

May 1999

An Overview

LAND USE AND ECONOMIC DEVELOPMENT IN STATEWIDE TRANSPORTATION PLANNING



U.S. Department of Transportation
Federal Highway Administration

AN OVERVIEW

LAND USE AND ECONOMIC DEVELOPMENT IN STATEWIDE TRANSPORTATION PLANNING

Prepared for
FEDERAL HIGHWAY ADMINISTRATION

Prepared by
Center for Urban Transportation Studies
University of Wisconsin-Milwaukee

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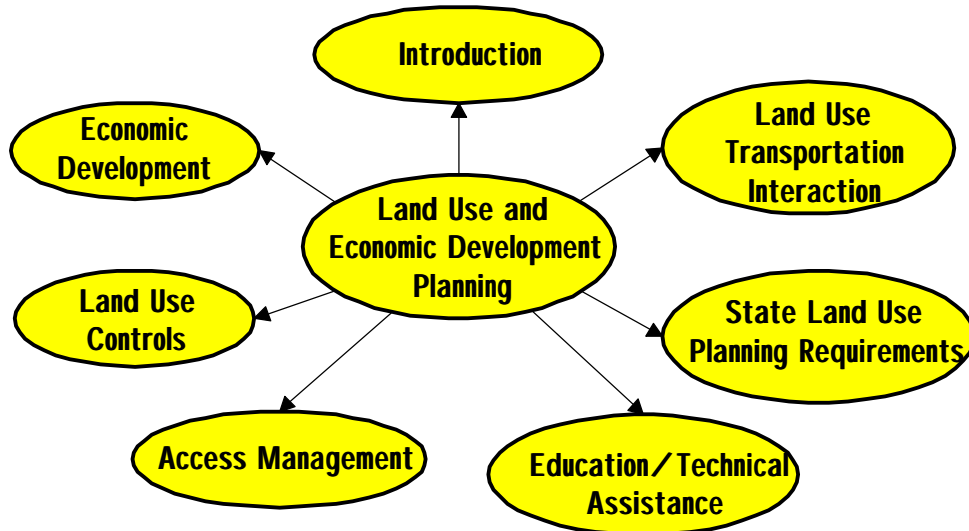
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This report adapted many descriptions of states' activities from their original sources. When the descriptions were taken verbatim, the text appears in italics. Otherwise, sources are cited by footnotes.

Introduction



This report provides an overview of land use activities of state departments of transportation. Such activities occur in various states and along a continuum ranging from passive to active in six major categories: land use/transportation planning; state land use planning capabilities; education/technical assistance; access management; land use controls; and economic development. This report addresses each of these categories in detail.

The report discusses how states incorporate land use issues into their statewide transportation planning and policy efforts. Also examined are the direct role the state DOTs have in land use and their role in the local and regional land use decision-making.

Chapter 2 is an overview of the interaction between land use, transportation and economic development. This chapter identifies major land use concerns and emerging approaches to economic development. In addition, this chapter presents a chart to graphically illustrate how state actions range from passive to very active. The intensity of activity is illustrated with examples from a hypothetical state.

Chapter 3 focuses on states' planning activities. These activities are subdivided into four major topics along the passive to active continuum: state funded regional and local planning, state mandated local planning, state approved land use planning and state planning of land use. It also describes a variety of state land use planning technical capabilities: data collection for the local government;

GIS assistance; research; economic forecasting; state land use models; and basic research. Land use models for statewide planning are also described in this chapter.

Chapter 4 deals with states' educational and technical assistance activities, including reaction to local requests to state guidelines, oversight committees, conferences, training sessions, newsletters, hotline/webpage, public education, one-to-one assistance and circuit riders.

Chapter 5 concerns access management. This chapter is divided into four major subsections, which range from passive to active: driveway permit guidelines; comprehensive access management; access regulation; and limits on capacity expansion. Access management programs in several states are described.

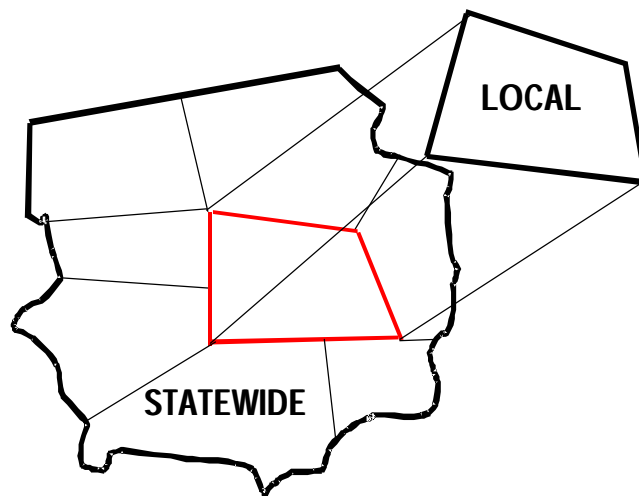
Chapter 6 explains the range of land use control programs for state DOTs. Topics included in this chapter are: environmental impact statements; project level control of environmental impacts; general controls in environmentally sensitive areas; smart growth; scenic easements; agricultural and open space preservation; growth management; development of regional impact control; and state land use control. This chapter describes land use programs implemented by the states of Maryland, Florida, Oregon, New Jersey and Wisconsin in the forms of smart growth, growth management programs, and control of developments of regional impact.

Chapter 7 deals with economic development activities of state DOTs. These activities can be in the form of special project designs to assist local businesses, state infrastructure banks (such as those piloted by Florida and Ohio), basic employment development funding programs (like the RISE and TEA programs in Iowa and Wisconsin, respectively), and industrial roads and road grant programs (in the states of New York and Mississippi).

While writing this report the authors attempted to contact all state DOTs to determine what each is doing regarding land use and economic development. This report is a compilation of much of the information found, but it is not intended to be exhaustive. Furthermore, the role of the state DOTs in land use and economic development is continuously evolving. This report is intended to discuss the range of activities rather than all possible activities.

Local versus Statewide Roles in Land Use Decisions

In most states land use decisions are made locally by governmental review boards and elected officials. State DOTs typically defer to local governments on land use issues. However, DOTs may have review authority when the development involves access to a state highway or causes traffic impacts on a state highway. By providing transportation facilities and services – whether it is through building highways, providing grants for local



transportation improvements, or providing assistance to transit services – a state DOT affects land use patterns in many different ways. Similarly, all development and land use decisions will ultimately affect travel patterns and, thus, influence the decisions made by state transportation officials regarding project planning and programming. Transportation is irrevocably tied to land use and land development.

Even in states where the DOT feels it has no role in land use decisions, its staff members may still find themselves heavily involved in land use concerns. These involvements occur through the environmental review process, by issuing permits and by deciding where, when and how to expand highway capacity.

Many other state agencies and local interest groups take prominent roles in decisions that directly or indirectly affect land use. Increasingly, coordinated efforts are being made by states to integrate programs and policies, serving to promote transportation options that can minimize harm to the environment, preserve sensitive lands and encourage economic development. The state DOT is only one of many agencies taking part in these coordinated efforts. The level of support garnered from various state agencies and groups in working together on transportation and land use topics depends largely upon the individual state's political climate, history and local issues. Hot issues in one area of the country or in a particular state may not be salient in others. A wide variety of factors must be taken into account when comparing various state DOT actions.

Legislative Framework

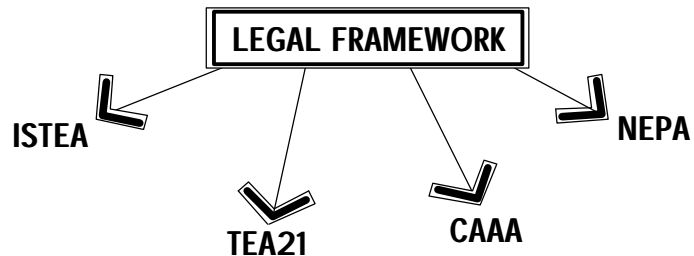
There is an increasing awareness of the value of land as a resource (similar to air or water) and the need to protect this resource from pollution and misuse. A number of regulations have been implemented by federal and state governments

to protect land. This section provides a brief overview of the legal framework that regulates statewide transportation planning and policy implementation.¹

Applicable Federal Legislation

ISTEA

In 1991, Congress passed the Intermodal Surface Transportation Efficiency Act (ISTEA), which required all state DOTs to develop state transportation plans. This plan was meant to identify statewide growth patterns and the need for transportation improvements in the long term (ten to twenty years). ISTEA provided a framework to incorporate broad and open-ended requirements, including land use and transportation planning practices, in each state's adopted transportation plan. ISTEA also provided a list of 23 factors that should be considered in the development of a statewide transportation plan.



Several of these factors relate directly to land use. The transportation plan must specifically address the interaction between transportation and economic development statewide, as well as the link between transportation and land use and land development. The state transportation plan can, through extensive public involvement efforts, develop action steps to successfully implement transportation objectives seeking to improve the positive link between transportation, land development and economic development.

The following is a list of the ISTEA statewide planning factors. Particular attention should be paid to factor number 14.

Each State shall, at a minimum, explicitly consider, analyze as appropriate and reflect in planning process products the following factors in conducting its continuing statewide transportation planning process:

- 1. The transportation needs (strategies and other results) identified through the management systems required by 23 U.S.C. 303;*
- 2. Any Federal, State, or local energy goals, objectives, programs or requirements.*
- 3. Strategies for incorporating bicycle transportation facilities and pedestrian walkways in projects where appropriate throughout the State;*

¹ Environmental Impact Analysis Handbook. Ed. By John G. Rau and David C. Wooten, University of California at Irvine, Copyright McGraw-Hill, Inc. 1980. p. 1-2.

4. *International border crossings and access to ports, airports, intermodal transportation facilities, major freight distribution routes, national parks, recreation and scenic areas, monuments and historic sites, and military installations;*
5. *The transportation needs of nonmetropolitan areas (areas outside of MPO planning boundaries) through a process that includes consultation with local elected officials with jurisdiction over transportation;*
6. *Any metropolitan area plan developed pursuant to 23 U.S.C. 134 and section 8 of the Federal Transit Act, 49 U.S.C. app. 1607;*
7. *Connectivity between metropolitan areas within the State and with any metropolitan planning areas in other States;*
8. *Recreational travel and tourism;*
9. *Any State plan developed pursuant to the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq (and in addition to plans pursuant to the Coastal Zone Management Act);*
10. *Transportation system management and investment strategies designed to make the most efficient use of existing transportation facilities (including consideration of all transportation modes).*
11. *The overall social, economic, energy, and environmental effects of transportation decisions (including housing and community development effects and effects on the human, natural and manmade environments);*
12. *Methods to reduce traffic congestion and to prevent traffic congestion from developing in areas where it does not yet occur, including methods which reduce motor vehicle travel, particularly single-occupant motor vehicle travel;*
13. *Methods to expand and enhance appropriate transit services and to increase the use of such services (including commuter rail);*
14. *The effect of transportation decisions on land use and land development, including the need for consistency between transportation decision making and the provisions of all applicable short-range and long-range land use and development plans (analysis should include projections of economic, demographic, environmental protection, growth management and land use activities consistent with development goals and transportation demand projections.*
15. *Strategies for identifying and implementing transportation enhancements where appropriate throughout the State;*
16. *Where appropriate, the use of innovative mechanisms for financing projects, including value capture pricing, tolls, and congestion pricing;*
17. *Preservation of rights-of-way for construction of future transportation projects, including identification of unused rights-of-way which may be needed for future transportation corridors, and identification of those corridors for which action is most needed to prevent destruction or loss (including strategies for preventing loss of rights-of-way);*
18. *Long-range needs of the State transportation system for movement of persons and goods;*
19. *Methods to enhance the efficient movement of commercial motor vehicles.*

20. *The use of life-cycle costs in the design and engineering of bridges, tunnels or pavements;*
21. *The coordination of transportation plans and programs developed for metropolitan planning areas under 23 U.S.C. 134 and section 8 of the Federal Transit Act with statewide plans and programs developed under this subpart, and the reconciliation of such plans and programs as necessary to ensure connectivity within transportation systems;*
22. *Investment strategies to improve adjoining state and local roads that support rural economic growth and tourism development, Federal Agency renewable resources management, and multipurpose land management practices, including recreation development; and*
23. *The concerns of Indian tribal governments having jurisdiction over lands within the boundaries of the State.*¹

ISTEA also explains how the factors should be interpreted: *“The degree of consideration and analysis of the factors should be based on the scale and complexity of many issues, including transportation problems, land use, employment, economic development, environmental and housing and community development objectives, the extent of overlap between factors and other circumstances statewide or in subareas within the State.”*²

TEA 21

The Transportation Equity Act for the 21st Century (TEA 21) simplifies the list of planning factors into seven general considerations. Land use is not specifically mentioned, but is inherent in many of the factors, especially factor (d). These factors are given in Sec 1204 of the act.

Each State shall carry out a transportation planning process that provides for consideration of projects and strategies that will:

- (a) Support the economic vitality of the United States, the States, and metropolitan areas, especially by enabling global competitiveness, productivity, and efficiency;*
- (b) Increase the safety and security of the transportation system for motorized and non-motorized users;*
- (c) Increase the accessibility and mobility options available to people and for freight;*
- (d) Protect and enhance the environment, promote energy conservation, and improve quality of life;*
- (e) Enhance the integration and connectivity of the transportation system, across and between modes throughout the State for people and freight;*
- (f) Promote efficient system management and operation; and*

¹ Rules and Regulations, Federal Register; Vol. 58, No. 207; Thursday, October 28, 1993.

² 23 Code of Federal Regulations, Chapter 1, sec 450.206, (4-1-98 edition), p. 100-101.

(g) Emphasize the preservation of the existing transportation system.”¹

Clean Air Act Amendments (CAAA)

The Clean Air Act Amendments (CAAA) of 1990 require states and localities to integrate their transportation and clean air planning processes. Transportation legislation such as ISTEA and TEA 21 reinforce these requirements. The Clean Air Act establishes standards for air quality. In order to achieve these standards, transportation officials must participate in comprehensive and coordinated air quality planning in much the same way as land use and transportation planning must be coordinated. Conformity requirements under these laws address concerns arising from new transportation projects, which may increase vehicle travel and jeopardize the progress made in reducing emissions. Air quality issues may be viewed in light of comprehensive land use and transportation planning, as well. Transportation policies relating to economic development and urban growth have a strong indirect influence on air quality concerns.²

NEPA-National Environmental Policy Act, 1969

The National Environmental Policy Act (NEPA) of 1969 instructs all federal agencies to use a systematic, interdisciplinary approach during the various planning stages for any project that is likely to have a significant impact on the environment. The most important objective of NEPA is to direct agencies to assess any possible adverse environmental effects, alternatives to the proposed action, local short-term uses of the man’s environment, the maintenance and enhancement of long-term productivity and any irreversible and irretrievable commitments of resources. Evaluation efforts are documented in an environmental impact statement (EIS) or possibly in an environmental assessment (EA), which constitutes a less involved effort.

NEPA created the Council on Environmental Quality to set policies for and administer the environmental impact assessment process. Much of the environmental impact assessment process is defined by the CEQ Regulations, found in the Code of Federal Regulations (CFR) part 1500.

Because many state transportation projects involve federal funds, state DOTs actively participate in the NEPA process. NEPA involves the state departments of transportation directly in land use issues as many land use effects are considered to be significant impacts. Particularly, highways use land directly and change the pattern of accessibility to land.

The Environmental Impact Analysis Handbook defines environmental impact as, *“an environmental impact is any alteration of environmental conditions or creation of a new set of environmental conditions, adverse or beneficial, caused or*

¹ Transportation Equity Act for the 21st Century (TEA 21), section 1204 as downloaded from: <http://www.fhwa.dot.gov/tea21/h2400.htm>

² Clean Air Act Amendments of 1990, Strategic Planning, Chapter 12. Urban Transportation Planning in the United States, A Historical Overview. Revised Edition, November 1992.

*induced by the action or set of actions under consideration.*¹ The extent of the impact is determined by the extent of the project and the environment likely to be affected, such as land, air or water. Environmental impacts can either be primary or secondary. Primary impacts are the direct impacts of a new or proposed project. Secondary impacts, on the other hand, occur as a result of other events that derive from the project. For example, land development that follows a highway project may have adverse impacts on natural areas, even though the highway itself avoids those areas. The secondary impacts can be more significant than the primary impacts and are often more difficult to measure.

Other Federal Statutes Related to Environmental Protection

In addition to general requirements of environmental impact statements, there is a large body of legislation and regulations that deal with related issues and their land use consequences. Some of the relevant federal statutes in this context are the Archeological and Historic Preservation Act of 1980, the Endangered Species Act of 1973, the Federal Highway Administration Wetland Policy of 1977, the Floodplain Management Program and the Rustic Roads Act. Appendix A provides a list of other federal statutes pertaining to environmental protection and land use.

Federal Requirements

Transportation Plans and Improvement Programs

Transportation Planning Regulations issued by FHWA and FTA require that all regions consider effects of transportation investments on land use and economic development. In addition these regulations require that metropolitan transportation plans and transportation improvement programs (TIPs) be consistent with state transportation planning objectives and products (statewide plans and state transportation improvement programs, or STIPs).

Better integration of state and local land use and transportation planning has been the subject of many debates across the US in response to federal requirements. By improving cooperation and information sharing, transportation planning can result in better information for decision-makers when considering where to make transportation investments and their effects on land use and economic development.

Transportation Planning Regulations

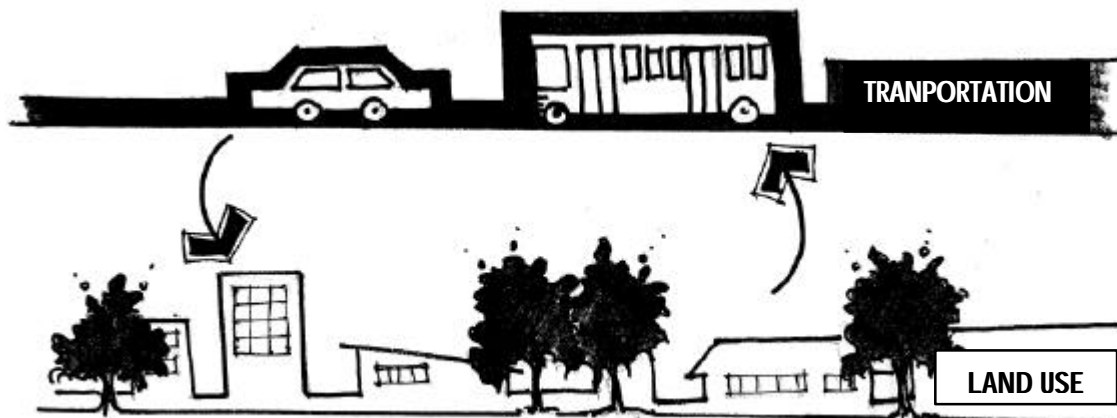
Transportation Planning Regulations also require analysis of land use impacts of transportation investment decisions at the project level. These regulations represent the most far-reaching call for coordinated land use and transportation planning. However, no specification is given as to how to analyze land use impacts of transportation investments or how land use characteristics or

¹ John G. Rau and David C. Wooten, *op. cit.*, p. 1-26.

development policies should be integrated into the transportation planning process.

State agencies may find themselves taking leading roles in developing coordinated programs and in bringing people together to ensure that transportation decisions consider the effects on land use and economic development. Some examples can be seen in the case studies given in this report.

Land Use – Transportation Interaction



Overview of Transportation and Land Use Interactions

The connection between transportation and land use is a fundamental concept in transportation. Transportation and land use are inexorably connected. Everything that happens to land use has transportation implications and every transportation action affects land use. State departments of transportation help shape land use by providing infrastructure to improve accessibility and mobility. Accessibility can be measured by the number of travel opportunities or destinations within a particular travel radius, measured in terms of either travel time or distance. On the other hand, mobility is a measure of the ability to move efficiently between origins and these destinations. Thus, mobility is directly influenced by the layout of the transportation network and the level of service it offers. Land development generates travel, and travel generates the need for new facilities, which in turn increases accessibility and attracts further development. The question of whether transportation influences development or whether land use dictates transportation has been a matter of ongoing concern among transportation professionals.¹

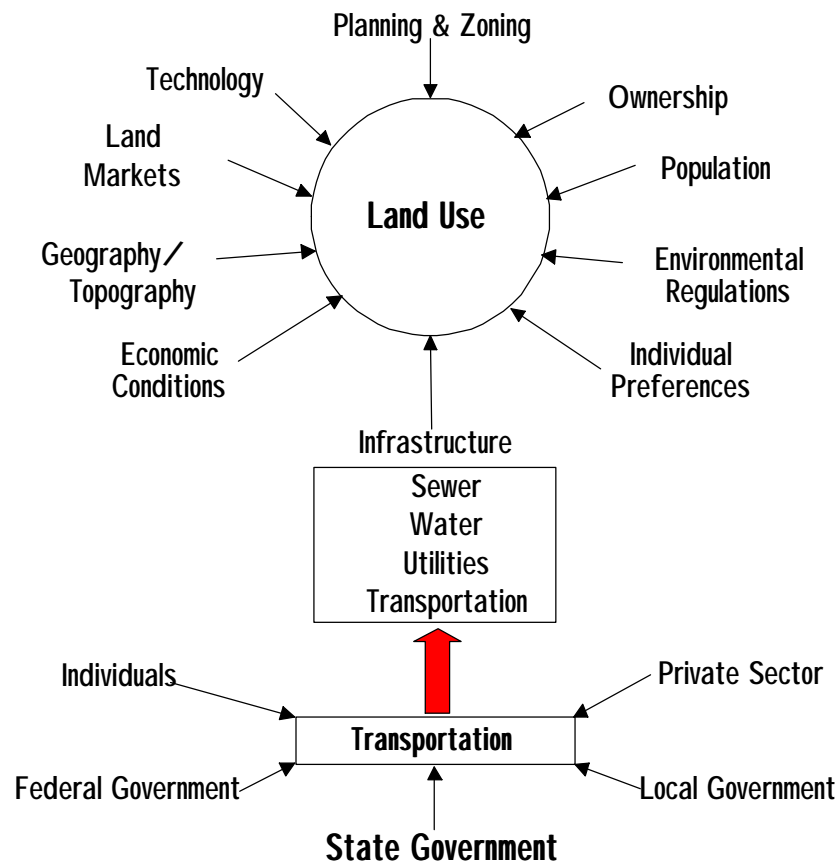
The state DOT is just one of the many forces influencing both transportation and land use. Other forces influencing land use and transportation are described later in this chapter. Also described is the role of state DOTs in controlling the effects of transportation on land development through planning, transportation-related regulations, access management and other programs.

¹ Adapted from Hanson, Susan. *The Geography of Urban Transportation*, Second Edition.

Effects of Transportation on Land Development

State DOTs influence land development through providing infrastructure and, to a lesser extent, through transportation-related regulations. These influences are seldom part of a project's goal and are usually not intentional. State transportation projects are normally planned to improve safety, decrease travel time by alleviating congestion, and achieve other mobility-related goals. Transportation's most significant impact on land development occurs when access is provided to land. Increased access to land raises its potential for development, and more development generates additional travel. Once access has been provided, land patterns begin to change over a period of time. The results of these changes are, for the most part, irreversible.

Transportation's Role in Land Use



[Source for Figure: Indirect and Cumulative Effects Analysis for Project Induced Land Development WisDOT 1996]

The above figure illustrates the factors in the land development process. Transportation systems, themselves influenced by a variety of public and private

factors, can lead to large changes in land development patterns. However, many other factors also influence land use. These include overall population and economic growth, individual preferences and life style choices, other infrastructure, changing technology, local planning and zoning polices and geographic and topographic conditions. For this reason, state DOTs are often only one of many agencies that develop programs to coordinate transportation and land use decisions.²

Emerging Land Use Concerns

Recently, concerns about urban sprawl have arisen in many areas of the nation. Many diverse groups have common concerns about the role transportation plays in exacerbating or combating the problems associated with urban sprawl, suburban congestion, and jobs/housing mismatches. Some people have argued that efforts to expand the highway system contribute to urban sprawl by decreasing travel times from urban to exurban/rural areas and making undeveloped areas attractive for residential and commercial uses. Highway facilities, some time after construction, have experienced driving times that often exceed the predicted driving times, suggesting that new or expanded facilities may be unable to solve long-term congestion problems.³

Several factors can be identified as contributing to sprawl, including the movement of jobs to suburbs, lower transportation costs versus lower housing costs, preference of many people to live in remote areas away from the problems of the city, and the desire for larger lots. This section provides an overview of some of these factors.

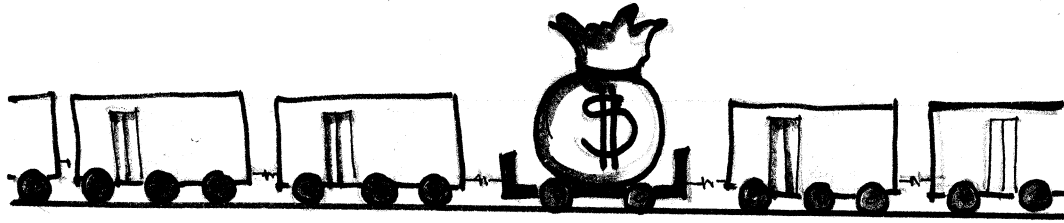
Of recent concern are labor shortages created by jobs/housing mismatches. Housing markets in the suburbs have excluded many skilled laborers who would traditionally be employed by the industries and commercial enterprises that develop in these areas. A combination of transportation and land use measures is needed to address this problem.

The concern about sprawl and transportation has led to a new debate in many states and communities about the relationship between transportation and urban sprawl. In some cases, local and statewide efforts are now beginning to take effect to limit sprawl in some of the nation's fastest growing urban areas. The new debate invariably involves state DOTs, whose role in land use decision making continues to evolve.

² Adapted from Indirect and Cumulative Effects Analysis for Project Induced Land Development; Technical Reference Guidance Document. Wisconsin Department of Transportation 1996.

³ Adapted from Guiliano, Genevieve. The Weakening Transportation Land Use Connection. Access. No. 6, Spring 1995, pp. 3-11.

Transportation and Economic Development

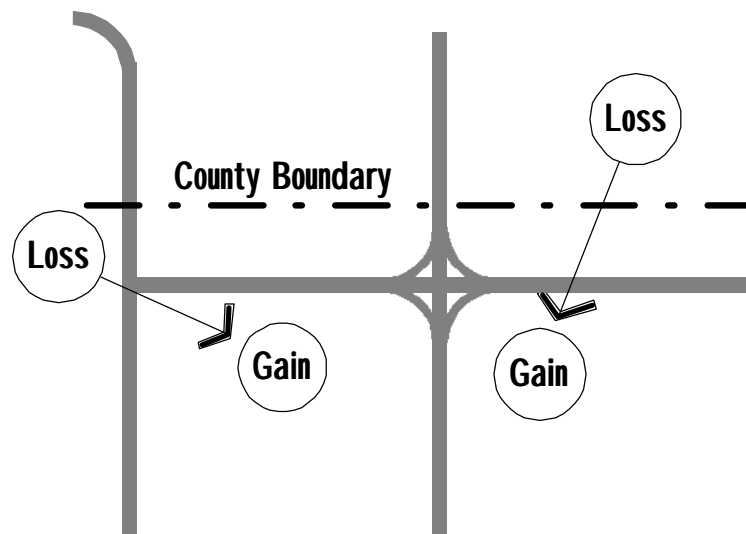


Transportation investment can be an important factor in influencing economic growth. Highway facilities can attract economic growth by increasing access to new areas, which in turn may provide access to skilled labor markets and inexpensive land for new businesses. Many state DOTs have recognized and addressed the interaction between transportation and economic development. This section summarizes the basic concepts that can be used to analyze the economic development impact of new highways.

Transportation is only one of many factors that affect economic development. It is clear that actions taken by local or state transportation agencies affect economic activity in a variety of ways. As transportation systems change, increased accessibility to new areas will make them attractive for development. Although most state statutes delegate economic development planning to local municipal or county governmental bodies, there are a variety of ways for a state DOT to influence the decisions made locally.

Impact or Transfer?

Land and economic impacts of transportation must be understood in their geographic context. The increased access to land provided by new or upgraded transportation facilities can either induce new development or change existing development patterns.⁴ The extent of the impact depends upon the geographic scope of the analysis. A small impact



⁴ Indirect and Cumulative Effects Analysis for Project Induced Land Development; Technical Reference Guidance Document. Wisconsin Department of Transportation, 1996.

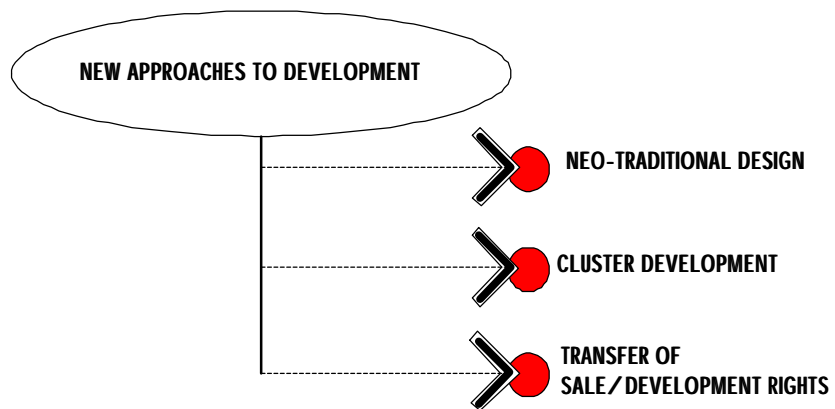
area can show an increase in economic activity, but when a larger area is defined the impact will appear as a shift in development within the region or local jurisdiction. The gains to one location are matched by losses at another location. For example, in the drawing above the shift of activity across the county line would be viewed as either a positive impact or a transfer, depending upon how the area boundaries are chosen. A new highway interchange can cause development patterns to shift from one area to another. This shift causes a localized gain for one county with a loss to the other. However, the net result is zero. These are called “transfer effects.” Economic benefits resulting from roadway improvements or initial construction vary depending on the viewpoint of the analyst. Benefits observed at the local level or surrounding the highway interchange may not be realized when observed at a statewide level.

If the regional economy is growing, transportation improvements are likely to have a big effect on land development patterns. If the economy is stagnant, transportation system improvements are less likely to induce new land development, but rather cause it to shift from one location to another. When considering the potential impact of transportation projects it is important to recognize that there are many other factors, locally, regionally and nationally, that influence where land development occurs.⁵

Investment in highway infrastructure has typically been looked at as a means of supporting economic development. Studies have shown that while highway investments result in cost savings to travelers by providing easier access to outlying areas, the local economic development benefits may be derived from a shift of activity to an area of increased accessibility from a region of lesser accessibility. Therefore, highway investment decisions that have a goal of economic development, should not be made based on transfer effects, that is, when there is no net gain in economic activity when looked at on a regional or statewide or national scale.

New Approaches to Development

New approaches to development that emphasize transit, bicycles and pedestrian oriented designs are being considered in many communities. These new approaches can have a major effect on polices from state

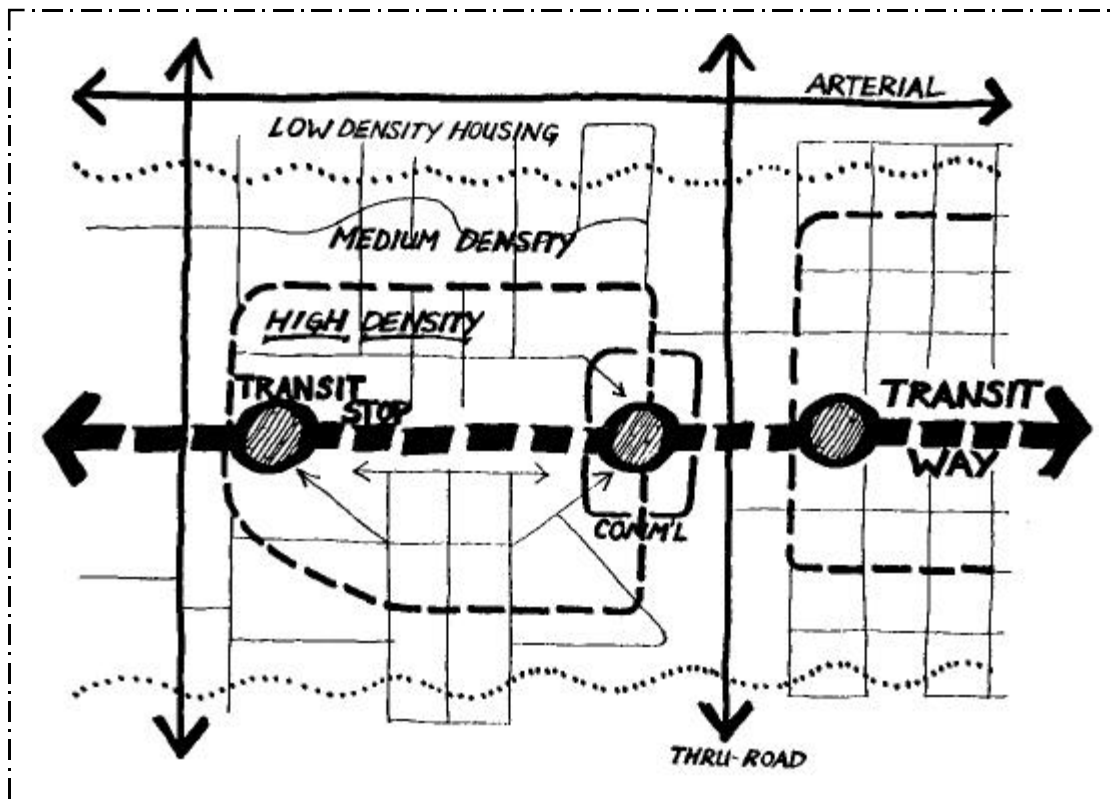


⁵ Forkenbrock, David, and Norman Foster. Highways and Business Location Decisions. Economic Development Quarterly. August 1996.

DOTs, as they can change the way in which transportation and land use interact. Some of the concepts discussed here are neo-traditional design, cluster development and transfer or sale of development rights.

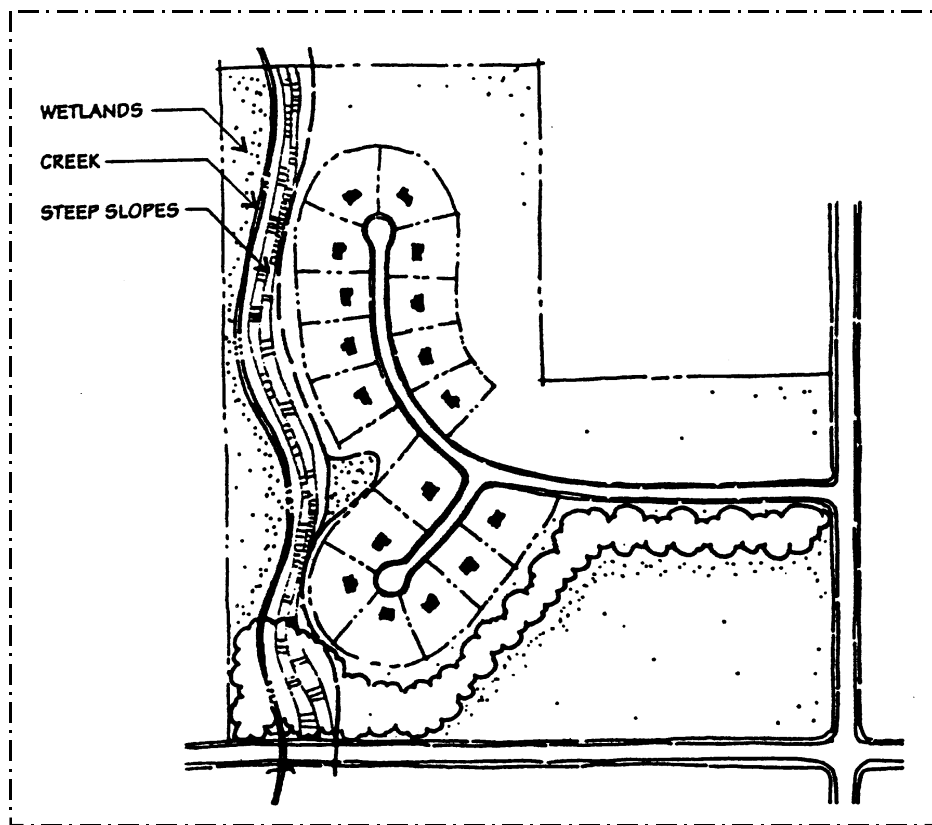
Neo-Traditional Design

“Neo-traditional design”, “new urbanism”, “transit sensitive design”, “pedestrian pods” and “transit oriented development” are terms used to describe a different approach to neighborhood development. Such projects are emerging across the United States showing how transportation systems can effectively be integrated with neighborhood design principles. The goal of these concepts is to reduce automobile dependency and automobile dominance. The principles are not necessarily anti-automobile, but pro-transit, pro-pedestrian and pro-bicycle travel. In these designs land use is arranged to facilitate success of transit services and promote places where people can walk or bicycle safely. In addition, these areas attempt to achieve a high degree of interconnectivity between local streets, often by the use of grid street patterns. Advocates of this type of development want streets that are narrower than most existing street standards. In addition, such designs may include extensive traffic calming measures. Traffic calming can alter travel patterns, especially the balance of travel between local and major streets.



Cluster Development

A cluster development allows estate densities over an entire development, but dictates suburban sizes for individual lots. For example, a large 40 acre parcel might be developed so that one-acre home sites are built on ten acres, while the other 30 acres are left as open space, which can be held in common by all property owners, held privately, or dedicated to public use. Consequently, cluster development allows much of the land to be kept in a natural state for environmental or agricultural preservation. Cluster development is an emerging approach in rural areas and other very low-density development. This style of neighborhood design implies that length of residential streets will differ from conventional designs, and the access system to major roads will also vary.



[Source for Figure: SEWRPC Planning Guide No. 7, Rural Cluster Development, December 1996]

Transfer or Purchase of Development Rights

The transfer or purchase of development rights is a way for local jurisdictions to preserve rural and natural areas or the appearance of their communities. Property owners sell or transfer the right to develop their property, and in return they receive the assessed difference between the land's value for development and its value for open space or agriculture. This transfer often manifests itself in the form of a conservation easement. Once the development rights are sold or

transferred, the land cannot be developed. The landowner receives the value of development and can remain on the land and use it for specified purposes. The land owner may also receive a considerable break on taxes when the land is assessed at a lower value. Communities benefit from a lower infrastructure and service cost following the purchase. TDR/PDR practices have been implemented by state, municipal and/or county governments in Maryland, Pennsylvania, Vermont and Wisconsin.⁶

State Roles in Land Use Activities

There are considerable variations between the state DOTs in their role in land use and economic development activities. Roles in an individual state can vary along a broad spectrum ranging from very active involvement in the coordination of transportation and land use to a very passive role, where the state leaves most of the decision-making to other agencies. In order to help understand the spectrum of activity that states may undertake a chart has been developed to show the range of state activities. A state's role can be defined along a continuum from active to passive in the following six categories.

- ◆ Land Use/Transportation Planning Requirements
- ◆ State Land Use Planning Capabilities
- ◆ Education/Technical Assistance
- ◆ Access Management
- ◆ Land Use Controls
- ◆ Economic Development

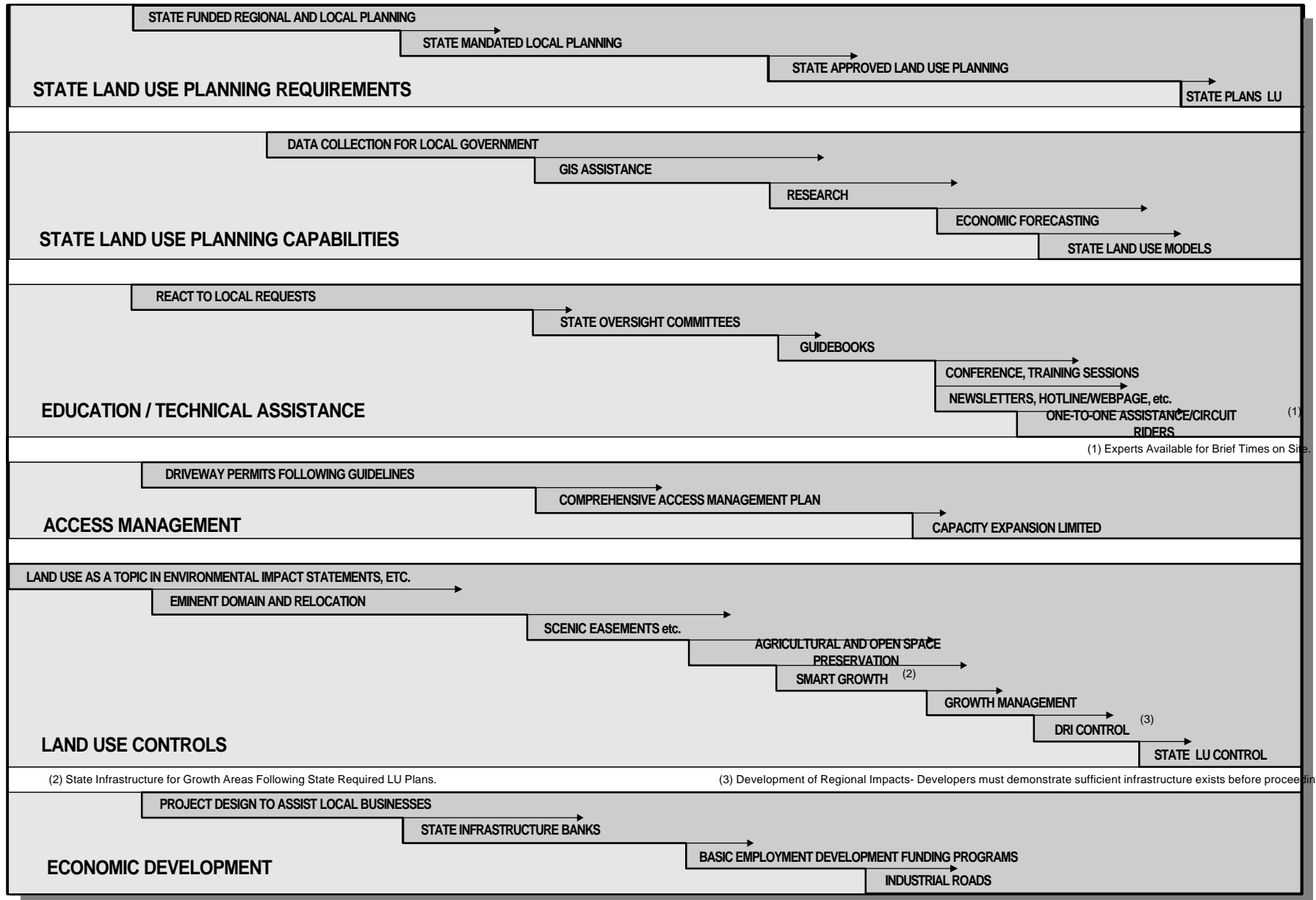
Each of these categories is described below.

⁶ Adapted from: Alternatives to Conventional Development: Livable Community Design, Neotraditional, Clusters and TDR's; ITE WORKSHOP, April 1993. Presented by Prof. Edward Beimborn, Center for Urban Transportation Studies, University of Wisconsin-Milwaukee.

PASSIVE - LOCAL OPTION

< < STATE / LOCAL COORDINATION > >

ACTIVE- STRONG STATE ROLE



Land Use/Transportation Planning Requirements

At the passive end of the continuum, states fund regional and local level planning and leave the decision making entirely to local jurisdictions. The option to do planning and how it is done is left to the local agencies. At the most active level, the state itself is responsible for planning and zoning, as is done in Hawaii. Between these two ends of the spectrum is state mandated local planning where the state sets mandatory standards for land use plans or may set guidelines reflecting the state's interests. A passive approach would require the planning to take place but not require state approval of the plans. A slightly more active strategy would require that local land use decisions must have state approval and certification.

State Land Use Planning Capabilities

The state DOT can provide a range of capabilities to assist local agencies, depending on how involved it wants to be in the planning process. As shown in the chart, these activities would range from providing data collection services for local government, at the passive end, to the utilization of sophisticated state land use models and basic research, at the active end. The purpose of transportation/land use models is to predict the future impact of transportation investments on land use. Oregon and New Jersey are two states using transportation/land use models. Intermediate state services would include providing GIS assistance, policy research and economic forecasting.

Education and Technical Assistance

State participation in education and technical assistance can take many forms. At the passive end of the continuum, states only react to local requests for assistance. A more active state participation would include formulating state guidelines, convening oversight committees, providing conferences, holding training sessions, issuing newsletters, organizing a hotline or Web site, providing public education, etc. At the most active level of participation, the state would provide one-to-one assistance to local government for the analysis of land use implications of transportation decisions.

Access Management

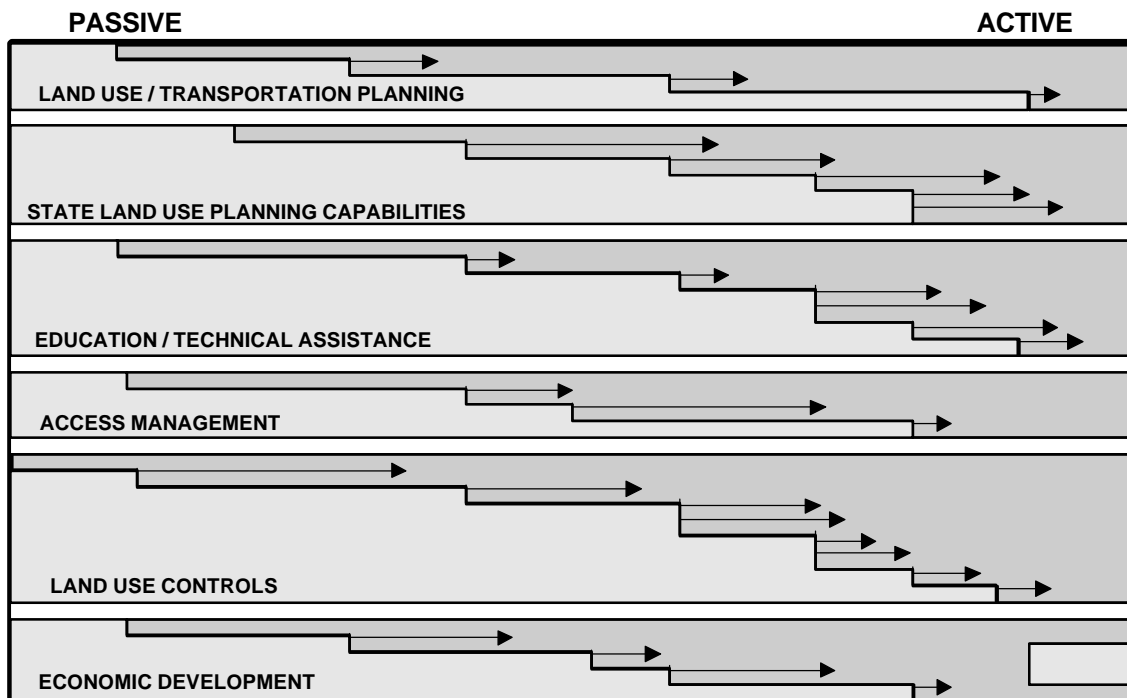
Access management is a systematic approach to providing appropriate access to land development on highways. The chart shows the range of access management programs that states have adopted. A passive approach is to allow unlimited access to the state highway system as long as access points follow site specific guidelines. A more active strategy involves the development of comprehensive access management plans and policies. The most active strategy is to limit capacity expansion only to designated areas according to a statewide growth management policy.

Land Use Controls

Land use control initiatives by a state encompass a broad range from simply including a topic in transportation plans or environmental impact statements to completely controlling land use. The various options available to a state involve different degrees of participation by state and local agencies in project-level control of land use and the project's environmental impacts, land use control in environmentally sensitive areas, smart growth, scenic easements, agricultural and open space preservation, growth management and control of large scale developments. Smart growth programs bias the provision of state infrastructure to designated growth areas following state mandated land use plans. For example, the state of Maryland restricts the expenditure of state highway funds to areas designated for development according to local plans that have been written from guidelines provided to governmental agencies, developers and local officials. Florida, Oregon and New Jersey have adopted growth management programs. Development of regional impacts (DRI) controls, such as those used in Florida, require a developer to demonstrate that sufficient infrastructure exists before proceeding with the project.

Economic Development

Economic development spans a range of activities that includes project design assistance to local businesses, state infrastructure banks, funding programs to promote basic employment opportunities, industrial roads and provision of road facilities by the state for developments that generate both basic and non-basic employment. Examples of state funding programs that facilitate economic development are the RISE program in Iowa and the TEA programs in Wisconsin and California. State infrastructure banks (SIB) are funds for infrastructure investment generated at the state or regional level, as pioneered in Ohio and Florida. Industrial road programs pertain to the allotment of funds by the state towards improving existing road facilities that enhance accessibility to eligible industrial and agricultural facilities.



Use of the Chart

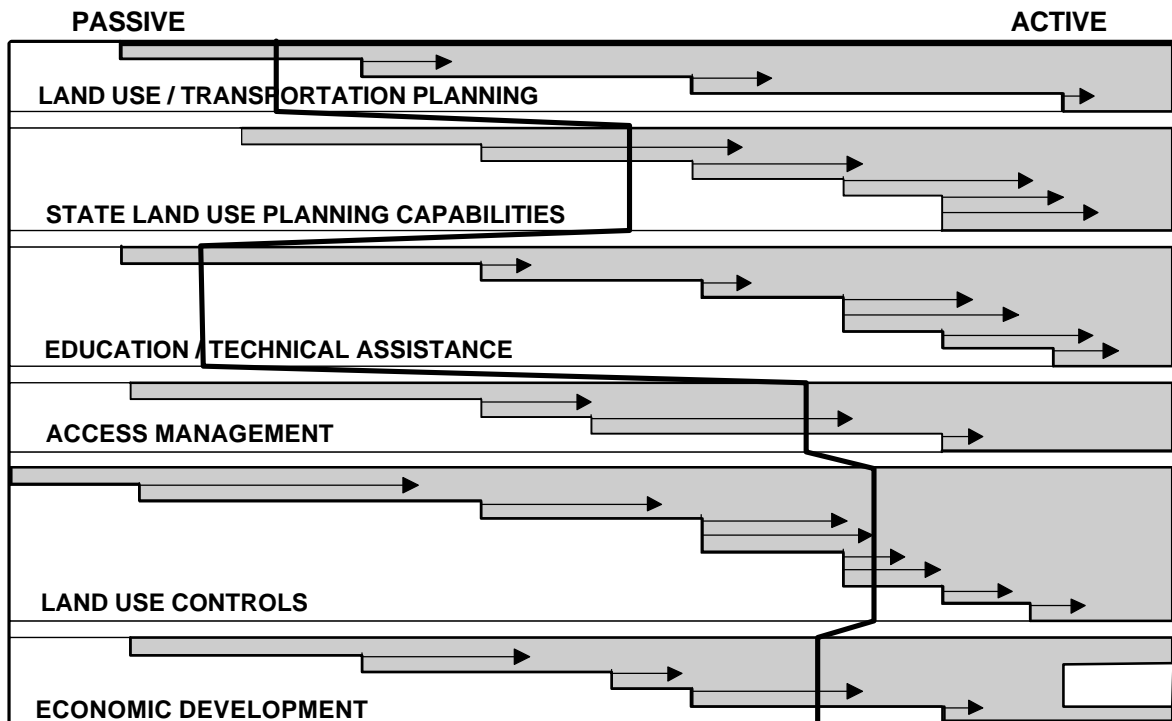
The range of activities for each of the six topics is represented graphically in the chart on the scale from passive to active. Based on the programs, activities and regulations implemented by a particular state, the state could easily determine where they fit on the chart. Note that most of these activities are cumulative in their implementation. For example, under Land Use Controls, “Topic in Environmental Impact Statements” spans the entire length of the scale from passive to active, and this element would coexist with any other option that is implemented by the state. Once the state policy/action is graphically represented on this chart, it can be used as the basis to consider future endeavors. A state could then choose to be more or less active by implementing other strategies on the chart. States can review the chart to determine if they should add options to each of the categories on the chart or add entirely new categories, based on emerging issues or new technologies specific to the state. This chart is intended to be generic and can be modified to represent the planning actions and programs implemented by any particular state.

The use of the chart is illustrated by an example of a hypothetical state. In each of the various categories, the state is doing the following.

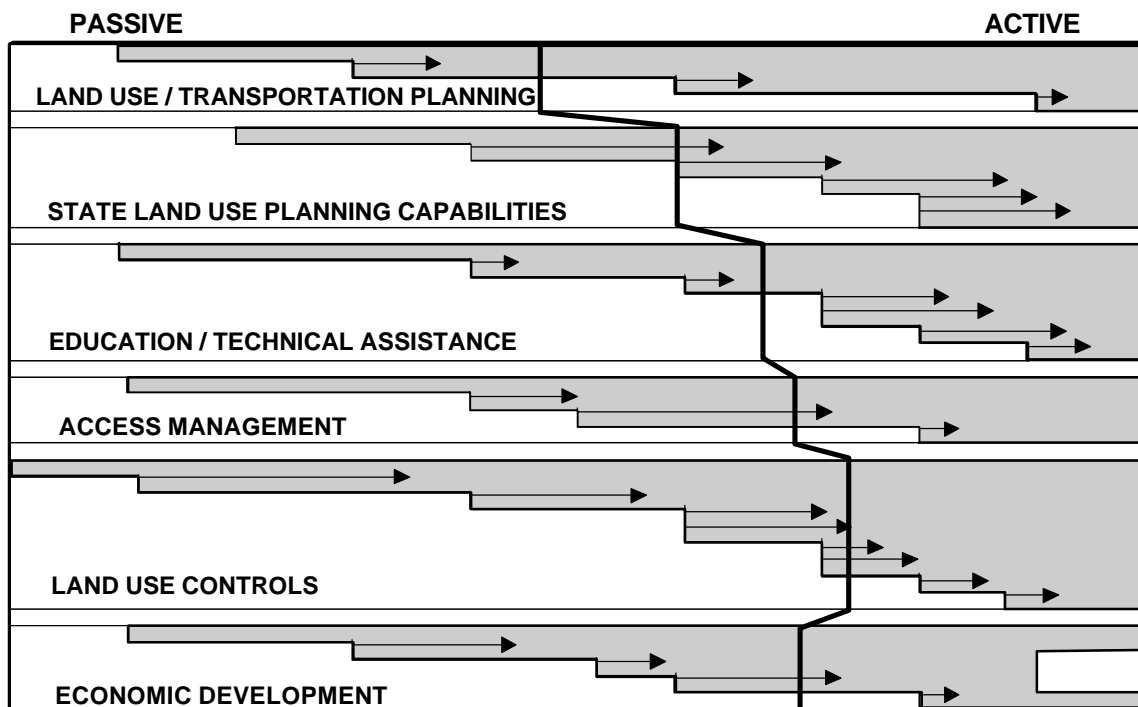
- ◆ *Land Use/Transportation Planning:* The State delegates land decisions to local municipal governments, and does not require MPO zoning conformance with a comprehensive plan. Thus, this state assumes a passive role in land use and transportation planning.

- ◆ *State Land Use Planning Capabilities:* The state assists the local municipalities in making transportation and economic decisions by providing them with information such as vehicle travel data. It also provides technical assistance in the development of geographic information systems.
- ◆ *Education/Technical Assistance:* The state is largely inactive in this field. The only form of assistance provided by the state to the local agencies is through prompt responses to requests.
- ◆ *Access Management:* The state has developed an Access Management System Plan to indicate the network of state highways on which access shall be controlled. This system plan aims at maintaining safety on the selected highways by regulating traffic flow through access management. The state also works with the local governments to review development plans that are adjacent to or affect the traffic flow to a state highway. Thus, the DOT plays an active role in terms of access regulation.
- ◆ *Land Use Controls:* The state practices weak growth management by developing technical reference guides that assist local agencies in assessing a project's potential in influencing land development patterns. The state also plays an active role in land use by participating in interagency councils that direct land use and initiate land use reforms. The state has also organized focus groups with both state and local participants to provide local governments with the necessary tools to make decisions that reflect statewide goals.
- ◆ *Economic Development:* The state uses a Development Grant Program, which provides communities with infrastructure improvements that initiate both basic and non-basic employment opportunities for these communities. Emphasis is always maintained on rural communities.

The following chart shows the strategies adopted by the state. Thus, the thick line plotted on the chart displays the present position of the state

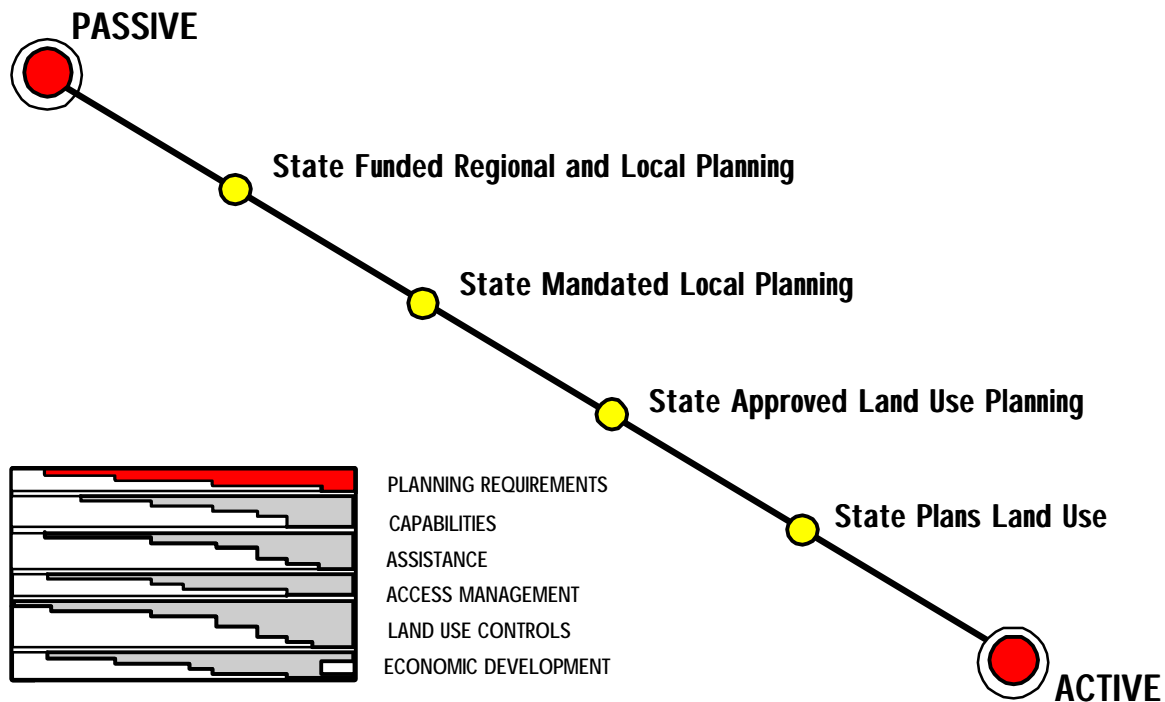


A review of the chart indicates that the state level of activity in outreach and technical assistance appears to be inconsistent with its other activities. The state might review its role in providing outreach and technical assistance in relation to its other more active programs. If the state were to be more active with regard to land use transportation and planning, the state could consider implementing state mandated local planning, where the state sets mandatory standards for comprehensive planning. Similarly, the state could organize oversight committees, conferences and training programs to assist local agencies. With the implementation of these steps, the new chart representing state actions would look like the one shown below, which is more balanced in its aggressiveness.



State Land Use Planning Requirements and Capabilities

Land Use Planning Requirements



Actions taken by state DOTs in coordinating land use planning have much to do with the structure of state and local governments. Sixteen of the 45 states surveyed require local governments to perform comprehensive planning in addition to zoning and regulations related to the zoning designation. The levels of action can be described in a continuum varying from a passive approach that delegates comprehensive planning to local governments to a very active involvement in coordination of transportation and land use planning. The following list outlines the continuum of actions.

State Funded Regional and Local Planning

In most states, enabling legislation gives the decision-making power pertaining to land use to local jurisdictions. Planners at the local level may receive assistance from the state, but the local unit of government is left with the option to decide whether or not to conduct planning. Wisconsin and New York, for example, delegate land decisions to municipal governments and do not require zoning

conformance with a comprehensive plan. Comprehensive plans may or may not be developed by municipalities. State agencies may provide technical assistance and provide funding for local development of plans.

State Mandated Local Planning

In a slightly more aggressive style of planning, comprehensive plans are mandated, but the plans developed by local agencies do not require state approval. Land use decisions are then to be based on locally adopted plans, as is done in South Dakota and Iowa. States may also set guidelines rather than mandatory standards for comprehensive planning and enact incentives for compliance with those guidelines, as is done in Georgia.

State Approved Land Use Planning

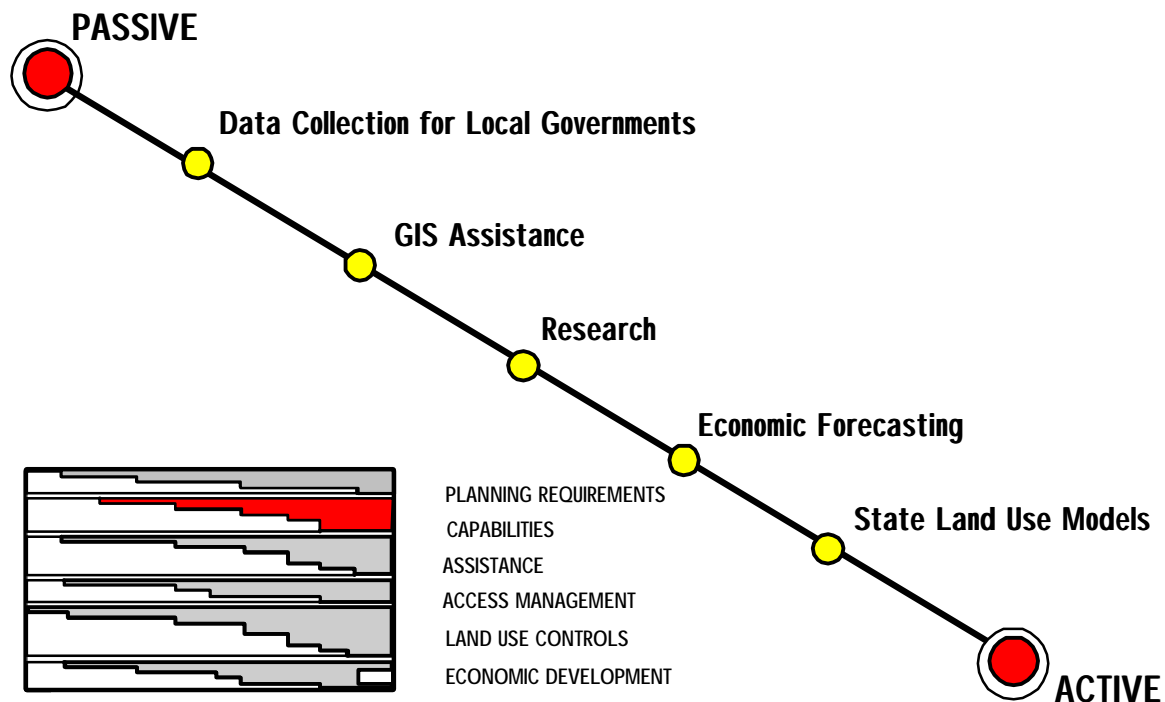
In this style of planning, local governments must develop comprehensive plans, which are reviewed and approved by the state agency. The lead state agency can set standards for land use conditions that impact state interests. For example, California, Florida, New Jersey, Oregon and Washington may impose sanctions on local governments that do not meet state requirements. However, states like Vermont review only developments that are expected to have a large regional impact.

State Plans Land Use

In the most active planning style, the state prepares land use plans. Hawaii is the only state where planning and zoning are left entirely to the state agency. The state government makes all decisions related to land use within the state. These land use decisions focus mostly on permits and other policies and regulations related to land use.¹

¹ Adapted from Land Use in Wisconsin, An Interim Report from the Interagency Land Use Council to Governor Tommy G. Thompson, December 1995; Six main types of State Land Use Planning Programs. Table 9; p. 119.
Land Use Issues Facing Wisconsin; Report from the WI Strategic Growth Task Force, Feb 1996.

State Land Use Planning Capabilities



State DOTs vary considerably in their capability to conduct technical studies and analysis related to land use issues. Those states that have adopted an active role in land use generally have more extensive capabilities. In many situations the states provide technical services to local governments to assist them in their decision making. These activities range from simple assistance with data collection to full scale statewide land use modeling efforts.

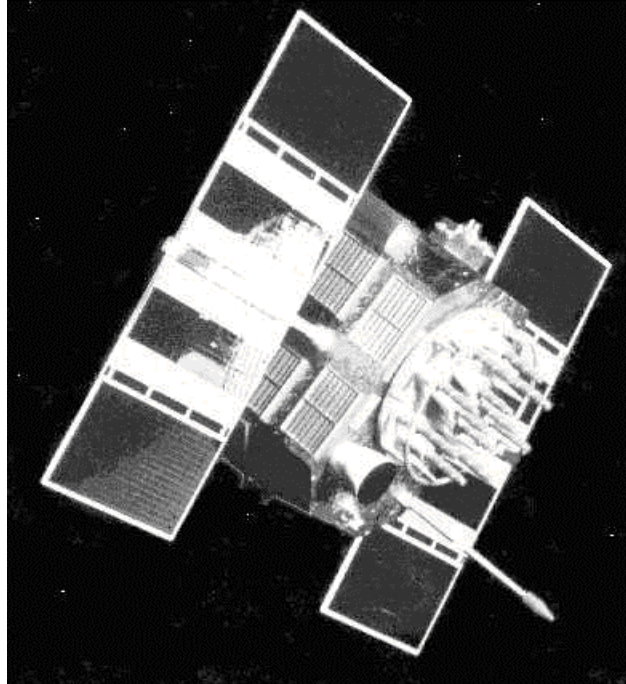
Data Collection for Local Governments

The state government can assist local agencies in determining land use and the effects of economic development of proposed projects by providing them with necessary data. For example, Wisconsin Department of Transportation's Division of Economic Development assists municipalities in making transportation and economic decisions based on vehicle travel information obtained from the Division of Motor Vehicles (DMV), which records license plates of vehicles passing under major overpasses in an area. The DMV records can identify the garaging address of vehicles that are traveling at a specific location.

GIS Assistance

Many states encourage the local agencies to develop a geographic information system (GIS) that will facilitate research related to land use planning and economic development. It can also be used effectively to respond to local

requests for data retrieval. One of the main advantages of a GIS is that it functions as a common interface for data exchange between different departments in local and state governments. GIS resources can be used by state and local agencies to analyze data pertaining to new planning strategies and to review those plans. By maintaining maps in a digital format, any changes that are eventually implemented can be easily monitored and updated. All departments can concurrently access these maps and their related attribute data, rather than having to rely on outdated hard copy maps. Thus, GIS is not just a device to prepare and maintain maps, but it is a powerful tool to analyze the present situation using the available data and to develop strategies that will initiate land use and transportation planning in keeping with the goals of both state and local agencies. Since any given local government may be limited in its capacity to develop and implement a GIS, it becomes the responsibility of the state to provide the necessary technical assistance.



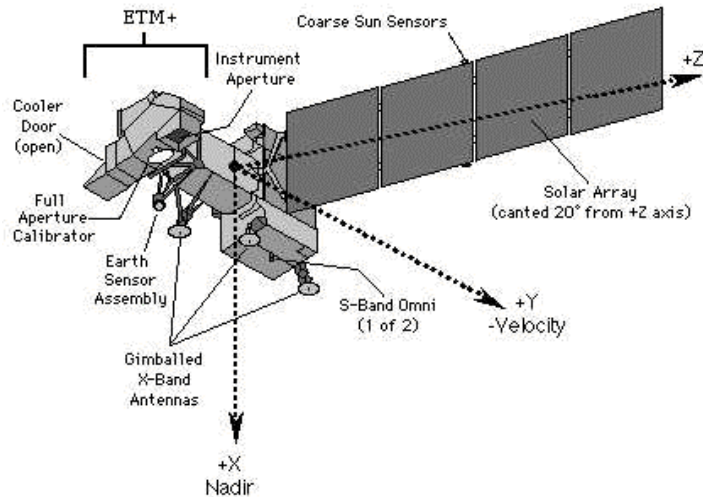
However, setting up a full scale GIS for a local government may involve a major investment, depending on the requirements of the state and the local government. Thus, a good starting point is to run a pilot project that will give local staff a better understanding of the capabilities of a new GIS and bring out the possible problems in the initial installation process. Another major advantage is that both the state and the local governments are not obliged to immediately invest in a large-scale GIS set up; rather, they would be able to initiate this project in phases.¹

Remote Sensing Assistance

Remote Sensing is defined as the technique of obtaining information through the analysis of data collected by special “remote” instruments, such as satellites. Like GIS, remote sensing is a fairly new concept that is gaining increasing popularity among state and local agencies. States often assist local agencies by providing data in the form of satellite images, air photos, etc. The Southeastern Wisconsin Regional Planning Commission (SEWRPC) in Wisconsin is known for

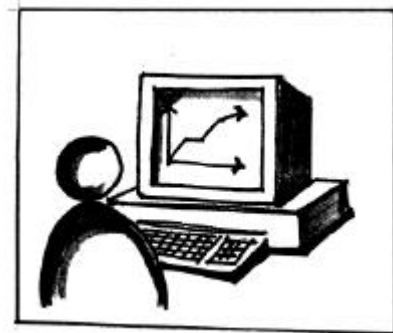
¹ Adapted from: An Introduction to Geographic Information Systems. William E. Huxhold.

maintaining an up-to-date database consisting of air images of its region at five-year intervals. This database becomes an invaluable source of information for projects based on the study of an existing corridor, proposing changes to existing land uses, initiating new land uses in rural areas, etc. These images have good resolution, thus providing a realistic picture of vegetation types, buildings, topography and other physical features of large expanses of land.¹



Research

Initiating a geographic information system is one of the many ways to facilitate research at the local level. Providing local agencies with the necessary funds, as well as the technical support, should be one of the fundamental objectives of the state.



A state DOT can develop a comprehensive program of research in order to assist local governments with their projects pertaining to land use and economic development. Research can consist of data collection, data analysis or the creation of new empirical or theoretical relationships. Research can occur in-house or on a cooperative basis with local governments or universities.

Economic Forecasting

Economic forecasting can be an important land use planning tool. In a number of states, statewide economic forecasts are used by local governments in their planning processes. These forecasts require special expertise not normally available at the local level. Some of the commonly used methods for economic forecasting are input-output analysis, shift share analysis, elasticity methods, linear regression and ARIMA time series models.



¹ Adapted from: Overview of Remote Sensing; Fundamentals of Remote Sensing and Airphoto Interpretation.

- ◆ Input-Output (IO) Analysis: This method can be used to predict the effects of projects and programs on national or regional economies. It does so by accounting for inter-industry relationships within a region. Economic activity by an industry can be calculated as output or sales, earnings and employment.¹ The basis of IO analysis is the IO table, which contains the amount of goods and services from any one industry that is sold to any other industry. Conversely, the table shows the amount of goods and services purchased by any one industry from all other industries. The table also takes into consideration the amount of sales to final consumption by households. For example, this method can be used to forecast the number of jobs created by a major new development in a region. Input-output models facilitate the use of multipliers that help determine changes in output, earnings, or employment for other industries and for the region as a whole. Such input-output tables are available from the US Bureau of Economic Analysis and private data services.
- ◆ Shift-Share Analysis: Shift-share analysis measures the competitiveness of a region's industries by breaking their growth into three components.²
 - ✓ Overall national growth
 - ✓ Industry mix, nationally
 - ✓ Competitiveness, locally

Competitiveness may be thought of as the residual growth in a local industrial group after accounting for overall national growth and national growth in the specific industry. Assuming competitiveness remains constant, local industrial growth may be forecasted from knowledge of growth in the national economy.³

- ◆ Application of Elasticities: An elasticity may be thought of as the percentage change in some output divided by the percentage change in some input. There are two important elasticity concepts with regard to economic forecasting: price elasticity, which is the rate of change of demand (purchases) for a good given the rate of change of its own price, and cross elasticity, which is the rate of change of demand of one good given a change in the price of some other good.⁴ Both of these concepts are important ingredients in measuring the economic activity in a region

¹ Input-Output Analysis; Selected Methods of Economic Forecasting. FHWA Freight Forecasting Workshops by Cambridge Systematics, Inc. June 4, 1998.

² Shift-Share Analysis; Selected Methods of Economic Forecasting. FHWA Freight Forecasting Workshops by Cambridge Systematics, Inc. June 4, 1998.

³ Loc. cit.

⁴ Price Elasticity of Demand; Selected Methods of Economic Forecasting. FHWA Freight Forecasting Workshops by Cambridge Systematics, Inc. June 4, 1998.

initiated by a new proposal. A typical example would be predicting the effects on housing starts of changes in mortgage rates.¹

- ◆ **Linear Regression Analysis:** Linear regression models take the form of a linear equation where one “dependent” variable is predicted by one or more “independent” variables. Linear regression analysis fits a line to data by minimizing the square of the deviations of the data to the line. Different models can be used based on the complexity of the problem. These models attempt to establish cause and effect relationships between some level of economic activity and the factors that cause it to change.
- ◆ **ARIMA Models:** ARIMA is a statistical time series forecasting technique and stands for Autoregressive Integrated Moving Average. ARIMA models are sometimes referred to as Box-Jenkins models. ARIMA models forecast economic activity for some future period using economic data from many earlier periods of time. Thus an ARIMA model could predict activity for a given month in the future (m) based on the economic activity in that region for the previous month (m-1) and the same month, the previous year (m-12).

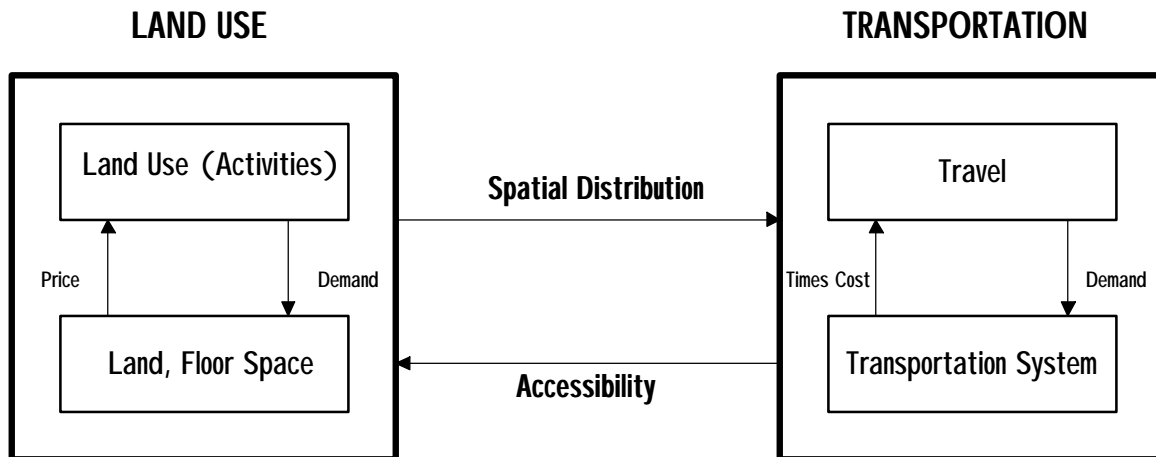
Some of the sources for econometric software most commonly used by state and local agencies are SAS, SPSS, and Scientific Computing Associates.

Statewide Land Use Forecasting

There are two aspects of land use forecasting relevant to statewide land use plans. First, it is possible to create a statewide land use model that is sensitive to transportation policies and projects. Second, it is possible to use the results of urban land use models in statewide transportation plans.

¹ Pignataro, Wen, Burchell, Lahr, Strauss-Wieder, The Transportation Economic and Land Use System (TELUS); *Abstract*, p. 2-3.

Land Use Modeling



[Source: Loudon, W., et al. Integrating Transportation and Land Use Planning: Addressing the Requirements of Federal Legislation and Rule Making. TRB Paper No. 971022. January, 1997 annual meeting]

Land use forecasting is normally associated with urban planning. Although land use forecasting is a frequently discussed topic among urban planners, only a comparatively few metropolitan areas have recently implemented land use models. Land use models share some common elements with urban travel forecasting models, but involve additional forecasts of population and economic activity for all locations in the urban area. Such a forecast requires extremely detailed data on the relationships between economic activity and land consumption, land price, and markets for products. Thus, urban land use models are difficult to implement and can result in forecasts with a large degree of error.

There are several proprietary land use forecasting software packages available, and they differ substantially in terms of theoretical approaches, cost and data requirements. Unlike urban travel forecasting models, there does not exist a consensus as to what constitutes best practice. It is not the purpose of this guidebook to recommend a specific package or approach. Rather, this guidebook describes the advantages and disadvantages of using information from land use models in statewide forecasting.

Notions of Urban Land Use Forecasting

Urban land use models attempt to forecast the distribution of population and employment throughout the urban area and then calculate the amount of land devoted to each activity. To do so they are sensitive to the relationships between economic sectors, the relationships between population and employment, the importance of population as a final demand sector, and the quality of transportation between economic sectors and between industry and population.

Information on the quality of transportation service is usually provided by a model component that behaves similarly to an urban travel-forecasting model.

The earliest land use models divided the economy into just two sectors – basic and nonbasic. Basic industries are those that derive their income primarily from outside the urban area, while nonbasic industries are those that derive their income primarily from inside the urban area. The locations of all basic industries are assumed to be known, while the locations of nonbasic industries are calculated by the model. Although the economy is crudely divided into just two sectors, there is good reason to keep the model simple in this regard. Many cities have continued this two-sector approach. Nonetheless, there is nothing in the theory that prohibits further disaggregation of economic sectors.

In these models economic sectors (and population) are linked together spatially as well as economically. The spatial linkages involve the transportation costs between producers and consumers and between employees and employers. Economic linkages relate to sales of products and can be ascertained by Census data (when the number of sectors is small) or by input-output tables (when the number of sectors is large). Population is linked to employment by looking at the number of employees in each household.

Some models impose constraints on the amount of activities that can be allocated to zones, usually by observing the rate at which each activity consumes land. Conflicts over land are resolved by allocating the land to the highest bidder or by assuming that one type of activity always prevails over another.

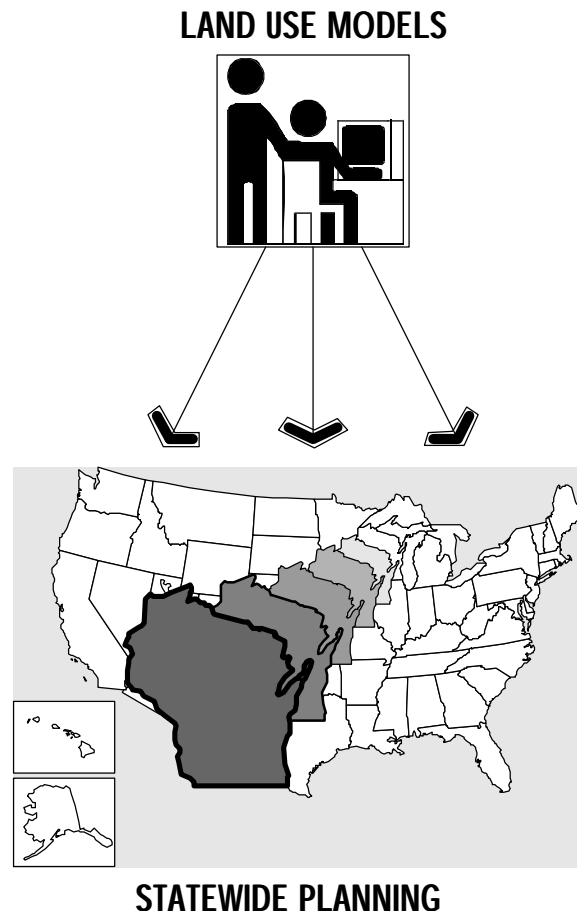
Land use models can be time incremental or equilibrium. Time incremental models forecast the state of the urban area in a series of stages, each stage being a few years in length. Equilibrium models forecast the end state of the city at some long-range (and often undisclosed) point in time. Both approaches have their strengths and weakness. For example, equilibrium models can attain a high degree of consistency between land use and the quality of transportation services (an advantage), but they may be unable to forecast states of the city that are substantially in disequilibrium – a common occurrence.

Some land use models try to be sensitive to the different characteristics of population in different parts of the urban area. For example, these models may capture the relationship between income and population density.

There is a class of land use models, called residential location models, which seeks only to determine population distribution across an urban area. These models require industrial location patterns as an input. They can be used by themselves or in conjunction with an industrial location model.

Applicability of Urban Land Use Models in Statewide Planning

Because of the difficulty of establishing an urban land use model, the needs of statewide planning do not justify its creation. However, if a large metropolitan area already has a land use model, then the results may be beneficial for statewide planning. Interestingly, the errors that are so common in land use models have less significance for statewide planning than for urban planning.



Urban land use models are very good at predicting the overall amount of decentralization that might occur in an urban area and the traffic implications of that decentralization. Thus, a land use model could provide any of the following.

- ◆ Long-term forecast of the amount of traffic on the state highway system at the periphery of the urban area.
- ◆ The extent to which industry, tax base and population might shift between counties that are contained within the urban area or touch on the urban area.
- ◆ The overall expansion of the urban area and the likely directions of new development, indicating the impact on agricultural lands, environmentally sensitive areas and other forms of open space.

The Nature of Statewide Land Use Models

By and large, states have not developed land use models that cover the whole state or even large sections of the state. Oregon is a major exception. At this writing Oregon is in the process of developing a statewide land use model that is similar in nature to a traditional urban model. New Jersey has a land allocation model, which differs substantially from Oregon's land use model. This allocation model will be described later.

Prior to embarking on model development, Oregon established several issues of primary concern, of which five should be addressed by a statewide model.

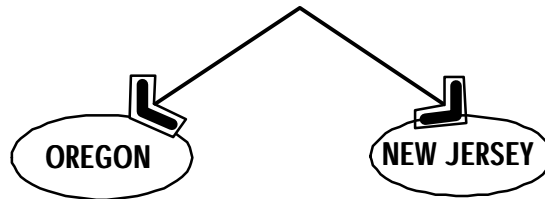
- ◆ The effect of land supply on land use and location decisions
- ◆ The effect of land supply on travel behavior
- ◆ The effect highway capacity increases on travel behavior
- ◆ The effect of rail investment on highway use
- ◆ The effect of changes in the demographic and economic composition of the state

Oregon felt that none of the existing urban land use models could fully meet its statewide needs, but it pursued implementation of one of the more flexible software packages as an intermediate step. The model can be described as being time-incremental, industrially multisector and spatially disaggregated. The model is organized into twelve industrial sectors, three household categories differing on income, and six land-use categories. The state is divided into 142 zones, and transportation services are organized into three passenger modes and four freight modes. Given the expanded set of industrial sectors, an input-output table is used to establish the production-consumption relationships in the model. Spatial relationships and mode choice are described by a set of logit equations. Location decisions are assumed to be influenced by accessibility and land price. Land prices are adjusted across time increments in response to competition for land. Exogenous variables include employment by sector, imports, exports and available land in each zone.

It should be obvious from the above description that this model requires an enormous amount of data to operate and calibrate. Oregon reported having difficulty in getting a complete set of data for their prototype tests, especially information on the relationship between demand and supply of land and land prices.¹

¹ Rick Donnelly and William J. Upton, "The Development of Integrated Land Use-Transport Models in Oregon", Working Paper, Oregon Department of Transportation, no date.

EXAMPLES OF STATEWIDE LAND USE MODELS



Experience with statewide land use models has been very limited, so conclusions about their applicability are difficult to reach. The strength of the concept will not be known until Oregon comes closer to fulfilling its goals in model development. At this time, Oregon's efforts should be considered to be very ambitious. However, if it does achieve its goals, it will be able to intelligently integrate land use policies into its transportation plans and vice versa.

There are considerable side benefits to Oregon's approach. The resulting model will also tell planners about the possibilities for economic development in the state while trying to preserve environmental quality, the effect of economic development in one part of the state on economic development in another part of the state, and the effect of improved freight transportation services on economic development. Indeed, the potential of this model for understanding economic development may exceed the model's benefits in forecasting land use.

A common criticism of urban land use models relates to the scale of the analysis versus the scale of the decision. Most land use decisions are made for parcels, while land use models are incapable of forecasting at this level of detail. A statewide land use model, by its nature, should never be used for fine-grained decision making and, therefore, should be able to sidestep this criticism.

New Jersey Land Use Model (TELUS)

The purpose of the New Jersey Transportation Economic and Land Use System (TELUS) is to allow greater access to the transportation improvement program (TIP) in northern New Jersey and to be able to fully appreciate the impacts of a whole TIP or its individual projects.¹ TELUS enables a wide range of database functions to be performed on the TIP, to display the TIP in map form, to determine the interrelationships between projects, and to estimate the economic and land use impacts of projects.² The system was designed by the New Jersey Institute of Technology's National Center for Transportation and Industrial Productivity (NCTIP) and the Center for Urban Policy Research at Rutgers

¹ Pignataro, *op. cit.*, p. 2-3.

² *Ibid.*, p. 2-4.

University for the North Jersey Transportation Planning Authority. TELUS is distributed to public agencies throughout the northern part of New Jersey.

At its core TELUS consists of a database manager combined with a GIS and specialized analysis routines.¹ Projects may be selected for analysis through a series of sorting and querying steps, whereby users can view and analyze a specific project or multiple projects in a given area. Detailed information on any project can be obtained, including funding amount and source, results of project evaluation exercises, project milestones, location and budget status.

Unlike Oregon's model and urban land use models, TELUS does not forecast secondary land use impacts. Instead, TELUS estimates changes in property values and changes in property taxes in lands adjacent to a planned transportation project.² In particular, TELUS contains three submodels to estimate primary effects on land:

- ◆ *A quantification of relationships between accessibility changes and transportation improvements of certain types.*
- ◆ *A property value and land use model that relates changes in accessibility to changes in property value.*
- ◆ *A property tax model that converts property value increases into property tax.*³

TELUS also uses a multiregional input-output model to estimate the economic impacts of transportation projects locally and throughout the state. The model traces the cumulative effects in the state's economy of expenditures on one or more transportation projects. In particular, TELUS reports:

- ◆ Employment effects
- ◆ Income effects
- ◆ Federal tax effects
- ◆ State tax effects
- ◆ Local tax effects⁴

TELUS can ascertain the impact of both the initial capital expenditure and long-term maintenance costs.

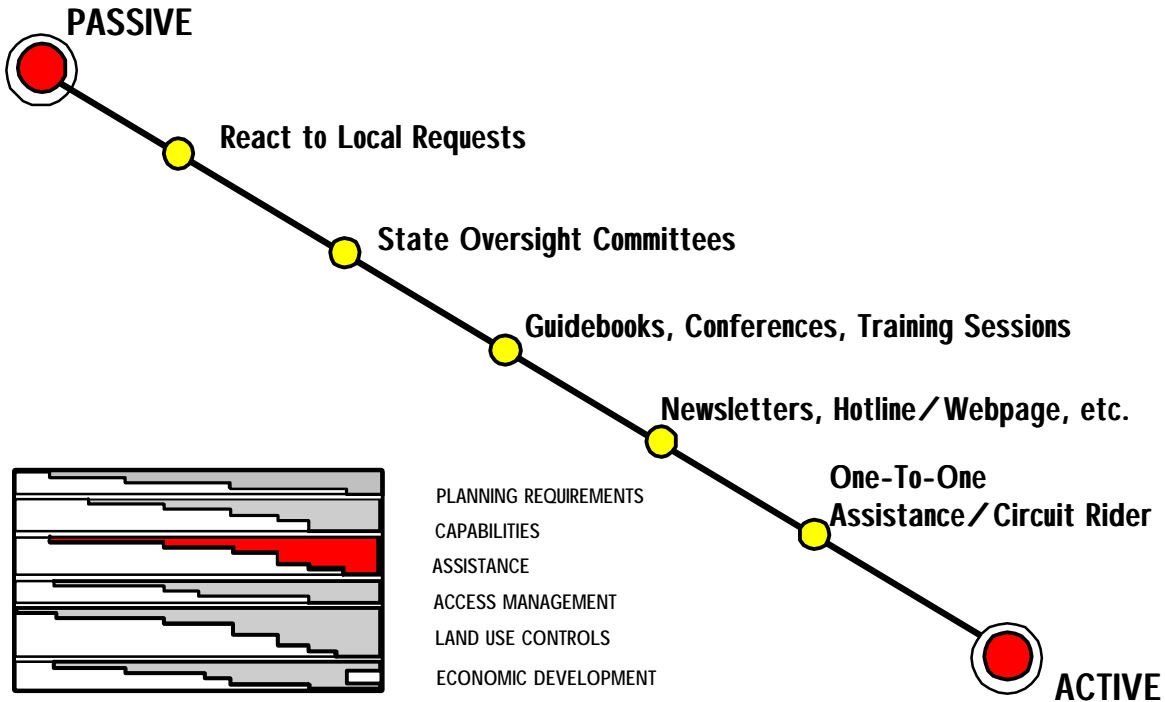
¹ *Ibid.*, p. 5.

² *Ibid.*, p. 7.

³ *Ibid.*, p. 8.

⁴ *Ibid.*, p. 7.

Education/Technical Assistance



Regardless of the role that a state takes in land use control and regulation, and regardless of its technical capabilities, there are different approaches to the level of assistance it provides to local government. Since different states approach the coordination of transportation, land use and economic development planning in different ways, styles of technical assistance and training will also differ. Some of the more important ways in which states perform local technical assistance are discussed in this chapter.

React to Local Requests

Reacting to local requests is a strategy that involves the state in only a reactive, passive, role. When a local government comes to the state with a request for assistance, most states will respond by providing that assistance. If that is all the state does, it is providing limited help to local governments on land use and economic development issues. Some states adopt a more proactive strategy aimed at getting up-to-date information into the hands of local agencies to improve their decision-making capabilities.

Often it takes the effort of only a small number of individuals at a state agency to begin the coordination of state and local level planning. Even in the cases of states where local comprehensive planning is not required, the state DOT or other agencies may still choose to make an effort to provide technical assistance to local jurisdictions.



Planning at the state level can have local ramifications. Therefore, state transportation planners may want to consider reaching out to local governments to make them aware of actions the DOT may take that influence individual communities. This is especially true of transportation decisions. Other state agencies may want to consider the same approach with regard to their own plans, research and policy implementation. Agencies that take the leading role are often those which make the most effort to involve local government officials in the decision making process.

State Oversight Committees

A number of states have established joint committees and councils as a means of coordinating land use programs. These committees can be made up of only state agencies, or they could be broadened to include representatives of local government and individuals. The scope of such committees can vary from a means to communicate new information to a specific task force charged to create new legislation.

Wisconsin Land Council

In 1995, WisDOT joined with the Wisconsin Department of Administration, Department of Agriculture, Trade and Consumer Protection, Department of Natural Resources, Department of Development, Department of Industry, Labor and Human Relations and Department of Revenue to



create the Interagency Land Use Council (ILUC). This council developed recommendations and a set of actions for a statewide land use vision and specific land use reforms in a report that was presented to the governor. Later, a ten-member permanent Land Use Council was appointed, which included state

agency secretaries, county and municipal representatives and public members at large.

In conjunction with the ILUC, the Strategic Growth Task Force – a group representing state and local agencies, municipal associations, private and public associations and citizens appointed by the ILUC – participated in several focus group discussions in communities statewide. The overall theme emanating from these focus groups indicated strong support for local land use decision making. However, it was recognized that the state must play an important role in encouraging local governments to make land use decisions that are consistent with statewide goals and plans. This encouragement would principally come in the form of technical assistance from state agencies.

Guidebooks



A number of states have issued guidebooks and technical assistance materials that are specifically directed to local agencies. These materials are used to help local government better understand good land use planning practices and the interaction between transportation and land use. The materials can help create consistency in planning practice between different locales and to transfer information on emerging practices and techniques. Some examples are given below.

Managing Transportation Handbook

A municipal handbook was developed by the New Jersey Department of Transportation to provide guidance for developing and implementing successful transportation master plans. The guidebook contains elements on how to define study areas and goals, as well as steps to implement the plan, including zoning updates, access control on roadways, parking management, and advice on how to review traffic impact studies and transportation demand management principles. By providing this information, the state DOT is able to assist communities make informed transportation decisions that are consistent with the goals of the state transportation plan, in New Jersey – Transportation Choices 2020.

Planning Transit-Friendly Land Use Handbook

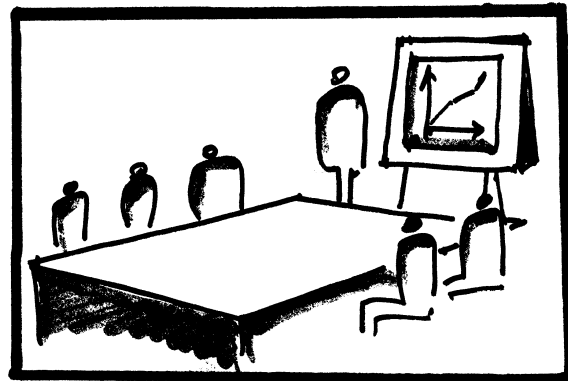
New Jersey Transit developed a handbook for New Jersey communities to assist elected and appointed planning officials and citizens in improving the relationship between land use planning and transit. The book presents techniques to reinforce basic strategies that organize land uses to support transit, emphasize pedestrian and other non-motorized modes of access and implement traffic calming techniques that interface automobiles with transit facilities while protecting pedestrian movement. The handbook supports the policies outlined in the State Development and Redevelopment Plan.

Traffic Impact Analysis Handbook

In order to ensure that traffic impact analyses provide sufficient information to make informed infrastructure additions, WisDOT District 2 in the Milwaukee metropolitan area developed guidelines for impact studies. The guidelines specify information requirements and a presentation format to be included in all projects submitted. This standard format decreases the processing time through the department and ensures that appropriate access decisions are made for new or improved development along state highways.¹

Conferences, Training Sessions

States have also had involvement in land use issues through the sponsorship of conferences and training sessions. These programs are designed to make local government personnel more aware of good land use and transportation practices. For example, a state could sponsor local training sessions on access management for local government in order to convince local agencies of the need for better control



of driveway entrances onto state highways. Typically, these training programs are run for one day and are held regionally to allow for attendance with a minimum of travel. Such programs may be offered by the state directly or offered by others such as universities or professional organizations. States can be very effective as catalysts for such programs if they adopt an active role in their development and promotion. Even if a state feels that land use is entirely a local issue, training and conference programs can help local governments perform their jobs more effectively.

¹ Traffic Impact Analysis Guidelines, District 2, Wisconsin Department of Transportation, January 1998.

Newsletters, Hotline, Web Sites etc.

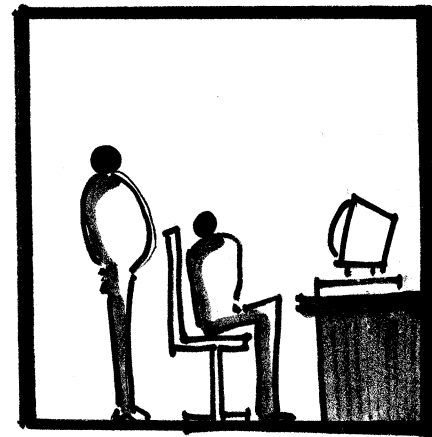
Active states provide information to MPOs and municipalities so that they are aware of alternative transportation choices by organizing planning conferences and training sessions, releasing newsletters, distributing educational videos and releasing planning guides. Another strategy adopted by several states is to



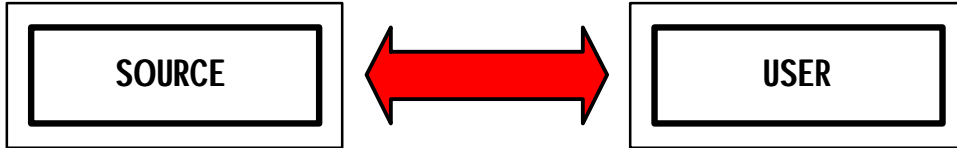
maintain a hotline or an up-to-date web site. The hotline has become somewhat outdated, and the web site has replaced it as a means to quickly reach out to the local agencies. Care must be taken by states to ensure that its web site is updated frequently with all the latest issues pertinent to transportation and land use planning within the state.

One-to-One Assistance/Circuit Riders

Research conducted at technical organizations is often documented in language far too technical and detailed for rapid understanding by potential local users of research. Sophisticated research is useless if it is not relayed effectively to a wide range of users in a language they can understand. A circuit rider can provide a link for the flow of information from the source to the user. The circuit rider is able to address the varying needs of the users and translate the required technical knowledge to them in a manner that is easy for the user to understand and apply.



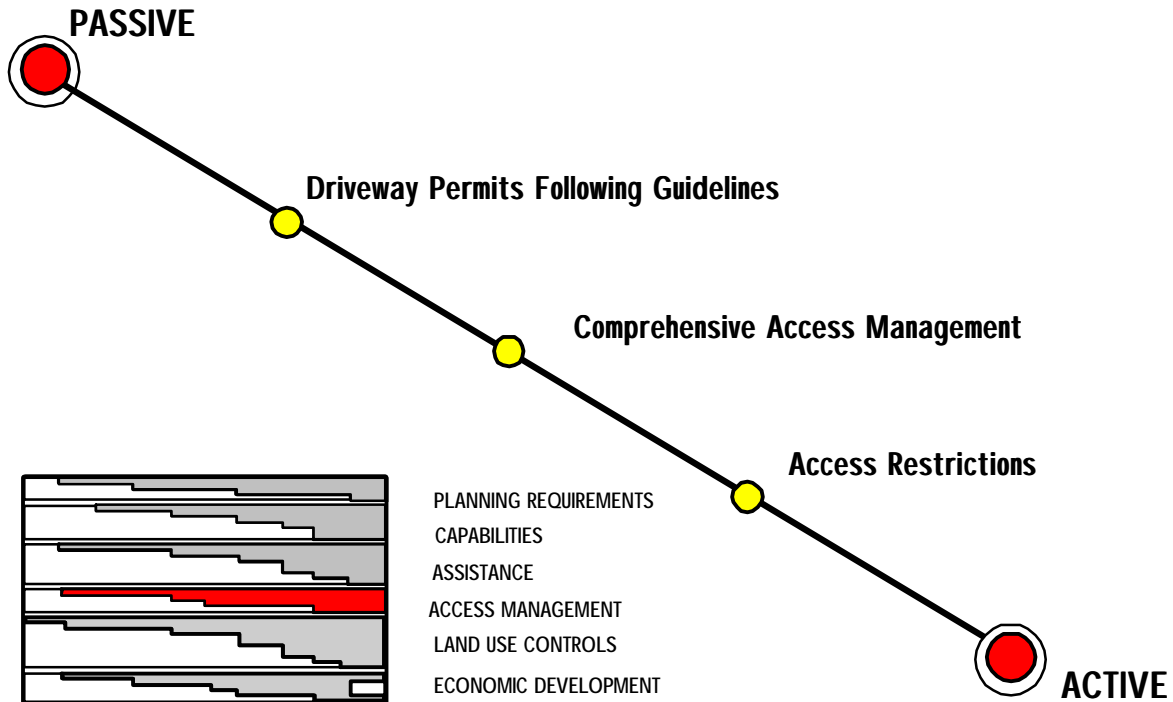
This method of technical assistance is patterned after the agricultural extension model for information transfer. A circuit rider has periodic meetings with local governmental agencies at their offices where they discuss local problems and exchange information on new methods for dealing with them. The circuit rider can also initiate the exchange of information between users. Moreover, the circuit rider is in a position to guide researchers according to the needs of users. Circuit riders must create relationships based on trust and credibility with both the researchers and the users to ensure that vital new technologies do not go to waste.



Nearly all state DOTs participate in the LTAP (Local Technical Assistance Program) program of the Federal Highway Administration. This program was originally set up to provide local governments with better information to administer and maintain their local roads. Many states use circuit riders in conjunction with training programs and newsletters to assist in local road programs. Some states have expanded the role of the circuit rider to deal with land use/transportation issues as well.²

² Source: Beimborn, Edward, Mulroy, Mary and Schmitt Robert; *Technology Transfer Agents*; Technology Transfer Workshop; U.S. Department of Transportation, Federal Highway Administration, October, 1985 (Revised February 1988). p. 2-1-2, 2-1-3, 2-2-10, 2-2-11.

Access Management



Access management has been defined as “the process that provides (or manages) access to land development, while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity, and speed.”¹ This process is achieved through managing the design and location of driveways, median openings and points of access to the state highway system. The level of highway access control is based on the importance of the highway to regional and statewide travel as determined through a functional classification system.

Access Management Concepts

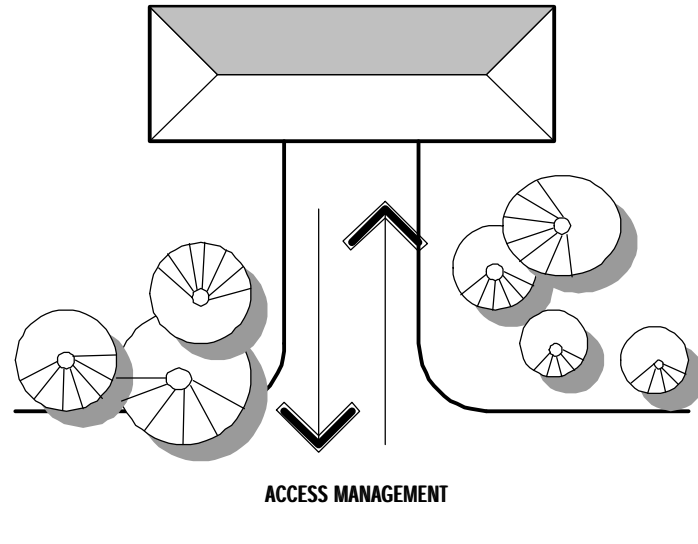
State highways can have a significant impact on the state’s economy and their mobility function must be protected. The main function of access management is to establish a balance between the existing traffic flow and highway access. The functional class to which the road belongs should be taken into consideration while providing access, with the objective of maintaining the appropriate quality

¹ *Overview of Access Management*. NCHRP Synthesis 233: Land Development Regulations that Promote Access Management. p. 3.

of traffic flow.¹ In order to achieve successful access management, land use development should be integrated with the layout and design of roads and major highways.

Legal Considerations

Government authority to engage in regulation is traditionally derived from the power to exercise police power to protect the public good.² Both state statutes and state constitutions provide procedural planning authority.³ When considering any form of access management, *governments must consider whether they have statutory authority to engage in any program of regulation, and whether this regulation is consistent with procedural requirements provided in State statutes.*⁴



Local land development activities can also be affected by access management procedures of the state DOTs.⁵ Proposed changes in land use, which affect the amount, type or intensity of traffic activity to a site, may require alterations in order to meet access requirements. These requirements can be imposed either by the state or local authority. However, in some states local agencies are prohibited from implementing access regulations more stringent than those issued by the state DOT. In some states, South Carolina and Oregon for example, approval must be obtained from both the local jurisdiction and the state. Approval by the state DOT does not relieve the applicant of the need to comply with local access requirements.

Land Use Connection

ISTEA instituted policy support for access management and coordinated land use and transportation solutions. Policies, like access management focus on making more efficient use of existing transportation facilities. By adopting a state policy on access control, state DOTs can establish a framework to induce local action that will effect changes in access management policies and increase

¹ Functional Integrity of the Highway System; Policy Paper #1. Third draft, 1997. p. 5.

² *Statutory Authority; Legal Considerations; Land Development Regulations that Promote Access Management; NCHRP Synthesis 233, Chapter 5. p. 24.*

³ Loc. cit.

⁴ Loc. cit.

⁵ *Ibid*, p. 24-25

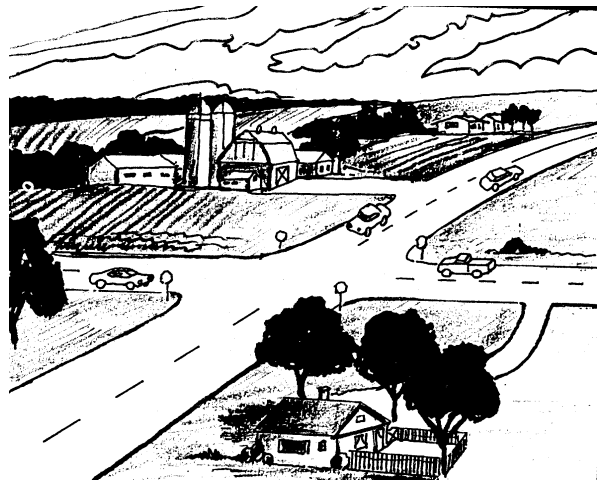
coordination between state and local agencies when making transportation planning decisions. Access management strategies may be incorporated into local plans and work programs when planning agencies attempt to resolve the inconsistencies between transportation facilities and the land use that still exists.

Interagency Coordination

Access management requires improved coordination between land use and transportation and between government agencies. While a state DOT logically initiates the statewide agenda to integrate access management practices into transportation planning, MPOs and local governments must also play a strong role in facilitating coordination on access management objectives.

Traffic Impact Analysis

A number of state DOTs, regardless of access management policies, require that a traffic impact analysis (TIA) be performed for any development along a state highway that attracts or generates traffic beyond a given threshold of peak hour trips. A TIA provides state transportation planners with a description of the development and land use, existing and future traffic patterns, existing roadway geometry with current traffic levels, and proposed access points and improvements. TIAs can be useful tools for identifying the land use impacts imposed by particular developments. By understanding the existing and future development within the study area, the best access points and improvements can be determined. However, to systematically determine the appropriate access points and geometric improvements, TIAs must correctly identify land development patterns for the study area.¹



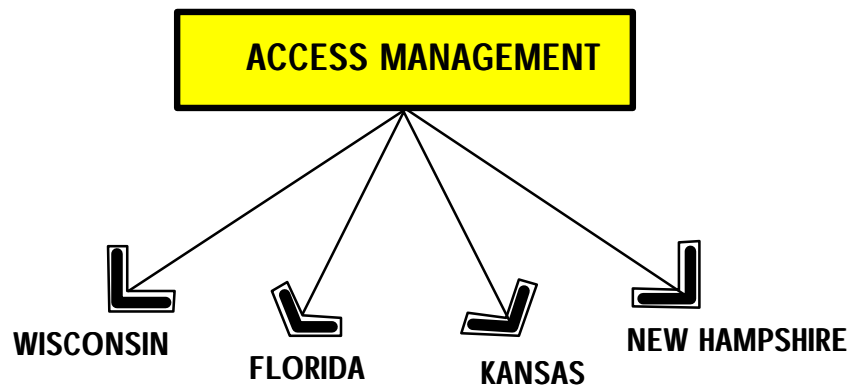
Driveway Permits Following Guidelines

At its most basic level, access management is handled through a driveway permitting process. State DOTs normally have specific guidelines for the placement of driveways along the state highway system. These guidelines may relate to placement of driveways near intersections, sight distances and frequency of driveways. Access control simply limited to a permit process would imply a rather passive approach to access management. More active strategies involve comprehensive access management planning and regulation of access systems.

¹ Wisconsin's Plan for Managing Access to State Highways; Wisconsin Department of Transportation, 1996.

Comprehensive Access Management

The ISTEA sets forth a recommendation for state DOTs to consider access management to promote congestion management and corridor preservation. While most states have some form of access management policy, a few states have taken the lead in progressive efforts to coordinate intergovernmental cooperation to successfully carry out access management goals. Access management can be effective when state DOTs develop broad programs and provide technical support to metropolitan planning organizations (MPOs) to include access management in comprehensive planning and land use management. Transportation elements of comprehensive plans provide a means of achieving well designed communities and roadway systems that adequately accommodate traffic flow. Local development decisions that follow these plans can cause development and traffic patterns that minimize future problems of land use and travel conflict. The following are some examples of this approach.



Access Management in Wisconsin

Wisconsin's Access Management System Plan delineates those state highways that will be subject to access management.¹ This highway network comprises a total of 5,320 miles and is made up of segments already subjected to a high degree of access control. The network consists of two groups of highways, those covered by the state transportation plan, Corridors 2020, and supplemental highways.² This network connects all of Wisconsin's population and economic centers.³ WisDOT also identified highways in areas where the present rate of traffic growth is likely to necessitate access management in the near future.

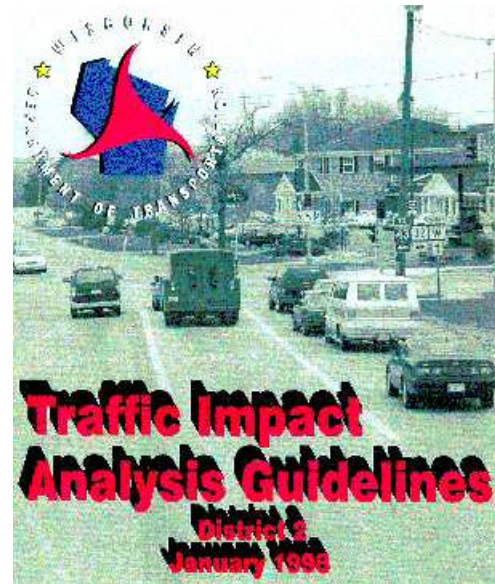
The state manages access to designated highways by the following methods:

¹ "System plan indicates roads where access will be managed"; Wisconsin's Plan for Managing Access to State Highways. Wisconsin Department of Transportation, 1996.

² Loc. cit.

³ Loc. cit.

- ◆ Purchase access rights at the same time that right-of-way is purchased.¹
- ◆ Designate “controlled access highways” that cannot have access without specific WisDOT approval.²
- ◆ Work with local governments to review development plans and subdivision plans for lands that are adjacent to or affect the traffic flow to a state highway.
- ◆ Insert covenants into deeds to limit accesses to a property³ along a state highway.



Access Management in Florida

Florida’s Access Management Act outlines regulation of access to the state highway system. The act also *assists in the coordination of land use planning decisions by local governments, which will serve to enhance managed growth within the state.* In addition, administrative rules have been adopted to deal with the application and permit process, with the classification system and with standards for access.

It is important to note that the Florida state statutes and administrative rules only provide standards under prescribed conditions. The procedures require close interaction between state DOT staff and local officials to successfully integrate access management into local level planning. Through the decentralized structure of FDOT, access standards serve as guides for MPOs and counties to draw upon for local plans. FDOT staff provides local administrative assistance to communicate these principles through training workshops.⁴



¹ “The Department of Transportation (WisDOT) manages access to state highways by:”; Wisconsin’s Plan for Managing Access to State Highways. Wisconsin Department of Transportation, 1996.

² Loc. cit.

³ Loc. cit.

⁴ Adapted from (a) Florida’s Access Management Guidelines; (b) Florida Statute 335 – The Access Management Act; (c) Rules of the Department of Transportation Chapter 14-97 State Highway System Access Management Classification System and Standards.

Access Management in Kansas

The Corridor Management Policy adopted by the Kansas Department of Transportation (KDOT) is directed at achieving best use of the state highway system. *The purpose of this policy is to assist local governmental units, KDOT employees, metropolitan planning organizations, architects, consulting engineers, contractors, developers and the general public with the criteria and procedures necessary to obtain reasonable access to abutting properties while maintaining safety and efficiency in the movement of people and goods on the state highway system.*¹ The policy is also meant to establish uniformity in the management of other state corridors in Kansas. The provisions of this policy act do not constitute a specific set of legal requirements. Rather, the act sets minimum standards for access installations and establishment of protected corridors.² The main purpose of this policy is to establish methods of corridor management that lead to a minimization of vehicle conflicts, improvements in safety and traffic operations, a reduction of delays and smaller major capital expenditures.³

The Corridor Management Policy specifies four categories of access management in conjunction with the state highway system.

- ◆ In order to minimize the number of conflicts, eliminate driveways by combining access points or providing access from other roads.
- ◆ Achieve better separation of conflict points by providing wide spacing between driveways and keeping driveways away from intersections.
- ◆ Allow for slower deceleration through geometric changes.
- ◆ Provide exclusive turning lanes so that turning vehicles and queues are separated from through traffic.⁴

KDOT can also purchase access rights to property or additional right-of-way.⁵ When choosing the strategy for access control, KDOT considers a wide range of factors, such as patterns of development, travel demand, environmental issues and efficient use of resources.⁶ All issues pertaining to corridor management are reviewed and managed by the Corridor Management Committee. The KDOT coordinates its efforts with local agencies and landowners in order to effectively implement the guidelines specified in this policy.

¹ *Corridor Management Policy*; Kansas Department of Transportation. p. 1.

² *Ibid.*, p. 2.

³ *Loc. cit.*

⁴ *Loc. cit.*

⁵ "Policy Application"; *Corridor Management Policy*; Kansas Department of Transportation. p. A-1.

⁶ *Loc. cit.*

Route 16 Corridor Protection in New Hampshire

Route 16 in New Hampshire is a major north-south highway along the eastern edge of the state. The Route 16 Corridor Protection Study stands an example of how land use and transportation can be integrated to initiate more efficient land use patterns. Some of the problems experienced by this corridor in the last few decades are:

- ◆ Urban sprawl and low-density development in the form of commercial strip development.¹
- ◆ Growing traffic congestion and pollution.
- ◆ Uncontrolled access and development along the corridor, which negatively impacts safety and visual quality.²

Parts of this route have become fully developed commercial strips, while other parts are quickly approaching this stage.³ The access management component of the Route 16 study addresses the interaction between land use and transportation.⁴ The New Hampshire Department of Transportation identified the following solutions in its study:

- ◆ Reduce new highway commercial development directly fronting on the corridor, but allow development in higher density areas that are served by consolidated access points.
- ◆ Stimulate higher density development by down-zoning existing commercial strips.
- ◆ Predefine and limit access points through joint local/state access management plans for both existing and planned commercial development areas.
- ◆ Improve and connect pedestrian, bicycle and transit facilities.
- ◆ Encourage land uses that generate fewer vehicle trips.⁵

Like other developing corridors in growing urban areas, Route 16 is also facing several obstacles to implementing more appropriate land use policies.⁶ There are advocacy groups whose interests differ with regard to development on this corridor. Some local residents would like to see more development in this corridor to enhance the local tax base, while the governing body would like to protect the corridor by implementing policies that control unlimited and unplanned growth. There is also a need to integrate the efforts of the local and state planning authorities in order to make effective, long-standing changes to the land use patterns in this corridor.

¹ "Route 16 Corridor Protection Study"; Land Use and Transportation Issue Summary; p. 2. July 1997.

² Ibid., p. 1.

³ Ibid., p. 3.

⁴ Loc. cit.

⁵ Ibid., p. 3-4.

⁶ Ibid., p. 4.

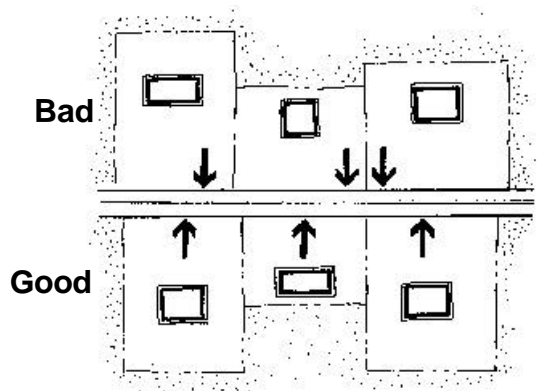
Some of the possible outcomes of effective access management cited by New Hampshire are:

- ◆ *Increase highway capacity.*
- ◆ *Reduce the need to spend tax money on capacity expansion.*
- ◆ *Protect the economic viability of parcels adjacent to arterials by preventing congestion that will discourage users from coming.*
- ◆ *Reduce travel and delay times.*
- ◆ *Reduce vehicle emissions by reducing acceleration, deceleration, and stops.*
- ◆ *Maintain a community's character.*¹

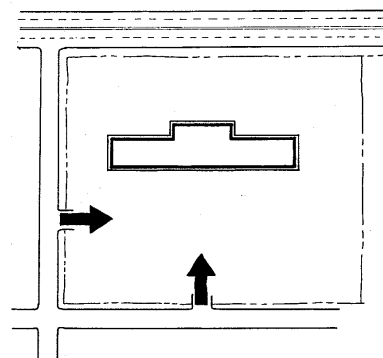
New Hampshire's local and state authorities are taking steps to control the number, spacing, and design of driveways and to remove turning vehicles from the travel lanes of arterial roads.² They are also paying special attention to the safety and mobility of pedestrians and people in vehicles and on bicycles. NHDOT is working actively with local agencies to create an effective and active access management program, which will achieve both its long-term and short-term goals of protecting and enhancing the existing highway system. New Hampshire does not yet have the legal or administrative structure to exercise strong access management statewide, but NHDOT plans to actively seek these mechanisms.³

Access Management Techniques

The NHDOT recommends the following access management techniques as means to resolve the traffic problems in different situations.



Safe Distance between Driveways



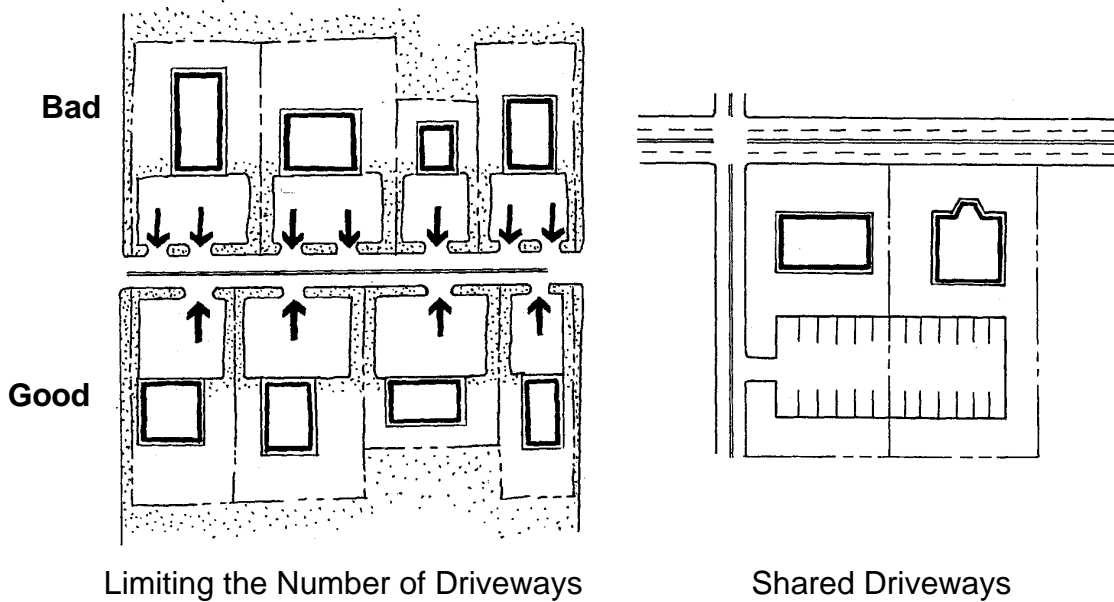
Corner Lot Access

¹ *Ibid.*, p. 2.

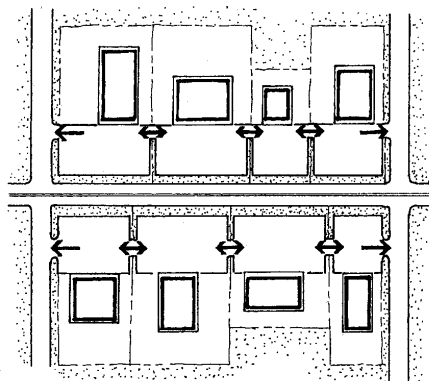
² *Loc. cit.*

³ *Ibid.*, p. 6.

- ◆ Gain a safe minimum distance between driveways by limiting the number of access points, thereby reducing conflicts between turning vehicles and vehicles in the travel lanes.¹
- ◆ Where possible provide corner lot access from the adjacent collector road.
- ◆ Place limits on the number of driveways to any given property.



- ◆ Create shared driveways to combine access points for residential and nonresidential sites and reduce conflicts on the arterial.²



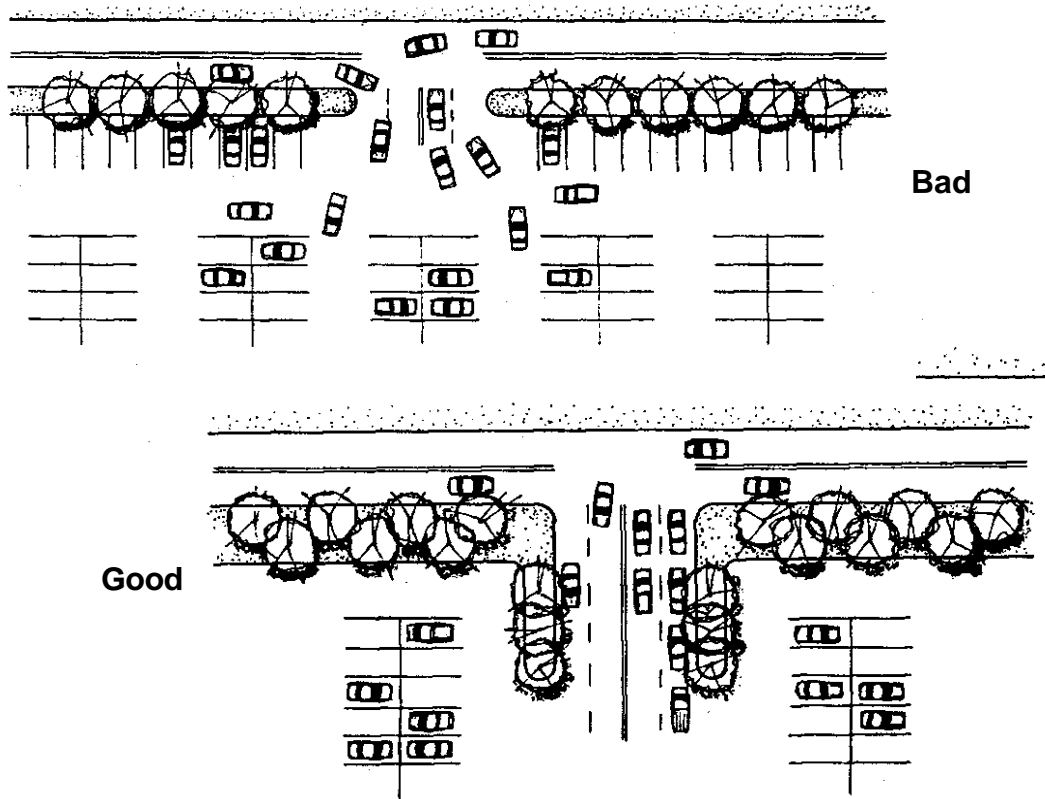
- ◆ Encourage interconnecting site developments to allow employees and customers to move from site to site without entering and exiting the arterial.³

¹ Ibid., p. 16.

² Ibid., p. 17.

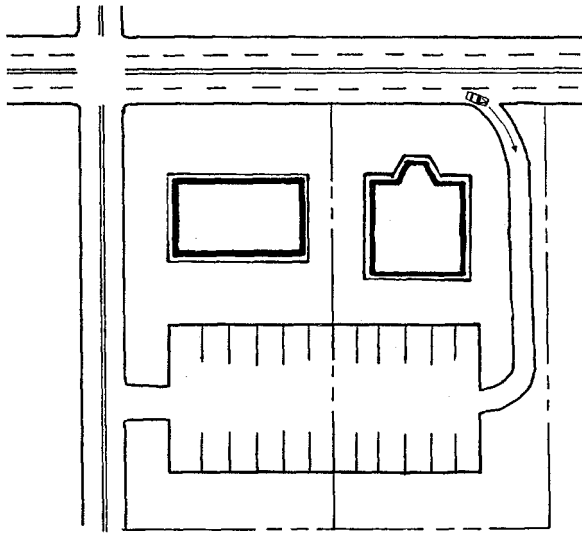
³ Ibid., p. 18.

- ◆ Increase throat length on driveways to parking lots to allow vehicles to move away from the access point and permit other vehicles to easily enter and exit the site.

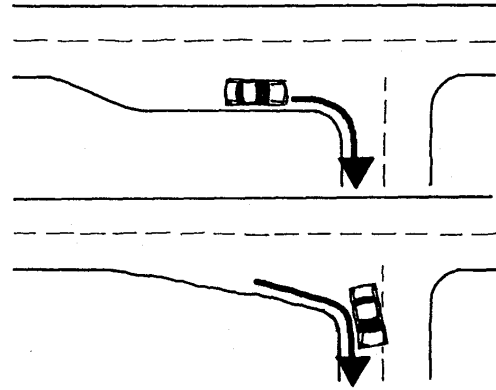


- ◆ Where warranted, provide both exclusive right-turn lanes and left-turn lanes to isolate decelerating vehicles from through vehicles or employ simpler driveway design methods to minimize the impact of a turning vehicle on other vehicles.
- ◆ Reduce conflicts by separating the entrance and exit for a site.
- ◆ Increase the turning radii to and from the arterial so that turning vehicles can maintain a higher speed.¹

¹ Ibid., p. 22.



Separating Entrance and Exit



Turn lanes and driveway design

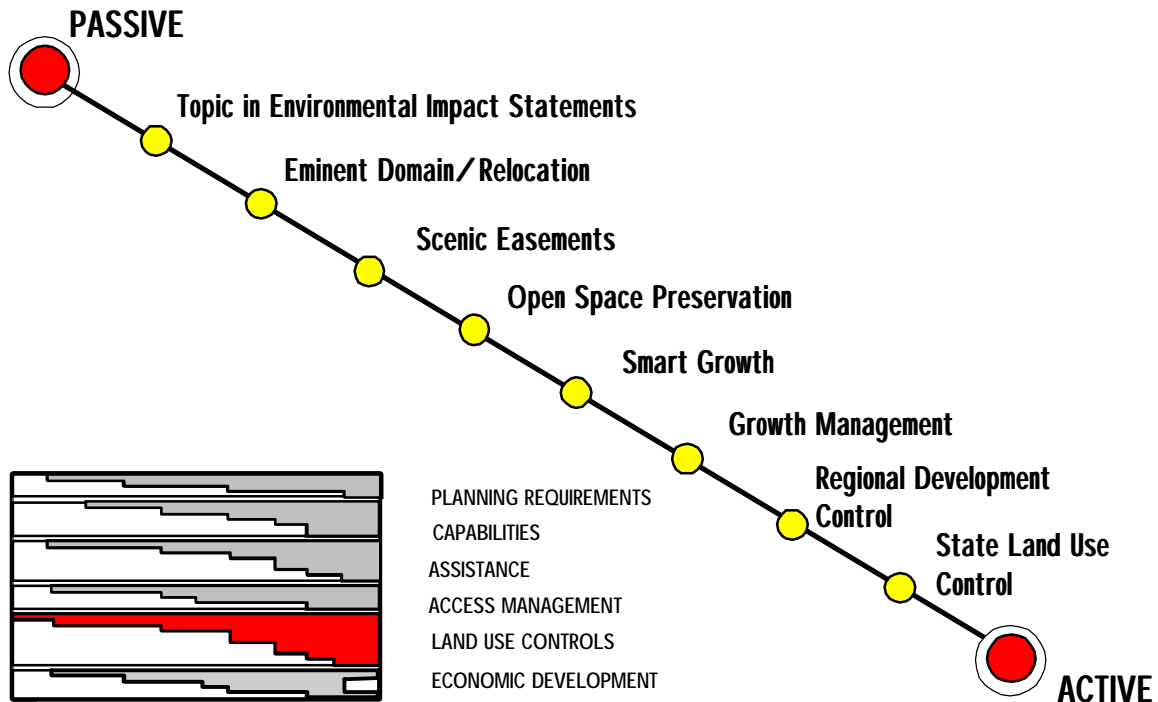
[Source for images: Access Management: Route 16 Corridor Protection Study; p. 16-25. April 1998.]

Assessing Benefits of Access Control

The benefits of access control relate primarily to the orderly flow of traffic on higher-order facilities. Theoretically, benefits could be assessed quantitatively at the project level, but the effort of performing the necessary analysis for assessment of general statewide policies or programs may not be worthwhile. The same measures of effectiveness that are used for judging the value of a project can be used for statewide program evaluation. These include time savings, crash reduction, emissions reductions, costs to public for access right purchases and direct or indirect cost increases to landowners. The cost difference between roads with and without access control is also relevant. However, the cost savings associated with being able to build a smaller cross section to carry the same amount of traffic would constitute a double counting of time savings and emissions reductions benefits.

For statewide program evaluation it is also necessary to account for induced demand in the measures of effectiveness. That is, improvements in capacity or speeds can result in more travel, thereby offsetting reductions in emissions and energy consumption.

Land Use Controls



Control of land use is a controversial subject in many locations. It involves a tradeoff between the rights of an individual landowner and the need to avoid adverse consequences of inappropriate land use on the population as a whole. There are a wide variety of programs used in those particular states that address this issue. Programs range from a passive approach, where land use impacts are documented in environmental impact statements, to extensive programs of growth management and land use control.

Land Use as a Topic in Environmental Impact Statements

The National Environmental Policy Act of 1969, Section 102, requires all federal agencies to prepare specific documentation on any action likely to impact the human environment. This documentation takes the form of an environmental impact statement. An EIS includes:

- ◆ *The environmental impact of the proposed action;*
- ◆ *Any adverse environmental effects which cannot be avoided should the proposal be implemented; and*

◆ *Alternatives to the proposed action.*¹

For all major proposals, an EIS must be prepared portraying all the relevant environmental impacts. The proposing agency is required to identify possible alternatives, which are also discussed and analyzed in the EIS. The EIS is then circulated to all interested parties and the public for their review. The input from these agencies and the public is also incorporated in the final document.

Environmental impact statements are documents that can deal with the interaction between land use and transportation. They can be instrumental in defining how transportation facilities affect land use. States have adopted different approaches in dealing with land use impacts related to transportation in their EIS requirements.

The Wisconsin Department of Transportation (WisDOT) has developed seven basic “environmental screening worksheets” and several “factor sheets” that evaluate the significance of various impacts. Some of the topics covered in these worksheets are:

- ◆ *Stimulation of secondary environmental effects.*
- ◆ *Creation of new environmental effects.*
- ◆ *Impacts on geographically scarce resources.*
- ◆ *Precedent-setting nature of the proposed action.*
- ◆ *Degree of controversy associated with the proposed action.*
- ◆ *Conflicts with official agency plans or local, state, or national policies, including conflicts resulting from potential effects of transportation on land use and land use on transportation demand.*
- ◆ *Cumulative environmental impacts of repeated actions of the type proposed.*
- ◆ *Foreclosure of future options.*
- ◆ *Direct or indirect impacts on ethnic or cultural groups.*²

Basic Worksheet 7 used by WisDOT relates directly to land use and covers the following topics:

- ◆ *General Economic Impact Evaluation:* This section examines the economic characteristics of the area in which the project is proposed and evaluates the economic advantages and disadvantages of the proposed project.

¹ *State Environmental Statute*; State Statutes; Federal and State Environmental Laws, Policies, Regulations and Agreements; Facilities Development Manual. Procedure 20-5-1, p. 1.

² *Format and Content of Environmental Documents*; Environmental Impact Statements (EIS) – Type of Action; Environmental Documents, Reports and Permits; Facilities Development Manual. Procedure 21-15-1.

- ◆ *Commercial and Industrial Impact Evaluation:* In this section the commercial or industrial area affected by the proposed project is identified. The possible degree of impact is evaluated through a series of detailed questions in this regard.
- ◆ *Agricultural Impact Evaluation:* The land acquired for the given project is classified as crop land or pasture, woodland, wetland, yard, road, etc. This section also identifies the effects on farm operations often caused by a change in access.
- ◆ *Wetland Impact Evaluation:* This section identifies the extent of work proposed in the wetland under consideration, in the form of excavation, fill, marsh disposal, etc. At this stage it is also important to identify any endangered or threatened species, which either permanently or seasonally inhabit these wetlands and would likely be affected by the proposed course of action. This section further lists the various options for wetland mitigation in terms of avoidance or compensation for unavoidable loss.
- ◆ *Streams and Floodplains Impact Evaluation:* All streams (and in turn, all endangered or threatened species) and wetlands or other land areas likely to be affected by the proposed action are identified here.
- ◆ *Lake or Waterbody Evaluation:* This section identifies the waterbody affected by the proposed project. The steps to be implemented for erosion control and storm water management are also evaluated.
- ◆ *Upland Habitat Impact Evaluation:* This section studies the possible effects of the proposed work in the upland habitat area being evaluated and measures the extent of impact on the plant and animal life in that area.
- ◆ *Air Quality Impact Evaluation:* The project may often require that an air quality analysis be performed and may require a construction permit prior to actual construction.
- ◆ *General Sound Quality Impact Evaluation:* There may be a need for noise analysis. This section also identifies the noise abatement measures to be implemented for the action.
- ◆ *Unique Area Impact Evaluation:* Unique areas include public parks and recreation areas, wildlife and waterfowl refuges, historic properties, archeological sites, special coastal areas, etc. This section evaluates the degree of impact on these specified areas.
- ◆ *Hazardous Substances or Underground Storage Tanks:* This section identifies the parcels affected by the proposed project and possible contamination in the affected sites.
- ◆ *Aesthetics:* The principal objective of this section is to study the effect that this project would have on viewer groups and to avoid adverse visual effects.

The sections listed above not only identify the different effects of the proposed project on the environment, but also identify the various mitigation measures to be adopted for each of these effects.

Environmental impact statements are required for all federal actions with significant environmental impact and for similar state actions requiring federal funds or permits. In addition, many states have state environmental policy acts (SEPA), which mimic NEPA for all state actions. For example, Wisconsin's WEPA aims at *improving agency procedures through public involvement and participation*.¹ In some states, such as California, private projects are subject to the creation of an environmental impact report (EIR).

Courts have held that EISs are not binding on decision makers, but a good faith effort must always be made to document important impacts. Impacts can be either physical or social, but purely economic impacts or psychological impacts need not be included. Historically, the wide dissemination of information on the environmental impacts of transportation projects has had a profound effect on the design and implementation of these projects.²

Secondary Impact Analysis - Wisconsin

Wisconsin provides an example of an extended environmental review of the land use impacts of transportation projects. WisDOT developed a technical reference guidance document for its districts, whereby a project's potential to change land development patterns can be determined.³ The document provides general information on land use planning, development regulation, and the relationship between transportation investments and land development patterns. The document was presented to district managers in June 1997 as a guide for conducting current practices in the NEPA/WEPA process; however, none of the steps in the evaluation process is considered mandatory by WisDOT.

The framework provides analysis for assessing impacts for potentially significant actions. In defining the project study area, the size of the area can be found in several ways.

- ◆ *Traffic shed – the entire area served by the transportation project to reach a major destination.*⁴
- ◆ *Commuter shed – the area served by the transportation project for commuting to a major destination.*⁵

¹ *State Environmental Statute, op. cit.*, Procedure 20-20-1, p. 1.

² State Statutes, Federal and State Environmental Laws, Policies, Regulations and Agreements; Facilities Development Manual, State of Wisconsin Department of Transportation. Format and Content of Environmental Documents, Environmental Documents, Reports and Permits, Facilities Development Manual, State of Wisconsin Department of Transportation.

³ *Use of This Technical Reference Guidance Document; Indirect and Cumulative Effects Analysis for Project-Induced Land Development; Technical Reference Guidance Document; Wisconsin Department of Transportation.* p. I-1.

⁴ *Definition Methods; Indirect and Cumulative Effects Analysis for Project-Induced Land Development; Technical Reference Guidance Document; Wisconsin Department of Transportation.* p. I-1.

⁵ *Loc. cit.*

- ◆ *20-Year Growth Boundary – the area expected to develop in the next twenty years.*¹
- ◆ Interview – ask “experts” what land area may be affected by the project.

Analysis of the indirect and cumulative effects on land development at the project level is different from local land use planning. Local land use planning merely studies and develops local goals and community vision, while project level analysis focuses on how the project alternatives affect local land use and land use plans. The guidelines provided in the reference guide are followed by local jurisdictions and consultants in the transportation planning process.

Eminent Domain and Relocation

Another major issue of concern with all state governments is eminent domain and relocation, that is when people are displaced from their homes, farms or businesses. Eminent domain is used to acquire private property for state or federal projects, such as construction of highways, airports and mass transit facilities.² The agency acquiring the land is required to compensate for relocation by providing moving costs and covering the cost of renting or purchasing comparable replacement housing following several statutes.³ One such statute is the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.⁴ Title VI of the Civil Rights Act of 1964 relates to this topic by stating, “No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal assistance.”⁵ This act thus protects individuals *from displacement, isolation, increased or decreased accessibility during the planning and implementation of a federal project.*⁶ At the state level, some states, such as Wisconsin, have implemented Rights of Landowners under Eminent Domain Law, which gives the affected public the right to be compensated justly for their loss. Another law that is applicable in that state is the Wisconsin Relocation Law, which requires relocation assistance and compensation to persons displaced by a public project.⁷

¹ Ibid., p. 1-4.

² *Rights of Landowners under Wisconsin Eminent Domain Law, Federal and State Environmental Laws, Policies, Regulations and Agreements, Facilities Development Manual. Procedure 20-20-25, p. 1.*

³ Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Federal and State Environmental Laws, Policies, Regulations and Agreements, Facilities Development Manual. Procedure 20-5-25, p. 1.

⁴ Loc. cit.

⁵ Title VI, Civil Rights Act of 1964, Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Federal and State Environmental Laws, Policies, Regulations and Agreements, Facilities Development Manual. Procedure 20-5-35, p. 1.

⁶ Loc. cit.

⁷ *Wisconsin Relocation Law, Policies, Regulations and Agreements, Facilities Development Manual. Procedure 20-20-25, p. 1.*

Scenic Easements, etc.

Scenic easements provide another way in which state agencies have control over land use that has unique characteristics. *“A scenic, conservation, or historic easement is the acquisition of certain limited rights to, or interests in, real property; essentially it is an agreement between the owner of the property and the holder of the easement that the land will be restricted from certain specified uses that might compromise its scenic, historic, or other designated qualities”*.¹ The agency pays the land owner for the right to control the scenic

characteristics of property, keeping in mind the larger good of the community.

The reasons for which a scenic easement is issued could be natural resource protection, scenic view protection, historic preservation, etc. Scenic easements are popular ways to retain the environment in its natural state or try to retain the unique character of a neighborhood. One of the outstanding examples is the Big Sur Land Trust in California where easements were issued in order to protect Highway 1 and thereby preserve the scenic beauty of the drive along California’s Pacific Coast. Generally, local agencies take the initiative in designating a road or highway as a scenic byway. A state DOT usually works in conjunction with the local agency in deciding which roads or highways should be protected.²



Open Space Preservation

State and local agencies can protect agricultural or other desirable open spaces from future development by means of protective easements or by incorporating it in the comprehensive plan for the community. For example, a desirable open space can be protected in its natural state by designating it as a park or parkway. *“A parkway, which is a special unit of the National Park System, is a highway for recreational passenger car traffic with a wide right-of-way that insulates the roadway from abutting private property, minimized intersections and access points, and protects natural scenic values.”*³



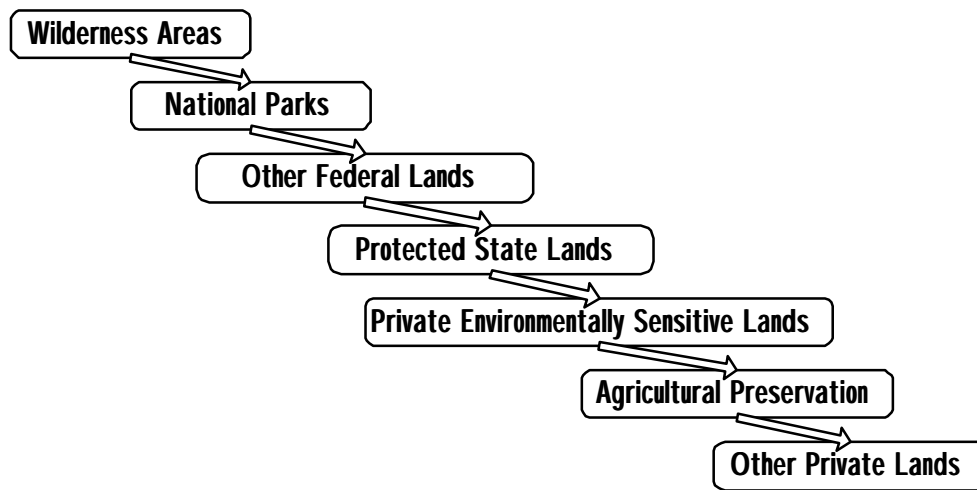
¹ *Scenic or Conservation Easements*; Final Case Study for the National Scenic Byways Study, U.S Department of Transportation, Federal Highway Administration, September 1990. p. 10.

² Adapted from Final Case Study for the National Scenic Byways Study; U.S. Department of Transportation, FHWA. September 1990.

³ *Ibid.*, p. 16.

An example of this approach can be found in Wisconsin, where an agreement to expand Highway 12 north of Madison included provisions to purchase development rights in the corridor to protect rural areas from increased urban sprawl related to the expanded highway. A total of \$15 million for land use planning and conservation land acquisition costs will be available for the 18 mile road widening project. The state will work with the Nature Conservancy to protect open space and specific natural areas as part of the agreement and will also provide staff assistance for local land use planning efforts.¹

Open space preservation programs depend on the type of land to be preserved. The following flow chart represents the hierarchy of open spaces usually protected by federal and state agencies as part of various open space preservation programs. Highest priority is given to the lands at the top of the chart, with lesser priority to lower levels. In general the trend has been to move down the list with additional programs to preserve additional land use types.



¹ Murphy, Kevin, "Agreement finally reached on widening Highway 12", Milwaukee Journal Sentinel, March 5, 1999.

Smart Growth: Maryland



[Source: <http://www.op.state.md.us/smartgrowth/>]

Policy Framework

Smart growth is an integrated growth management approach used in Maryland. It began in 1992 with the Economic Growth, Resource Protection and Planning Act, which created a set of policies called the Seven Visions.¹ These policies served to guide the actions of everyone involved in Maryland's land management.² The smart growth legislative package restricts *most state infrastructure funding, economic development, housing and other program dollars to Priority Funding Areas*³ designated by local governments. Smart growth policy objectives are integrated into the transportation system through the planning process.

Priority Funding Areas

The smart growth initiative provides the opportunity for the state DOT to influence local land use decisions by directing transportation resources to priority funding areas. These areas are designated because they have existing infrastructure to support new development. Maryland's smart growth policy affects the project process in which MDOT works with local communities to select modal alternatives to meet transportation needs. The 1997 smart growth legislation provides exceptions for project funding that does not occur in designated Priority Funding Areas. Such cases include projects that are *necessary to protect public health or safety, or are related to commercial or industrial activity* that can not be accommodated in an already developed area.⁴

It is important to note that under the smart growth legislation, local governments still have ultimate control over land use and transportation decisions by focusing the distribution of funds to areas designated as priority funding areas, and thus

¹ *What you need to know about Smart Growth and Neighborhood Conservation*; Managing Maryland's Smart Growth; Maryland Office of Planning. May 1997. p. 5.

² Loc. cit.

³ Ibid., p. 6.

⁴ Ibid., p. 11.

meeting the requirements of the state. However, MDOT may use the project planning process to communicate the state's interests when working with local governments.

Interagency Coordination

While MDOT has a leading role in providing basic infrastructure needs for the implementation of the smart growth law, the ultimate success of smart growth relies on all state agencies working together to provide the services to priority funding areas for orderly, planned development. MDOT has already coordinated with the departments of Housing and Community Development and Business and Economic Development in the implementation of neighborhood conservation projects.

Implementation

Counties give the Maryland Office of Planning the exact boundaries of their Priority Funding Areas.¹ The Office of Planning in turn provides this information to all agencies involved in project development. This office also runs a review process for state funded projects in which each state agency reports annually on its impact on the implementation of smart growth.²

Planned Growth

There are several key components of this program.

- ◆ Directed Funding – Through Maryland's smart growth initiative, infrastructure funds will be directed toward the priority funding areas designated by local governments according to state criteria. Under the smart growth legislative package, funding programs have been developed to provide for compact development.
- ◆ Rural Legacy Program – This grant program redirects existing state transfer tax revenue toward purchasing properties, property rights, or perpetual easements in rural areas threatened by sprawl development.³
- ◆ Live Near Your Work Program (LNYW) – This grant program provides home buyers who agree to live in a locally designated LNYW area with a minimum of \$3,000.⁴

Responsibilities of the Local Government:

Under the smart growth program local governments must do several things.

- ◆ *Prepare and update transportation elements of comprehensive plans that are consistent with the Visions set in 1992.*⁵

¹ *Ibid.*, p. 10.

² *Loc. cit.*

³ *Ibid.*, p. 12.

⁴ *Ibid.*, p. 13.

⁵ *Ibid.*, p. 3.

- ◆ *Provide implementation and development mechanisms consistent with comprehensive plans.*¹
- ◆ *Design Priority Funding Areas in accordance with state standards.*
- ◆ *Certify proposed transportation projects' locations in Priority Funding Areas.*²

Responsibilities of the State Government:

The responsibilities of the state agencies extend over a wide range of activities. Some of these duties include:

- ◆ *Providing local governments planning assistance;*
- ◆ *Implementing Visions as state growth policy;*
- ◆ *Reviewing State funding for consistency with Visions;*
- ◆ *Redirecting capital funding to developed areas and Priority Funding Areas designated by local governments;*
- ◆ *Determining Rural Legacy Areas;*
- ◆ *Providing employers tax credits for new employees in Priority Funding Areas;*
- ◆ *Administering Brownfields Revitalization Program;*
- ◆ *Offering homebuyers incentives within designated Live Near Your Work Program; and*
- ◆ *Assessing infrastructure needs.*³

Growth Management

Growth management is a strongly active program to direct urban development into desirable patterns. Growth Management from a transportation and land use perspective follows from legislative rules, which outline the framework for interagency cooperation to achieve managed growth statewide. Moreover, it is vital to the program's success that there be local support for and participation in these efforts to effectively manage a state's growth patterns.



Growth Management policies do not normally come directly from state DOTs. However, there are many actions and subprograms that result from growth management which affect transportation decisions. State DOTs typically perform review functions or provide local funding assistance for transportation improvements, which adhere to growth management strategies. While the lead

¹ Loc. cit.
² Loc. cit.
³ Ibid. p. 4.

state agency sets standards for development, the state DOT must also comply with and review necessary infrastructure improvements associated with development decisions. State growth management acts do not, in fact, limit local control of land use decisions. Instead, they provide a nexus between local level decisions and state funding for projects. Case study examples from Florida, Oregon, Tennessee and New Jersey illustrate how state agencies can work together with local governments to manage growth.

Florida's Growth Management Program

Florida's growth management program was enacted through the Local Government Comprehensive Planning and Land Development Regulation Act. The central theme of this program, administered by the Department of Community Affairs, is to address the problem of urban sprawl.

Comprehensive Plans

All FDOT sponsored roadway projects are bound by state statute to be in compliance with the local comprehensive plan for the specific project's limits. The FDOT looks to MPOs for guidance in regard to local transportation decisions. For example, an FDOT district staff member sits as a nonvoting member at all MPO committee and board meetings.

Each MPO is required to develop and update a comprehensive plan that includes land use, highway and transit elements. These plans must be locally adopted and approved by the Department of Community Affairs according to the growth management standards. Four-fifths of the state is located within a MPO.

- ◆ All goals, objectives, and policies, as well as the future land use and traffic circulation maps in local plans must be supported by and based on specific data and analyses. This requirement provides a basis of factual information for growth management decisions, which injects more objectivity into the planning process.
- ◆ A concurrency requirement mandates that *"public facilities and services needed to support development shall be available concurrent with the impacts of such development."* If a new development would prevent a local government from maintaining a level of service it has established, the development must wait until that particular facility or service can be brought up to standard. Concurrency is the cornerstone of the growth management process.

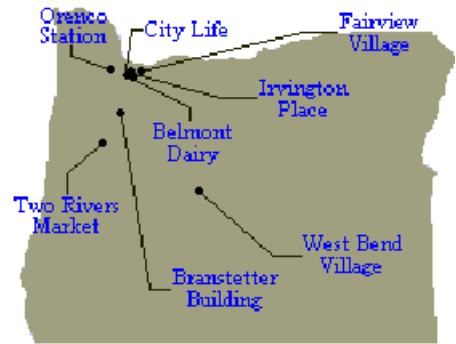
Oregon Transportation and Growth Management Program

In 1993, the Oregon Department of Land Conservation and Development (DLCD) and the Oregon Department of Transportation (ODOT) jointly established the Transportation and Growth Management (TGM) program to assist local governments in establishing policies that support state growth management objectives. The TGM program includes a variety of jointly funded projects that

illustrate the benefits of the policy tools recommended by the Urban Growth Management Task Group, one of which includes Transportation Efficient Land Use Strategies. Both federal and state funds are being directed towards this program in keeping with the provisions of the 1991 ISTEA. The following map shows some of the locations in Oregon where Smart Development Projects are being implemented.

Transportation Efficient Land Use Strategies

The goal of TGM is to review existing comprehensive plan policies to address the connection between land use and transportation. Since land use decisions affect transportation and vice versa, strategies were developed to evaluate local planning policies for encouraging land use patterns that incorporate walking, bicycling and public transit as alternate modes of transportation for everyday trips.



[Source for map: <http://www.lcd.state.or.us/issues/tgmweb/about/index.htm>]

Transportation Planning Rule

Under the Transportation Planning Rule, local jurisdictions are obligated to consider land uses, densities and design standards that help meet transportation needs. The rule sets requirements for coordination among affected levels of government for preparation, adoption, refinement, implementation and amendment of transportation system plans. Through coordination with local jurisdictions in the development of transportation system plans, DLCD assures that planned transportation systems will support a pattern of travel and land use that avoids air pollution, traffic and livability problems. ODOT is responsible for preparing and adopting a statewide Transportation System Plan (TSP), which identifies a system of transportation facilities and services adequate to meet identified state transportation needs.

Grants

The TGM program provides grants to cities, counties and MPOs for three purposes:

- ◆ Developing of local transportation system plans (TSPs) and implementation measures;
- ◆ Writing updates to land use plans which meet state transportation needs; and
- ◆ Implementing urban growth management strategies.

Advocacy for Smart Development

Livable Oregon, Inc., a non-profit organization, works under contract with the TGM program to encourage developers to offer designs supporting travel by foot, bicycle and transit.

Quick Response Team

The TGM program provides consultant teams to assist communities or developers meet statewide smart development design objectives that promote transit-supportive density, as well as pedestrian and bicycle travel modes.

Technical Assistance

TGM sponsors workshops designed to help local governments develop or amend transportation system or land use plans that apply urban growth management tools. A handbook, "Tools of the Trade," describes planning techniques, which can be used to achieve the goals set forth in the Transportation Planning Rule.¹

Tennessee's Growth Boundary Policy Act

The Growth Boundary Policy Act implemented in Tennessee is primarily intended to influence the distribution of TEA-21 funds within the state. With this act every county within the state must write a comprehensive land use plan and the local governing body must also adopt this plan.² This comprehensive plan will address transportation and public infrastructure needs in each county and should be in overall compliance with the TDOT's goals.³ Some of the issues addressed by means of this act to:

- ◆ Provide for adequate infrastructure or the upgrading of existing infrastructure;
- ◆ Reuse already developed land within the existing growth boundaries rather than adding infrastructure and annexing new areas for development; and
- ◆ Redesign the existing network of roads so as to revitalize the urban centers, avoid exclusionary zoning and encourage mixed-use development.

According to this act, each Urban Growth Boundary (UGB) should clearly demarcate a reasonably compact region having the capacity to accommodate 20 years' worth of residential, industrial and commercial growth.⁴ It is the

¹ <http://www.lcd.state.or.us/issues/tgmweb/about/index.htm>

² Pfitzer, Jeff; Transportation Planning and Tennessee's Growth Boundary Policy Act: A Few Issues to Consider. Transportation Planning, Fall 1998. p. 1.

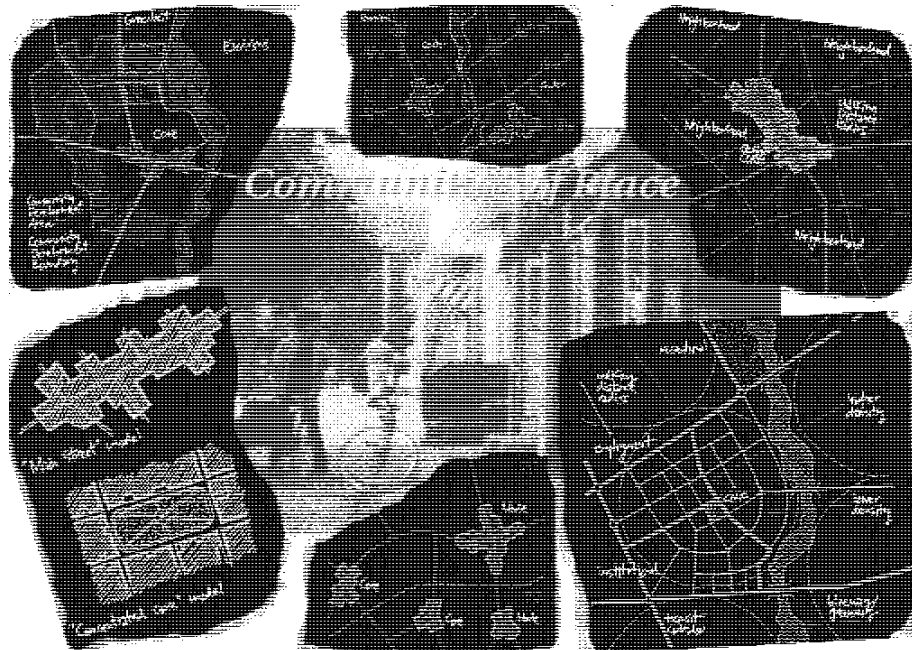
³ *Ibid.*, p. 2.

⁴ *A Guide for Conducting County Level Land Use Plans*; Tennessee Growth Policy Act Project: Fulfilling the Potential of Law; School of Planning, University of Tennessee, Knoxville. p. 1. <http://planning.cap.utk.edu/tgp/pubc1101.html>

responsibility of the local planning agency to manage and control urban expansion outside of such established growth boundaries.¹ The municipality should consider the impacts of urban expansion on the surrounding agricultural lands, forests, recreational areas and wildlife management areas.² If growth cannot be accommodated within the specified growth boundary, then the municipality should identify potential new areas adjoining the existing high growth areas so that they can easily be incorporated into the network of road, utility infrastructure and public services.³

This act reinforces the need for smart growth, especially in those less-developed areas that are now growing rapidly.⁴ With the implementation of Tennessee's Growth Boundary Policy Act, every county in Tennessee will effectively adopt a comprehensive plan by July 2001.

State Development and Redevelopment Plan, New Jersey



The New Jersey Legislature enacted the New Jersey State Planning Act in 1986, which in addition to other requirements created the State Planning Commission

¹ Ibid. p. 2.

² Loc. cit.

³ Ibid. p. 3.

⁴ *Smart Growth; Tennessee Growth Policy Act Project: Fulfilling the Potential of Law*; School of Planning, University of Tennessee, Knoxville. p. 1.
<http://planning.cap.utk.edu/tqp/pubc1101.html>

and a statewide planning process. A process called “cross-acceptance”, is used to ensure that governments at all levels and the public participate in preparing the State Plan with the goal of conserving and revitalizing urban centers while promoting economic growth. In response to this act the State Planning Commission developed the State Development and Redevelopment Plan (SDRP). The SDRP is being developed through the involvement of five state agencies including the state DOT.

An essential element within the SDRP is a set of statewide policies for transportation which serves *to improve transportation* systems by coordinating transportation and land use planning and by recognizing the impacts of transportation investment on land and economic development.¹ Twenty policies were developed as action steps to coordinate transportation planning on a statewide level, as required under ISTEA. Of these policies, three have particular relevance to this discussion.

- ◆ Policy 1: Coordination of Transportation Planning Among Public, Quasi-Public, and Private Agencies
- ◆ Policy 2: Integration of Land Use and Transportation Planning
- ◆ Policy 17: Transportation Planning as a Redevelopment and Development Tool

The SDRP serves as a guide for public and private sector investment in New Jersey’s future. Centers and Planning Areas are designated by the State Planning Commission, through which state funding is funneled for development or redevelopment projects. The success of the plan takes place through the exercise of existing public powers at local, regional and state levels in coordinated transportation, land use and economic development planning. In addition, the DOT provides funding for the following programs that give assistance to municipalities which have formally participated in the implementation of SDRP.

- ◆ Local Aid for Centers Program – \$1 million is available for nontraditional transportation improvements that advance the visions, planning and implementation of SDRP.
- ◆ Transportation Enhancements Program – Funded under ISTEA, this program focuses on transportation projects designed to preserve environmental and cultural resources through encouraging alternative modes of transportation. Priority is given to projects in state designated centers.²

¹ *The State Planning Act*; State Development and Redevelopment Plan, New Jersey; The 1997 New Jersey State Planning CD-ROM.

² Adapted from The New Jersey State Development and Redevelopment Plan; 1997 New Jersey State Planning CD-Rom; <http://www.state.nj.us/osp/ospplan2.htm>

Transportation Development District Act

The TDD Act, enacted in 1989, provides for the coordination of transportation investments with land development in high growth districts and for private developer contributions. Its purpose is to create special financing districts in designated high growth areas to meet transportation needs through public-private partnerships.

Development of Regional Impact (DRI)

Florida Control of Projects of Regional Significance

According to Florida law a development of regional impact (DRI) “means any development which, because of its character, magnitude, or location, would have a substantial effect upon the health, safety, or welfare of citizens of more than one county.” The DRI law specifies how such large development projects are to be reviewed and approved.¹

Specifically, the Department of Community Affairs is the agency that requires regional planning council review of all large-scale developments, such as residential subdivisions, airports, hospitals, office parks, shopping centers, etc., where the magnitude would affect multiple jurisdictions. The DRI process provides a more intensive review than most local communities are able to give. Developers are required to prove that the existing roadway provides sufficient anticipated capacity or they must wait until the transportation service has sufficient capacity for additional traffic as measured by a state level of service standard. For example, for a proposed industrial park the DRI statute might specify parking facilities of more than 1500 vehicles or a minimum site extent of one square mile. Developers might also make significant contributions to the transit system that provides service to the area of development.

The Florida Quality Developments Program was adopted to provide developers with an incentive to go through review of developments of regional impact (DRI), rather than design developments just below the threshold to avoid the process. This program allows the state to review and resolve problems early in the process, and to delegate the review of DRIs to local governments that show they have the capacity to review a DRI.²

¹ *Ask DCA: Development of Regional Impacts (DRIs); Community Planning, Florida Department of Community Affairs, Summer 1998. Vol. 7, Number 2. p. 10.*

² Adapted from: (a) CH 28-24 Developments Presumed to be of Regional Impact; (b) Development of Regional Impact (DRI) Review; (c) Rules of the Department Community Affairs Division of Resource Planning and Management Schedule for the Transmission and Submission of Local Government Evaluation and Appraisal Reports; (d) Development of Regional Impact Application for Development Approval under Section 380.06, Florida Statutes.

Maximum Lane Standard

In 1994, Florida passed a maximum lane standard for all interstate and intrastate highways, including the Florida Turnpike toll highway. Although pre-existing segments of I-95 in Dade County already exceed this standard, no future infrastructure may exceed the standard of six general use lanes in each direction of traffic flow. The lane standard allows up to two special lanes such as HOV or express lanes in each direction in addition to the six general use lanes. However, local jurisdictions may undercut this standard by imposing transportation impact fees on private development that effectively go toward funding of road infrastructure to support such increased levels of development. FDOT has no control over locally funded roadway infrastructure standards. In addition, select charter counties have home rule rights that imply extra power over local decisions and land planning authority.

Urban Service Areas

Although not required by state planning legislation, various municipalities in Florida have enacted urban service areas to stop leap-frog development and promote infill development.

State Land Use Control

Only the state of Hawaii has a role in the direct control of land use. Hawaii is the example of the most active land use strategy for state involvement.

Assessing Transportation Benefits of Land Use Controls or Incentives

Land use controls or incentives (such as smart growth programs) have both positive and negative benefits, so a careful weighing of all the consequences is necessary to understand whether a land use policy or program is beneficial overall. Positive benefits are largely intangible, so rigorous economic analysis is not always possible.

By their very nature, land use controls tend to restrict people's sets of destination choices. Consequently, it is entirely possible that the benefits of reaching desirable locations, as measured by conventional economic theory, are negative when compared to more laissez-faire policies.

The transportation effects of land use policies can be conveniently determined by four-step travel forecasting models. Comparisons between alternatives, including the null alternatives, can reveal the size and direction of travel benefits. To make that comparison it is recommended that the enhanced consumer surplus method from the report "Measurement of Transit Benefits" be used. The procedure extends conventional economic theory to a multimodal context, accounting for the full perceived cost of travel between all origins and destinations and across all possible modes. A major drawback of this procedure

at the state level is that only a few states have (at this writing) operational four-step travel forecasting models.

Nontravel benefits owing to land use controls and incentives can be diverse. Some of these benefits can be calculated, but most cannot. Here is a list of commonly cited benefits of more compact land use patterns.

- ◆ Better ability to provide high quality transit service, resulting in lower costs for personal transportation
- ◆ Shorter trip lengths and better modal opportunities reduces air pollution, noise pollution and energy consumption
- ◆ Potentially lower cost of provision of utilities
- ◆ Potentially lower cost of provision of roads
- ◆ Less land consumed for transportation facilities, including parking
- ◆ Open space preservation, including farmland, wilderness and wetlands
- ◆ Greater opportunities for community interaction
- ◆ Potentially favorable distribution of land values and tax base
- ◆ Potentially favorable distribution of job sites
- ◆ Potentially favorable distribution of services and recreational opportunities
- ◆ Potential reduction in racial and social inequities
- ◆ Improvement in community image
- ◆ Greater incentive for reuse of land and for cleaning existing hazardous sites

Since emissions reductions may be required under the Clean Air Act Amendments of 1990, air pollution benefits in nonattainment areas are most readily assessed by determining the cost of a second best alternative for achieving the same reduction in emissions. A convenient second best alternative is the use of travel pricing mechanisms to achieve similar reductions in emissions without land use controls. The benefits of not needing pricing mechanisms to achieve required emissions reductions is readily assessed by the enhanced consumer surplus method, described in "Measurement of Transit Benefits".

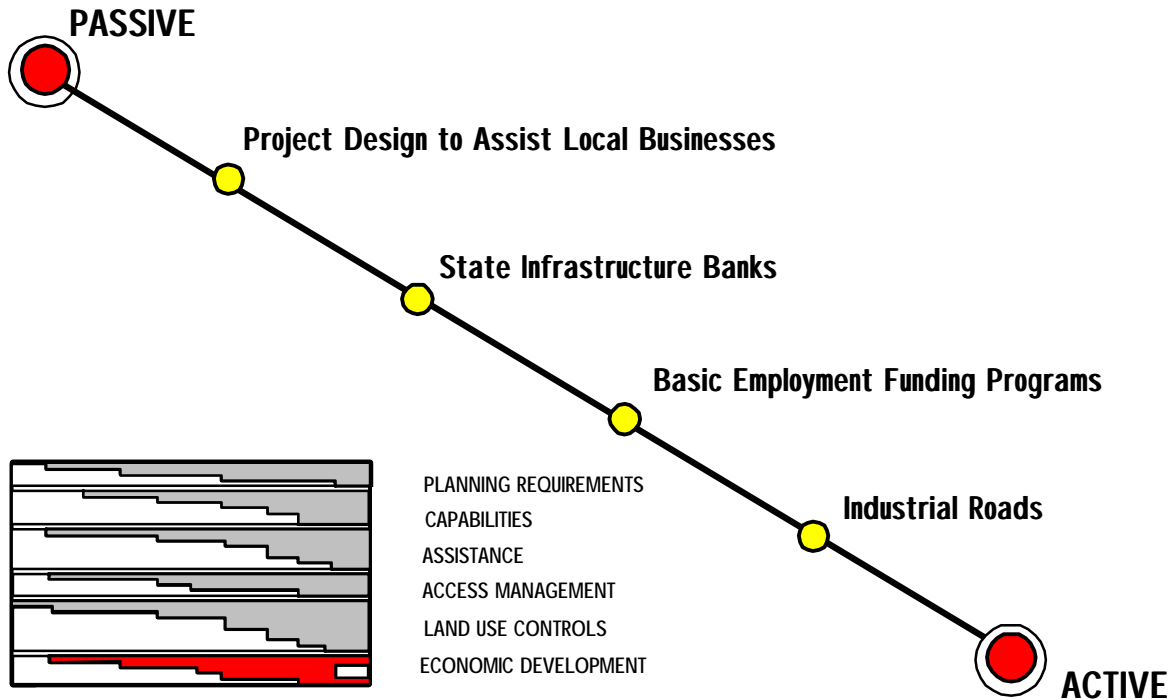
When performing analysis to assess air pollution and energy impacts, it is important to consider effects of compact land use patterns on numbers of trips. It has often been observed that communities with shorter trips have, on average, greater numbers of trips.

An effective program to control or concentrate growth should have an impact on land values. While the distribution of land values can be important for assessing the quality of the program, it would be difficult to count overall land value increases as true benefits. The reasons for some of the land value increases may have already been counted in other benefit measures, and other increases may be viewed simply as transfer payments.

Intangible benefits must be described in a manner that allows ready assessment by decision makers. Maps and charts, as well as descriptions can provide a good understanding of the size and scope of the benefits.¹

¹ Edward Beimborn and Alan Horowitz, "Measurement of Transit Benefits", Urban Mass Transportation Administration, DOT-T-93-33, June 1993.

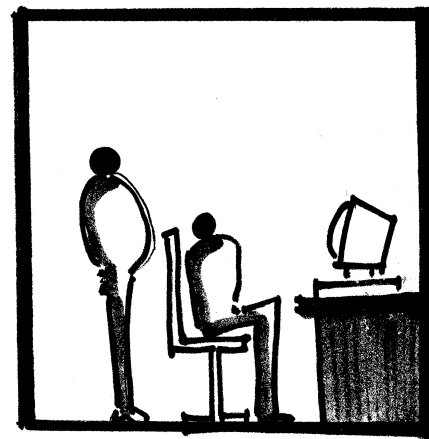
Economic Development



State DOT involvement in economic development can be viewed as a complement to state participation in land use planning and control. Normally economic development activities are aimed at increasing the land use for commercial purposes and providing transportation facilities to enhance the state's economy. These activities can range from passive to active, depending the state view of its role in economic development.

Project Design to Assist Local Businesses

At the most basic level of involvement, state DOTs can take specific actions to assist local businesses within the context of individual projects. Such actions might include special access provisions, design for wide turning radii, drainage improvements and similar efforts to assist an individual business. These actions normally must be done according to specified policies that keep the action within reasonable bounds and do not provide favorable treatment of one business over another.



State Infrastructure Banks

The Nature of State Infrastructure Banks

State infrastructure banks (SIBs) are revolving investment funds that can be created and operated by a state government. They are designed to increase the financing capability of states by more effectively using scarce public funds to finance parts of the states' transportation program. SIBs are originally seeded with federal money and a 25% local match. They can lend these funds to a wide variety of projects with a considerable amount of flexibility, thereby initiating projects that would not otherwise be feasible.¹

A state infrastructure bank, which could hold both state and federal funds, is initially started by forming the bank through state legislation. The state then directs the use of this money towards projects beneficial to the state, for example, transportation projects. This money is usually loaned at a low interest rate to developers or sponsors of state-level projects. Thus, the SIB slowly grows as these loans are paid back with interest and these funds are again directed toward new projects. As the loans are paid off, the money can be used again for additional projects. In essence, SIBs use federal funds, usually with a state match to provide the capital needed to create a private bank for infrastructure projects.

Infrastructure banks can do any of the following.

- ◆ Accelerate projects that may be of lower funding priority, perhaps by combining SIB funds with traditional or other innovative funding options.
- ◆ Increase the range of projects that may receive financial assistance.

¹ State Infrastructure Banks: A Primer (U.S. DOT) (November 1995) [TD 2.2: 582]. p. 1. <http://www.azfms.com/DocReviews/Mar96/art5.htm>

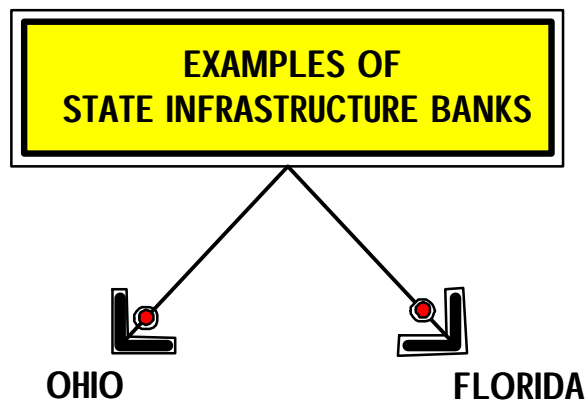
- ◆ Better fit the type of financing to a project's needs, including flexible term loans, lines of credit, letters of credit and bond insurance.
- ◆ Maintain the longevity of the funding opportunities by recycling the original funds as loans are repaid.
- ◆ Potentially free up traditional grant funds for projects that cannot be innovatively financed.
- ◆ Leverage the fund's resources by guaranteeing debts or issuing bonds for itself.

Creating State Infrastructure Banks

A state usually needs new legislation to create an SIB, which designates authority over the financial management of the funds.¹ In addition, there may be specific legal or administrative barriers to SIB implementation that must be addressed. The legal needs of SIB customers are also considerations. FHWA recommends that enabling legislation be as flexible as possible, and it has written model legislation to guide states. SIB's can be housed entirely within the state DOT, be jointly administered by two or more state agencies or be administered by an independent agency.

SIBs' customers can be either public entities such as local governments, special financing districts, and port authorities, private corporations or public-private partnerships. Potential projects should undergo an initial screening for adequate revenue streams, basic eligibility and conformance with planning mandates. Final project selection should be done by weighing the benefits and pitfalls of candidate projects, including the importance of the transportation problem, impact on mobility and safety, and financial viability.

Loans must be repaid at an interest rate that protects the revolving fund. Repayment must commence within five years (or earlier with certain highway projects) and be completed within 30 years.



¹ Ibid., p. 2

Ohio's SIB Structure

Ohio was selected as a pilot state to participate in the State Infrastructure Bank program and was the first state to make a loan under this program. The state legislature passed a short bill that provided the following SIB structure.

- ◆ Established the fund and gave maximum flexibility as to how the fund could be operated.
- ◆ Allowed a wide variety of assistance, such as loans, loan guarantees, letters of credit, leases and interest rate subsidies.
- ◆ Gave ODOT the authority to select SIB projects, determine the general rules of operation, and the terms of any financial arrangement.
- ◆ Allowed the SIB to fund a wide range of public and private transportation projects, including the cost of planning.



The Ohio SIB program was originally given \$30 million by the state and had access to federal funds nearly twice that amount in any given year. In its first two years of operation, the SIB funded 15 separate projects ranging from \$300,000 to \$20 million. Projects consisted of intermodal facilities, roads, interchanges, a viaduct and right-of-way acquisition. Both private and public projects were funded.

Details of lending have been established to protect the fund while serving the public. Interest rates are determined individually for each project, but the average interest rate across all projects must be 75% of the prime rate. In addition, the SIB charges an administrative fee of 0.25% and all closing costs. When bonds are issued, there is also an annual trustee fee of 0.05%. The costs of bonds are determined by the market. The SIB may request collateral or security for the loan in one of many forms, including pledges of tax revenues or fees, mortgages on assets and guarantees from borrowers.

The SIB has established formal criteria for project selection, including ability to repay and guarantee the loan, other financial arrangements, project quality and closeness to starting construction. In addition, the project must meet all environmental requirements and have finished all required studies. There must be an identifiable revenue stream. Ohio DOT suggests that the loans can be repaid from sources such as tolls, tax increment financing, a variety of fees or

property assessments. The list of current projects suggests that Ohio DOT heavily weights the economic impact of a project in its selection process.¹

Florida's SIB

Like Ohio, Florida was selected as a pilot state to participate in the State Infrastructure Bank program. State legislation already existed for the creation of an SIB, giving the Department of Transportation's Office of Finance bonding authority to leverage state and federal funds.



Florida Department of Transportation is decentralized into seven district offices. Therefore, the central office serves only as a pass through point for federal funding, including the SIB capital funding dollars.

Florida has committed repayment dollars to transit projects. In many cases, SIB loans are approved to help transportation districts, MPOs or transit agencies to get a quicker start on preliminary project development that would be otherwise delayed. Florida has designated \$10.8 million of its SIB capital towards transit projects, either new starts or additions to existing service. Once the loans for these initial transit projects are repaid, the recovered dollars will remain in a fund specifically for additional transit related funding programs within the seven transportation districts.

FDOT initiated the program by sending letters to the seven district secretaries inviting project submissions. Initially, only one district submitted projects requiring funding. Following subsequent Executive Committee meetings of the district secretaries, benefits of SIB funding became known, producing a greater response from the districts.

Basic Employment Funding Programs

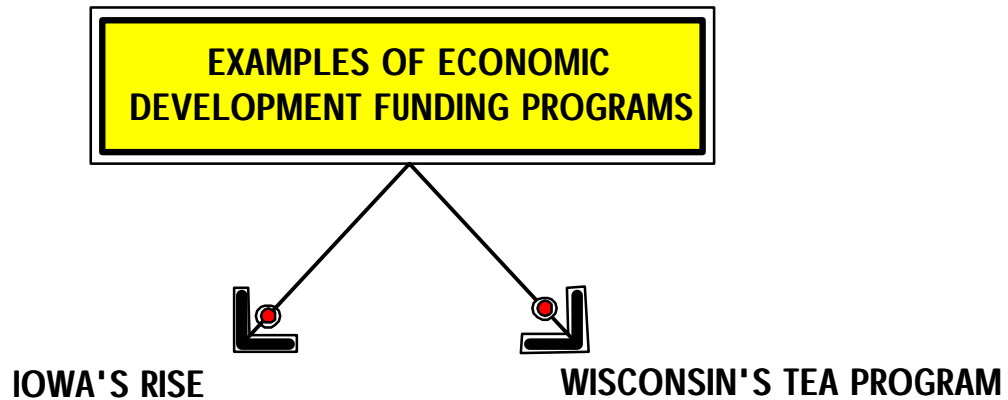
Economic Development Funding Programs

Many state and local governments have worked to increase income and employment through the provision of public facilities, like highways and local roads, but this approach becomes increasingly difficult because of limited budgets. Therefore, the need to identify which improvements provide the most cost-effective services becomes important.

A premise of ISTEA was that transportation contributes significantly to economic development. ISTEA required that states acknowledge this relationship by

¹ State of Ohio Department of Transportation. State Infrastructure Bank: www.dot.state.oh.us/sib1.htm

discussing this element in state transportation plans. Most states have developed transportation goals that pertain to economic growth through sound transportation decisions in the interest of efficient movement of goods and people across the state highway network. To further implement these goals various state agencies have enacted programs that provide funding for transportation improvements that relate to these goals. Some examples of these funding programs are explained here. These programs target “basic” employment, that is, employment that brings income into the state from elsewhere; such income is then re-circulated in the local economy.



Revitalize Iowa’s Sound Economy (RISE)

RISE is an attempt by Iowa to direct highway funds toward projects that can have a significant effect on economic development. RISE projects include the construction or improvement of roads, streets and highways.¹ RISE, which is administered through the Iowa DOT Office of Project Planning, provides a commitment of funds for actions that create and/or retain jobs. The program is funded from a 1.55 cent per gallon motor fuel tax that yields about \$31 million annually. Almost two-thirds of these funds are spend on the state highway system, with the balance devoted to city and county roads.

RISE projects are evaluated on a series of factors including the effect on competition, economic impact to the state, quality of jobs created and/or retained, and the business’ record of legal violations.² There are two types of projects, Immediate Opportunity and Local Development.

- ◆ Immediate Opportunity Projects – These relate to a well-established and immediate opportunity for the creation or retention of permanent jobs.³

¹ *Revitalize Iowa’s Sound Economy (RISE)*, Iowa Department of Transportation. p. 71.

² Loc. cit.

³ Loc. cit.

Jobs must be basic and not stem from a relocation from within the state. A 20% local match is required. Immediate opportunity projects can be approved within a few weeks.

- ◆ Local Development Projects – These projects support economic development but do not require an immediate commitment of funds. Example employers are industrial parks and tourist attractions. Iowa DOT evaluates these projects on their development potential, local initiative and transportation and economic need of the area. Approval for local development projects can take a few months.

Iowa DOT also operates the Rail Economic Development (RED) program to stimulate economic development by providing or maintaining rail service. Each project is limited to \$100,000 and can be awarded up to 80% of its costs. Applicants must demonstrate that the project has an immediate impact on jobs.

Wisconsin's Transportation Economic Assistance (TEA) Program

Wisconsin's TEA program is similar to Iowa's RISE in intent; however, it is administered somewhat differently. Grants can be up to \$1 million but a 50% local match is required. Eligible projects include all modes of transportation, such as access roads, rail spurs and widened intersections. There must be an immediate (within three years), measurable and permanent impact on jobs. Funds are provided at a maximum rate of up to \$5,000 per each new job created. Besides cost, evaluation factors include the local unemployment rate, the impact on the regional transportation system, and proximity to other TEA projects. TEA is currently funded at \$7 million for two years, not including the local match.¹

In its first eleven years of operation, TEA made almost \$37 million in grants spread across 152 projects. A 1994 audit reports that the actual average employment gain matched the projections made in the grant applications and the average cost per new job was just \$2,225.²

Performance Measures

WisDOT Department of Economic Development established performance measures or criteria upon which to evaluate the effectiveness of the overall TEA program.

- ◆ Grant decisions shall be made before construction of the new or expanded business facility or operation.³

¹ Source: Transportation Economic Assistance Program (TEA); WisDOT: Programs and Services. <http://www.dot.state.wi.us/dtim/bop/gati.html>

² Transportation Economic Assistance Program (TEA); WisDOT: Programs and Services. <http://www.dot.state.wi.us/dtim/bop/gati.html>

³ *Performance Measures*; Local Transportation Capital Assistance Programs, October 7th, 1997. p. 33.

- ◆ Any TEA grant should be less than one-third of the cost of the new or expanded business.¹
- ◆ Grants shall have less than \$5000 per new or preserved job or the benefit/cost ratio shall exceed 1.²
- ◆ Rural communities must receive at least half of the awards.³

Industrial Roads

Industrial roads programs have traditionally been designed to complement statewide economic development projects, where transportation access poses a problem or causes a development to not be viable without additional or new infrastructure. Administered by the state DOT, industrial roads programs encourage businesses to expand or relocate within the state by providing grants or loans to build or to improve roads, bridges or intermodal connections to a wide variety of sites.⁴

Projects must often be sponsored by a local government agency. Sponsors are encouraged to contact the state DOT. Most states allow funds to apply to acquisition of real property, engineering and design, construction or reconstruction of transportation facilities, and infrastructure improvements.⁵ However, details of the various states' programs differ.

Industrial roads programs are designed to fund transportation facilities that will:

- ◆ Lead to the creation or retention of jobs within the state;
- ◆ Stimulate economic development;
- ◆ Effectively combine public and private sources of funds to accomplish a worthwhile project;
- ◆ Support projects that might not qualify for other funding programs; and
- ◆ Complement and enhance the existing transportation system.⁶

¹ Loc. cit.

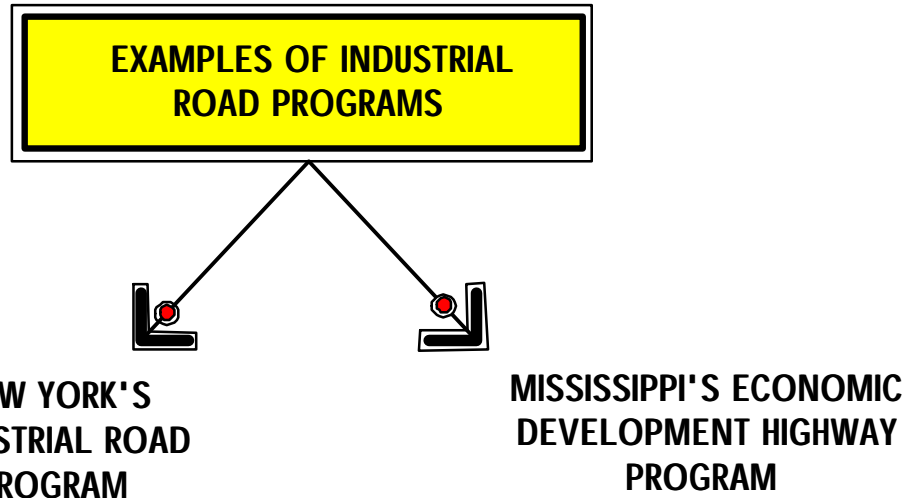
² Loc. cit.

³ Loc. cit.

⁴ *"The Program"*; New York State Industrial Access Program, New York State Department of Transportation.

⁵ *"Eligible Costs"*; New York State Industrial Access Program, New York State Department of Transportation.

⁶ *"Projects are designed to....."*; New York State Industrial Access Program, New York State Department of Transportation.



New York's Industrial Access Program

New York's Industrial Access Program was designed to provide state funding for highway projects that can enhance economic development but would not have any other source of public support.¹ The program is administered through the state DOT. Eligible applicants include municipalities or industrial development agencies. Private firms are also eligible, provided they are sponsored by a municipal or state agency. Projects must be a component of a larger economic development effort,² and applicants must provide solid evidence of new or retained jobs. Primarily retail developments do not qualify for funding since they tend to only change the location of employment rather than create new basic employment. No other type of development is explicitly excluded, opening up the possibility of counting non-basic employment.

The Industrial Access Program has a strict formula of 60% grant and 40% interest free loan, up to \$1 million for any given project.³ The loan must be repaid within five years. Funding can be applied toward anything associated with design and construction, including real property acquisition, drainage systems and landscaping. Costs that can be construed as being part of the day-to-day activities of the agency are excluded. Small projects can be done in-house, but projects exceeding \$50,000 require that the work be bid competitively. Projects are subject to the State Environmental Quality Review Act (SEQRA), other state regulations and state statutes.⁴ The State Department of Economic Development furnishes the DOT with its evaluation of project applicants. The state DOT cautions applicants to allow up to six months for all approvals.

¹ *Program Highlights*; New York State Industrial Access Program, New York State Department of Transportation. p. 2.

² Loc. cit.

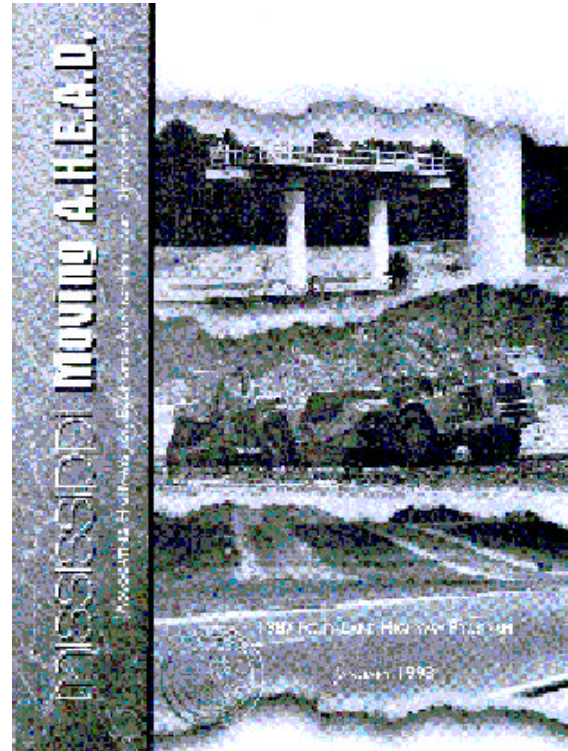
³ Loc. cit.

⁴ Ibid., p. 2-3

The state DOT evaluates funding proposals primarily on two criteria: the cost per job retained or created and the amount of private funds leveraged. In addition, potential projects are reviewed for their adequacy, impact on the surrounding transportation system, impact on nearby economic development programs, the absence of other funding and the ability of the applicant to repay the loan.

Mississippi's Economic Development Highway Program

Mississippi provides highway funding in support of large developments, many non-basic, through its economic development highway program. This program is regulated through the Department of Community and Economic Development. Qualifying facilities, including regional shopping malls, distribution centers, manufacturing process industries and large hotels and resorts, are eligible for transportation investment. The program is authorized to a total of approximately \$120 million/year. Most eligible developments are completed through public-private investment, in which case the DOT provides a local government grant requiring a match of \$20 million. For private investment applicants, a \$50 million capital investment is required. Development must justify a qualifying provision for additional jobs and a positive cost-benefit analysis. Funds are administered through the Department of State Aid, while the state DOT coordinates the roadway design and any construction to state highways. The DOT determines which entities will maintain the road(s) or transportation improvements constructed for the development.



One of the projects given top priority in Mississippi was the 1987 Four-Lane Highway Program. Mississippi reports strong returns from this program. This program has created 450 miles of four-lane highway. Cited benefits include improved safety and accelerated economic and commercial growth. This program will eventually build 1,705 of four-lane road at an estimated project cost of \$3.9 billion.¹

¹ Source: Mississippi Moving A.H.E.A.D; Advocating Highways for Economic Advancement and Development; 1987 Four-Lane Highway Program; January 1998.

Benefits of Economic Development Impacts from Highway Improvements

There have been surprisingly few studies that systematically document the actual economic development impact of new highways in non-urban areas. However, there have been many forward-looking planning studies that suggest a wide range of possible impacts, from no new development to extensive development.

In a fully developed economy, transportation acts more as a constraint than an incentive for economic development. Poor access or poor average speeds can deter economic development in affected locales. Areas already in possession of reasonable access and good speeds cannot expect to see large gains in economic development through highway improvements.

Many economists are skeptical about the goal of building highways to attract new employers to a region because these employers most often (1) have good alternative sites where transportation improvements are not required or (2) are already located in a neighboring community. The benefits of a gain in employment at one location must be offset by a loss of employment at another location. Thus, there may be different conclusions, depending upon one's point of view. From a local viewpoint attracting employment from another area would count as a gain. From a broader viewpoint this local gain may be seen as a shift. To be counted as an overall benefit, the gains in employment must be entirely new and second-best sites must be seriously deficient in an important criterion.

For existing employers, the economic gain of a new highway can be measured best by the time and cost savings to their operations. If the new road does not significantly change travel times and costs, there is little benefit. Care must be exercised to avoid double counting of benefits, as time and cost savings can have secondary economic impacts that are positive and tempting to count.

If existing businesses grow and that growth can be directly attributed to the highway improvement, then it is also possible to count the presence of new traffic as a benefit. The most convenient method of counting these growth-related benefits is the rule-of-half from conventional economic theory. The rule of half states that the benefit of new traffic is approximately equal to one half of the change in full cost of travel (driver time, vehicle costs, etc.) multiplied by the number of new trips. These benefits should be calculated trip-by-trip and include the full cost of the trip, not just the cost associated with the highway improvement.

Even if there is a zero net gain in employment because of a new highway, there may still be substantial benefits from employment shifts. These benefits can only be justified where unemployment rates are high or where other economic indicators suggest that the local economy is performing poorly. Benefits are larger when relocated industries are basic. Service jobs are of lesser interest. Any claims along these lines must be supported by good economic analysis.

There are many specific instances where new highways or better access to existing highways can enhance economic development. For example, a bypass can reduce the cost and uncertainty of goods movement, thereby leading to growth or greater profits in existing industries. A new interchange may allow a specific employer to expand operations at its current site. Geometric improvements to congested, unsafe or otherwise deficient arterials may allow nearby businesses to remain viable or to expand. In each of these cases the beneficiaries are clearly identified and there should be little need for speculation.

An excellent source of information about methods of economic analysis of highway proposals is NCHRP Report 342, "A Primer on Transportation Productivity and Economic Development."

Appendix A

This appendix is a list of important federal laws and regulations related to environmental protection and to the relationship between transportation and land use.

- ◆ *Agricultural and Food Act (Farmland Protection Policy Act of 1981)*: Implemented to protect farmlands and to prevent the use of those farmlands for uses other than agriculture. This act ensures that any federal action that is taken will be in keeping with the state and local interest.
- ◆ *Archaeological and Historic Preservation Act of 1980*, as amended.
- ◆ *Antiquities Act of 1906*: *Requires that a permit be acquired for the examination of ruins, the excavation of archeological sites, and gathering of objects of antiquity on lands under the jurisdiction of the Secretary of Interior, Agriculture, and Army.*¹
- ◆ *Comprehensive Environmental Response, Compensation and Liability Act of 1980*.
- ◆ *Conservation of Forest Lands Act of 1960*.
- ◆ *Endangered Species Conservation Act of 1969*: *Provided a program for the conservation, protection, restoration, and propagation of selected endangered species.*²
- ◆ *Endangered Species Act of 1973*: Protects endangered species by preventing their use for commercial purposes. Generally, the Department of Natural Resources (DNR) within the state is responsible for maintaining this list.
- ◆ *Endangered and Threatened Species Act*.
- ◆ *Farmland Protection Policy Act of 1984*: Intended to of protecting farmlands and prevent their usage for nonagricultural purposes. The state and local agencies are required to identify the undesirable effects of proposed actions on farmlands and implement measures to mitigate these adverse effects.
- ◆ *Federal Aid in Wildlife Restoration Act and Federal Aid in Fish Restoration Act*: *Authorized the Secretary of the Interior to cooperate with the states in selecting and preserving areas of land or water suitable for sustaining wildlife.*³ The Federal Aid in Fish Restoration Act provides the states with federal aid for managing and restoring fish having *material value in connection with sport or recreation in the marine and/or fresh waters of the United States.*⁴

¹ Federal and State Environmental Laws, Policies, Regulations and Agreements, Facilities Development Manual, State of Wisconsin, Department of Transportation, February 15, 1988. Chapter 20, Section 5, p. 1.

² Environmental Impact Analysis Handbook. p. 1-4.

³ Federal and State Environmental Laws, Policies, Regulations and Agreements, Facilities Development Manual.

⁴ Loc. cit.

- ◆ *Federal Highway Administration Wetland Policy, 1977*: Implemented by the US DOT this policy to ensure *the protection, preservation and enhancement of wetlands during transportation planning and construction*.¹
- ◆ *Floodplain Management Program*: Regulations intended to *protect human life, health, and minimize property damages and economic losses*.²
- ◆ *Guidelines for Specification of Disposal Sites for Dredged or Fill Material*: Guidelines that govern the discharge of dredge or fill material into the waters of the United States.
- ◆ *Land and Water Conservation Fund Act of 1965*: This act is primarily responsible for *providing funds authorizing federal assistance to the states and providing funds for the same in planning and developing needed land and water areas and their facilities*.³ Created a special Land and Water Conservation Fund from which appropriations were authorized mainly for matching grants to states for outdoor recreation projects.
- ◆ *Mitigation of Environmental Impacts on Privately Owned Wetlands*.
- ◆ *National Historic Preservation Act of 1966, as amended*: Required “*departments or agencies to take into consideration the effect of the federal activity on a district or site or building or structure or object, included in the National Register of Historic Places*”.⁴ Created the Advisory Council on Historic Preservation whose main function was to advise the President on matters related to historic preservation.
- ◆ *Noise Control Act of 1972, as amended*: Implemented by Environmental Protection Agency to set standards for noise emission and keep the public informed about issues related to noise emissions.
- ◆ *Procedures for the Protection of Historic and Cultural Properties*: These procedures follow the specifications of the National Historic Preservation Act. Their emphasis is on the need to *accommodate historic preservation concerns with the needs of federal undertakings*.⁵
- ◆ *Regulations for Controlling Certain Activities in Waters of the United States, Corps of Engineers, 1986*: Require that permits be obtained for the construction of structures or related activity in navigable waters from the Army of Corps of Engineers.
- ◆ *Rivers and Harbors Act of 1899, as amended*: This act governs the *construction of bridges in and over commercially navigable waters of the state to ensure navigational clearance*.⁶
- ◆ *Rustic Roads Act*: Its main purpose is to *create and preserve rustic and scenic roads for vehicular, bicycle, and pedestrian travel*.⁷
- ◆ *Submerged Lands Act of 1953*.

¹ Loc. cit.

² Loc. cit.

³ Environmental Impact Analysis Handbook. p. 1-8.

⁴ Ibid., p. 1-6

⁵ Federal and State Environmental Laws, Policies, Regulations and Agreements, Facilities Development Manual.

⁶ Loc. cit.

⁷ Loc. cit.

- ◆ *Uniform Relocation Assistance and Real Property Acquisition*: The purpose of this act is to protect those people displaced from their homes, farms or businesses for federal projects. Thus, this act establishes uniform and equitable land acquisition policies for the affected persons.
- ◆ *Water Quality Act of 1965*: *Requires all states to establish and submit water quality standards for all interstate waters.*¹
- ◆ *Water Resources Planning Act of 1965*, as amended: Responsible for *establishing the Water Resources Council with responsibility for assessing the adequacy of water supplies; studying the administration of water resources; and developing principles, standards, and procedures for federal participants in the preparation of comprehensive regional or river basin plans. It also established the framework for state and federal cooperation through a series of river basin commissions.*²
- ◆ *Watershed Protection and Flood Control Act of 1954*, as amended.
- ◆ *Wetland Management Guidelines of 1977*: Guidelines for the protection wetlands from any negative impacts of a federal action.
- ◆ *Wild and Scenic Rivers Act of 1968*, as amended: This act aimed at protecting “*those rivers in their natural free-flowing state, which possessed recognizable scenic, recreational, geological, fish and wildlife, historic, cultural, or other similar values*”.³ Generally, Congress or the state decide which rivers meet the criteria for inclusion under this act.

¹ Environmental Impact Analysis Handbook. p. 1-10.

² Loc. cit.

³ Ibid., p. 1-5.

Appendix B:

Useful websites:

1. Transportation Equity Act for the 21st Century (TEA 21), section 1204 as downloaded from: <http://www.fhwa.dot.gov/tea21/h2400.htm>
2. Smart Growth in Maryland: <http://www.op.state.md.us/smartgrowth>
3. Oregon Transportation and Growth Management Program: <http://www.lcd.state.or.us/issues/tgmweb/about/index.htm>
4. *A Guide for Conducting County Level Land Use Plans*; Tennessee Growth Policy Act Project: <http://planning.cap.utk.edu/tgp/pubc1101.html>
5. The New Jersey State Development and Redevelopment Plan; 1997 New Jersey State Planning CD-Rom; <http://www.state.nj.us/osp/ospplan2.htm>
6. *State Infrastructure Banks: A primer* (U.S. DOT) (November 1995) [TD 2.2: 582]: <http://www.azfms.com/DocReviews/Mar96/art5.htm>
7. State of Ohio Department of Transportation. State Infrastructure Bank: www.dot.state.oh.us/sib1.htm
8. Transportation Economic Assistance Program (TEA); WisDOT: Programs and Services. <http://www.dot.state.wi.us/dtim/bop/gati.html>

Appendix C:

References

1. *A Guide for Conducting County Level Land Use Plans*; Tennessee Growth Policy Act Project: Fulfilling the Potential of Law; School of Planning, University of Tennessee, Knoxville.
2. *Alternatives to Conventional Development: Livable Community Design, Neotraditional, Clusters and TDR's*; ITE WORKSHOP, April 1993. Presented by Prof. Edward Beimborn, Center for Urban Transportation Studies, University of Wisconsin-Milwaukee.
3. *Ask DCA: Development of Regional Impacts (DRIs)*; Community Planning, Florida Department of Community Affairs, Summer 1998. Vol. 7, Number 2.
4. *Beimborn, Edward and Horowitz, Alan J*; "Measurement of Transit Benefits", Urban Mass Transportation Administration, DOT-T-93-33, June 1993.
5. Beimborn, Edward, Mulroy, Mary and Schmitt Robert; *Technology Transfer Agents*; Technology Transfer Workshop; U.S. Department of Transportation, Federal Highway Administration, October, 1985 (Revised February 1988).
6. CH 28-24 Developments Presumed to be of Regional Impact.
7. Clean Air Act Amendments of 1990, Strategic Planning, Chapter 12. Urban Transportation Planning in the United States, A Historical Overview. Revised Edition, November 1992.
8. 23 Code of Federal Regulations, Chapter 1, sec 450.206, (4-1-98 edition).
9. *Corridor Management Policy*; Kansas Department of Transportation.
10. Development of Regional Impact Application for Development Approval under Section 380.06, Florida Statutes.
11. Development of Regional Impact (DRI) Review.
12. Donnelly, Rick and Upton, William J. "The Development of Integrated Land Use-Transport Models in Oregon", Working Paper, Oregon Department of Transportation, no date.
13. Environmental Impact Analysis Handbook. Ed. By John G. Rau and David C. Wooten, University of California at Irvine, Copyright McGraw-Hill, Inc. 1980.
14. Facilities Development Manual, Wisconsin Department of Transportation.

15. Final Case Study for the National Scenic Byways Study, U.S Department of Transportation, Federal Highway Administration, September 1990.
16. Florida's Access Management Guidelines.
17. Florida Statute 335 – The Access Management Act.
18. Forkenbrock, David, and Norman Foster. Highways and Business Location Decisions. Economic Development Quarterly. August 1996.
19. Functional Integrity of the Highway System; Policy Paper #1. Third draft, 1997.
20. Guiliano, Genevieve. The Weakening Transportation Land Use Connection. Access. No. 6, Spring 1995.
21. Hanson, Susan. The Geography of Urban Transportation, Second Edition.
22. Huxhold, William. An Introduction to Geographic Information Systems.
23. Indirect and Cumulative Effects Analysis for Project Induced Land Development WisDOT 1996.
24. Land Use in Wisconsin, An Interim Report from the Interagency Land Use Council to Governor Tommy G. Thompson, December 1995; Six main types of State Land Use Planning Programs.
25. Land Use Issues Facing Wisconsin; Report from the WI Strategic Growth Task Force, Feb 1996.
26. Loudon, W., et al. Integrating Transportation and Land Use Planning: Addressing the Requirements of Federal Legislation and Rule Making. TRB Paper No. 971022. January, 1997 annual meeting.
27. Mississippi Moving A.H.E.A.D; Advocating Highways for Economic Advancement and Development; 1987 Four-Lane Highway Program; January 1998.
28. Murphy, Kevin, "Agreement finally reached on widening Highway 12", Milwaukee Journal Sentinel, March 5, 1999.
29. New York State Industrial Access Program, New York State Department of Transportation.

30. *Overview of Access Management*. NCHRP Synthesis 233: Land Development Regulations that Promote Access Management.
31. Overview of Remote Sensing; Fundamentals of Remote Sensing and Airphoto Interpretation.
32. *Performance Measures*; Local Transportation Capital Assistance Programs, October 7th, 1997.
33. *Pfitzer, Jeff*; Transportation Planning and Tennessee's Growth Boundary Policy Act: A Few Issues to Consider. Transportation Planning, Fall 1998.
34. Pignataro, Wen, Burchell, Lahr, Strauss-Wieder, The Transportation Economic and Land Use System (TELUS); *Abstract*.
35. "Policy Application"; Corridor Management Policy; Kansas Department of Transportation.
36. Revitalize Iowa's Sound Economy (RISE), Iowa Department of Transportation.
37. "Route 16 Corridor Protection Study"; Land Use and Transportation Issue Summary; July 1997.
38. Rules and Regulations, Federal Register; Vol. 58, No. 207; October 28, 1993.
39. Rules of the Department Community Affairs Division of Resource Planning and Management Schedule for the Transmission and Submission of Local Government Evaluation and Appraisal Reports.
40. Rules of the Department of Transportation Chapter 14-97 State Highway System Access Management Classification System and Standards.
41. Selected Methods of Economic Forecasting. FHWA Freight Forecasting Workshops by Cambridge Systematics, Inc., June 4, 1998.
42. SEWRPC Planning Guide No. 7, Rural Cluster Development, December 1996.
43. State Infrastructure Banks: A Primer (U.S. DOT) (November 1995) [TD 2.2: 582]. <http://www.azfms.com/DocReviews/Mar96/art5.htm>
44. State of Ohio Department of Transportation. State Infrastructure Bank: www.dot.state.oh.us/sib1.htm
45. *Statutory Authority*; Legal Considerations; Land Development Regulations that Promote Access Management; NCHRP Synthesis 233.

46. "System plan indicates roads where access will be managed"; Wisconsin's Plan for Managing Access to State Highways. Wisconsin Department of Transportation, 1996.
 47. "The Department of Transportation (WisDOT) manages access to state highways by:"; Wisconsin's Plan for Managing Access to State Highways. Wisconsin Department of Transportation, 1996.
 48. *The State Planning Act*; State Development and Redevelopment Plan, New Jersey; The 1997 New Jersey State Planning CD-ROM.
 49. Traffic Impact Analysis Guidelines, District 2, Wisconsin Department of Transportation, January 1998.
 50. Transportation Economic Assistance Program (TEA); WisDOT: Programs and Services. <http://www.dot.state.wi.us/dtim/bop/gati.html>
 51. Transportation Equity Act for the 21st Century (TEA 21), section 1204 as downloaded from: <http://www.fhwa.dot.gov/tea21/h2400.htm>
 52. *What you need to know about Smart Growth and Neighborhood Conservation*; Managing Maryland's Smart Growth; Maryland Office of Planning. May 1997.
 53. Wisconsin's Plan for Managing Access to State Highways; Wisconsin Department of Transportation, 1996.
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