

# Framework for Analyzing the Impact of Fixed-Guideway Transit Projects on Land Use and Urban Development

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An approach is presented for predicting the impacts of fixed-guideway transit projects on land use and economic development. The Urban Mass Transit Administration developed this approach to help local agencies perform transit project planning studies, including alternatives analyses. The relationships between land use and transportation are reviewed and technical methods for identifying land use impacts at the regional, corridor, and station area levels are described. The importance of supportive land use policies and ways to evaluate the desirability of anticipated land use impacts are identified.

For several years, the Urban Mass Transportation Administration (UMTA) has been developing procedural and technical guidance for the conduct of transit project planning studies. UMTA's *Procedures and Technical Methods for Transit Project Planning (1)* focuses on corridor studies for fixed-guideway transit systems (e.g., rapid rail, light rail, busways, and people movers), but much of its guidance can be applied as well to system-level guideway planning studies and to rail modernization and bus service planning. UMTA will update and refine the guidance as new issues arise and as different analytical techniques impart new knowledge.

The section of UMTA's technical guidance on the analysis of land use and urban development impacts was revised earlier this year. UMTA had found that local transit planning reports often predicted economic development would be promoted by a major transit investment, although this conclusion was seldom supported by sound technical analysis. The aim of the revised guidance is to suggest a scope and structure for the land use analysis, and this paper sets forth that framework. Local planners involved in transit planning and others engaged in other types of infrastructure planning may find the information useful. As part of UMTA's continuing effort to refine the guidance, comments are welcome.

The impact of a fixed-guideway transit investment on land use and urban development should be evaluated for at least four reasons, as follows:

- Under the National Environmental Policy Act, federal agencies are required to consider the impacts of proposed projects and alternative courses of action. This requirement includes the consideration of impacts on land use and economic development. Many states have similar requirements.

- Cities often tout urban development benefits as a primary reason for considering a major investment in transit. In such cases, the magnitude of this benefit needs to be estimated to determine whether the combined urban development and other benefits justify the costs, and whether other strategies might produce the desired benefits at less cost.

- Projects that have urban development benefits can often be financed, at least in part, through value-capture techniques, or they may be built through public and private partnerships that rely on a project's development benefits. Preparing a credible estimate of these benefits can be an essential part of the financial planning work done for the project. The property owners most likely to benefit from increased property values should be identified as part of this assessment.

- Community groups may be concerned about how a project will affect neighborhoods along the line and at station areas. They may oppose, for example, a transit project that might stimulate increased activity in quiet neighborhoods or increase local traffic. An urban development impact analysis can help determine whether these concerns are valid and, if they are, help bring about agreement on appropriate mitigation measures.

## LINKAGES BETWEEN LAND USE AND TRANSPORTATION

Transportation access is one of several significant factors affecting the development of land. Any site slated for economic activity must be accessible to the labor and materials needed to develop a product and to a market for selling the product. At the national level, cities have sprung up in areas highly accessible to the national system of roadways, railroads, or waterways and at places where goods are transferred from one mode of travel to another (at ports, for instance). The same holds true within cities. Historically, the central business district (CBD) has been the most accessible point in any given region and thus has engendered the most development and the highest land values. More recently, highly accessible suburban locations, particularly at freeway interchanges, have given rise to dense commercial and retail development.

A 1987 survey (2) illustrates how important accessibility is to the chief executive officers (CEOs) of the country's largest corporations. Asked to rank five factors that can affect the location of office facilities, the CEOs put "easy access to domestic markets, customers, or clients" number one, with

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37 percent of all CEOs deeming it “absolutely essential.” Ranked fourth was “quality of life for employees,” which included such factors as good public schools, enough streets and highways, affordable housing, and low crime. Executives of organizations involved in wholesale, retail, or manufacturing operations similarly ranked seven factors affecting their location decisions. Top ranking went to “the availability of sites with existing water, sewage, and roads”; second was “access to domestic markets.” “Easy access to raw materials” was ranked third and “quality of life for employees” fifth.

Of course, accessibility is not the only factor that affects the amount and location of urban development (see Figure 1). Nontransportation factors cited in the survey of CEOs include the climate that state and local governments create for business through tax policy and regulation; the cost and availability of housing and labor; the crime rate; the public schools, colleges, and universities; and cultural and recreational facilities. Other nontransportation factors are the strength of the overall economy; the availability and cost of developable land, capital financing, and managerial expertise; the attractiveness of a given site for development; and the availability of other nearby land investments. Should some of these factors be judged to impede or preclude development, an increase in accessibility alone likely will not surmount them; such factors might be termed obstacles to development.

Nevertheless, accessibility is undeniably important, and a major new transportation facility should measurably improve accessibility. (If it does not, the justification for the project would certainly be in question.) As travel time between points is reduced, forces are put in motion that can, over time, change the distribution of economic development. Transportation facilities that significantly reduce travel time between an urban region and other parts of the country can eventually lead to new jobs and growth in that urban region. Likewise, facilities that change the relative accessibility of certain parts

of an urban area can lead to a redistribution of growth within that region, although the total amount of regional growth is unlikely to change. Urban mass transportation projects fall into this second category.

Researchers have documented the land use changes that followed some major transit investments. *Land Use Impacts of Rapid Transit: Implications of Recent Experience* (3), published in 1977, found the following:

- Major rapid transit improvements were important inducements for intensified development near stations both in CBDs and in outlying areas, although only when supported by other favorable forces.
- Some major commuter rail improvements led to significantly intensified land use, but findings on light rail systems and busways were inconclusive.
- No rapid transit improvements were proved to have led to net new urban economic or population growth.
- The timing of land use impact appeared to be highly dependent on general economic conditions.
- Local changes in land use policy facilitated the impact of transit improvements on land use.
- The transit improvement itself often led to changes in land use policies.

More recent experience tends to confirm these findings.

#### IDENTIFYING LAND USE IMPACTS

Land use impact assessments are made to predict the amount, type, and density of land development that each transit mode and alignment alternative would produce and to compare the results. To this end, the analyst must isolate the development that likely would be induced by a transit alternative from

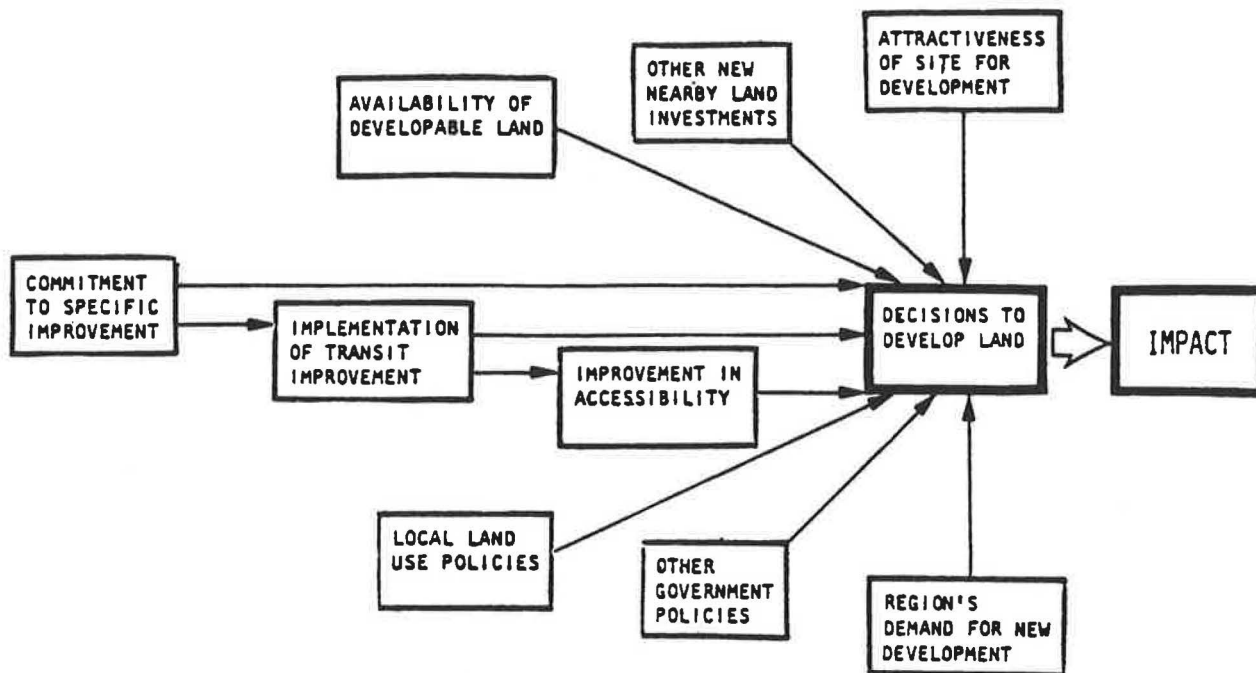


FIGURE 1 Major factors influencing land use impact (3).

development that would happen anyway. Once the induced development has been predicted, the analyst must then try to evaluate its desirability. Given the large number of factors that can influence economic development, as well as the difficulties inherent in all economic forecasting, the most the analyst can hope to do is make an educated guess. This section describes a framework for analysis that should make the land use impact forecast more educated and less a conjecture.

The framework can also be used to help identify joint development opportunities that may be created by one or more transit alternatives. Joint development—the linking of private real estate development to public transportation services and station facilities—can benefit the transit operator by increasing ridership on the transit system, providing revenue from the sale or lease of real estate and/or air rights, and reducing land acquisition and construction costs.

In undertaking the land use impact assessment, it is important to

- Rely on sound analysis—not wishful thinking—for projecting market demand;
- Ensure that the projected land use impacts are consistent with projected changes in accessibility;
- Consider the need for supporting public and private actions; and
- Recognize the difference between temporary and permanent employment changes.

Keep in mind, too, that interested parties need to be brought into the assessment process. Local governments should be consulted about development trends and adopted land use plans, policies, and ordinances. The business community can provide information on economic trends and the factors influencing the local economy. Local developers, in particular, can offer insights on regional growth and development and the potential impact of a new transportation facility; they may also be instrumental in bringing about public and private partnerships to help build the project. Community groups should also be asked for their views on development.

Data on existing market and extramarket conditions and trends need to be plugged into the assessment. The identification of market conditions requires data on the direction and performance of the economy, broken down into regional, corridor, and subarea groupings, and should include the following:

- Population data: number of individuals, household size, income, race, and age.
- Land use data: uses and densities, including the location of activity centers, areas of growth and decline, availability and cost of developable land, rents, absorption and vacancy rates, building permits, and availability and cost of development capital.
- Other economic data: employment and retail sales.

Such information may be readily available, because those data are used for financial and transportation impact analyses. Extramarket conditions to be considered include the powers and policies of public agencies, the availability of public services, concentrations of low-income residents, traffic congestion, and land use controls.

The land use impact analysis for major transit projects should be performed on three levels: impact on the region as a whole, impact on the corridor, and impact on specific station areas. The three levels of analysis should produce results that are internally consistent. That is, the sum of the land use changes predicted at the local levels should equal the regional total. If land use impacts are an issue, UMTA urges local agencies to approach the analysis from both the “top down” and the “bottom up,” and then to check the results to ensure consistency.

### Impact on Regional Development

Although no empirical evidence shows that urban mass transportation investments affect rate of development at the regional level, urban development is often touted as a reason for pursuing major transit projects, particularly rail systems. Some local officials and civic boosters simply assume that transit brings new growth to an area. In such cases, the technical process may need to address regional development impact to help ensure that local decisions are not based on false hopes and dreams. Absent convincing evidence to the contrary, all UMTA-sponsored fixed-guideway planning studies assume that mass transit investments will have no net effect on the amount of regional development.

Should urban area officials wish to pursue an assessment of regional development impact, one possible avenue is exploring before-and-after studies already compiled on cities with similar economic conditions and transportation problems. A second approach consists of examining regional development trends and identifying the factors driving the local economy. In slow-growth areas, attention should be directed specifically to identifying the obstacles that may be slowing development. (For example: A local transit investment could improve regional growth if local traffic congestion is judged a significant obstacle to new development. Land use impact assessments should then address the efficacy with which each mode and alignment alternative relieves congestion. Traffic and travel time forecasts produced in the service and patronage analysis can be useful indicators of potential impacts. Even if traffic congestion is an obstacle, however, a transportation improvement may not lead to increased growth and development unless other contributing factors, such as the health of the local economy, are also positive.

### Impact on Corridor Development

Rather than increasing regional growth, transit investments are more likely to help redistribute the current level of that growth. In some cases, transit projects serving a CBD may provide the added transportation capacity that is needed for additional growth in the downtown area. Transit projects that improve CBD access may also promote development along the line and help residential development dispersal in peripheral areas. These effects are seen most often when the CBD and other areas have been hampered, by inferior access, from growing as rapidly as other parts of the region. The methods for identifying land use impacts at the corridor level are similar to those already described for regional analyses. Empirical

evidence from before-and-after studies may be useful, along with information on development trends and obstacles in the corridor.

At the corridor level, the analysis can begin to consider the types and densities of land use development that are apt to occur with various transit alternatives. Projected market absorption rates for office, retail, hotel, and residential uses should be set against historic rates to make sure that the forecast is reasonable. Forecasted development should also be compared with the supply of developable and redevelopable land, taking into account local plans and ordinances that affect the use of this land.

If corridor impacts are anticipated, the analysis should clearly indicate how much growth will come from other parts of the region. Decision makers need to keep in mind that corridor impacts tend to be a zero-sum game, that is, increased growth in one area means decreased growth in another; equity and other implications must be taken into account.

### Impact on Development Around Station Areas

A fixed-guideway transit project is most likely to affect land use in areas immediately adjacent to stations. These areas experience the greatest increase in accessibility. Stations with high levels of walk access can also create new, pedestrian-targeted markets for retail development. Because of the link between development and accessibility, standard transportation measures—changes in travel time to other points in the region and the number of walk-on riders, for example—can be used to compare each alternative's potential to induce land use changes.

Each alternative's potential to induce station area development might be evaluated using the following measures:

- Percentage of the region's population and employment within  $x$  min by transit.
- Changes in transit and highway travel times, weighted by mode share. (For this purpose, the denominator of the logit model can serve as the analysis variable.)
- Number of walk-on riders or, at the CBD level, the volume of transit arrivals.

As at the corridor level, the station area impact analysis should try to identify obstacles to development—local economic conditions and land use policies, for example—and the availability of developable sites. Should the necessary conditions for land use change appear to exist, a market analysis should be performed to determine the type and density of development most likely to occur. Sample pro formas should be prepared to test the viability of different development types and densities.

### Joint Development

Joint development is an important tool that can be used to make transit part of an overall development strategy and to help finance the transit system as well. Joint development includes actions to encourage the implementation of desirable

land uses in and around station areas or in air rights over or under the transit facility. For example, high-density residential developments at outlying stations may be desirable because they can lead to a higher transit share of work and shop trips to high-density employment and shopping areas (i.e., the downtown area). On the other hand, dense office or commercial activities at outlying stations may hinder system use by increasing congestion and degrading access to the system.

Sites where joint development is possible should normally be identified as part of the land use impact assessment. Specific joint development proposals are not likely to be available at the project planning stage, but suitable land parcels can be identified using the approach described for station areas. Sample pro formas can be prepared, and local and state laws and ordinances concerning joint development should be identified and local policies toward it ascertained.

### SUPPORTIVE POLICIES

The development potential associated with each of the alternatives can be greatly enhanced if supportive public policies are put in place. Such policies are usually not formally adopted until the preliminary engineering stage. Nevertheless, it may be helpful during corridor planning to identify and begin evaluating, in concert with local jurisdictions, the kinds of land use policies that might be necessary to induce desired development. Where appropriate, forecasts of land use changes prepared in project planning should specify the extent to which the forecasts depend upon the adoption of new local policies.

The local policies that should be considered include the following:

- Local governments may amend local comprehensive plans and zoning to change permitted land uses and to allow higher densities in areas within walking distance of stations. They might also reduce parking requirements for office development near stations, or possibly establish a ceiling on the amount of parking allowed, thereby reducing development costs.
- If the jurisdiction is already overzoned (or if variances are easily obtained), downzoning areas away from the stations may give the station area a competitive advantage in the market. One approach may be to transfer development rights from an area where lowered densities are desirable.
- Public entities may promise to provide, in a timely manner, the necessary infrastructure (roads, water, sewer, etc.) and services needed to support increased development.
- Desirable development may be promoted by making available suitable land parcels. This might include the sale or lease of excess land or air rights at below-market prices.
- Other supportive public policies may include tax incentives and the assumption of some development risks.

Many of these policies entail substantial public costs. If these policies are proposed, the costs should be calculated and compared with public benefits.

### ASSESSING THE IMPACTS OF LAND USE CHANGES

Land use changes brought about by transit alternatives will in turn have their own impact. Issues that often arise include the consistency of anticipated land use changes with compre-



hensive plans and zoning ordinances, and the effect this development might have on tax revenues and the cost of public services, transit system use, traffic, and parking. These issues often engender considerable local interest, and their analysis can become complex and time consuming. The analyst must keep in mind that the land use impact forecast is little more than an educated guess and be wary of devoting more consideration than is prudent to these issues.

### **Consistency with Planning and Zoning**

The analysis should consider whether the anticipated development is consistent with adopted local comprehensive plans and zoning, which in turn could indicate whether the anticipated development would likely be viewed as desirable by the affected community. The usual procedure is to ask local governments to review forecasts of land use impacts and compare them with adopted plans to determine consistency. Local governments should also be asked to identify any zoning changes necessary for the development and to assess the likelihood of approval of such changes. The land use impact forecast should take into account federal requirements designed to protect certain types of land from development. Federally protected lands include the habitat of endangered species, floodplains, and coastal zones.

### **Impact on Services and Tax Base**

Induced development can increase the tax base of affected jurisdictions, but it may also increase the demand for public services such as schools and law enforcement. In most project planning studies, these impacts are not explicitly considered. However, if the fiscal impact of induced development is at issue, local governments are probably in the best position to estimate the added revenues and costs. Such estimates should consider the type of development expected to occur, the kinds of public services normally required for such development, and the possible need for new capital facilities to provide these services.

### **Impact on Transit System Use**

Station area development can serve specific transportation objectives. First, increased economic activity, represented by commercial office, retail, convention center, and hotel developments, specifically at the downtown end of the corridor, can improve ridership; this same development at outlying stations, however, often hinders access to transit by increasing congestion in the station area and creating greater competition for parking. Medium- and high-density residential development, on the other hand, can increase ridership and farebox revenues at outlying stations.

UMTA requires that a fixed total trip table be used for preparing ridership estimates. Transit ridership estimates always tend to be optimistic, and adding induced development, which is speculative, into the calculation makes results even more tenuous. Ridership estimates are therefore given less weight than other factors in the evaluation of alternatives.

Nevertheless, UMTA acknowledges that induced development, particularly around station areas, can lead to increased transit ridership, and some local agencies may wish to estimate the size of this effect. A sensitivity test is usually the way to proceed.

### **Impact on Traffic and Parking**

The sensitivity test examining the effects of induced land use change on transit ridership will also identify the impact of this development on traffic and parking. Traffic and parking are most likely to be affected around stations, where development impacts are usually most apparent. The added traffic generated by new development, when added to traffic destined for the transit station, can overload the local street system. In such cases, roadway capacity may need to be increased or travel demand managed, or both.

## **EXPLORING VALUE-CAPTURE OPPORTUNITIES**

The analysis of land development impacts should lead to an explicit assessment of the potential for financing some of the transit investment alternatives through recapture of the value added by the investment to certain sites. This assessment should include a review of such public policy and implementation options as joint development, station cost sharing by private developers and public agencies (urban renewal authorities), benefit assessment districts, and tax increment financing. The results of this assessment feed into an analysis of financing options for the project.

In assessing the potential for capturing some of this added value, it is useful to distinguish value capture from joint development. Joint development refers to development occurring in conjunction with the transit improvement, and is usually designed to foster urban development in general, thereby enhancing transit ridership and increasing farebox recovery. The primary goal of value capture strategies is to return income to the transit property. Value capture can include joint development, such as air rights leases, station construction, or improvement by developers, but it can also include a broad range of activities designed to capture part of the value created by the transit investment. For example, assessments on property owners in station vicinities can capture some of the financial benefits accruing to those whose buildings command higher rents and occupancy rates. Another approach is to dedicate to transit the increase in property taxes attributable to increased land values in the vicinity of the investment.

Establishing a mechanism for benefit assessment to help pay for a transit investment is necessarily a political decision, based as much on negotiation as on technical analysis. But the technical process can provide critical information on the extent and magnitude of anticipated benefits. Given the difficulty of forecasting changes in property values and rents, the technical information used in these decisions is often limited to transportation benefits. Changes in travel time, pedestrian volume, and other outputs of the travel forecasting process can be useful inputs to the benefit assessment. Forecasted reductions in automobile use, if translated into reduced parking requirements, can be regarded as a direct monetary benefit

to developers. Sample pro formas prepared as part of the land use impact analysis can also help reveal how much can be assessed without unduly affecting the economic viability of desirable development.

## CONCLUSION

UMTA's revised guidance on land use impact assessment has been available for only a few months, but many of its concepts were incorporated in earlier fixed-guideway planning studies. In Miami, as part of the environmental impact statement for two extensions to the downtown people mover, the land use impact assessment was presented in accordance with this framework; although an in-depth analysis was not made, the framework offered a useful structure for presenting information to the public and local decision makers. In Milwaukee, a more detailed economic development analysis was performed for a proposed light-rail line. The framework is currently being applied in Buffalo to a major study on economic development and value capture. The Buffalo study is exploring alternative public policy scenarios associated with a possible extension to Buffalo's light-rail rapid transit line.

The recommended framework provides a useful checklist of the topics that should be addressed in a land use impact assessment. It points out important, frequently overlooked relationships between the land use assessment and other technical topics. The framework should help the analyst structure and perform an objective technical study, as well as present the results in a way that allows decision makers to make more informed choices among alternatives. The framework

does not advocate specific analysis techniques, nor does it obviate the need for more accurate land use forecasting techniques and better before-and-after data for completed transit projects.

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