

Impacts of Toll Roads on the Regional Economy: Suggested Measures

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CHAPTER 1: INTRODUCTION

1.1 Summary of the Task

It is widely believed that toll roads will increasingly be used to meet the transportation needs of Texas citizens and businesses. For planning purposes and the edification of affected communities, the Texas Department of Transportation (TxDOT) requires the ability to disseminate information regarding the potential economic, developmental, and fiscal impacts of toll roads including new facility construction and the addition/adaptation of tolled managed and express lanes to existing facilities.

In this report, we examine the type of metrics that can be employed in evaluating the economic, developmental, and fiscal impacts of toll roads. We have drawn these metrics from the literature of analyses and case studies of toll and non-toll facilities. Where the literature does not address a specific metric for a relevant impact, we suggest one. These metrics will be used in later components of this research project to assess impacts realized or projected for selected case studies of local and regional economies from the construction and operation of toll facilities in Texas in urban, suburban, and rural settings. The information gathered from these case studies will support the development of project deliverables.

This report should be considered a draft document. We will include the commentary of TxDOT officials and other experts into this document and work plan for the remaining tasks in this project.

1.2 Organization of the Report

In Chapter 2, we present a review of the relevant literature, case studies, and research guides highlighting metrics used, or potentially used, to assess the economic, developmental, and fiscal impacts of toll facilities. Chapter 3 offers a summary of the metrics organized into a taxonomy of characteristics including metrics with broad characteristics and those that describe effects on property, businesses, and residents. This taxonomy is offered only as a way of presenting the metrics and does not trivialize the complex interactions among each of the described types of metrics.

CHAPTER 2: REVIEW OF THE LITERATURE

In conducting the following review, we have examined a sample of indicative cases, research, and research guides as opposed to writing a review of all relevant documents. It is worth noting that the body of literature specifically examining toll road impacts is still relatively small. We have also chosen to review reports and guides that include non-economic impacts of toll and non-toll facility construction and operation. This is to allow us to consider including metrics and characteristics that are not directly economic but could influence the magnitude and direction of economic, developmental, and fiscal impacts. The first section reviews research from outside Texas, including national studies as well as relevant research conducted abroad. The second section looks at previous research focusing on Texas. In the third section we separately review research guides offering suggestions for measuring the impacts of road (toll and non-toll) facilities from federal and other sources.

Our review does not include the extensive number of case studies and research specifically addressing methods of estimating the total economic impacts of infrastructure investment. There is extensive literature, including several done by Texas-based entities, describing how direct economic effects lead to indirect and induced effects. For our purposes, we offer the following brief definitions and examples of what these different impacts encompass and a reminder to the reader that any impact described in the subsequent review, both negative and positive impacts, will be multiplied through indirect and induced effects.

The direct impacts represent spending and activity at a given firm or agency. In highway construction this would include the value of a contract to build the roadway issued to a contractor. Indirect effects generally measure the secondary economic activity that is created when the firm purchases goods and services from their suppliers. In the case of our construction contractor, they purchase materials, rent equipment, and hire professional services such as accountants to support their business operations. Induced impacts are a result of the contractor paying salaries, wages, and benefits to its employees, who then spend a portion of their earnings in the local economy for goods

and services. When added together, the direct, indirect, and induced impacts create a “multiplier” effect such that the total impacts are greater than the initial value of output of the contract. These impacts apply to all business activities, government spending, and, to a lesser extent, the spending of households. Keep in mind that if a business is relocated from an area due to a right-of-way acquisition, the losses could also be multiplied.

2.1 Studies and Cases from Outside Texas

DeCorla-Souza and Kane (1992) discussed the economic reason for road pricing and impacts of peak period tolls on congestion, air quality, and economic development. Many urban areas face the problem of highway congestion that represents an obstacle to economic development. Although commercial traffic and business travelers will bear an extra production cost by paying for tolls, businesses will experience production efficiency and competitiveness through shorter travel time. Therefore, regions can expect business growth and economic development. These researchers note that funds generated by tolls will provide the means for expanding transportation system capacities, creating new construction jobs in the short term and job-creating growth in the long term.

It is important here to note that economic development is more than economic growth. Briefly stated, economic growth can be measured in terms of the number of jobs created, total personal income changes, and similar measures. Economic development deals more broadly with issues of employment quality, resiliency to economic shocks, the nature of trade, and sustainability.

Marlon and Chalermpong (2001) studied the impact of the development of toll roads in Orange County, California, on housing prices. Using hedonic models¹ these researchers found that homebuyers are willing to pay for improved access created by toll roads. Homebuyers exhibit a willingness to pay for improved access, which impacts residential development patterns and induced traffic.²

¹ “Hedonic” derives from the word hedonism. In economic modeling it refers to using amenities and features that offer psychic (non-monetary) income as predictors of value. In housing studies these types of features include proximity to parks, being in the “right” part of town, and other features including convenient access to efficient transportation systems.

² Induced travel recognizes a relationship between enhancements in highway capacity and increases in vehicle miles of travel.

Helmut Seitz (1993) used the duality approach to estimate the impact of public infrastructure on cost savings in production through the provision of public road infrastructure capital. A panel data set used for this study represented 31 German manufacturing industries in the Federal Republic of Germany (FRG). He also assessed the degree of the willingness to pay for public infrastructure by private industry. The results showed that the willingness to pay for public infrastructure varied substantially across industries. According to the study, public road infrastructure had a significant overall positive effect on economic performance of industry.

Parasibu (2005) discussed the impact of toll roads on regional development in his case study of Jabotabek, the largest urban area in Indonesia. Parasibu emphasized the importance of private capital in developing toll roads in Jabotabek. Since government fiscal capacity is limited, private capital increased the opportunity for the area to invest in road development. He found that the development of industry, creation and expansion of residential areas, and environmental improvements were especially noticeable in toll road areas. Significant improvements in the transportation system led to increased land values. According to this author, the toll road system has increased private investment and stimulated socio-economic and regional development.

Spry and Crowley (2004) cautioned that other factors contribute to the quality and efficiency of business development along toll roads. These researchers discussed the need for contract reform between toll road authorities and service providers in the state of New Jersey. They found that a government-created monopoly for service providers increase prices and decrease the quality of services in absence of competition, reducing overall consumer welfare. The authors offered the following policy recommendations to improve customer well-being along the toll roads: eliminate limitations and legal barriers for firms that are ready to provide services along the toll roads, enhance competition by removing exclusive operating rights, and reduce restrictions on service provider advertising.

Fishbein and Babbar (1996) studied the experiences of eight projects developing private toll roads in developing and industrialized countries. The success of such projects depends on the efficient allocation of responsibilities between public and private sector participants. The study examined financing of toll roads and public-private sharing

issues. The authors predicted growth in the number of future private toll roads but noted important obstacles such as public resistance to tolling and the nature of concessions offered to private developers. Perhaps the best known example of Fishbein and Babbar's caution close to Texas is the highly underutilized toll road from Monterey to Nuevo Laredo, Mexico.

Weisbrod and Gupta (2003) observe that when transportation network improvements enhance a business's access to markets, that business can realize cost advantages from new economies of scale, just-in-time inventory management, and improved logistical efficiencies. Illustrating the confidence placed by state planners in the role of transportation infrastructure on economic development, this report reviews road facility development programs supported with state funding that are undertaken specifically to attract or enhance business development activities. The metrics reported in this study as evidence of economic development include the number of new jobs and private capital investment and other measures attributed to the studied road improvements. For example, the State of Arizona uses projections of the following criteria to select state-supported roadway improvement projects: jobs created or retained, capital investment, contribution to the state economy, and cost/benefit ratios among other local match funding and project characteristics. Florida's state program calls for projects that promote economic growth and competitiveness. Kansas requires that any project funded by the state in this program have the potential to enhance job creation, income, and property values. Michigan favors projects designed to support targeted industries including agriculture and food processing, tourism, forestry, high technology research, manufacturing, mining, and office centers greater than 50,000 square feet. Michigan also specifically mentions increasing the local tax base in the program requirements. Most of the programs reviewed in this report call for unspecified "economic development," which can have multiple measures depending on the regional or local economic context.

Weisbrod and Gupta updated their work in 2005 looking at changes in state funding programs for highway or rail improvements for economic development with examinations of programs in Massachusetts, Tennessee, Oklahoma, and Wisconsin. The eligibility requirements cited in the Massachusetts, Tennessee, and Oklahoma programs in total include jobs created, jobs retained, wages/income, private sector investments,

unemployment rate, impacts on local tax base, and level of private sector investments for new or refurbishing plants and equipment. Wisconsin takes a slightly different approach, counting the number of new businesses but specifically discounting businesses in the retail and hospitality trades (eating and drinking, hotels, and entertainment venues). Wisconsin's program will also not fund any enhancements used to attract businesses from other parts of the state.

Price (2001) discussed competitiveness of tollways and freeways for traffic or "business," as well as public and non-profit stewardship of toll way assets. This article provides an example of an initially successful public-private tollway project in Orange County, California. However, the private entity brought a suit against the public entity for violation of the no-compete clause of the agreement when the state initiated freeway traffic improvements to enhance safety. The parties reached an out-of-court agreement clarifying the no-compete clause, but the private entity was still considering selling the project at the time of the article's publication.

Levinson (1998) developed a model that provides insight into how jurisdictions of different sizes may strategically approach the choice of funding a new transportation facility through taxes or tolls. Large jurisdictions tend to prefer taxes or a mixed financing strategy over tolls whose revenues do not cover costs. Small jurisdictions tend to have a higher demand and relatively lower collection costs and will tend to impose tolls. According to the author, a jurisdiction will gain more by imposing tolls than by imposing taxes because residents of other jurisdictions will be paying tolls. Levinson suggests that "road pricing is a necessary prerequisite to congestion pricing," which is considered by many economists to provide more effective use of resources, and implementing tolls on non-tolled roads can be easier when other tolls are in place. The author suggested the following factors for future success of toll roads: relative centralization of control and reduction of collecting costs.

DeCorla-Souza (2000) offered consideration of time in the development of toll facilities. This author utilized existing analysis tools to evaluate toll options and compare them with more traditional "free" highway alternatives. The author offered relatively simple analytical procedures to assess the impact of pricing options and provided information for decision making in a case study of the Capital Beltway project. The

Spreadsheet Model for Induced Travel Estimation (SMITE) developed by the Federal Highway Administration (FHWA) was modified for this case study. The results of the case study showed the highway project's purpose can be accomplished more effectively and efficiently through pricing alternatives than through conventional alternatives that exclude pricing. These conventional alternatives generate revenue to support construction and/or fund improved transit and paratransit services. The author concluded that pricing alternatives might eliminate delays due to construction funding, increase transportation choices, and decrease time and public costs for the public to obtain superior mobility.

MacroSys Research and Technology (2003) provided a model that evaluates the level and type of employment generated by highway operations funding. Direct hires and indirect employment are included in the model. The largest job activities, such as traffic supervision, toll collection, and snow and ice removal, accounted for 65 percent of all jobs created by highway operations funding. The research results showed that the number and types of jobs developed through highway operations funding differ from jobs developed through new construction. Jobs developed through highway operations funding are less labor intensive and require higher labor skills. This fact results in a considerably different ratio of payroll to expenditures. In 2000, the ratio of payroll to expenditures was about 18,000 jobs per \$1 billion of average spending on highway operations.

The Economic Development Research Group (2004) performed an economic impact assessment that estimated the direct, indirect, and induced impacts of business losses due to the expansion of I-70 in Columbia, Missouri. These losses included business displacements from right-of-way acquisitions and business disruptions to remaining businesses during construction. The measures included displaced sales; employment and labor income losses; and reductions in sales, hotel occupancy, and property tax revenues. The report also offered some recommendations that would mitigate the negative impacts of certain design features that would also apply to toll road designs, including: advanced signage in the corridor to address lower visibility of business properties along the highway, minimizing right-of-way acquisitions by having

one-way frontage roads instead of two-way roads, and a suggestion that business development efforts be targeted to firms not dependent on pass-by traffic.

2.2 Studies and Cases from Texas

Kalmanje and Kockelman (2005) assessed the impact of toll roads in the Austin, Dallas/Fort Worth, and El Paso metropolitan planning areas. The authors emphasized differences in network configuration, spatial and temporal variations in demand, and road rider characteristics between these regions. A regional response to toll roads is affected by the enumerated differences determining the real character of impacts on a region's aspects, such as traffic, land use, economic structure, and residents' welfare. Results, which varied by region, showed that there are positive impacts on the regions' aspects enumerated above in Austin, Dallas/Fort Worth, and El Paso in the areas near toll roads.

Williams (2000) reviewed the work of Texas Transportation Institute (TTI) researchers Eisele and Frawley looking at the economic impacts of raised medians to impose left-turn restrictions on existing roadways. The key findings of this analysis may guide our thinking about the impact of converting existing highway lanes to managed, restricted access, toll lanes:

- Perceptions of business owners before a median was installed were more pessimistic than what actually happened.
- Most business types (including specialty retail, fast-food restaurants, and sit-down restaurants) reported increases in numbers of customers per day and gross sales, except for gasoline stations and automotive repair shops, which reported decreases in the numbers of customers per day and gross sales.
- Most adverse economic impacts were realized during the construction phase of the median installation.
- Employment within the corridors experienced upward trends overall, with some exceptions during construction phases.
- When asked what factors were important to attracting customers, business owners generally ranked "accessibility to store" lower than

customer service, product quality, and product price, and ahead of store hours and distance to travel. (page 2, list redacted)

I-27 in Hale County, Texas, is the subject of a report by Weiss (2005). Hale County is a rural area of the Texas panhandle north of Lubbock. Weiss reported that employment growth in Hale County accelerated after the construction of I-27. Interestingly, while the new highway promoted job growth, it made it easier for individuals to live further away in Lubbock. Commuting increased, and the population of Hale County decreased, though the population remained stable in the 1992 through 2002 period. Income growth continued to trail state and national averages, though Hale County and adjacent Swisher County, which also hosts I-27, did have better income growth than the average for all Texas non-metro areas in many years. Weiss also stated that the industrial base of the five counties along I-27 diversified after construction was completed. Other measures of economic development selected by Weiss include the number of business establishments and median home values (owner occupied, non-condominium). Weiss used these same metrics to evaluate the economic development impacts of other rural highway projects in Wisconsin, Georgia, Pennsylvania, California, Iowa, Virginia, and Maryland. In the broader context of all these case studies, Weiss found mixed results, with some counties experiencing economic growth and/or development after construction of a new highway, while others did not. Growth and development are apparently highly contextual.

The findings of Weiss (2005) are similar to a study by Rychnowski et al. (2003) using the same methodology as Weiss for the western portion of the I-86 Southern Tier Expressway in southwestern New York state.³ Some rural communities in the I-86 corridor experienced growth after the highway was constructed; others did not. The metrics included population, numbers of business establishments, total employment, manufacturing employment, per capita income, and property values (median price of homes). This analysis makes a couple of very important contributions. First, it specifically notes that the benefits accruing to a community from the development of new

³ The review of Rychnowski et al. (2003) is included in this section because of similarities in methodology and findings.

highway infrastructure may take up to 10 years to materialize. The second is drawn from the report's conclusions (Section 5.3, subsection Local Action Planning):

The analysis indicates that some types of business, such as manufacturing and distribution facilities, are being attracted at least in part because of the region's improved highway accessibility. The report indicates that other types of business, such as lodging, restaurants and attractions, are also opening up in anticipation of an increase in visitors. *Of course, there will have to be local marketing, supporting infrastructure and services, and land development controls and assistance mechanisms to ensure that these investments will succeed and that communities are better off as a result* [emphasis added].

2.3 Government and Other Resources on the Measurement on Facility Impacts

2.3.1 National Cooperative Highway Research Program (2002). *Desk reference for estimating the indirect effects of proposed transportation projects*.

This report provides updated guidance for estimating indirect effects of transportation projects that was first published in 1998 as National Cooperative Highway Research Program (NCHRP) Report 403. It is more difficult to identify the indirect impacts of transportation projects than the direct effects. Indirect impacts affect social and economic factors, natural resources, cultural/historical resources, accessibility, and many other factors.

The report provides examples of indirect effects and offers eight steps to estimate them:

1. scoping,
2. identifying the study area's direction and goals,
3. inventorying the study area's notable features,
4. identifying impact-causing activities of proposed action and alternatives,
5. identifying potentially significant indirect effects for analysis,
6. analyzing indirect effects,

7. evaluating analysis results, and
8. assessing consequences and developing mitigation.

The Council on Environmental Quality defined indirect effects as those that are “caused by the action and occur later in time or farther removed in distance, but are still reasonably foreseen” (40 CFR 1508.08). Indirect effects “may include growth-inducing effects and other effects related to induced changes in the patterns of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems” (40 CFR 1508.8).

2.3.2 Brock, W., King, G., Cunill, B., Dockter, S., Isom, J., Stevens, B., Sparklin, D., and Lindsey-Foster, L. (1996). *Community impact assessment: A quick reference for transportation*.

This guide helps transportation professionals assess the impacts of transportation projects on communities by highlighting important areas that must be examined and offering tools and sources to find information. First, the analyst defines transportation alternatives and preliminary community profiles, and then she analyzes and compares the anticipated results when the transportation action was applied to the anticipated results when the transportation action was not applied. Analysts should take into consideration negative and positive impacts, long-term and short-term perspectives, community goals, public perceptions of impacts, and focus on the magnitude of an issue to adopt an appropriate level of specificity. The following types of impacts might be identified and analyzed:

- Social and psychological aspects:
 - changes in population
 - community cohesion and interaction
 - isolation
 - social values
 - quality of life
- Physical aspects:
 - barrier effects
 - sounds

- other physical intrusions (dust, odor, etc.)
- Visual environment:
 - aesthetics
 - compatibility with plans
- Land use:
 - land use patterns
 - compatibility with plans
- Economic conditions:
 - business and employment impacts
 - short-term impacts
 - business visibility
 - tax base
 - property values
- Mobility and access:
 - pedestrian and bicycle access
 - public transportation
 - vehicular access
- Provision of public services:
 - use of public facilities
 - displacement of public facilities
- Safety:
 - pedestrian and bicycle safety
 - crime
 - emergency response
- Displacement:
 - effect on neighborhoods
 - residential displacements
 - business and farm displacements
 - relocation sites

Moreover, analysts should examine the relatedness of different impacts to each other, and take into account direct and indirect effects, and cumulative and counterbalancing effects.

2.3.3 Forkenbrock, D., and Weisbrod, G. (2001). *Guidebook for assessing the social and economic effects of transportation projects*.

This report offers methods, tools, and techniques to assess the social and economic effects of transportation projects on neighboring communities, and it provides a review of relevant legislation. This report summarizes 11 general types of social and economic impacts such as safety, changes in vehicle operating costs, changes in travel time, transportation choice, accessibility, community cohesion, economic development, traffic noise, visual quality, property values, and quality of life. The author recommends the following steps when undertaking a comprehensive impact assessment of a transportation project: assessment of need for the project, feasibility analysis of alternatives, analysis of social and economic effects, analysis of effects of natural system, and communication of results in ways that are easily understood by residents, stakeholders, and decision makers. The effects of transportation projects are divided into two general clusters: transportation system effects, and social and economic effects.

2.3.4 Central Environmental Management Office, Florida Department of Transportation (2000). *Community impact assessment: A handbook for transportation professionals*.

Two previous works, *Community Impact Assessment: A Quick Reference for Transportation* produced by the Federal Highway Administration in 1996 and *Guidelines and Principles for Social Impact Assessment* produced by the U.S. Department of Commerce, were used to expand this handbook. The handbook develops methods and indicators to identify and assess impacts of transportation projects on communities. Also, it identifies steps to reduce negative effects. This handbook addresses the following issues: the assessment process, community impact assessment in project phases, developing a community profile, social impacts, economic impacts, land use, aesthetics and livability, relocation and displacement, and civil rights of the area population.

2.3.5 U.S. Department of Transportation, Federal Highway Administration (2005). “Chapter 16: Pricing” in *Status of the nation’s highways, bridges, and transit: 2002 conditions and performance report*.

This chapter reviews the following types of pricing projects: variable tolls on existing toll facilities, variable tolls on added highway lanes, adaptation of high-occupancy vehicles (HOV) lanes to high-occupancy toll (HOT) lanes, fast and intertwined regular (FAIR) lanes, and other pricing concepts. Also, the chapter considers the benefits and costs of pricing. According to the study, the following benefits exist: value of time savings and decrease in other social costs. Costs incorporate capital investments in tolling infrastructure and toll operation costs. The study also showed that implementing road pricing and improving highway capacity simultaneously provide significant net benefits.

CHAPTER 3: METRICS FOR ASSESSING THE IMPACTS OF TOLL FACILITIES

In this section, we list and categorize the metrics that could be used to assess the economic, developmental, and fiscal impacts of new toll facilities and/or the addition or adaptation of managed toll lanes to existing facilities. We begin with a discussion of the broad-based characteristics of our listed impacts, followed by metrics we describe as property impacts, business impacts, and impacts on residents. For each, we denote likely differences, if any, in the way these impacts would manifest in rural, suburban, or urban settings. These discussions are summarized in Table 3-1. We note again that, by necessity, we have taken a somewhat simple approach in the description of these metrics. The actual impacts that may be experienced by any community or area will be influenced by local circumstances, attitudes of citizens, the quality and capacity of local development agencies, and a large range of other characteristics outside the control of the Texas Department of Transportation.⁴

3.1 Broad Characteristics

3.1.1 Positive or negative impacts based on perceptions.

Whether any particular impact is perceived by a local community as being positive or negative will depend in part on the attitudes and preconceived notions of the local population. These perceptions may, or may not, be expressed through local political leadership. For example, construction of a new toll facility in a rural area may spark population growth and new business development. That does not mean the local population will perceive growth as a positive attribute. There are many rural communities and some suburban communities where the expressed desire of the local population may be to “raise the drawbridge.” Also, as suggested in the literature, the development of new roadways tends to be most attractive to certain types of businesses

⁴ The metrics described in this report are “impacts.” Impact analysis is not the same as a cost-benefit analysis. For example, while new businesses locating along a new toll facility in a rural area will certainly boost local tax revenues, there could be substantial marginal expenses incurred by local government to provide services to the developing area. Of course this effect would be less prevalent in urban and suburban settings.

that may not fit well with local development goals. Delivering the message of the potential impacts of toll facilities requires the presenter to do more than a small amount of homework into local pre-existing perceptions and attitudes.

3.1.2 Temporary and recurring impacts.

The time dimension of economic and fiscal impacts is an important distinction to make. For example, the construction of any new infrastructure generates local economic activity supporting jobs, labor income, and tax revenues. However, once the construction is complete, the impacts cease. Operations and maintenance of toll facilities will have different economic and fiscal impacts from construction activities. (See Office of Program Policy Analysis and Government Accountability, 1999.) Similarly, the negative impacts of business disruptions will be temporary, unless the disruption lasts long enough to cause a long-term change in consumer behavior. In offering our metrics, we will specifically note if the impacts are likely to be temporary; otherwise, the reader may assume the impacts to be recurring.

3.1.3 Cumulative effects.

As suggested in our earlier description of direct and indirect economic impacts, indirect effects can be considered secondary impacts that spread to firms and activities across an economy as a result of direct spending. These effects are not the same as cumulative effects. For example, negative cumulative effects could occur during the construction phase of a toll facility development. Because of temporary road closures, business activity can be disrupted. If one business located in a strip center affected by road construction activities chooses to close, the entire strip center is less attractive and may see other businesses close temporarily or permanently due to a cumulative effect. Cumulative effects can work in the positive direction also. If one retailer locates at the access point of a toll road, the next retailer to locate there will do so because of the traffic on the new roadway *and* because of the presence of the other retailer, a phenomenon called clustering. In this example, the cumulative effect can be summarized as growth, sparked by the transportation infrastructure, begetting growth.

3.1.4 Speed of development and the time value of money.

As noted earlier, most of the metrics we describe apply to both toll and non-toll facilities. A major difference between toll and non-toll facilities in our existing state fiscal climate is that bonded toll facilities typically will be built sooner and the construction phase will be completed more rapidly than traditionally funded non-toll facilities. The overall effect on our impact measures will be almost completely positive. Business disruptions during construction will be reduced, and the gains in trade and business development can happen more quickly when the facility construction is financed through toll-supported revenue bonds. A potential negative is that faster construction schedules give businesses that must relocate less time to identify and move to a new site. Realizing the benefits of increased tax revenues and other measures of economic performance creates a time-value-of-money benefit associated with toll facility development. We found no studies specifically examining this issue, and due to the complex nature of calculating a present value of any anticipated benefits, we have not included this measure in our metrics.

3.1.5 Toll facility design characteristics.

Typically, toll roads have fewer ingress and egress points than highways. This limited access may have one of several potential impacts on development and local fiscal impacts. Though we found no supporting literature, it is possible that access characteristics could impact the location of development. For example, development could cluster at ingress/egress points. This effect is anticipated more particularly on toll roads without continuous free frontage roads between access points. We expect that retail trade establishments catering to drive-by customers would prefer locations with comparatively easy access. To the extent any clustering takes place or that certain types of businesses display a preference for proximity to ingress/egress points or along free frontage roads between ingress/egress points, certain properties could develop more quickly.

As suggested by the case involving the introduction of raised medians, adding managed, limited access lanes or adapting existing free lanes to limited access lanes could potentially impact traffic patterns for some adjacent businesses. (If a driver is

traveling in a limited access lane, he or she may miss the exit closest to a particular retailer.) This would tend to affect those businesses that most heavily rely on passerby traffic and convenience shoppers. There are obvious implications for assessing the impacts on existing businesses or for strategies to attract new businesses.

Other design features that impact visibility of adjacent properties, circuitry of access to individual properties, and the location of toll collection stations (where the design of the toll station impacts traffic patterns) could influence the pace and quality of surrounding development. Electronic tolling systems typically require less space versus staffed tolling facilities and therefore require less land be taken out of the local developable inventory of properties. In addition, the ramping configuration, such as diamond or crossing, and the presence of U-turn lanes impact accessibility and could influence adjacent property development. These design features must be addressed on a case-by-case basis.

3.1.6 Air quality impacts.

Several metropolitan areas in Texas are facing challenges in meeting federal air quality standards. Those communities that are designated as non-attainment areas may find it more difficult to attract certain types of businesses. If the toll facility is to be located in a region where air quality is a concern, the marginal improvement in air quality realized through the development of new and converted toll facilities could have a positive non-direct impact on the potential for development.

3.1.7 Congestion.

In urban and suburban settings, the impacts of new toll facilities on congestion represent opportunities to address the well-documented loss of productivity that accompanies congestion. Reducing congestion can increase business productivity, make a location more attractive for business and residential development, and improve opportunities for trade. However, one caution is worth considering: When access is limited, as with most toll road designs, there are fewer opportunities for drivers to access alternative routes when an accident occurs; thus in some circumstances, a toll road design may increase congestion. This is frequently seen on I-30 just west of downtown Dallas

(the old Dallas-Fort Worth tollway), where even a minor accident can create substantial traffic delays. Parallel roadway development could mitigate this potential negative effect on traffic.

3.2 Property Impacts

3.2.1 Change in use.

The development of new roadways can impact developable land and developed land in different ways. On developable land (land that is currently not developed), the measure could include:

- number of acres and market value of land going from fallow to active (most often in rural settings); and
- number of acres and market value of land in agricultural production moving to commercial, industrial, or residential uses (this could be perceived as a positive or negative impact in rural settings).

For developed land, the addition of new transportation infrastructure or the improvement of existing infrastructure through managed lane adaptations could alter the highest and best use of property that is already developed. On developed land, the measure could include:

- number of acres that change in use resulting in changes in value;
- change in value due to change in density (this could be measured by changes in floor space to area ratio [FAR]; FAR is measured by dividing the total square footage of space in the building[s] by the amount of space in the parcel of land on which the building sits⁵); and
- total number of buildings occupying a particular land parcel or group of parcels.

⁵ Allowing for parking spaces at an office building, a one- or two-story office building may have a FAR less than 1.0. A six-story building may have a FAR of 1.2. Downtown skyscrapers with underground parking may have a FAR above 8.0. “Campus” type building complexes with substantial green space between and around buildings often have a FAR around 0.5.

3.2.2 Impacts on taxable values.

The potential impacts on taxable property values may be a key determinant in receiving support for a toll facility from local officials. Any measures of taxable values should be segregated by impacts on residential, commercial, and industrial properties. In addition, impacts on taxable business personal property values should be included. The measure could include:

- number of acres and taxable value of land taken off tax roles (right-of-way acquisition, likely to be a minimal impact in rural areas and a potentially significant impact in urban areas);
- number of acres and taxable value of land where market and taxable values increase (at access points); and
- number of acres and taxable value of land where market and taxable values of land decrease (where access/visibility is hampered and other impacts).

3.3 Impacts on Businesses

3.3.1 Impacts during construction.

These impacts could be temporary or permanent impacts associated with construction of any new road infrastructure. As noted above, disruption impacts are minimized by the quicker completion schedule offered through toll revenue bond financing. Impacts could include:

- Lost sales due to business disruptions (density of existing development, proximity of construction to business, availability of alternative shopping venues [in rural areas, may be smaller because there are fewer alternatives available when business access is made less convenient during facility construction]):
 - impacts on employment, wages, rents, and taxes
- Lost sales due to business displacement/farm displacement:
 - impacts on employment, wages, rents, and taxes
 - should consider unique products or customer base (for example, a popular wild seed farm in a rural area can be a tourism draw)

- Residential displacement:
 - impacts on housing values, rents, availability of affordable alternatives, and property taxes
- Business relocation:
 - cost of relocation and lost sales during move with attendant impacts on employment, wages, and sales taxes
 - availability of land for relocation in current taxing jurisdiction
 - secondary changes in land use from business relocation
- Impacts of facility construction expenditures in the local economy

3.3.2 Business activity after construction.

These are the recurring impacts. It is often appropriate to express these impacts in annual figures such as yearly salaries, wages, tax revenues, and the like.

- Changes in sales:
 - due to changes in accessibility
 - impacts on employment, wages, rents, and taxes
 - due to changes in visibility
 - impacts on employment, wages, rents, and taxes
 - due to expanded trade area
 - impacts on employment, wages, rents, and taxes
 - trade area could be diminished if transportation improvements allow local residents to more easily access more distant retail outlets
 - net gains in sales – are these sales new or simply transferred from an adjacent jurisdiction?
- Number of businesses:
 - number of new businesses
 - net new businesses
- Density of development (from changes in accessibility)
- Number of jobs
- Average annual salaries and wages per job
- Changes in unemployment rates

- Economic and fiscal impacts of toll facility operation and maintenance:
 - impacts from ongoing spending creating jobs in the local community

3.4 Impacts on Residents

Many of the studies we reviewed focused on business impacts. The resident population will also be affected by the development of new or converted toll facilities. These are also recurring impacts:

- Population change:
 - could be negative or positive; particularly uncertain in rural settings
 - sales impacts of increasing or decreasing population would be captured in the measures above
- Changes in housing values:
 - median prices of owner-occupied homes
 - changes to property tax base
 - average rental rates
 - single-family properties
 - multi-family properties
 - changes to property tax base

3.5 Conclusions to This Section

The metrics cited above are offered in a manner that assumes causation. This is an important distinction between the goals of this project and a project that calls for the formal assessment of each or any of the metrics we are including. In describing the potential impacts of new toll facility construction or the adaptation of an open lane to a tolled managed access lane, TxDOT officials and their representatives will need to be able to discuss these measures with citizens and local officials. That is not the same as measuring these impacts. Most of the data sources available to assess the impacts of any given toll project would offer county-wide or at least city-wide data. It could be difficult to assign the proportion of gain in employment in a given county, for example, that is attributable to transportation infrastructure changes and those gains caused by other factors affecting the economy.

Table 3-1 summarizes the metrics we have described in this section. The table is organized to show where we would expect different magnitudes or directions of impacts based on the affected community being in an urban, suburban, or rural setting. We have also included a column that offers an indication of the differential impact of a toll versus a non-toll facility in any given metric, if applicable. Finally, we offer some notes where further explanation is warranted. This table is designed to serve as a quick-reference guide to the metrics of assessing the impacts of toll facilities on a local economy. For presentation clarity, Table 3-1 is divided into three parts: property impacts (3-1-A), business impacts (3-1-B), and impacts on residents (3-1-C).

Table 3-1-A
Metrics for Assessing the Economic, Developmental, and Fiscal Impacts of Toll Roads and Managed Toll Lanes –
Property Impacts

Description	Urban	Suburban	Rural	Toll	Notes
Impacts from change in use					
Impacts on undeveloped land					
Land improving from fallow to active					
Market value and number of acres	Minor	Minor	Could be large	N/D	Could be perceived as a negative.
Land moving from ag uses to non-ag					
Market value and number of acres	Minor	Some in new suburbs	Could be large	N/D	Could be perceived as a negative.
Impacts on developed land					
Market value from change in use	Moderate	Larger in newer suburbs	Minor to moderate	Access differences	Access changes for managed lanes could change the “best” type of business
Floor to area ratio	?	?	Minor	Access differences	Spacing of access, ramping configurations, U-turns
Number of buildings per parcel/area	?	Minor to moderate	Could be large	Access differences	Spacing of access, ramping configurations, U-turns
Impacts on taxable property values					
Value lost to right-of-way acquisition	Large	Moderate to large	Minor	N/D	
Market value changes as noted above					
Business personal property values (BPPV)			Smaller than others	N/D	New or expanded buildings mean new BPPV

Blank boxes indicate no anticipated difference in impacts among types of regions. N/D indicates no difference. ? indicates the literature reports or researchers judge there to be mixed results in the direction and/or magnitude of impacts across cases.

Table 3-1-B
Metrics for Assessing the Economic, Developmental, and Fiscal Impacts of Toll Roads and Managed Toll Lanes –
Business Impacts

Description	Urban	Suburban	Rural	Toll	Notes
Impacts during construction					
Lost sales, employment, wages, rents, sales taxes due to business disruption	Minor to moderate	Minor to moderate	Minor	Smaller	Smaller due to quicker completion. Impact always large for directly impacted
Lost sales, employment, wages, rents, sales taxes due to business/farm displacement	Minor to moderate	Minor	?	N/D	Could be major negative in local politics. Unique product or customer base?
Residential displacement: housing values, rents, presence of affordable alternatives, property taxes			Fewer alternatives	N/D	Strength of opposition depends on value of housing
Business relocation: cost of relocation, lost sales during move and related impacts on employment, sales, wages, property and sales taxes				N/D	Are there available sites in current taxing jurisdiction?
Economic and fiscal impacts of construction activities			Smaller multipliers	Impacts don't last as long	Impacts cease when construction is completed
Business activity after construction					
Change in sales, employment, wages, rents, and taxes	Existing capacity for growth	Existing capacity for growth	Capacity, desire to grow?	Design differences	Access, visibility, trade area, affects growth
Net changes in sales, employment, wages, rents, and taxes					Are changes net growth or relocated existing sales, etc.?

Blank boxes indicate no anticipated difference in impacts among types of regions. N/D indicates no difference. ? indicates the literature reports or researchers judge there to be mixed results in the direction and/or magnitude of impacts across cases.

Table 3-1-B – continued
Metrics for Assessing the Economic, Developmental, and Fiscal Impacts of Toll Roads and Managed Toll Lanes –
Business Impacts

Description	Urban	Suburban	Rural	Toll	Notes
Business activity after construction					
Number of businesses/number of new businesses					Same notes and caveats described in changes in sales
Density of development			Minor	Limited access effect	The access effect would be influenced by the presence of a continuous service road, ramping configuration, presence of U-turn lanes
Number of jobs			Fewer		Separate from measured through sales growth
Average annual salaries and wages			Typically lower		Changes in job quality?
Unemployment rates			Typically higher		
Economic and fiscal impacts of toll facility operation and maintenance			More important source of jobs	Operations impact toll only	Maintenance more frequent for toll

Blank boxes indicate no anticipated difference in impacts among types of regions. N/D indicates no difference. ? indicates the literature reports or researchers judge there to be mixed results in the direction and/or magnitude of impacts across cases.

Table 3-1-C
Metrics for Assessing the Economic, Developmental, and Fiscal Impacts of Toll Roads and Managed Toll Lanes –
Impacts on Residents

Description	Urban	Suburban	Rural	Toll	Notes
Population change					
Total population		May increase	?	N/D	Could attract new resident or could make it easier for rural resident to move but still work locally
Household spending				N/D	Measure captured in sales measures above unless specifically surveyed
Housing values					
Median owner-occupied housing prices				Access differences	Some will judge proximity as a positive, others as a negative. On average, proximity has a positive impact. Ramping configuration could have an impact
Average rental rates for single-family, multi-family properties				Access differences	Proximity has a positive impact. Spacing of access, ramping configurations, U-turns
Taxable property values				Access differences	Spacing of access, ramping configurations, U-turns

Blank boxes indicate no anticipated difference in impacts among types of regions. N/D indicates no difference. ? indicates the literature reports or researchers judge there to be mixed results in the direction and/or magnitude of impacts across cases.

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