THE INFLUENCE ON RURAL COMMUNITIES OF INTERURBAN TRANSPORTATION SYSTEMS

VOLUME II
TRANSPORTATION AND COMMUNITY DEVELOPMENT: A MANUAL FOR SMALL COMMUNITIES
CHAPTER II: Transportation Impact

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The set of planning guides contained in Volume II would be of interest to the community representatives. The guides are designed for the layperson and are written in non-technical language. The purpose of the manual is to promote a more informed participation in the national, state, and regional decision-making process as it relates to transportation, and to provide the basis for initiating and continuing comprehensive local planning for small urban places (cities and towns with a population of 25,000 or less).

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PREFACE

BACKGROUND

This document is one in a series developed as an outgrowth of research sponsored by the U. S. Department of Transportation, Office of University Research, through the Council for Advanced Transportation Studies, The University of Texas at Austin. The topic of this research project, "The Influence on Rural Communities of Interurban Transportation Systems," was one of five conducted under the general title, "Transportation to Fulfill Human Needs in a Rural/Urban Environment." The overall objective of this project was to investigate the nature of interurban transportation influence on small "rural" communities (below 25,000 in population) and to assess the relationship between changes in the interurban system and the potential for growth and development of small communities.

The project consisted of four basic stages:

(1) a review and analysis of transportation impact studies leading to the identification and investigation of areas deemed important to rural communities and intercity transportation systems,

(2) an investigation of high probability areas of impact to ascertain data availability and appropriateness of various methodological concepts in studying transportation impacts on rural communities,

(3) a detailed case study of selected rural communities in terms of their response, real and perceived, to changes in their intercity transportation systems and accessibility, and

(4) the development and field testing of a set of transportation planning guides designed for use by the layperson in the rural community and the regional planner.

The research is documented in two volumes:

Volume I: The Influence on Rural Communities of Interurban Transportation Systems, and

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The set of planning guides contained in Volume II would be of interest to the community representatives. The guides are designed for the layperson and are written in non-technical language. The purpose of the manual is twofold:

(1) to promote a more informed participation in the national state, and regional decision-making process as it relates to transportation and

(2) to provide the basis for initiating and continuing comprehensive local planning for small urban places (cities and towns with a population of 25,000 or less).

The MANUAL is divided into an executive summary and seven chapters, each individually bound and designed for use separately or in conjunction with others. The seven chapters are:

Chapter I. The Transportation Planning Process,

Chapter II. Transportation Impact,

Chapter III. Goals and Objectives,

Chapter IV. Community Inventory,

Chapter V. Development of Alternatives and Preliminary Assessment,

Chapter VI. Evaluation, and

Chapter VII. Glossary and Bibliography.

This document contains the second chapter of Volume II. It describes and illustrates the categories of impact on small towns and cities resulting from changes in the intercity transportation system. The content of the chapter should serve as a general guide to an understanding of the ways changes in the intercity system can affect certain community characteristics. Such an understanding can serve the community in two practical ways: 1) it can aid the community in assessing the plans and proposals prepared by extra-local planning agencies; and 2) it can alert the community to the considerations necessary to a planned response to transportation induced change.

Appendix A contains guidelines for the assessment of an agency-produced Environmental Impact Statement. Appendix B contains an annotated bibliography of impact studies which may be of use to the community in pursuing more specific information regarding particular aspects of transportation induced changes.

CHAPTER II. TRANSPORTATION IMPACT

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CHAPTER II

TRANSPORTATION IMPACT

INTRODUCTION

2.1 Transportation systems influence economic activities, help determine where people live and work, and even shape our general life-style. Historically, the networks of waterways, rail, streets and highways, and airports have each in turn influenced the location and form of American cities, shaped our economy, and changed our social behavior. Today, approximately twenty percent of our gross national expenditures goes into transportation. Given the importance of transportation, determining the IMPACT of different transportation systems is an essential task in planning for our future well-being.

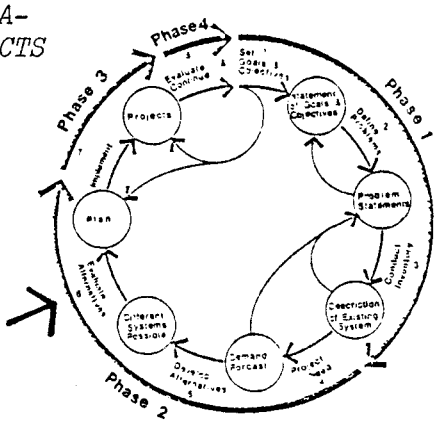
This chapter is devoted to a discussion of the ways transportation impact is usually defined and measured. In particular, it is tailored to the needs of small communities. Hopefully, an understanding of the definition and measurement of transportation impact will increase the ability of the residents of small communities to evaluate the decisions of transportation agencies and other authorities and hence promote a more informed participation in the transportation planning process. Most importantly, an understanding of the particular effects of transportation changes will help promote the community's own planning effort.

BASIC DEFINITION

2.2 TRANSPORTATION IMPACTS may be broadly defined as the economic, social, political, environmental and even psychological changes which are directly or indirectly effected by transportation

investments and/or policies. Transportation investments include expenditures for planning and building new facilities (roads, canals, airports, etc.) and the improvement, management, or maintenance of existing facilities. Transportation policy involves a multitude of public and private decisions ranging in scope from setting the speed limit on highways at 55 miles-per-hour through the regulation of freight and passenger rates to the creation of the highway trust fund for the establishment of the nation's network of integrated highways.

THE PURPOSE OF UNDERSTANDING TRANSPORTATION IMPACTS



2.3 From an agency point of view, the extensive nature of transportation investments requires that the particular effects of present and future systems be understood in order to

1. Evaluate the need for a particular transportation investment or policy;
2. Determine the "best" solution for meeting the need; and
3. Provide the proper facilities and regulations.

As discussed in the previous chapter, an important step in transportation planning is an analysis of the likely social, economic and environmental impact of each alternative under consideration. This analysis typically is included in an ENVIRONMENTAL IMPACT STATEMENT (EIS) or, in some cases, an ENVIRONMENTAL IMPACT ASSESSMENT (EIA).

From the community's point of view, there are two important reasons

for understanding the nature of transportation impact. First, a general understanding will be of value in helping develop or in reviewing an agency-produced EIS. Second, the awareness of specific changes which may occur, or are likely to occur, as the result of altered transportation services will provide a basis for the community's own planning activity.

The subsequent sections of this chapter are concerned with providing the groundwork for understanding and evaluating transportation impact. First, we will provide a basic glossary of distinctions commonly used in discussions of transportation impact. Second, we will discuss the kinds of DIRECT IMPACT and their measurement since these are usually of primary concern in the preparation of an EIS. Finally, we will analyze the indirect impacts of transportation system changes as they are likely to affect the growth and development of small communities.

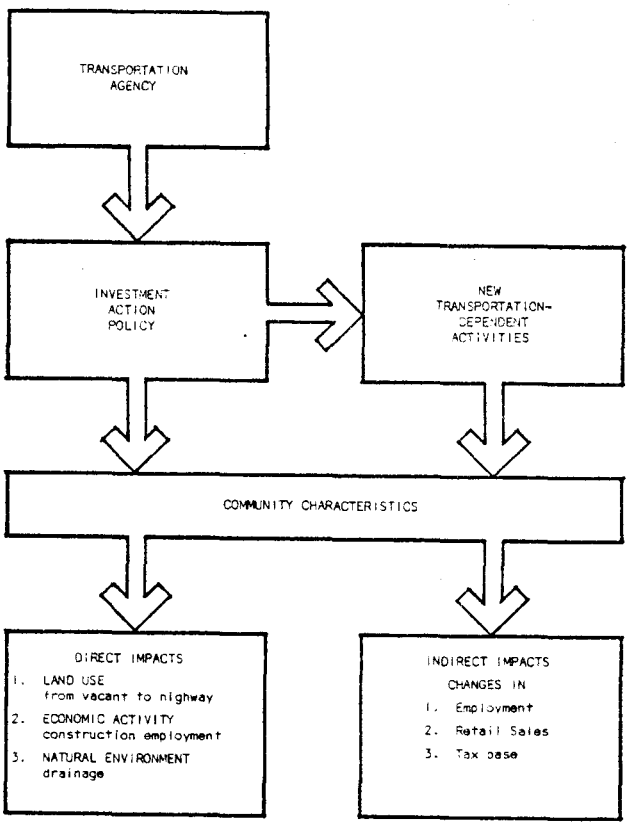
A GLOSSARY OF BASIC DISTINCTIONS

Below are listed four basic distinctions commonly used in classifying the types of transportation impact. Each distinction will be briefly explained.

1. Direct vs. Indirect Impacts
2. Short-term vs. Long-term Impacts
3. Community-wide vs. Spatially Specific Impacts
4. Qualitative vs. Quantitative Impacts

DIRECT VS. INDIRECT IMPACTS

2.4 DIRECT IMPACTS are generally confined to the changes in land use, the natural environment, and economic activity related to the construction of and/or operational changes in a transportation



network. INDIRECT IMPACTS are induced changes in economic activity, land use patterns and human behavior which are the result of new or altered transportation related activities. Indirect impacts are changes which probably would not have occurred without a given transportation investment or policy, but which are also dependent on other conditions for their occurrence.

The distinction between direct and indirect impacts may be illustrated by the following example:

Let us say that a new airport has been constructed in a farming area just outside a particular community. One clearly direct impact would be the alteration in land use acreage that is removed from agricultural production and converted to use as an airport. Another direct impact would be the measurable increase in noise

caused by the aircraft using the facility. The indirect impacts would depend on certain conditions in the area other than the mere change in land use or the increase in noise. One indirect impact of the facility might be a reduction in land value in a nearby residential area. Although closely linked to the increased noise, the actual occurence of the reduction would depend upon a variety of circumstances (the local housing market, the residents' tolerance of noise, etc.). Another indirect impact, less closely related though still partially traceable to the transportation change, might be an increase in business for local firms which were able to use air service to expand their market area.

A major reason for distinguishing between direct and indirect impacts has to do with the accountability of the sponsoring agency for the impact. For the most part, direct impacts fall within the agency's province of responsibility, and hence must be considered in planning the facility. It is up to the agency to minimize adverse impacts, whether direct or indirect, but accountability is generally limited to clearly definable, direct impacts.

SHORT-TERM VS. LONG-TERM IMPACTS

2.5 Both direct and indirect impacts may be either short term or long term. Short-term impacts are usually defined as those which are immediately associated with the implementation of a particular policy or investment and occur during a precisely defined period of time.

In the case of highway construction, for example, the short term period can usually be defined as the time between the announcement of a particular route and the time, after construction, when the new facility's basic operational characteristics are established. Short-term effects might include fluctuations in land value near

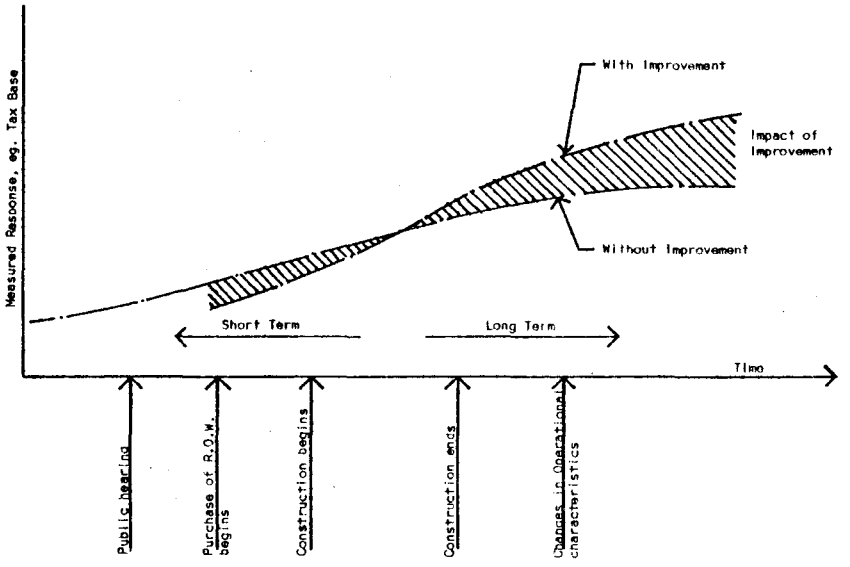
the facility, increased employment among construction workers, temporary disruption of traffic, etc.

Long-term impacts are those changes which occur as part of the so-called "stabilization process" following implementation of a particular policy or investment.

The long term period is less precisely definable since there will be great variation in the amount of time required for any given community to reach a point of equilibrium.

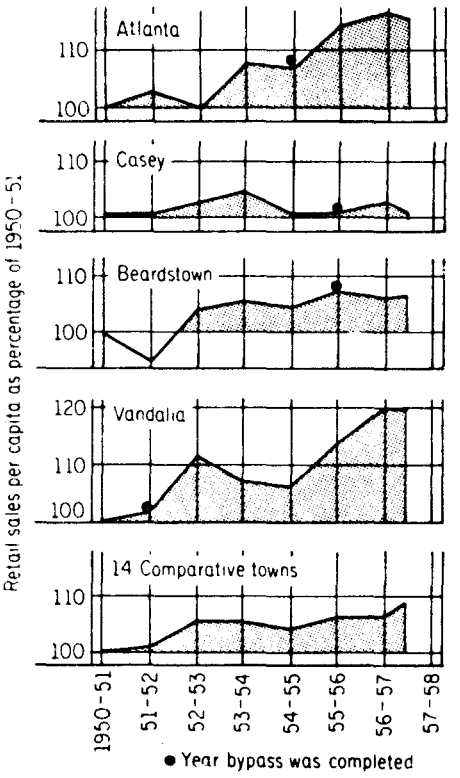
Long-term impacts include shifts in the community's economic base, its population characteristics, and the social and political behavior of its citizens. Figure 2.1 illustrates the difference between possible long- and short-term impacts on one community characteristic, in this case, the tax base of a hypothetical community affected by a transportation improvement.

Figure 2.1



Possible Effects of Different Phases in Highway Improvement

The main reason for distinguishing between short-term and long-term effects is to aid in assessing the ultimate costs and benefits of a particular investment or policy. Many of the myths which have arisen concerning transportation systems are based on short-term disbenefits rather than long-term benefits. For example, the usual practice of by-passing small communities often works to the disadvantage of traffic-serving businesses. In the long-term, however, these losses may be offset by later gains. Yet the myth persists that a by-pass will "kill" a town.



Experience with bypass routes in four Illinois communities. Retail sales of four Illinois cities where a major highway bypassed the community are compared with sales in 14 cities similar in size and basic sales per capita where the highway does not bypass. State sales tax records show retail business to be sustained or improved after through traffic has been shifted into new relief routes.

Source: George W. Barton and Associates. "Highways and Their Meaning to Illinois Citizens." Prepared for the Illinois Division of Highways, Springfield, Ill., 1958.

2.6 Impacts may also be classified according to whether they affect the community as a whole or whether they affect the spatial organization of community activities.

COMMUNITY-WIDE VS. SPATIALLY SPECIFIC IMPACTS

Community-wide economic impacts, for example, would be reflected by the changes in the total number of activities, the total employment, the total retail sales, etc. Spatially specific economic impacts would include relocation of existing activities, the growth or decline of a given area of town, the shift of business activity centers from one area to another, etc.

The distinction between community-wide impacts and spatially specific impacts is important in understanding transportation impact.

Some of the problems associated with transportation impact can be ameliorated by thorough planning for changes in specific geographical areas. Anticipating these changes makes clearer the options for dealing with potential problems. Zoning may be necessary, for example, or special considerations required for impacted areas in order to equalize tax burdens. Shifts in the location of activities may cause changes in travel patterns of local residents and require increases in city services.

QUANTITATIVE VS. QUALITATIVE MEASUREMENT OF IMPACT

2.7 The final distinction commonly used in classifying impacts is the division between those which can be measured quantitatively and those which must be described in qualitative terms. Quantitative impacts are those aspects of change which may be specifically defined and measured in numerical terms, i.e., dollars saved or spent, acres removed from farm production, decibels of sound produced, etc. Qualitative impacts are those aspects of change which involve personal perceptions and values, including alterations in social, aesthetic, and cultural preferences and in the general "quality of life" or "life style" of a community or a group. Quantitative and qualitative impacts are not always mutually exclusive; that is, one can measure the quantity of a particular change as well as describe the quality of the same change.

For example, both quantitative and qualitative impacts will result from the construction of a new airport in a town where no facility previously existed. Some quantitative impacts would be the cost of the facility to the town, the savings in time to shippers and passengers, and the increase in noise adjacent to the facility.

Some of the qualitative impacts might include the perceived "attractiveness" of the town to outsiders, the decrease in the "desirability" of other modes of travel, and the psychological effects of increased noise.

Qualitative impacts are often "converted" into numerical values in order to measure their importance. In the above case, for example, one might determine the number of people who perceive other modes as being less attractive and even translate this into dollars diverted from one mode to another.

Many qualitative impacts, however, are difficult to define, let alone measure in quantitative terms. It is difficult, for example, to determine the psychological effects of the availability of a new travel mode, and just as difficult to translate these into, say, monetary terms or some other unit of measurement.

The distinction between quantitative and qualitative impacts has both theoretical and practical implications. In theory, all changes, whether measurable or not, need to be included in an analysis of impact. In the past, impact studies have sometimes concentrated on only those changes which can be dealt with in quantitative terms and have thus ignored the changes which transportation can induce in our quality of life. On the practical level, qualitative considerations may be used to weight the importance of a particular quantitative impact in the overall evaluation of the effects of a particular investment or alternative. (See COST-BENEFIT ANALYSIS in the Glossary.)

	DIRECT		INDIRECT	
	SPATIALLY SPECIFIC	COMMUNITY WIDE	SPATIALLY SPECIFIC	COMMUNITY WIDE
SHORT TERM	1. Change in topography and in eco-system 2. Relocation of persons and existing economic activities 3. Changes in travel patterns during construction	1. Changes in tax base 2. Changes in total retail sales 3. Changes in employment	1. Relocation of existing activities and location of new facilities 2. Change in land values in connection with (1)	1. Change in composition of labor force 2. Change in demand for public services 3. Change in community tax base
LONG TERM	1. Changes in traffic patterns within region 2. Change in land use adjacent to facility	1. Direct costs of facility 2. Changes in relative accessibility	1. Changes in traffic patterns and trip purpose. 2. Changes in overall land use patterns	1. Change in economic base 2. Change in social and political behavior 3. Change in composition of community 4. Change in public services

Figure 2.2

2.8 Using the distinctions described in the previous sections, we can classify some typical impacts of a transportation change as shown in the chart, Figure 2.2. This scheme provides a descriptive base upon which to build an analysis of transportation impact. The analysis itself will depend upon the purpose which the analysis will serve. For the most part, we will be interested in analyzing the implications of transportation impact as they relate to community planning and development.

DESCRIPTION AND ANALYSIS OF IMPACT

2.9 The prevailing rationale for public investments is that they will produce maximum BENEFIT at the least COST. We do not want to imply that there is a simple accounting procedure for determining all the costs and benefits of a transportation investment, but we do want to suggest that the general notion of weighing costs against benefits will aid a community in evaluating the role which transportation can play in the community's development. Using the distinctions explained in the last section, we will now examine the various areas of transportation impact for their significance in community planning and development. Where possible, we will identify the particular indicators used to measure the magnitude of the impact and explain the indicators' usefulness to the community in evaluating the potential benefits and disadvantages associated with transportation impact.

TRANSPORTATION IMPACTS AND COMMUNITY DEVELOPMENT

DIRECT IMPACTS

Most direct impacts are associated with the construction of a new facility. However, changes in policy (e.g., reduction of the

speed limit to 55 M.P.H.) or changes in service (e.g., increased or decreased number of buses serving the community) may also have a direct impact. Table 2.1 lists and classifies the characteristics likely to be directly affected by a major change in the transportation system.

TABLE 2.1: OUTLINE OF COMMUNITY CHARACTERISTICS DIRECTLY AFFECTED

I. Community Accessibility
   - A. Relative to all other communities in the region
   - B. Relative to major external activity centers

II. Transportation Behavior
   - A. Through traffic
   - B. Local traffic

III. Environment
   - A. Natural habitat
   - B. Natural drainage patterns
   - C. Noise levels
   - D. Air quality
   - E. Water Quality

IV. Land Use
   - A. Business and residences in right-of-way
   - B. Acreage in agricultural production
   - C. Land on tax rolls

V. Economic Activity
   - A. Agricultural operations
   - B. Traffic-dependent businesses
   - C. Other businesses
   - D. Employment and community income associated with project construction

The remainder of this section will discuss the implications of each area of direct impact on small communities.

2.10 A major intention behind most transportation decisions is to create a change in accessibility. A controlled access freeway, designed to permit a safe and unimpeded flow of vehicles at relatively high speeds between two places, obviously makes those places more "accessible" to each other than would a less safe roadway with relatively slower average highway speeds and a lower level of service.

CHANGES IN ACCESSIBILITY

In a regional context, a change in accessibility between two or more places alters the accessibility of all places within the region 1) relative to each other and 2) relative to major activity centers in the region.

While a given community may be more accessible relative to others within the region, and thus be enhanced as a possible location for new investment, this remains only a possibility. For the possibility to be realizable, there must be a positive combination of the political, social, and economic factors within the community as well as a lack of environmental constraints such as energy availability, existing air and water pollution levels, soil conditions, topography, etc.

The change in accessibility relative to major activity centers will also have potential consequences. These may work to the economic disadvantage of certain activities in a community, at least on a short-term basis, as people travel to places where a greater range of goods and services is available.

CHANGES IN TRAVEL BEHAVIOR

2.11 In addition to creating a change in accessibility, one purpose of major transportation investments is to improve conditions for travellers with destinations outside the community. For this reason, and for reasons of economy (lower cost of right-of-way, etc), small communities are often by-passed when major transportation links are constructed. There are both advantages and disadvantages to the community as a result.

The main advantage comes from the removal of heavy vehicle traffic from the town's center, thus reducing noise and air pollution and increasing safety. The disadvantages include a reduction in the town's visibility to outsiders and a potential business loss to some commercial establishments. Studies have shown that, in many cases, the disadvantages are short-term, being offset by long-term increases in traffic volumes. Nevertheless, there is no question that some businesses are faced with genuine hardship for an extended period of time.

Figure 2.3 indicates the changes over time in locations of highway related businesses in relationship to changes in traffic exposure (measured by average daily traffic, ADT). The changes in ADT were affected by the opening of a new highway which by-passed a small rural city. These figures (taken from an indepth case study), studied in detail, provide a clearer image of the typical short-term response to accessibility and implications of longer term spatial impacts.

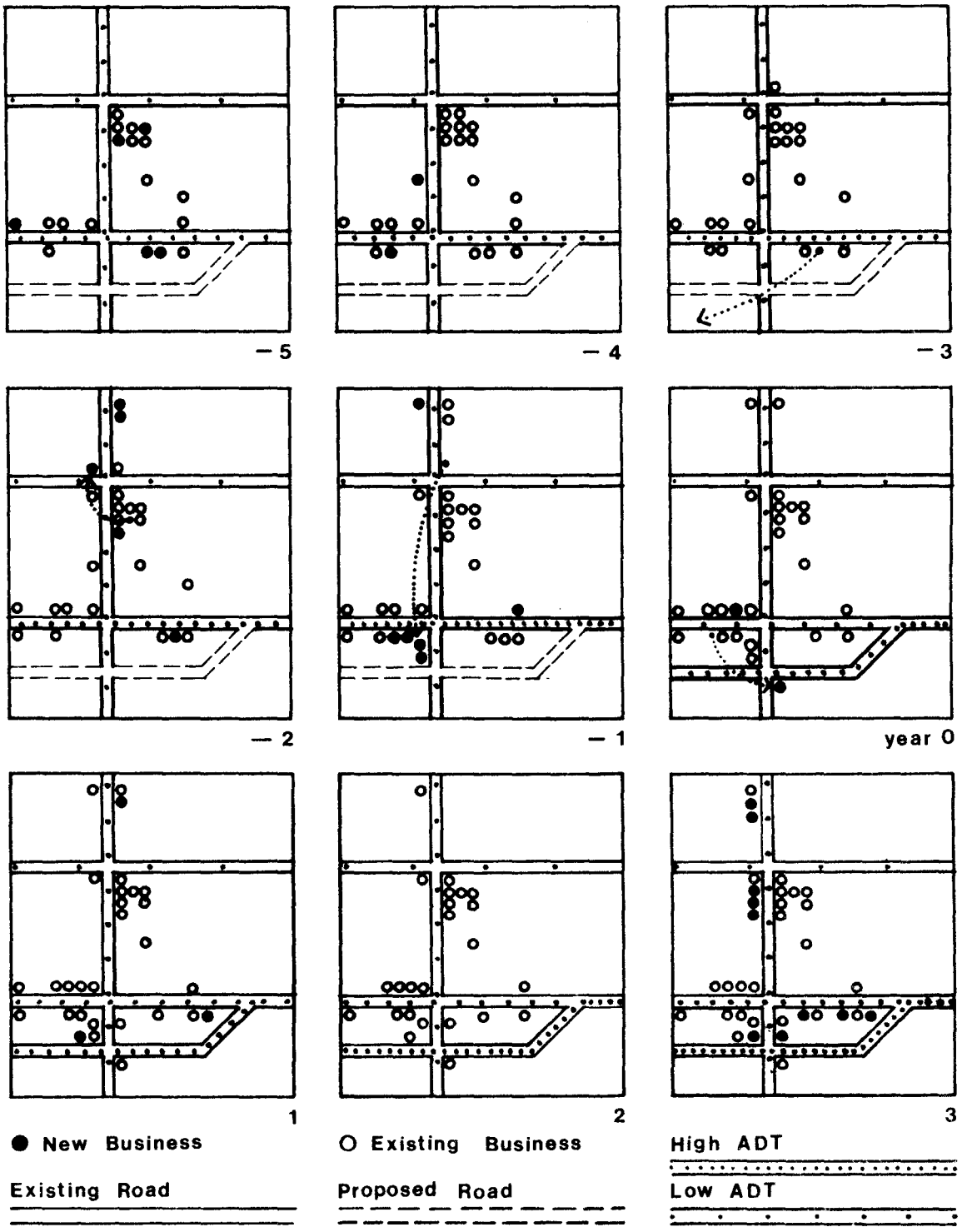


Figure 2.3

Changes in Location of Highway-related Businesses Shown in Relationship to Changes in ADT Affected by New By-pass

In many states, the designers of highways have attempted to minimize the disadvantages of by-passes and other route changes. Signs advising travellers of the town's existence and of the services it offers and frontage roads, providing access to the town's commercial establishments, are standard in many states. Barring major changes in state and federal policy, it remains unlikely that state or federal agencies will go beyond such means as these in minimizing the negative effects of bypasses. It will therefore be up to the community itself to determine the extent of negative impact and to institute any procedures for compensation. Some of the options open to a community in overcoming the disadvantages of a major change in through traffic are discussed in a report prepared for the Federal Highway Administration by Arthur D. Little, Inc., entitled "Enhancing the Public Share of Highway Benefits" (DOT-FH-11-8214).

In addition to the impact on travel behavior of those whose destination is outside the local area, a new facility will be likely to create changes in the patterns of <u>local</u> traffic. A controlled access highway facility, for example, will act as a barrier to traffic moving from one portion of an area to another since there will usually be a reduction in the number of points where traffic may cross (underpasses, etc.). This will in turn affect the distribution of traffic on local streets. What was a quiet residential street may become a "collector," which may require modification to increase the capacity of the street or highway. (See Volume II, Chapter IV, for a discussion of the functional classification of streets and highways. Note Figure 2.4.)

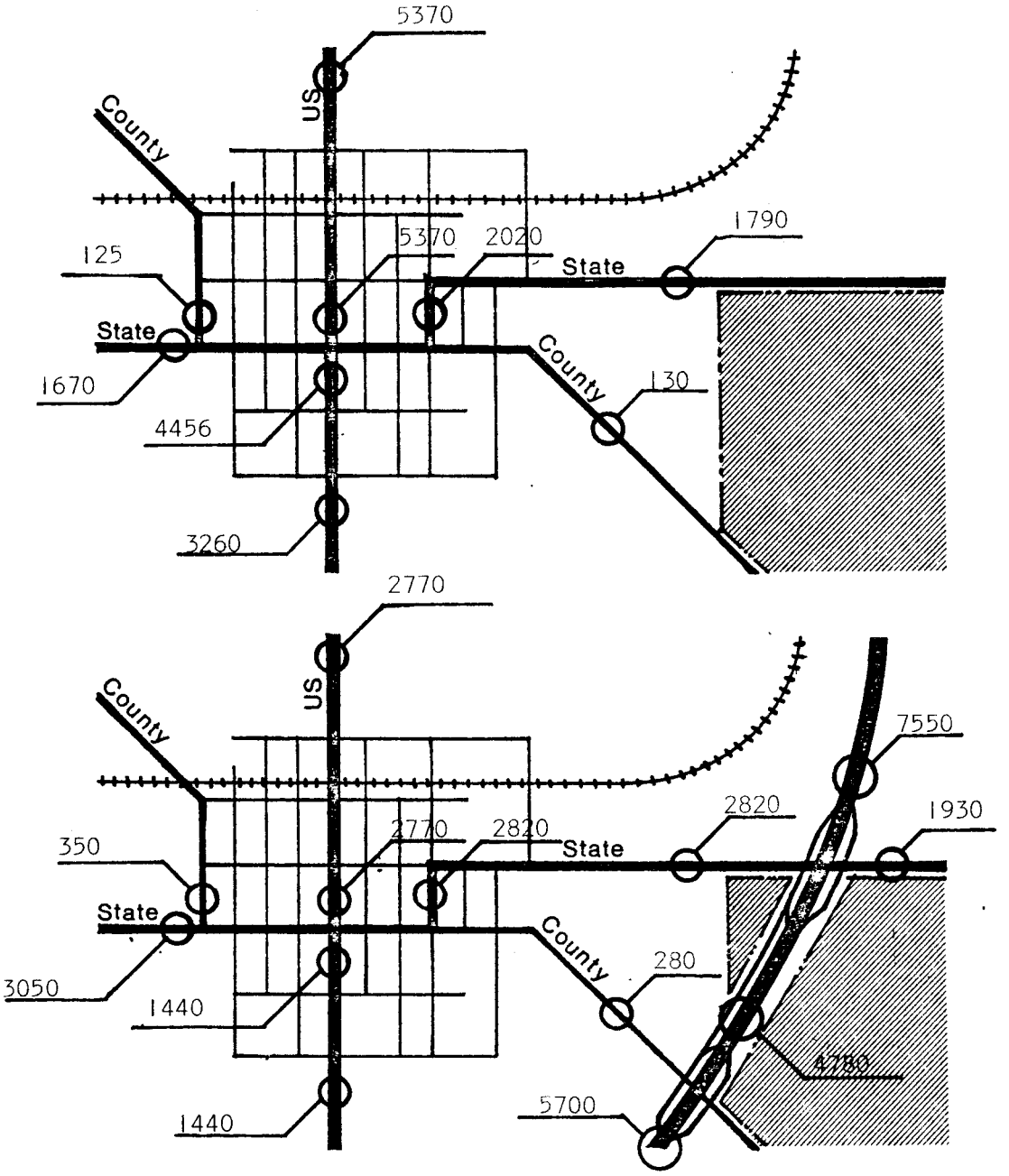


Figure 2.4

Changes in Traffic Flow

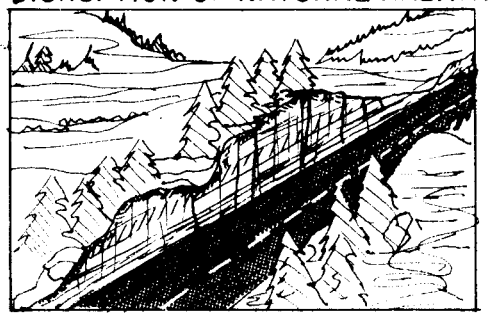
Expressed in ADT (Average Daily Traffic)

Facilities other than highways also create changes in local traffic patterns. Shopping centers, sports arenas, and bus stations, for example, serve as traffic generators (points of origin and destination for groups of travellers). In small communities, the amount of new traffic may not be considerable in the short term, but, again, the pattern of traffic may be altered, changing the function of local streets and highways. In the long-term, increases in population and changes in the level of transportation activity may require a careful planning of local streets in order to avoid overburdening of facilities. (See Chapter IV, pp. 14-20.)

CHANGES IN THE NATURAL ENVIRONMENT

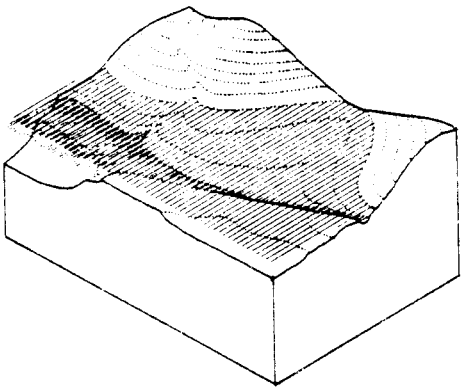
2.12 The construction of a major transportation facility can affect the following areas of the environment: 1) the ecological system; 2) FLOOD PLAIN; 3) noise level; 4) air quality; and 5) water quality.

DISRUPTION OF NATURAL HABITAT

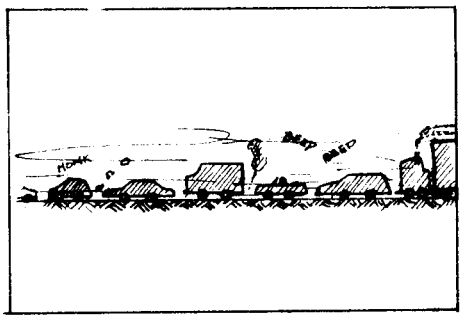


1) A direct impact especially prevalent in building through virgin land is the disturbance of the ecological system (animal habitats, places of forage, areas of vegetation, etc.). In addition to the immediate disturbance, as usage of the land increased, the previous stability of the "ecosystem" may further deteriorate.

2) There is a danger that storm water runoff and drainage patterns will be changed, increasing the probability of local flooding. Following the completion of a facility, any changes in the 100-year flood plain should be evaluated and, if necessary, land use controls may be required.



3) In most non-metropolitan areas, noise is more of a nuisance than a health hazard. Particular locations may be affected by an increase in noise levels, however. These are usually found close to the facility, whether it be road, airport, or rail line.



Noise level standards for various land uses are available (see Volume II, Chapter VI) and should be used as guidelines for future development around the transportation facility. Residential uses are incompatible with high noise levels. In these areas of higher noise, retail and industrial uses should be encouraged.

4) Traffic volumes on rural highways are usually not high enough to cause major air quality problems. Local short-term problems may arise from blowing dust during construction.

5) Sediment in nearby streams can be increased substantially. during construction of the facility making the stream unsightly and possibly even unsanitary.

CHANGES IN LAND USE

2.13 The predominant impact on land use associated with the construction of new transportation facilities is the result of relocation of businesses, residences, and other activities within the right-of-way acquired for the facility. The number of people who must be re-located or who receive compensatory damages is often an important consideration in decisions about route alternatives.

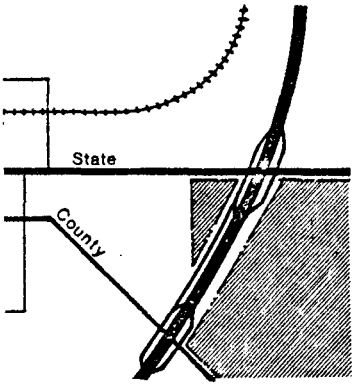
Federal requirements specify the nature of relocation assistance for any project involving federal funds. This assistance includes payment of moving expenses, rent supplements, and advisory services. For the local community, an evaluation of potential impact should include a survey of suitable replacement housing and the availability of land for the reestablishment of business activity.

The amount of land removed from agricultural production is usually considered in planning the construction of new transportation facilities. The extent of the impact will largely depend upon the kind of operations in the area. The choice between alternative routes or sites may be in part based on the quality of the land taken out of production.

As land for right-of-way is converted to public use, it is removed from the tax rolls. At least in the short-term, this may have a negative impact on the community's tax base and hence its

revenue. (The average freeway, for example, removes about 40-50 acres per mile from the tax rolls.) It is usually assumed that positive changes induced in the area around the facility will more than offset the initial reduction by increasing land value. The realization of an increasing tax base depends, of course, not only on the induced change in activity but also on the community's taxation procedure (on, for example, the frequency of revaluation, the basis of valuation, etc.).

A special case of disruptive impact is the result of dividing one section of a single agricultural operation from another. The effect is to increase the operating costs of the producer, who may have to travel a much greater distance in order to work both areas. In some cases, the value of the land may be adversely affected as well.



CHANGES IN ECONOMIC ACTIVITY

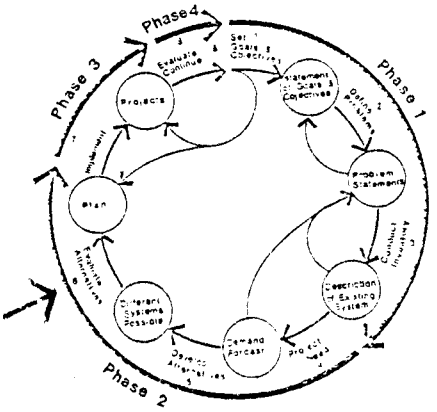
2.14 The direct changes in economic activity have, for the most part, been discussed in connection with the other categories of impact. These include the disruption of business acitivity thorugh direct relocation, diversion of traffic, and changes in accessibility. If local merchants are willing to participate, the local government may wish to conduct a study to determine the exact nature of the economic impact. Data on annual retail sales, on employment, and on land value should be collected for a five-year period prior to the announced change in the transportation system. This will help establish a trend for each of the three

indicators. Data should then be gathered on the same indicators after the transportation change. Net losses or gains may be determined by comparing expected values (based on previous trends) with actual values (adjusted for regional trends). Once the impact has been determined, the community may wish to institute measures which will help equalize the benefits and losses of the transportation change. (Again, see "Enhancing the Public Share of Highway Benefits," DOT-FH-11-8214.)

One short-term economic impact is the increase in employment in connection with the actual construction of a new facility. This, in turn, may temporarily increase community income as wages are spent on goods and services locally.

SPECIAL QUALITATIVE CONSIDERATIONS

2.15 Most of the direct impacts discussed so far are short-term, spatially specific, and quantifiable. Before we begin a discussion of indirect impacts, the qualitative aspects of direct impacts need to be touched upon.



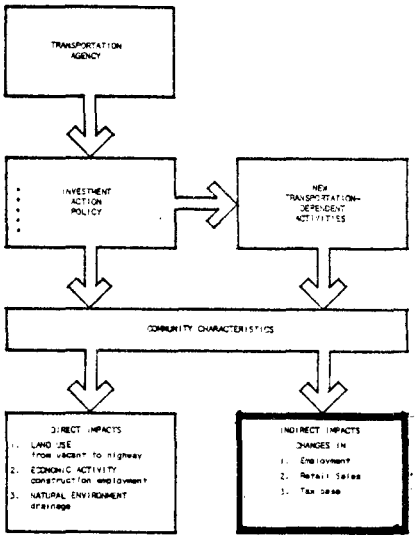
An important qualitative issue centers around the question of <u>who</u> or <u>what</u> is affected rather than the <u>number</u> of people affected or the <u>magnitude</u> of the effect. It is one thing, for example, to say that 24 people will be forced to relocate as a result of a particular decision to construct a facility. It is quite another to say that 24 <u>elderly</u>

people will be re-located. It is one thing to say that four businesses will be re-located, and another to say that this number includes two which occupy buildings of historical value to the community. The difference between one set of statements and the other is essentially qualitative in that community values will enter into our assessment of their meaning. Older people are likely to be economically less able to re-locate and more emotionally attached to their places of residence. Because we wish to reduce the hardship on such people, we differentiate impacts on the basis of their qualitative aspects. This differentiation will have a place in the final judgment an agency makes about environmental impacts of a particular transportation alternative. (A worksheet is included at the end of the chapter which will serve as an aid to the community in helping to develop, or to monitor the development of, an Environmental Impact Statement.)

INDIRECT IMPACT

INDICATORS OF INDIRECT IMPACT

2.16 The indirect impacts of transportation investments and policies result from a complex interaction between various social and economic forces and factors related to transportation. Thus, it is often impossible to separate accurately the role played by transportation from that played by general economic and social conditions. In one way or another, it is conceivable that any change in a community could be related, at least remotely, to transportation.



For the problem of defining indirect impact to be a manageable one, there must be some logical basis for relating a given change in the community to the transportation system in particular. In order to create this basis, we will define the term indirect impacts as the effects on certain community characteristics which are the product of activities dependent on the use of the transportation system.

One set of transportation-dependent activities will be selected. This set of activities is composed of those most likely to be associated with a major improvement in the intercity transportation system. Each of the activities and their probable effects on the major characteristics of communities will be discussed.

Transportation Dependent Activities. The activities involved in the indirect impact of a transportation investment may be classified according to the purpose of the activity:

1. Change in people or goods passing through the community
2. Change in the number of new residents who commute to jobs outside the community
3. Change in number of firms or other employment centers locating in the community
4. Change in the character of households in the community associated with change in firms
5. Change in the use of the transportation system by existing residents

6. Change in the use of the transportation system by existing firms

7. Change in number of workers or shoppers who commute to the community

Community Characteristics. The activities listed above will have both community-wide and spatially-specific effects. The community characteristics likely to be affected are listed in Table 2.2, classified according to whether they are community-wide or spatially-specific.

TABLE 2.2: COMMUNITY CHARACTERISTICS

I. Community-wide characteristics
   - A. Access to jobs and services
   - B. Total population by age groups
   - C. Social and ethnic composition
   - D. Total employment (by industry class or occupation)
   - E. Average wage rates (by industry or occupation)
   - F. Average business and manufacturing income
   - G. Average land costs for existing activities
   - H. Average land costs for new activities
   - I. Tax base and assessment rate
   - J. New public utilities and services

II. Spatially-Specific Impacts
   - A. Land use by
     - 1) residential (including population)
     - 2) service or retail (including employment)
     - 3) industry (including employment)
     - 4) agriculture (population and employment)
   - B. Population by zone
   - C. Land value by zone and use category
   - D. Traffic volumes and patterns by zone
   - E. Location of activity centers
   - F. Neighborhood quality

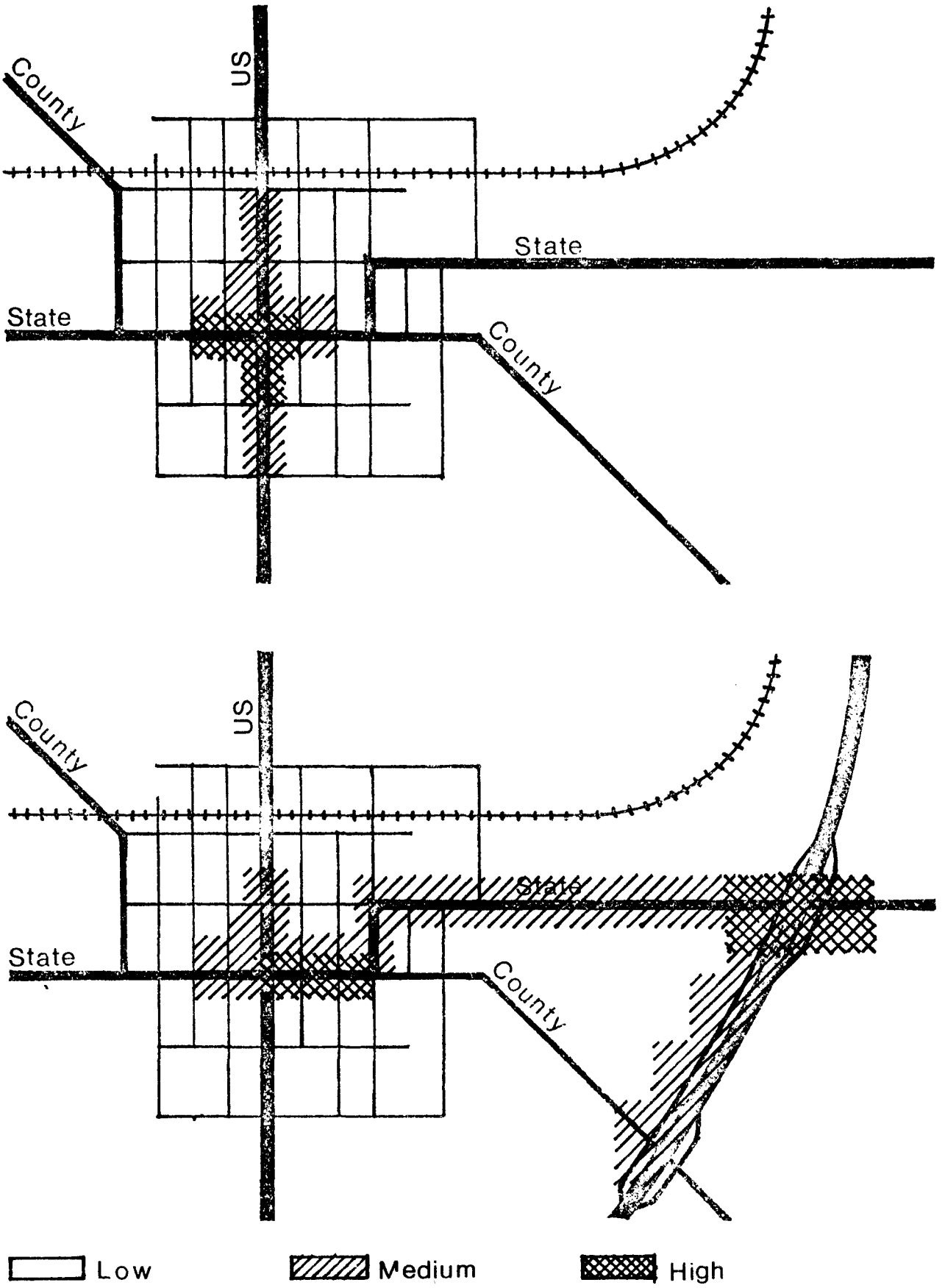
EFFECT OF CHANGES IN PEOPLE OR GOODS PASSING THROUGH

2.17 One effect of the change in the people or goods passing through a community is to induce a change in economic activity, usually in a spatially-specific way. The community characteristics affected are usually land use, land value, location of activity centers, and traffic patterns. There may be some effect on the average land costs for existing and new activities, on the tax base, and on public utilities.

To illustrate the effects, we may look at the case of the construction of a controlled access highway which bypasses a small community. Figure 2.5 shows the old situation in comparison with the new. As a result of the change, even if we suppose that additional people are passing through the community, the number of activities has been reduced since there are fewer convenient locations for service to through travellers. Land values will probably increase at the locations near the interchange but, in the short term at least, decrease for some existing activities. (One effect of the reduction in the number of profitable sites may be to "price" local investors "out of the market.") Changes in land use near the interchange (e.g., from vacant or agricultural to commercial) may be accompanied by changes elsewhere in the community. The degree of change will depend upon the decline of previously successful activities and the intensity of land use in the interchange area.

In our illustrative case, two issues may arise for the community. The first issue arises because the changes in land use and business activity may have some impact on the tax base of the community as a whole. The impact could be positive or negative depending 1) on the net change in market value and 2) the local community's assessment practices. The second issue is raised by the transfer

Figure 2.5. Effect of Construction of Highway Bypass on Land Values



of benefits from one locality and group to another, especially in the price of land. Several techniques are available for equalizing the share of gains and losses, including transfer of development rights and public acquisition of land. (Reference, "Enhancing the Public Share of Highway Benefits.")

For planning purposes, it is important for the community to recognize the possibility that certain kinds of changes will occur as the result of a change in people and goods passing through the community. (While it is not possible to predict with any precision the specific changes that will occur, some efforts have been made to identify the kinds of changes likely to occur and the most important determinants of those changes.

Most impact studies in rural areas have focused on the effects associated with highway improvements. Much of the impact of additional people and goods passing through or within the vicinity of small communities is a function of the type of improvement. The most important improvements are:

1. Interchanges (where a major new facility intersects another primary or a secondary route);
2. Bypass routes;
3. New rural routes[1].

Table 2.3 summarizes the community characteristics most clearly affected and the most important determinants of the magnitude of the effect.

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[1] Lidvard Skorpa, et al., Transportation Impact Studies: A Review with Emphasis on Rural Areas, Research Report 2, Council for Advanced Transportation Studies, The University of Texas at Austin, October, 1974 (DOT-TST-7559). See also the bibliography of impact studies at the end of this chapter.

Interchange Areas. Just as "crossroads" were usually focal points of development in the nineteenth century, the areas near interchanges between upgraded highway facilities and other routes have received the great pressure for development in both urban and rural areas. Everyone who has driven an Interstate Highway knows that interchanges will be the location of new traveler services (gas stations, motels, etc.). Eventually, they may also be the location of other new commercial or residential activities.

TABLE 2.3: EFFECTS OF EXTERNAL TRAFFIC ON COMMUNITY CHARACTERISTICS

	Type of Improvement	Community Characteristics Affected	Some Determinants of Magnitude of Growth (a)
1.	Interchange of major highway route with other primary or secondary routes	Land use, land value, and economic activity in interchange area	-Traffic volumes on cross-route -Distance of interchange from community -Interchange type (full access vs. partial or no access) -Population of area
2.	Bypass route (major highway replacing older facility)	Land use and land value in tracts abutting bypass routes	-Distance from highway facility -Distance from metropolitan area -Population of area
3.	Rural route (new highways built in rural areas)	Land value, land use	-Population density -Attractiveness of area for new development

(a) listed in order of importance

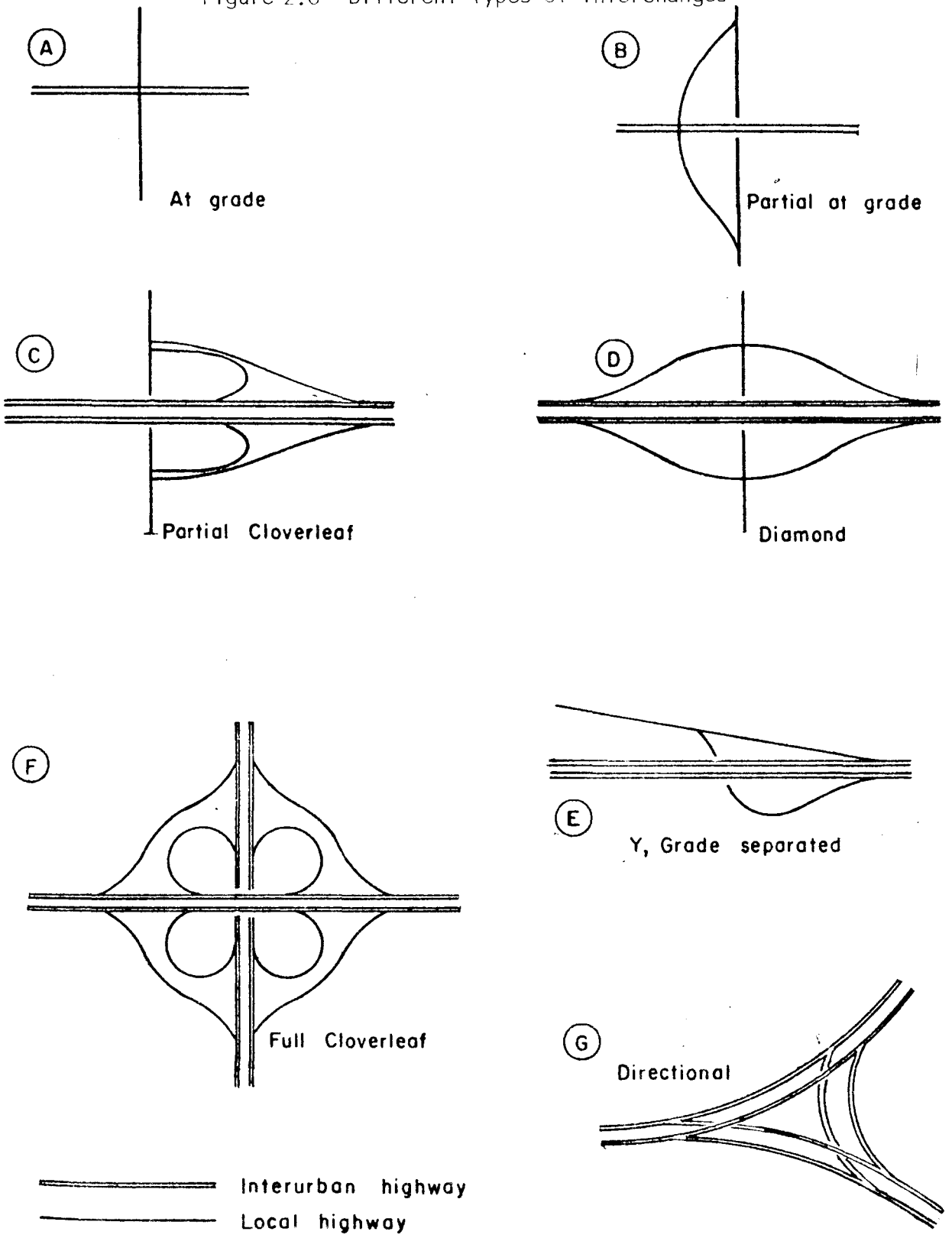
As the table indicates, the magnitude of change in land use and land value in the vicinity of an interchange will depend upon the amount of traffic volume on the cross route, the distance of the

interchange from the community, the type of interchange, and certain population factors (usually size and growth rate of the community).

Actual and projected travel volumes will help determine both the intensity of land use and the value of the land within the vicinity of the interchange. (In one study, the traffic volumes on the cross-route alone explained up to 25% of the variation in development. (Ref. 55). The distance between the community and the interchange is also likely to affect the degree of land use and land value change. In general, the closer the interchange is to the community, the greater will be the pressure for development. (Beyond a distance of five miles, the amount of development falls off rapidly). The type of interchange influences both the magnitude of development and the location of development. Figure 2.6 shows the types of interchange between a CONTROLLED ACCESS FACILITY and another route. Of the types, full diamond and full and partial cloverleaf attract the most development. (Ref. 55). A final consideration is the growth rate of the community and the surrounding area. Development pressure will be increased by a growth rate that is above the average for a given community size.

Knowing which factors influence the development in the vicinity of interchanges has two important implications for the planner or citizen of a small community. First, it should help in evaluating the design of proposed facilities within or near the community.

Figure 2.6 Different types of interchanges



For example, if it is in the community's interest to encourage development, the plans for the interchange should be consistent with those factors most likely to foster development pressure. On the other hand, if the community wishes to discourage development, the planner may decide to opt for a particular interchange type which will limit the likelihood of new activities adjacent to the interchange.

The second implication concerns already existing interchanges. A high likelihood of development pressure will require careful land use planning to prevent undesirable traffic problems and incompatible land uses. Four conclusions from one report conducted in Illinois are relevant here.[2]

1. Local interchange area land-use may have little functional relationships to the major type of traffic using the interchange. Almost regardless of interchange location, commuter traffic (work trips) comprise the bulk of interchange traffic, and except for cases where a worker's home or place of employment lies adjacent to an interchange, this type of traffic makes little or no demand upon interchange area land. As far as the interchange area is concerned, it acts as through traffic.

2. Interchange area land-use is most likely to be functionally related to a secondary traffic service function of the interchange (in terms of quantity of movement.) For example, long-distance through traffic, while usually comprising a small percentage of total interchange traffic, fosters the most prevalent type of interchange land development -- road-user services.

3. Land-uses immediately adjacent to interchanges exert an influence on area traffic operations far in excess of the actual quantity of traffic which they generate. The introduction of local traffic (even of small quantities) into the cross-route at critical sections adjacent to ramp terminals can seriously conflict with entering or exiting ramp movements. The access points serving this local traffic also create difficulties in adequately signing ramp movements and often confuse ramp-bound traffic.

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[2] Barton-Aschman Associates, Case Studies of Selected Interchange Areas, Supplementary Report No. 3 for the State of Illinois, Chicago, Illinois, August 1966.

4. Related to point 3 above, there is a tendency for road-user services (service stations, motels, restaurants) in interchange areas to exert an influence on area traffic operations far beyond the actual quantity of traffic which they generated. This is because these activities are likely to take the form of "strip commercial" development along the cross-route with numerous and often poorly defined points of access. Fortunately, this problem can be alleviated through the grouping of such activities into planned functional units or by the use of frontage road systems and a reduction in the number of access driveways.

Bypass Routes. Some of the effects of bypass routes have already been discussed (supra, p. 2-28). Three general observations may be added here. First, in cases where a bypass includes an interchange area, the considerations mentioned in the previous section on interchanges apply to the alterations in land use and land value along the bypass route. Of most importance are distance from the community and traffic volumes.

Second, it has been well documented that the reduction of through traffic in the bypassed community has at least a short term negative effect on traffic-serving businesses (gas stations, motels, and good service). The magnitude of the effect varies greatly, however, and the long-term effects are usually dependent on the general economic conditions of the area or the community. Third, exclusive of interchange areas, the general effect of bypasses is to induce gradual changes in land use and increases in land value along the new route. However, since much of this effect is unrelated to the impact of changes in people and goods passing through the community (the subject of this section), it will be considered later.

Rural Routes. Improved rural routes include both primary and secondary road improvements. The effects on land value and land

use will vary greatly depending on the characteristics of the rural area itself. General effects noted in various studies are 1) the value of farmland tends to increase as a result of greater accessibility and 2) where greater traffic volumes occur, retail activity increases. Where the second effect occurs, it has been noted that there may be an increase in the concentration of activities and a reduction of so-called "open-country" stores (Ref. 60).

NEW RESIDENTS COMMUTING

2.18 The second source of indirect impact on our list is the number of new residents who commute to jobs outside the community. Their activities have an effect on both community-wide and spatially-specific characteristics. These include, in the first category, total population, average business income, average land costs, tax base potential, public utilities and services, social and ethnic composition, and political and social behavior patterns. In the second category, commuter residents can have a particular effect on land use patterns, zonal land values, and eventually zonal traffic patterns.

Commuter residents usually fall into two basic classes: those who have family ties in the community and wish to return there, but find local employment opportunity to be limited; and those who for a variety of reasons may prefer the environment of a small town to that of a large metropolitan area. For the most part, members of both groups are likely to have relatively higher incomes since they can afford the generally higher expenditure for transportation entailed by living at a greater distance from their places of employment.[3]

[3]There will, of course, be some savings due to lower land costs, which will to some extent offset the increased travel costs.

The effect on local land values and land use patterns will depend on the number of new residents, their age, income, and social characteristics, and the availability of local housing.

For purposes of illustration, we might construct another hypothetical community. In this case, we assume that there are enough new residents commuting outside the community to create a substantial increase in the housing market. We will also assume that the new residents possess basically three classes of ~~preferences~~ for housing: 1) new single-family dwellings, 2) new multiple family dwellings, and 3) older dwellings which have the potential for reconstruction. The results of such preferences will be to increase the pressure for conversion of vacant land to residential purposes, increase the densities in particular residential areas, and increase the market value for existing housing.

Such increases in residential activity will create the need for a careful planning strategy. New residents generally represent an initial cost to the community in terms of public services (education, for example) and new capital improvements. To minimize these costs, the community will need to review its existing land use and density controls (subdivision ordinances, zoning laws, building codes, etc.) and to develop a policy for the extension of public utilities. To insure safe and convenient streets, any new residential developments should be reviewed for their potential effect on transportation circulation patterns.

The balance between the costs to the community of development and the benefits gained from new residents is one issue in the current growth controversy that exists in many areas of the country. While new residents do represent a cost to the community, that cost per resident seems to be significantly lower for small communities. At the same time, commuter residents not only add to the tax base, but also contribute dollars earned elsewhere to the local economy. It should be noted that the number of those dollars captured by local merchants will depend on how well they

can compete in the regional markets since the commuter residents tend to make a larger share of their purchases, especially for durable goods, outside the community. In all, the amount of economic benefit generated by commuter residents depends upon the policies adopted by both the private and public sectors of the community.

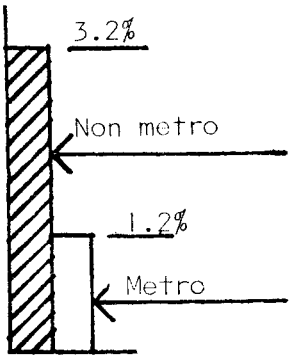
The effect of new residents on the social and political patterns of the community will again depend on the size of the community, its internal cohesiveness, the number of new residents, and their age, social, and income characteristics. In some cases, commuter residents have tended to form separate enclaves within the community. In others, there has arisen little distinction or friction between old and new residents. The very existence of a growing population is likely to produce an increase in the level of political activity and to change existing political patterns. An effect noted in many case studies of small communities undergoing growth is a qualitative change in political activity. For example, political campaigning for local offices in small, stable communities is often based on the social standing of the candidate. As a community begins to grow, and as the population increases in diversity, there is often a shift towards issue-based, more "politically oriented" campaigns.

The social and political impacts of new commuter residents are closely connected with the impacts of growth in general. Some of these will be considered in connection with other activities induced by transportation changes.

CHANGES IN MANUFACTURING EMPLOYMENT

2.19 From the point of view of people in non-metropolitan areas, one of the most important impacts of an improved transportation network is the increased possibility of new manufacturing firms or other employment centers locating in the community.

In the past decade, non-metropolitan areas have gained manufacturing jobs at a proportionately higher rate than metropolitan areas. While improved transportation links are not sufficient in themselves to account for this growth, adequate transportation is a necessary factor in making such growth possible. In addition to transportatio important location factors include available land, inexpensive labor, and lower taxes. Usually, except for resource-based industries, proximity to markets or shipping centers is also important.



Manufacturing Employment Gains 1960-1970

In most cases, gains in manufacturing activity will have a pronounced effect on all of the community characteristics listed in Table 2.2. In addition to changes in population and economic characteristics, there can be pronounced changes in land use, social and political behavior, and the general quality of the living environment.

The desirability of manufacturing from the community's point of view is that it increases basic employment. (Basic refers to economic activities which bring a surplus of income into the community from the outside.) For every new manufacturing job, approximately one more job is created in the retail or service sectors of the local economy. Access to local employment also reduces the likelihood of outmigration of the young.

The disadvantages of manufacturing growth will depend on the kind of industry locating in the area and the demand for public services created. Industry can represent a threat to the environment through the loss of irreplaceable resources, pollution, and the destruction of the aesthetic qualities of the community. While it is unlikely that an industry would choose a location which lacked sufficient public services or resources, in the long run the existence of industry may increase the amount of public expenditures for maintaining existing facilities (water and sewer facilities, roads, etc.).

The planning problems posed by the location of new industry may be illustrated by another hypothetical case.

A small community (population 5,000) feels fortunate that a metals manufacturing firm has chosen the vicinity for a new plant employing 400 workers. The community has adequate rail and highway connections to the firm's major sources of supply and the regional shipping center. Once the firm has commenced operations, however, the town finds itself faced with several new problems. As figure 2.7 illustrates, several of the problems are spatially-specific. The central access route to the plant for both workers and shippers is along Old County Road. For east- and westbound trucks to reach the plant, they must move from the Interstate to the U. S. Highway and then to Old County Road; north- and southbound trucks will also be turning onto Old County Road from the same direction. Workers at the factory will also use the one arterial available, adding peak hour traffic to both the U. S. Highway and to Old County Road. In addition to the increased vehicular traffic, the volume of rail shipments also increases, adding to the noise and air pollution levels on the east side of town.

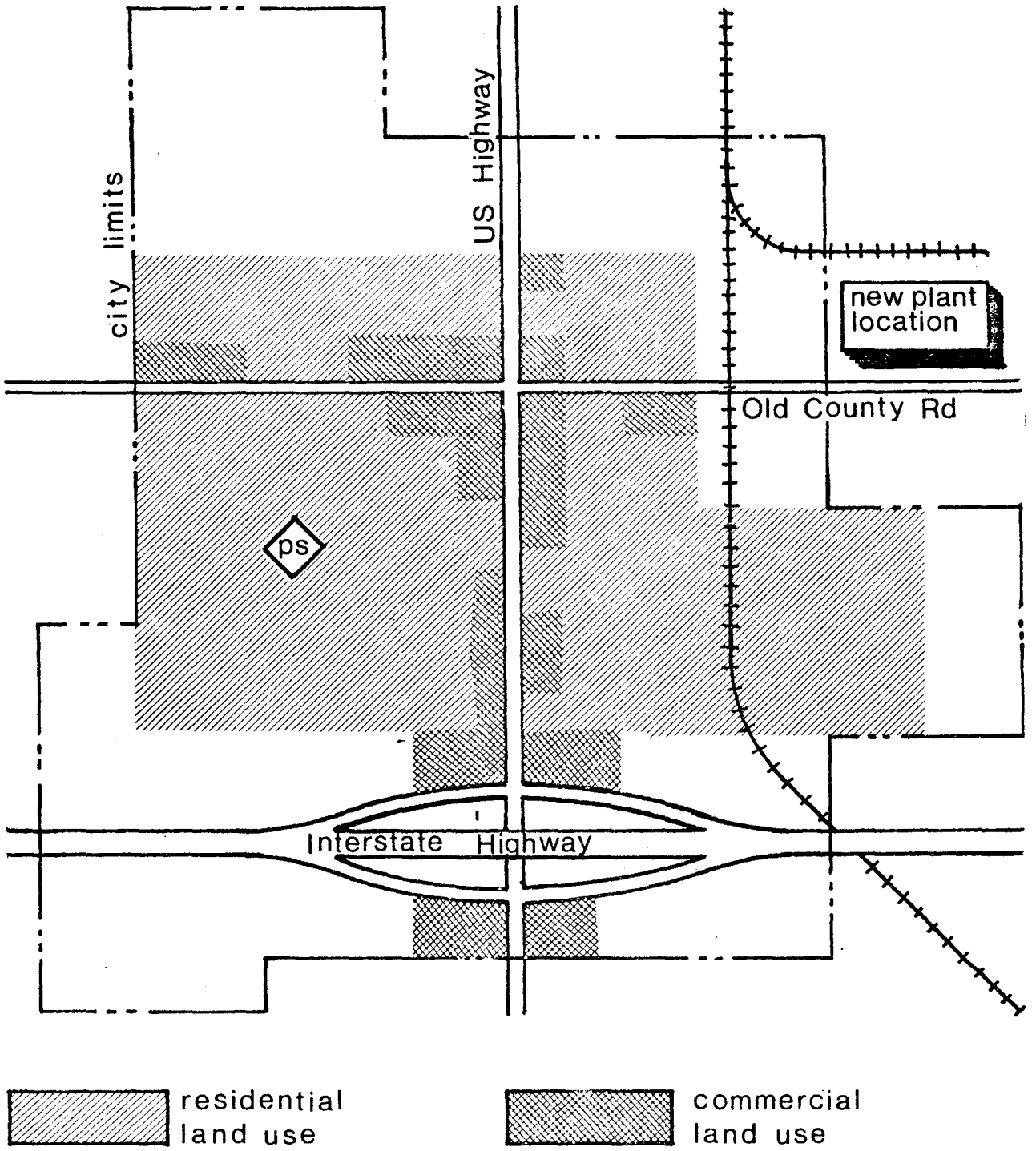


Figure 2.7

Possible Effects of New Interstate Highway on a Hypothetical Community

Even though the traffic problems might be minor in comparison to those of a larger city, they may place stress on the resources of a small town. The highway traffic creates both control and maintenance problems for the city. The larger volumes of traffic and the heavier vehicles lead to a deterioration of Old County Road, especially the section east of the U. S. Highway. The intersection of the U. S. Highway and Old County Road will eventually require upgraded traffic controls (signals, etc.). New arterial streets might be called for to relieve the traffic along Old County Road.

It might also be expected that changes in land use patterns will be induced by the location of the manufacturing plant. The residential areas along Old County Road may decrease in value, while the undesirability of living near the factory and its major access routes will likely make the western portion of the town more attractive. Thus, most of the development pressure will probably concentrate on the area to the southwest. Traffic on the western portion of Old County Road, created by both work trips (to the commercial area), may create a burden for pedestrians destined for the public school. The probable decline in residential property along Old County Road may eventually lead to a conversion of the area to non-residential use. In the short run, however, the decline of the residential area may negatively alter public tax revenues as well as create a loss to property owners in the area.

In our hypothetical case, the factory created numerous short-term inter-related pressures and resultant changes having longer term impacts on the spatial and economic characteristics of the community. The community must attempt to identify and evaluate the ramifications of change.

We have presented, perhaps, an extreme case, but we wish to illustrate the planning problems associated with new industry. Land use problems, transportation problems, and public revenue problems are all likely to be associated with new industry.

ESTABLISHMENT OF NEW HOUSEHOLDS

2.20 With some important exceptions, the existence of new households in the community associated with new firms creates benefits and disbenefits similar to those associated with new residents who commute to jobs outside the community.

Since industry may locate in communities which are farther from major activity centers than the average commuter distance (usually one hour's travel time or less), in many cases new residents associated with manufacturing will likely spend much of their wages locally.

At the same time, there will likely be a wider range of income levels represented by the workers brought in by industrial firms, ranging from transferred executives and managers to low-skilled employees. The result may be a wider diversity in the type of housing and the kinds of services required.

In some cases, new residents have created resentments in small communities because of the local feeling that the increased job opportunities have been lost to outsiders. Cooperation between employers and community representatives can often decrease this source of friction.

In general, changes in the social and political system of the town are likely to be greater in magnitude as the result of new households associated with manufacturing and other employment opportunities than is the case with commuter residents.

EXISTING RESIDENTS COMMUTING OUTSIDE THE COMMUNITY

2.21 The number of existing residents who commute outside the community for jobs and goods has effects on such community

characteristics as total employment, average household income, average business income, and social patterns of behavior.

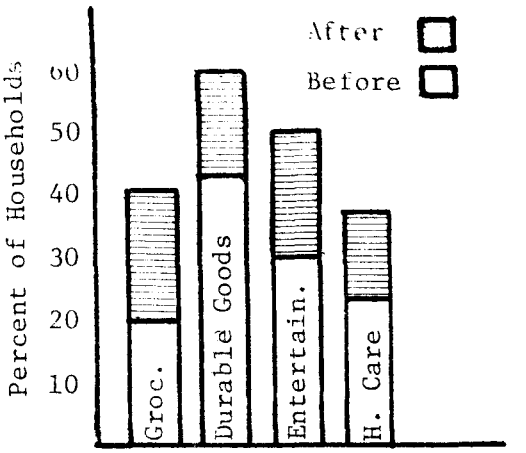
Greater accessibility to the job market for local residents is usually perceived as having a positive social as well as economic influence. It opens the possibility of reducing outmigration of the young and thus helps maintain family ties. It allows for a more "balanced" population and hence helps alleviate many of the problems associated with an aging population.

The ability of local residents to commute outside the community can increase household income. A wider variety of jobs (as well as a greater number of jobs) makes it possible for heads of households to increase their income opportunity and for other members of the household to find employment. One side effect of this situation can be an increase in local wage-rages since local employers are essentially in competition with outside employers.

An increase in household income can increase the average business income as money earned outside the community is spent locally for goods and services. At the same time, however, there is the corresponding possibility that work trips and shopping trips will be combined and that business wil be "lost" to other areas of the region.

The number of existing residents who commute for goods and services outside the local community can have an even more profound effect on local business income than the number of commuting workers. Certain categories of business are more

likely to be affected than others. People usually are willing to make longer trips for items of occasional purchase (automobiles, etc.) than for "everyday" needs (groceries, etc.) Clothing and durable goods (furniture and applicances, for example) are usually among the items for which people will shop elsewhere.



% of Households Purchasing Items Outside a Community Before & After Construction of an Interstate Highway

In some rural communities, it has become the practice for people to combine external trips for entertainment and shopping purposes. Housewives may "carpool" on a given day of the week, or families may use a Saturday for both shopping and entertainment in a larger city (community). While local merchants may counter such trends by offering a greater variety of goods and by competitive pricing, commuter shopping is often as much a form of social behavior as it is a matter of economics.

The number of residents who commute elsewhere for either jobs or goods will be dependent on distance to major activity centers, the regional economic structure, and the income and age characteristics of the population. The number of community trips for goods will to some degree depend upon the availability of local services - medical care, banking, etc. The greater number of trips made for any purpose, the greater will be the likelihood that goods will be purchased outside the community.

INCREASED ACTIVITY BY EXISTING FIRMS

2.22 The use of the transportation systems by existing firms for new activities can have as strong an effect on the community as the location of new manufacturing plants.

The change in the level of activity depends upon the way MARKET LINKAGES are altered by improved accessibility and by the potential for agglomerate effects produced when mutually supporting industries locate in the same general area or vicinity.

As an example, we might assume that a small community has served as a local cattle trading center, a transfer point in a regional market. An improvement in its regional accessibility expands the potential of its activities. It can now serve as a terminal market for the region. Let us also assume that its "forward linkages" to customers for processed beef are sufficiently improved that the marketing firm can add a processing plant to its previous operations, combining the advantages of its location as a receiver and distributor of products with those of a supplier.

In our hypothetical case, the extended activity of the existing firm might eventually lead to the extension of other, related activities: feed lot operations, commercial services, and local transport operations, for example.

The possibility of existing firms extending their operations will depend not only on the advantages of an altered accessibility, but also on the willingness and ability of local entrepreneurs to perceive those advantages and to take risks in capital investment.

2.23 The number of new workers and shoppers commuting to the community for goods and jobs will depend upon 1) the community's changed regional accessibility, 2) the changes induced by the other transportation-dependent activities listed above and 3) the availability of services in the community.

NEW COMMUTING TO THE COMMUNITY

The two activities need to be separated in the evaluation of impact on the community. For the most part, community shoppers add to the economic base of the town and hence can have a positive effect on the economic characteristics of the community. Commuting workers, on the other hand, may take dollars out of the community and hence negatively affect the local employers. Since commuters do not pay property taxes, they may use services (such as transportation facilities) which they may not pay for directly. Thus, it is only through the sales tax or through a market increase in local business that the community can benefit from an increase in commuter activity.

2.24 It has been assumed throughout this chapter that a change in the intercity transportation system will alter a wide variety of community characteristics. Past experience, such as that gained during the development of the present Interstate Highway System, has shown that change in the intercity system has the potential to induce changes in transportation related behavior and that these changes in turn seem to affect both the economic and social patterns of small communities. Thus, the kinds of changes which may occur are now fairly well understood even though the specific

SUMMARY AND CONCLUSIONS

effects of a particular change will vary widely form one situation to another. Nevertheless, a general understanding of the sources of impact and of the effects likely to occur when changes are made can serve to guide a community in 1) assessing proposed changes, and 2) planning responses to transportation induced change.

When changes in the system are proposed, the community may want to ask the following questions of the sponsoring agency.

1) Have the potential direct effects of the proposed change been accounted for by the sponsoring agency? (See the set of questions in the worksheet on environmental impact statements at the end of this chapter.)

2) Does the proposed change serve local goals and objectives, or will the possible indirect effects of the change require an alteration in existing goals and objectives?

Both of these questions may be asked in a spirit of informed cooperation, and the answers may be developed jointly by the sponsoring agency and the community.

In planning responses to transportation induced changes, the community will want to monitor carefully the actual changes as they take place over time. This chapter has provided a description of the general categories of change and illustrated some of the implications of these changes for small communities. The subsequent chapters of the manual deal with the community planning process and hence with the procedures necessary for identifying problems and utilizing resources to solve these problems. Monitoring the impact of changes in the transportation system is an integral part of both the community inventory process (Chapter IV) and of the development of alternatives (Chapter V). The performance measures supplied for

the development of objectives (Chapter III) will also serve as an aid in monitoring the specific changes which occur in a given community.

CHAPTER II: APPENDIX A

ASSESSMENT OF ENVIRONMENTAL IMPACT STATEMENTS

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APPENDIX A

An Environmental Impact Statement (EIS) is a detailed analysis of the environmental effects that may result from a proposed action. (All of the impacts discussed in Chapter II are considered to be environmental effects. These range from the disruption of natural processes to the problems associated with increased population growth.) Many of these impacts will have a significant influence on the character of the community and its natural environment. A community should at least be aware of the potential effects of a proposed transportation (and other) change. After reading the EIS, the community may want to submit comments on the EIS that express local reactions to the statement.

An Environmental Assessment is required for any major federal action that has a significant effect on the quality of the human environment. ("Major action" includes construction projects using federal monies or significant policy alterations by a state or local government.) The Environmental Assessment is a preliminary investigation of a proposed action to determine if any negative environmental effects are anticipated. If the assessment indicates that significant environmental effects may occur, a draft EIS will be prepared and published. The draft EIS is made available to all governmental agencies (including the Environmental Protection Agency) with jurisdiction in the area of concern, and to interested individuals and citizens' groups. These agencies and citizens are then asked to submit comments on the draft EIS. The comments are evaluated and appropriate changes in the proposed action are made. Both the comments and the relevant changes are included in the final EIS.

There are at least two places in this process where the input of a group of citizens may have an impact. First, if the initial environmental assessment reveals that no significant impacts will result from the proposed action, a citizen's group may present evidence to the contrary. This can result in the sponsoring agency's preparing of a draft Environmental Impact Statement. Second, after the draft EIS is completed, the citizens may present their information to the relevant agency for inclusion in the final EIS. This action will require the agency to examine the impacts brought to light by the citizens' group(s). The final decision on whether or not the proposed action will be implemented rests with the Environmental Protection Agency, Council for Environmental Quality.

There are seven content requirements that a draft EIS must fulfill.[1]

a) Background and description of proposed action

b) Alternatives to the proposed action

c) Environmental impacts of the proposed action

d) Any adverse and unavoidable environmental impacts

e) Relationship between local short term use of man's environment and long-range productivity

f) Irreversible and irretrievable commitments of resources

g) Problems and objections raised by other federal, state and local agencies and interested persons.

The information contained in Chapter II should serve as a guide for assessing the impacts described in c, d, and e above. The following questions are included to help you in your assessment.

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1 See Public Law 91-190, known as "The National Environmental Policy Act of 1969" (NEPA), 42 USC, 4332 (2)(c). The actual order of the content elements will vary depending on the agency guidelines used in preparing the EIS.

A. Background and Description of Proposed Action.

1. Is the proposed action clearly defined in terms of its character, scope, and magnitude?

2. What reasons are given to justify the proposed action?

3. What is the basis used to determine the need (estimates of future population, projected changes in land use, etc.)?

4. Do you concur with the justificatin of need (including any assumptions or projections used in the justification)?

B. Alternatives to the Proposed Action.

1. Does the list of alternatives seem to be exhaustive (i.e., have all feasible actions to meet the need been considered)?

2. Are the rejected alternatives sufficiently described?

3. Do the reasons given for rejecting alternatives to the proposed action seem reasonable and prudent?

C. Environmental Impacts of the Proposed Action.

1. Is the description of the environment to be affected by the proposed action clear? (Are there, for example, technical terms which need explanation?)

2. Have all aspects of the environment relevant to the proposed action been described? These should include but not be limited to

   a) Surrounding terrain, including flora, fauna, geological features, presence of water, etc.

   b) Archeological and historical sites and areas of scenic beauty or unique interest

   c) Parks, recreation areas, game preserves, and wildlife refuges

   d) Current and anticipated land use

   e) Other social, cultural, and economic activities

3. Does the EIS address the question of potential for controversy, and, if so, does the discussion seem substantially correct given local issues and attitudes?

4. Does the discussion of environmental impacts seem complete? The discussion should include but not necessarily be limited to, the following impacts:

   [ ] a. Endangerment of parks, game preserves, or wildlife refuges

   [ ] b. Displacement of persons, businesses, or other activities

   [ ] c. Division or disruption of established neighborhoods, communities, and existing land uses

   [ ] d. Disruption of planned development

[ ] e. Changes in water quality

[ ] f. Changes in air quality

[ ] g. Changes in noise levels

[ ] h. Effects on areas of unique interest or scenic beauty

[ ] i. Alteration in behavior pattern of species or interference with important breeding, nesting and feeding grounds

[ ] j. Erosion and other changes in topography

[ ] k. Effect on water table

[ ] l. Disturbance of the ecological balance of land or water areas

[ ] m. Other social, economic, or environmental effects, including impact on public services (health, education, etc.)

5. Do you agree with the estimate of magnitude for each impact?

6. Do you agree with the importance assigned to each impact?

7. Does each of the projected impacts serve or hinder the accomplishment of local goals and objectives?

8. Would any of the impacts, as described, require a change in local goals and objectives?

9. Would any of the impacts as assessed by the sponsoring agency place a financial burden on the community?

10. Are any further data needed to substantiate or clarify the agency's estimate of impact?

D. Adverse and Unavoidable Environmental Impacts

1. Is the estimate of adverse impacts complete and accurate? The discussion should include particular reference to those impacts which can be minimized at best or merely acknowledged. The following areas are of great importance.

   a. Displacement of persons

   b. Damage to terrain

   c. Loss of wildlife habitat

   d. Air, water, and noise pollution

   e. Removal of land from tax rolls

   f. Removal of land from production

2. Is there an adequate discussion of measures to be taken for minimizing adverse impact during the implementation of the action? (E.g., is relocation assistance available for displaced persons? Are there clear procedures for minimizing impact during construction of necessary facilities?)

E. The Relationship Between Local Short-Term Uses of Man's Environmental and Long-Range Productivity

1. Do the benefits of the proposed project outweigh the expenditure of natural resources and the adverse environmental impacts?
2. Will the proposed action affect positively or negatively the long-run expenditure of local resources? (The discussion of Indirect Impacts in Chapter II should serve as a guide for answering this question.)
3. Will local planning efforts be required to minimize adverse impacts and enhance long-range productivity?

F. Any Irreversible and Irretrievable Commitment of Resources

1. Are there estimates of the actual use of materials in the EIS?
2. Is consideration given to alternative uses of facilities or other permanent results of the proposed action?
3. Does the proposed action generate other actions which involve further commitment of resources?
4. If the answer to Question 3 is "Yes," will such actions be consistent with local values, goals, and objectives?

G. Problems and Objections Raised by Other Federal, State, and Local Agencies or Interested Parties

1. Are the comments of agencies other than the sponsoring agency included or otherwise available?
2. If public hearings have been held, are the transcripts or summaries available?
3. Have the comments been considered in the preparation of the EIS?
4. Do any negative comments seem unwarranted?
5. If the answer to Question 4 is "Yes," then can the community aid in reducing the potential for controversy?

CHAPTER II: APPENDIX B

ANNOTATED BIBLIOGRAPHY OF TRANSPORTATION IMPACT STUDIES

ANNOTATED BIBLIOGRAPHY OF

TRANSPORTATION IMPACT STUDIES

1. Ashley, R. H., and W. F. Berard, "Interchange Development Along 180 Miles of I-94." Highway Research Record No. 96, Highway Research Board (1967), pp 46-58.

   A study of land use related to interchange type (full, partial and closed interchantes) and interchange location (major city, secondary city, small town, rural) in Michigan. Also examines land value and gallonage for service stations.

2. Babcock, W. F., and S. Khasnabis. "Land Use Changes and Traffic Generation On Controlled Access Highways in North Carolina." North Carolina State University at Raleigh, 1971, pp 1-20.

   A study of 221 interchanges along a total of 550 miles of controlled access freeway in North Carolina. Investigation of land development and land use in the interchanges for urban, suburban and rural areas.

3. Bardwell, G. E., and P. R. Merry. "Measuring the Economic Impact of a Limited-Access Highway on Communities, Land Use, and Land Value." Bulletin 268, Highway Research Board (1960), pp 37-73.

   Study of the influence of U.S. 85 and U.S. 87 on business activity and land values in certain bypassed Colorado communities. Business activity expressed by sales tax collections, land values by sales price per acre. Land values seem to decline with increasing distance from an urban community.

4. Beimborn, E. A., B. P. Nedwek, and C. R. Ryan. "An Evaluation of the Feasibility of Social Diagnostic Techniques in the Transportation Planning Process." Highway Research Record 410, Highway Research Board (1972).

   Survey (Questionnaire) which shows demographic characteristics, attitudes towards transportation services, attitudes toward non-transportation services, and analysis of freeway support and opposition to a freeway project in Milwaukee.

5. Bone, A. J., and M. Wohl. "Massachusetts Route 128 Impact Study." Bulletin 227, Highway Research Board (1959).

   The principal impact of Route 128 (circumferencing Boston about 60 miles from CBD) has been the channeling of industrial development into the towns through which it passes. Residential development has also been stimulated in areas along the highway.

6. Bouchard, R. J., E. L. Lehr, M. J. Redding and G. R. Thomas. "Techniques Considering Social, Economic, and Environmental Factors in Planning Transportation Systems." Highway Research Record No. 410, Highway Research Board (1972), pp 1-7.

Use of an "urban planning matrix" as a tool in the comprehensive transportation planning process. Nothing is explained about how to find the value of the different factors which are the elements in the matrix.

7. Bowersox, Donald J. "Influence of Highways on Selection of Six Industrial Locations." Bulletin 268, Highway Research Board (1960), pp 13-28.

A group of industrial firms were interviewed about the importance of location adjacent to freeway access. The influence of highway facilities on the selection of these plants was considered as important, but not critical (Michigan).

8. Buffington, J. L., and H. G. Meuth. "Economic Impact Restudy, Temple, Texas," Texas Transportation Institute, Bulletin 27 (1964).

Restudy of the economic impact of the new bypass route of IH35 around Temple. This study includes a second "after construction period" - otherwise it is the same as a previous study, TTI Bulletin No. 14 (1960).

9. Buffington, J. L. "Economic Impact Study, Rural Area East of Houston, Texas." Texas Transportation Institute, Bulletin 37 (1967).

The economic impact of IH 10 on a rural area, about 15 miles east of Houston, Texas. Changes in land values, land use, and business activity.

10. _____. "Economic Impact Study, Chambers County, Texas." Texas Transportation Institute, Bulletin 39 (1967).

A study of the economic impact in a study area in Chambers County, Texas, along a 14 mile-long section of IH10. There was no other route before the construction of IH10, and land use was agricultural. The study includes changes in land values, land use and business activity.

11. _____. "Economic Impact Study, Huntsville, Texas." Texas Transportation Institute, Bulletin 38 (1967).

A study of the impact of IH 45 on Huntsville, Texas. Influence on land values, land use, business activity, travel patterns and general community development.

12. _____. "Economic Impact Study, Conroe, Texas." Texas Transportation Institute, Bulletin 40 (1967).

A study of economic impact of IH45 on Conroe, Texas. Includes land values, land use, business activity, travel patterns, and general community development.

13. _____. "Economic Impact Study, Waxahachie, Texas." Texas Transportation Institute, Bulletin 35 (1966).

An economic impact study of IH35E on Waxahachie, Texas, south of Dallas. Includes changes in land values, land use, business activity and other economic considerations.

14. _____. "Economic Impact Study, Merkel, Texas." Texas Transportation Institute, Bulletin 36 (1966).

15. Brinton, Jr. J. H., and J. N. Bloom. "Effect of Highway Landscape Development on Nearby Property." National Cooperative Highway Research Program, Report No. 75 (1969).

Physical disturbance (noise, vibration) on 800 properties adjacent to highway is analyzed to find the correlation to differences in property values. Concludes that sound from trucks is the most objectionable highway disturbance to residential areas.

16. Burke, D. E., J. L. Buffington, H. G. Meuth, W. G. Adkins, and D. Schafer. "Attitudes, Opinions, and Expectations of Businessmen in a Planned Freeway Corridor." Texas Transportation Institute, Study 2-1-71-148, Research Report 148-2.

Discussion of how businessmen obtain information about a freeway project, their attitudes (pro vs. con), preferences with regard to freeway location and design, and expectations about how the freeway will affect their business decision-making.

17. Charles River Associates, Inc. "Measurement of the Effects of Transportation Changes." National Technical Information Service Report PB-213 491 (September, 1972).

The report discusses methodologies used in previous studies and analyzes the problem of measuring urban transportation impacts. It also discusses the theory of transportation impact, relevant variables, and guidance to existing sources of information (data).

18. Cribbins, P. D., W. T. Hill, and H. O. Seagraves. "Economic Impact of Selected Sections of Interstate Routes on Land Value and Use." Highway Research Record No. 75, Highway Research Board (1965), pp 1-31.

An effort to find the influence on land value and use by use of multiple regression techniques. Great variations for different sites. Land value = f (size of parcel, year of sale, vacant-

non-vacant land use, rural-urban land use, subdivision, roadside, alternate roadway, distance to right-of-way, distance to CBD, distance to access).

19. Dansereau, H. Kirk. "Five Years of Highway Research: A Sociological Perspective." Highway Research Record No. 75, Highway Research Board (1965), pp 76-81.

    Discusses various highway-community relationships, namely, population, changes in levels of living as measured by a social class rating, community values as evidenced to an extent by attitudes expressed, and degree of community organization as ascertained through use of an Index of Community Complexity. Sites studied in Pennsylvania - Monroeville (Pittsburgh), Blairsville (Indiana County) and four interchanges near York.

20. Dansereau, H. K., R. A. Rehberg, and J. R. Maiolo. "Specified Social Determinants of Attitudes Toward Community Planning and Zoning." Pennsylvania State University (1966).

    Study of attitudes toward planning and zoning in interchange communities, and identification of some factors related to differences in those attitudes.

21. Ellis, Raymond H. "Toward Measurement of the Community Consequences of Urban Freeways." Highway Research Record No. 229, Highway Research Board (1968), pp 38-52.

    This article proposes a strategy for quantitative estimation of community consequences of urban freeways. Discussion about how to consider community consequences and transportation impact on the existing community linkages.

22. Ellis, R. H., and R. D. Worral. "Towards Measurement of Community Impact: The Utilization of Longitudinal Travel Data to Define Residential Linkages." Highway Research Record No. 277, Highway Research Board (1969), pp 25-39.

    An effort to present a methodology for using residential linkages as a strategy for measuring community impact of transportation projects.

23. Eyerly, Raymond W. "Land Use and Land Value in Four Interchange Communities: An Interim Report on the York Study." The Pennsylvania State University, 1968.

    The study included all properties within two miles of the interchanges. It investiagtes the rate of formation of new properties, types of land uses, and changing land values.

24. Fabbroni, Lawrence P. "Land Use Development at Interstate Interchanges in Indiana." Joint Highway Research Project, Purdue University, Project C-36-70D, May, 1973, pp 1-85 and appendices.

Brief review of past research in this area: collects data from 102 interchanges along 8 interstate sections and makes an effort to set up a model to determine the extent of land use development along crossroads (1 mile to each side). More detailed studies of 10 intersections and discussion of available planning tools which might have been used in one of the "case areas."

25. Fleishman, Edward R. "The Impact After Seven Years of a Highway Improvement in a Small City." Joint Highway Research Project C-36-64D, Purdue University, May, 1968.

Study from Lafayette, Indiana (population 62,000 in 1967), considering changes in traffic patterns, accidents, travel times, and, to some degree, land use and values due to construction of a new bridge over Wabash River.

26. Franklin, William D. "The Effect of Access of Right of Way Costs and the Determination of Special Benefits." Texas Transportation Institute, Research Report No. 82-1F (1968).

The effects of granted access contrasted with non-access on amount paid for damages connected with property acquisition.

27. Frey, J. C., H. K. Dansereau, R. D. Pashek, and A. Twark. "Land Use Planning and the Interchange Community." Bulletin 327, Highway Research Board (1962).

Discussions of land-use adjustment at interchange locations and importance of land-use regulations and control in preserving highway efficiency. No methodology to predict development which will take place at the interchange.

28. Garrison, William L. "Land Uses in the Vicinity of Freeway Interchanges." University of Washington, December 1961.

Discussion of simulation models of interchange - urban growth and development, a deterministic land development model, and the problems of estimation of supply and demand in the vicinity of freeway interchanges.

29. Goldberg, Michael A. "Economics of Transportation Corridors: Further Empirical Analysis." Highway Research Record 410, Highway Research Board (1972), pp 37-51.

Study of 325 properties within 0.2 mile of the Trans-Canada Highway (Vancouver). Showed that even the properties closest to the freeway only increased at a compound annual rate of 2.85 percent net inflation (properties in Richmond as a whole 5.23 percent net inflation).

30. Greenbie, B. B. "Interchange Planning in Rural Areas." Traffic Quarterly, April, 1970, pp 265-278.

Example of interchange area planning (I-90 and I-74) in Monroe County, Wisconsin.

31. Grossman, D. A., and M. R. Levin. "Area Development and Highway Transportation." Highway Research Record 16, Highway Research Board (1963).

Discussion of "distressed" areas in the light of Area Redevelopment Act of 1961.

32. Holshouser, E. C. "An Investigation of Some Economic Effects of Two Kentucky Bypasses: The Methodology." Bulletin 268, Highway Research Board (1960), pp 74-79.

One bypass provided free access, the other limited access. The beltline had positive influence mainly within 1/4 mile of the facility; the effect of the limited access expressway reached 2-3 miles. Discussion of methodologies: survey-control area comparison, case study method, multiple regression analysis, projected land use-value relationship approach.

33. Horwood, Edgar M. "Freeway Impact on Municipal Land Planning Effort." Bulletin 268, Highway Research Board (1960), pp 1-12.

A discussion of some factors which impose limitations on the city planning and highway development processes.

34. Isibor, Edward I. "Modeling the Impact of Highway Improvements on the Value of Adjacent Land Parcels." Joint Highway Research Project C-36-64G, Purdue University, (December, 1969).

Use of regression analysis to find a model for change in land value as a function of size, time after construction, type of highway, type of land use, type of area, and type of access control. Only adjacent parcels (from two right-of-way studies, Florida and Indiana) included in the study.

35. Jordan, Jack D. "Final Report on Studies of Right of Way Remainders." Texas Highway Department, 1970.

Analysis of 300 remainder properties from right-of-way taking. Relationship of dollar amount of appraised damages to actual damages or enhancements.

36. Kahn, H. M., and A. Kriken. "Social Characteristics of Neighborhoods as Indicators of the Effects of Highway Improvements." Marshall Kaplan, Gans, and Kahn, San Francisco, California.

Study of the social impact of highways on neighborhoods (4 cases), where a predictive "Social Feasibility Model" was developed. The model is based on secondary data. No quantitative measurement of the degree of impact.

37. Kemp, Barbara H. "Social Impact of a Highway on an Urban Community." Highway Research Record No. 75, Highway Research Board (1965), pp 92-102.

Discusses the effects of a loop through D. C. on those who would have to move and those who would remain in the area; also formulates programs to reduce possible harmful effects on the people concerned.

38. Kiley, Edward V. "Highways as a Factor in Industrial Location." Highway Research Record No. 75, Highway Research Board (1965), pp 48-52.

Survey of 4,150 industrial establishments by American Trucking Association. Included all states. Proximity to highways was found to be one of the most frequently mentioned location factors.

39. Klein, G. E., et al. "Methods of Evaluation of the Effects of Transportation Systems on Community Values." Stanford Research Institute, April, 1971.

An effort to develop methods of identifying, measuring and evaluating selected community attributes that are affected by transportation system changes. Looks into the effects of accessibility to services, property development, relocation, disruption, and noise and air pollution.

40. Lang, A. S., and M. Wohl. "Evaluation of Highway Impact," Bulletin 268, Highway Research Board (1960), pp 105-119.

The authors state that "there is no logical basis for assuming highway improvements can produce any net economic benefits over and above user (vehicular) benefits." Secondary benefits such as increase in land values, etc., however, are of importance in the over-all picture of land-use development. Followed by a discussion of the arguments by Sidney Goldstein, Bureau of Public Roads.

41. Levin, David R. "Informal Notes on Sociological Effects of Highways." Highway Research Record No. 75, Highway Research Board (1965), pp 82-84.

Raised questions on the degree to which transportation and sociology are related. Also, some considerations a transportation planner should make. Concerned mainly with urban transportation.

42. Levin, D. R. "The Highway Interchange Land-Use Problem." Bulletin 288, Highway Research Board (1961), pp 1-24.

Rather general discussion of development at freeway interchanges, land use problem at the interchange, types of land associated with interchanges, land use and access control.

43. Long, Gale A., Gary D. Long, and Raymond W. Hooker. "A Cooridor Land Use Study: The Impact of an Interstate Highway on Land Values, Private Investment and Land Use in Southwestern Wyoming." Division of Business and Economic Research, University of Wyoming, October, 1970.

This study found that land value in city outskirts rose, although there was a small decrease in CBD. Induced private investment only the first years after completion.

44. Longley, J. W., and B. T. Goley. "A Statistical Evaluation of the Influence of Highway on Rural Land Values in the United States." Bulletin 327, Highway Research Board (1962), pp 21-55.

Analysis of 5,000 rural land sales, to determine existing differences in land values by type of road as to price per acre and distance from nearest trading center. Distance to nearest trading center seems to be most significant.

45. McKain, W. C. "Community Response to Highway Improvement." Highway Research Record No. 96, Highway Research Board (1965), pp 19-23.

The study found that the Connecticut Turnpike had a favorable impact on many towns, while others in the same area were left relatively untouched. Discussion of possible social and employment factors; labor force does not readily improve its skills, communities may tend to resist change, and take a crisis approach to social action.

46. Miller, Stanley, F., Jr. "Effects of Proposed Highway Improvements on Property Values." National Cooperative Highway Research Program, Report 114 (1971).

Basic principles of real estate values, valuation practices and procedures, factors causing enhancement or diminuation of value, and legal considerations.

47. Meuth, H. G. "Right of Way Effects of Controlled Access Type Highway on a Ranching Area in Madison County, Texas." Texas Transportation Institute, Research Report 58-4 (1968).

The study describes changes in land tenure, land use, income and travel patterns of the operators affected by acquisition of right of way and construction of IH 45 in Madison County.

48. Meuth, H. G., and J. L. Buffington. "Right of Way Effects of Controlled Access Type Highway on a Farming Area in Ellis County, Texas." Texas Transportation Institute, Research Report 58-5 (1969).

Changes in kind and intensity of rural land use, number of farm and ranch units, cost of adjustment to new farm and operating conditions, and change in farm income due to acquisition of right of way and construction of IH 35 in an intensive farming area, Ellis County.

49. Meuth, H. G. "Right of Way Effects of Controlled Access Type Highway on a Farming Area in Colorado and Fayette Counties, Texas." Texas Transportation Institute, Research Report 58-6 (1970).

Discusses how operators in a diversified farming area were affected by, and how they adjusted to, right-of-way acquisitions for IH 70, in Colorado and Fayette Counties. (Land value, land use, travel patterns, and income, etc.)

50. National Center for Highway Research. "A Review of Transportation Aspects of Land-Use Control." National Cooperative Highway Research Program, Report No. 31 (1966).

Mainly a literature review on the subject of the relationships between land-use control, traffic generation and transportation systems in urban areas. Chapters: Urban Structure, Land-use Control, Land-use Stability, The Highway System, Highway Functional Classification, Access Controls, Highway Design Control, Traffic Generation, Freeway Interchanges.

51. Ohio Department of Highways. "Factors Influencing Land Development-Subdivision Development Study." September, 1970.

Study of 16 subdivisions in different locations to freeways. Average percentage of sales per month used as a measure of success and analyzed on the background of freeway exposure of lots, distance to CBD-area, commercial influences, etc.

52. Pendleton, W. C. "Relation of Highway Accessiblity to Urban Real Estate Values." Highway Research Record No. 16, Highway Research Board (1963).

A study of Washington metropolitan area showed that sales prices set in the real market do reflect accessibility differences.

53. Pillsbury, Warren A. "Economics of Highway Location: A Critique of Collateral Effect Analysis." Highway Research Record No. 75, Highway Research Board (1965), pp 53-61.

Discussion of different methods for economic analysis of possible highway locations. Highway economic impact may be one factor in the analysis, but nothing is said about how to calculate economic effect in a highway corridor.

54. Raup, P. M. "The Land Use Map Versus the Land Value Map - A Dichotomy." Bulletin 227, Highway Research Board (1959), pp 83-88.

Discussion of the sequence of changes in land-use and land values. Land values may express anticipated development, and not the actual changes. Also discussion of a mapping technique for land use and land values.

55. Sauerlender, O. H., R. B. Donaldson, and R. D. Twark. "Factors that Influence Economic Development at Non-urban Interchange Locations." The Pennsylvania State University, 1967.

The development in 36 typical interchanges in Pennsylvania was analyzed on the background of the characteristics of each interchange and the surrounding region. Indicates factors that should be useful as predictors of development.

56. Sloan, Allan K., and Martin S. Baker. "Enhancing the Public Share of Highway Benefits." Final Report, Department of Transportation, Federal Highway Administration, 1974.

Discusses the types of non-user benefits associated with highways and other transportation facilities and the methods, techniques, and issues involved in public sharing of these benefits. Also discusses the possibility that transportation agencies might plan for and implement "benefit realization" schemes, which could include the acquisition of land beyond the right-of-way for subsequent disposition in accordance with official plans.

57. Spears, John D., and Charles G. Smith. "Final Report on a Study of the Land Development and Utilization in Interchange Areas Adjacent to Interstate 40 in Tennessee." University of Tennessee, July, 1970.

Study of adjacent properties to 74 interchanges on I-40 between Memphis and Knoxville, with listing of tracts, property sales and land uses. Summary of interchange development in different groups of interchanges.

58. Stein, Martin M. "Highway Interchange Area Development - Some Recent Findings." Public Roads Vol. 35, No. 11 (December, 1969), pp 241-250.

The study of 332 interchanges in 16 states shows that interchange land development is affected both by type of intersecting road and by the relative accessibility of the interchange quadrants.

59. Stover, V. G., W. G. Adkins, and J. C. Goodknight. "Guidelines for Medical and Marginal Access Control on Major Roadways." National Cooperative Highway Research Program, Report 93 (1970).

One of the chapters, "Highways and Economic Development," summarizes previous research about economic impact on land values in interchanges, bypass effect, etc.

60. Stroup, R. H., and L. A. Vargha. "Economic Impact of Secondary Road Improvements." Highway Research Record No. 16, Highway Research Board (1963), pp 1-13.

The study shows that there may be a relationship between changes in retail business and road improvement. The geographic dispersion of business may be expressed as a function of population density, per capita income and proportions of farms on all-weather roads. Rural area (six counties) in Kentucky.

61. Stroup, R. H., L. A. Vargha, and R. K. Main. "Predicting the Economic Impact of Alternate Interstate Route Locations." Bulletin 327, Highway Research Board (1962), pp 67-72.

Report of a study method used in an examination of the comparative economic impact of three alternative routes for I-65, Kentucky. Use of the concept of an economically "neutral" road, against which the three alternative routes are compared (on the basis of access, visibility of establishment, development potential, etc.).

62. Texas Aeronautics Commission. "Importance of a Modern Airport, Austin, Texas, 1965."

Attitude survey among towns and small communities in Texas about how important they consider an airport to be.

63. Texas Transportation Institute. "Economic Effects of Bypasses and Freeways." Bibliography.

Listing and short description of 38 papers and studies about economic effect of highways.

64. Thiel, Floyd I. "Social Effects of Modern Highway Transportation." Bulletin 327, Highway Research Board (1962), pp 1-20.

Discussion of some ways in which highways affect life styles. Effect on population mobility, residences, relocation, employment conditions, public services, education, rural employment and improvement, recreation, etc.

65. _____. "Seminar on Sociological Effects of Highway Transportation, Introductory Remarks." Highway Research Record No. 75, Highway Research Board (1965), p 75.

Five different articles, dealing with sociological effects and (one article) trip generation.

66. _____. "Highway Interchange Area Development." Public Roads Vol. 33, No. 8 (June, 1965), pp 153-166.

Discussion of controlling the development in interchange areas. Includes treatment of development problems, available means of controls, application of control, space needs at interchanges, and techniques to implement interchange planning.

67. U. S. Congress. "Final Report of the Highway Cost Allocation Study." House Document No. 72, 87th Congress, 1st Session, January 1961.

Mainly summary of changes in land values from previous highway impact studies.

68. U. S. Department of Transportation. "Benefits of Interstate Highways." Federal Highway Administration, U. S. Department of Transportation, June 1970.

Summary of user and non-user benefits from interstate highways. General economic and community benefits: land use and value, industrial and commercial effect, non-work opportunities, opportunities for community change, etc.

69. U. S. Department of Transportation. "Economic and Social Effect of Highways." Federal Highway Administration, U. S. Department of Transportation, 1972.

Review of 200 studies of the economic and social effects of highways, a narrative discussion of the studies and abstract of 178 studies.

70. U. S. Department of Transportation. "Guide for Highway Impact Studies." Federal Highway Administration, U. S. Department of Transportation, 1973.

States the need for impact studies and indicates types of studies that may be especially appropriate in identifying social and economic effects. Lists and describes socioeconomic studies proposed, studies in progress, and studies recently completed.

71. Vargha, Louis A. "Highway Bypasses, Natural Barriers, and Community Growth in Michigan." Bulletin 268, Highway Research Board (1960), pp 29-36.

Discussion of the freeway as a physical barrier.

72. Vaughan, C. M. "Development Aspects of Kentucky's Toll Roads." American Society of Mechanical Engineering Publication 73-ICT-19 (1973).

The study uses the analysis of covariance to separate the rate of change in manufacturing employment and personal per capita income in those counties which have limited access highways, toll roads and interstates, from those counties which have neither of the aforementioned.

73. Vogt, Ivers & Associates. "Social and Economic Factors Affecting Intercity Travel." National Cooperative Highway Research Program Report 70 (1969).

74. Warner, A. E. "The Impact of Highways on Land Uses and Property Values." Michigan State University, March, 1958.

A review of early impact studies, and bibliography.

75. Wheat, Leonhard F. "The Effect of Modern Highways on Urban Manufacturing Growth." Highway Research Record No. 277, Highway Research Board (1969), pp 9-24.

Nationwide study of manufacturing growth in 212 cities (population 10,000-50,000), 106 "freeway-cities (< 7 miles from freeway) and 106 "non-freeway-cities" (> 16 miles from freeway). The study findings indicate that modern highways do significantly affect manufacturing growth, but not in all situations. Freeway-cities grew faster only in regions where traffic flow along regular highways is seriously impeded. The study also considers effect of air service, rail, waterways, and distance to freeway.

76. Wootan, C. V. and H. G. Meuth. "Economic Impact Study, Temple, Texas." Texas Transportation Institute, Bulletin 14 (1960).

Study of the economic impact of the new by-pass route for IH35, Temple, Texas. The study area is located along a section (3 miles) of the new IH35. Changes in land values compared to a control area; changes in land use along the new route; and changes in business activity along the new and old route.

77. Wynn, F. Houston. "Who Makes the Trips? Notes on an Exploratory Investigation of One-Worker Households in Chattanooga." Highway Research Record No. 75, Highway Research Board (1965), pp 84-91.

Studies question: given shorter working days and/or shorter working weeks, how will future urban travel demands be affected?

78. Zinkefoose, Paul W. "Economic Survey of Raton, New Mexico - 1958-1966." New Mexico State University, Bulletin No. 37 (May, 1968).

The after portion of a highway impact relocation study. Discusses land values, business activity, employment, and general economic conditions.

79. _____, "Economic Survey of Anthony. New Mexico-Texas." New Mexico State University, Bulletin No. 41 (May, 1970).

Study of the impact of highway relocation in a small town having practically no economic data. More or less a general description of the effect without use of any modeling procedures.

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