Final Report VTRC 07-R8

Virginia Transportation Research Council

research report

Defining Effective Regional Planning in Virginia

http:/www.virginiadot.org/vtrc/main/online_reports/pdf/07-r8.pdf

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Standard Title Page - Report on Federally Funded Project

1. Report No. FHWA/VTRC 07-R8	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Defining Effective Regional Planning in Virginia		5. Report Date October 2006
		6. Performing Organization Code
7. Author(s): John S. Miller, Lester A. Hoel, Taylor F. Dalton, and Danielle R. McCray		8. Performing Organization Report No. VTRC 07-R8
9. Performing Organization and Address Virginia Transportation Research Council 530 Edgemont Road Charlottesville, VA 22903		10. Work Unit No. (TRAIS) 11. Contract or Grant No. 76303
12. Sponsoring Agencies' Name and Address Virginia Department of Transportation 1401 E. Broad Street Richmond, VA 23219 FHWA P.O. Box 10249 Richmond, VA 23240		13. Type of Report and Period Covered Final 14. Sponsoring Agency Code
15. Supplementary Notes		

16. Abstract

One of the most visible mechanisms for considering major transportation investments is the regional long-range transportation plan (LRP) (also referred to as the urbanized long-range transportation plan). With a typical cost of $3 to $5 million, Virginia's Transportation Planning Research Advisory Committee has asked how to assess the effectiveness of such plans. This study addressed this question by synthesizing the views of 16 planning professionals regarding what constitutes an effective plan and testing one aspect of their definition of *effectiveness*—implementation—with Virginia data. Interviewees represented regional planning districts, local public works or transportation departments, and a professional association. The data were used to examine the link between 25 years of LRPs and the corresponding highway investment programs for the Hampton Roads region.

The interviewees defined *planning effectiveness* in three ways: the elements a plan contains, the objectives achieved by actions taken as a result of the plan, and the barriers the plan overcomes. An effective plan contains a vision statement, a link to land use in local comprehensive plans, a list of prioritized projects, a statement addressing how the community wants to grow, modal tradeoffs, accurate information, and measurable goals. An effective plan implements projects, garners support from local decision makers and the public, uses travel demand models appropriately, and considers alternatives. An effective plan moves past obstacles such as imperfect coordination, inadequate funding, and the federal requirement that plans be financially constrained.

Because the interviewees generally indicated that a major measure of effectiveness is whether the LRP is implemented, the extent to which the regional LRP influenced the allocation of funds to specific projects in the VDOT Six-Year Improvement Program (SYIP) was examined. This implementation was measured in four ways in the Hampton Roads area: (1) percentage of LRP projects implemented, (2) number of implemented projects appearing in an SYIP prior to the LRP, (3) percentage of implemented projects started before the LRP was superseded by a successive LRP, and (4) for any given LRP, percentage of projects that appeared in a previous LRP.

First, of the 664 projects proposed in the five LRPs studied, about 28% were implemented in an SYIP. Second, of 85 projects appearing in an SYIP from the four most recent LRPs, only 5 had appeared in an SYIP prior to the LRP; thus, for the universe of built projects, the LRP is influential. Third, 66% of implemented projects started while the current LRP was in effect. Fourth, of the 934 projects that appeared in an LRP, 61% had appeared in a previous LRP.

Conclusions are that regional long-range planning effectively influences *which* projects are chosen but not *if* these projects are delivered; the relevance of any given LRP is limited by the fact that there is a large backlog of unbuilt projects; and LRPs are gradually becoming programming documents where a small proportion of projects are selected for investment but the selections are undertaken in the short term.

17 Key Words	18. Distribution Statement
Effective planning, performance measures, programming, long-range planning, MOEs, regional planning	No restrictions. This document is available to the public through NTIS, Springfield, VA 22161.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	49	

FINAL REPORT

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Virginia Transportation Research Council
(A partnership of the Virginia Department of Transportation
and the University of Virginia since 1948)

In Cooperation with the U.S. Department of Transportation
Federal Highway Administration

Charlottesville, Virginia

October 2006
VTRC 07-R8

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The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Virginia Department of Transportation, the Commonwealth Transportation Board, or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

ABSTRACT

One of the most visible mechanisms for considering major transportation investments is the regional long-range transportation plan (LRP) (also referred to as the urbanized long-range transportation plan). With a typical cost of $3 to $5 million (Rothblatt and Colman, 2001), members of Virginia's Transportation Planning Research Advisory Committee have asked how the effectiveness of such plans should be assessed. This study addressed this question by synthesizing the views of 16 planning professionals regarding what constitutes an effective plan and testing one aspect of their definition of *effectiveness*—implementation—with Virginia data. Interviewees represented regional planning districts, local public works or transportation departments, and a professional association. The data were used to examine the link between a quarter century of LRPs and the corresponding highway investment programs for the Hampton Roads region.

The interviewees defined *planning effectiveness* in three ways: the elements a plan contains, the objectives achieved by actions taken as a result of the plan, and the barriers the plan overcomes. An effective plan ideally contains a vision statement, a link to land use in local comprehensive plans, a list of prioritized projects, a statement addressing how the community wants to grow, modal tradeoffs, accurate information (e.g., realistic forecasts and practical recommendations), and measurable goals. An effective plan implements projects, garners support from local decision makers and the public, uses travel demand models appropriately, and considers alternatives. An effective plan moves past obstacles such as imperfect coordination, inadequate funding, and the federal requirement that plans be financially constrained.

Because the interviewees generally indicated that a major, but not the only, measure of effectiveness is whether the LRP is implemented, the extent to which the regional LRP influenced the allocation of funds to specific projects in the VDOT Six-Year Improvement Program (SYIP) was examined. This implementation was measured in four ways in the Hampton Roads area: (1) the percentage of LRP projects implemented, (2) the number of implemented projects appearing in an SYIP prior to the LRP, (3) the percentage of implemented projects started before the LRP was superseded by a successive LRP, and (4) for any given LRP, the percentage of projects that appeared in a previous LRP.

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The conclusions implied by these four answers is that regional long-range planning effectively influences *which* projects are chosen but not if these projects are delivered; the relevance of any given LRP is limited by the fact that there is a large backlog of unbuilt projects; and LRPs are gradually becoming programming documents where a small proportion of projects are selected for investment but the selections are undertaken in the short term.

PREFACE

At the spring 2004 meeting of the Virginia Transportation Planning Research Advisory Committee (TPRAC), attendees suggested that work be undertaken that would address two research needs: determination of the effectiveness of long-range plans and measures of effectiveness for planning programs. This study responded to that suggestion. This work could not have been undertaken without the help of the persons named here.

Several individuals graciously donated their time by participating in interviews and reviewing (and often correcting) notes taken during the interviews. These interviewees included Rob Case (Hampton Roads Planning District Commission); Young Ho Chang (County of Fairfax); Mike Clements, Larry Hagin, and Dan Lysy (Richmond Regional Planning District Commission); Dale Castellow (City of Virginia Beach); Chris Forinash (County of Arlington); Wesley King (City of Suffolk); Mark McCaskill (Roanoke Valley-Alleghany Regional Commission); Pat O'Hare and Mike Toalson (Home Builders Association of Virginia); Jeff Raliski (City of Norfolk); Al Riutort and Tom Slaughter (City of Newport News); Harrison Rue (Thomas Jefferson Planning District Commission); and Bob White (Region 2000 Local Government Council).

This work benefited from a steering committee composed of Rob Case, Wayne Ferguson, Robin Grier, Roger Howe, Bill LaBaugh, and Ron Mustain who provided helpful review comments, insights, and raw data that proved essential to the study. Additional reviews of the draft report by Marsha Fiol and Robin Grier helped the authors clarify terminology and better understand some of the challenges facing planners.

Despite these acknowledgments, the authors alone are responsible for any errors.

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INTRODUCTION

Long-range transportation planning is a dynamic process that determines where, when, and how transportation infrastructure should be constructed. At the system level, planning addresses how to use scarce resources to address any number of mobility or social goals for a region or area. The Virginia Department of Transportation (VDOT) emulates this comprehensive approach, stating that long-range planning is

> a vision of the transportation system's future conditions, needs and opportunities, which guides decision-making today. These long-range plans generally project transportation system needs and requirements 20 to 25 years into the future and help shape local, regional, and state strategies for addressing economic growth, safety, congestion, air quality, and public mobility (VDOT, 2005a).

It is no surprise that transportation planning has been described as a process, rather than a product, because it is explicitly designed as such at both the federal and the state level. The 1962 Federal-Aid Highway Act called for states and local communities to conduct planning in a cooperative manner, and when the Bureau of Public Roads (BPR, the predecessor to the Federal Highway Administration [FHWA]) implemented the requirements of the act, the BPR issued guidance stating that planning must follow the "3C" process. This process was defined by BPR as being *continuing* (e.g., plans are periodically updated), *cooperative* (e.g., coordinated efforts among diverse agencies at a single level of government and among local, state, and federal levels of government), and *comprehensive* (where 10 discrete elements such as population, land use, social values, and economic development were considered) (Weiner, 1992). Virginia follows this model. VDOT's *Welcome Transportation Planners* web page shows there is no single work unit or level of government that does all "planning" (VDOT, 2005b). Instead, the planning process entails input from a variety of stakeholders within and outside VDOT representing

diverse modes and interests. Further, although the long-range regional transportation plan (also called the long-range urbanized transportation plan) is a well-known product of the planning process, there is a variety of other system-oriented transportation planning efforts. Examples are tangible products, such as small urban area transportation plans, the state highway plan, and the statewide multimodal plan, VTrans2025 (VDOT, 2005a), and public involvement opportunities to comment on these efforts (VDOT, 2003).

Long-range regional transportation planning is expensive. A survey of California metropolitan planning organizations (MPOs) suggested that long-range plans (LRPs) have costs ranging from $0.5 million for a simple update and staff salaries only to $15 million for a brand new plan in a complex urban area, with typical regional transportation plans costing between $3 and $5 million (Rothblatt and Colman, 2001). Planning is also expensive in terms of human and political capital, requiring active community involvement, agency staff time, and energy from elected officials. Given this expense, it is reasonable to ask what constitutes an effective plan.

How the Literature Defines Effective Planning

The literature gives limited and sometimes conflicting guidance on this matter. One definition of planning efficacy is the degree to which a transportation agency builds the projects that reflect the vision outlined in the LRP (Barolsky, 2005). At one peer exchange, the belief of many participants was that

> the effectiveness of long-range planning can be assessed with respect to the strength of the planning-to-programming relationship—specifically the extent to which the plan drives the programming process and project development (Barolsky, 2005).

Connecting the programming decisions to the long-range planning process has been discussed previously in Virginia (Virginia Transportation Planning Research Advisory Committee, 2004) and other states (Covil, 1996; Stout, 2002). Thus, effectiveness may be quantified as the proportion of projects (or the proportion of construction dollars) that can be attributed to an LRP.

However, legislative history suggests that implementation alone cannot define effective planning. For example, many of the requirements that the U.S. Congress attached to urban freeway planning between 1962 and 1966 such as those to "consider local land use" and not take parkland for federal projects unless no alternative existed (Altshuler and Luberoff, 2003) were in response to very effective implementation of freeway construction following the 1956 Federal-Aid Highway Act. Those requirements continue to influence how planning is done today. Given that the no-build alternative is intended to be a viable candidate when considering alternatives as part of the National Environmental Policy Act (NEPA) process (Council on Environmental Quality, 2000), it appears that making *effective* synonymous with *implementation* is not necessarily correct for all circumstances. Because the MPO project selection process is "a political process not exclusively a technical process," there may be concerns that have a higher priority than transportation needs (T. Slaughter, personal communication, July 27, 2006).

Accordingly, an alternative indicator of effectiveness is the extent to which planning promotes the factors outlined in the three most recent federal reauthorizations: the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, the Transportation Equity Act for the 21st Century (TEA-21) of 1998, and the Safe, Accountable, Flexible, and Efficient Transportation Equity Act—A Legacy for Users (SAFETEA-LU) of 2005. The planning factors of ISTEA and TEA-21 (and presumably SAFETEA-LU) were intended to enable states and MPOs to use the "full range" of multimodal options in their transportation planning process (Pedersen, 2005) that ostensibly would make planning more effective. For example, it is difficult to disagree with TEA-21's seven planning factors (Fredericksburg Area Metropolitan Planning Organization, 2000).

1. Support economic vitality.
2. Increase safety and security for motorized and non-motorized users.
3. Increase accessibility and mobility options for people and freight.
4. Protect the environment, promote energy conservation, and improve quality of life.
5. Enhance modal connectivity for people and freight.
6. Promote efficient system management and operation.
7. Emphasize the preservation of the existing transportation system.

The measurement of a plan's effectiveness under these factors may be accomplished with specific performance measures. For example, economic vitality may be defined as household spending on transportation; safety may be defined as emergency response time and crash costs; and modal connectivity may be defined as the proportion of the population within a particular distance of bicycle or transit facilities (FHWA, n.d.).

These planning factors suggest what an effective plan might accomplish in a broader sense than the straightforward implementation measure proposed earlier. Their weakness, however, is that they do not explicitly indicate *how* states should perform effective planning—a lack of specific guidance that was also noted in the literature (Kramer and Mierzejewski, 2003). This lack of specificity has led others to recommend guiding paradigms for planners. Thus, rather than defining effectiveness as what planning should accomplish, these admonitions define effective planning in terms of how it is done. Although a degree of subjectivity is required to determine whether a plan adequately reflected this guidance in retrospect, the admonitions appear quite reasonable as guidance for a plan that is to be undertaken:

1. *Study the unknown, not the obvious.* An admonition is that "there are times when, because one knows the subject, more than adequate effort is directed toward the popular and known concepts" (Guyton, 1997). As an example, although the traffic engineer might understand well the functioning of an at-grade intersection, perhaps energy in the long-range planning process should be spent on identifying how the intersection will affect adjacent land development. Similarly, although infrastructure investment may be the planner's initial focus, the long-range planner should consider operational changes and work with experts in those areas in developing the plan (Gayle, 2003).

2. *Obtain good data where feasible and necessary.* High-quality data, such as traffic projections or air quality information, improve the quality of the regional transportation planning process (Rothblatt and Colman, 2001). Yet obtaining good data is not an end in itself: the planning horizon should be sufficiently long that it forecasts future transportation needs but sufficiently short that there is some reasonable hope of accuracy in the projections (Guyton, 1997).

3. *Recognize the benefits and limitations of outreach to the public and external agencies.* Public involvement can provide insights, lead to specific discussion points, increase support, and identify issues that "must be addressed in later, more detailed studies *if the decision is made to adopt an improvement program*" (emphasis in the original) (Guyton, 1997). Careful outreach to local jurisdictions and the state DOT enabled the development of a transportation improvement program (TIP) that was strikingly similar in terms of policy choices to the recommendations of the MPO's LRP (Younger and O'Neill, 1998)—the lesson being that outreach from the MPO enabled it to influence funding decisions made by the state. However, increased local participation may be detrimental to regional planning if it is "conducted excessively or improperly" (Rothblatt and Colman, 2001); the authors found that a large number of official meetings held by the MPO negatively affected counties' cooperation with the MPO (Rothblatt and Colman, 2001).

4. *Evaluate projects in a modally blind manner* by using multimodal performance measures such as those cited previously (e.g., costs per household for transportation) or measures that can be applied regardless of the mode chosen (e.g., energy consumed per trip). These performance measures can enable the consideration of operational improvements. For example, the cost of traveler disruption from a work zone (for pavement maintenance) can be included as an element in considering the alternatives of overlay, milling, or full-depth reconstruction (Gayle, 2003). The literature cautions, however, that performance measures are not a panacea: consistent definitions must be used as there is often variation by agency and by researcher (Abbott et al., 1998) and when multiple measures are being aggregated to rank projects, the method of ranking must make intuitive sense to the audience (Guyton, 1998). The literature also cautions that although some objectives lend themselves to performance measurement (e.g., a reduction in "lead-based bridge coatings" or the construction of "2,000 miles of bike paths in 10 years"), it may be more difficult to set performance-based objectives in other areas (e.g., "supporting transportation enhancements" or the state provision of "funding in a timely manner" to localities) (Stout, 2002).

5. *Study the areas outside long-range infrastructure transportation that nonetheless affect planning's relevance. These areas include land use, data acquisition, operations, the NEPA process, and the political acceptability of funding increases.* Much of the literature recognizes that transportation and land use are related and thus that land use alternatives should be considered as part of the plan or that land development should at least be better understood in the planning process (McGlashan, 2003; Rothblatt and Colman, 2001); a land use driven level of service has been

> advocated as part of the transportation planning process (Moudon et al., 2005). Having a comprehensive data collection and quality program (where ideally data capture is integrated with other systems rather than being a stand-alone effort for planning) can improve planning's effectiveness; in one case, such a system enabled the state to spend the majority of its time analyzing rather than collecting data (Jack Faucett Associates, 1997). The literature also notes the importance of operations as it affects infrastructure planning (Gayle 2003; Rothblatt and Colman, 2001); similarly, it has been argued that starting the NEPA process during the earlier planning stage, rather than during the later programming stage as is convention, has increased planning's effectiveness by decreasing adverse environmental impacts (Manning, 2002). Finally, it is noted that traditional infrastructure needs studies that call for large funding increases have generally failed, and that in response, the U.S. Department of Transportation is starting to focus on performance measures that affect outcomes, e.g., the number of persons who rate transit service as high or low (Mazur and Zabierek, 1997).

The literature uses three different approaches to define effective planning: (1) determine whether planning leads to implementation in the form of programmed projects, (2) measure the extent to which planning achieves certain objectives (e.g., the planning factors shown in the three most recent federal authorizations), and (3) determine if certain best practices are followed in terms of how planning is accomplished, such as modally blind performance measures.

The Importance of Context to Define "Effective"

It is evident that the three approaches for defining effective planning are context dependent: remove the context, and the suggestions conflict. Consider, for example, just a single suggestion from the literature that advises not to provide too much detail in the LRPs. In particular, Guyton (1997) wrote:

> Long range planning needs to focus more on planning and less on details . . . it is not necessary nor desirable to make a final decision about the far future—leave future decisions open until more and better information is available.

A follower of this advice might be surprised to read that to improve the efficacy of the planning process, some transportation agencies are providing *more* details in the statewide planning process (Noerager and Lyons, 2002). Examples cited therein are the District of Columbia, which identifies not just costs for projects but also the type of cost (capital, operations, maintenance, or design) and Idaho, which identifies funding elements and potential risks thereof.

The conflict between Guyton (1997) (do not provide too much detail early on) and the actions of those cited by Noerager and Lyons (2002) (provide funding details presumably to facilitate implementation) may be resolved by careful consideration of the context of each suggestion. Guyton warns planners to have a horizon that is long enough to provide meaningful direction but not so long as to render forecasts utterly inaccurate and thus to adjust data collection resources accordingly—collecting what must be done now but recognizing which data

elements must be studied later, in greater detail, if the plan's recommendations are to move forward. Presumably, therefore, an extension of Guyton's argument is that it might not be cost-effective to expend significant monetary resources developing a travel demand forecast for a corridor two decades into the future, given that the major trip generators that will exist adjacent to the corridor are not known. The efforts of the state agencies described by Noerager and Lyons (2002) to include cost details in the LRP, however, serve a specific purpose: to force an explicit choice regarding whether particular revenues should be increased or particular projects should not be undertaken.

A similar argument can be made for much of the other guidance offered previously. For example, the suggestion that the planner evaluate projects in a modally blind manner seems most appropriate in some situations where the proposed alternative is an irreversible infrastructure investment that has multiple effects on the physical and social environment. Yet there may be other contexts, notably in the operations area, where a planner's focus on a single performance measure, such as vehicle throughput, is a refreshingly disciplined approach to decision making.

Because the recommendations from the literature appear to be situation specific, it is appropriate to consider the views of individuals who can provide the context with which to evaluate the effectiveness of planning practices in Virginia.

PROBLEM STATEMENT

The problem in Virginia is twofold. First, it is not clear how to define effective planning: although the literature offers guidance, there is no single coherent definition that represents the views of a broad set of planning professionals. Second, it is not known if it is even possible to measure the effectiveness of a given planning approach.

PURPOSE AND SCOPE

The purpose of this study was to define the characteristics of effective long-range planning based on a Virginia-specific context and then to determine whether it is possible to measure the effectiveness of such planning. The scope of the study was limited to systems level planning as opposed to project level planning.

METHODOLOGY

This research used an interview methodology and a case study methodology. Data from interviews of 16 persons experienced with the planning profession were synthesized to develop a definition of effective planning. Then, one critical aspect of this definition was tested using a

quarter century of data in the Hampton Roads area. This methodology was accomplished by performing three tasks.

1. Conduct, verify, and synthesize interviews of planning professionals.
2. Develop one potential measure of effectiveness (MOE) based on the synthesis.
3. Compute the MOEs for the Hampton Roads area.

By periodically reviewing progress, the project steering committee identified areas that needed greater exploration.

Conduct, Verify, and Synthesize Interviews

Interviews were conducted with planners representing urban and rural communities; cities, counties, and regional planning districts; and a professional association. The interviewees are listed in Table 1. Each interviewee was contacted initially by phone or email and provided with a list of available dates for an interview in his or her office. From that list, a preferred date was selected, and then, with one exception, all three researchers met the interviewee at his or her office.

Table 1. Interview Schedule

Name	Affiliation	Interview Date
Al Riutort and Tom Slaughter[a]	City of Newport News	July 20, 2005
Bob White	Region 2000 Local Government Council	July 12, 2005
Chris Forinash	County of Arlington	July 19, 2005
Dale Castellow	City of Virginia Beach	July 13, 2005
Harrison Rue	Thomas Jefferson Planning District Commission	Jan. 21, 2005
Jeff Raliski	City of Norfolk	July 7, 2005
Mark McCaskill[b]	Roanoke Valley-Alleghany Regional Commission	Feb. 18, 2005
Mike Clements, Larry Hagin, and Dan Lysy	Richmond Regional Planning District Commission	March 4, 2005
Pat O'Hare and Mike Toalson	Home Builders Association of Virginia	July 13, 2005
Rob Case	Hampton Roads Planning District Commission	July 7, 2005
Wesley King	City of Suffolk	July 13, 2005
Young Ho Chang	Fairfax County Department of Transportation	April 1, 2005

[a]Only two, rather than three, interviewers were present.
[b]This interview was conducted by telephone.

Generally, the interviewees were asked the questions shown here. However, since some interviewees were able to provide more detail for a specific question, not all questions were posed during the interview. Questions were:

- What are the characteristics of an effective regional plan?
- How do you measure that effectiveness?
- What is the process for building an effective regional plan?
- What are the state, local, and private roles in forming an effective plan?
- Everyone talks about effective regional planning. What are the obstacles to getting it done?

- Are there facets of regional planning to which state, local, and private sector persons should be devoting more attention?
- Alternatively, are there key planning concepts that practitioners (regardless of discipline) should consider more strongly?

Except for one interview where only two investigators were present, the fact that three investigators attended each interview made it feasible to ensure that interview notes were detailed and accurate. The notes were written by the primary note taker, reviewed by the two other interviewers, and then forwarded to the interviewee who could make additions, deletions, or corrections as appropriate. These notes typically ranged from two to five pages and are available from the authors.

The interview notes were synthesized to create a single definition of effective planning as summarized in Table 2 in the "Results" section of this report.

Develop One Potential Measure of Effectiveness

Although it was not the only suggestion, one MOE that came from the interviews was implementation of major construction recommendations in the LRP. In Virginia, implementation may be assessed by evaluating the link between the LRP and the VDOT Six-Year Improvement Program (SYIP). Accordingly, the MOE was "the proportion of projects in the LRP that were implemented in a successive SYIP."

Because a typical LRP might include a couple of hundred projects, it was necessary to develop an approach that could be repeated by multiple persons. Four mutually exclusive scenarios for each project *in a given LRP* were identified:

1. *A project appears in an LRP for the first time and later appears in an SYIP for the first time.* For example, a 2015 LRP (approved in June 1995) recommends a major capacity investment for I-264 and the project then appears in a 1997 SYIP. In such a case, the LRP—and hence long-range planning—was the impetus for the project. Later in this report, these projects are called *LRP/SYIP* projects.

2. *A project appears in an SYIP for the first time and later appears in an LRP for the first time.* For example, the aforementioned I-264 project appeared in an SYIP for the first time in 1993 and then appeared in the LRP for the first time in 1995. Unlike the first category, long-range planning was not the impetus for the project. Later in this report, these projects are called *SYIP/LRP* projects.

3. *The project appears in an LRP for the first time and never appears in an SYIP because it is never built.* Later in this report, such projects are called *LRP/No SYIP* projects.

4. *A project appears in an LRP that was also in a previous LRP.* Such projects were influenced by the previous LRP and not the most recent planning exercise. An

example is an I-264 project in the 2018 LRP that is identical with an I-264 proposed in the 2015 LRP. (For the 2015 LRP, this project would be in Category 1, 2, or 3, but for the 2018 LRP, this project would be in Category 4). Later in this report, such projects are called *LRP/LRP* projects.

If implementation were the only criterion, then a "perfect" planning process would eventually show most or possibly all of its projects in the first category (LRP/SYIP). Accordingly, an implementation MOE was initially computed as "the proportion of the projects in the LRP/SYIP category divided by the total projects in all categories." Because of the requirement that plans be fiscally constrained, having some projects in the fourth category—LRP/LRP—is expected, although having too many LRP/LRP projects might mean that subsequent LRPs were simply repeating projects from previous LRPs.

Compute the Measures of Effectiveness for the Hampton Roads Area

The number of projects from each LRP that fall into each of the four categories discussed was determined. Spreadsheets identifying projects in each LRP and the corresponding SYIPs were created. An iterative process was used to compute the MOEs: researchers categorized the LRP projects as suggested previously, tabulated the projects accordingly, showed the results to the steering committee, received feedback on possible errors (e.g., one planner who knew the region well was able to clarify information that could not be gleaned from the plans alone), and then re-categorized the projects.

As this process continued, the findings were used to refine the MOEs. For example, it had initially been hypothesized that there might be a significant number of projects in Category 2 (SYIP/LRP), especially prior to the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. Although this hypothesis turned out to be incorrect, it led steering committee members to ask a related question: How often does a project from an LRP get constructed within a few years of the LRP being adopted? Accordingly, the manner of computing the MOEs was an iterative process and was expanded beyond the initial definition (i.e., the number of LRP/SYIP projects divided by the number of total projects).

RESULTS AND DISCUSSION

Synthesis of Interviews

The planning document produced and the steps taken to create it are certainly not the same: one interviewee noted that a plan "is not about a product but rather a process" (D. Castellow, personal communication, July 15, 2005). For the context of these interviews, however, the phrases *plan* and *planning* were used interchangeably.

Interviewees suggested that the definition of *effective plan* is a plan that contains seven specific elements, accomplishes five specific objectives, and overcomes three specific obstacles,

as summarized in Table 2 and detailed here. Interviewees provided examples of successes and failures that generally supported each element in Table 2.

Table 2. Characteristics of an Effective Plan

Elements the Plan Contains	Objectives the Plan Accomplishes	Obstacles the Plan Overcomes
1. A vision that guides regional progress. 2. A link with proposed local land uses. 3. A list of prioritized projects. 4. A statement that addresses how the community wants to grow. 5. Consideration of tradeoffs among modes. 6. Accurate information. 7. Measurable goals.	1. Implements recommended projects or policies. 2. Garners local government support. 3. Garners citizen support. 4. Uses urban travel demand models appropriately. 5. Presents alternatives.	1. Imperfect coordination among the state, MPOs, and jurisdictions. 2. Inadequate funding and inadequate incentives to coordinate funding. 3. Requirement that the plan be financially constrained.

Table 2 should be viewed as a set of ideals rather than as a minimum threshold. For example, one planner noted that Elements 1 and 4 (a vision statement and a statement addressing how the community wants to grow) are difficult to achieve if the community is composed of separate jurisdictions (T. Slaughter, personal communication, July 27, 2006). However, the same planner noted that even without such consensus, an effective plan can still be developed.

Seven Elements of an Effective Plan

An effective plan, based on a synthesis of interview comments, has seven elements:

1. a vision statement that guides regional progress
2. a link with proposed local land uses
3. a list of prioritized projects (in either the plan or companion documents)
4. a statement that addresses how the community wants to grow
5. consideration of tradeoffs among modes
6. accurate information
7. measurable goals.

Vision Statement That Guides Regional Progress

The recommendations of a regional plan should be based on a vision of how the region will make progress in the future. Interviewees offered three forms this progress might take: land development, economic development, and transportation development. Common to these three examples is that the vision for development is based on goals set by the region as opposed to a single jurisdiction. In practice, the three examples offered by interviewees illustrate the vision statements that may be explicitly stated in a regional planning document.

1. *Coordinate regional land development.* Planners from VDOT and the City of Lynchburg facilitated the creation of a traditional neighborhood development in the form of the Wyndhurst neighborhood (Figures 1 and 2). Traffic calming approaches were used, such as brick crosswalks and the allowance of on-street parking, and the city was able to reprogram $10 million to consolidate the land rather than divide it

into typical subdivisions. The project resulted in higher development densities, mixed-use development, and greater attention to public spaces. VDOT's willingness to be sensitive to design combined with planners' awareness of how infrastructure can help develop a community led to a successful, well-received new neighborhood within the city (B. White, personal communication, July 12, 2005).

Another example of a regionally coordinated land development effort is revenue sharing (A. Riutort and T. Slaughter, personal communication, July 20, 2005). For example, industrial development in (rural) Brunswick County instead of (congested) Virginia Beach could conceivably (with the right tax sharing structure) lead to regional economic growth without an increase in regional congestion (W. King, personal communication, July 13, 2005).

Figure 1. Wyndhurst Neighborhood (Enterprise Drive Near Duncraig Drive)

Figure 2. Wyndhurst Neighborhood (Enterprise Drive, Section Adjacent to Figure 1)

2. *Increase economic development.* Interviewees showed that being proactive can increase a plan's effectiveness. In the Roanoke area, local jurisdictions were informed by the U.S. Environmental Protection Agency that new ozone standards could force the area into a non-attainment status, potentially restricting transportation and industrial activities. Recognizing this potential threat of economic harm, the Roanoke Valley-Alleghany Regional Commission and the localities worked with EPA to enter the ozone "early action compact." Local officials could see that participation in the program would enable the area to remain an ozone attainment area. Thus by being proactive, the region will still have full flexibility to use federal funds for transportation projects (M. McCaskill, personal communication, February 18, 2005).

3. *Attain economies of scale by coordinating multijurisdictional transportation projects.* Ideally, a plan is a regional vision rather than an aggregation of projects from individual jurisdictions. However, the ideal of regional cooperation is not always attained: one interviewee cited an example where two cities shared a road and had different views regarding a proposed improvement: for one, the roadway improvement was a priority, and for the other, it was not. Their positions were reversed on the subject of a light rail line between the two: one viewed the light rail line as a tool for economic development (and hence favored its implementation), and one wanted a bus rapid project instead (D. Castellow, personal communication, July 13, 2005). One interviewee questioned whether a good LRP even exists, given that so many projects therein are desires of local officials rather than a part of a coherent system (W. King, personal communication, July 13, 2005); further, coordination does not always happen with a region as each city independently prepares its LRP (J. Raliski, personal communication, July 7, 2005).

Link With Proposed Local Land Uses

Proposed transportation improvements (from regional plans) and proposed local land uses (from local comprehensive plans) can be mutually supportive. One interviewee suggested that land use changes are the most effective way to improve transportation performance (C. Forinash, personal communication, November 16, 2005).

Interviewees gave three specific examples of such mutual support:

1. *Use transportation infrastructure to promote land-use designs.* For example, planners may be able to accept a lower level of service in an effort to guide a particular development policy (B. White, personal communication, July 12, 2005). In this case, even if the road should be expanded to accommodate increasing traffic volumes, the jurisdiction may choose to avoid the expansion if it would disrupt the community and undermine the redevelopment strategy. Another example of using transportation to support land use was noted in Virginia Beach where a new convention center on I-264 was supported by hotels on Atlantic Avenue and a bus rapid transit system linking the two (D. Castellow, personal communication, July 13, 2005). In short, land use and transportation at the regional level should be integrated;

further, regional plans should include a full build-out of local land use plans so that the impact of such eventual developments on the regional system can be considered (M. Clements, L. Hagin, and D. Lysy, personal communication, March 4, 2005).

2. *Use the transportation plan to show the need for future improvements and then secure additional right of way (ROW) accordingly.* For example, Route 60 in Newport News was built with a wider median than necessary so that two additional lanes could be added in the future. If the original plan had not called for six lanes total, it is not likely that the additional land would have been acquired (A. Riutort and T. Slaughter, personal communication, July 20, 2005).

3. *Link transportation performance to the desired land use.* For example, faster travel speeds are not always an improvement; instead, one can compare actual speeds to desired speeds for various classes of roadway (C. Forinash, personal communication, July 19, 2005).

List of Prioritized Projects

Effective regional plans should prioritize projects with local interest in at least some of the items on the list (M. McCaskill, personal communication, February 18, 2005). Interviewees offered several ways to present project priorities—including, when necessary, limiting the list.

One way is to have the plan translate into an action agenda in future endeavors. For example, the Eastern Planning Initiative contained many visionary elements that were later incorporated into an effective LRP by being discussed in the extensive UnJAM 2025 (LRP for the Thomas Jefferson Planning District) public process. These enabled planners to demonstrate the importance of these elements as well as show the consequences of not including them in the plan. Action agendas allow planners and policy makers to reevaluate project priorities continuously (H. Rue, personal communication, January 21, 2005).

Similar to the action agenda is a clear vision list that includes both tangible actions and the expected results of a plan; this list encourages localities to take leadership and promote the creation of an LRP. The plan should indicate how success can be measured (M. McCaskill, personal communication, February 18, 2005), and thus the list may help with such measurement. An established process for prioritizing projects is appropriate whereas one project is completed another takes its place (M. Clements, L. Hagin, and D. Lysy, personal communication, March 4, 2005).

The utility of a "wish list" was also noted. Rather than omit projects for which funding is not available, projects should be prioritized so that those that are more expensive can be ranked according to regional significance (C. Forinash, personal communication, July 19, 2005). Projects might also be ranked by urgency, especially when competing projects require different amounts of time to complete (T. Slaughter, personal communication, July 27, 2006).

Finally, an intriguing remark made by two interviewees suggests that prioritization may also mean knowing which recommendations are not negotiable: "hold out for the ultimate

improvement, rather than settling for smaller, less expensive projects" (A. Riutort and T. Slaughter, personal communication, July 20, 2005). This advice was implicitly supported by a third interviewee who noted that, in particular, MPOs should limit the number of preliminary engineering–only (PE-only) projects in their plan. By taking such a step, MPOs will tend to have a relatively small number of projects in their plan and thus better influence which projects are programmed (R. B. Case, personal communication, July 7, 2005). If, however, MPOs take the opposite step and include many PE-only projects, then because the plan has so many projects for which construction funds are insufficient, the plan ultimately does not prioritize projects and thus does not influence which are programmed.

Statement That Addresses How the Community Wants to Grow

Through two examples—one pertaining to a high-growth area and one pertaining to an area showing no growth—interviewees indicated that regional planning should consider the demand for growth and how the community should respond. Taken in context with the remarks of a third interviewee—that transportation improvements are a necessary ingredient for effective community growth but not the sole contributor (Y. H. Chang, personal communication, April 1, 2005)—an inference is that the planning document should contain an explicit statement indicating how the community wants to grow. The two approaches to growth noted in the interviews were as follows:

1. *In areas where growth is expected, planners may be able to influence where growth will occur.* One example given was in the form of a contrast between Arlington and Fairfax counties (C. Forinash, personal communication, July 19, 2005). To avoid losing some of its economic base to faster growing counties, Arlington encouraged transit-oriented development along a heavy rail line, with the result being that roadway traffic volumes have remained comparable to those in the 1970s. However, the county was able to attract industry and development to the area in the vicinity of these transit facilities, which enables surrounding communities to have a lower density than would otherwise be the case. The message was to build infrastructure that will accommodate a desired land use and not necessarily the infrastructure that will accommodate forecast traffic volumes. A similar suggestion was made by another interviewee: instead of building a transportation system exactly aligned with the forecasts, consider an integration such as light rail systems and mixed-use developments (A. Riutort and T. Slaughter, personal communication, July 20, 2005).

2. *Areas remaining constant should not show growth in the LRP.* Planners cannot always assume that growth will come (M. McCaskill, personal communication, February 18, 2005). Although some regions have a steady supply of growth, such as major universities, others may need to attract growth [especially in the form of jobs or an increased tax base]. Thus, regions in the latter category may not be able to spend funds on some design aspects such as roundabouts, tree-lined streets, and new urbanist style developments.

Consideration of Tradeoffs Among Modes

The interview results suggest that an effective regional LRP shows in which modes investment is best placed. For example, port traffic in Newport News may be better served with an additional river crossing rather than a tunnel widening, since the tunnel crossing addresses only the traffic that currently uses the tunnel and a third crossing would spread out traffic and possibly better serve the entire community. It was also suggested that an effective LRP should reduce the overall vehicle miles traveled (A. Riutort and T. Slaughter, personal communication, July 20, 2005). Similarly a plan should include all modes—bicycle, pedestrian, airport, transit, and highway (H. Rue, personal communication, January 21, 2005).

Accurate Information

An effective plan will have accurate technical analysis and may even have modeled the impacts of alternative scenarios, in terms of both land development and transportation investments (Y. H. Chang, personal communication, May 5, 2005). Given that no locality can say with certainty where growth will occur (P. O'Hare and M. Toalson, personal communication, July 13, 2006), it can be inferred that "accuracy" might include some reasonable estimate of the forecast error.

Accuracy is not limited to population, employment, or development forecasts: accuracy also means the plan should include a realistic assessment of what will occur if certain projects are *not* implemented. One interviewee emphasized the importance of having the plan provide an honest picture of the future and thus avoid overstating the consequences of inaction, giving as an example the fact that despite severe congestion, people may still move to an area (J. Raliski, personal communication, July 7, 2005).

Finally, accuracy means the plan's recommended project list should be realistic—too many projects with insufficient funding will cause a plan to lose credibility (P. O'Hare and M. Toalson, personal communication, July 13, 2005). Similarly, having a plan that includes projects where only PE funds (but no construction funds) are available should be avoided since none of these projects, according to the plan, can be constructed (R. B. Case, personal communication, July 7, 2005). An interviewee's advice to "work with what you have" was exemplified by his description of improvements to I-495, a congested facility in a heavily developed area (Y. H. Chang, personal communication, April 1, 2005). Under the proposed widening, the facility will have redesigned interchanges that will not be built to interstate standards but that may be preferable to the takings of several hundred homes [or the do-nothing alternative].

Measurable Goals

Ideally, a plan provides a goal against which progress may be measured. One group of interviewees suggested the use of quantifiable benchmarks aligned with planning factors from the federal legislation (M. Clements, L. Hagin, and D. Lysy, personal communication, March 4, 2005). For example, for the goals of safety, mode choice, and congestion, the plan could show benchmarks based on results (e.g., number of crashes per VMT would be a way to measure progress toward safety). The plan could also show benchmarks based on inputs or decisions

(e.g., funding transportation alternatives such that highways have 87.5% of funding and transit has 12.5% of funding could measure progress toward mode choice). Further, the plan could be integrated with existing data sources: e.g., congestion could be assessed through the Texas Transportation Institute congestion index; e.g., see the travel time index, which is "the ratio of peak period travel time to free-flow travel time" (Schrank and Lomax, 2005) and is thus an output-based measure) or even as the number of freeway lane miles per capita (an input-based measure).

Objectives Accomplished by an Effective Plan

Determination of what a plan accomplishes must be made by looking outside the plan. Interviewees suggested that an effective plan accomplishes five main objectives:

1. implements recommended projects or policies
2. garners local government support
3. garners citizen support
4. uses urban travel demand models appropriately
5. presents alternatives.

Implements Recommended Projects or Policies

For many interviewees, effectiveness was defined as whether a transportation plan's recommended projects or policies were implemented. The total number of build projects is a selling point for transportation professionals to gain public trust and to show citizens how the new projects can improve their quality of life (C. Forinash, personal communication, July 19, 2005). Two interviewees noted that if a region cannot move goods and people efficiently, companies will not come and the area will suffer economically (P. O'Hare and M. Toalson, personal communication, July 13, 2005). Success is not limited to construction; policy changes such as revisions to modal funding formulas are also examples of implementation (H. Rue, personal communication, January 21, 2005).

One negative example was the Northern Virginia 2000 Transportation Plan [completed in 1969] that included a series of highway and transit corridors with development near these transportation corridors. Ultimately the only road project completed was the Fairfax County Parkway, and sprawl in the area has continued (Y. H. Chang, personal communication, April 1, 2005).

Implementing a plan does not mean that the entire project must be implemented within the current plan's life cycle: instead, implementation means the plan should make tangible progress toward a given goal. A good plan will acknowledge potential funding shortfalls and thus include projects that can be implemented in stages, thereby garnering support and funding as the project progresses. A positive example was the Richmond Highway Express (REX) system, which aimed to implement a fixed light rail system on Route 1 in southeastern Fairfax County within the next 20 years. This long-range goal was broken into three phases, with the first phase being started immediately:

1. Improve the current system of bus stops and intersections; this phase included a marketing program to encourage more citizens to ride the buses.

2. Create a dedicated bus lane. Because a road widening is required, substantial funds will be spent, making the support as a result of the first phase critical.

3. Convert the bus ROW from a bus lane to a track route for rail.

The lesson is that with this phased system, the public—and legislators—can observe immediate results at each phase rather than waiting for 20 years to see any improvement. Being able to notice results within a few years is critical for building public support. Congressman Moran provided an earmark for this project based on the results of Phase 1, and undoubtedly being able to see a working system was a factor in favor of that suggestion (Y. H. Chang, personal communication, April 1, 2005).

Other interviewees also suggested a longer horizon than the typical 20-year period (M. Clements, L. Hagin, and D. Lysy, personal communication, March 4, 2005; A. Riutort and T. Slaughter, personal communication, July 20, 2005). This longer time might make some [expensive] projects feasible that otherwise could not be accomplished within the shorter time frame, and such projects could also be done in phases. Comments from other interviewees emphasized the importance of good project phasing, notably because of the difference in time frames between that of the LRP and the term of an elected official, some of whom experience a high turnover rate (W. King, personal communication, July 13, 2005). A salient example of these longer time frames was the 9 years required for a parking garage that supports transit service—the project has been successful, but the long time frame was noted (and contrasts with the shorter time frame of the 1-year REX example) (Y.H. Chang, personal communication, April 1, 2005).

Garners Local Government Support

An effective plan is one that is adopted by the localities involved with the plan (Y. H. Chang, personal communication, April 1, 2005). However, some disagreement is not only reasonable but desired: favoring of some projects over others by different localities suggests local interest in the plan. No specified interest, or projects are all prioritized the same, is a sign that the effectiveness of the regional plan has not been maximized (M. McCaskill, personal communication, February 18, 2005).

To a greater extent than any of the other objectives, garnering local support appears to relate as much to process as to the product of the plan itself. For example, one interviewee noted that effective planning "relies on the quality of communications between jurisdictions in each region" and, thus, that the key to achieving this good communication is a forum (e.g., monthly technical meetings) among jurisdictional representatives (J. Raliski, personal communication, July 7, 2005).

Although the approach of collaboration among localities increases local support, another approach for obtaining support is to have data that justify the plan's recommendations. Well-

organized data can tell a story and relate the impacts of a project to a personal level. For example, with regard to the phenomenon of relatively empty bus lanes adjacent to congested regular travel lanes, there will be calls for the elimination of the bus-only restriction. If, however, supporting data can be used to show that individual commutes are eased because the new bus lanes remove traffic from the adjacent traffic lanes or even that the bus lanes are moving more people per hour, planners can give elected officials the support they need (Y. H. Chang, personal communication, April 1, 2005).

Garners Citizen Support

Although public participation was not explicitly studied, several interviewees mentioned its relevance to effective planning. It is difficult to capture the typical citizen's viewpoint as projects tend to attract strong advocates and opponents (M. Clements, L. Hagin, and D. Lysy, personal communication, March 4, 2005); it is also difficult to obtain meaningful public input from a large area of 1.3 million people (J. Raliski, personal communication, July 7, 2005). Two types of techniques to increase public participation are noted here: group-based approaches (workshops, focus groups, and charettes) and market survey–based approaches.

Workshops help participants define a specific vision and prioritize potential projects (H. Rue, personal communication, January 21, 2006). This particular interview showed two critical commitments to making such workshops succeed. First, there is a substantial time commitment (2 to 8 hours per trainee leading the process), and second, the resultant action agenda should include deliverables that really will be accomplished. The similar use of such focus groups was also suggested by other interviewees (B. White, personal communication, July 12, 2005). Proof was offered in the case of a Denver (Colorado) plan whose corresponding referendum had failed. The planners used the same plan but with the "charette" approach to gain a better perspective of what the public wanted and to educate them on all aspects of the plan. When the next vote occurred, the funding referendum was passed (C. Forinash, personal communication, July 19, 2005).

Market survey approaches, which may take the form of a phone call or written questionnaire, are a complement to the group-based approaches and public meetings. Three advantages of market surveys are that (1) individual opinions are not affected by the other group members; (2) it is possible to target citizens from the general community (whereas public meetings have a disproportionate portion of government, consultant, and advocacy groups in attendance); and (3) the larger audience enables the use of quantitative analyses. Given the finding that only 6% of adults had attended a public meeting for a particularly controversial project, market survey approaches tend to provide a larger response rate than public meetings. With this larger set of responses, it is possible to perform quantitative analyses. Market survey approaches do not eliminate the need for public meetings (or vice-versa), but they are a useful way to obtain statistically reliable findings (G. Robey, personal communication, March 14, 2006, and July 17, 2006).

Uses Urban Travel Demand Models Appropriately

When interview results were combined, a clear recommendation was that an effective plan uses the conventional urban travel demand forecasting process (trip generation, distribution, mode choice, and traffic assignment) only to the extent it is useful and thus recognizes the model's limitations.

- *Models can help evaluate the technical feasibility of certain projects*. The four-step process can be used to test the feasibility of a variety of construction and policy alternatives, ranging from low-cost traffic control measures to light rail transit integrated with land development (M. Clements, L. Hagin, and D. Lysy, personal communication, March 4, 2005). To the extent that models are helpful, it is appropriate to identify aggressively all data that may be needed in the LRP; further, local staff who know the area can quickly detect errors in the model that might not otherwise be apparent (M. Clements, L. Hagin, and D. Lysy, personal communication, March 4, 2005).

- *Models cannot replace policy decisions or professional experience.* Deficiencies identified by the models do not replace a region's vision for how it wants to grow (M. McCaskill, personal communication, April 5, 2005). One planner noted that the traffic forecasts of an urban travel demand model may become a self-fulfilling prophecy. The planner noted the Rosslyn-Ballston corridor has the same number of vehicles it did in the 1970s (in contrast to model forecasts) because the area chose to integrate transportation and land use (e.g., high density at stations that quickly tapers off to accommodate surrounding communities) rather than simply expanding highway capacity (C. Forinash, personal communication, July 19, 2005). The model's limitations, such as its forecast accuracy when each jurisdiction allocates a particular volume of traffic across zones, also need to be understood (J. Raliski, personal communication, July 7, 2005). Finally, the benefit of an updated model was questioned in one instance where a model update (funded by VDOT and FHWA) cost about $200,000 but did not provide the Lynchburg planners with a significant amount of new information (B. White, personal communication, July 12, 2005).

Another interviewee described that about $250,000 was spent modeling the impacts of narrowing a facility from four to two lanes, noting that although models can indicate queues and delays that form under certain alternatives, the model itself does not pick the recommended alternative (H. Rue, personal communication, January 21, 2005). In this particular case, it appears that the interviewee was discussing simulation models as opposed to the urban travel demand models described. These remarks about simulation models match those from other interviewees regarding demand models: they are useful for determining the feasibility of alternatives but they are not the only factor in the decision.

Presents Alternatives

An effective plan will ideally produce a set of alternatives, such as a compact areas scenario and a sprawl analysis. This allows participants to perform two tasks. First, they can

understand the extent to which transportation improvements can affect various performance measures; e.g., it may not be possible to reduce vehicle hours of delay substantially, but it may be feasible to increase the number of shopping opportunities within a specified radius. Second, the scenarios allow choices to be explicitly (rather than implicitly) made; e.g., by noting particulate matter emissions for each alternative, participants may consciously choose how to affect air quality for certain alternatives (C. Forinash, personal communication, July 19, 2005).

Obstacles Overcome by an Effective Plan

An effective plan will overcome three main categories of obstacles:

1. imperfect coordination among the state, MPOs, and jurisdictions
2. inadequate funding and inadequate incentives to coordinate funding
3. requirement that the plan be financially constrained.

Imperfect Coordination Among State, MPOs, and Jurisdictions

Interviewees noted several areas where coordination is imperfect or challenging.

- *Collaboration among all planning entities*. In order for citizens to understand how long-range planning is done, the roles of regional and state entities doing this planning need to be defined. For example, in Northern Virginia, these include the Metropolitan Washington Council of Governments, the Northern Virginia Transportation Association 2030 Plan, and the VTrans 2025 statewide plan. The relevance of each plan and how money is allocated to reach region were unclear (C. Forinash, personal communication, July 19, 2005).

- *Collaboration among jurisdictions*. Jurisdictions may want infrastructure to serve two different purposes. For example, Arlington and Fairfax counties were updating their plans at the same time. Arlington had plans to narrow a stretch of Columbia Pike to make it more pedestrian-friendly, and Fairfax County was planning to provide more travel lanes—both on the same facility (C. Forinash, personal communication, July 19, 2005). Problems such as these may be exacerbated by the timing of plan updates: when one jurisdiction is completing a plan update, another region is just beginning. A positive example would be to share funds for regionally significant projects (W. King, personal communication, July 13, 2005). Another good instance of coordination is the concurrent widening projects of Campostella Road and Atlantic Road from Norfolk to Chesapeake, which yielded a continuous pathway through the two jurisdictions without interruption of changing geometries.

- *Coordination between localities and the region*. Because effective planning requires technical support from the planning district commission (PDC) (J. Raliski, personal communication, July 7, 2005), sharing such knowledge between the PDC and localities may also increase collaboration. This interviewee noted that the PDC provides a forum for jurisdictions to come out of their "silos" periodically to discuss transportation issues and even gave an example where localities have to work

together: although the regional transit agency is funded by localities, the PDC works to coordinate this funding before it is given to the regional transit agency. Despite this example, however, Virginia localities do not have a strong fiscal incentive to work together as in other states where funds are allocated at the regional level rather than going directly to localities. Further, these localities compete with one another for revenue (from commercial development), which may hamper regional land use coordination (D. Castellow, personal communication, July 15, 2005). The Hampton Roads area may have been better served when it was two separate regions because of its vastly different needs (W. King, personal communication, July 13, 2005).

- *Collaboration between the state and localities.* Two interviewees suggested that the perception that transportation problems stem from a lack of coordination between localities and VDOT is a misconception, noting that VDOT is involved in almost all site planning projects and that the breakdown occurs when a VDOT study reveals that a particular project may increase congestion and the locality decides nonetheless to allow it. The same interviewees, however, noted that giving the state the ability to reject local land use projects because of a lack of infrastructure would effectively shut down growth (P. O'Hare and M. Toalson, personal communication, July 13, 2005). Instead, it was noted that if a regional project is opposed by a single locality or magisterial district, there should be an ability to override and review comprehensive plans and determine if the road plan is still acceptable.

- *Collaboration between the state and the region.* Another interviewee suggested that one challenge to coordination is getting VDOT to read the MPO plans and use them in the state planning process rather than the reverse. Specifically, the MPO plans should be a major factor in the statewide plan and should not be generated from only a statewide model, such as the Highway Needs Assessment (H. Rue, personal communication, January 21, 2005). One interviewee suggested sending state staff or interns to aid regional staff when necessary (M. McCaskill, personal communication, February 18, 2005). Another interviewee noted that without VDOT programming staff at the PDC meetings, it was difficult to link projects from the planning step to the programming step (R. B. Case, personal communication, July 7, 2005).

It may be the case that coordination can be improved through clarification of existing processes. For example, according to the technical report associated with the long-range state highway plan, the Highway Needs Assessment uses highway and traffic information to identify deficiencies (VDOT, 2005c), but the assessment is just one of several inputs into the LRP—with other inputs including the MPO LRPs (VDOT, 2005c). It may be the case that coordination can be improved through better communication or there may be other issues not identified herein that hamper this coordination. In either case, however, the need for improved communication appears to match the opinion of the interviewee who suggested that the relevance of each plan was not clear.

Inadequate Funding and Inadequate Incentives to Coordinate Funding

Insufficient funding and the lack of a funding guarantee were the most discussed obstacles in creating an effective LRP.

When funding is reduced, one impact is to make jurisdictions focus on getting local projects implemented at the expense of regional needs, which are then given a lower priority (A. Riutort and T. Slaughter, personal communication, July 20, 2005). At the time of this interview, the annual urban allocations for one jurisdiction—Newport News—were at $6 million (contrasted with a previous high of $12 million) and were projected to disappear.

In terms of uncertainty, one interviewee noted that in just 2 years the amount of money forecast for the next 20 years can be cut in half. These wide swings in financial estimates hinder effective planning, especially when significant infrastructure requires funding for multiple years. Without guaranteed funds, it is difficult to maintain a healthy vision and project list to use if or when those funds do become available (M. McCaskill, personal communication, February 18, 2005).

Suggestions for improving the amount of funding include constitutional amendments to protect transportation resources from use for other purposes, cutting construction costs in other areas such as new school construction, integrating land use and transportation planning through access management, and using real estate taxes from new development to fund transportation improvements (P. O'Hare and M. Toalson, personal communication, July 13, 2006).

Suggestions were also made for improving the coordination of funding—both local representatives and regional representatives noted that MPOs or regions do not have the same amount of authority as in some other states. For example, it was noted that the Richmond area controls about 10% of transportation funds for the region; further, other states such as Florida can review developments for regional impact (M. Clements, L. Hagin, and D. Lysy, personal communication, March 4, 2005). This authority is also limited in terms of submittal of the Statewide Transportation Improvement Program (STIP): an MPO can remove a project from the STIP but cannot add one. The STIP is composed of the SYIP and the TIP; VDOT submits the STIP to FHWA and the Federal Transit Administration for approval. As a point of clarification, another interviewee noted that roads included in the TIP have already been in VDOT's SYIP for at least 3 years, making it difficult to have a link between the TIP and the LRP (M. McCaskill, personal communication, April 5, 2005). Other interviewees similarly noted the lack of authority in Virginia that some other states give their regions to implement regional plans, with tools such as urban growth boundaries, development rights, and impact fees (A. Riutort and T. Slaughter, personal communication, July 20, 2005). California was cited as one state where the MPO's funding authority enables the region to force localities to collaborate (D. Castellow, personal communication, July 15, 2005).

Finally, one interviewee suggested that NEPA may raise a funding barrier when the need for a roadway widening is known years in advance. Until the NEPA process is undertaken (which may occur long after the need is placed in an LRP), an exact alignment will not be known. Thus, potential ROW may still be privately developed, thereby increasing land costs should the widening ever move forward. Ideally, a way can be found to meet the joint

requirements of (1) planners and developers (who need specific information) and (2) the NEPA process (which requires consideration of alternatives) (B. White, personal communication, July 12, 2005).

Requirement That Plan Be Financially Constrained

Regional plans may show only projects for which funds are reasonably expected to be available over the next 20 years. Comments from the interviewees suggested that although this requirement may have the beneficial impact of forcing plans to be realistic, it unduly prevents planners from thinking about what is possible for the transportation system (A. Riutort and M. Slaughter, personal communication, July 20, 2005). The financial constraint requirement also prevents the plan from showing all regional needs, leaving the public uninformed about the dire transportation needs of the region. Further, without showing all needs, there is no way to secure the land that may be needed for future improvements (W. King, personal communication, July 13, 2005). A possible compromise is to include a vision plan along with the required fiscally constrained plan (C. Forinash, personal communication, July 19, 2005).

Development of One Possible MOE

Each of the seven characteristics, five objectives, and three (addressed) obstacles that define an effective plan can be quantified for a given LRP. multiple MOEs are feasible.

The first obstacle—imperfect coordination—might be assessed through determining the percentage of localities' plans that identify the same projects as are identified in the regional plan or the percentage of projects for which there is explicit funding support among the member localities. Thus, the MOE would be based on the extent to which the plan overcame key obstacles. Because one of the most prevalent indicators of effectiveness identified in the interviews was implementation, this MOE was chosen for further examination.

Implementation was defined as the proportion of projects in a region's LRP that were implemented in a successive SYIP. This MOE is not a perfect indicator of implementation because the long-range planning process entails multiple facets (stakeholder meetings, data collection, brainstorming exercises, informal conversations, and the creation of additional documents, only one of which is the LRP). Similarly *implementation* may be defined as projects that are eventually built, advocacy for certain projects, and decisions made to construct certain projects, with only one of those decisions being the SYIP. However, although the LRP is not the same as the entire planning process, it is a good sample thereof: the LRP captures the major themes, considerations, and decisions that result from the planning process. Similarly, the SYIP—Virginia's major transportation construction document—is an unbiased representation of the transportation investment decisions that are made. Thus, knowing the extent to which the LRP influences the SYIP approximates the extent to which the recommendations of the planning process are implemented.

This MOE was computed for the Hampton Roads area by examining more than two decades of LRPs and SYIPs. This measure was computed as follows:

1. *Obtain LRPs for the Hampton Roads area for the period 1983 through 2004*. The earliest plans tended simply to be maps, whereas others included the regional plan and a technical index. For simplicity, the plans are denoted by their *horizon years*. For example, an LRP produced in 1979 with a horizon year of 2000 is designated as the 2000 LRP.

2. *Obtain all SYIPs (VDOT Six-Year Improvement Program) that span the years the regional transportation plans were published*. A total of 22 SYIPs were obtained: the earliest one began with FY83-84 and the latest one began with FY03-04.

3. *Align the appropriate LRP with the appropriate SYIPs and record the results in a spreadsheet*. Earlier SYIPs prior to the LRP approval date should be reviewed to confirm that projects did not appear in an earlier SYIP before being added to the LRP. For example, the 2010 Southeastern Virginia Regional Transportation Study was approved by the MPO in December 1989. Therefore, it should influence the SYIP that begins the following fiscal year (July 1, 1990, through June 30, 1991, which is the FY90-91 SYIP). New projects from that LRP should not be in the FY89-90 SYIP or earlier SYIP (unless they were in an earlier LRP). Table 3 shows the name of each LRP, the region it represents, the date it was published, the first SYIP that should be influenced by the LRP, and the last SYIP for which the associated LRP is still current.

Table 3. Linkage Between Long-range Plans and Six-Year Improvement Programs

Long-range Plan (LRP)	Represents	Approval Date	First SYIP in Active Period	Last SYIP in Active Period
Southeastern Virginia (SEVA) Regional 2000 Transportation Plan	SEVA portion[a]	October 1982	FY83-84	FY89-90
Peninsula Area Transportation Study: Year 2000 Plan[b]	Peninsula portion[a]	April 1979	FY79-80	FY90-91
Southeastern Virginia Regional Transportation 2010 Highway Needs Study	SEVA portion[a]	December 1989	FY90-91	FY94-95
Peninsula Area Transportation Study: Year 2010 Plan	Peninsula portion[a]	April 1991	FY91-92	FY94-95
Hampton Roads 2015 Regional transportation Plan	Entire region	June 1995	FY95-96	FY97-98
Hampton Roads 2018 Regional Transportation Plan	Entire region	February 1998	FY98-99	FY00-01
Hampton Roads 2021Regional Transportation Plan	Entire region	February 2001	FY01-02	FY03-04
Hampton Roads 2026 Regional Transportation Plan	Entire region	June 2004	FY04-05	Future

[a]The Southeastern Virginia and Peninsula plans were produced separately for the 2000 and 2010 horizon years; at that time, they represented two different planning districts. The term "2000 LRP" denotes the combination of plans from these two districts for the 2000 forecast year; the term "2010 LRP" denotes the combination of plans from these two districts for the 2010 forecast year.

[b]As the fold-out map did not clearly identify projects, specific projects were identified from the corresponding *Peninsula Area Transportation Study: Year 2000 Plan Technical Report* (Virginia Department of Highways and Transportation, 1983).

4. *Identify when, if ever, each project from Step 3 first appears in an SYIP*. As is the case with LRP projects, SYIP projects are repeated through multiple years. Each LRP project may be placed into one of four mutually exclusive categories identified previously and repeated here:

    - *LRP/SYIP projects* appear in an LRP for the first time and later appear in an SYIP for the first time.

    - *SYIP/LRP projects* appear in an SYIP for the first time and later appear in an LRP for the first time.

    - *LRP/No SYIP projects* appear in an LRP and never appear in an SYIP because they are never built.

    - *LRP/LRP projects* appear in an LRP and also appeared in a previous LRP.

5. *Use these data to compute four definitions of an implementation MOE*. Although the version shown in Eq. 1 was initially anticipated, the iterative process of making calculations, having them reviewed, and then making corrections actually led to four different definitions of an implementation MOE, as shown in Eqs. 1, 2, 3, and 4:

    - The *percentage of LRP projects implemented* indicates the extent to which the LRP results in tangible improvements. A high percentage is desirable. This MOE is

$$\text{MOE}_1 = \frac{\text{Number of LRP/SIP projects}}{\text{Number of LRP/SYIP, SYIP/LRP, and LRP/No SYIP projects}} \quad \text{[Eq. 1]}$$

    - The *percentage of implemented projects that appear in an SYIP prior to the LRP* indicates the extent to which the SYIP influenced the LRP. A low percentage is desirable. This MOE is

$$\text{MOE}_2 = \frac{\text{Number of SYIP/LRP projects}}{\text{Number of LRP/SYIP and SYIP/LRP projects}} \quad \text{[Eq. 2]}$$

    - The *percentage of implemented projects started during the LRP's active period* is

$$\text{MOE}_3 = \frac{\text{Number of LRP/SYIP projects during the active period}}{\text{Number of LRP/SYIP projects}} \quad \text{[Eq. 3]}$$

      Note that the active period for each LRP is defined in Table 3.

    - The *percentage of projects appearing in a previous LRP* (as opposed to being generated by the current planning endeavor) is defined in Eq.4. A low percentage is desirable.

$$MOE_4 = \frac{\text{Number of LRP/LRP projects}}{\text{Number of LRP/SYIP, SYIP/LRP, LRP/LRP, and LRP/No SYIP projects}} \quad \text{[Eq. 4]}$$

The Appendix details seven additional steps that are essential to replicating these results: (1) recognize exceptions to the rule for categorizing SYIP/LRP projects, (2) remove regionally insignificant projects from the categories, (3) define the protocol for studying the earliest LRP available for this study, (4) define the LRP's active period, (5) use local expertise, (6) track the original LRP and SYIP year for each project, and (7) recognize that judgment is exercised when defining projects. Readers who wish to replicate this methodology elsewhere may refer to the Appendix. The Appendix also illustrates the types of details that had to be determined through the iterative process of computation, review, correction, and recomputation.

Measuring the Effectiveness of Planning for the Hampton Roads Area

Tables 4 through 11 summarize the relationship between projects in LRPs prepared by the Hampton Roads PDC for the years 2000, 2010, 2015, 2018, and 2021 and the VDOT SYIP. As was suggested (D. Castellow, personal communication, July 15, 2005), only regionally significant projects are shown in Table 4. Data from these tables may then be used to determine the four MOEs using Eqs. (1) through (4).

Summary Data

Table 4 shows the total number of projects studied. Among the five plans, 1,233 regionally significant projects were recommended.

Table 4. Number of Projects from Hampton Roads LRPs

Code: Explanation	2000	2010	2015	2018	2021	Total
LRP/SYIP: LRP before SYIP	105	46	18	2	14	185
SYIP/LRP: SYIP before LRP	n/a[a]	5	0	0	0	5
LRP/No SYIP: Not found in SYIP	194[b]	130	83	17	50	474
LRP/LRP: In previous LRP	n/a[a]	48	151	239	131	569
Total[c]	299[d]	229	252	258	195	1,233

[a]Because the earlier LRP was not part of the study, it was not possible to determine LRP/LRP projects for the 2000 LRP. Further, because SYIPs were not studied prior to the 1983-1984 SYIP (along with the fact that LRPs prior to the 2000 LRP were not studied), it was not possible to determine SYIP/LRP projects for the 2000 LRP.

[b]It was noted for at least two projects in the 2000 LRP that although they were never found in a subsequent LRP, they have been built. These projects are the four-lane improvement to Elmhurst Lane (from Portsmouth Boulevard) to a one-half-mile section south of Portsmouth Boulevard) and Ferrell Parkway (between Indian River Road and Princess Anne Boulevard). The explanation for the former may be that it was placed in an SYIP that preceded the earliest one examined in this study, the 1982-1983 SYIP. The latter was built in the 1990s but could not be found in the SYIPs.

[c]Projects not considered regionally significant were excluded because they are not required to be in an LRP prior to being in an SYIP.

[d]This number excludes eight projects in the 1983-1984 SYIP because they may have been in previous LRPs or SYIPs (but we do not know for certain).

Table 4 may be interpreted as follows using the 2010 LRP as an example. The LRP had a total of 229 regionally significant projects, categorized as follows: 46 appeared in an SYIP after appearing in the LRP for the first time (LRP/SYIP), 5 appeared in an SYIP prior to the LRP (SYIP/LRP), 130 were not found in any SYIP (LRP/No SYIP), and 48 appeared in the earlier 2000 LRP (LRP/LRP).

Table 5 shows the percentage of LRP projects, by category, appearing in the SYIP. For example, referring to the 2010 LRP, Table 4 showed that of the 229 regionally significant projects, 46 were LRP/SYIP. Thus 46/229, or 20%, of the projects appearing in the SYIP are shown as LRP/SYIP in Table 5.

Table 5. Percentage of Total Significant Projects in Hampton Roads LRP

Code: Explanation	2000	2010	2015	2018	2021	Average[a]
LRP/SYIP: LRP before SYIP	35%	20%	7%	1%	7%	14%
SYIP/LRP: SYIP before LRP	n/a	2%	0%	0%	0%	≈ 1%[b]
LRP/No SYIP: Not found in SYIP	65%	57%	33%	7%	26%	37%
LRP/LRP: In Previous LRP	n/a	21%	60%	93%	67%	60%[b]

[a]Average values weight each LRP equally rather than each project equally.
[b]Average values exclude the 2000 LRP for the SYIP/LRP and LRP/LRP categories.

MOE 1: Percentage of LRP Projects Implemented

The last row of Table 5 showed the percentage of projects that appeared in a previous LRP. For example, of the 229 projects in the 2010 LRP, 48 appeared in a previous LRP, yielding 21% in the bottom row of Table 5 (LRP/LRP projects). Of the remaining projects that did not appear in a previous LRP, 25% of those in the LRP were found in the SYIP, as indicated in Table 6 and calculated in Eq. 1.

$$\text{MOE}_1 = 100\left(\frac{46\ \text{LRP/SYIP projects}}{181\ \text{LRP/SYIP, SYIP/LRP, and LRP/No SYIP projects}}\right) = 25\% \qquad \text{[Eq. 1]}$$

Table 6. Percentage of New LRP Projects Implemented[a]

2000 LRP	2010 LRP	2015 LRP	2018 LRP	2021 LRP	Average
35%[b]	25%	18%	11%	22%	23%[c]

[a]Projects were evaluated according to the first LRP in which they appeared.
[b]Because LRPs earlier than 2000 were not examined, this 2000 statistic covers new and repeated projects.
[c]The average value weights each plan equally. Weighting each project equally yields an average of 28%.

Overall, the percentages in Table 6 are relatively low, indicating that about 25% of the projects in an LRP tend to be implemented. It is striking that the percentages are not higher for the three plans published after ISTEA (2015, 2018, and 2021) since ISTEA required such plans to be financially constrained. The 2010 Southeastern Virginia Regional Transportation Plan noted that less than 50% the needs shown could be funded. Accordingly, based only on the knowledge of the ISTEA requirement, fewer LRP/No SYIP projects (and thus higher percentages) would have been expected in these three later plans. However, this was not the case.

Further, as shown in Figure 3, the long passage of time since the 2000 LRP does not necessarily explain why it has the highest percentage of implemented projects in Table 6. For the first three LRPs (2000, 2010, and 2015), no additional projects were implemented in the SYIP after the 2000-2001 SYIP, suggesting that sufficient time has elapsed to consider the projects proposed in those first LRPs. Interviewees had made two suggestions: (1) use time horizons longer than 20 years, and (2) stage larger projects. Figure 3 does not indicate that these suggestions were without merit for rendering large projects more feasible. Instead, Figure 3 suggests that the passage of time alone does not explain why a greater proportion of projects for the 2000 LRP was implemented compared to the LRPs that followed.

The trend toward less implementation is also evidenced by the decreasing *number* of projects progressing from the LRP to the SYIP. LRP/SYIP projects fell from a high of 105 in the 2000 LRP to 14 in the 2021 LRP. The number of LRP/SYIP projects for the 2021 LRP may change as future SYIPs are examined. However, the trend is not limited to 2021—even by the time the 2015 LRP was produced, the number of LRP/SYIP projects had dropped to 18.

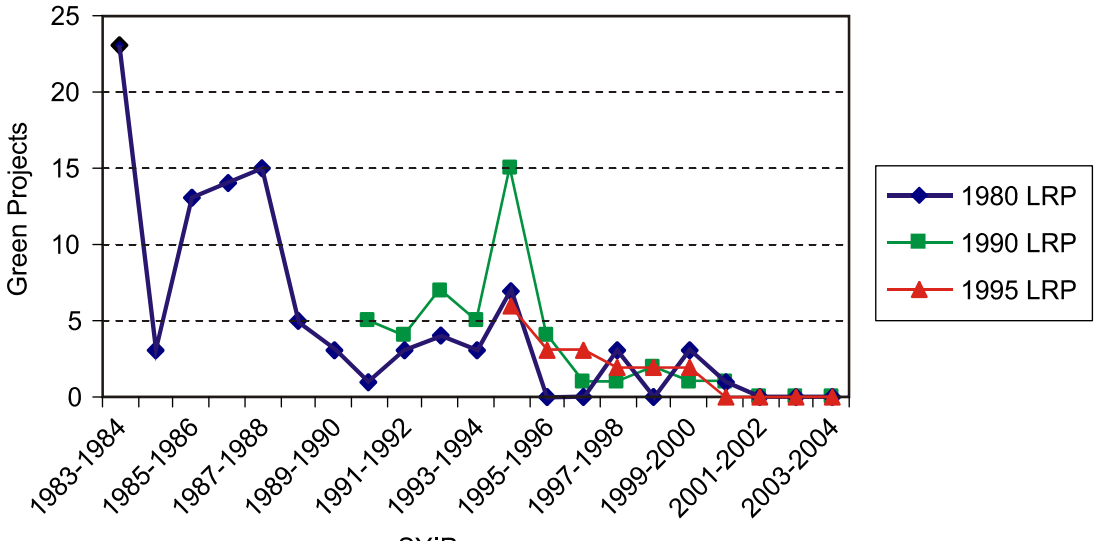

Figure 3. SYIPs Where LRP/SYIP Projects Were Implemented for 2000, 2010, and 2015 LRPs

MOE 2: Percentage of Implemented Projects That Appear in SYIP Prior to LRP

Table 7 shows the percentage of SYIP projects that are SYIP/LRP or LRP/SYIP projects. For example, Table 4 showed that from the 2010 LRP, 51 projects appeared in an SYIP: 46 LRP/SYIP and 5 SYIP/LRP projects. Thus Eq. 2 classifies 10% of the projects as SYIP/LRP, as they appeared in an SYIP and later in an LRP.

$$\mathrm{MOE}_2 = 100\left(\frac{5\,\mathrm{SYIP/LRP}}{46\,\mathrm{LRP/SYIP} + 5\,\mathrm{SYIP/LRP}}\right) = 10\% \qquad \text{[Eq. 2]}$$

Table 7 shows that for the last four plans for which the number of SYIP/LRP projects could be determined, about 2% of the implemented projects were SYIP/LRP projects. Contrary to initial expectations, therefore, the LRP has tended to influence the SYIP when the set of LRP projects found in an SYIP are considered.

Table 7. Percentage of Significant Projects from an LRP in That Are in an SYIP

Project Category	2010	2015	2018	2021	Average[a]
LRP/SYIP: LRP before SYIP	90%	100%	100%	100%	98%
SYIP/LRP: SYIP before LRP	10%	0%	0%	0%	2%

[a]The average value weights each plan equally; that is, the average of 90, 100, 100, and 100 is 98%. Weighting each project equally—that is, summing all of the LRP/SYIP projects and dividing by the total of the LRP/SYIP and SYIP/LRP projects—yields an average of 94% for the top row and 6% for the bottom row.

MOE 3: Percentage of Implemented Projects Started During the LRP's Active Period

An LRP's "active period" is the period that begins when the LRP is adopted and ends when the subsequent LRP is adopted. For example, the 2015 LRP was active from FY95 through FY97, a period of 3 years (Table 8). Although that LRP has produced 18 category LRP/SYIP projects (Table 9), only 12 were produced during the 3-year active period. Thus, the third MOE is calculated using Eq. 3.

$$\text{MOE}_3 = \frac{\text{Number of LRP/SYIP projects during the active period}}{\text{Number of LRP/SYIP projects}} = \frac{12}{18} = 67\% \qquad \text{[Eq. 3]}$$

For 2018 (an LRP with only two LRP/SYIP projects) and 2021 (an LRP with 14 LRP/SYIP projects), no projects have been initiated after the active period, although this may be because less time has elapsed. For the LRP/SYIP projects that appeared in the first three LRPs in Table 9, almost two-thirds were implemented while the current LRP was still active, as computed by Eq. 3 and shown in the bottom row of Table 9.

The significance of these results in Table 9 is twofold. First, for the set of projects from an LRP that will make it to the SYIP, the majority (66%) is started sooner—while the LRP is still active—rather than later when the LRP has been replaced by another LRP. Second, the percentages shown in Table 9 do not vary substantially—for each LRP, about two-thirds of the projects implemented were implemented during the LRP's active period, despite the shorter active periods for later LRPs.

Table 8. Active Periods for Each LRP

Long-range Plan (LRP)	Approval Date	Active Period	Length (years)
2000 (SEVA)	October 1982	FY83-84 through FY89-90	7
2000 (Peninsula)	April 1979	FY79-80 through FY90-91	12
2010 (SEVA)	December 1989	FY90-91 through FY94-95	5
2010 (Peninsula)	April 1991	FY91-92 through FY94-95	4
2015	June 1995	FY95-96 through FY97-98	3
2018	February 1998	FY98-99 through FY00-01	3
2021	February 2001	FY01-02 through FY03-04	3

SEVA = Southeastern Virginia.

Table 9. Projects in an SYIP That Appear During LRP Active Period

Long-range Plan (LRP)	2000	2010	2015	Total
Projects in SYIP (LRP/SYIP)	105	46[a]	18	169
Appeared within active period	67	32	12	111
Percentage appearing within active period	64%	70%	67%	66%

[a]Does not include the five SYIP/LRP projects in the 2010 LRP.

MOE 4: Percentage of Projects Appearing in Previous LRP

Table 10 shows that the LRP/LRP projects make up a large proportion of the projects in the LRP except for the 2010 (and presumably earlier) LRP. For example, of the 229 projects in the 1990 LRP, 48 had been in the previous 2000 LRP; thus, the fourth MOE is computed as shown in Eq. 4.

$$\text{MOE}_4 = \frac{\text{Number of LRP/LRP projects}}{\text{Number of LRP/SYIP, SYIP/LRP, LRP/LRP, and LRP/No SYIP projects}} = \frac{48}{229} = 21\% \quad \text{[Eq. 4]}$$

Excluding the 2000 LRP for which LRP/LRP projects could not be determined, the four succeeding LRPs for 2010, 2015, 2018, and 2021 had 569 LRP/LRP projects of 934 projects that were LRP/SYIP, SYIP/LRP, LRP/No SYIP, or LRP/LRP. Thus, LRP/LRP projects constituted a substantive 61% of the total regionally significant LRP projects.

Because of the large proportion of LRP/LRP projects, reviewers asked for the number of LRPs in which a project appears. For example, Table 4 showed that the 2010 LRP contained 46 LRP/SYIP projects, 5 SYIP/LRP projects, and 130 LRP/No SYIP projects for a total of 181 non-LRP/LRP regionally significant projects. Of these 181 projects, Table 11 shows that most of them (136) appeared in an LRP only once, although 19 of them appeared in two LRPs (2010 and 2015), 9 appeared in three LRPs (2010, 2015, and 2018), 15 appeared in four LRPs (2010, 2015, 2018, and 2021), and two appeared in five LRPs (2010, 2015, 2018, 2021, and 2026).

Table 10. Proportion of Projects in an LRP That Are LRP/LRP

LRP	2010	2015	2018	2021	Average
Percentage LRP/LRP	21%	60%	93%	67%	60%[a]

[a]Average values weight each LRP equally. Weighting each project equally yields an average of 61%.

Table 11. Number of Projects That Appear in Multiple LRPs[a]

Number of LRPs in Which Project Appears	2000	2010	2015	2018	2021
1	89	136	22	13	63
2	126	19	47	6	1
3	18	9	23	0	n/a
4	40	15	9	n/a	n/a
5	26	2	n/a	n/a	n/a
Total (LRP/SYIP + SYIP/LRP + LRP/No SYIP)	299	181	101	19	64

[a]Frequencies include projects appearing in the 2026 LRP.

Considerations for Interpreting the MOEs

Once a numerical value is obtained for an MOE, determining whether the value indicates effective or ineffective planning depends heavily on the specific policy being assessed. For example, for MOE 1, the extent to which long-range planning recommendations were implemented, a high percentage is desirable, yet an ambitious LRP that proposed projects addressing most needs might be deemed effective with a percentage of 50% whereas a more

conservative LRP that recommended projects for only a few dire needs might require a much higher percentage to be deemed useful.

Alternatively, for MOE 2, the proportion of SYIP/LRP projects, for any given LRP enacted after ISTEA, federal authorizations require that a project must be in a TIP before being placed in the state's work program. Unless a project was in the amendments to an LRP, any SYIP/LRP project would reflect a case where the legal requirements were not followed. Therefore, except for any amendments, any number greater than 0% might indicate ineffective planning. Fortunately, this was not the case in this study as no SYIP/LRP projects were found in the LRPs produced after the passage of ISTEA.

MOEs 3 and 4 are more nuanced than the first two because there is not necessarily a desired percentage a perfect plan would attain. MOE 3 measures the proportion of LRP projects found in the SYIP during the LRP's active period. A proportion of about 25% might be expected (based on 5-year updates for the LRP and a 20-year horizon), but unlike with the first two MOEs, careful evaluation is required for significant deviations from this value. A high percentage might mean the LRP is doing more short-range than long-range planning, for example, whereas a low percentage might mean a large backlog of unbuilt projects is delaying the relevance of any current planning.

MOE 4 measures the proportion of LRP projects that occurred in the previous LRP—the LRP/LRP projects. One interviewee's reaction to this MOE was that given the LRP has a 20-year horizon but is updated every 5 years or so, *some* LRP/LRP projects would be expected in any given LRP (M. McCaskill, personal communication, July 19, 2006). If there were no LRP/LRP projects, this would mean that (1) the LRPs were wildly inconsistent, or (2) the LRP was not representing the financial constraints accurately, since 20 years of projects could be completed in 5. Thus, if all projects were weighted equally, all projects were being implemented, and the plan's financial constraints were realistic, a reasonable expectation for any given LRP is that MOE 4 would show about 75% LRP/LRP projects (assuming a 20-year LRP horizon and each LRP is updated every 5 years). Large deviations from that value, however, would require careful interpretation: a much higher percentage might mean that too few projects were being considered in each LRP, and a much lower percentage might mean that the LRPs were significantly inconsistent.

Another consideration is the length of the active periods. As shown in Table 8, active periods vary: the 2000 LRP, which came from two planning districts, had active periods of 7 and 12 years. The next LRP (the 2010 LRP) was composed of plans that had active periods of 4 and 5 years. The LRPs that followed had active periods of 3 years. Without any change in the effectiveness of the underlying process, an LRP with a shorter active period than previous LRPs should have a lower percentage of projects implemented during the active period (MOE 3). Further, for the LRP that follows, there should be a higher percentage of LRP/LRP projects (MOE 4) as many of these projects will carry over from the preceding LRP with the short active period.

In summary, for MOEs 1 and 2, it is a straightforward manner to agree on MOE values for a perfectly effective plan (e.g., 100% for MOE 1 and 0% for the MOE 2) or MOE values for

a completely ineffective plan. For plans between these values, however, determination of effectiveness depends on the specific policy in question.

Interpretation of Four MOEs for Hampton Roads Area

Based on MOE 1, only about one-fourth (28%) of all LRP projects have been implemented in an SYIP. This implementation trend is not improving over time: MOE 1 suggested a figure of 35% for the 2000 LRP, which dropped to a figure of 22% for the 2021 LRP. Fortunately, MOE 2 showed that when only the projects that progressed to the SYIP are considered, a vast majority—94%—had first appeared in the LRP as opposed to the SYIP. Further, MOE 3 shows that two-thirds (66%) of the projects that had progressed from the LRP to the SYIP did so while the current LRP was active.

Thus, MOEs 1, 2, and 3 suggest that planning is effective in terms of influencing which projects move to the SYIP but ineffective in terms of moving a majority of such projects to the SYIP. The minority of projects that do make it to the SYIP tend to do so sooner rather than later—making the LRP more comparable to a shorter term programming document than to a longer term vision plan. This view is supported by the observation that the number of projects shown in Table 4 is decreasing over time, suggesting, perhaps, that LRPs are less ambitious than they have been in the past. An extension of this view is that although an LRP may be effective as a list of projects, it is ineffective as a vision document.

MOE 4 calls into question the relevance of a given LRP from a slightly different perspective by testing the impact of a given LRP apart from preceding LRPs. The fact that 61% of all projects, on average, are LRP/LRP—and thus carried over from a preceding LRP—means that any given LRP generates only a comparably small number of new projects. Accordingly, the relevance of any *individual* LRP is limited by the large proportion of LRP/LRP projects carried over from previous LRPs. One interpretation is that this limitation echoes the comments of two interviewees that updating plans every 3 to 5 years seems wasteful (A. Riutort and T. Slaughter, personal communication, July 20, 2005). By extension, either plans should be updated less frequently or more progress should be made toward implementing projects. Another interpretation is that the large number of LRP/LRP projects means plans are not necessarily inconsistent with one another.

Figure 3 helps choose between these two interpretations. Figure 3 showed that no projects from the 2010 and 2015 LRPs were implemented after FY2000, even though the horizon year had not yet arrived. An inference drawn from Figure 3 alone is that either (1) LRPs have been inconsistent such that later LRPs showed there is no reason to implement the recommendations of earlier LRPs or (2) there are insufficient resources to implement the projects recommended by the earlier LRPs. The high value of MOE 4 suggests that LRPs are consistent, meaning the second interpretation is likely correct in this situation.

How do the differences in the length of the active periods shown in Table 8 affect the interpretation of MOEs 3 and 4 that the LRP is becoming more of a programming document? They appear to support the second interpretation:

- Starting with MOE 3, Table 9 showed that the percentage of projects implemented during the active period were similar for the 2000, 2010, and 2015 LRPs (64%, 70%, and 67%) despite shrinking durations of the active period (approximately 10, 5, and 3 years). Thus, underlying these comparable percentages for MOE 3 is an increasing propensity for projects to be implemented sooner rather than later.

- MOE 4 suggests that a shorter active period in one LRP should yield a larger percentage of LRP/LRP projects in the successive LRP (if the underlying process did not change). The spike in Table 10 directly supports this contention: the 2015 LRP was the first LRP to have the very short (3-year) active period, and in the 2018 LRP, the percentage of LRP/LRP projects climbed from 60% to 93%. Thus, at least some, and possibly all, of the increase is attributable to the short duration of the 2015 LRP and not attributable to a change in effectiveness between the 2015 LRP and the 2018 LRP.

Alternative Approaches for Measuring the Effectiveness of Planning for the Hampton Roads Area

The four MOEs reflect a single aspect of the definition of effective planning shown in Table 1: implementation of the recommended projects or policies. However, as noted by one reviewer of this report, it would have also been possible to develop alternative MOEs for other aspects of Table 1. It may be argued that a better evaluation of a plan's success is whether the plan's *goals* are implemented. Such an alternative MOE could refer to Table 1, Element 7 (measurable goals). For example, if the original goal of the plan was to reduce congestion, congestion levels before and after plan implementation could be compared.

Although such an alternative MOE is in our view a more accurate assessment of the plan's effectiveness than the four MOEs developed herein, there are two disadvantages that led us not to use such an alternative MOE. First, such an MOE may probably not be assessed while the current plan is under development: planners would need to wait until the plan had been implemented and then they could see whether the implemented projects were achieving the goal of reduced congestion. Second, there may be other factors outside the planning process that influence the goal—in this case, for example, a decrease in gas prices might lead to increased driving and congestion. Since the four MOEs presented here define implementation as programming a project, the test of whether a plan is implemented is conducted sooner than would be the case if the effects of the program (e.g., reduced congestion, improved air quality, etc.) had to be assessed.

For this exercise, treating implementation as moving a policy into the program appeared to be a reasonable compromise between realistically measuring implementation and doing so in a timely fashion. Although it would be most accurate to measure implementation as a function of built projects, this measurement could not take place until many years after a plan was developed. In contrast, knowledge of which projects are moving forward into the program can be determined within a smaller number of years, thereby providing some useful information to the professionals performing the long-range planning function.

CONCLUSIONS

This study asked if it is possible to define effective long-range planning and measure such effectiveness. The answer to both questions is *yes.* Five related conclusions are drawn.

1. *Effective planning may be defined in three different ways: by the elements the planning document contains, by the objectives the plan accomplishes, and by the obstacles the plan overcomes.* The results herein suggest that an effective plan has seven characteristics (a vision statement to guide regional development, a link between the regional transportation plan and the local comprehensive plan, a list of prioritized projects, an explicit statement about growth, multimodal tradeoffs, accurate information, and measurable goals). Further, such a plan should accomplish five objectives: implement recommendations, garner local government support, garner citizen support, use urban travel demand models appropriately, and present alternatives. Finally, an effective plan will have to overcome three obstacles: imperfect coordination among the state, regional, and local governing bodies; inadequate funding; and a federal requirement that regional plans be financially constrained.

2. *Although it is fairly easy to identify MOEs in the abstract, substantial effort must be expended if they are to be applied to real data.* Although the interviews from this study identified multiple MOEs within about 5 months, it took approximately twice that time to quantify just one such MOE. For example, most interviewees readily identified *implementation* as an important MOE. Defining implementation such that it could be quantified, however, required a substantial amount of time for three reasons:

    - Details of the computations had to be established such that two or more persons could obtain the same answer.

    - There was initial disagreement regarding how to categorize projects; thus, several rounds of review and re-computation of the projects were required.

    - Determination of the value for a particular MOE led to additional questions and thus alternative MOEs that were needed.

3. *Planning's effectiveness can be measured to address stakeholders' questions in terms of implementation.* The implementation MOE answered four questions for Hampton Roads:

    - what percentage of LRP projects have been implemented over 25 years (185 projects implemented, 474 not implemented, percentage of about 28%)

    - does the LRP influence the SYIP rather than the other way around (yes, given that 94% of the projects implemented appeared first in the LRP and second in the SYIP)

- what percentage of SYIP projects were implemented within the LRPs active period (about 66% for the first three LRPs studied)

- what proportion of projects have appeared in a previous LRP (about 61%).

4. *Interpretation of these MOEs is context dependent.* Taken in unison, these four MOEs suggest that long-range planning has limited effectiveness in terms of implementing most of its recommendations (only 28%) and that the effectiveness of any individual LRP is hampered by the fact that so many projects therein (61%) are repeated from previous LRPs. The good news, however, is that of the projects implemented, most (94%) followed the intended process of the LRP driving the SYIP rather than the other way around. Given that most of the projects (66%) were implemented while the current LRP was in force, it appears that the LRP is becoming a project programming document where a few projects are quickly undertaken. Finally, the aforementioned 61% of LRP/LRP projects indicates consistency from one plan to the next.

5. *Many of the recent planning successes described were tangible initiatives undertaken within a couple of years*. These successes included (1) attracting local jurisdictions to participate in an early action ozone compact (thereby reducing economic harm), (2) collaboration among a jurisdiction, PDC, and the state to redevelop an area, (3) advance acquisition of ROW for the Route 60 corridor, (4) the use of charettes (or comparable techniques) to influence a transportation program's funding as per the Denver example, (5) coordination of widening projects between two jurisdictions, (6) the use of the PDC as a forum to discuss transportation issues, and (7) project phasing for light rail. These successes were shorter-term initiatives. Poignant examples of items beyond planners' control were inadequate funding for transportation projects and a lack of incentives or ability to coordinate local jurisdiction funding within the region (owing to a lack of coordination within the jurisdiction or a lack of MPO authority).

RECOMMENDATIONS

This research was undertaken in response to a question posed by local, regional, and VDOT planners: Is it feasible to define a plan's effectiveness? To the extent that it is desirable to replicate this approach elsewhere, four recommendations are offered.

1. *Consider applying the four implementation MOEs developed herein in other regions of the Commonwealth:*

   - percentage of projects in a regional LRP that were implemented in an SYIP (or funded through some other mechanism)
   - percentage of projects appearing in an SYIP before appearing in an LRP
   - percentage of projects implemented during an SYIP's active period
   - percentage of projects in a LRP that are repeated from a previous LRP.

Although this recommendation may be implemented by VDOT central office staff, VDOT district staff, PDC staff, or locality staff, a policy decision as to whether it justifies the effort is probably needed from VDOT leadership. This report did not examine projects funded from sources other than the SYIP, such as Public-Private Transportation Act (PPTA) projects. Such projects may become more common than they were during the study period (1979-2004) and thus may merit consideration in such an effort.

2. *If Recommendation 1 is supported, identify ways to simplify the linkage between projects identified in an LRP and projects identified in the SYIP*. There may be ways to automate the manual process undertaken in this case study, and such automation could greatly ease the workload of persons charged with implementing Recommendation 1. Recommendation 2 should be implemented by the Virginia Transportation Research Council or some other entity designated by VDOT's Transportation Mobility Planning Division.

3. *If the characteristics identified in Table 2 are supported by district planners, adopt the table as a guideline for designing effective LRPs*. The increased involvement of VDOT district planners in regional planning initiatives means that VDOT is spending additional resources on planning. Although planning is not identical with creating a plan, having a set of ideals for what a LRP should accomplish may help district and local planners coordinate efforts.

4. *Consider the short steps interviewees suggested for improving the planning process, some of which are as follows:*

    - Break long-range projects into smaller phases where improvements can be observed as each phase is completed.

    - Consider the use of alternative public participation methods such as focus groups, charettes, and market research (although concerns regarding a statistically representative sample are still relevant).

    - Despite the requirement that transportation plans be financially constrained, include a complete picture of transportation needs in LRPs. One reviewer noted that such a list could identify potential PPTA projects. Such a "complete picture" could also ensure that, for example, LRPs contain a visionary component despite the observation made here that some may be becoming programming documents.

    - Work with localities on specific issues: although the phrase is trite, the examples of Wyndhurst, Campostella Road, and the early action ozone compact are not.

    - Explain, or continue to explain, how the state, regional, and local planning processes relate and influence project selection. The literature cited herein does show such linkages. Comments herein in reference to the roles of (1) the state

highway needs assessment, (2) regional travel demand models, and (3) MPO recommendations suggest that additional clarification may be of value.

COSTS AND BENEFITS ASSESSMENT

VDOT district, local, and regional planners are better suited than the investigators to judge the benefits and risks of Recommendations 3 and 4. The primary benefit/cost tradeoff that needs to be made is with Recommendations 1 and 2.

The benefit of Recommendations 1 and 2 is that they enable VDOT, a PDC, or a locality to have a running tally of the extent to which an LRP has been implemented. These data may be useful for encouraging stakeholders to participate in the planning process, as such persons could be provided with tangible evidence of what the plan has accomplished.

There is, however, a substantial risk with Recommendation 1. It could lead to undue emphasis on attaining a particular number for an MOE. In the extreme, for example, a likely-to-be-successful project could be broken into separate projects to increase the implementation score. Similarly, a high implementation MOE might be pursued at the expense of the other aspects of long-range planning that interviewees deemed critical and as shown in Table 2. Even well-intentioned efforts to attain a good MOE score might have unintended consequences; e.g., too much emphasis on having a high percentage of LRP/SYIP projects might lead to a general tendency to make plans less ambitious in terms of their recommendations than they ought to be.

In this context, the comment from one interviewee regarding the health of debate seems appropriate here. The interviewee noted that disagreement among jurisdictions in a region's plan was a good sign, because it showed they were taking the planning effort seriously. Extending that comment to the MOEs, it would be good to use them if they could encourage high-quality debate among planners about how to make good recommendations implementable but not if the MOEs will force planners to identify only "safe" projects. For that reason, the investigators have refrained from judging the scores obtained for the four MOEs as good, average, or poor but rather used them as diagnostic tools—looking at areas where planning is doing well (e.g., the small number of SYIP/LRP projects) and identifying areas that may be targeted for improvement.

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APPENDIX

CASE STUDY CAVEATS

Conceptually the case study was a simple comparison between LRPs and SYIPs. In practice, however, seven steps were necessary to complete the case study: (1) recognize exceptions to the rule for categorizing SYIP/LRP projects, (2) remove regionally insignificant projects, (3) define the protocol for studying the earliest LRP available for this study, (4) define the LRP's active period, (5) use local expertise, (6) track the original LRP and SYIP year for each project, and (7) recognize that judgment is exercised when defining projects.

Recognize Exceptions to the Rule for Categorizing SYIP/LRP Projects

SYIP/LRP projects were defined as those that first appeared in an SYIP and then appeared in an LRP. This could occur under either of two scenarios: the project was added to the current LRP through an MPO-approved amendment (which is in accordance with federal guidance) or there was simply an error in the programming process (which is not in accordance with federal guidance). Under either scenario, the project is clearly not being driven by the long-range planning process, but the latter scenario is more serious that the first.

There is, however, one exception: a project was counted as an LRP/SYIP project, rather than an SYIP/LRP project, if it did not receive construction funds until after the LRP was published. This is indicated by any of the following conditions: (1) even though the project is shown in an SYIP, it does not receive funds for construction until the fiscal year after the LRP is published, (2) the SYIP indicates only that a feasibility study is being undertaken, (3) the project receives PE and ROW funds only, (4) the project is the same as or similar to a project from an earlier LRP even though the name has changed.

Remove Regionally Insignificant Projects

The tables in the report do not include projects that are not regionally significant. For the purposes of this study, regionally significant projects are those that result in additional lane-miles being added to the transportation system. This definition precludes projects that only improve network connectivity, such as adding turn lanes or widening ramps, and it does not include projects that improve the transportation system without making a physical capacity expansion (e.g., improvements to a smart travel center, bridge rehabilitation, addition of curb and gutter on the secondary system, installation of sound barriers, environmental impact studies, or upgrades to communications systems).

The criteria for determining whether a project is regionally significant may vary by state and by metropolitan area within a state (FHWA, 2006). A general definition of regional significance within the context of conformity analysis is available.

> Regionally significant project means transportation project (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area

> outside of the region, major activity centers in the region, major planned developments such as new retail malls, sports complexes, etc., or transportation terminals as well as most terminals themselves) and would normally be included in the modeling of a metropolitan area's transportation network, including, at a minimum, all principal arterial highways and all fixed guideway transit facilities that offer an alternative to regional highway travel (FHWA, 2006).

As discussed in the next item, the use of local expertise was critical for many aspects of this study, including defining which projects were regionally significant.

Define the Protocol for Studying the Earliest Available LRP

The first example merits explanation, because its interpretation is affected by three limitations of this study: (1) the earliest plan was a map (and thus did not list specific projects), (2) the SYIP that preceded the publication of this plan was not obtained, and (3) the LRP that preceded the first LRP used in this study was not available.

- The first LRP used in this study was the *Peninsula Area Year 2000 Major Thoroughfare Plan*, which was adopted April 30, 1979, with the Transportation Systems Management (TSM) element adopted October 8, 1979. Specific projects could not be readily identified in the plan, which was essentially a fold-out map. To identify specific projects, the *Peninsula Area Transportation Study: Year 2000 Plan Technical Report*, published in October 1983, was used. It is expected that these two documents have identical project lists except for one known discrepancy: widening Mercury Boulevard to six lanes between the City of Hampton and Warwick Boulevard (R. B. Case, personal communication, April 20, 2006).

- Assuming the TSM element is not critical in the *Peninsula Area Year 2000 Major Thoroughfare Plan*, it would be necessary to examine the FY78-79 SYIP to see if projects therein preceded the LRP of October 1979. These would be potentially SYIP/LRP projects. However, the earliest SYIP used in this study was FY83-84.

- Even if potentially SYIP/LRP projects were identified, the 1995 LRP would still have to be examined to ensure that it was not the case that the projects had been included in the 1995 LRP but omitted from subsequent LRPs because they were being implemented in the FY78-79 SYIP.

Although these considerations prevent a determination of the exact number of SYIP/LRP projects, a probable upper bound may be estimated. From the *Peninsula Area Transportation Study: Year 2000 Plan Technical Report* there are 16 projects that appear in the FY83-84 SYIP. Thus, the extreme case scenario is that all 16 projects could have appeared in the FY78-79 SYIP but not in the preceding LRP and thus would be classified as SYIP/LRP projects. This extreme scenario appears highly unlikely as this study has shown that in the four successive LRPs, the number of SYIP/LRP projects was about 6%, based on 5 SYIP/LRP projects of 85 found in the SYIP. The 16 is described as a “probable” upper bound because it is possible that some of the LRP/No SYIP projects were completed and built prior to the 1983-1984 SYIP as well, although this possibility also appears unlikely on a large scale.

Define the LRP's Active Period

Determination of the effective dates for each LRP (given in Tables 3 and 8) required some judgment, where in this case local expertise was sought. Before the passage of ISTEA, the critical date for each plan to take effect was the date it was approved by the MPO. After the passage of ISTEA, the most important date became the date was approved for air quality conformity by FHWA (R. B. Case, personal communication, May 1, 2006).

Use Local Expertise

The process of completing the five steps in the case study methodology was highly iterative, largely because an expert from the case study area was available to verify (and make corrections to) the projects that were categorized as SYIP/LRP versus LRP/SYIP. To an extent, the research team could categorize projects based solely on the information documented in the LRPs and SYIPs. However, for approximately three dozen projects, the assistance of a planner with extensive knowledge of the area's geography and planning processes was critical. This planner was able to make corrections to the initial project categorizations for at least three reasons. First, especially when reviewing a map, it was possible to overlook a specific project on an LRP and thus erroneously believe a project was an SYIP/LRP rather than an LRP/SYIP project. Second, as noted previously, the definition of regional significance can vary between geographical areas; thus, clarification of which projects are regionally significant was necessary from this planner. Third, also as noted previously, assistance was needed to determine the dates some of the LRPs took effect given the relevance of conformity analysis (following ISTEA) and given some of the different dates that planning documents with the same horizon year were published (e.g., the 2000 Plan was published in 1979, but the technical documentation for the plan was published in 1983). Although it is still quite possible that there are specific projects that could be categorized differently (e.g., as noted in Table 4, there was a project categorized as an LRP/No SYIP project simply because it could not be found in an SYIP even though it is known to have been constructed), the use of local expertise helped reduce these types of errors.

Track the Original LRP and SYIP Year for Each Project

It is critical that the *original LRP* year and *original SYIP* year be documented for each project. For tracking SYIP projects, it is important to record the project number and not just the location, as the location may change but the project number usually remains constant.

Recognize That Judgment Is Exercised When Defining Projects

Tables 4 through 11 are based on the number of projects in each LRP and SYIP. As with any planning data set that uses number of projects, some judgment calls had to be made when classifying improvements. For example, the 2000 SEVA Plan indicated four segments along Lynnhaven Parkway to be improved: three were built, and one was not. In this analysis, these were considered four projects (3 LRP/No SYIP and 1 LRP/SYIP). It could be argued, however, that they should be

described as two projects (1 LRP/SYIP built segment and 1 unbuilt LRP/No SYIP segment) or even 1 project (simply construct and improve Lynnhaven Parkway). These considerations did not affect the categorizations of SYIP/LRP and LRP/SYIP projects, but they can affect how the projects in the LRP/LRP, LRP/No SYIP, or LRP/SYIP categories are tallied (shown in Table 1) by about 15%.

Reference

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