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16. Abstract

This is the final summary report from a research study focusing on the process of preparing and evaluating feasibility studies for private toll road projects in Texas. State legislation requires that the sponsors of a proposed toll road project submit a feasibility study to the Texas Department of Transportation (TxDOT). The financial viability of a proposed project, as documented in the feasibility study, must be considered by the Texas Transportation Commission as part of the approval process. This study was undertaken to examine the issues associated with toll road feasibility studies, the approaches being used in other states, and possible procedures TxDOT can use in determining whether a proposed private toll road project will be financially viable. This report describes the toll road project proposal process in other states, as well as information required from investment banks and rating agencies. The report presents suggested guidelines for preparing toll road feasibility studies, reviewing submitted feasibility studies, and examining the financial viability of private toll roads in Texas.

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SUGGESTED GUIDELINES FOR PREPARING AND REVIEWING TOLL ROAD FEASIBILITY STUDIES IN TEXAS: PROJECT SUMMARY REPORT

by

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Research Study Number 0-1756
Research Study Title: Feasibility of Private Toll Roads:
An Evaluation Procedure for TxDOT— Phase II

Sponsored by the
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IMPLEMENTATION RECOMMENDATIONS

This report summarizes the results of a research project examining the preparation and evaluation of toll road feasibility studies. Researchers reviewed the legislative requirements in Texas, the approaches used in other states, and the national experience with recent toll road projects. They developed a series of suggested guidelines for consideration by TxDOT based on this information. As summarized in this report, potential guidelines are presented for preparing toll road feasibility studies, reviewing submitted feasibility studies, and examining the financial viability of private toll roads in Texas.

The suggested guidelines can be considered for implementation by TxDOT to assist in meeting legislative requirements. The researchers recommended the following steps to implement the suggested guidelines.

1. TxDOT staff review suggested guidelines for preparing toll road feasibility studies, reviewing submitted feasibility studies, and examining the financial viability of private toll roads.

2. TxDOT staff finalize a set of draft guidelines for the Department.

3. TxDOT provides the opportunity for toll road corporations, appropriate public agencies, and other groups to review and comment on the draft guidelines.

4. TxDOT finalizes the guidelines based on input from these groups and uses the guidelines to consider and review future private toll road feasibility studies.

5. TXDOT develops and implements an ongoing process to monitor toll road projects in the state. This process would establish an ongoing database on utilization levels and revenues. This information could be used to help evaluate future proposals.

DISCLAIMER

The contents of this report reflect the views of the author, who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the Texas Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

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CHAPTER ONE—INTRODUCTION

This report is the final in a series focusing on the preparation and assessment of feasibility studies for private toll road projects in Texas. State legislation requires that sponsors of a proposed toll road submit a feasibility study to the Texas Department of Transportation (TxDOT). Preliminary approval of a proposed facility by the Texas Transportation Commission must consider the financial viability of the project based on this feasibility study.

This research project was undertaken to examine the factors that should be included in feasibility studies for private toll facilities in the state and to provide guidance to TxDOT on key elements to be considered in the review of these studies, including the financial viability of a project. The activities conducted as part of the research project and the suggested guidelines for developing and reviewing private toll road feasibility studies are summarized in this report. More detailed information on these topics is provided in the previous five reports.

Background

Legislation passed in 1991 governs the construction of private turnpikes and toll roads in Texas. The legislation established June 1, 1991, as the deadline for chartering private toll road projects in the state. Those legislative provisions have been codified in Chapter 362, Subchapter C (Private Turnpikes and Toll Projects), Section 362.101-362.104 of the Texas Transportation Code. The following elements highlight the major requirements of the legislation (1).

- A private entity or corporation may not construct any privately owned toll project which connects to a road, bridge, or highway included in the state highway system unless the project is approved by the Texas Transportation Commission.

- The Commission must adopt procedures and substantive rules and regulations for use in approving private toll road projects. These procedures must consider the integration of the project into the state roadway system and the potential impact on the economy of the area. If the proposed project is located along the Texas/Mexico border, the potential impact on the free flow of trade between the United States and Mexico must also be examined.

- A private entity or corporation must complete a feasibility study addressing the alignment, environmental impacts, and the financial viability of a proposed project. The financial assessment must include the proposed methods of financing, traffic data, and forecasted revenues.

- The Commission may grant preliminary approval for construction of a project if it finds the facility is consistent with state and metropolitan transportation plans, will have no significant negative impacts on the economy of the area, will not adversely impact the free flow of trade between Mexico and the United States, and is financially viable.

A total of 45 potential private toll road projects were chartered by six private toll road corporations by the 1991 legislatively mandated deadline. The Camino Columbia Toll Road project is the only facility actively pursued to date. This project has been preliminarily approved by the Commission. The other chartered projects may be pursued at any time.

Research Objectives

Although the legislation requires that a feasibility study determining the financial viability of a project be completed, only limited guidance is provided on how these studies should be conducted and the specific elements to be included. The legislation indicates that the feasibility study must include the proposed method of financing for planning, designing, constructing, operating, and maintaining the proposed toll project, and must address traffic data and revenue projections. This research study was conducted to assist TxDOT in identifying the key elements that should be included in financial feasibility assessments and the process to review feasibility studies submitted by project sponsors, including examining the financial viability of proposed projects.

The objectives of the research study were to develop suggested guidelines for the preparation of feasibility studies for private toll roads in the state, as well as suggested guidelines for the review of these studies by TxDOT, and criteria for reviewing the financial viability of a project. A number of activities were conducted to accomplish these objects. First, a state-of-the-art literature review was completed to identify relevant information on toll road feasibility studies, experience with toll facilities, and revenue and cost estimation procedures. This review included an examination of the experience with revenue forecasts on recently completed toll projects in the United States. Second, information on the approaches and requirements used in other states was obtained through a survey of state departments of transportation. Third, interviews were conducted with representatives from eight investment firms and rating agencies. The results of these activities were used to develop the suggested guidelines outlined in this report.

Organization of this Report

The remainder of this report is divided into six chapters. The results from the literature review are summarized in Chapter Two. The requirements and criteria used in other states to guide the preparation and review of feasibility studies for toll facilities are presented in Chapter Three. The factors examined by investment firms and rating agencies related to toll road feasibility studies are discussed in Chapter Four. Chapter Five presents the suggested guidelines for the preparation and review of private toll facility feasibility studies in Texas. The report concludes with a summary of the main elements covered in the research study and areas for further research.

CHAPTER TWO—LITERATURE REVIEW

A comprehensive review of available literature was conducted as the first task in this research study. Information on recent toll facilities, innovative public/private roadway projects, traffic forecasting procedures, and methods to estimate toll revenues were examined. The results from the literature review are highlighted in this chapter.

Experience with Recent Toll Roads

A recent study (2) examined the experience with toll roads opened between 1986 and 1995 in California, Florida, Georgia, Oklahoma, and Texas. A major portion of this study compared the forecasted and actual revenues for the 14 projects. Table 1 highlights the opening date and the projected revenue growth over the first four years for the 14 toll roads.

As shown in Table 2, actual revenues exceeded projected revenues on only two projects. These were the Illinois North South Tollway in Chicago and the Georgia 400 in Atlanta. The Dallas North Tollway was very close to meeting the projected revenues in the fourth year (2). The remaining 12 projects experienced revenues below projections. Of these, the actual revenues on four projects were 12 percent to 26 percent below the estimates, while eight facilities were 45 percent to 75 percent below estimated revenues.

Factors identified that appeared to contribute to the overestimation of revenues included overly optimistic economic growth projections in the area and the corridor, assumptions of fairly high rates of revenue growth, travel time savings of less than five minutes over competing routes, and toll charges in excess of 10 cents per mile. Factors that seemed to be part of forecasts closer to the actual experience include conservative economic projections with moderate levels of growth, congested travel corridors, travel time savings of five to 10 minutes over competing routes, toll charges averaging eight cents per mile, and revenue growth forecasts under 5 percent per annum during the first four years of operation (2).

Traffic and Revenue Forecasting Methodologies

The literature review also examined the current methods and techniques used to estimate traffic and revenue for proposed toll roads. Although different programs are utilized, the basic methodology focuses on estimating the traffic volume for a corridor during specific time periods (per hour, per day, or per year) and the share that will be captured by the toll road. For the most part, the consultants who conduct toll road traffic and revenue forecasts use proprietary models that are not available to other groups, including this research study.

The review indicated that the diversion rates, or the estimates of corridor traffic that will divert to the toll road, appear to be an important factor in the forecasting process. Thus, the diversion rates and assumptions used in a feasibility study should be examined as part of any review process.

The literature review did not identify any procedures that can consistently identify when a forecast for a proposed project is overestimated or if the estimated debt coverage ratio will be achieved. There is also no clear guidance from available literature on how to adjust evaluation procedures or financial viability criteria to take into account the high probability of an overestimate of toll revenues.

Table 1. Recent Toll Road Projects

Project	Date Opened	Projected Revenue Growth[1] (%)
Georgia 400	1993	6.3
Hardy, TX	1988	15.0
Illinois North South Tollway	1989	18.0
Dallas North Tollway	1986, 1987	20.4
Kilpatrick, OK	1991	31.4
Greene Way South Segment, FL	1990	31.7
Sam Houston, TX	1998, 1990	41.1
Seminole, FL	1994	42.6
Greene Way Southern Connector, FL	1993	43.0
Creek, OK	1992	43.2
Sawgrass Expressway, FL	1986	47.6
Veterans' Expressway, FL	1994	50.6
Greene Way North Segment, FL	1989	54.8
Foothill North, CA	1995	NA

(2)

[1] Project revenue growth is for first four years of operation.

NA - Information not available.

Table 2. Actual Revenues as Percentage of Projected Revenues in the Original Traffic and Revenue Forecasts

Project	Year 1	Year 2	Year 3	Year 4
Georgia 400	117.0	133.1	NA	NA
Hardy, TX	29.2	27.7	23.8	22.8
Illinois North South Tollway	94.7	104.3	112.5	116.9
Dallas North Tollway	73.9	91.3	94.7	99.3
Kilpatrick, OK	18.0	26.4	29.3	31.4
Greene Way South Segment, FL	34.1	36.2	36.0	50.0
Sam Houston, TX	64.9	79.7	81.0	83.2
Seminole, FL	45.5	52.5	NA	NA
Greene Way Southern Connector, FL	27.5	36.6	NA	NA
Creek, OK	49.0	55.0	56.8	NA
Sawgrass Expressway, FL	17.8	23.4	32.0	37.1
Veterans' Expressway, FL	50.1	54.1	NA	NA
Greene Way North Segment, FL	96.8	85.7	81.4	69.6
Foothill North, CA	88.0	NA	NA	NA

(2)
NA - Information not available.

CHAPTER THREE—GUIDELINES USED IN OTHER STATES TO PREPARE AND REVIEW PRIVATE TOLL ROAD FEASIBILITY STUDIES

This chapter summarizes the guidelines used in six other states to prepare private toll road feasibility studies, and the process used to review toll road proposals. The information presented was obtained through a survey of state departments of transportation. For each state, the guidelines for feasibility studies are presented first, followed by the review process and the factors considered in assessing projected revenues.

Information on the main elements required in private toll facility feasibility studies and public/private roadway projects in Arizona, California, Florida, Minnesota, Virginia, and Washington is presented in Table 3. The main factors used in these states to review proposals for toll roads and in assessing projected revenues on proposed projects are highlighted in Table 4. The financial viability criteria used in each state is highlighted in Table 5.

Arizona. Arizona uses requests for proposals (RFPs) for preliminary financial plans of toll facilities. The RFP provided by the Arizona Department of Transportation (ADOT) was for a 1995 preliminary financial plan for a project in Maricopa County (3). The major requirements outlined in the RFP include a description of the sources and uses of funds for the project. The Department uses a two-step review process. Proposals are first examined by Department staff. ADOT also contracts with outside financial consultants specializing in financial assessment of toll facilities to conduct a more detailed review of the financial projections included in a proposal.

As highlighted in Table 4, after an initial internal review, the outside financial consultants conduct a detailed assessment of a proposal. The consultants examine the sources of proposed funding and the reasonableness of any public financing. A detailed review is conducted of the assumptions, and the calculations included in the proposal are verified. The consultants examine the impacts of the proposed plan on the state, the state's credit, and local government. The allocation of risk among the various parties is assessed and a sensitivity analysis is conducted on the assumptions. Finally, the consultants provide a summary and overall assessment of the financial plan.

The Department also uses an outside traffic consultant to conduct a risk assessment of the demand forecasts. As a final step in the evaluation process, ADOT staff meet with representatives from the group proposing the project to review the findings of the outside consultants. The Department may request additional information or revisions to the initial proposal. According to this document, the Department's general criteria for considering a proposed project financially viable is a debt coverage ratio of 1.5 or better in each year of operation.

California. California uses a combination of requests for qualifications (RFQs) and RFPs to obtain financial information on proposed toll facilities. Information on the financial plan elements and review process is included in the 1990 California Department of Transportation (Caltrans) *Guidelines for Conceptual Project Proposals for Toll Revenue Transportation Projects* (4).

Financial information required in the proposal includes the source and nature of equity contributions; the extent, type, and mix of debt financing; documentation of credit; and any agreements with local governments or other entities. The required cash flow analysis has two components. The first includes cash flow projections, interest rates, cost associated with financing, the expected rate of return and internal rate of return, the toll structure, traffic estimates, the operation and maintenance projections, and any non-toll revenues. In addition, a sensitivity analysis is required that tests the financial plan under different assumptions, identifies the best-case and the worst-case scenarios, and examines different assumptions related to property values, development schedules, and market absorption. Finally, Caltrans requires that a third-party financial consultant examine the adequacy of the plan.

Caltrans does not conduct its own evaluation of proposed financial plans. Rather, the Department requires that private toll road companies obtain a statement of a financial plan's adequacy from a financial consultant pre-qualified by Caltrans. The Department does provide guidance to these consulting firms on the elements that should be examined as part of this assessment.

The review process focuses on the three basic categories required in the proposal. These are a financing structure analysis, a cash flow analysis, and a sensitivity analysis. The required cash flow analysis has two components. The first includes cash flow projections, interest rates, costs associated with financing, the expected rate of return and internal rate of return, the toll structure, traffic estimates, the operation and maintenance projections, and any non-toll revenues. In addition, a sensitivity analysis is required that tests the financial plan under different assumptions, identifies the best-case and the worst-case scenarios, and examines different assumptions related to property values, development schedules, and market absorption. Finally, Caltrans requires that a third-party financial consultant examine the adequacy of the funding plan.

Although the Department requires a variety of financial information in a proposal and requires that a third-party financial consultant examine the adequacy of the plan, it does not have specific criteria for assessing the financial viability of a project. Rather, Caltrans considers the general adequacy and reasonableness of the forecasts, revenues, and costs.

Table 3. Main Elements in Toll Facility Feasibility Studies Required by Other States

State	Data and Information Requirements
Arizona	**Financial Plan, including sources and uses of funds**
California	**Financing Structure** •Equity contribution •Debt financing •Credit support letters or lines of credit •Bank loans •Real estate financing •Other funding **Cash Flow** •Projections for construction and subsequent years •Interest rates and fees on borrowed funds •Costs associated with financing •Expected rate of annual return •Proposed internal rate of return •Proposed toll and fee structure •Traffic count estimates •Projected operation/maintenance costs and funding sources •Non-toll revenues **Sensitivity Analysis** •Test financial plan under different assumptions •Identify best-case and worst-case scenarios •Test any assumptions relating to property values and development schedules **Review by Third-Party Financial Consultant**
Florida	**Quantity, Type, and Source of Funding** •Public sector funding •Equity funds from private entity •Bond financing and other debt financing •Contributions from net operating revenues **Proposed Operating Budget for each Activity Phase, Including Methods and Assumptions for Verification** **Operating Revenue Projections** •Toll revenues •Other operating revenues (advertising, station concessions, etc.) •Associated development/supplemental revenues •Public sector subsidies •Methods and assumptions **Cash Flow Analysis, 30-Year Period** **Sensitivity Analysis of Financing Scenarios** **Ability to Request Additional Information**

Table 3. Main Elements in Toll Facility Feasibility Studies Required by Other States (Continued)

State	Data and Information Requirements
Minnesota	**Traffic and Demand Forecasts** **Financial Plan**
Virginia	**Phase One Conceptual Proposal** •Cost estimate by project phase •Plan/schedule for development, financing, and operation •List and discussion of assumptions (toll rates, facility usage) •Risk factors and mitigation methods •Resources requested (financial, services, property) **Phase Two Proposal** •Total life-cycle cost •Detailed list of assumptions (toll rates, facility usage)
Washington	**Cost Estimate by Project Phase** **Plan for Development and Operation** •Funding schedule and sources •Project revenues, costs, return on investment •List of assumptions

Table 4. Evaluation Process and Criteria Used in Other States

State	Evaluation Procedures and Review Criteria
Arizona	**Initial Review by ADOT Staff** • Evaluation of financial projections. **Outside Financial Consultant** •Review sources and use of funds. •Identify public finding. •Verify mathematical calculations. •Review and comment on assumptions. •Review and comment on debt proposed. •Identify and review any third-party financing. •Determine impact on state, state's credit standing, and fiscal impact on local government. •Comment on reasonableness of public funding assumption. •Identify level of contingency. •Determine risk to various parties. •Verify return on equity/internal rate of return. •Conduct sensitivity analysis on assumptions.
California	**Outside Financial Consultant** •Financing Structure Analysis — Quantify and assess equity contribution. •Analyze Debt Financing — Determine total aggregate debt financing. — Identify type and mix of debt financing. — Review terms of debt structure. — Review assumptions of any special district financing. — Analyze credit support letters and lines of credit. — Analyze bank lending. — Analyze real estate financing. — Analyze other funding. •Cash Flow Analysis — Review cash flow projections. — Confirm debt requirements. — Review reasonableness of interest rate assumptions. — Review reasonableness of cost associated with debt financing. — Review reasonableness of expected rate of return. — Review reasonableness of toll and fee structure. — Review reasonableness of traffic estimates. — Review reasonableness of projected operations and maintenance costs and funding sources. — Review reasonableness of non-toll revenues. •Perform Sensitivity Analysis — Test financial plan under different assumptions. — Identify best-case and worst-case scenarios. — Develop and use sensitivity models on real estate, property values, and related elements.

Table 4. Evaluation Process and Criteria Used in Other States (Continued)

Florida	**Evaluation Headed by FDOT Financial Planning Office** •Outside traffic consultant verifies toll revenue projects. •Office of Toll Facilities evaluates operation/maintenance cost projections. **Executive Review Team** •Technical Review Group •Financial/Administrative Review Group •Consultants
Minnesota	**Outside Traffic Consultant** •Traffic and revenue study showing that project can be funded. **Department Review** •Reasonable basis to fund project development and operations. •Well defined and reasonable assumptions. •Risk factors identified and addressed. •Realistic sources of funding and financing.
Virginia	**Outside Financial Advisors Evaluate Proposal** **VDOT Reviews Traffic Assumptions and Forecasts**
Washington	**Outside Financial Consultant to Evaluate Feasibility of Proposal** •Assumptions •Revenue sources •Effects of inflation •Reasonableness of construction estimates •Contingency level •In-kind funding •Public funding •Risk to public and private parties •Reasonableness of plan

Table 5. Criteria Used in Other States to Examine the Financial Viability of Proposed Toll Roads

State	Criteria for Financial Viability
Arizona	Debt coverage of 1.5 or better in each year of operation.
California	No specific criteria — general adequacy of forecasts, revenues, and costs examined.
Florida	Debt coverage of 1.5 or better.
Minnesota	No specific criteria.
Virginia	Debt coverage of 1.3.
Washington	Reasonableness of projections — no criteria on debt coverage ratio.

Florida. The Florida Administrative Code (5) addresses the requirements of financial plans for Private Transportation Facilities in the state. The financing plan must include the level, type, and source of financing for the various phases of the project. Specific information on public sector funds, equity, bond financing, any other debt financing methods, and contributions from operating revenues is required. A proposed operating budget containing detailed annual costs associated with each proposed activity phase must be provided. The methods and assumptions used to develop the cost estimates are required for verification.

Other requirements include detailing the operating revenue projections, along with the methods and assumptions used in developing the estimates. Projections related to revenues from tolls, other operating sources, and associated developments must be documented, and any public sector subsidies must be identified. A cash flow analysis for a 30-year period is required. Components in the sensitivity analysis include examining variations in interest rates, inflation, capital costs, traffic volumes, operations and maintenance costs, and other revenue streams. The Florida Department of Transportation (FDOT) also has the authority to request additional information or clarification regarding any deficiencies in a proposal.

The Department provided a flowchart summarizing the review process for a private toll road proposal in the state in response to the survey request (4). According to the flowchart, a Private Transportation Facilities Executive Review Team is formed within the Department to assess a proposal. The Team is further subdivided into a Technical Review Group and a Financial/Administrative Review Group. Engineering and financial consultants are retained as needed to assist both groups. A proposal is analyzed by the team and the consultants, and a recommendation is made to the Secretary of Transportation to accept or deny a proposal. Additional information may be requested from the proposing group during the review process.

The practice to date within the Department has varied slightly from this process as the Financial Planning Office has been responsible for reviewing stand-alone toll road projects. The Office has used both traffic consultants and the Department's Office of Toll Facilities to review the demand and revenue forecasts, as well as the operation and maintenance projections. The Department uses a debt coverage ratio of at least 1.5 as the key financial viability criteria in the review process.

Minnesota. The Minnesota Department of Transportation (Mn/DOT) issued a request for public-private toll facilities in 1995 (6). Traffic forecasts, an explanation of the methods and assumptions used to develop these estimates, and a financial plan were required in proposals submitted in response to this solicitation.

Five proposals were received in response to this RFP. The Department planned to use an outside financial consultant to help review the proposals. The financial plans submitted with the proposals were determined to be too general to evaluate in detail, however. In

the future, the Department may use a two-step proposal process, with more detailed financial plans required in the second phase.

Virginia. The development of proposals for private toll facilities in Virginia is governed by the *Public-Private Transportation Act of 1995: Implementation Guidelines* (7). Toll projects may be proposed by the Virginia Department of Transportation (VDOT) or through unsolicited proposals from interested parties. Virginia has a two phased proposal submission process. The first phase is a conceptual proposal which includes the estimated cost of the project by phase; the plan and schedule for developing, financing, and operating the facility; a discussion of all assumptions used in developing the proposal; the identification of proposed risk factors and approaches for dealing with these; and the identification of any anticipated public resources. The second phase requires more specific deliverables including those relating to life-cycle costs and detailed information on traffic forecasts and toll revenue assumptions.

The Department uses an outside financial advisor to evaluate the financial standing of proposals on private toll road projects and to assess the financial feasibility of a project. The Department reviews the traffic assumptions and forecasts, and provides the results of this assessment to the financial advisor. A proposed project must have a debt coverage ratio of 1.3 or better to be considered viable by VDOT.

Washington. The *New Partners Program 1993-1995: Summary* (8) highlights the Washington State Department of Transportation (WSDOT) requirements for innovative public-private projects, as well as the review and selection process. Financial data required in proposals included an estimate of project cost by phase, sources of funding, a development and operation plan, and a description of the assumption and methodologies used in preparing the plan.

Elements examined in the review of the financial plans include the reasonableness of the proposed funding, the assumptions, the risk factors, and the proposed funding sources. An outside consultant was used by WSDOT to review the five proposals submitted in response to the initial RFP. Elements examined by the consultants included the revenue sources, the assumptions, the potential impact of inflation, the reasonableness of construction estimates, the contingency level and in-kind contributions, the public funding level, and the reasonableness and risks to WSDOT and other groups.

Although a variety of financial data was required in proposals, WSDOT did not use a minimum debt coverage ratio as a criteria of financial viability. Rather, the Department considered the reasonableness of the proposed financial plan.

CHAPTER FOUR—INFORMATION EXAMINED BY INVESTMENT FIRMS AND RATING AGENCIES

Researchers interviewed representatives from seven investment firms and one rating agency to obtain additional information on the factors these groups examine when considering proposals for private toll facilities. Firms providing information were Bear, Stearns & Company; J.P. Morgan & Company; Morgan Stanley & Company; Paine Webber; Salomon Brothers; Smith Barney Shearson; and Standard & Poor's. Table 6 outlines the major elements suggested by these individuals for inclusion in toll road feasibility studies.

The individuals interviewed stressed two key elements for financial feasibility studies. The first is the inclusion of revenue projections for the full term of the bonds issued to finance the toll facility. The second is sufficient documentation of the traffic forecasts, toll revenue projections, and any other estimates to permit adequate review. Representation from these groups also noted the difficulty of establishing a formal list of elements to be required in every financial feasibility study given limited experience with recent toll facilities.

Table 6. Factors Considered by Investment Firms and Rating Agencies

Investment Firms	**Documentation of Traffic/Revenue Studies** • Assumptions • Calculations • Sources of numbers/information **Projected Revenues, Costs, Cash Flows**
Rating Agencies	***For Feasibility Studies:*** **Market and Demand Analysis** • Demographics • Traffic patterns and traffic mix • Competing facilities • Historical/projected toll rates **Financial Analysis** • Revenues and operating costs • Projected impact of travel-related factors ***For Start-up Toll Roads:*** **Demand Analysis** • Service area, local economy • Nature of facility and competitive facilities **Operational/Financial Analysis**

Although different approaches were described by these individuals for reviewing private toll road feasibility studies, a number of common factors were noted. These are highlighted in Table 7. First, representatives indicated they review the traffic estimates and revenue forecasts, and assumptions included in a proposal. The level of this analysis and the exact approach used may vary, however. It appears that most firms attempt to ensure that the assumptions used in the proposal are valid and that the projections are within reasonable boundaries. A number of individuals noted the difficulty associated with this review and stressed that the credibility of the traffic forecasting consulting firm is critical.

Representatives from some firms provided more detail on the techniques used to review the traffic and revenue forecasts and to test the reasonableness of the projections. These include examining historical and current travel levels in the corridor, reviewing the reasonableness of the diversion rates, and examining the proposed toll per mile. Most of the companies also conduct either a sensitivity analysis or a stress test on the forecasts. Although different approaches and terms are used to describe these analyses, all evaluate the impact of different factors on the forecasted revenue generation. Some firms use a best-case and worst-case analysis, while others examine the impacts of lower than projected traffic volumes. In some cases, the assumptions related to economic development and growth are also tested.

Table 7. Elements Examined by Investment Firms and Rating Agencies Reviewing Private Toll Road Feasibility Studies

General Factors	Criteria
Review Traffic and Revenue Assumptions and Forecasts	Historical travel in corridor. Review reasonableness of forecast. Review reasonableness of diversion rates. Review reasonableness of tolls per mile.
Stress Test Analysis	Best-case/worse-case analysis. Minimum debt coverage ratio if projections are not met. Impact of ½ to ⅓ of projections. Reduction of 10% and 20%. Reduction in economic growth. Identify traffic volumes needed to break even.
Sensitivity Analysis	Best-case/worse-case analysis. Decrease estimated by one-third.

Table 8 highlights the financial viability criteria identified by these individuals for toll road projects. A debt coverage ratio was the most commonly reported criteria, although the exact level varied by firm. Two agencies use a debt coverage ratio of 1.5, while one each reported using a ratio of 1.3, 1.25, and 1.0. The firm reporting the 1.0 ratio indicated this was a minimum level and a 1.3 ratio was desired. One individual reported that the minimum debt coverage was dependent on the desired credit rating.

In addition to using a minimum debt coverage ratio, some firms noted the use of other financial viability criteria. For example, the experience and record of the project sponsor was identified as an important consideration by one agency. Other factors noted included cash flow availability to cover debt service requirements, the share of equity related to total capitalization, and projection of at least 20 percent to 25 percent of the total trips in the corridor.

Table 8. Financial Viability Criteria Used by Investment Firms and Rating Agencies

Group	Criteria for Financial Viability*
Investment Firms	• Debt coverage ratio of 1.5 or better (2). • Debt coverage ratio of 1.3 or better (1). • Debt coverage ratio of 1.25 or better (1). • Debt coverage ratio of 1.0 or better (1). • Investment grade rating from a rating agency (2). • Minimum debt coverage ratio dependant on desired credit rating (1). • 20-25% of total trips for corridor projected for toll road.
Rating Agencies	• Experience of sponsor. • Record of sponsor. • Share of equity in total capitalization. • Cash flow available to cover debt service requirements.

***Number in parenthesis represents the number of firms reporting use of the criteria.**

CHAPTER FIVE–SUGGESTED GUIDELINES FOR PREPARING AND REVIEWING PRIVATE TOLL ROAD FEASIBILITY STUDIES IN TEXAS

This chapter presents the suggested guidelines for the preparation and review of feasibility studies for private toll roads in Texas, as well as the guidelines for assessing the financial viability of projects. The requirements contained in the legislation, and the information obtained from other states, investment firms, rating agencies, and available literature were all used in the development of the proposed guidelines.

Guidelines for Preparing Private Toll Road Feasibility Studies

The elements suggested for inclusion in toll road feasible studies are highlighted in Table 9 and summarized next. The proposed elements are provided for consideration by TxDOT for use in guiding the development of toll road feasibility studies in the state.

Project Description and Proposed Alignment. A description and alignment of the proposed toll road should be provided as part of a feasibility study. The description should include the proposed alignment in enough detail to allow for a review of the proposed path and the identification of any potential problems or issues. Elements to be identified in the alignment include proposed connections to the state, city, or county roadway system, as well as any connections to other toll roads. Links to major traffic generators, such as ports, airports, rail yards, or other facilities should also be highlighted. The project description and alignment should identify any potentially sensitive environmental areas.

Integration with State, Metropolitan, and Local Transportation Plans. Legislation requires that the process established by TxDOT to review and approve constructing a private toll road project include consideration of existing transportation facilities and plans. As a result, the suggested guidelines require the proposing party to identify how the project will be integrated into appropriate state highways plans, metropolitans and regional plans, and county and local plans. In addition, coordination with the transportation plans of other special generators, such as ports and airports, should be addressed.

Potential Environmental Impacts of Proposed Project. The potential environmental impacts of a proposed toll road project should be identified and examined in the feasibility study. The possible impact on air quality, water quality, wetlands, biodiversity and endangered species, noise levels, and environmental justice should be identified and potential mitigation strategies analyzed.

Traffic Forecast. Detail information on the traffic projections for the proposed toll projects should represent a major component of the feasibility study. The overprotection of traffic volumes on recent toll projects, and the subsequent lower levels of revenue

generation, indicates the importance of this element. The feasibility study should document the assumptions, methodology, and data sources used in the development of the traffic demand projections. Information on the economic projections, growth factors, development and land use forecasts, and population and employment trends used in developing the forecasts should be included. In addition, the diversion ratios used in the forecasting process should be identified.

Financial Plan. The financial plan on a proposed project represents another key component of the suggested guidelines. It is recommended that the financial plan cover a number of elements. The first is a detailed budget for all phases of the project, including design, construction, operations, and maintenance. The second component is the financing structure. The use of bonding, bank loans, real estate financing, equity contributions, lines of credit, public funding, and other financing techniques should be identified and the level anticipated from each source should be documented. The third element of the financial plan focuses on the operating revenue projections. The proposed toll or fee structure, the estimated toll revenues, and other anticipated operating revenues should be provided. Finally, it is suggested that the plan include a cash flow analysis for the proposed project.

Economic Impact Assessment. State legislation requires that the potential impact on the economy of an area be included in a feasibility study for a proposed toll road project. Elements that could be requested in this section of a feasibility study are new development opportunities and estimates of new jobs generated from these developments.

Impact on U.S./Mexico Trade Flow. State legislation also requires that a proposed project located along the Texas/Mexico border examine the impact on the free flow of trade between the U.S. and Mexico. This element is incorporated into the suggested guidelines. Factors that might be included in this assessment are connections with border crossings, links to ports, rail, and other modes, and travel time savings.

Sensitivity Analysis. The final element suggested for the feasibility study guidelines is a sensitivity analysis. Elements that could be required in this section include testing the proposed financial plan under different assumptions, identifying best-case and worst-case scenarios, and examining the impact of alternative economic growth projections.

Table 9. Outline of Suggested Guidelines for Toll Road Feasibility Studies

Project Description and Proposed Alignment •General route •Connections to state highway and road system •Connection to other public roads •Connections to other toll roads •Identification of any environmentally sensitive areas
Integration with Existing Transportation Plans •State plan •Metropolitan and regional plans •County and local plans •Special generator plans (airports, ports, etc.)
Environmental Impacts •Air quality •Water quality •Wetlands •Biodiversity and endangered species •Noise levels •Environment justice
Traffic Forecasts •Assumptions •Methodology •Data sources •Diversion routes •Sensitivity analysis

Table 9. Outline of Suggested Guidelines for Toll Road Feasibility Studies (Continued)

Financial Plan
- Proposed Budget
  - Design
  - Construction
  - Operation
  - Maintenance
- Financing Structure
  - Bonds/debt financing
  - Bank loans
  - Real estate financing
  - Toll revenues
  - Equity contributions
  - Lines of credit
  - Public funding
  - Other sources
- Operating Revenue Projects
  - Toll levels
  - Toll revenues
  - Other operating revenues
- Cash Flow Analysis

Economic Impact Assessment
- New development opportunities (commercial, industrial, residential)
- Estimates of new job generation

Impact on U.S./Mexico Trade Flow
- Connections with border crossings
- Travel time savings
- Links to ports, rail, and other modes

Sensitivity Analysis
- Testing the financial plan under different assumptions
- Best-case and worst-case scenarios
- Impact of economic growth projections

Guidelines for Reviewing Private Toll Road Feasibility Studies

Two general approaches are suggested for use in reviewing toll road feasibility studies in Texas. First, it is suggested that an internal TxDOT team be formed to review proposals. Second, it is recommended that an outside third-party consultant be retained to examine the financial elements of a proposal. This two-pronged approach builds on TxDOT's historical strengths, while at the same time providing additional expertise in toll financing and revenue forecasting. The suggested areas of review for each group are highlighted in Table 10, and Table 11 outlines the factors in more detail. A description of the individual elements is also provided. The proposed elements are provided for consideration by TxDOT for use in guiding the review of toll road feasibility studies in the state.

Table 10. Areas of Review — TxDOT Team and Third-Party Financial Consultant

Group	Topic
Internal TxDOT Team	**Primary Review Responsibility** • Project Descriptions • Proposal Alignment • Integration with State, Metropolitan, and Local Plans • Potential Environmental Impacts • Traffic Forecasts • Impact on U.S./Mexico Trade Flow **Secondary Review Responsibility** • Financial Plan • Economic Impact Assessment • Sensitivity Analysis
Third-Party Financial Consultant	**Primary Review Responsibility** • Financial Plan • Economic Impact Assessment • Sensitivity Analysis **Secondary Review Responsibility** • Traffic Forecasts

Table 11. Outline of Suggested Guidelines for Reviewing Toll Road Feasibility Studies

TxDOT Team

Project Description and Proposed Alignment

- General route
- Connections to state highway and road system
- Connection to other public roads
- Connections to other toll roads
- Identification of any environmentally sensitive areas

Integration with Existing Transportation Plans

- State plan
- Metropolitan and regional plans
- County and local plans
- Special generator plans (airports, ports, etc.)

Environmental Impacts

- Air quality
- Water quality
- Wetlands
- Biodiversity and endangered species
- Noise levels
- Environment justice

Traffic Forecasts

- Assumptions
- Methodology
- Data sources
- Diversion routes
- Sensitivity analysis

Economic Impact Assessment

- New development opportunities (commercial, industrial, residential)
- Estimates of new job generation

Impact on U.S./Mexico Trade Flow

- Connections with border crossings
- Travel time savings
- Links to ports, rail, and other modes

Sensitivity Analysis

- Testing the financial plan under different assumptions
- Best-case and worst-case scenarios
- Impact of economic growth projections

Table 11. Outline of Suggested Guidelines for Reviewing Toll Road Feasibility Studies (Continued)

Third-Party Financial Consultant

Financial Plan

- Proposed Budget
  - Design
  - Construction
  - Operation
  - Maintenance
- Financing Structure
  - Bonds/debt financing
  - Bank loans
  - Real estate financing
  - Toll revenues
  - Equity contributions
  - Lines of credit
  - Public funding
  - Other sources
- Operating Revenue Projects
  - Toll levels
  - Toll revenues
  - Other operating revenues
- Cash Flow Analysis
- Overall Reasonableness of Proposed Funding
- Impact on State and Local Credit Standing
- Risk Associated with Project for State and Local Governments

Economic Impact Assessment

- New development opportunities (commercial, industrial, residential)
- Estimates of new job generation

Sensitivity Analysis

- Testing the financial plan under different assumptions (such as 10%, 25% lower traffic)
- Best-case and worst-case scenarios
- Impact of changes in the economic growth projections

TxDOT Team

It is suggested that the internal TxDOT team be comprised of representatives from all appropriate Divisions and Districts. This team would be primarily responsible for reviewing the project description and proposed alignment; the integration with state, metropolitan, and local plans; the potential environmental impacts; the traffic forecasts; the economic impact assessment; and the impact on U.S./Mexico trade flow. These are all areas where the Department has extensive expertise. It is also suggested that the internal team examine the financing plan and conduct sensitivity analyses as deemed appropriate.

Project Description and Proposed Alignment. A description and alignment of the proposed toll road should be provided as part of a feasibility study. The description should include the proposed alignment in enough detail to allow for a review of the proposed path and the identification of any potential problems or issues. Elements to be identified in the alignment include proposed connections to the state, city, or county roadway system, as well as any connections to other toll roads. Links to major traffic generators, such as ports, airports, rail yards, or other facilities should also be highlighted. The project description and alignment should identify any potentially sensitive environmental areas.

Integration with State, Metropolitan, and Local Transportation Plans. Legislation requires that the process established by TxDOT to review and approve constructing a private toll road project include consideration of existing transportation facilities and plans. As a result, the suggested guidelines require the proposing party to identify how the project will be integrated into appropriate state highway plans, metropolitans and regional plans, and county and local plans. In addition, coordination with the transportation plans of other special generators, such as ports and airports, should be addressed.

Potential Environmental Impacts of Proposed Project. The potential environmental impacts of a proposed toll road project should be identified and examined in the feasibility study. The possible impact on air quality, water quality, wetlands, biodiversity and endangered species, noise levels, and environmental justice should be identified and potential mitigation strategies analyzed.

Traffic Forecast. Detailed information on the traffic projections for the proposed toll projects should represent a major component of the feasibility study. The overprotection of traffic volumes on recent toll projects, and the subsequent lower levels of revenue generation, indicates the importance of this element. The feasibility study should document the assumptions, methodology, and data sources used in the development of the traffic demand projections. Information on the economic projections, growth factors, development and land use forecasts, and population and employment trends used in developing the forecasts should be included. In addition, the diversion ratios used in the forecasting process should be identified.

Financial Plan. The financial plan on a proposed project represents another key component of the suggested guidelines. It is recommended that the financial plan cover a number of elements. The first is a detailed budget for all phases of the project, including design, construction, operations, and maintenance. The second component is the financing structure. The use of bonding, bank loans, real estate financing, equity contributions, lines of credit, public funding, and other financing techniques should be identified and the level anticipated from each source should be documented. The third element of the financial plan focuses on the operating revenue projections. The proposed toll or fee structure, the estimated toll revenues, and other anticipated operating revenues should be provided. Finally, it is suggested that the plan include a cash flow analysis for the proposed project.

Economic Impact Assessment. State legislation requires that the potential impact on the economy of an area be included in a feasibility study for a proposed toll road project. Elements that could be requested in this section of a feasibility study are new development opportunities and estimates of new jobs generated from these developments.

Impact on U.S./Mexico Trade Flow. State legislation also requires that a proposed project located along the Texas/Mexico border examine the impact on the free flow of trade between the U.S. and Mexico. This element is incorporated into the suggested guidelines. Factors that might be included in this assessment are connections with border crossings, links to ports, rail, and other modes, and travel time savings.

Sensitivity Analysis. The final element suggested for the feasibility study guidelines is a sensitivity analysis. Elements that could be required in this section include testing the proposed financial plan under different assumptions, identifying best-case and worst-case scenarios, and examining the impact of alternative economic growth projections.

Third-Party Financial Consultant

Building on the approach used in some states, it is also suggested that the Department utilize a third-party consultant to conduct a more detailed analysis of the financial proposal. The consultant may also perform stress tests or sensitivity analyses on specific elements of the plan.

Financial Plan. Along with the traffic forecast, the financial plan on a proposed project represents a key component of a proposal. The review of the proposed plans should examine a detailed budget for all phases of the project, including design, construction, operations, and maintenance. The financing structure should also be reviewed. The use of bonding, bank loans, real estate financing, equity contributions, lines of credit, public funding, and other financing techniques should be reviewed. The proposed toll or fee structure, the estimated toll revenues, other anticipated operating revenues, and the cash flow projections should all be examined.

Economic Impact Assessment. The financial consultant may assist the TxDOT team in the assessment of the economic impact of a proposed toll road project.

Sensitivity Analyses. The consultant may be requested to perform sensitivity analyses on financial elements. These may include testing different assumptions, analyzing best-case and worst-case scenarios, and examining alternative growth forecasts.

Guidelines for Reviewing Private Toll Road Revenue Forecasts in Texas

This section presents the suggested guidelines for reviewing private toll road revenue forecasts in Texas. As noted previously, detailed traffic forecasts and financial information represent two of the key elements to be included in the feasibility studies. The major focus of the review process is also on these elements. Based on the national experience with recent toll road projects, it is suggested that the review process focus on the traffic forecasts, the level and rate of traffic growth, travel time savings, toll charges, revenue growth forecasts, economic growth assumptions, and the debt coverage ratio. Each of these elements is described next.

Traffic Forecasts. The estimated traffic on a toll road has a direct impact on the revenue projections. Given the recent national experience on some toll road projects with the over-projection of traffic and the subsequent under-generation of revenues, reviewing the traffic forecasts is critical step. As noted previously, there is no procedure that can assure accurate traffic projections or that can be used to assess the accuracy of these forecasts. A number of factors can be examined, however, to better determine the reasonableness of the traffic estimates included in a proposal. First, the forecasts can be compared to estimates and actual experience with similar projects throughout the country. Second, the diversion rates used in the forecasting process should be reviewed. Overly optimistic diversion rates may raise questions concerning the viability of the forecasts. Third, assumptions related to economic growth in the corridor should be examined. Very optimistic or high-growth rates should be questioned.

Forecasted Traffic Growth. The literature review indicated that toll road projects that met or were close to meeting the forecasted traffic and revenue levels had moderate levels of projected growth. The assumptions related to projected traffic growth should be reviewed. A comparison of the projected growth rates with those actually experienced on similar facilities should be part of this analysis. Overly optimistic assumptions should be examined in more detail.

Travel Time Savings. The literature review indicated that many of the recent toll facilities with overestimated traffic forecasts provided travel time savings of less than five minutes over competing routes. Although the travel time savings are related to the length of a facility, as well as the level of traffic congestion on alternate routes, the estimates contained in a proposal should be reviewed for reasonableness. Projected travel time savings of less than five minutes should be examined in more detail.

Toll Charges. The anticipated toll charges will influence both use of a facility and revenues. The literature review indicated that toll charges in excess of 10 cents per mile were one of the factors associated with the overestimation of revenues on some recent projects, while those averaging eight cents per mile appeared more realistic. The toll

charges included in a proposal should be reviewed using the eight cents per mile guideline associated with more successful recent projects. Comparisons of the proposed toll charges can also be made with existing projects.

Revenue Growth Forecasts. Similar to the traffic growth projections, the revenue growth forecasts should also be reviewed. Revenue growth forecasts of under 5 percent per annum were identified in the literature review as a reasonable level. This measure can be used as a general guideline in Texas or comparisons can be made with other operating toll facilities.

Economic Growth Assumptions. The assumptions related to economic development and growth in the corridor should be reviewed. Overly optimistic economic growth projections were identified as a potential contributing factor with some of the recent toll projects that did not meet the traffic and revenue forecasts. It is suggested that conservative economic projections with moderate levels of growth should be used in proposals. Those with higher projections should be examined carefully.

Debt Coverage Ratio. Based on the criteria used by other states, investment firms, and rating agencies, it is suggested that a debt coverage ratio of between 1.25 and 1.5 be used in Texas. It appears that the 1.5 ratio is favored by more states and investment firms than lower levels.

CHAPTER SIX–SUMMARY

This report provides an overall summary of the research project examining the process of preparing and reviewing toll road feasibility studies. Available literature was summarized and suggested guidelines for preparing and reviewing private toll road feasibility studies in Texas were presented. The guidelines were developed based on a review of available literature, a survey of the procedures used in other states, and factors considered by investment firms and rating agencies.

The suggested guidelines for preparing toll road feasibility studies focus on eight elements. These are project description and proposed alignment; integration with existing transportation plans; environmental impacts; traffic forecasts; financial plan; operation revenue projections; economic impacts assessments; impact on U.S./Mexico flow of trade; and a sensitivity analysis. These elements address the state legislative requirements and directions relating to private toll road feasibility studies.

The suggested approach to review toll road feasibility studies submitted to TxDOT uses an internal Department team and a third-party financial consultant. The TxDOT team would be primarily responsible for reviewing the project description and proposed alignment, the integration with existing transportation plans, the potential environmental impacts, the traffic forecasts, and the impacts on U.S./Mexico trade flow. The third-party consultants would take the lead in examining the proposed financial plan. Both groups may conduct sensitivity analyses on specific elements and request additional information from the project sponsors.

Finally, the suggested criteria for examining the financial viability of a proposed toll road project focus on seven major elements. These are traffic forecasts, the level and rate of traffic growth, travel time savings over competing routes, toll charges, revenue growth forecasts, economic growth assumptions, and debt coverage ratio. These elements can be examined to help assess the revenue forecasts and the financial viability of a proposed toll road project.

The information presented in this report and the suggested guidelines can be used by TxDOT in developing procedures and requirements for reviewing toll road feasibility studies in the state. The suggested guidelines will help ensure that proposals for toll road projects are given a thorough and comprehensive review. Ultimately, the proposed guidelines should assist in ensuring that future toll facilities are financially viable, represent sound transportation improvements, and contribute to the economic viability of the state.

Continuing to examine the experience with existing and new toll road projects could be considered for future research studies. Building a comprehensive database on state and national experience with toll facilities would be of benefit to numerous groups. Examining the forecasted and actual traffic and revenue levels should be a major focus of this ongoing effort.

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