventional funding sources such as the SYIP are not included; rather, other sources such as the scenic byways program (administered by the U.S. DOT); the Hazard Elimination Safety Program, the Safe Routes to School programs, and STARS (administered by VDOT); and the Virginia Recreational Trails Fund (administered by the Virginia Department of Conservation and Recreation) are listed along with historical funding amounts and contact information. (It is recognized that funding programs, rules, amounts, and contacts change frequently, but the list shows that a wide variety of programs is generally possible at any given point in time.) The example provided shows how to rewrite a project proposal (a connection between a university and an apartment complex) to render it eligible for one particular fund (the U.S. DOT's Transportation and Community System Program). For instance, one criterion is a reduction in environmental impacts: the project meets this criterion through providing a walking path that reduces auto travel and hence emissions.

Section 8. Monitoring

Monitoring refers to an assessment of the transportation system's performance after the proposed strategies or projects have been implemented. Although monitoring is typically associated with a before/after study, it generally refers to the identification of unresolved deficiencies or opportunities for improvement. Section 8 shows how monitoring can be used to provide a cost savings and to ensure that crash risk is not unduly increased. In the example provided, the removal of a traffic signal is proposed. (A justification for signal removal is that the decrease in traffic volumes suggests the signal may no longer be necessary; its removal would save approximately $3,000 to $8,000 per year.) However, a concern is that removal of the signal may adversely affect safety; thus, the example shows how to use signal warrants (FHWA, 2003) to determine whether volume or crash experience justifies the continuation of the signal.

DISCUSSION

The obstacles to safety and planning integration noted in the survey sent to Virginia's MPOs and PDCs largely match those cited in the literature. For example, AECOM Consulting Transportation Group et al. (2002) reported a lack of funding, data, and training. The survey responses of MPOs/PDCs noted these same barriers: obtaining funding for safety-related projects was cited as the top obstacle to integration and obtaining crash data was the second largest obstacle. Only 22% of respondents indicated staff had "adequate" training in the necessary areas such as geometric design, crash data acquisition, and human factors. The reported practices were logically consistent with these barriers: e.g. only some respondents identify potential safety problems specific to a jurisdiction, conduct a before/after study, or use a given safety-related funding source.

Despite these barriers, the survey results and literature review show that MPOs/PDCs desire to integrate safety and planning. MPOs and PDCs consider safety in the planning process: 83% of respondents include safety in their planning goals and objectives, and 61% actively involve individual citizens in safety planning. These high percentages suggest MPOs/PDCs implicitly or explicitly view safety integration as productive—a viewpoint espoused by several sources (Ritter, 2005; Thorne et al., 2002; Washington et al., 2006). Thus, it does not appear that MPOs or PDCs need to be convinced of the merits of integrating safety and planning; rather, the aforementioned barriers to integration need to be overcome.

A careful examination of methods for overcoming the data, funding, and training barriers shows that several solutions are feasible in some situations but not in others. For example, each method of data acquisition given in Section 4 of the resource guide has a limitation: SPS provides relatively fast answers but is available only within VDOT; CAT is useful for corridor-related crashes but not intersection-related crashes; and the more complete crash records database can give detailed information but requires additional analysis skills. The various funding sources given in Section 7 also have limited applicability: CMAQ funding is available only for nonattainment areas, and the Virginia Recreational Trails Fund is available only for locations where recreational trails are needed. Some training solutions may work well in some

situations but not in others. For example, reducing the number of through lanes may reduce crash risk for a congested multi-lane facility with poor access management. Yet for a narrow, curved two-lane facility with high-speed rural traffic, such a road diet is infeasible and in fact a widening of substandard lanes may be necessary to reduce crash risk.

By necessity, therefore, the resource guide provided as Volume II of this report (Miller et al., 2010) provides numerous diverse solutions, some of which will apply to a given MPO/PDC and some of which will not. Some solutions are not applicable because of variations in regional characteristics: the option of removing a traffic signal because of a reduction in traffic volumes in the HRMPO (T. Short, personal communication, May 28, 2009) may not extend to growing urbanized areas, and the reduction of travel lanes to accommodate nonmotorized vehicles in Fairfax, Virginia, may not be appropriate in rural areas where such demand is low. Some solutions may be affected by institutional alignments: a PDC composed of relatively few cities and incorporated towns is less reliant on local crash data systems than one composed mostly of counties for whom VDOT maintains crash data. Some of the strongest illustrations of how to integrate safety and planning are provided by the MPOs and PDCs themselves, such as the use of diverse funding sources, the prioritization process for bicycle facility improvements, and the achievement of cost savings through signal elimination.

CONCLUSIONS

- *The survey of MPOs/PDCs and the literature suggest three challenges to incorporating safety into the planning process*: inadequate funding, inadequate data, and a lack of training in safety-related methods. This suggests that deployment of some form of technical assistance may overcome some, but not all, of the barriers to safety and planning integration.

- *The resource guide requires diverse examples because each solution has its own limitations and the specific opportunities to incorporate safety into the planning process vary by location.* For example, the road diet mentioned in Section 5 of the resource guide may not be appropriate for narrow, two-lane rural roads suffering from roadway departure crashes. Some of the best solutions are those provided by individual PDCs and MPOs.

- *Specific examples are needed to make further progress toward bringing safety into the planning process*. The literature review and survey results clearly show a desire by MPOs/PDCs to consider safety. Recognizing the three challenges noted previously, it appears that safety-planning integration will be best enhanced through the use of specific examples that can be applied within Virginia's institutional structure rather than through exhortation of the benefits of integration.

RECOMMENDATIONS

1. *VDOT's Transportation and Mobility Planning Division should make MPOs/PDCs and VDOT district planners aware of the resource guide through meetings that have already been scheduled with these groups*. The resource guide (Miller et al., 2010) should not be

issued as VDOT policy but rather as a resource. By itself, this recommendation will not necessarily result in widespread implementation, but it will make the resource guide available on an as-needed basis.

2. *VDOT planning or engineering staff should undertake a pilot effort to implement the resource guide in conjunction with one MPO's CLRP development.* Potential resources for such a pilot include VDOT's Transportation and Mobility Planning Division, VDOT's Traffic Engineering Division, the Center for Learning Services, and the Center for Knowledge and Information Transfer. The reason for this recommendation is that although the guide was strengthened by comments from two PDC representatives and the steering committee, a logical next step is to pilot the guide throughout the development of an MPO's CLRP. Such a pilot might result in additional emphasis areas for the guide, such as considerations regarding children (Berkovitz, 2001).

3. *VDOT should aggressively provide MPOs and PDCs as much access to safety-related data as is possible within security and other policy restraints.* Several of the data acquisition tools that are available internally to VDOT staff, such as the SPS and roadway images available through VDOT Visiweb, are well suited to planning level applications and can be used by a wide variety of planning professionals. As these tools are maintained by multiple units, carrying out this recommendation would require the assistance of several VDOT entities: the Traffic Engineering Division, the Transportation and Mobility Planning Division, the Maintenance Division, and the Information Technology Division.

BENEFITS AND IMPLEMENTATION POTENTIAL

Implementation Resources

- The number of staff hours required to implement Recommendation 1 is relatively small in that some time might be spent by VDOT staff in preparation for meetings where the resource guide would be mentioned to MPOs, PDCs, and district staff.

- The number of staff hours required to implement Recommendation 2 is estimated to range from about 40 to 250. The upper limit presumes four meetings of two staff from the VDOT units leading the pilot, a VDOT Central Office staff member, a PDC staff member, and an accompanying VDOT district staff member (about 60 hours); approximately 150 hours of work by VDOT staff where select steps of the resource guide are used during CLRP development; and about 40 hours of work to revise the resource guide. The lower limit presumes that because of the interagency consultation process between VDOT and PDCs or MPOs, much of the aforementioned work is already under way, and hence revisions to the guide might be based on existing best practices. The time frame for this recommendation is calendar years 2010 and 2011, assuming that CLRP development takes 12 to 18 months.

- The number of staff hours required to implement Recommendation 3 cannot be estimated precisely. The most straightforward option is simply for VDOT's Traffic Engineering

Division to continue to make crash data available on a compact disc as it has done in the past. A more helpful option (for PDCs) is to make the tools themselves available; however, the time required to obtain administrative permissions for this option is unknown.

Benefits

The benefits of Recommendations 1, 2, and 3 are greater safety and planning integration, which is generally suggested as reducing crashes, injuries, and fatalities (FHWA, 2009; Thorne et al., 2002). However, beyond stating the magnitude of the problem (e.g., crashes cost the United States $230 billion in 2004 [FHWA, 2009]), the literature does not appear to quantify the precise benefit of safety-planning integration. It is possible to use the resource guide to demonstrate potential reductions in either dollars expended or crashes as noted in the two examples provided here, with the recognition that quantifying these impacts is highly speculative.

1. *Example of a reduction in dollars expended.* Section 8 (Monitoring) illustrates an instance where a city may remove a traffic signal without adversely affecting safety. Based on maintenance costs of $3,000 to $8,000 per year [due to the signal being of an older type for which maintenance costs are higher (T. Short, personal communication, May 28, 2009)], 5-year savings would be approximately $15,000 to $40,000 per such intersection per locale minus the cost of installing a stop or yield sign and the cost of applying Step 8.

2. *Example of a reduction in crashes.* Section 5 (Data Analysis) shows how to estimate the crash reduction benefits of geometric improvements. In Example 3 in Section 5 of the resource guide, it was found that two projects that were seemingly similar at first would achieve different expected crash reductions: the first project would eliminate about 4 times as many crashes as the second.

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APPENDIX A

COVER LETTER AND SURVEY INSTRUMENT

Cover Letter

Incorporating Safety into the Regional Planning Process

Final Survey

Dear [The investigators inserted the name of each potential respondent here]

To improve surface transportation safety, Virginia's Strategic Highway Safety Plan recommended that the Virginia Department of Transportation (VDOT) work with Virginia MPOs to identify ways to enhance the incorporation of safety into the regional planning process. This short, multiple choice survey identifies ways in which MPOs are already doing this. Thus, your completion of this survey will contribute significantly to our effort in developing a template for incorporating safety into the transportation planning process.

The information from this survey will not be used to identify any MPO individually (unless you indicate a waiver to that effect). We will send you a summary of the survey results.

We would appreciate it if you could please return the completed survey by November 24, 2008.

Thank you very much for your participation.

Sincerely,

Njeri Kamatu (434-293-1906 or Josephine.kamatu@vdot.virginia.gov)
John Miller (434-293-1999 or John.miller@vdot.virginia.gov)
Nick Garber (434-924-6366 or njg@virginia.edu)

Virginia Transportation Research Council
530 Edgemont Road
Charlottesville, Virginia 22903
(434) 293-1990 (fax)

More details on this research project are available from the following website:
http://vtrc.virginiadot.org/ProjDetails.aspx?Id=409

Agency Contact

Name: [The investigators inserted all of this information for each potential respondent such
Title: that the respondent had to complete only the questions on the pages that follow]
Agency:
Address:
Telephone:
Email:
Website:

Survey Instrument

Incorporating Safety into the Regional Planning Process

1. What elements of safety are currently incorporated into your MPO's planning process? (check all that apply)

____ Identification of road safety deficiencies by visual inspection
____ Road safety assessments (sometimes referred to as road safety audits)
____ Use of number of pedestrian crashes
____ Use of number of automobile crashes
____ Use of number of bicycle crashes
____ Use of number of truck crashes
____ Interagency cooperation
____ Others (please specify)
____ Not at all

2. How is safety included within the long range planning documents? (check all that apply)

____ In the vision statement
____ In the goals and/or objectives
____ In the discussion of planning factors
____ In specific strategies
____ In other areas (please specify)
____ Not at all

3. (a) To what level of detail does your MPO identify potential <u>safety problems</u> during the planning process? (check all that apply)

____Regional/PDC level (e.g., our PDC has the highest crash rate in the entire Commonwealth)
____Jurisdiction level (e.g., City X has an above-average injury crash rate relative to other jurisdictions in this PDC)
____Facility type level (e.g., signalized intersections have a much higher injury crash rate than other types of intersections)
____User type (e.g., bicycle crashes have increased by X% over the past five years)
____Project level (e.g., Bridge X or sidewalk X or intersection X is a high-risk location based on examination of crashes)
____Others (please specify)

3. (b) To what level of detail does your MPO identify potential <u>safety solutions</u> during the planning process? (check all that apply)

____Regional/PDC level (e.g., our PDC will double safety funding over the next two years)
____Jurisdiction level (e.g., comprehensive safety audits in City X will be undertaken)
____Facility type level (e.g., the yellow timing will be studied at all signalized intersections)
____User type (e.g., dedicated bicycle lanes will be studied to reduce such crashes)

____Project level (e.g., sight distance at intersection X will be increased)
____Others (please specify)

4. What performance measures are included in the long range planning documents?
(check all that apply)

____ Total number of vehicle crashes per 100 million VMT or ADT
____ Total number of serious (fatal and injury) crashes per 100 million VMT or ADT
____ Total number of fatalities
____ Total number of injuries
____ Fatality or injury rates per 100 million VMT or ADT
____ Crashes (or percent of crashes) involving injuries per 1,000 residents
____ Crashes (or percent of crashes) involving pedestrians or bicyclists
____ Number of railroad-crossing crashes
____ Number of pedestrian fatalities
____ Percent crash reduction due to highway construction
____ Percentage change in miles in high crash locations
____ Number of locations with substandard geometric design
____ Average response time of EMS
____ Others (please specify)
____ None

5. Which goals or standards are used in the long range planning documents?
(check all that apply)

____ Crash rate: *Example:* Vehicle crashes per 100 million VMT is a maximum of X
____ Fatality or injury rate. *Example*: Injury rates per 100 million VMT are less than X.
____ Crashes/population. *Example:* Injury crashes per 1,000 residents are less than X.
____ Pedestrian or bicycle crashes. *Example:* Crashes involving bicyclists are less than X
____ Railroad crossing crashes. *Example:* Annual railroad-crossing crashes are less than X.
____ Pedestrian or bicycle fatalities. *Example:* Annual pedestrian fatalities are less than X.
____ Targeted crash improvements. *Example:* Crash reduction due to highway construction exceeds X%.
____ Highway improvements. *Example:* Number of locations with substandard geometric design is less than X%.
____ EMS response. *Example:* Average response time of EMS is less than X minutes.
____ Others (please specify).
____ None

6. (a) How is safety used to prioritize projects for placement in the Long Range Plan?

____ There is a prioritization process but safety is <u>not</u> a factor
____ There is a prioritization process and safety is <u>a</u> factor
____ There is a prioritization process and safety is <u>the only</u> factor
____ There is no prioritization process

6. (b) How is safety used to prioritize project scheduling in the Six Year Improvement Program (SYIP) or State Transportation Improvement Program (STIP)?

____ There is a prioritization process but safety is not a factor
____ There is a prioritization process and safety is a factor
____ There is a prioritization process and safety is the only factor
____ There is no prioritization process
____ Don't know

7. What approaches are used to evaluate the safety impacts of projects in the long range planning documents? (check all that apply)

____ None
____ Public perception (e.g., media articles, comments from citizens, or comments from advocacy groups)
____ Before and after observations of near misses
____ Before and after comparison of crashes
____ Before and after comparison of crashes (divided by population)
____ Before and after comparison of crashes (divided by VMT or ADTP)
____ Comparison of crash rates with some type of critical rate or threshold rate.
____ Safety performance indices based on Safety Performance Functions (SPF)
____ Planning-related software (e.g., FHWA's Surface Transportation Efficiency Analysis Model (STEAM)
____ Other (please specify)

8. Consider the projects in your MPO or PDC where right-of-way (ROW) and/or construction funds have been placed in the SYIP or STIP over the past three years. For approximately what percentage of those projects is it true that:

(a) Safety was the sole reason for placing the project in the SYIP or STIP?
____ 0% -20% of the time
____ 20% -40% of the time
____ 40% -60% of the time
____ 80% -100% of the time
____ Don't know

(b) Safety was one of two or more reasons for placing the project in the SYIP or STIP?
____ 0% -20% of the time
____ 20% -40% of the time
____ 40% -60% of the time
____ 80% -100% of the time
____ Don't know

(c) Safety was not the reason for placing the project in the SYIP or STIP?
____ 0% -20% of the time
____ 20% -40% of the time

____ 40% -60% of the time
____ 80% -100% of the time
____ Don't know

9. Which of the following are actively involved in the safety planning process? (check all that apply)

____ Individual citizens
____ Advocacy groups
____ Cities (e.g., engineering, public affairs, management, etc.)
____ Counties
____ State Police (e.g., local, district, or state)
____ Planning District Commissions (PDC)
____ Department of Motor Vehicles (DMV)
____ Federal Highway Administration (FHWA)
____ Federal Transit Authority (FTA)
____ Federal Rail Administration (FRA)
____ Virginia Department of Rail and Public Transportation (DRPT)
____ Virginia Department of Transportation (VDOT) (e.g., residency, district, or Central Office)
____ Private industry (e.g., developers)
____ Others (Please specify)
____ None

10. Through what means are staff from other agencies actually involved in the selection of safety projects? (check all that apply)

____ Telephone conversations
____ Meetings/ forums
____ Written communication
____ Others (please specify)

11. Is crash data quality sufficient and available for incorporating safety into the planning process?

____Yes
____ No (Please briefly list defects or what is missing)
____Crash information
____Traffic information
____Roadway inventory information
____Others (please specify)

12. What obstacles do you face in incorporating safety in the planning process?
Rank the obstacles from **1** (biggest obstacle) to **11** (smallest obstacle)

____Lack of safety planning expertise and experience
____Not knowing who within an organization to contact
____Interagency challenges (turf protection, lack of time, lack of personnel, etc.)
____Agreement on the scope of the topic
____Lack of safety data or difficulty with obtaining such data
____Sharing of data in proprietary systems
____Lack of dedicated safety funding
____Lack of ongoing dedicated funds
____Insufficient ongoing dedicated funds for safety
____Insufficient flexibility to shift funds among programs
____Others (please specify)
____None

13. (a) Expertise in which areas shown below are necessary for incorporating safety into the planning process? (check all that apply)

____Geometric design (e.g.,. sight distance calculations, minimum curvature, etc.)
____Signal operations (e.g., minimum clearance interval, yellow trap, etc.)
____Speed/capacity analysis (e.g., simulation, level of service, speed/flow relationships, etc.)
____Statistical analysis (e.g., before/after, Empirical Bayes, etc.)
____Human factors (e.g., consistency of signing, information workload, etc.)
____Pavement design (e.g., skid resistance, IRI, etc.)
____Crash data acquisition (e.g., obtaining crash data from manual or electronic databases)
____Crash scene analysis (e.g., a contributing factor to this icy road crash was tree shading)
____Traffic laws (e.g., red light running is defined as *x* in the *Code of Virginia*)
____Travel demand estimation (e.g., bus riders will walk a maximum of *x* feet to the bus stop)
____Others (please specify)
____None

13. (b) To what extent do MPO staff have the necessary training identified in part (a) above?

____ Somewhat
____ Adequate
____ Fully
____ Other (please specify)
____ Not at all

14. What funding sources are used in your MPO or PDC to include safety related projects for implementation in the planning process? (check all that apply)

____ Regional Surface Transportation Program (RSTP)
____ Congestion Mitigation and Air Quality (CMAQ)
____ Maintenance
____ Interstate
____ National Highway System (NHS) (non-interstate)
____ Primary system
____ Secondary system
____ Urban system
____ Enhancements
____ Safety
____ Transit Capital
____ Highway Safety Improvement Funds (HSIP)
____ Access Management
____ Safe Routes
____ Others (please specify)
____ None

15. Is a retrospective analysis (e.g., a before/after study) ever performed to determine the efficacy of safety related projects? (check all that apply)

____ Never
____ On an ad hoc basis (e.g., not with regularity)
____ On a systematic basis (please explain)
____ Others (please explain)

16. When will the next update of the Constrained Long Range Plan be available?
_____

17. Based on the results of this research effort, we plan to develop an approach to incorporate safety into the regional planning process and test this with one MPO. Would your MPO be willing to participate in this test?
___ Yes
___ No

18. Do you have any additional comments, questions, or insights regarding either the survey or the project?
_____

_____

APPENDIX B

SURVEY RESPONSES

The survey provided in Appendix A was distributed to the 23 Virginia MPOs and PDCs in October 2008. There were 4 large, 13 medium, and 6 small MPOs/PDCs.

Information that could be used to identify an MPO or PDC was removed from the information shown here except in the case of Question 16, which gives the dates LRPs are to be updated. The survey questions are numbered 1 through 18. Because some questions have multiple parts, there are 23 tables in this appendix.

1. What elements of safety are currently incorporated into your MPOs/PDCs planning process? (check all that apply)

Responses for Question 1	No. of Respondents (23)			
	Large	**Medium**	**Small**	**Total**
Identification of road safety deficiencies by visual inspection	0	5	3	8
Road safety assessments (sometimes referred to as road safety audits)	1	4	1	6
Use of number of pedestrian crashes	1	7	0	8
Use of number of automobile crashes	3	12	4	19
Use of number of bicycle crashes	1	6	0	7
Use of number of truck crashes	1	8	1	10
Interagency cooperation	3	8	3	14
Others (please specify)	0	2	2	4
Not at all	1	0	0	1

Other Responses for Question 1

One medium MPO uses elements brought forward by the public, local staff, and/or elected officials; keeps up with crash data; and mentions this in the CLRP. Another medium MPO indicated that (1) road safety assessments are performed by a separate group but the respondent at times has access to the results and (2) obtaining the number of automobile crashes from DMV or VDOT is difficult at times. Another medium MPO included the discussion with local government officials as a safety element. Another noted that despite its rapid urbanization and proximity to larger areas with MPOs, it is, "with respect to FHWA and a function of our population density, still regarded as Rural."

One small PDC commented:

> Use of VDOT data provided on: Numbers of Intersection Crashes (3 or more crashes), Level of Service of the roads, Traffic Forecast, Traffic History. The CRC's Transportation Committee is currently working on providing Identified Transportation Deficiencies in our region to the State's On-Call Consultant who will then provide recommendations for remedies.

Another small PDC indicated the use of deer crashes as a safety element.

2. How is safety included within the long range planning documents? (check all that apply)

Responses for Question 2	No. of Respondents (23)			
	Large	Medium	Small	Total
In the vision statement	2	3	3	8
In the goals and/or objectives	3	12	4	19
In the discussion of planning factors	2	9	4	15
In specific strategies	2	4	2	8
In other areas (please specify)	1	4	1	6
Not at all	1	1	0	2

Other Responses for Question 2

One large MPO considers safety as a measure of effectiveness of candidate projects. One medium MPO considers safety in the selection of projects. Another medium MPO is in the process of updating the CLRP. Another medium MPO includes safety in the visualization and discussion of other programs such as "Safe Routes to School."

One small PDC commented:

> Use of VDOT data provided on: Numbers of Intersection Crashes (3 or more crashes), Level of Service of the roads, Traffic Forecast, Traffic History. The CRC's Transportation Committee is currently working on providing Identified Transportation Deficiencies in our region to the State's On-Call Consultant who will then provide recommendations for remedies.

3. (a) To what level of detail does your MPO identify potential <u>safety problems</u> during the planning process? (check all that apply)

Responses for Question 3a	No. of Respondents (20)			
	Large	Medium	Small	Total
Regional/PDC level (e.g., our PDC has the highest crash rate in the entire Commonwealth)	3	4	2	9
Jurisdiction level (e.g., City X has an above-average injury crash rate relative to other jurisdictions in this PDC)	2	2	1	5
Facility type level (e.g., signalized intersections have a much higher injury crash rate than other types of intersections)	1	4	1	6
User type (e.g., bicycle crashes have increased by X% over the past five years)	2	0	1	3
Project level (e.g., Bridge X or sidewalk X or intersection X is a high-risk location based on examination of crashes)	1	5	1	7
Others (please specify)	1	3	0	4

Other Responses for Question 3a

One medium MPO identifies safety problems by jurisdiction and corridor; another noted that this information is provided by its partnering agencies/ experts. Another indicated identifying safety problems only when the data are available; another bases safety problems on location of highest incidence.

One small PDC identifies safety problems at the regional level, commenting that:

(Committee has utilized VDOT data as well as local knowledge to Identify Transportation Deficiencies in the Region for planning purposes. This information will be given the state's on-call consultant to provide feedback and remedies.)

3. (b) To what level of detail does your MPO identify potential safety solutions during the planning process? (check all that apply)

Responses for Question 3b	No. of Respondents (21)			
	Large	Medium	Small	Total
Regional/PDC level (e.g., our PDC will double safety funding over the next tw years)	2	1	2	5
Jurisdiction level (e.g., comprehensive safety audits in City X will be undertak	0	3	0	3
Facility type level (e.g., the yellow timing will be studied at all signalized intersections)	0	2	1	3
User type (e.g., dedicated bicycle lanes will be studied to reduce such crashes)	0	3	1	4
Project level (e.g., sight distance at intersection X will be increased)	2	7	2	11
Others (please specify)	1	3	0	4

Other Responses for Question 3b

One medium MPO considers safety during project selection; another identifies safety solutions from collaborative discussions with partnering agencies and public input. Another monitors the data to seek potential solutions, and another identifies solutions in the user type level as part of the bicycle, pedestrian, and safe routes to school planning projects.

One small PDC identifies safety solutions at the project level commenting that:

(Committee has utilized VDOT data as well as local knowledge to Identify Transportation Deficiencies in the Region for planning purposes. This information will be given to the State's On-Call Consultant to provide recommendations to address the problems.)

4. What performance measures are included in the long range planning documents? (check all that apply)

Responses for Question 4	No. of Respondents (21)			
	Large	Medium	Small	Total
Total number of vehicle crashes per 100 million VMT or ADT	0	2	1	3
Total number of serious (fatal and injury) crashes per 100 million VMT or ADT	0	2	0	2
Total number of fatalities	0	6	2	8
Total number of injuries	0	5	1	6
Fatality or injury rates per 100 million VMT or ADT	0	2	0	2
Crashes (or percent of crashes) involving injuries per 1,000 residents	0	1	0	1
Crashes (or percent of crashes) involving pedestrians or bicyclists	0	3	0	3
Number of railroad-crossing crashes	0	3	0	3
Number of pedestrian fatalities	0	2	0	2
Percent crash reduction due to highway construction	0	0	1	1
Percentage change in miles in high crash locations	0	0	1	1
Number of locations with substandard geometric design	0	1	0	1
Average response time of EMS	0	1	1	2
Others (please specify)	2	0	1	3
None	2	6	0	8

Other Responses for Question 4

One large MPO uses equivalent property damage only (EPDO) crash rate per million VMT as a performance measure. Another uses VDOT's system of roads (interstates, freeways and expressways), data years 2000-2006, and the total number of (1) crashes, (2) injuries, and (3) fatalities.

One medium MPO does not use any of the listed performance measures but indicated that their long range planning document vision, goals and objectives are quite general in nature. They include safety as an important goal, but also point to equally important goals such as mobility, connectivity and transit-oriented development among others.

One small PDC uses the number of intersection crashes (3 or more), level of service of roads, traffic forecast, traffic history, and major freight generators.

5. Which goals or standards are used in the long range planning documents?

Responses for Question 5	No. of Respondents (22)			
	Large	**Medium**	**Small**	**Total**
Crash rate. *Example:* Vehicle crashes per 100 million VMT is a maximum of X	0	5	3	8
Fatality or injury rate. *Example*: Injury rates per 100 million VMT are less than X.	0	4	2	6
Crashes/population. *Example:* Injury crashes per 1,000 residents are less than X.	0	2	1	3
Pedestrian or bicycle crashes. *Example:* Crashes involving bicyclists are less than X	0	1	0	1
Railroad crossing crashes. *Example:* Annual railroad-crossing crashes are less than X.	0	1	0	1
Pedestrian or bicycle fatalities. *Example:* Annual pedestrian fatalities are less than X.	0	1	0	1
Targeted crash improvements. *Example:* Crash reduction due to highway construction exceeds X%	0	2	1	3
Highway improvements. *Example:* Number of locations with substandard geometric design is less than X%	0	1	3	4
EMS response. *Example:* Average response time of EMS is less than X minutes.	0	0	0	0
Others (please specify).	1	1	0	2
None	3	6	0	9

Other Responses for Question 5

One large MPO identifies crash locations on interstates, freeways and expressways. Two medium MPOs and one PDC do not use the surveys goals or standards but rather (1) consider safety during the project selection process, (2) indicated that neither the current long range plan or the update address safety in this way, but are developing a matrix to tie the CLRP to the 8 federal planning factors, and safety is only mentioned in a broad-brushed sort of way in one of the factors, and (3) a PDC is still is currently in Phase III in the process of developing the regional long range plan.

6. (a) How is safety used to prioritize projects for placement in the Long Range Plan?

Responses for Question 6a	No. of Respondents (22)			
	Large	Medium	Small	Total
There is a prioritization process but safety is not a factor	0	0	0	0
There is a prioritization process and safety is a factor	2	11	5	18
There is a prioritization process and safety is the only factor	0	0	1	1
There is no prioritization process	2	0	1	3

Other Responses for Question 6a

One medium MPO noted:

> Prioritization factors are based on fiscal constraints and project costs. In these times, some projects cannot fit into a fiscally constrained plan. Safety is a factor in the discussion but state and federal funding/finances dominate the discussion among member governments. For instance, as small town or city may face a choice of one big project or two or more smaller projects. The "we can afford one big project or a few smaller projects but not both" type of discussion dominates any formalized prioritization process discussion. Federal fiscal stimulus may help somewhat, but that remains to be seen.

6. (b) How is safety used to prioritize project scheduling in the Six Year Improvement Program (SYIP) or State Transportation Improvement Program (STIP)?

Responses for Question 6b[a]	No. of Respondents (21)			
	Large	Medium	Small	Total
There is a prioritization process but safety is not a factor	0	0	0	0
There is a prioritization process and safety is a factor	3	7	2	12
There is a prioritization process and safety is the only factor	0	0	0	0
There is no prioritization process	0	0	0	0
Don't know	2	5	3	10

[a]One respondent indicated two choices ("there is a prioritization process and safety is a factor" and "don't know").

Other Responses for Question 6b

One large MPO noted that safety is considered as a factor in prioritization in RSTP [Regional Surface Transportation Program] funded projects [but the respondent did not extend this answer to other projects noting that VDOT is responsible for all funding programs except RSTP and regional CMAQ funds allocated to the MPO.]

Two medium MPOs did not know if safety is used. The first noted that VDOT does not communicate their decision making process for the SYIP other than an invitation to the public hearings/ public meetings. The other noted that the MPO does not have a voice in the SYIP process. Their TIP process initiates by VDOT providing a project list that indicates the funding, the year of expenditure and the like. If prioritizing is done, it is done at VDOT. What is provided to the MPO has already been programmed in a fiscal year.

7. What approaches are used to evaluate the safety impacts of projects in the long range planning documents? (check all that apply)

Responses for Question 7	Number of Respondents (22)			
	Large	Medium	Small	Total
None	2	0	1	3
Public perception (e.g., media articles, comments from citizens, or comments from advocacy groups)	1	11	3	15
Before and after observations of near misses	0	2	0	2
Before and after comparison of crashes	0	3	1	4
Before and after comparison of crashes (divided by population)	0	0	0	0
Before and after comparison of crashes (divided by VMT or ADTP)	0	2	0	2
Comparison of crash rates with some type of critical rate or threshold rate.	0	1	1	2
Safety performance indices based on Safety Performance Functions (SPF)	0	0	2	2
Planning-related software (e.g., FHWA's Surface Transportation Efficiency Analysis Model (STEAM)	1	0	1	2
Other (please specify)	0	1	1	2

Other Responses for Question 7

One large MPO noted that the evaluation of the safety impacts of projects is not included in the CLRP document. One medium MPO uses the ranking of regional corridors by motor vehicle crash experience as one approach. Another uses the before and after observations of near misses and comparison of crashes witnessed and reported. One small PDC includes the local government in evaluation of the safety impacts of projects.

8. Consider the projects in your MPO or PDC where right-of-way (ROW) and/or construction funds have been placed in the SYIP or STIP over the past three years. For approximately what percentage of those projects is it true that:

(a) Safety was the <u>sole reason</u> for placing the project in the SYIP or STIP?

Responses for Question 8a	No. of Respondents (20)			
	Large	Medium	Small	Total
0%-20% of the time	1	5	0	6
20%-40% of the time	0	0	1	1
40%-60% of the time	0	3	0	3
80%-100% of the time	0	0	0	0
Don't know	3	4	3	10

Other Responses for Question 8a

One medium MPO for which safety is the sole consideration 0% to 20% of the time noted that safety and RR crossing projects are bundled in the same funding category.

(b) Safety was <u>one of two or more reasons</u> for placing the project in the SYIP or STIP?

Responses for Question 8b	No. of Respondents (20)			
	Large	Medium	Small	Total
0%-20% of the time	1	0	0	1
20%-40% of the time	0	5	0	5
40%-60% of the time	1	0	1	2
80%-100% of the time	0	3	0	3
Don't know	2	4	3	9

Other Responses for Question 8b

One medium MPO where safety is the sole consideration 20% to 40% of the time noted that "this usually affects interstate projects in the TIP, i.e., lengthening interchange acceleration lanes or additional guardrail to an existing interstate project." Another medium MPO noted that the survey questions do not provide a clear understanding of the SYIP versus the STIP processes. The SYIP programs obligate funding over 6 years, and STIP obligates funding over 4 years. Different bodies have jurisdiction over the SYIP (city: urban, county: secondary, state: primary and interstate). The STIP is a body of work between VDOT, DRPT, and the MPO, with public input. The STIP just indicates what funds will be obligated only on projects that have federal funding.

(c) Safety was <u>not the reason</u> for placing the project in the SYIP or STIP?

Responses for Question 8c	No. of Respondents (20)			
	Large	Medium	Small	Total
0%-20% of the time	0	4	1	5
20%-40% of the time	0	1	0	1
40%-60% of the time	1	0	0	1
80%-100% of the time	0	0	0	0
Don't know	3	7	3	13

9. Which of the following are actively involved in the safety planning process?
(check all that apply)

Responses for Question 9	No. of Respondents (23)			
	Large	Medium	Small	Total
Individual citizens	4	8	2	14
Advocacy groups	3	6	0	9
Cities (e.g., engineering, public affairs, management, etc.)	4	7	0	11
Counties	3	9	6	18
State Police (e.g., local, district, or state)	3	4	1	8
Planning District Commissions (PDC)	2	10	5	17
Department of Motor Vehicles (DMV)	2	1	0	3
Federal Highway Administration (FHWA)	3	5	1	9
Federal Transit Authority (FTA)	1	2	0	3
Federal Rail Administration (FRA)	1	0	0	1
Virginia Department of Rail and Public Transportation (DRPT)	1	3	2	6
Virginia Department of Transportation (VDOT) (e.g., residency, district, or Central Office)	4	11	6	21
Private industry (e.g., developers)	0	3	1	4
Others (Please specify)	1	0	1	2
None	0	1	0	1

Other Responses for Question 9

One large MPO includes local elected officials and planning commissioners as stakeholders. One medium MPO noted that safety is a consideration of its planning process and not a process by itself. Another medium MPO indicated that all stakeholders are actively involved in the planning process and safety is part of its consideration. Another medium MPO expressed the hope that VDOT's "Smart Travel Center" in [location removed to preserve anonymity] will have a large role in providing data in the future.

10. Through what means are staff from other agencies actually involved in the selection of safety projects? (check all that apply)

Responses for Question 10	No. of Respondents (20)			
	Large	**Medium**	**Small**	**Total**
Telephone conversations	1	7	3	11
Meetings/ forums	4	9	5	18
Written communication	3	3	3	9
Others (please specify)	1	2	0	3

Other Responses for Question 10

One large MPO indicated that VDOT and PDC staff conduct reviews to analyze funding requests for "RSPT" [the researchers believe the respondent meant to say RSTP] and CMAQ funds that may include safety projects. One medium MPO noted the use of "TTC and MPO process if applicable," and another noted the use of individual discussions.

11. Is crash data quality sufficient and available for incorporating safety into the planning process?

Responses for Question 11	No. of Respondents (22)			
	Large	**Medium**	**Small**	**Total**
Yes	2	8	6	16
No (Please briefly list defects or what is missing)	2	3	0	5
Crash information	1	2	0	3
Traffic information	0	1	0	1
Roadway inventory information	0	2	0	2
Others (please specify)	1	2	0	3

Other Responses for Question 11

One MPO commented that "Assume it is for our partnering agencies and we expect them to come to the collaborative planning table as the subject expert." Another noted difficulty for MPOs in obtaining the data that VDOT may have on its internal systems.

One large MPO noted under crash information that the state data base does not include crash location in cities prior to 2008. Another noted that MPOs should include data from all roadways, not only VDOT-maintained roadways.

One medium MPO was unable to answer this question as it lacked dedicated training in safety planning. Another expects the partnering agencies to be subject experts during collaborative planning. Two medium MPOs noted that the data may be available but are difficult to access from VDOT and must be reorganized.

12. What obstacles do you face in incorporating safety in the planning process?
Rank the obstacles from **1** (biggest obstacle) to **11** (smallest obstacle)

Summary of the 22 Responses to Question 12[a]	No. of Ranked Responses	No. of Unranked Responses	Average of Ranked Responses	Overall Rank
Lack of safety planning expertise and experience	11	3	5.09	5
Not knowing who within an organization to contact	9	1	6.33	9
Interagency challenges (turf protection, lack of time, lack of personnel, etc.)	9	0	4.56	3
Agreement on the scope of the topic	9	0	6.89	10
Lack of safety data or difficulty with obtaining such data	9	2	4.22	2
Sharing of data in proprietary systems	8	1	6.13	8
Lack of dedicated safety funding	8	2	3.88	1
Lack of ongoing dedicated funds	8	2	5.00	4
Insufficient ongoing dedicated funds for safety	8	4	5.13	6
Insufficient flexibility to shift funds among programs	7	1	6.00	7
Others (please specify)	5	1	7.80	11
None		2		

[a]Twenty-two of 23 respondents responded to this question.

Column 2 shows the total number of respondents that ranked their responses with a number from 1 through 11. Column 3 shows the number of respondents that marked the obstacle but did not rank their responses. For example, Row 1 shows that 11 respondents gave a ranking from 1 through 11 to "lack of safety planning and expertise." An additional 3 respondents checked this box but did not assign a rank.

An overall ranking was computed as follows. The first obstacle "lack of safety planning expertise and experience" had the following ranks from the 11 respondents: 6, 10, 3, 9, 11, 3, 8, 3, 1, 1, and 1, giving a sum of 56. The sum of these rankings (56) divided by the number of responses (11) yields 5.09 as the ranked average for the first obstacle. Note that the average of 5.09 is the fifth lowest value in this column. Accordingly, the "Overall Rank" column shows the value "5."

Based on this method, the largest obstacle is "Lack of dedicated safety funding." The second largest is "Lack of safety data or difficulty with obtaining such data." The smallest is "Others," which one large MPO specified as cross-coordination of laws, policies, and data in its multi-state environment and one medium MPO noted that available staff time has been focused on other SAFETEA-LU requirements.

Other Responses for Question 12

One large MPO indicated cross coordination of laws, policies, and data in the multistate environment as another obstacle. One medium MPO looks to its agency partners to represent the expert positions on safety in transportation planning. Another medium MPO noted needing additional training in safety planning to address this item, and another medium MPO indicated the allotment of staff to other SAFETEA-LU requirements as an obstacle.

13. (a) Expertise in which areas shown below are necessary for incorporating safety into the planning process? (check all that apply)

Responses for Question 13a	No. of Respondents (22)			
	Large	**Medium**	**Small**	**Total**
Geometric design (e.g., sight distance calculations, minimum curvature, etc.)	1	9	3	13
Signal operations (e.g., minimum clearance interval, yellow trap, etc.)	1	9	2	12
Speed/capacity analysis (e.g., simulation, level of service, speed/flow relationships, etc.)	1	8	4	13
Statistical analysis (e.g., before/after, Empirical Bayes, etc.)	1	5	0	6
Human factors (e.g., consistency of signing, information workload, etc.)	1	7	3	11
Pavement design (e.g., skid resistance, IRI, etc.)	0	7	1	8
Crash data acquisition (e.g., obtaining crash data from manual or electronic databases)	3	9	3	15
Crash scene analysis (e.g., a contributing factor to this icy road crash was tree shading)	2	8	0	10
Traffic laws (e.g., red light running is defined as *x* in the *Code of Virginia*)	2	4	1	7
Travel demand estimation (e.g., bus riders will walk a maximum of *x* feet to the bus stop)	1	4	1	6
Others (please specify)	0	3	1	4
None	1	1	0	2

[a]Twenty-two of 23 respondents responded to this question.

Other Responses for Question 13a

Three medium MPOs separately noted the following comments: (1) training across spectrum is needed; (2) involvement of agency partners who are engineers rather than planners for the projects (the respondent commented that "it is not appropriate for planners to be engineers;" and (3) expertise in selection of projects and estimation of construction and engineering costs.

13. (b) To what extent do MPO staff have the necessary training identified in part (a) above?

Responses for Question 13b	No. of Respondents (23)			
	Large	**Medium**	**Small**	**Total**
Somewhat	3	6	2	11
Adequate	1	3	1	5
Fully	0	0	0	0
Other (please specify)	0	3	2	5
Not at all	0	1	1	2

Other Responses for Question 13b

Three medium MPOs noted separately that the staff are (1) minimally trained; (2) have limited training; and (3) certain staff have engineering experience although planning agencies are normally staffed with planners. One small PDC noted that it relies on VDOT staff who have been very helpful on its transportation committee to provide the expertise.

14. What funding sources are used in your MPO or PDC to include safety related projects for implementation in the planning process? (check all that apply)

Responses for Question 14	No. of Respondents (22)			
	Large	Medium	Small	Total
Regional Surface Transportation Program (RSTP)	2	3	2	7
Congestion Mitigation and Air Quality (CMAQ)	1	1	0	2
Maintenance	0	4	1	5
Interstate	0	4	0	4
National Highway System (NHS) (non-interstate)	1	5	0	6
Primary system	0	7	1	8
Secondary system	0	5	2	7
Urban system	0	6	0	6
Enhancements	0	8	3	11
Safety	1	5	1	7
Transit Capital	1	1	0	2
Highway Safety Improvement Funds (HSIP)	2	5	1	8
Access Management	1	1	3	5
Safe Routes	1	5	3	9
Others (please specify)	1	1	1	3
None	0	1	1	2

Other Responses for Question 14

One large MPO uses toll, state, tax district, and STP hazard elimination funds for projects. Another large MPO uses FHWA PL and FTA Section 5303 funds to conduct the MPO 3C planning process, which includes safety-related planning.

One medium MPO uses matching funds, and another medium MPO does not use any of the funds as MPOs are not involved in determining the funding sources to be used for the projects. One small PDC uses VDOT's planning rural funds.

15. Is a retrospective analysis (e.g., a before/after study) ever performed to determine the efficacy of safety related projects? (check all that apply)

Responses for Question 15	No. of Respondents (18)			
	Large	Medium	Small	Total
Never	3	2	3	8
On an ad hoc basis (e.g., not with regularity)	1	5	2	8
On a systematic basis (please explain)	0	1	0	1
Others (please explain)	0	1	0	1

Other Responses for Question 15

One large MPO does not perform a retrospective analysis as this is done by VDOT and/or local governments. One medium MPO indicated that funds for construction must be available before the retrospective analysis is considered. One small PDC checks with VDOT residencies.

16. When will the next update of the Constrained Long Range Plan be available?

Respondents that did not provide a date or that are not required to develop a CLRP are not listed here.

Large
- Metropolitan Washington Council of Governments: 2010
- Hampton Roads MPO: January 2012
- Richmond MPO: August 2012.

Medium
- Fredericksburg Area MPO: December 2008
- Harrisonburg-Rockingham MPO: January 2011
- Roanoke Valley-Alleghany RC: March/April 2009
- West Piedmont MPO: 2009
- Central Virginia MPO: December 2010
- Thomas Jefferson PDC: May 2009
- Winchester-Frederick 2010
- Tri Cities MPO: June 2012.

Small
- Lenowisco PDC: 2010
- Middle Peninsula: June 2010.

17. Based on the results of this research effort, we plan to develop an approach to incorporate safety into the regional planning process and test this with one MPO. Would your MPO be willing to participate in this test?

Responses for Question 17	No. of Respondents (21) [a]			
	Large	Medium	Small	Total
Yes	3	8	2	13
No	1	3	3	7

[a]One respondent indicated "N/A," which is why the sum of the "Total" column is 20 rather than 21.

18. Do you have any additional comments, questions, or insights regarding either the survey or the project?

Responses for Question 18[a]	No. of Respondents (23)			
	Large	Medium	Small	Total
Yes	1	7	3	11
No	3	6	3	12

One large MPO was interested in the results of the survey. Another large MPO noted the importance of the incorporation of safety into the planning process in the United States, as many recommendations are European techniques and solutions shown to decrease significantly the risk of crashes.

Seven medium MPOs/PDCs gave the following responses:

1. One responded that it was willing to test the template only if the timing would be right with regard to the CLRP.

2. One responded that several questions related more to "VDOT/CTB practices."

3. One responded that safety is handled on an urgent basis by VDOT as deemed necessary and "brought through the MPO" only if federal funding is required; the same MPO reported that the CLRP addresses other factors such as land use, population, and sometimes safety to determine how the transportation infrastructure might have to change to meet the expected demand.

4. One responded that many of the survey questions seemed to be "Engineering Design/Analysis" type of questions, the aspects of which will be taken care of in the "Preliminary Engineering" project phase instead of at the MPO planning level.

5. One responded that more staff time would be focused on safety planning if other MPO requirements were reduced.

6. One responded that the concentration on safety is important but requires construction funding support.

7. One responded it was impressed with past interactions between the VTRC and UVA and would be interested in exploring the project further.

One of the above respondents commented that most of the survey questions were answered to the best of its ability but not cross referenced or verified with past studies. Further, it noted not having access to data on before/after studies or performance measures that would enable it to develop and evaluate safety performance measures.

Two small PDCs expressed difficulty in completing the survey as they are in the initial stages of developing the Rural Transportation Plans for the region. Another suggested that the Rural Residency Administrators should also be surveyed.