CHAPTER 2

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

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.

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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

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 policies from state

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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.

![Diagram of Cluster Development](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.

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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.
An Overview: Land Use and Economic Development in Statewide Transportation Planning

STATE FUNDED REGIONAL AND LOCAL PLANNING
STATE MANDATED LOCAL PLANNING
STATE APPROVED LAND USE PLANNING
STATE PLANS LU

DATA COLLECTION FOR LOCAL GOVERNMENT
GIS ASSISTANCE
RESEARCH
ECONOMIC FORECASTING
STATE LAND USE MODELS

STATE LAND USE PLANNING REQUIREMENTS
STATE LAND USE PLANNING CAPABILITIES

REACT TO LOCAL REQUESTS
STATE OVERSIGHT COMMITTEES
GUIDEBOOKS
CONFERENCE, TRAINING SESSIONS
NEWSLETTERS, HOTLINE/WEBPAGE, etc.
ONE-TO-ONE ASSISTANCE/CIRCUIT RIDERS

EDUCATION / TECHNICAL ASSISTANCE

DRIVEWAY PERMITS FOLLOWING GUIDELINES
COMPREHENSIVE ACCESS MANAGEMENT PLAN
CAPACITY EXPANSION LIMITED

ACCESS MANAGEMENT

LAND USE AS A TOPIC IN ENVIRONMENTAL IMPACT STATEMENTS, ETC.
EMINENT DOMAIN AND RELOCATION
SCENIC EASEMENTS etc.
AGRICULTURAL AND OPEN SPACE PRESERVATION
SMART GROWTH
GROWTH MANAGEMENT
DRI CONTROL
STATE LU CONTROL

LAND USE CONTROLS

(2) State Infrastructure for Growth Areas Following State Required LU Plans.
(3) Development of Regional Impacts: Developers must demonstrate sufficient infrastructure exists before proceeding wi

PROJECT DESIGN TO ASSIST LOCAL BUSINESSES
STATE INFRASTRUCTURE BANKS
BASIC EMPLOYMENT DEVELOPMENT FUNDING PROGRAMS
INDUSTRIAL ROADS

ECONOMIC DEVELOPMENT

PASSIVE - LOCAL OPTION
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.