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16. Abstract

The Trans-Texas Corridor is a proposed new tolled multimodal transportation system 4,000 miles long across Texas. The 1,200-feet-wide right-of-way (ROW) required is significantly more than that for previous transportation projects. Recent legislation (HB 3588) permits the Texas Department of Transportation (TxDOT) to offer landowners in the corridor ROW a "corridor participation payment" — a portion of the revenue to be derived from the corridor, for "an interest in real property or a real property right." Such payments (termed "royalty payments" when this research project commenced) are a completely new approach to procurement of ROW for transportation corridors in the United States.

This report presents the results of research conducted by the Center for Transportation (CTR) for TxDOT on the feasibility of paying for ROW for the Trans-Texas Corridor with toll revenues. It includes results presented in previous products of this research project, namely: P1 — an assessment of Trans-Texas Corridor ROW acquisition issues, P2 — an analysis of the financial feasibility of paying for ROW with toll revenues, P3 — a study of landowner response to the ROW royalty concept and alternatives, P4 — a financial analysis of alternative deferred payment options, and P5 — royalty payments plans and financial outcomes.

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TRANS-TEXAS CORRIDOR RIGHT-OF-WAY ROYALTY PAYMENT FEASIBILITY

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Chapter 1: Introduction

1.1 The Trans-Texas Corridor: A New Approach to Transportation

In January 2002, Texas Governor Rick Perry announced his vision for a new statewide system of multimodal transportation corridors called the Trans-Texas Corridor. Citing growing traffic congestion on existing corridors, hazardous cargo movements through populated areas, air pollution in urban centers, and expanding trade with Mexico, the governor called for a new approach to transportation: completely new corridors containing road, high-speed rail and utility lines side-by-side. When built out the system could extend over 4,000 miles and cost between $145 billion and $184 billion in 2002 dollars.

To finance this undertaking the governor suggested four mechanisms:

- Exclusive Development Agreements
- Toll Equity
- Regional Mobility Authorities
- Texas Mobility Fund

Governor Perry called on the Texas Department of Transportation (TxDOT) to come up with an implementation plan by summer 2002. The charge to TxDOT was fivefold:

1. Identify technical issues and solutions.
2. Recommend ways to minimize the impact on the environment.
3. Identify segments of the corridor to be built in order of priority.
4. Evaluate how best to use the above financing tools.
5. Specify what other legislative tools are necessary to execute the plan.

TxDOT established teams to evaluate different aspects of the governor's proposal, and its action plan was approved at the June 2002 meeting of the Texas Transportation Commission. Titled *Crossroads of the Americas: Trans-Texas Corridor Plan,* it addressed issues in planning, design, environment, right-of-way (ROW), toll, rail, utilities, and finance (TxDOT 2002). Four priority segments were identified (Figure 1.1):

a. South-north from the Rio Grande Valley to Denison parallel to I-35
b. Southwest-northeast from Laredo to Texarkana via Houston

c. Southeast-north from Houston to Dallas-Ft. Worth
d. West-east from El Paso to Orange

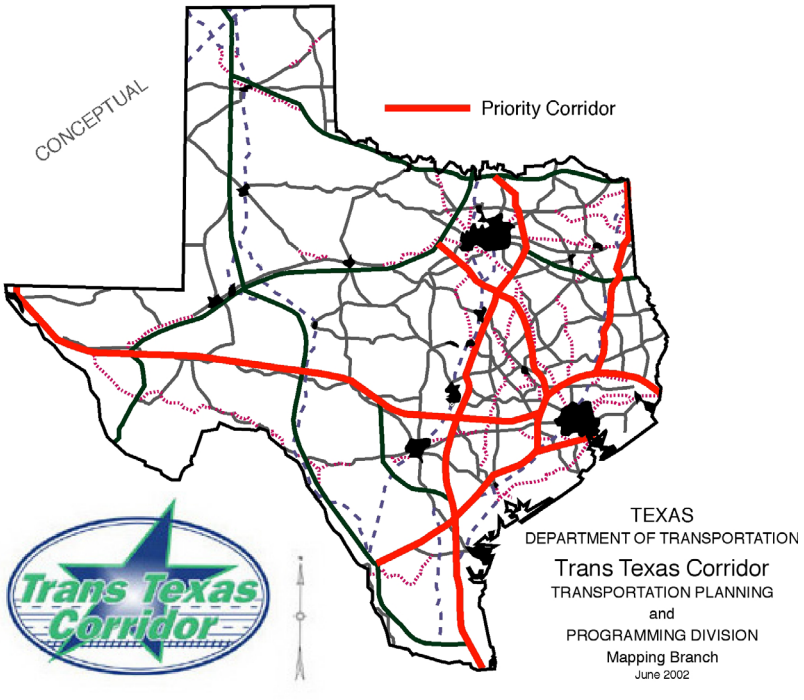

Figure 1.1: Trans-Texas Corridor — Conceptual Alignments (www.dot.state.tx.us)

The TxDOT action plan proposes a 1,200-foot right-of-way for the Trans-Texas Corridor (Figure 1.2). In each direction there will be three highway lanes, two truck lanes, and three rail lines (one high-speed commuter line, one high-speed freight line, and one low-speed commuter/freight line). Alongside, there will be a dedicated utility zone 200 feet wide. Estimated ROW cost for the proposed 4,000 miles of the Trans-Texas Corridor is in the range from $12 billion to $38 billion, or $3 million to $9.5 million per mile (2002 dollars). The plan sets forth a timetable through December 2003 for marketing the plan, conducting public outreach, and working with the U.S. Congress and the Texas Legislature to put necessary legislation in place.

1.2 Policy Innovations and Research Needs

The Trans-Texas Corridor proposal builds on the results of TxDOT research project 0-1326, *Preliminary Economic Evaluation of the Super Corridor Concept,* which was conducted by Robert Harrison of the Center for Transportation Research (CTR). The idea

is a radical departure from traditional transportation system provision, and it will entail innovative approaches to financing, planning, construction, and operation. The following are just a few of the policy innovations proposed in the TxDOT action plan:

Figure 1.2: Trans-Texas Corridor Layout (www.dot.state.tx.us)

- Allow Regional Mobility Authorities (RMA) to purchase portions of the public highway system and set them up as toll highways.
- Allow tolling on federally funded projects.
- Allow private entities to issue tax-exempt bonds to finance highway projects.
- Allow TxDOT to acquire ROW for rail and utility corridors.
- Allow acquisition of surplus ROW and lease back to private entities for profit.
- Charge utility companies for use of ROW.
- In lieu of cash payment to landowners for ROW, consider offering a percentage of future toll receipts as an incentive for speedy acquisition and as a way to reduce upfront ROW costs.

This last innovative idea is the subject of this research project. TxDOT requested that research be conducted to determine the economic, financial, legal, and administrative feasibility of royalty payments to landowners instead of traditional cash-in-exchange-for-deed. The primary issues of concern to TxDOT are:

- Economic and financial feasibility of the concept, including impact on project funding, restrictions from bonding companies, landowner response and incentives, costs of administration, and impact on availability of revenue for future projects
- Appropriate methods of calculating landowner share of revenue from tolls and other sources, including use of gross revenues versus net revenues, pooling of

parcels according to revenue streams, period of payment, interest rate, and sharing of risk
- Development and evaluation of alternative methods of accomplishing the same purpose
- Legal issues, including commitments by the state, property rights, and constitutional impediments

1.3 Project Action Elements

The Center for Transportation Research (CTR) identified three major thrusts for this research project. Table 1.1 illustrates the primary topics, related research issues, and targeted outcomes.

Table 1.1: Major Thrusts of this Research

Topic	Research Needed	Targeted Outcomes
Economics of ROW Royalty Payments from Toll Revenue	- Prediction and distribution of toll revenue stream - Developer and financier requirements - Landowner equity in investment	- Evaluation of ROW acquisition with toll revenue - Matrix of alternatives ranked in order of feasibility
Landowner Concerns	- Risk sharing - Incentives and tax consequences - Access	- Summary of likely response to the concept
Considerations of Toll Revenue Distribution	- Issues to be considered by TxDOT in developing and administering the program	- Technical paper summarizing issues - Payment plans and impacts

The key issue as identified by CTR is the feasibility of using anticipated revenue from toll roads to compensate landowners for their property. The research questions, therefore, are how reliable is toll revenue, what are the restrictions typically imposed on use of that revenue, and what would be an individual landowner's equity in a transportation corridor.

The targeted outcomes of the research effort are a financial evaluation of the royalty concept and the development of ranked alternatives. The desired output is a range of compensation techniques that will offer the landowner options as to timing, risks, and fiscal efficiency. To the extent possible, these techniques should have a degree of equivalency, so that no payment plan is more profitable than another.

The second issue is landowner response to the concept. Landowners in Texas are heterogeneous and broadly comprised of (a) working farmers, (b) companies associated

with agricultural production and consumption, (c) wealthy landowners, (d) large corporations, and (e) developers. Some have owned the land for generations, while for others it is a company asset to be traded (when appropriate) to raise revenues. This heterogeneity requires that one consistent model be followed: How can corridor ROW acquisition best fit the needs of both the State and the landowner?

Whether or not royalty payments are financially feasible, will landowners choose to participate? What incentives would induce a participant to risk future payments over upfront cash? (Why do lottery winners prefer the cash option, while pensioners prefer an annuity?) The targeted outcome is an evaluation of likely response by landowners. The probable level of incentives can then be fed back into the financial evaluation using alternative scenarios.

The third issue for research is the implementation of the program. The TxDOT Right of Way Division has already researched the legal questions and identified potential challenges and needs for enabling legislation. However, administration of a system of royalty payments could add a new layer of costs, in turn impacting the economics. Simple yet generalizable compensation plans are required.

1.4 Research Tasks

To accomplish the objectives identified for this research project, the following tasks were conducted.

1.4.1 Task 1: ROW Royalty Payments — Evaluation of the Issues

This task developed the political, legal, financial, and institutional issues presented in Chapter 2 of this report. To a large extent it built on the work done by TxDOT's Right of Way Division in evaluating the legal and administrative questions.

Just after the beginning of the project (October 17, 2002), the research team met with the TxDOT Project Management Committee (PMC) and presented its initial findings. The TxDOT panel also identified the issues it considered central to the project. Thereafter, the researchers maintained contact and held meetings with the PMC to update them on

progress and to solicit feedback. Most of the effort of this task took place in the first three months of the project (October through December 2002), but the task continued as a background activity for the entire project.

The research team produced Report 4808-P1, *Technical Paper Summarizing Key Issues,* a working document for the PMC to allow TxDOT to answer early questions when the Texas Legislature convened in January 2003 and started debating enabling legislation for the governor's proposal. Some of the issues evaluated were:

- Private equity in transportation investments
- Risk sharing in public-private partnerships
- Pitfalls in toll revenue prediction
- The range of alternatives for landowner participation

Product: P1 — Technical paper summarizing key issues (submitted December 2002)

1.4.2 Task 2: Prediction and Distribution of Corridor Revenue

This task consisted of three related subtasks:

- Review cash flows from established toll corridors in Texas and other states.
- Develop comparable revenue and expense estimates and sensitivity analyses for a selected segment of the Trans-Texas Corridor.
- Determine expected cash flow patterns and the fraction of revenue available for ROW compensation.

The first subtask involved reviewing several projects for potential case studies. Financial data from selected toll roads were analyzed. The research team supplemented available information with data from financial reports from investment banks and credit rating agencies.

The second subtask was to select one of the priority segments of the Trans-Texas Corridor, and to develop revenue and expense forecasts. Projections for SH 130 (proposed toll road from Georgetown to San Marcos parallel to and east of I-35) were used to calculate measures of financial feasibility with a view to determining the

feasibility of paying for ROW with toll revenues. Sensitivity analysis to the assumptions was also conducted.

The third subtask was to review standard financing practices with regard to investor claims on net revenue and from this to derive what fraction can be offered to landowners. Different scenarios were analyzed, each incorporating the risk premium that landowners would require to accept an offer of a long-term arrangement instead of simply selling their land. The final step was to compare the present discounted value of the landowner revenues to the estimated market value of the ROW.

Product: P2—Financial feasibility of royalty payments (submitted June 2003)

1.4.3 Task 3: Simulation of Landowner Concerns

Landowners will play a critical role in the successful implementation of the Trans-Texas Corridor network. Should landowners hear that 1,200 feet of ROW is needed, their reaction would be one of incredulity unless the needs are clearly stated and understood. Accordingly, it was important that the study team captured the essential concerns of landowners regarding different approaches to, and phasing of, land acquisition. This task did not involve a direct survey of landowners because TxDOT did not consider it appropriate at this stage of planning for the corridor.

A two-step approach to the task of addressing landowner concerns was employed:

1. The various stages of the corridor and related ROW needs were evaluated. The final buildout of the corridor may not occur for more than 60 years, whereas most individuals have a 20- or 30-year outlook horizon. To any investor, the transportation modes in the corridor at any given stage will have to provide the revenues for all expenses incurred to date. As an example, if a truck-only highway is initially built on a 400-foot ROW, the revenues would have to compensate for a 1,200-foot tract.

2. The various financial tools developed in Task 4 (next) were tested by focus groups, where role playing was used to capture landowner attitude. Four focus groups, reflecting different landowner composition, were used to examine and address landowner concerns. The agendas and member composition of these meetings were determined from the different phases and feedback of the research.

Product: P3 — Summary of simulated landowner response to the concept and possible alternatives (submitted September 2003)

1.4.4 Task 4: Evaluation of ROW Acquisition Alternatives

The purpose of this task was to evaluate the feasibility of different ROW acquisition alternatives identified in Tasks 1–3. Special consideration was given to the level and magnitude of incentives or guarantees required, financing costs (including a comparison of the royalty payments to the interest rate at which TxDOT can borrow), cash flow implications, etc. All alternatives had to be attractive to property owners while not impairing the feasibility of the specific project.

Alternatives evaluated included:

- *Royalty Payments* — These were interpreted initially as rental of the property from the landowners.
- *Reverse Mortgage* — The state would compensate the landowner for the cost of the land over an agreed time period at a conventional interest rate (a bond).
- *Replacement Property* — State property is exchanged for the required right of way property. This has occurred primarily in connection with public utilities where substitute property is provided to replace property required for a project.
- *Alternative Financing* — State would borrow on capital markets.
- *Other alternatives as identified through comprehensive research of the options available to TxDOT.*

Product: P4 — Financial analysis and ranking of ROW acquisition alternatives in terms of feasibility (submitted October 2003)

1.4.5 Task 5 : Recommended Policy and Process for ROW Compensation

This task utilized the results of Task 4 and feedback from the PMC to produce a set of payment plans and recommendations for TxDOT. As will be presented later, the research team found that a "buy-a-narrower-strip-and-lease-the-rest" option was found to be the most feasible option, but the TxDOT panel requested a range of royalty payment plans.

Product: P5 — Royalty payment plans for Trans-Texas Corridor ROW, and estimated financial outcomes (submitted November 2003)

1.5 Summary

This chapter presented an overview of the research approach used by the Center for Transportation Research to address TxDOT needs with respect to evaluating the feasibility of royalty payments for ROW for the Trans-Texas Corridor. Chapter 2 provides an overview of the issues considered in the feasibility evaluation. Chapter 3 describes the basis for the financial evaluation, while Chapters 4 and 5 present the case studies and feasibility of paying for ROW with toll revenues. Chapter 6 summarizes landowner response to the concept and the development of alternatives, and Chapter 7 provides a financial analysis of the alternatives. Chapter 8 outlines the payment plans requested by the TxDOT panel, and Chapter 9 summarizes the conclusions and recommendations. Appendix A shows the details of the payment plans discussed in Chapter 8.

Chapter 2: Overview of ROW Royalty Payment Issues

2.1 Introduction

The first stage of development of the Trans-Texas Corridor will provide shared passenger vehicle/truck lanes, a rail line along currently congested rail corridors, and a utility zone. As demand grows, the road will become truck-only, and separate passenger roads and high-speed rail will be added (TxDOT 2002). Regardless of when each phase is built and associated revenues, the intent of TxDOT is that the full 1,200 feet of right-of-way (ROW) for a segment will be procured upfront.

2.2 ROW Procurement

In the past, the only method state departments of transportation (DOTs) were authorized to use for ROW acquisition was cash in exchange for a deed. Acquisition of private property for public use falls under the government's right of "eminent domain." Land acquisition for government projects is subject to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, which regulates agencies that finance projects with federal funds. Congress amended and updated the act in 1987.

2.2.1 ROW Acquisition Process

The normal method of ROW acquisition for highways starts with the preliminary alignment of the corridor (Figure 2.1). A base map is prepared from aerial surveys, ground surveys, and planimetric mapping of the terrain. Preliminary outlines of the corridor are marked, and an assessment of ROW needs is done. A courthouse title search is done to identify property owners in the vicinity of the proposed alignment alternatives. This information feeds into the public-meetings and public-hearings phase of environmental clearance.

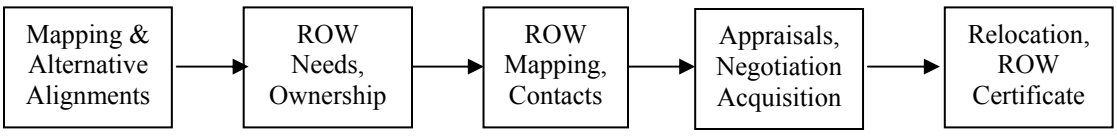

Figure 2.1: Standard ROW Acquisition Process

Once a project is approved to proceed to letting, ROW mapping can begin. Individual parcels are plotted, the actual segments to be acquired are identified and marked (including uneconomic remnants), and the owners are notified. Deed surveys may be done at this time as well. Appraisals of the individual parcels are made to determine current market value, and the DOT enters into negotiations with the owners. Donations are permitted. The outcome is either an agreement with the owner on price, cash payment and transfer of deed to the DOT, or condemnation. In the case of condemnation, the matter proceeds to court and the judge decides on a price for the property.

The final result is that ownership by deed to the properties passes into the possession of the DOT. Final ROW maps are prepared showing the boundaries of the procured corridor, and a ROW certificate is issued. Only at this point can construction begin. Initial contracts involve relocation of the former owners and clearance of the ROW. Utilities can then be relocated, and finally the main contractor can proceed.

A study by CTR in 1989 found that ROW acquisition could take as long as three years for widening of a freeway or conversion of a non-freeway to freeway. In almost every project involving ROW acquisition, that activity falls on the critical path in project development (Persad 1989). Another study by CTR in 2001 found that delays due to incomplete clearance of ROW are a major cause of claims (Weisleder 2001). The longer a project takes to develop, the more likely speculators will bid up the price of the land. Any approach that can speed up ROW acquisition and clearance can deliver a facility more quickly, save on construction costs, and produce benefits to users sooner.

2.2.2 History of ROW Acquisition for Transportation

Property owners have not always had the right to fair compensation from government for use of their land as roadways. The Romans seized land for their roads by military force. The British not only took the land in the name of the Crown, but also required labor from the public to construct the roads. The colony of Virginia adopted the English Road Law and also required all males 16 and older to contribute 6 days per year for road construction. All roads belonged to the parishes and were tolled.

By 1776, canals were the preferred mode of transportation in the United States. Because of the sheer scale of canal works, public financing was necessary. ROW acquisition was not an issue because bodies of water were deemed public property. Road construction remained a function of local governments. The usual approach was to set up turnpike authorities, private ventures that could raise capital, construct roads under minimal rules, and charge tolls. Very few of these ventures were successful, and most required support from public revenues. Stockholders demanded a government guarantee of 12–15% per annum return on their investment. Compounding the investors' problems was the emergence of rail as a viable ground mode, fueled in part by land grants.

Still, roads were recognized as necessary for commercial and military purposes, and the government's role in financing transportation had been established. As the age of the automobile dawned, the federal government took a larger role in funding and constructing highways. The interstate highway system was touted as a military need and 80% federally funded/20% state funded (in some segments 90%/10%).

Federal rules regarding ROW acquisition originate in the Fifth Amendment of the U.S. Constitution: Private property shall not "be taken for public use, without just compensation." The Fourteenth Amendment provides comparable restrictions on the states. Current law on ROW acquisition embodies these principles of individual property rights.

2.3 Transportation Financing

Transportation funding in Texas is trust fund–based, and was originally structured to ensure that users paid for the full system cost. This was achieved through fuel taxes and vehicle fees. As such, the intent was not a true tax but rather a user fee. Over the years the gas tax as a fraction of gas price has decreased, vehicle fuel usage has become more efficient, and the net purchasing power of transportation revenue has fallen behind growth in demand. At the same time, federal and state lawmakers have shown no willingness to raise taxes. The Trans-Texas Corridor will be the ultimate test of TxDOT's creativity in financing. ROW procurement is just the first in a series of huge financial commitments required for this project.

2.3.1 Borrowing

Many local agencies finance transportation improvements through borrowing. Some instruments for public borrowing include:

Municipal Bonds — Municipal bonds may be issued by state or local governments. The interest income earned is exempt from federal, state, and local taxes if issued in the investor's state of residence. There are several types of municipal bonds. General obligation bonds are voter-approved bonds to finance specific capital improvements. These bonds are not tied to a particular revenue stream; rather they are backed by the full faith and credit of the state or local agency. City bonds pledge the city's general fund income, including taxes on real and personal property, for the payment of the principal and interest of the bonds. The issuer can thus raise taxes as needed to pay the bonds.

Limited Obligation and Special Tax Bonds — These bonds are payable from a pledge of the proceeds against a specific tax, such as a gas tax. Unlike general obligation bonds, the issuer is limited as to the source for revenue to pay the bonds.

Tax Credit Bonds — These are a form of interest free financing in that the issuer is only responsible for repaying the principal. The federal government provides tax credits to bondholders instead of interest payments. These bonds provide a more substantial benefit to the issuer than tax-exempt bonds.

Revenue Debt — Revenue debt can be issued by the state, an authority, or even the private sector and are guaranteed by specific new and or existing revenue streams. These include tolls, cargo fees, dedicated sales or other taxes, etc.

2.3.2 Public-Private Partnerships

Privatization of transportation has been advocated as a cure for shortfalls in funding. In recent years, with the global domination of free-market economics, expansion of world trade, demand for additional transportation infrastructure, and shortage of public funds, governments have sought partnerships with the private sector to fund their initiatives.

In Europe, several governments are experimenting with public-private partnerships (PPP). The British government is changing its role from provider of services to purchaser of services (Haynes 1999). Private companies design, build, finance, and operate highways in DBFO projects. The government pays the operator shadow tolls, a fee calculated from the actual traffic carried by the facility. The operator receives bonuses or deductions if the road is not used or its use is restricted. The length of the contract is usually fixed from 20 to 30 years. In the first eight DBFO projects implemented, estimated savings are $230 million to $315 million. BOOT (build-own-operate-transfer) or BOT (build-operate-transfer) projects are similar, except the operator collects tolls directly from road users. Similar initiatives are underway throughout the European community.

In Australia, the Melbourne city link project was designed and funded, and is being operated by the private sector (Lay 2002). The cost of the project was approximately 1.5 billion Australian dollars. The project includes linking of three highways; improvement in the capacity of two others; connections to the airport, seaport and interstate rail terminal; and two bypasses around the city. Melbourne had no toll roads previously, and this project was completely electronically tolled. One important government requirement was to keep a toll-free alternate route. Since the link opened, truck traffic has been higher than expected. Overall traffic demand has remained in the range forecasted.

The road privatization trend in the U.S. began in the 1980s as part of the Reagan Doctrine that whatever government can (or cannot) do, private enterprise can do better, but its real genesis is the rising federal budget deficits of that period.

Privatization finds its best applications where:

- Technological progress is rapid.
- Production is heterogeneous.
- There is waste in the public sector.

Neither of the first two points justify the privatization of roads. However, the third does: the entire interstate system is designed for truck traffic, which is actually less than 10% of all traffic. Many rural segments are under-utilized to some degree. This represents a

significant waste of resources. Conversely, most urban segments are under-designed, and many are congested most of the day. This too is a significant waste of resources, but it presents a prime opportunity for entrepreneurs (Walters 1987).

2.3.3 Risk Sharing

To be attractive to an investor, a project must offer a rate of return equal to or better than other investments, with a good probability of success. However, rate of return is related to the risk of an investment: "low risk, low reward; high risk, high reward." Because many transportation projects are perceived as high-risk, investors generally require a higher rate of return. As an industry standard investment banks require an annual debt coverage ratio (revenue/expenses) of 1.25 to 1.3.

Current low interest rates could make toll road investments attractive. However, financial projections require assumptions regarding inflation, discount rate, and future interest rates. Feasibility analyses would need to include a range of interest rates to determine sensitivity of the results to assumptions.

Modern approaches to risk management attempt to allocate the risk to the party that is best able to minimize it. For example, in DBFO contracts in the United Kingdom the government pays different toll rates based on traffic volume ranges — if volumes are low, the rate is high; as traffic increases, rates decrease; and no payment is made for traffic in excess of a specified level. This reduces the chance of the government authorizing competing routes, but it also encourages the operator to move as much traffic as possible (FHWA 1999).

Components of successful risk sharing include (UNESC 2002):

- Commitment from a politically and fiscally stable government
- Willingness to implement legislative changes
- Pilot programs

Factors that reduce investor risk include equity contributions, tax benefits, government full faith and credit guarantees, and contracts that allow bailout or takeover if projections fail to materialize and default is imminent. At the same time, many government agencies are unwilling to risk income from future revenues — many have rejected the idea of grant

anticipation revenue vehicle (GARVEE) bonds, which would finance today's projects on the promise of future funding.

2.4 Feasibility

Experience with toll roads in the United States has been mixed. Many of the most lucrative routes are in urban areas, where environmental and ROW restrictions have delayed construction. One rule of thumb for toll road success is that they must be built 4 or more years sooner than a normal project (CBO 1985). California and Virginia have had limited success in building new toll roads. One study cited difficulties of attracting landowner contributions or government aid to supplement tolls (Gomez-Ibanez 1991).

Many toll roads have positive financial results only on urban segments. Even after attaining mature traffic volumes some barely pay for operation and maintenance (Rao 1983). In Texas, toll roads in Houston and Dallas operate at margins close to projections, but the Camino Colombia Toll Road near Laredo has not attracted sufficient traffic to meet bond repayment schedules.

2.4.1 Feasibility Evaluation

TxDOT rules for evaluating the feasibility of toll projects arise from legislation passed in 1991 and codified in Chapter 362 of the Texas Transportation Code. A Texas Transportation Institute (TTI) study in 1996 presented factors used by various states and investment banks in evaluating toll road project feasibility (Glenn 1996). Most DOTs establish a team to evaluate the project's technical feasibility and require an independent evaluation by a financial consultant. Investment banks review the revenue forecasts and require an annual debt coverage ratio of 1.25 to 1.3. Standard & Poor's assigns a credit rating to the revenue bonds for the project based on the debt coverage ratio.

Revenue growth depends on growth in traffic and toll rates, which in turn depends on overall national and state economic trends, economic development, and land use changes along the corridor. Another vital revenue source is concessions from restaurants and service stations operating in the ROW. The Trans-Texas Corridor proposes to derive income from railroads and utilities contracts as well.

Annual expenses include the cost of toll collection and, in particular, system maintenance. Maintenance costs are heavily influenced by the type of traffic using the facility. Highway cost allocation studies have found that light vehicles cause surface wear in proportion to vehicle miles traveled (VMT), but heavy vehicles cause foundation wear related to axle loads and to the foundation design itself. Amortization of capital costs depends on service life assumptions. Surface life may be as little as 2–5 years, foundation life 10–25 years, structures 50 years, and the ROW amortization period could be anywhere from zero years to eternity.

Factors that affect project feasibility include economic growth projections, revenue growth assumptions, and tolling rates. A study of fourteen toll projects, including three in Texas, found that only two had exceeded forecasts (Muller 1996). These two had growth assumptions under 5% per annum over the first four years, travel time savings of five to 10 minutes over competing routes, and toll charges around 8 cents per mile. The other 12 had overly optimistic growth assumptions and toll charges in excess of 10 cents per mile.

A toll road carrying moderate traffic (about 10,000 vehicles per day) and charging about 5 cents per tolled mile can expect to cover toll collection costs and annual debt service on maintenance expenses. However, few routes carry sufficient traffic to repay capital expenses including right-of-way and construction costs (Rao 1983). Realistically, only a small segment of the transportation system can pay for itself directly.

2.4.2 Revenue Forecasting

Toll revenue forecasts depend on the toll rate and the traffic forecast. Maximization of toll revenue requires setting a toll that attracts customers from alternative facilities. The "Pigouvian tax" formulation (Geltner 1987) estimates *T*, the efficient toll per vehicle-mile traveled (VMT) on a highway as:

$$T^2 > 2P(C)/e$$

where

P = average total user cost per VMT including time and vehicle wear and tear

C = average cost of collection of tolls per VMT
e = absolute value of the elasticity of demand for travel on the highway with respect to P

The primary source of error in toll revenue forecasting is the estimate of traffic diversion, compounded by errors in traffic demand forecasts. To increase VMT, a tolled highway facility must provide benefits to users that are not obtained on "free" routes, for example, predictable travel time. Safety, quick incident handling, and better maintenance are other desirable features. C can be minimized through the use of automated technologies such as "Speedpass" cardreaders.

In a 1993 study, CTR analyzed toll road revenues from 28 toll authorities in the United States and developed a series of models relating toll traffic, actual revenue, and deviations from forecasts (Dedeitch 1993). Another CTR study in 1998 developed formulas for toll traffic diversion and expected revenues (Orozco 1998).

2.4.3 ROW Royalty Payments and Alternatives

Royalty payment in lieu of cash purchase is a completely new approach to procurement of ROW for transportation corridors in the United States. No examples were found in the literature where a public agency paid for ROW with a promise of future revenues. Clearly this is a result of the history of property rights and restrictions on state contracts with private entities.

However, there are many examples of the reverse situation: the state owns the land and leases it to a private entity for a share of the income derived from use of the property. A prime example is university land: The State of Texas Constitution of 1876 created the University of Texas with an endowment of 1 million acres for a Permanent University Fund (currently over 2.3 million acres). Income is derived primarily from royalty payments from oil and gas leases, grazing leases, and surface leases. Surface leases are granted for a variety of municipal and commercial purposes. Airport sites, plant sites, compressor stations, tank farms, tower sites, and business sites such as motels and office buildings are leased either as a paid up ten-year lease or a temporary lease. Lease rates are fixed by the University Lands Office.

TEA-21 grants permission to state DOTs to lease ROW acquired with federal funds for fair market value and to use the proceeds for federally eligible projects. Leases include sub-surface, surface, and air uses. Many states have entered into arrangements with communications companies to use public ROW for fiber-optic lines and cellular towers.

In the private sector there are numerous instances where landowners enter into contracts with property developers for a share of profits. However, in most cases the landowner is a partner in the venture or receives stock in proportion to his contribution.

Strictly speaking, royalty payments do not entail a change in ownership of the ROW. Instead landowners are paid royalties for the use of the land over a fixed period of time (for example, 20 years) or until the land reverts back to the landowner or his/her designated heir. The willingness of landowners to accept royalties for the use of their land in a transportation corridor depends on their expectations concerning the amounts of royalties they will receive each year. In the royalty arrangement that this project evaluated, the royalties will be derivatives of the corridor revenues that accrue to the Texas government.

Regardless of the compensation method finally adopted, without a change in law TxDOT would still require a deed conveying to the state fee simple title without condition or encumbrance. A separate contract, note, or bond would be provided to the landowner establishing the specific terms of payment. Presumably, TxDOT would, under this arrangement, provide a prospectus to landowners who in accepting the royalty offer would become, in effect, part investors in the transportation corridor. The prospectus would contain forecasts of corridor revenues, perhaps with a range for optimistic and pessimistic assumptions.

2.5 Analytical Framework

For the State of Texas to commit to pay for Trans-Texas Corridor ROW with future revenues, there must be some assurance that corridor revenues will exceed costs. Economic development resulting from the corridor will be a benefit to the state, but will

not necessarily translate into corridor revenue. Potential sources of revenue include tolls from passenger and freight (truck) traffic, user fees on railroad traffic, charges on utility companies, and concession fees.

To estimate toll revenue, it is possible to draw analogies with comparable U.S. toll roads. However, there are limited data on user fees from railroad and utility companies. The feasibility analysis must therefore include assessments of the reliability of:

- Revenue estimates, timing of when they will begin, and projected growth rates
- Cost projections and timing of expenditures.

2.5.1 Revenue Reliability

Toll revenue is the product of two variables: traffic volumes and toll rates. The issues associated with corridor revenue prediction are as follows.

2.5.1.1 *How much roadway traffic would be diverted from competing corridors?*

Forecasts of traffic diversion to toll corridors are often unreliable. A study of 14 toll roads found that only 2 had exceeded traffic forecasts (Muller 1996). Commuters will switch to a toll highway only if it provides benefits that are not obtained on "free" routes. Desired benefits include time savings, predictable travel time, low congestion, safety, quick incident handling, and better maintenance (Dedeitch 1993). At a minimum, time savings have to be 5 to 10 minutes (Muller 1996).

Because the corridor will generally run along NAFTA (North American Free Trade Agreement) routes and mostly traverse rural areas, most of the traffic initially could be trucks. Passenger traffic may be predominantly intercity travelers, who already have highway or air travel alternatives. To relieve the burden on the current highway system it would be desirable to divert as much truck traffic as possible to the corridor, perhaps using a combination of incentives on the corridor and restrictions on free roads.

2.5.1.2 *How much traffic would be induced by the corridor?*

Traffic growth rates on toll roads are typically less than 5% per year in the first 4 years (Muller 1996). However, the corridor is likely to encourage the development of new

inland ports comparable to the Alliance Development near Dallas-Fort Worth, that is, intermodal nodes for value-added services and trans-shipping. These developments will stimulate additional demand.

2.5.1.3 *How much will users pay in tolls?*

Low tolls may attract too much traffic and increase maintenance costs, while high tolls will deter users. It is difficult to determine a rate that maximizes net revenue. Different classes of users have different responses to tolls. Business commuters often place a higher value on their time than casual drivers do. The mix of users and their respective sensitivities to toll rates must be assessed over time.

Passenger car toll rates in the United States typically range from 5 to 20 cents per mile. To attract users, toll rates need to start off at less than 10 cents per mile (Muller 1996). Truck tolls are typically about triple the car rate. With electronic tolling, it is relatively easy to set different toll rates for different vehicle classes and for peak and off-peak travel periods. Electronic tolling also lessens the impact of the toll on users because it does not slow traffic, it seems painless, and billing is often deferred.

2.5.1.4 *What will be the revenue from freight rail?*

The timing for development of the rail components of the corridor will depend on demand. Rail is still primarily the province of private enterprise, where short planning horizons and quick return on capital are the norm. Railroad companies are facing major difficulties in maintaining or adding capacity, and may prefer to operate trains on public infrastructure to more effectively compete with trucks. The willingness of railroad companies to participate in the corridor is a major unknown.

The Alameda Corridor is a public-private rail partnership 20 miles long from the ports of Los Angeles and Long Beach to downtown Los Angeles. About one-half of the $2.4 billion cost is backed by railroad user fees of about $30 per container (ACTA 2002). The railroads donated the ROW. Federal loans, and state and local funds made up the remainder of the financing.

2.5.1.5 *Will high speed rail be viable?*

Due to slope and track curvature requirements, and velocity differential of high-speed rail (HSR), it may be necessary to locate the line on a separate alignment.

In the early 1990s, Texas established a state agency to build HSR connecting Dallas, Houston, and San Antonio. The proposal was eventually shelved. California estimates that by 2020 HSR will be able to grab up to 35% of intercity trips, diverting about 60% of air trips and 7% of car trips. The California HSR plan estimates that annual revenue of nearly $900 million from 32 million passengers will cover the estimated $550 million annual operating costs. These estimates are highly sensitive to travel growth rates and the price of airfares (TCA 2002).

2.5.1.6 *Is it feasible to operate a commuter rail line?*

The California HSR plan estimates that about one quarter of its ridership will be local commuters avoiding highway congestion. The $70 million annual revenue would cover an extra $32 million operating costs and $20 million annualized capital costs.

2.5.1.7 *What precedents are there for charging utilities?*

The utility zone will occupy 200 feet of the ROW. Utility companies now enjoy free use of state ROW. Will they pay to use the corridor? FHWA allows states to charge utilities for use of ROW. Caltrans leases ROW airspace to wireless carriers. Texas is one of the few states that do not routinely charge utility fees.

2.5.1.8 *Predicting concession revenue*

Access to the corridor will be restricted. Development akin to the frontage roads on the interstate highways is not proposed. In 2000, concessions were 2.3% of the Florida Turnpike's $320 million revenue. In 2001, the New York State Thruway collected $14 million from concessions such as gas stations and restaurants, out of $440 million in revenue (NYST 2002).

2.5.2 Cost Reliability

Funding for the corridor will be through exclusive development agreements leveraged by toll equity and the Texas Mobility Fund. Because of the proposed phased development of the corridor, it is difficult to determine when the capital costs for each stage will be incurred. Recurring costs, including ROW payments, will begin at initiation. Upfront costs will include financing, engineering, construction, and ROW (landowners who choose cash). The issues associated with prediction of expenses are as follows.

2.5.2.1 *What will financing cost?*

Typical costs include a 1% bond issue fee and 3% fee for insurance. In addition, a reserve account of 20% to 25% of the principal may be required to cover shortfalls in revenues. In effect, only about 70–75 cents of every dollar borrowed is available.

2.5.2.2 *What will each stage cost to build?*

If landowners opt for cash, upfront ROW costs will be between $3 million and $9 million per mile of corridor. Speculators may bid up land prices. Much of the infrastructure cost (earthworks, drainage, utilities, overpasses, and interchanges) may have to be expended upfront. The figure could be as high as $20 million per mile just to place in service the initial four-lane roadway and freight rail.

Adding the passenger-vehicle-only roadway (thinner pavement) and the high-speed rail lines would cost about $4 million and $7 million per mile (2002 dollars), respectively. Delays in construction and changes in scope can add 30% or more to costs. Design-build contracting would expedite construction and return revenues sooner.

2.5.2.3 *What will be the cost of administration of the corridor?*

Annual expenses will include administration and toll collection, interest payments on debt, ROW (landowners who choose payments), and maintenance costs. It is important that long-term ROW payments are predictable. All options for corridor ROW administration should be considered, including privatization (as part of the revenue manager duties, for instance).

Costs for patrolling, incident clearing, tollbooth staff, and overhead staff are usually stable year-to-year, typically in the range of 5% to 10% of toll revenue. Electronic tolling lowers costs, but may require providing toll tags to regular users. Depending on evasion rates, it may be feasible to staff a collections unit.

2.5.2.4 *How high will the interest payments be?*

The coverage ratio — the ratio of projected revenue to expenditure — affects the rating given to the debt issue by agencies, such as Standard and Poors™, which determine the minimum interest rate for financing. Most agencies require a ratio of 1.3 for a satisfactory rating. There are different rates for different tiers of debt depending on the guarantee associated with repayment of each. The debt rating for the corridor could change as it develops a "credit history." As a result, debt incurred for future stages of the project may carry a different interest rate from earlier debt.

2.5.2.5 *What will maintenance cost?*

Maintenance of the Florida Turnpike costs about $100 million per year for almost 400 miles, or about $250,000 per mile per year. The 2000 figures for the New York State Thruway were $86 million for 640 miles. Surface maintenance generally depends on the number of wheels passing, while foundation repairs depend on the number of equivalent axle loads. Maintenance costs will grow with time. Eventually, elements like pavement and bridges require replacement. Contingency funds may need to be set aside for damage and disruption due to uncontrollable events. Alternately, it might be possible to insure against calamities.

2.5.3 Feasibility Analysis

Revenue from the corridor at each stage of development must pay for all costs incurred up to that point. Some of the financial analyses of toll projects reviewed do not account for all construction and ROW costs. To compare revenues to costs, the estimates must be converted to a common base such as net present value (NPV) or annual worth using a discount rate. Annual worth may be more important to investors interested in the

reliability of annual income. Since the state is in for the long haul, NPV is more important from the state's perspective. Alternatively, the internal rate of return (IRR) indicates the worth of the investment compared to other options. The questions to be dealt with in the feasibility analysis are as follows.

2.5.3.1 *What is the analysis horizon?*

Because costs will be incurred at different times and revenues will vary over time, it is necessary to evaluate the cash flows to determine payback period. The longer the period, the more uncertain are the projections. Each component has a different economic life over which costs must be amortized, e.g., pavements may be 20 years, bridges 50 years. ROW has an infinite life. Investors and landowners prefer payback within their own lifetime, which generally would be 20 to 30 years or so.

2.5.3.2 *What discount rate should be used?*

The discount rate is the interest rate assumed for comparing future dollars to present value. The rate must be greater than risk-free long-term government bonds and must be comparable to similar private investment opportunities. If the coverage ratio and payback period are highly sensitive to the assumed rate, then the rate chosen must reflect the uncertainties of the estimates and the risk exposure of the investors.

2.5.3.3 *What is the probability that revenues will exceed costs?*

It might be possible to estimate the probabilities associated with different levels of revenue and costs, and thus the probability of the coverage ratio being greater than one. This would be a measure of the risk in the investment.

2.5.4 Risk Assessment

An evaluation of the risks underlying investment in the Trans-Texas Corridor would give a better idea of investors' reaction to the project. General risks include:

- Economic conditions nationally and in Texas and Mexico over the long term
- Economic growth and development along the corridor
- Competition from other transportation modes.

Modern approaches to risk management attempt to allocate the risk to the party that is best able to minimize it. Optimal allocation of risk among the landowners, the state, and other investors of the corridor would be desirable. The issues of concern are as follows.

2.5.4.1 *Hierarchy of calls on revenue*

The order in which debtors get paid determines the risk exposure of each party. Lower-tier debtors require higher incentives because people are generally risk-averse.

2.5.4.2 *How much risk will landowners tolerate?*

Given a choice between guaranteed cash upfront and uncertain income over an extended period, most people choose the former. Even lottery winners prefer cash upfront. Any other arrangement must have a greater present worth. The higher the uncertainty, the greater will be the risk-premium (incentive) required. Tax benefits and government guarantees are possible incentives that lower risk.

2.5.4.3 *How much risk will financiers assume?*

To achieve a coverage ratio of 1.3 for toll projects, it may be necessary for the state to put up cash to cover some of the costs. Bonding companies may resist committing corridor revenues to ROW.

2.5.4.4 *How much risk is the state willing to assume?*

In some toll projects built in the United States, the state guaranteed the funds for design, ROW, and maintenance. In others, local governments donated funds or procured ROW, presumably banking on economic development and a greater tax base. Some financing arrangements provide for government bailout in event of default.

In some respects the ROW royalty idea is similar to GARVEE (Grant Anticipation Revenue Vehicle) bonds, a concept not embraced by a majority of Texas legislators in the 2001 session.

2.5.4.5 *What legislative changes are required?*

Successful risk sharing requires a willingness on the part of the state to implement legislative changes and to support pilot programs (UNESC 2002). To implement the Trans-Texas Corridor, legislation is needed to:

- Grant TxDOT the ability to acquire ROW for transportation uses other than roads
- Allow TxDOT to acquire more ROW than immediately needed and to lease it back for profit
- Expand the ability of the state to enter into contracts (such as ROW royalty payment contracts) with private individuals
- Allow private entities to issue bonds backed by state credit and/or free of taxes.

Some of these measures were enacted in the 2003 Texas Legislative Session.

2.6 Implementation Framework

Regardless of the financial feasibility of the ROW royalty concept, TxDOT would still need to convince landowners to accept deferred compensation. Both the federal and state Constitutions allow the government to take private property for public purposes under the right of eminent domain. However, the owner must receive "just compensation." Courts have held that cash payment of market value is required. A legal determination will be required as to whether royalty payments are "just compensation."

2.6.1 Landowner Response

Landowner response to royalty payments for ROW is an issue of great interest to TxDOT and to legislators. The mere suggestion that state action will affect property rights is enough to fell many proposals. Understanding the psychology of landowners, assessing their attitude towards the state and transportation projects, and evaluating whether there is room to change ROW acquisition practice, are research projects in their own right.

2.6.1.1 *Landowner preferences*

Landowners include working farmers, agricultural production and consumption operations, other businesses, developers, corporations and individual families. Possession of their property may have come through inheritance or acquisition. They may view their property as a resource to be passed on to their descendants, conserved for the environ-

ment's sake, held as an investment, or exploited for profit. Each group may require a different enticement to part with (or share) their land. Resistance to acquisition probably increases exponentially with increasing ROW width. If the entire footprint is not needed immediately, landowners may desire to continue enjoying the property until needed.

2.6.1.2 *Equity in the corridor*

Of interest to the State and financiers is the amount of the landowners' equity in the corridor. Logically, it should be equal to the initial value of their land (the money they would have received if they chose upfront payment). Their share of revenue should thus be in proportion to the equity they contribute to the enterprise.

Similarly, of interest to each landowner is the amount of his share of revenue. Some may suggest it is in proportion to the area of land given, or to the length of corridor running through, or the number of vehicles passing through, or some such measure. Again, logically, it should be in proportion to the equity that they contribute to the overall enterprise. Undoubtedly landowners in profitable segments would resist this "Robin Hood" plan, which would subsidize unprofitable segments. It is therefore important to define the limits of an enterprise upfront.

An equity holder's share is normally out of net revenues, that is, gross revenues minus operating expenses. All investors should have equal call on net revenues. However, bondholders usually require first call on revenues, and in some cases limits are placed on how much gross revenue can go toward operating expenses.

2.6.1.3 *Compensation packages*

It is unlikely that landowners will accept any arrangement unless its net present value is greater than upfront cash. The makeup of the package could have variations on:

- Amount of down payment
- Waiting period till first payment
- Period of payments
- Source of funds
- Expected rate of return

2.6.1.4 *Possible landowner responses*

Response to a royalty offer could run the full range, including:

- Refusal of any offer, and ensuing condemnation action (The court would probably rule for full upfront compensation.)
- Substantial downpayment upfront
- Payments in perpetuity
- Guaranteed payments not tied to revenues
- Interest rates higher than prevailing financing options
- First call on revenue, ahead of other bondholders

2.6.2 Alternatives

The purpose of ROW royalty payments is to reduce acquisition time and upfront cash outlay. However, any alternative that facilitates these objectives should be considered as an option. Some possibilities include donations, leasing, and alternative funding for early buyout.

2.6.2.1 *Donations*

From TxDOT's perspective, it would be easiest if landowners could be convinced to donate ROW. Multimodal centers, such as Alliance and the proposed Kelly AFB redevelopment in San Antonio, may be willing to donate. Existing railroad ROW corridors are also possibilities. Some arrangements that could benefit an owner if he chose to donate ROW follow.

- *Tax abatements and interim use*

Under this arrangement the landowner pays reduced or no property taxes on remainder property, and continues to enjoy use of the donated ROW (without improving it) until the corridor needs it. In effect, he receives an annual cash amount equal to the property tax savings. The state has no authority to abate property taxes, but it may be possible to offer an incentive to local governments to do so (perhaps revenue from the corridor!).

- *Development concessions*

In some situations, it might be possible to grant zoning concessions to allow more lucrative use of remainder property, such as higher-density development. This would be more feasible in urban and suburban areas. The state does not have zoning powers, but

again, local governments may be willing to cooperate if the net result is additional revenues to them.

- *Replacement property*

This is really an exchange: the state would deed the landowner equivalent-valued property from holdings elsewhere. Since the state is required to dispose of surplus property anyway, landowners may be happy to swap in some instances.

2.6.2.2 *Lease options*

In this option, the state would lease land from owners and pay in proportion to the amount of use. Leasing is not cheaper than buying, but it defers some cost until revenue starts flowing.

- *Development easement*

This involves paying the landowner for the right to develop a portion of his property. It is similar to a utility easement — the landowner enjoys use except when the utility company needs access. However, utilities generally leave the surface vacant and accessible. The corridor would place it under asphalt. This option is often as expensive as outright acquisition.

- *Fractional compensation/purchase option*

Here, the state would pay the landowner for the right to buy the full 1,200-foot strip in the future and pay in full only for the width actually used at a given time. This option may be less costly than a development easement and more acceptable to landowners.

2.6.2.3 *Buyout options*

Buyout options essentially involve alternative ways to finance upfront ROW acquisition.

- *Revolving fund*

The most profitable segments of the corridor are likely to be built first. Profits could go into a revolving fund that would be used to finance additional segments. One drawback is that, to be an effective corridor, it must be continuous over long stretches, some of which may not be profitable.

Another funding source for a revolving fund would be leasing of surplus ROW (along the corridor and elsewhere). A comparable precedent is the University Lands operation of the General Land Office, which grants surface leases for municipal and commercial purposes, including airport sites.

- *Local agency participation*

This is one of the more promising alternatives. In several toll projects reviewed, local governments agreed to fund ROW purchase and sometimes to pay for construction as well. Usually their motivation is economic development and increased future tax revenues. Presumably people along the corridor will enjoy lower prices for goods and may be willing to pay more in sales taxes. The factors that enhance local participation in transportation financing should be researched by TxDOT.

- *Include in development financing*

If it is feasible to offer corridor revenues for ROW, then it ought to be feasible to include the cost of ROW as part of the development financing for the project. Landowners may then choose to take cash upfront (other investors' money) or swap the property for a bond paying interest from corridor revenues. Some exclusive development agreements include ROW acquisition.

2.6.2.4 *Evaluation of alternatives*

As alternatives for ROW acquisition are developed, they must also face the acid test: how will landowners respond? Then as with the royalty alternative, the top candidates must undergo financial analysis.

2.7 Summary

This chapter presented a review of the major issues to be considered by TxDOT as it moves forward with planning for ROW acquisition for the Trans-Texas Corridor and implementation of a royalty payment option. Detailed analyses of these issues are presented in later chapters.

Chapter 3: Basis for Financial Analysis

3.1 Introduction

In order to assess the financial feasibility of paying for Trans-Texas Corridor ROW with toll revenues, the research team examined the financial performance of comparable corridors and the financial projections for a hypothetical segment of the proposed corridor. An important consideration was the timing of development of the modes in the corridor and the resulting cash flows. The Trans-Texas Corridor concept is a vision of several modes, including highway (car and truck lanes separated), freight and high-speed rail, utilities, and possibly other modes, sharing the same ROW. Since extensive examples of multi-modal corridors are scarce, financial data describing their operation are not available. In the one year given for this research project, it was not possible to develop in-depth estimates for non-highway modes. The data collection effort was therefore focused on the revenue and cost performance of tolled roadways.

As a result, this financial analysis is based on a key assumption: the highway modes will be built first, and highway toll revenues will have to pay for all costs incurred prior to other modes being added. TxDOT's action plan (TxDOT 2002) indicates that in most cases the roadway mode would be built first (i.e., a standard toll road), with additional modes constructed as they became feasible. As will be shown later, even if a mode is viable in the long term, it may not produce surpluses for many years after opening. Thus, it was assumed that investment in non-highway modes will occur only if they are independently feasible, and the role those modes might play in future revenue streams has been intentionally excluded from this analysis.

3.2 Case Study Selection

To determine the amount of toll revenue that would be available to pay for ROW for the Trans-Texas Corridor and the timing of revenue flows, the research team decided to analyze the financial history of a mature toll road system large enough to bear some

comparison to the proposed corridor. New York, California, and Florida have extensive toll road systems. Of these three states, Florida is the one most comparable to Texas in geography, population, economy, and driver characteristics. The Florida toll road system was therefore selected for a "back-casting" study, namely, were its revenues sufficient to pay for all costs, and if so, at what point? The Florida system has been in operation for almost 50 years and thus provides an opportunity to evaluate an actual financial outcome.

In addition, it was considered necessary to study a potential segment of the future Trans-Texas Corridor and make projections of revenue and costs. The State Highway 130 Toll Road (SH 130) around Austin now under construction was selected because (a) it is on the alignment of a priority segment of the corridor, (b) financial projections are available, and (c) being located in one of the most congested areas of Texas, it presents a better-than-average corridor revenue scenario. Generally, toll revenues are correlated with congestion on competing corridors, which is related to urbanization, which affects the price of ROW. If it is not feasible to pay for SH 130 ROW with toll revenue, then it is not likely that the ROW royalty proposal would be financially feasible elsewhere in Texas.

3.3 Financial Feasibility

For the projects studied, several measures of financial feasibility are presented, along with sensitivity analyses. Conclusions and recommendations will then follow.

3.3.1 Terminology

In this report, a number of terms will be used to describe the analysis undertaken. Some of these terms are briefly discussed below.

3.3.1.1 *Cash flow terms*

Cash flow is the amount of money received or expended each year.

Upfront costs are the total money needed to finance the construction of a facility, including the following: administration costs before project opening, planning and engineering fees, other consultant fees, ROW acquisition, utility relocation costs, and construction contract amounts.

Debt is the amount of money borrowed to finance the project during construction and operation. For toll projects, debt is normally in the form of bonds for a specified initial amount and to be repaid at a fixed interest rate. The bond repayment schedule is typically over 35 years, with payments starting low and growing each year.

Gross revenue is actual income from collections of tolls, concession payments, interest-bearing reserve accounts, and other sources.

Operations and maintenance (O&M) expenses are expenses associated with keeping the facility in operation, namely: administration; maintenance, including periodic outlays for resurfacing or rehabilitating the facility ("renewal"); and toll collection, including policing.

Net revenue is usually gross revenue minus O&M expenses, the money available for servicing debt. However, sometimes bond payments have preference over O&M expenses ("first call on revenue"). Modified net revenue (MNR) is gross revenue minus bond service payments and is the money available for O&M and other expenses (such as ROW).

A subsidy or additional borrowing may be required if revenue is not sufficient to cover expenses. Excess revenue may be applied to pay off the debt.

Discount rate is the rate at which future dollars are discounted to present dollars. Generally the discount rate to be used should be not less than the inflation rate (currently ~3%), since inflation reduces the effective interest rate earned on an investment. The Texas state comptroller recommends a minimum discount rate of 3%. From an investor's perspective, the minimum discount rate should be the interest rate that could be earned on a guaranteed investment such as a U.S. Treasury Bond, currently paying close to 5% interest for a 30-year bond. Higher-risk investments such as revenue-backed bonds require a higher discount rate to reflect the opportunity cost of the money, the risk, and the tax implications.

3.3.1.2 *Measures of economic merit*

The merit or desirability of a project can be described in terms of one or more of the following:

Net present worth (NPW) is a calculation of the value of income over the life of the project minus all expenses. A discount rate must be assumed to convert future dollars to present dollars. The result is expressed in today's dollars.

Net future worth (NFW) is similar to NPW, except the calculation is expressed in dollars at some future point, usually at the end of the project's life.

Equivalent uniform annual worth (EUAW) is the conversion of NPW or NFW into an equivalent fixed annual amount for a specified period. This is similar to calculating a mortgage payment. Often the costs are calculated as equivalent uniform annual cost (EUAC), and revenues as equivalent uniform annual benefits (EUAB), with EUAW = EUAB minus EUAC.

Benefit/cost ratio (B/C ratio) is the ratio of EUAB to EUAC, which is the same as the ratio of net present benefits to net present costs. The ratio must exceed 1.0 for a project to be considered feasible at the chosen discount rate.

Coverage ratio is the ratio of revenues received in a particular year to all costs (including debt payments) experienced in that year and is a figure calculated for each year of the project life. Coverage ratio is a measure of project risk, and many investment companies require a ratio greater than 1.25 to 1.3 every year in order to rate an investment as acceptable. For this reason an owner may have to subsidize a project from other sources in order to maintain a good bond rating.

Payback period is the time at which cumulative revenues exceed cumulative costs (the breakeven point). Future revenues and costs may or may not be discounted to adjust for the time value of money. Payback period analysis does not take into account future points where additional costs may wipe out surpluses.

Internal rate of return (IRR) is the interest rate at which income and expenditure over the life of the project are equal (B/C ratio is 1.0) when discounted to present values. In effect, it is the interest rate earned on the investment. For example, if an investment of $100 now will return an income of $106.09 in two years, the IRR is 3% per annum.

3.3.1.3 *Project performance measures*

For analysis of the toll projects, payback period and internal rate of return were chosen as measures of project performance. Payback period is of concern to investors wanting to know how soon they can expect to get their initial investment back (the break-even point). It is a suitable measure for projects that are likely to continue earning revenues in excess of costs after break-even, as successful toll roads do. It would be of particular interest to a landowner expecting to recoup his land value from project revenues within a reasonable time, say 10–15 years. Individual investors prefer shorter payback periods and/or higher rates of return.

The internal rate of return (IRR) is a measure of how profitable the investment will be and how much interest can be promised to investors. An IRR less than the current inflation rate (about 3%) would not be an attractive investment, since the money invested would essentially be losing value. An IRR less than what can be earned from a safe investment (such as U.S. Treasury Bonds) would not attract institutional investors, but may be acceptable to the state. The 35-year bonds for SH 130 sold in 2002 at 5.75% interest over 35 years — one benchmark for an IRR that would be acceptable to investors.

3.3.2 Financial Analysis

The financial analysis consisted of the following steps:

- Obtain or estimate upfront costs, annual revenues, and periodic expenses.
- Calculate the selected measures of project feasibility.
- Evaluate actual outcomes.
- Assess possible risks due to variations in future revenues and expenses.

Depending on the data available, the following discount rates were used:

- For historical data, quoted interest rate on bonds and loans or computed interest rate from original amount borrowed, net revenues, and payback period
- For future projections, quoted interest rate on bonds and loans

3.3.2.1 *Analysis period*

Toll projects could continue to earn revenues for decades after the payback period if normal maintenance and periodic rehabilitation are done. Eventually annual costs may approach the amount of revenues (at which point major new capital investment would be required, or the project should be terminated). It is therefore necessary to extrapolate revenues and expenses over an extended analysis period, to determine first the payback period, and then the time when IRR is maximum or becomes stable.

3.3.2.2 *Financial analysis assumptions*

The following assumptions were made for the financial analysis:

- Historical trends in toll rates and O&M expenses will continue into the future. Traffic growth will stabilize when the system reaches capacity.
- ROW costs are proportional to width, i.e., the cost of 1,200 feet would be triple that of 400 feet.
- Net revenue is applied to the highest-interest debt (interest and principal). In reality, depending on the bond repayment schedule, revenue could be applied in an infinite number of ways, including being diverted for other purposes.

3.3.2.3 *Sensitivity analysis*

In analyzing future estimates of revenue and costs, it is necessary to determine the confidence level in the calculated measures of merit. One way to do this is to vary the estimates and see how much the measures change. For example, if the revenue is 10% less, how does the payback period change? What if costs are 10% higher? The sensitivity of the results to the assumptions gives an idea of the risks on the project and the chances of project success.

3.3.2.4 *Cumulative debt*

Investments in infrastructure are different from others in that it is not easy to liquidate the asset and recover its book value. At any point in time the owner owes the original amount of money borrowed, plus interest accumulated, minus payments made. In a normal loan

arrangement (such as a mortgage), debt decreases steadily over time because payments exceed accumulated interest. Decreasing debt would indicate that a project is paying for itself, while increasing debt implies that subsidies are required.

For the case studies the debt trends were analyzed in order to determine whether the project was paying for itself or whether subsidies were required, the maximum debt amount, the subsidies required, and the breakeven point. The information derived is of value in formulating a debt repayment structure — the amount of payments, timing, and interest rate that can be offered to prospective investors. A landowner who accepts a royalty payment for his land essentially would be like an investor in the project, since he will require repayment over some period at an attractive interest rate.

3.4 Summary

In this chapter the assumptions and terminology used for the financial analysis were presented. The key assumption is that the highway modes will be built first, and highway toll revenues will have to pay for all costs incurred prior to other modes being added.

Chapter 4: Case Study: The Florida Toll Road System

4.1 Introduction

The Florida toll road system, called Florida's Turnpike, is about 450 miles long. It includes the following segments as illustrated in Figure 4.1 (MyFlorida 2003):

- Turnpike Mainline, 265 miles long, from north Miami to a junction with Interstate 75 at Wildwood near Ocala
- Homestead Extension, 47 miles long, from Miami to the top of the Florida Keys
- Sawgrass Expressway/Toll 869, 23 miles, in Broward County (Miami)
- Seminole Expressway/Toll 417, 19 miles, near Orlando
- Southern Connector Extension of the Central Florida GreeneWay/Toll 417, 6 miles, in Orlando
- Bee Line Expressway/Toll 528, 8 miles, in Orlando (plus 30 miles described later)
- Veterans Expressway/Toll 589, 15 miles, in Tampa
- Polk Parkway, 25 miles, east of Tampa near Lakeland

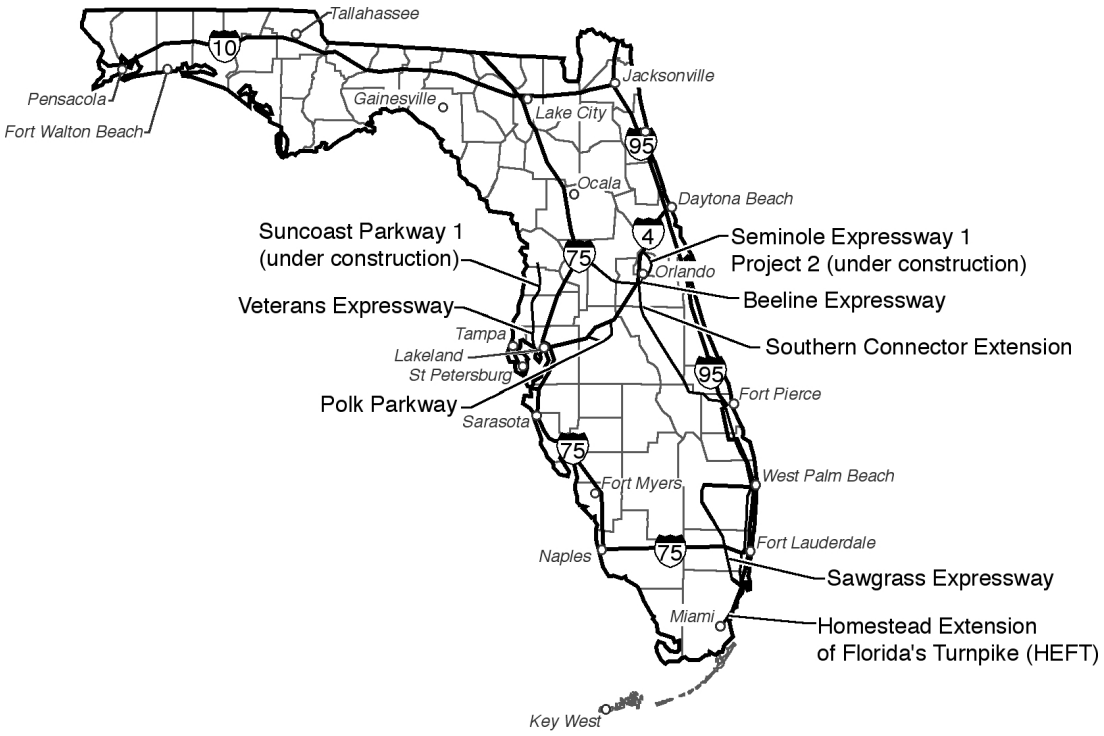

Figure 4.1: The Florida Toll Road System (MyFlorida 2003)

The first 110-mile segment of the Turnpike Mainline from North Miami to Fort Pierce was opened in 1957, and the 155-mile extension to Wildwood opened in 1964. The 47-mile Homestead Extension was completed in 1974. Prior to the turnpike, most travelers through Central Florida utilized U.S. 27, an arterial road that winds through multiple urban areas. Today, Florida's Turnpike handles the bulk of traffic from Central Florida to east coast destinations in South Florida. The Sawgrass Expressway/Toll 869 provides a bypass of the urban Fort Lauderdale and Miami areas. It was constructed by the Broward County Expressway Authority and opened to traffic in 1986. It was acquired by Florida's Turnpike District in 1990 as a result of legislative action. The Southern Connector Extension of Toll 417 opened in 1996, linking Central Florida GreeneWay/Toll Road 417 with Interstate 4 near Orlando. The extension has been nationally recognized for its innovative public/private financing.

Tolls are charged according to the number of axles on a vehicle, and the current rate is 6 cents per mile for two-axle vehicles. Vehicles with additional axles, such as trucks, pay proportionately higher tolls. Along with the traditional coin system of toll collection, the Southern Connector Extension uses the electronic system EPASS (MyFlorida 2003).

4.2 Financial Analysis of Florida's Toll System

For the following analysis, two segments of the Florida system were studied: the 265-mile Mainline and the Beeline Expressway. Financial information for the Turnpike Mainline was provided by David E. Tassinari, CPFO, Financial Planning Manager, Florida's Turnpike Enterprise (Tassinari 2003). The Beeline Expressway was developed by a separate authority and experienced a different development history from the Turnpike Mainline, but the results are strikingly similar. Data were obtained from published histories of the Beeline Expressway (Beeline 2003).

4.2.1 Turnpike Mainline

The first 110-mile segment of the Mainline from North Miami to Fort Pierce began construction in 1955 and opened in 1957. Costs incurred up to that point were converted

to a $74,000,000 bond debt with an interest rate of 4.75%. In 1961 another $92,881,000 was borrowed at 6% interest for construction of the 155 miles from Fort Pierce to Wildwood, completed in 1964. The 47-mile Homestead Extension was financed with $155 million in bonds at 7.1% and was built between 1970 and 1974. Construction expenses include ROW costs. On average about 260 feet of ROW was acquired.

Figure 4.2 shows the revenue and O&M expense patterns for the Mainline. Revenue growth has averaged 10% per year, although there were periods in the mid-1970s and late 1980s when revenues fell. O&M expenses have grown an average of 13% per year. As a fraction of revenue, O&M has steadily grown, from less than 20% initially to around 33% currently.

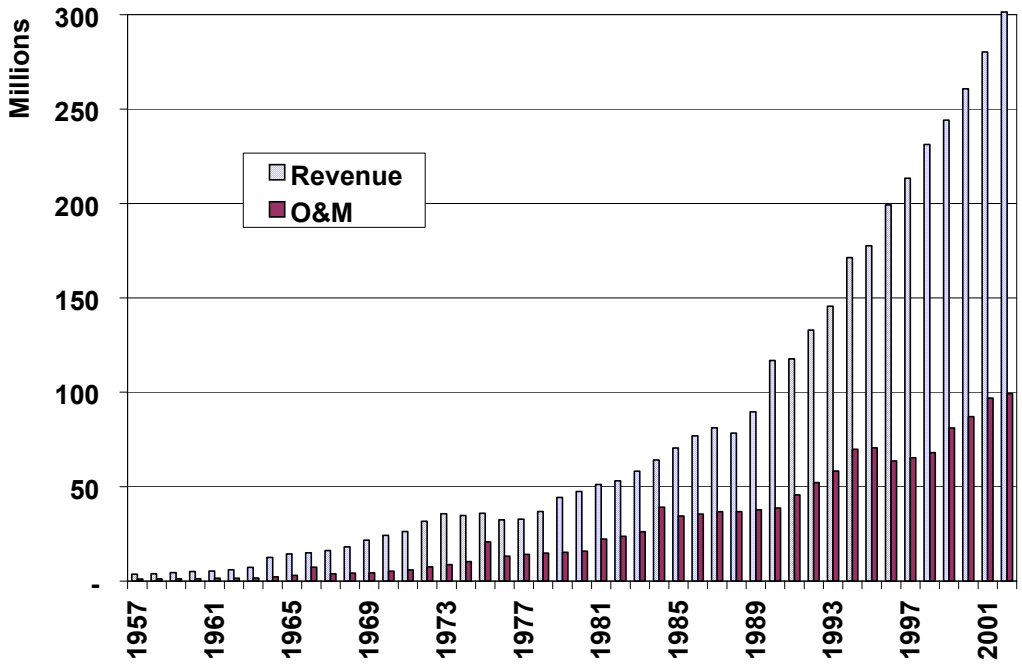

Figure 4.2: Florida Turnpike Mainline Revenue and O&M Expenses

The data on periodic "renewal" costs are not available, so those costs were estimated using as a model the case of the bonds for the Turnpike Mainline that were retired in 1986, by the following method: the original bonds were compounded at the quoted 4.75% and 6% interest rates, net revenues were applied as debt payments, and it was found that the original debt could have been paid off around 1984. The equivalent amount that

caused the payments to stretch till 1986 was computed and it was found that this figure is equivalent to three periodic expenditures of $4 million, $8 million, and $12 million at 9-year intervals (1966, 1975, 1984) compounded at 5.2% (the composite interest rate at payoff). As will be seen later, these renewal expenditures are comparable to periodic major expenditures for Texas SH 130.

Using the revised cash flow, the amount owed at any point in the project life was computed. The result is shown in Figure 4.3, with the amount by which net debt increased depicted as "subsidy." Alternative assumptions of periodic costs change the shape of the debt line between 1965 and 1986 slightly, but the general trend would be similar.

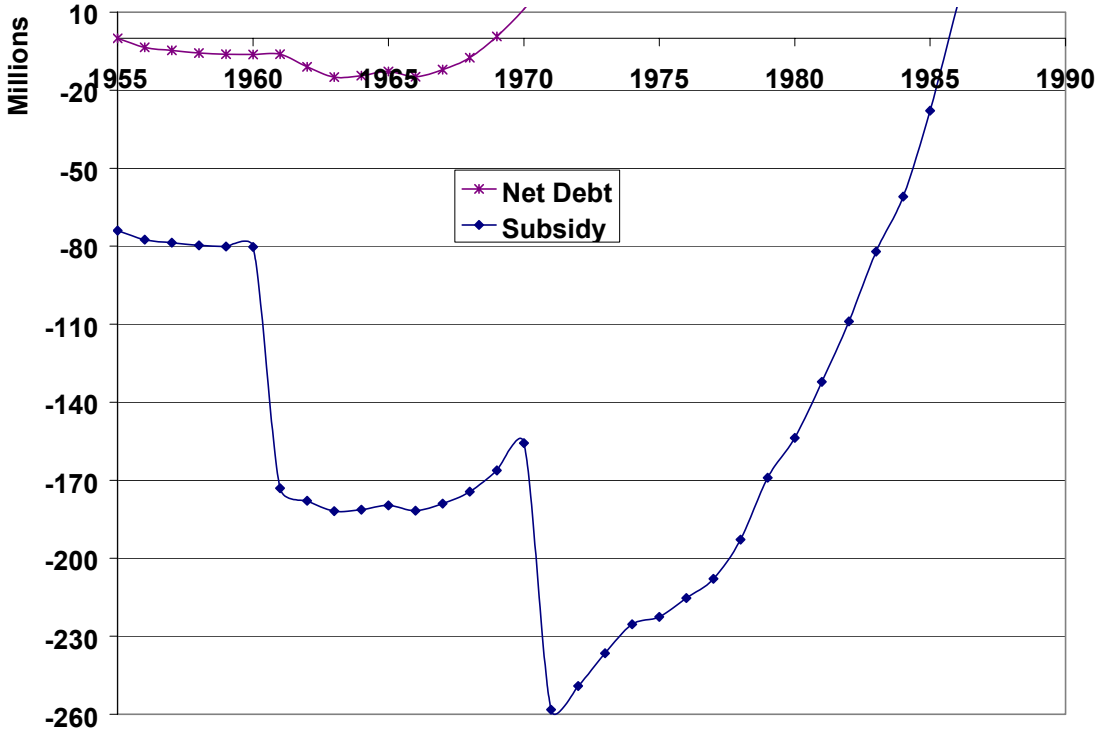

Figure 4.3: Florida Turnpike Mainline — Debt Pattern

This graph provides several insights. The initial debt was $74 million. Compounded at 4.75%, the debt grew to $80 million by 1960, because interest accrual exceeded net revenue available for payments. At that time another $93 million was borrowed. The debt continued to grow until 1966, to $182 million, after which it started to decline as net revenues were large enough to exceed the annual interest. The Homestead bonds

increased the debt to its maximum value of $258 million, but with growing revenues the debt was rapidly paid down. The payback period was 29 years. Since 1987 the project has generated a profit.

The "subsidy" required for the project attained a maximum value of $15 million in 1963. This is the amount by which the project went further into debt over time, finally coming out in 1969. It can be concluded that until 1970 net revenue was not enough to pay down the debt. (In reality, however, because of the back-loaded bond payment schedule the project always had sufficient net revenues to make bond payments.) Basically, the project did not generate sufficient net revenue over the first 12 years to cover interest on debt. If a landowner had agreed to accept a share of revenues after all other expenses as payment for his land, he might have had to wait 13 years (15 years if the 2-year initial construction phase is counted) before receiving payments, and another 16 years to be paid off. Ultimately, beyond 30 years he would have profited on his investment.

Table 4.1 shows several benchmark rates of return, and the years they were exceeded for the Florida Mainline investment.

Table 4.1: Florida Mainline Return on Investment

Benchmark IRR	Year Exceeded	Project Age
3%	1981	24
4%	1983	26
5%	1986	29
6%	1989	32
7%	1992	35
8%	1997	40

When the debt was paid off in 1986, the rate of return was 5.2%, essentially the composite interest rate paid on the debt. The low bond rate was one reason why this project had an early payoff. Thus, an investor who "got in" the project in 1955 earned 5.2% per annum on his money by 1986. If he had "stayed in" till 1997, he would have earned 8% per annum over the duration. The Florida Turnpike Mainline is expected to enjoy profits for the foreseeable future, meaning that the rate of return will continue to grow slowly over time. Ultimate IRR is projected to be about 9.8%.

4.2.2 Beeline Expressway

The Beeline Expressway is a 30-mile toll road in Orlando, Florida, operated by the Orlando-Orange County Expressway Authority (OOCEA)- See Figure 4.1. This is a separate venture from Florida's Turnpike. Construction of the first 17-mile segment began in 1964 and opened in 1967. Costs incurred up to that point, including $3 million in ROW, were financed by $7 million in bonds with an interest rate of 4.06%. In 1968 a 13-mile segment through downtown was financed with $33 million in bonds at 6% plus $39 million in contributions, and the segment opened in 1973. Another $17 million in bonds at 9.23% were issued in 1980 to fund improvements completed in 1983 around Orlando Airport (Beeline 2003).

In 1985 a bond issue of $57 million at 8.25% was used to refinance part of the debt. The next year there was a new bond issue of $433 million to finance additional projects. Actual revenue and O&M figures for the original Beeline Expressway segment were available from 1985 forward (separate from the cash flow for the newer segments), so this analysis was confined to the original project. The figures from 1967 to 1985 were interpolated with a straight line. Because those earlier numbers are very low relative to post-1985 numbers, variations on this assumption did not significantly alter the results. Figure 4.4 shows the resulting revenue and O&M history of the project.

Revenue growth has averaged almost 14% per year, although there were periods in the late 1980s, mid-1990s and in the early 2000s when revenues fell. O&M expenses have grown an average of nearly 12% per year. O&M consumes around 40% of revenue currently. To compute net debt, the bond amounts were compounded each year by the quoted interest rate, and the net revenue was applied to the highest-interest bond. The assumption was that, since the money was not enough to pay all interest, it is logical to apply it to the highest-interest debt. The result is shown in Figure 4.5.

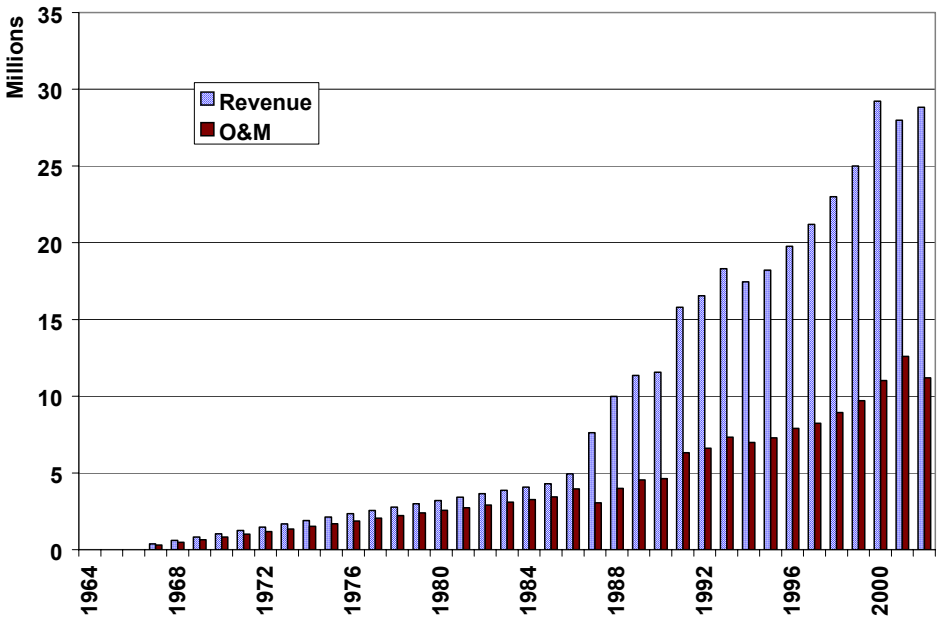

Figure 4.4: Beeline Expressway Revenue and O&M Expenses

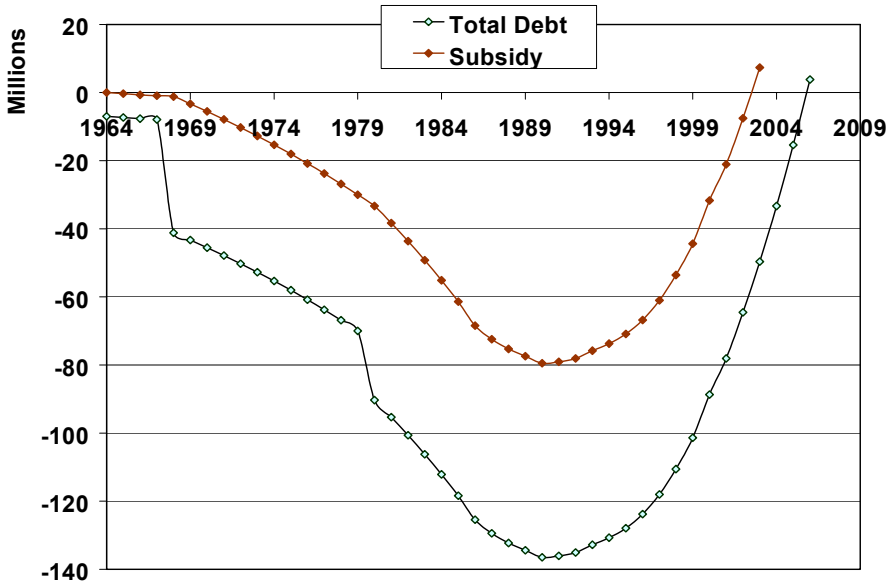

Figure 4.5: Beeline Expressway — Debt Pattern at Quoted Interest Rates

The Beeline debt pattern is similar to that observed for the Turnpike Mainline. The initial debt was $7 million. Compounded at 4.06%, it grew to $8 million by 1968. At that time another $33 million was borrowed at 6%. The debt continued to grow until 1980, when it

was $73 million. Another $17 million was borrowed at 9.23%. By 1985 the debt was $118 million. Part of this was refinanced with a bond of $57 million at 8.25%, perhaps to take advantage of lower bond payments in a back-loaded arrangement. The debt continued to grow till 1990, when it attained a maximum of $137 million. After that, revenues were large enough to exceed the annual interest, resulting in the debt being paid down. With revenue and expenses extrapolated at 3% growth per year, the debt can be paid off in 2006, giving a payback period of 42 years.

The "subsidy" required for the project attained a maximum value of $79 million in 1990. This is the amount by which the project went further into debt over time, finally coming out in 2003. If a landowner had agreed to accept a share of revenues after all other expenses as payment for his land, he might have had to wait 39 years before receiving payments, and another 3 years to be paid off. Ultimately, beyond 42 years he would have profited on his investment.

Note that the above did not include the $39 million in contributions in 1968. If that sum were treated as a loan (from landowners, say) with payments to be made after the bonds are paid off and the interest rate was the same as the 1968 bond (6%), it would have compounded to $357 million by 2006. Applying all future surpluses to that debt, it would be paid off in 2032, a total breakeven period of 68 years!

Table 4.2 shows several benchmark rates of return and the years when exceeded on the Beeline investment.

Table 4.2: Beeline Expressway Return on Investment

Benchmark IRR	**Year Exceeded**	**Project Age**
3%	1997	33
4%	1999	35
5%	2002	38
6%	2006	42
7%	2014	50
8%	2043	79

The project could break even in 2006, at which point the rate of return is 6.0%, the equivalent interest rate paid on the debt. The future IRR numbers are based on projected income and expenses. Ultimate rate of return is about 8%.

Different analyses could change the above results. Since it was not possible to obtain data on exactly how the bonds were serviced, a best-case scenario that results in the shortest payback period is presented here. For instance, not applying the payments to the highest-interest bond would extend the payback period. Clearly the results depend on the bond structure and the way payments are applied, but the trends are similar and the assumptions do not significantly affect the measures of project performance.

4.3 Conclusions from the Florida Case Studies

Two mature toll road systems in Florida were studied, one already paid off and the other nearly so. Analysis of current debt showed that for the initial 15–25 years, net revenues were not sufficient to cover interest on debt. In the next 15-plus years, revenue exceeded expenses, resulting in project payback periods of 29 to 42 years. If contributions are to be repaid, the payback period could extend as much as 70 years. Maximum rate of return is around 8 to 10%.

After the trends in costs and revenues are reviewed, it is seen that the projects appear to go through four phases:

- Loss phase: traffic is low, annual revenues are less than annual expenses, and the project debt increases.
- Stabilization phase: traffic is growing, annual revenues keep up with expenses, but debt is peaking.
- Breakeven phase: traffic volume continues to grow, revenues exceed expenses, and debt can be paid down.
- Profit phase: traffic volume stabilizes or continues to grow, revenues exceed expenses, and debt has been paid off.

Implicitly acknowledging the above phases, the Florida DOT uses the following criteria for toll viability (MyFlorida 2003): “The new facility must produce sufficient revenue by the twelfth year of its opening to traffic to pay at least 50 percent of its bond indebtedness (with revenue from the rest of the Turnpike system making up the difference), and must

be able to pay 100 percent of its annual bond indebtedness and Turnpike operations and maintenance costs by the 22nd year of operation."

The rate of return, as illustrated in Figure 4.6, seems to follow a predictable trend. The higher the curve, the more feasible is the project, but IRR eventually stabilizes at between 8% and 10%. The payback period is determined by the interest rate on the debt. Because of their borrowing rates and revenue histories, the Turnpike and Beeline toll roads may be considered to have had above- and below-average project performance, respectively.

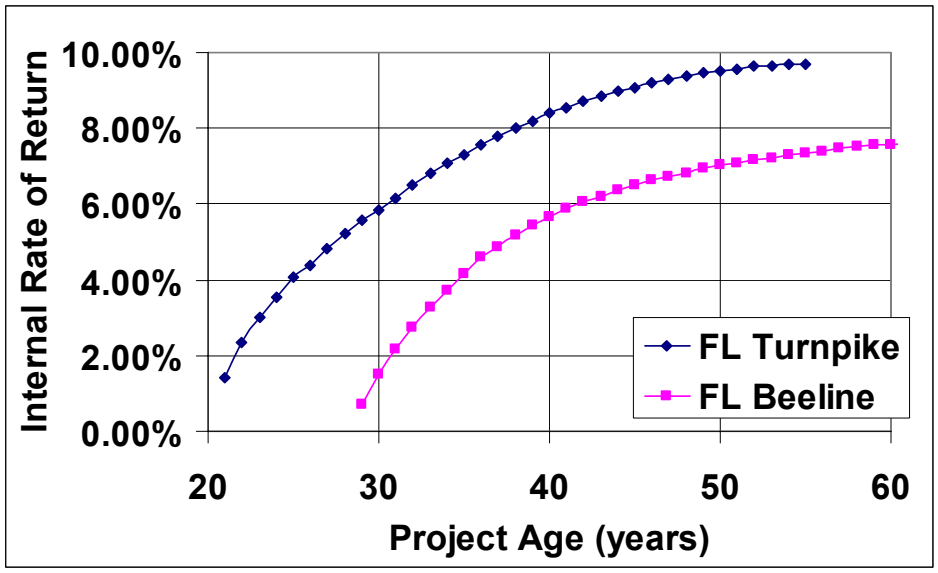

Figure 4.6: Internal Rate of Return versus Project Age

Additional borrowing was used to extend the roads laterally and longitudinally, improving revenues — presumably by providing better connectivity. Referring back to Figures 4.3 and 4.5 and visually extrapolating the debt trends before and after each new borrowing, it appears that the extra debt was paid off in roughly the same time. In other words, the demand for a toll road appears to increase as connectivity and capacity increase. This observation indicates that it would make sense to undertake initially only as much debt as the market would bear, monitor the debt pattern, and as soon as the opportunity arises, borrow again to extend the system and attract more traffic. However, only the state may have the stamina and borrowing capacity to withstand the relatively low rates of return and extended payback periods observed.

Chapter 5: Case Study: Texas State Highway 130 Project

5.1 Introduction

The Texas State Highway 130 (SH 130) is a new 49-mile toll road currently under construction in Central Texas, east of and paralleling Interstate Highway IH-35 from Georgetown to US 183 southeast of Austin. SH 130 will eventually extend about 90 miles, reaching IH-10 in Seguin. The route is shown in Figure 5.1 (Texas Tollways 2003).

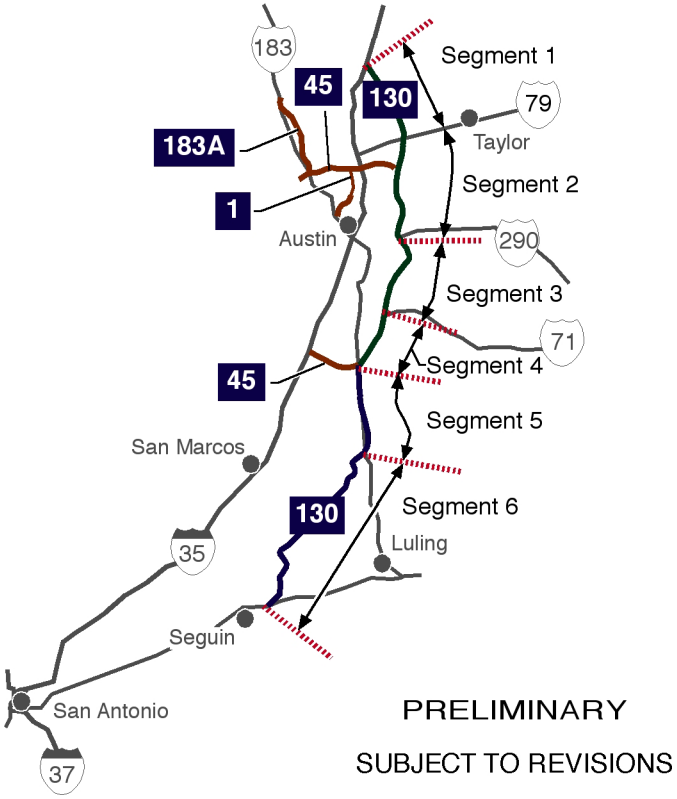

Figure 5.1: Texas State Highway 130 Alignment (Texas Tollways 2003)

SH 130 is the first phase of the Central Texas Turnpike Project (CTTP), which will also include State Highway 45 North — RM 620 to SH 130 (approx. 13 miles) — and Loop 1 Extension — FM 734 (Parmer Lane) to SH 45 North. Financing for the Central Texas Turnpike Project is through a bond issue ("2002 Series Bond") of $2.199 billion, a federal government (TIFIA) loan of $900 million, plus contributions from TxDOT and local governments for ROW costs and toll equity financing. Construction of SH 130 is projected to be completed by December 2007. The estimated cost is $1.5 billion, of which about $280 million is for acquiring 400 feet of right-of-way (ROW). (Note: Actual ROW expenditures as of summer 2003 have exceeded $400 million.)

The data for the initial construction cost, revenues, O&M costs, and bond repayment schedule were obtained from the official literature for the 2002 Series Bond. The bond and TIFIA expenses for SH 130 were calculated as 51.25% of the overall CTTP loan payment schedule based on the construction costs for SH 130 being 51.25% of the entire CTTP construction costs. The bond payments are spread over 35 years and back-loaded, starting at $18 million in 2009 and escalating to $133 million in 2042, its retirement date. In addition, the TIFIA loan repayment starts at $9 million in 2010 and escalates to $119 million in 2042, its end date.

5.2 Financial Analysis of SH 130 Investment

The following assumptions were made to extrapolate the financial data beyond 2042:

- O&M costs will increase at 10% per year from 2042 onward. This is consistent with the Florida experience. In addition, periodic major maintenance of the highway will be done every 10 years at costs similar to those incurred before 2042.
- By 2042 traffic volume will be 100,000 vehicles per day on the heaviest segment (US 79–US 290). It is assumed that it will stabilize at that volume but revenue will continue to grow at 2.5% per year because of toll increases matching the projections of 2035–2042. With these extrapolations, O&M expenses equal revenues in 2068. Alternative extrapolations do not significantly alter the results since those dollars are far in the future.

5.2.1 SH 130 Cash Flow

Figure 5.2 is the plot of revenues and O&M costs including extrapolations. Revenue growth averages almost 9% per year, comparable to Florida. O&M expenses also grow at about 9% per year. However, O&M as a fraction of revenue averages about 25%, less than the Florida experience. The use of electronic tolling should lower operation costs, but it is likely that maintenance expenses will be comparable to Florida's, and therefore higher than the official estimates.

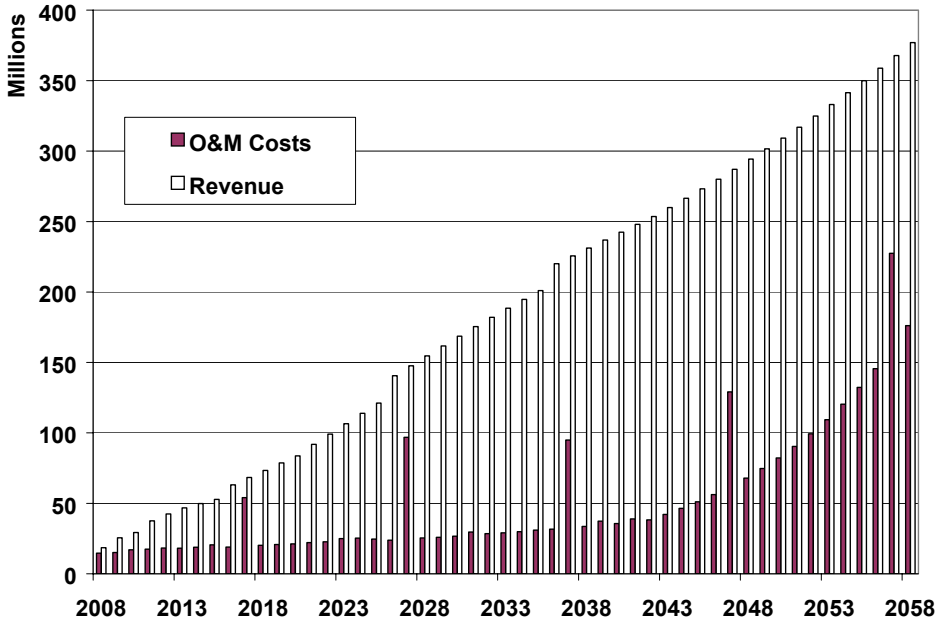

Figure 5.2: SH 130 Projections of Revenue and O&M Costs

5.2.2 SH 130 Projected Debt

The debt at any instant is the amount the developer would owe if the assets were completely lost. The amount of this debt at the end of 2008 is the total initial capital investment in the project. Every year after, this figure is compounded at the interest rate of the bonds, less the revenues available in that year for repayment of the debt. (Note that this debt does not include the cost of ROW, which was contributed by local governments.) Figure 5.3 shows the result.

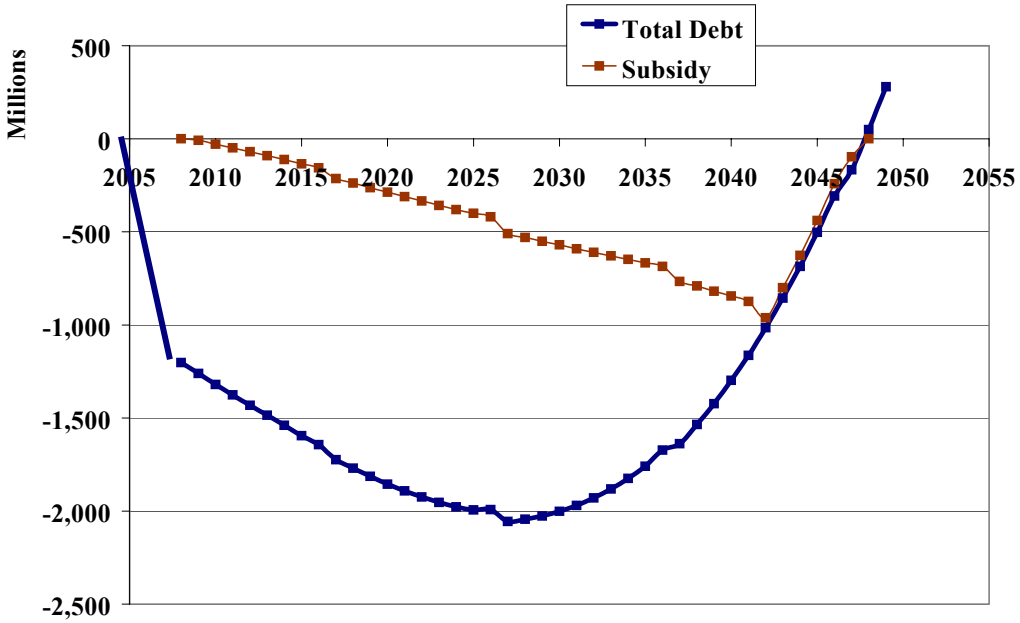

Figure 5.3: SH 130 Projected Debt Pattern

In the first 20 years of operation (2008–2028), the estimated SH 130 revenue will not be sufficient to meet O&M expenses plus interest on the debt. As a result, the outstanding debt will increase. From 2029 onward, revenues exceed expenses. This pattern is similar to those observed in the Florida projects.

In order to provide bond-rating agencies some assurance that the coverage ratio will exceed 1.30 annually, TxDOT will pay SH 130 maintenance expenses if revenues are not sufficient (i.e., bond repayment has first priority). TxDOT's guarantee is treated in this analysis as a line of credit payable when the project makes money. The balance on the line of credit (depicted as "subsidy") was compounded at a borrowing rate equal to the bond rate of 5.75%. In 2042 the line of credit will reach a maximum of $936 million. After 2042, the line of credit will be paid off in 6 years. The project breaks even in 2048, giving a payback period of 40 years. (A lower or higher compounding rate would shorten or extend the project payback period slightly.)

5.2.3 Internal Rate of Return

The rate of return for the project was calculated over an extended analysis period, as shown in Figure 5.4. This is the return to the state on its investment, which is really the subsidy amounts in Figure 5.3. ROW costs are not counted. At year 35 the bonds are paid off and future revenues accrue to the state's account. The pattern is similar to the Florida cases shown earlier in Figure 4.6, and ultimate return falls between the two previous projects. The project performance can therefore be considered average.

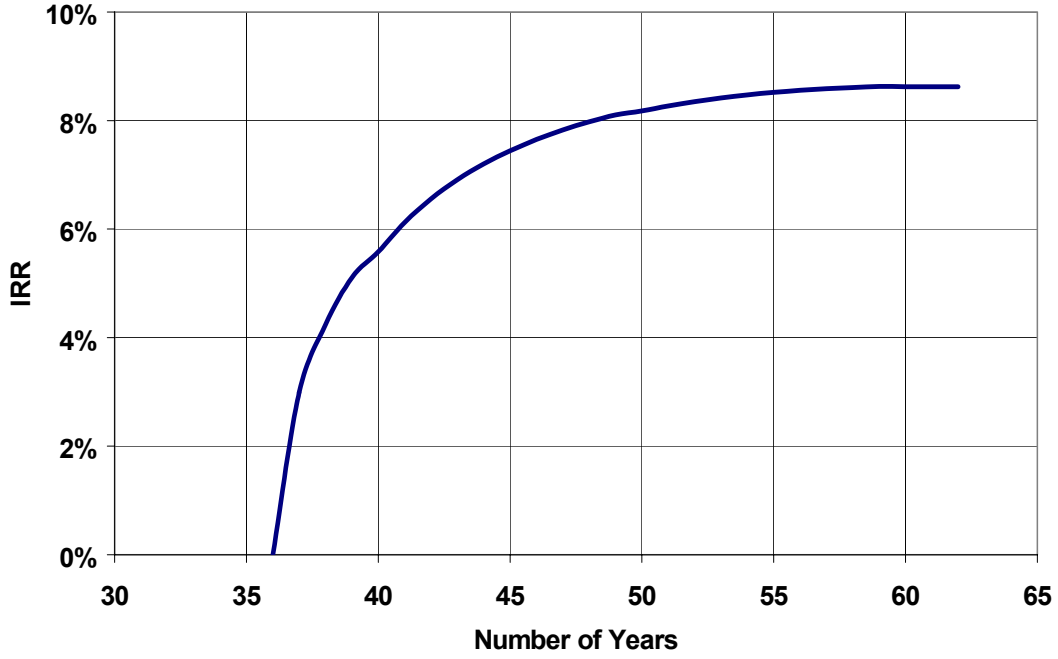

Figure 5.4: SH 130 Rate of Return over Analysis Period

Table 5.1 shows benchmark rates of return for SH 130 and project age when attained.

Table 5.1: SH 130 Return on Non-ROW Investment

Benchmark IRR	Project Age
3%	37
4%	38
5%	39
6%	41
7%	44
8%	48

At breakeven (year 40) the IRR is 5.4%, the composite interest rate on the loans. The ultimate IRR on the project is 8.6%, 60 years out. These values do not take into account the ROW contributed to the project. If ROW costs are figured in, ultimate IRR is significantly lower. Depending on the assumptions made in extrapolating revenue and expenses, the ultimate IRR could be slightly more or less, but the trend is clear: the payback period and return on investment would be attractive only to the state.

5.3 Sensitivity Analysis

The foregoing results are based on revenue and O&M estimates from the 2002 Bond Issue. The sensitivity of the results to variation in revenue, O&M expenses, and ROW costs is now presented.

5.3.1 Sensitivity to Variation in Revenue

Figures 5.5 and 5.6 show the variation in payback period and IRR for actual revenues being a factor of the 2002 Bond Series estimates.

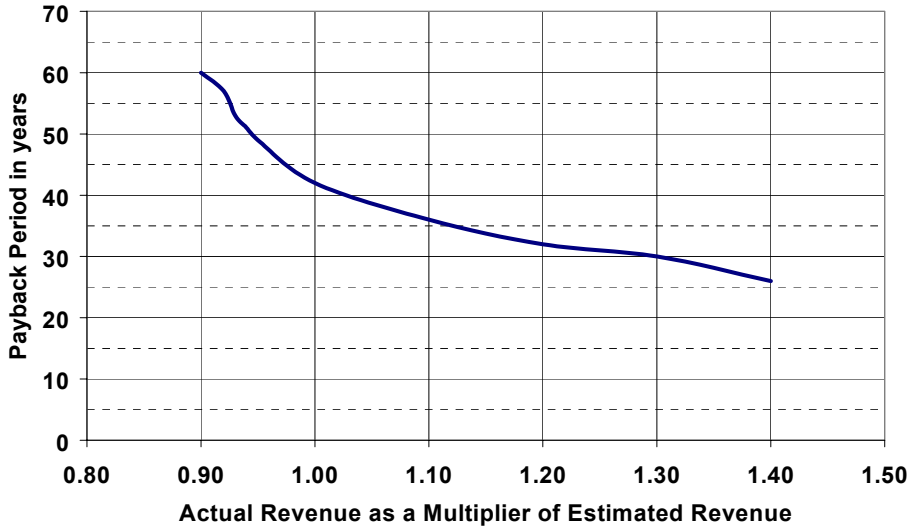

Figure 5.5: SH 130 Payback Period for Different Levels of Revenue

The payback period is highly sensitive to revenues being less than estimated. The project may never break even for revenues less than about 80% of those estimated. Obviously if revenue is higher than estimated the payback period is reduced. The internal rate of return is also sensitive to reduced revenues (Figure 5.6). If the actual revenues are less than 90% of estimates, the project will have an ultimate IRR of less than 6%. If revenues are greater than estimates, the IRR could exceed 30%.

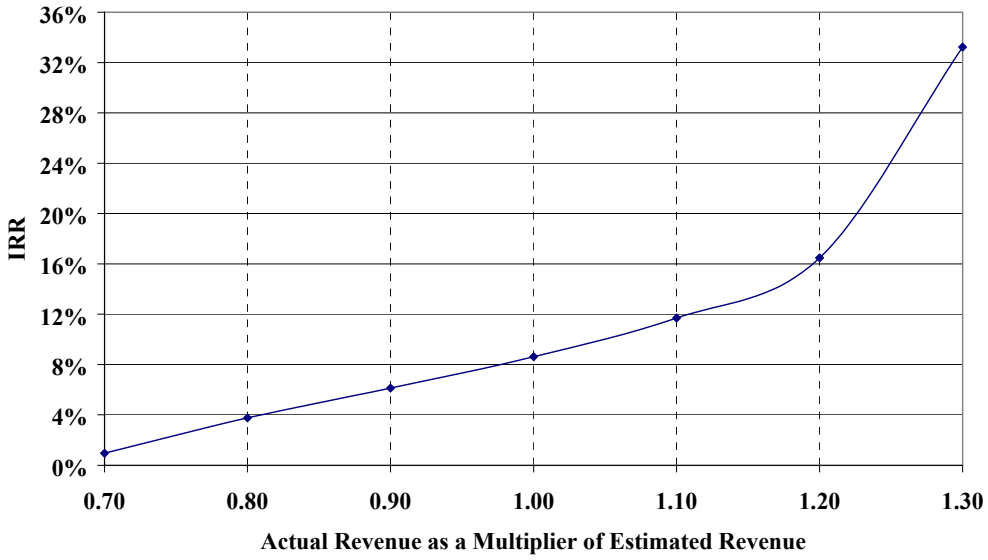

Figure 5.6: SH 130 Rate of Return for Different Levels of Revenue

5.3.2 Sensitivity to Variation in O&M Expenses

Figures 5.7 and 5.8 show sensitivity of the results to variation in O&M cost.

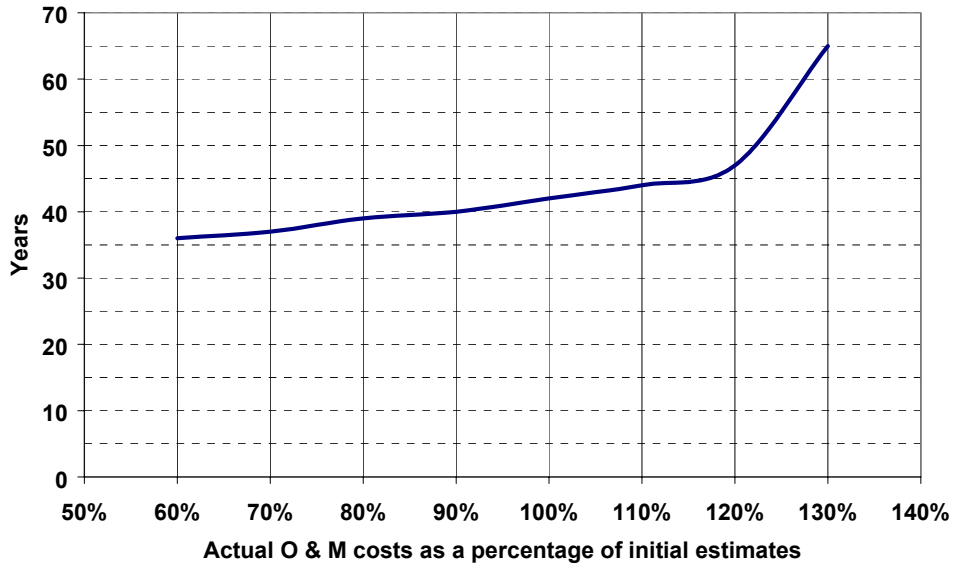

Figure 5.7: SH 130 Payback Period for Different Levels of O&M Costs

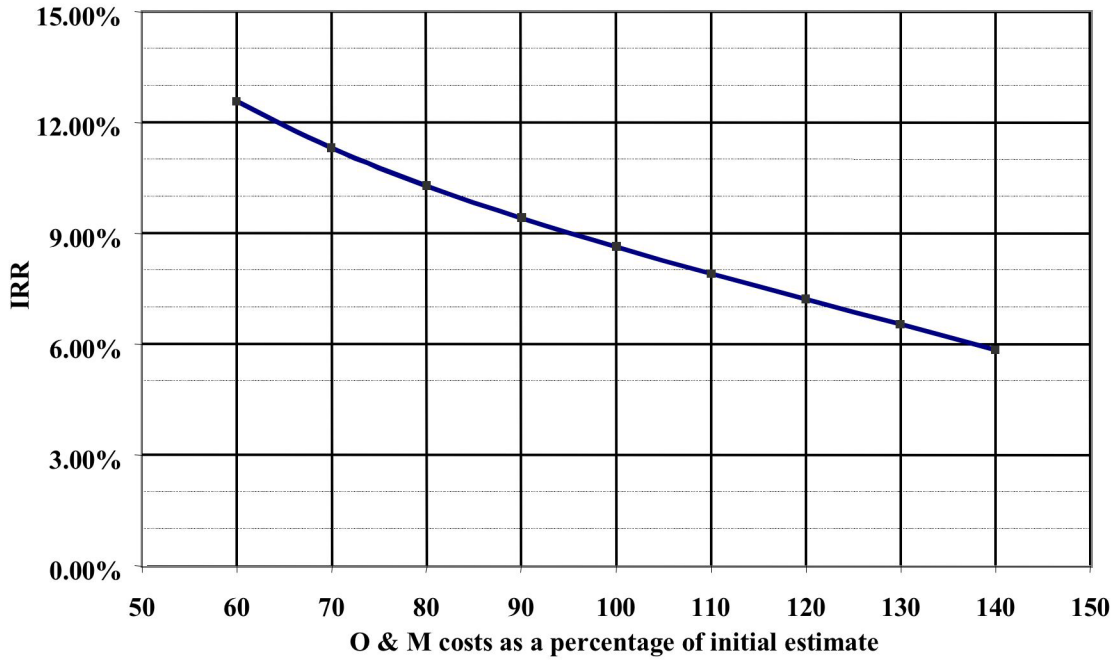

Figure 5.8: SH 130 Rate of Return for Different Levels of O&M Costs

The payback period is fairly insensitive to the variation in O&M costs up to 120%. This is because the estimated O&M costs are relatively small compared to bond debt. Beyond 120% the payback period escalates rapidly. The internal rate of return is sensitive to the O&M costs. Low costs will give a higher IRR, and costs greater than 140% of estimates will drop the IRR below 6%. Clearly O&M costs will have to be controlled very carefully.

5.3.3 Sensitivity to Changes in ROW Width or Cost

All of the foregoing analyses ignored the cost of ROW for SH 130, since the originally estimated $282 million ROW cost is being contributed by the local governments. The width of ROW being procured for SH 130 is 400 feet. For the Trans-Texas Corridor, 1,200 feet will be acquired, that is, approximately triple the cost of ROW for SH 130. The sensitivity of the performance measures to ROW cost was tested and the results are shown in Figure 5.9.

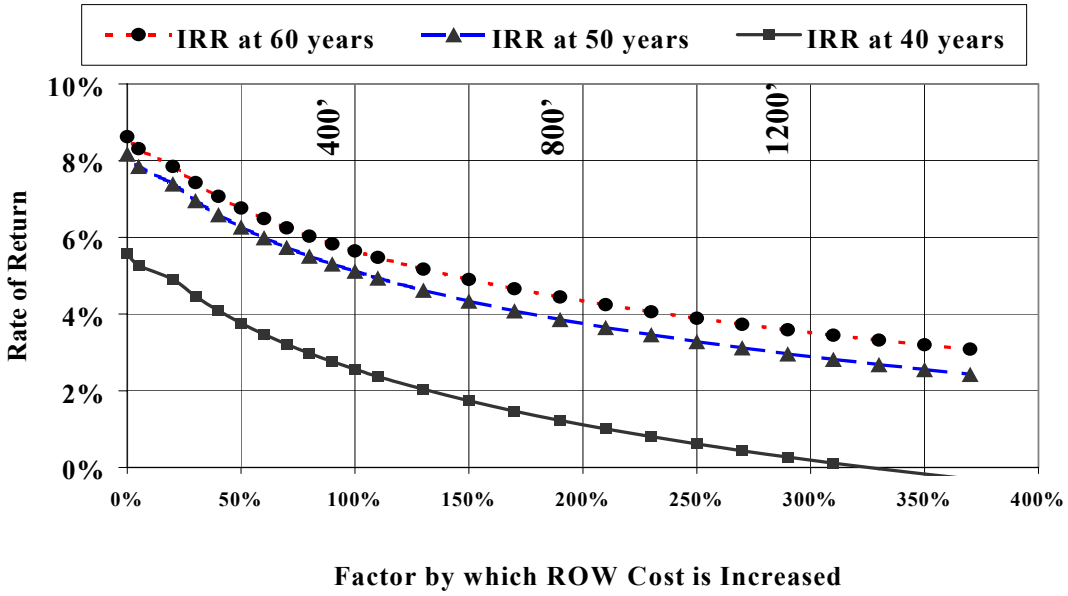

Figure 5.9: SH 130 Rate of Return when ROW Cost is Increased

The plot shows the variation in rate of return for varying levels of cost of ROW, starting from 0% (the SH 130 case). The three curves represent the value of the IRR at 40, 50, and 60 years, respectively, for different levels of ROW cost.

- The 100% ROW case applies if the 400 feet of ROW for SH 130 were to be paid from revenues. After 40 years, the IRR is less than 3%. The project does not attain an IRR of 5.75% (the bond interest rate to pay off construction debt) until 60 years.
- The 300% case applies if 1,200 feet of ROW were to be paid for. After 40 years the IRR is barely above zero. After 60 years it is about 3.5%. The project never attains the 5.75% benchmark.
- Added cost of ROW beyond 300% represents whatever incentive might be offered for landowners to accept deferred payments. Any incentive would cause the state to lose money.

The above results are based on projections of revenue and expenses beyond the 2002 Bond Series estimates, which end in 2042. The revenue and O&M projections were altered to see the effect on the results and it was found that the numbers improve with higher revenues, but not by much. The overall project performance is not significantly changed, meaning that the results are not very sensitive to revenues and costs far beyond 2042 because their discounted values are comparatively small.

5.4 Conclusions from SH 130 Case Study

Estimates of revenues, O&M costs, and debt payment commitments for the SH 130 project were analyzed. It was found that:

- The project's debt pattern will be very similar to the Florida projects; namely, it will go further into debt in the first 20 years, then stabilize, and then pay off all debt (bonds and line of credit) after about 40 years of operation. Ultimate return on investment is about 8.6%, 60 years out.
- The results are fairly sensitive to estimates of revenue, but more so to O&M costs. Compared to the Florida projects' experience, the estimates of O&M expenses for SH 130 appear to be low. If O&M expenses are higher than estimated, project performance could be less attractive.
- The financing of SH 130 includes a contribution by local governments for the ROW cost. If the project had to pay for that cost, the payback period would be in excess of 60 years, and the maximum IRR would be barely 5.75%. The project would not be able to pay for additional ROW comparable to the 1,200 feet for the Trans-Texas Corridor in a reasonable time or at an interest rate attractive to investors.

Overall, it appears that the roadway portion can afford 400 feet of ROW at most. To obtain a good bond rating and a reasonable interest rate on bonds for just that much ROW, the state would have to guarantee payments to bondholders (first call on revenues) and O&M expense (as is the case for SH 130). Essentially, the state would have to accept

all the risk on the project. Any ROW payment scheme that is contingent on revenue would expose the landowners to some risk, in that it would be similar to lending to the State with a low likelihood of payments in the first 15 to 25 years, and a payback period of 40 to 60 years at a very low interest rate. Only a small fraction of landowners would accept such terms. Conversely, if a landowner wishes to be an investor in the corridor, he can purchase corridor bonds, which would be far better deal.

The further out the royalty arrangement extends, the higher will be the interest that the state has to offer. An interest rate greater than the bond rate would make the scheme more costly to the state than issuing bonds and paying for ROW upfront. In any case landowners will require at least some upfront amount to clear taxes and title to the property. Investment options and risks acceptable to landowners will be presented in the next chapter.

The foregoing is based on a purely financial analysis. Transportation projects also yield economic benefits that would significantly improve project feasibility. One early study estimated the economic development benefits of the Trans-Texas Corridor at over $500 billion (Perryman 2002). However, local governments are in a better position than the state to convert economic growth into revenues. For SH 130 the state was able to obtain local government contributions to pay for ROW up front, in effect leveraging future benefits into up-front funds. Local contributions for the Trans-Texas Corridor would improve project feasibility, allowing the state to borrow more in bonds and at a better rate and to pay for ROW up front. If local entities can be encouraged to contribute to costs, the corridor would be a worthwhile investment because the return would eventually exceed the minimum benchmark of 3%. In fact, given the above financial results, it may be feasible for the state to offer local governments royalty payments in return for contributions.

Chapter 6: Landowner Response

6.1 Introduction

To capture landowner concerns and issues associated with various ROW payment scenarios, the research team conducted focus group sessions. At the current stage of planning for the Trans-Texas Corridor, focus groups offer a more effective method of data collection regarding royalty payments than surveys do, given that this research addresses the feasibility of the concept. A survey may have created the misconception in the landowner population that royalty payments are an actual TxDOT policy, whereas in a focus group setting it is possible to answer questions and assess before-and-after responses.

The objectives of the focus group sessions were as follows:

- Develop a range of landowner preferences
- Evaluate pros and cons of each preference
- Determine the options most preferred by landowners

Four sessions were conducted:

- Landowner group from Fort Stockton
- ROW specialists in TxDOT's Turnpike Authority Division
- ROW specialists in TxDOT's Austin District
- Landowner group affiliated with the Texas Farm Bureau

6.2 Focus Group 1 — Fort Stockton

The Fort Stockton focus group consisted of five landowners in the West Texas area near Midland-Odessa. They own large tracts in rural areas, most for several generations. The intent in starting with this group was to gauge the response of rural landowners to royalty payments (the Trans-Texas Corridor will traverse mostly rural areas) and to develop an array of payment options. The format of the meeting was:

- Description of the research objectives
- Presentation of general information about the Trans-Texas Corridor
- Free-form discussion guided by a moderator, with note taking
- Summarization of discussion and clarifications

6.2.1 Group 1 — General Discussion

Upon being presented with general information regarding the Trans-Texas Corridor (no information was provided to them on cash flow projections), this group of landowners reacted positively to the ROW royalty concept. However, with further discussion it became clear that their understanding of royalties is based on their experience with oil leases (common in West Texas), in which they receive a percentage of the oil revenue while retaining ownership of the property. Upon clarification that title to the land must be transferred to the state up front and that the royalty payment would be compensation for that title, they revealed a high emotional attachment to their land, wanting to retain ownership and/or guarantee the welfare of their descendants.

During the free-form discussion the group seemed to teeter between wanting the economic development promised by the corridor and concern that they would not get the full value of their property. Several of them had had disputes with oil producers and expressed misgivings about dealing with the state. Therefore they preferred upfront payment, but would accept guaranteed payments with incentives. Eventually they began exhibiting a desire to help the researchers and suggested some alternatives in addition to those outlined by the researchers.

6.2.2 Group 1 — Options Brainstormed

The options discussed were:

- Land swaps with other state property
- Tax-break incentives such as on property taxes, capital gains taxes, etc.
- Stocks
- Royalty payment, with disagreement over definitions and conditions:
    - Retention of land title
    - Which segments of the corridor would form the revenue pool
    - Priority order of expenses
    - Each landowner's share
    - Guarantees from the state
- Bonds with triple-A rating and interest rates 0.50 to 0.75 percentage points over the U.S. Treasury Bill (T-bill) rate (Note: T-bill rates increase with period.)
- Lower-rated bonds with higher interest rates for no more than 20% of the property value
- Lease to the state with first option on purchase

6.2.3 Group 1 — General Evaluation

The general evaluation of this group was that, while they themselves may not accept these options, other landowners might. The majority preferred guaranteed payments over a period of less than 25 years. They wanted a financial instrument that could be sold after 5 years. Essentially, they would accept a bond. They also liked the idea of leasing to the state. Individual preferences appeared to be related to age, how long the land had been in the family, whether or not it was the primary source of income, and what the landowner thought the land was worth.

6.3 Focus Group 2 — ROW Specialists from TxDOT Turnpike Division

The second focus group comprised three ROW specialists from TxDOT's Turnpike Division. They are all landowners themselves, but also have significant experience dealing on behalf of the state with landowners in urban and semi-urban areas, most recently for the SH 130 project. The objectives of this focus group session were to evaluate, refine, and add to the options revealed in Group 1 and to test the relationship between landowner demographics and likely responses to those options. The format was more structured than for Group 1, utilizing a questionnaire/discussion process. The questionnaire provided information on the various options developed from Group 1.

6.3.1 Group 2 — Evaluation of Options

This group was asked to respond as landowners offered each of the options as deferred payments for their property. Later they were asked to describe the characteristics of landowners who might accept each option. Having seen the official financial analysis for the Central Texas toll projects, these respondents were aware of the prospect of toll revenues falling short of expenses for an extended period, and this may have prejudiced their responses.

6.3.1.1 *Land swaps*

Land swaps were not seen as a viable option because TxDOT does not own surplus land. Buying equivalent land elsewhere would cost just as much and would require up-front payment. High administrative costs were also anticipated in operating such a "Land

Bank." (Discussions in later focus groups included swapping of remainders among landowners.)

6.3.1.2 *Tax-break incentives such as on property taxes, capital gains taxes, etc.*

This option was seen as a promising "sweetener" for a landowner to accept deferred payments. However, it would probably mean TxDOT either working out arrangements with the federal Internal Revenue Service and local taxing entities or else paying those taxes upfront. The precedent of local governments procuring ROW for TxDOT projects was also mentioned.

6.3.1.3 *Stocks*

The legality of the state issuing stocks was questioned. However, this might be possible in a public-private partnership. It was also discussed that there would be political repercussions if the stock lost value or failed to pay reasonable dividends. The consensus was that the majority of landowners are highly risk-averse and would not accept stocks as the only compensation for their land.

6.3.1.4 *Royalty payment*

As in Group 1, there was disagreement over definitions and conditions. This group understood that title would have to be turned over to the state, but some thought that the royalty should be in addition to deferred compensation for title. Group 2 felt that revenue from near-urban segments of the corridor should not be shared with remote or low-traffic segments. They could not agree on whether an individual's share should be based on traffic volume through the property, length of frontage, or value of the land. Group 2 thought that landowners should have equal priority with other debtors such as bondholders and that they would want minimum guarantees.

The group ranked this option as very low. The reasons included a desire to control their money, a relatively short investment horizon, and some mistrust of the state's motives. One response was: "If this is such a good deal, why does the state want to share it with

us?" These ROW specialists foresaw management of the royalty payment program as a "nightmare."

6.3.1.5 *Bonds*

The group discussed this option in great detail, perhaps because SH 130 is being financed this way. They agreed that the interest rate for the ROW bonds must be higher than the T-bill rate for the same period, but they also suggested that it should be indexed to mortgage rates. The rationale was that if a landowner had his assets tied up in a bond and had to borrow to move elsewhere, he would have to pay the mortgage interest rate. This discussion revealed that many near-urban landowners are heavily mortgaged and usually have low actual equity in their property. They would likely have large liens requiring substantial upfront payment to clear, or would require a large fraction of their money upfront in order to relocate. The group estimated that the potential in near-urban areas for ROW bonds is therefore probably less than 20% of total acquisition costs.

The group said that the start date for bond repayment should be the day traffic started moving through the property, and the period for repayment should be as short as possible. Pressed for a limit, the focus group preferred payback within 5 to 15 years, compared to Group 1's 25-year limit.

6.3.1.6 *Lease to the state with an option to buy*

There was a lot of interest in this alternative. Landowners saw this as a way to retain ownership and use of the land not actually occupied by traffic modes, while receiving guaranteed income. A number of provisions were discussed (Note: TxDOT may not have the legal authority to implement all of these provisions):

- Payment and transfer of title for only the used portion of the 1,200 feet
- Agreement to not change the type of usage of the remainder
- An annual lease payment equal to a percentage, perhaps of the order of 2–5%, of the "agreed value" of the remainder on the day of the agreement
- Lease for up to 15 years initially and renewable at expiry
- Landowner could sell the land, but the deed carries the lease as a lien. TxDOT could also sublease, sell, or transfer the lease

6.3.2 Group 2 — Factors Influencing Landowners' Acceptance of Options

In addition to evaluating the options, this focus group provided insight into the factors that might influence landowners' acceptance of any of the options or the possibility of condemnation/court action (which would require up-front payment).

6.3.2.1 *Factors not known in advance of setting the corridor alignment*

Several of the factors influencing landowner acceptance of a deferred payment option relate to information that will not be known until the final alignment of the corridor is settled:

- The amount/fraction of their land taken: Giving up 50% of a 40-acre block would be more significant to a landowner than giving up 10% of a 640-acre "patent."
- Dependence on that portion as their primary means of livelihood: Giving up the most lucrative section of his land would severely affect an owner.
- Cutting off one section of a property from another, and/or creating uneconomic remainders: These scenarios would increase a landowner's resistance and the possibility of condemnation. Up-front settlement would be required and/or the provision of alternative access routes, which are also up-front costs.
- Joint ownership: For an agreement with TxDOT, all owners must be involved. In many cases they would prefer cash payment so they can easily split the proceeds. In the case of absentee owners or title disputes, a title curative may be required, again requiring an up-front deposit.

6.3.2.2 *General demographic factors*

The second set of factors that might influence landowners' acceptance of deferred payments is general demographic issues:

- Rural versus urban: Rural holdings tend to be larger, and thus the net effect of giving up a 1,200-foot swath would be less. Rural landowners are also more likely to support the building of the corridor because they hope for local economic development. Near-urban landowners fear noise, pollution, hazardous material transport, and disruption of their lifestyle. Their properties are more likely to be owner-occupied or business-oriented, magnifying the impacts on them personally and thus increasing their resistance to acquisition.
- Speculative versus nonspeculative: Speculative landowners would have bought on the expectation that the land would increase in value to gain them a return greater than other investments, or are hoping to derive business income from future development. They would welcome the corridor if they could have access or profit from development. However, they would not settle for low returns or long-term commitments as envisaged in the royalty arrangement, preferring up-front payment or short payback periods. Nonspeculative landowners most likely

inherited the land and would prefer to keep it or guarantee their heirs a predictable income. Others may have bought the land for recreation or as a primary residence and would part with it for an equivalent property elsewhere. Such owners usually have low equity in the property and would need significant up-front payment to clear the title.

6.3.3 Group 2 — General Evaluation

Overall, the second focus group provided detailed evaluations of the limitations and possibilities of the various options. They also offered insights into the psychology of landowners and likely responses to the deferred payment options.

6.4 Focus Group 3 — ROW Specialists from TxDOT Austin District

The third focus group comprised six ROW specialists from TxDOT's Austin District. They have significant experience dealing on behalf of the state with landowners in urban and semi-rural areas. The objectives of this focus group session were to validate and further refine the evaluations of the options and the landowner response assessments done by Group 2. The format was similar to that of Group 2, with the questionnaire modified to reflect the demographic factors and the improvements to the options suggested by Group 2.

6.4.1 Group 3 — Evaluation of Options

This group was also asked to rank the options in terms of viability from the perspective of landowners as well as for TxDOT (in terms of nonmonetary criteria such as administrative costs, legal and political considerations, and jurisdictional concerns, particularly for tax incentives). The following presents only the additional information supplied by Group 3.

6.4.1.1 *Land swaps*

Refereeing land swaps could be difficult. Paying off landowners so they may acquire replacement properties was deemed more efficient. Land swaps were rated as high-acceptability to landowners but low-viability from the state perspective.

6.4.1.2 *Tax-break incentives on property taxes, capital gains taxes, etc.*

There was some discussion that deferred payments could spread out the expense of capital gains taxes or even eliminate them. Many landowners would also like to reduce their property taxes. This option was also rated as high-acceptability but low-viability.

6.4.1.3 *Stocks*

Near-urban segments of the corridor might attain positive cash flow earlier than rural segments, thus making stocks an attractive investment in limited portions. Segmenting the corridor according to profitability could be a contentious issue. This option was rated as low-acceptability to landowners and low-viability for TxDOT.

6.4.1.4 *Royalty payment*

The group felt that the royalty payment should be viewed more as an incentive to accept deferred payment for land. The actual payment should come from standard financing sources (i.e., guaranteed payments). Its consensus was that the only reasonable and fair way to calculate an individual's share is based on the original value of his land ("equity"), not land area, frontage, nor traffic passing. If the royalty payment is based on equity and is essentially a dividend paid if profits materialize, then it would be no different from a stock. This option was rated as low-acceptability for landowners and medium-viability for TxDOT.

6.4.1.5 *Bonds*

Discussion centered on whether a bond would pay as much as the income a landowner derives from his land. For properties with low net income, landowners might be glad to trade the land for bonds. For profit-making property, however, a landowner might want the equivalent of that income perennially. This focus group indicated that landowners are now more suspicious of the state, and condemnation rates have increased. Limiting the bond offer to only landowners might intensify suspicion and increase the number of condemnations, resulting in more up-front payments. A general bond offer was seen to be more acceptable. The bond option was rated as medium-acceptability to landowners and high-viability for the state.

6.4.1.6 *Lease to the state with an option to buy*

Instances where TxDOT has leased land back to former owners were mentioned. Landowners like this arrangement because they avoid property taxes while enjoying continued use, sometimes for many years. The reverse situation would obtain under this option (landowner retains title to unused width of ROW; state pays for lease). Since the landowner would retain his original income from the land, the lease payment would be additional guaranteed income. To avoid speculation, the state would have to find a way to lock in the price of the land, perhaps couching the lease payment as compensation for inflation. This option was rated as high-acceptability to landowners and high-viability for the state.

6.4.2 Factors Influencing Owner Acceptance

Focus Group 3 also elaborated on factors that might influence landowners' acceptance of the above options.

6.4.2.1 *Factors not known ahead of setting the corridor alignment*

- Benefits to the community: Rural landowners are more likely to give up or even donate land for ROW if they perceive a benefit to the wider community.
- Method of appraisal: Some landowners dispute the state's opinion of "highest and best use" of their land. They are therefore likely to not accept the state's offer, leading to condemnation proceedings. This may be more costly to the state because of project delays. Extending the negotiation process could save costs in the long run.
- Damages: Reduction of access or disruption of use often results in claims for damages. Such damages can be close to the actual value of the remainder property.

6.4.2.2 *General demographic factors*

In discussing the effect of demographic factors on acceptance of different options, this focus group concurred with Group 2:

- Rural versus urban: Urban landowners are likely to be financially educated and want control of their money, therefore preferring upfront payment. Rural owners view their land as a secure asset and want to retain control of ownership or receive guaranteed payments.
- Speculative versus nonspeculative: People who are aware of the coming construction of the corridor may buy up land in its path and force up prices (There

is not a lot of maneuverability in locating a 1,200-foot wide corridor.) Such speculators want 10–15% annual return on investment and will not settle for low-paying bonds or long-term royalties. On the other hand, landowners who depend on their property for their income have an expectation that the property will provide income forever. They therefore want guaranteed income greater than they currently enjoy or a large up-front settlement.

6.4.3 Group 3 — General Evaluation

Overall, this third focus group provided further evaluations of the options and confirmed the previous findings. They categorized the payment options as (1) upfront payment, (2) lease, (3) bond, (4) stock/royalty. They also revealed that better information seems to alter reaction to royalty payments, an issue that required further investigation.

6.5 Focus Group 4 — Landowners Affiliated with the Texas Farm Bureau

The fourth focus group comprised six people associated with the Texas Farm Bureau. Most of them are working farmers/ranchers who own large tracts in semi-rural areas in the potential path of the Trans-Texas Corridor. The objectives of this focus group session were to capture their responses to royalty payments before and after information regarding the Trans-Texas Corridor is provided and to compare the acceptance profiles to the previous findings. The format of the meeting was:

- Description of the research objectives
- Collection of general demographic information and landowners' initial understanding of the royalty concept using a questionnaire
- Presentation of general information about the Trans-Texas Corridor and revenue potential
- Collection of revised response to the royalty concept
- Free-form discussion

6.5.1 Group 4 — Initial Responses

As with Group 1, this group initially had positive impressions of the ROW royalty concept. The majority thought they would give up only surface rights to their land and expected immediately to start earning significantly higher annual incomes than they currently enjoy. Some compared it to easement fees from utility companies. Even those who were prepared to give up title thought the payback would be significantly higher than their land value. They saw it as a low risk/high reward proposition. However, one

landowner had been involved with the Texas Grand Venture (a high-speed rail proposal from the early 1990s) and was extremely skeptical of the success of the Trans-Texas Corridor.

The group implicitly recognized that rural segments are not likely to earn as much as urban segments and asked for pooling of revenues across the entire enterprise. They split on whether an individual's share should be based on traffic, land area, land value, or current income from the land. They wanted the royalty payments to continue in perpetuity. The tone of the responses suggested great aversion to risk and some mistrust of the state.

6.5.2 Group 4 — Post-Information Responses

After a brief description of the proposed development of the corridor and the typical revenue profile of toll projects (4808-P2, the landowners' responses underwent a marked change. They wanted a significant up-front payment and/or a guaranteed payment stream for a limited number of years that would compensate them for the value of their land plus foregone future income. Instead of the payment being a share of profits, they now wanted it to be considered an annual operational expense to be paid ahead of construction debt. The longer they would have to wait to receive full payment, the greater the initial down payment would have to be. These responses embodied the landowners' reassessment of the risk in the project. Their concern that they should be compensated for lost future income revealed that they are highly dependent on their land for their livelihood and see the corridor as likely to disrupt that livelihood ("Cows don't do too well near trains").

6.5.3 Group 4 — Discussion of Options

This group was not presented with the options developed by Groups 1–3, with discussion focusing on the structure of royalty payments. Yet the discussions eventually lined up with the previous options, verifying the previous findings:

6.5.3.1 *Land swaps*

The landowners were concerned about the corridor splitting their properties, leaving uneconomic remainders or making access more circuitous. They suggested swapping remainders with landowners on the other side of the corridor, thereby combining two or more adjacent pieces on one side into new viable parcels.

6.5.3.2 *Tax incentives*

The landowners felt that the corridor would bring economic benefits to the state and that the benefits should be translated into some incentives to landowners, such as reduction in property taxes. They also hinted that they preferred dealing with the counties rather than the state.

6.5.3.3 *Stocks*

Some compared the royalty concept to stocks and said that they have more faith in the long-term prospects of the stock market.

6.5.3.4 *Royalty payment*

They would accept a royalty payment only as a bonus for deferring payments for their land. If it is the sole payment for their land, then only wealthy or younger people might be interested. Asked if they thought speculators might buy land as an investment to earn royalty payments, they thought only large entities seeking to diversify their investments would be interested. Conversely, they knew of developers who were buying ranches and splitting them into mini-ranches for "city slickers." These developments could complicate ROW acquisitions for the corridor.

6.5.3.5 *Bonds*

Deferred payments could be structured as bonds or reverse mortgages with guaranteed minimum payments.

6.5.3.6 *Lease to the state with an option to buy*

They felt that landowners should be allowed to continue to use land not occupied. One landowner knew of someone who was making money off land leased *from* the state. Leasing to the state while enjoying use seemed to be "a win-win situation."

6.5.4 Group 4 — General Evaluation

General discussion returned to loss of future income and damage to existing livelihood. Most landowners want the compensation for their land to be a reliable income stream. Unless deferred payments are better than their current and projected income stream, they would not accept them. One landowner said that without access to the corridor, his remaining land would lose value, for which he would want compensation.

Overall, this fourth focus group validated the findings from the previous groups. Their order of preference was (1) up-front payment, (2) guaranteed payments for an agreed period with acceptable interest rate, and (3) royalty payments as an incentive to extend the period of the guaranteed payments. Group 4 also confirmed a potential pitfall for TxDOT: Without adequate information, landowners would accept royalty payments; with better information, they react negatively.

6.6 Evaluation of Payment Options

The following is a summary evaluation of the payment options by the focus groups:

6.6.1 Land Swaps

This would be a relatively low-cost option if the state owns swappable land. However, if that is not the case, then TxDOT would have to buy land elsewhere to trade, resulting in an up-front cost. In addition, TxDOT would have to operate as a land bank, a large administrative cost. Therefore, even though landowners may accept this option, it is probably not viable for TxDOT from a practical standpoint.

6.6.2 Tax Breaks

This is not strictly a deferred payment option, but may have potential as an incentive for landowners, who generally liked the idea. It would require TxDOT to coordinate with the IRS in the case of capital gains tax, and with the local taxing authorities for property taxes. Counties might be willing to forgo property taxes for future revenue from increased employment and development. Thus, this option could have some limited viability, especially at the nodes of the corridor, provided local taxing authorities agree.

6.6.3 Stocks

The main features of this option are the following:

- Equity in a public/private enterprise in exchange for land. An individual's share would be based on the ratio of his property value to total enterprise capitalization.
- The stock could be traded in the secondary market.
- Price could vary with performance of the enterprise.
- Dividends paid only if profits realized.

This option would require no up-front capital from the state and no commitments: the landowners would bear all risk. However, the stock's value may decrease in the early operating years if the toll revenues fall short of expenses. Even in later years dividends may be low if some segments have to subsidize others. Ultimately, the dividends and stock value could be high. Thus investing in such stocks is high-risk, exactly the opposite of the preferences displayed by landowners. Political fallout could be severe. Hence, the verdict for this alternative is that it is not viable for the state or the landowners.

6.6.4 Royalty Payments

Landowners have several misconceptions linked to the term "royalty":

- Landowner keeps title to the property. This is the traditional definition of a royalty. The new term "corridor participation payment" may not correct this notion.
- Toll roads produce a surplus from day one. This is not the typical outcome (4808-P2).
- Individual share of the revenue will be based on:
    - Traffic: Near-urban owners want their share to be based on traffic through their property, essentially a toll for use of their property. Administration of

such a system would be very difficult. Property value is a more equitable measure.
    - Pooled revenue: Rural owners are well aware that their sections would not generate much traffic or revenue. Thus, they want to share in the revenue of the entire system. Setting the boundaries for revenue sharing will be a serious problem. Even sharing based on property value will antagonize rural owners with lesser-valued land.
- The state will guarantee payments. This would not be a royalty, but a bond.
- Access/development will be permitted. Access to the corridor will be restricted to "nodes" — probably major roadway crossings near cities. Land alongside probably will not enjoy development such as has happened along existing Texas freeways. Learning this, many landowners felt the corridor may devalue adjacent properties.

When these misconceptions are clarified, landowners rate royalty payments as low-acceptability for the same reasons they down-rate stocks. The provisions they require make the payments similar to bonds.

6.6.5 Bonds

The primary features of the ROW bond would be:

- Principal: "Agreed value" = fair market value of property at date of agreement, net of up- front payments for mortgage release, other liens, damages, franchise fees, etc. (which can be up to 80% of total acquisition cost). Relocation expenses must be paid upfront.
- Interest rate: Pegged to T-bill rates or mortgage rates.
- Period: Varies from 5 to 25 years. Urban landowners preferred 0–5 years, while rural landowners may be willing to wait 15–25 years.
- Payment schedule: Could be designed to match expected traffic/revenue growth.

The main advantages of the bond option are that some upfront payments can be deferred, and, by matching payments to the revenue stream, early-stage subsidies can be reduced. However, offering bonds to landowners only makes them suspicious and adds a new layer of administrative costs. A general revenue bond issue for the corridor is rated as medium-acceptability to landowners, high-viability for the state.

6.6.6 Lease with Option to Buy

The main features of this option are:

- For an annual fee, the state reserves the right to buy the unused portion of the 1,200 feet of ROW. Landowner continues to use the property.

- Value locks in at original "agreed value," on date of agreement, with lease payment compensating for inflation.
- At the expiration date, state pays owner agreed value or renews lease after re-negotiation of terms. Payment option also negotiable.

This option provides maximum flexibility to TxDOT. It can be applied to the full 1,200 feet of ROW in segments where the alignment has been determined or to the unused portion of the 1,200 feet when a specific mode is being developed. In this way significant costs can be deferred. Speculation would be lessened. The lease would be a tradable asset for the landowner and the state: a landowner can sell it as guaranteed return on investment, and the state can sell it to another transportation provider wanting to develop a new mode. In this way each mode would pay for its own ROW, reducing the impact of the full 1,200 feet on the feasibility of the first mode developed. However, there will be some administrative costs for this option. Also, constitutionally the state must pay fair market value when title is acquired. This option is rated as high-acceptability for landowners, high-acceptability for the state.

6.7 Summary of Likely Landowner Responses

Significant differences were observed in the attitudes of urban and rural landowners, as summarized in Table 6.1.

Table 6.1: The Urban/Rural Split in Landowner Attitudes

Urban	Rural
Younger; own high-value land and expecting rapid escalation in value	Older; own low-value land and expecting slow escalation in value
View their property as investment	View their property as a heritage
Usually do not depend on land for income	Often depend on land for income
Short planning horizon — prefer quick and high return on investment	Long planning horizon — accustomed to slow and low returns
Think they are good money managers — prefer control of their money or up-front payment.	View their land as a secure asset — prefer control of land or guaranteed income.

6.7.1 Income Expectations

Within both the urban and rural subgroups, the nature of income expectations from their land was found to explain their responses.

6.7.1.1 *Land is primary source of income*

Businesses in urban areas and rural farmers/ranchers are in this category. Businessmen are generally risk takers and prefer to take their money upfront and invest it elsewhere. Agriculturalists prefer guaranteed income.

6.7.1.2 *Speculation*

Speculators by definition are looking to turn a quick profit and therefore want upfront payments or a high rate of return.

6.7.1.3 *Nonspeculation*

This category of landowners generally does not expect to profit from owning land, but have unique financial needs:

- Residential landowners: These landowners are generally highly mortgaged and require upfront payments to relocate.
- Low-value or low-income land: These landowners would welcome the corridor as long as they earn more than they do at present.
- Bequest motive: Those landowners who have had the land in the family for a long time exhibit high emotional attachment to it and prefer a lease arrangement or guaranteed payments in perpetuity.

6.7.2 Likelihood of Landowners Accepting Deferred Payment Options

Table 6.2 shows the likelihood of each type of landowner accepting deferred payments, as determined from the focus groups.

Table 6.2: Likelihood of Landowners Accepting Deferred Payments

Use of Land ----→	Primary Income	Speculative	Non-Speculative
Urban	Don't Accept	Don't Accept	Unlikely
Rural	Unlikely	Uncertain	Likely (Bequest Motive)

The "uncertain" group is rural land speculators, none of whom were were in the focus groups or in the experience of ROW specialists.

6.7.3 Landowners' Preferred Payment Options

Table 6.3 shows the type of payment that each of the above types of landowners is willing to accept:

Table 6.3: Landowners' Preferred Payment Options

Use of Land----→	Primary Income	Speculative	Non-Speculative
Urban	Upfront + Lease	Upfront	Upfront + Lease
Rural	Upfront + Lease	Uncertain	Bond or Lease

Essentially, most landowners will accept a lease arrangement. Some rural landowners will accept a bond. The only group thought to be amenable to ROW royalty payments is semi-urban or rural landowners hoping to bequeath income to their heirs.

Chapter 7: Financial Analysis of Alternatives

7.1 Introduction

The results presented in Chapter 6 show that landowners generally dislike parting with their land, and without eminent domain laws they probably would resist acquisition. Most landowners are risk-averse and are unwilling to accept royalty payments as compensation for their land, instead preferring to receive all or a significant portion of the payment up front. For the deferred amount they would prefer as short a payout period as possible, perhaps 5 years and in most cases no more than 15 years. They want guaranteed payments, essentially a bond or reverse mortgage, at a rate of interest better than U.S. Treasury bills and comparable to mortgage rates. Being emotionally attached to their land, rural landowners prefer the state to take only as much land as is needed. They were therefore receptive to an option where the state paid them for what it needed for initial construction and reserved the remainder of the 1,200 feet via a lease arrangement.

The general order of landowner preference was found to be:

- Up-front and/or bond payment, for the portion of ROW occupied by initial modes
- Lease by state with option to buy, for unused portion
- Royalty payment as an incentive to extend bond period

This chapter presents an analysis of the financial feasibility of permutations of these options from the state's perspective. This analysis required assumptions of revenues and expenses for the Trans-Texas Corridor. To be consistent with the analyses previously presented, State Highway 130 (SH 130) was used as the study segment. SH 130 is anticipated to become the roadway portion of the corridor around Austin and is expected to generate more revenue than rural segments. Therefore, an option that is infeasible or marginally feasible for a segment like SH 130 is not likely to be feasible for the greater corridor.

7.2 Criteria for Financial Evaluation of Options

For this analysis three criteria were chosen as measures of the financial feasibility of an investment:

Internal rate of return (IRR): This is the percentage interest earned annually on average over the project's life, on capital invested. By comparison, the IRR earned by a certificate of deposit is the annual percent interest received. The higher the IRR, the more profitable is an investment. The Texas State Comptroller recommends a minimum discount rate of 3% for state investments. In effect, this 3% ensures that the state gets back what it put in, since inflation reduces the worth of future money, and average annual inflation has been of the order of 3%. In other words, a project earning less than 3% would be a loss for the state. If the state is borrowing externally to finance a project, then a higher IRR is needed for at least two reasons: (1) to assure investors of the project's viability and (2) to earn enough to repay the loan. The external borrowing rate is currently about 6% for long-term loans (the 35-year bonds for SH 130 sold at 5.75%).

Payback period: This is the time the project takes to repay all capital and operating expenses incurred to that point. Inflation should be taken into account. The shorter the payback period, the more desirable would be the project. However, from the state's perspective this is not a critical criterion, since the state is able to wait for a long time provided the project pays for itself eventually. Payback periods of 40 to 60 years are acceptable for transportation projects. After 60 years a project would probably require significant reinvestment.

Subsidy required: Ideally, annual revenue from a project should at least meet annual financing, operating, and maintenance expenses. However, for toll projects revenue is low in the initial years, and some subsidy is usually required (4808-P2). For example, in order to reassure bond investors, TxDOT agreed to subsidize some expenses for SH 130 if revenues fall short. The subsidy is really a loan to the project and may be financed from external or internal borrowing. The project IRR has to be greater than the subsidy borrowing rate, or else the project will never pay back the subsidies. The subsidy can be expressed as a total over a period compounded at the borrowing rate or as an equivalent

annual amount over the required period. The subsidy amounts calculated will be for SH 130, that is, about 50 miles of roadway. The amount of subsidy for the Trans-Texas Corridor relative to other state commitments is a critical criterion.

7.3 Financial Analyses of Options

In Chapter 5, the feasibility of up-front payment with State funds for various widths of ROW for SH 130 was presented. It was concluded that the project could not afford much more than 400 feet of ROW (at an estimated cost of $280 million for 49 miles; as of mid-2003 the revised estimate of ROW cost was $304 million). For wider ROW, the IRR would be far less than the external borrowing rate of 5.75%, so the project would not attract investors. Table 7.1 summarizes those prior results.

Table 7.1: SH 130 Feasibility with Acquisition of Various Widths of ROW Upfront

Width of ROW Acquired	Ultimate IRR (attained at about 60 years)	Payback Period	Cumulative Subsidy at 5.75% Borrowing Rate
0 feet (i.e., ROW contributed)	8.63%	40 years	$936 million at 35th year (equiv. to $9 million per yr. or $0.18 mill. per mile/ yr.)
400 feet	5.65%	63 years	$2.85 billion at 35th year (equiv. to $27 million per yr. or $0.54 mill. per mile/ yr.)
800 feet	4.34%	Never	Infinite
1200 feet	3.52%	Never	Infinite

In that analysis the subsidy was compounded at the 5.75% external borrowing rate. If the subsidy is financed from internal funds, it can be compounded at 3% (the state's minimum IRR or internal borrowing rate). This change would not reduce the amount of subsidy required each year, but it would proportionally reduce the time beyond 35 years (when the revenue bonds are retired) at which point the total subsidy would be paid back. In that case, the project might be able to afford more than 400 feet of ROW. An analysis of various payment options from the state's perspective is now presented.

7.3.1 Option A: Bonds for 1,200 foot of ROW for a Segment Like SH 130

In this option the state issues ROW bonds to help finance the acquisition of the full 1,200-foot ROW width. The following are the assumptions for this option:

- The state will pay all up-front costs including ROW costs from revenue bonds similar to the SH 130 "2002 Series A" Bonds, with an interest rate of 5.75%, a period of 35 years, and a similar repayment schedule (one matching the projected revenue pattern). In the analyses presented in Chapter 5, up-front ROW costs were assumed to be paid with state ROW funds.
- At least 30% of ROW costs will have to be paid up front to clear liens and relocation costs. The remaining fraction of ROW costs is to be paid with ROW bonds, issued in exchange for land title.
- The ROW bonds are structured differently from the 2002 Series A Bonds, or else the results would be the same as those in Table 7.1. These ROW bonds will give a choice of repayment period from 5 to 35 years, with a fixed and equal amount paid each year and with an interest rate slightly higher than for U.S. Treasury Bonds (T-bills). These conditions meet the landowner preferences presented earlier. (Note: T-bill rates increase with duration, currently (late 2003) varying from about 2.15% for 5-year bills to about 4.35% for 30-year bills. Historically, rates have been higher.) In effect, the longer the spread of payments, the higher is the interest rate the state will have to offer landowners.
- The state will subsidize the project as needed. In the following analyses, it is assumed that the subsidy will be financed through internal borrowing at 3%.
- Each option is designated as *Axx,* where *xx* is the percent of ROW costs deferred through ROW bonds.

Tables 7.2 and 7.3 show the results for 70% and 50% of 1,200 feet paid with ROW bonds (remaining up-front payments made from revenue bond proceeds).

Table 7.2: Feasibility of Option A70 — ROW Bonds for 70% of 1,200 Feet of ROW

Period of Bond	Landowner Interest Rate	Project Internal Rate of Return (IRR) at 60 yrs.	Payback Period	Cumulative Subsidy at 3% borrowing rate
5 years	3.00%	3.04%	58 years	$3.27 billion at 35th year (= $1.08 million per mile per year)
15 years	4.00%	2.93%	Never	Infinite
25 years	5.00%	2.67%	Never	Infinite
35 years	5.75%	2.34%	Never	Infinite

Table 7.3: Feasibility of Option A50 — ROW bonds for 50% of 1,200 Feet of ROW

Period of Bond	Landowner Interest Rate	Project Internal Rate of Return (IRR) at 60 yrs.	Payback Period	Cumulative Subsidy at 3% borrowing rate
5 years	3.00%	2.74%	Never	Infinite
15 years	4.00%	2.64%	Never	Infinite
25 years	5.00%	2.45%	Never	Infinite
35 years	5.75%	2.21%	Never	Infinite

The following conclusions can be drawn from these results:

1. The project IRR decreases with increasing ROW bond period. The A70 5-year bond barely reaches the acceptable IRR of 3%, allowing no margin of error in the revenue and expense estimates. Longer bond periods worsen project feasibility.
2. The payback period increases with increasing ROW bond period. The A70 5-year bonds extend breakeven to 58 years. Longer-duration bonds extend the payback period beyond 60 years.
3. The longer the ROW bond period, the greater is the subsidy required. This is because all the ROW bond periods fall within the subsidy phase predicted for SH 130 (namely, operating deficits for the first 20 years, with payback 40 years out). Effectively, the ROW bonds will have to be paid from other borrowing.
4. Comparing Tables 7.2 and 7.3, as the fraction of ROW costs paid with ROW bonds decreases (i.e., more of the costs are paid up front), the IRR decreases, payback period increases, and subsidies increase. This trend suggests that as much of ROW cost as possible ought to be paid with ROW bonds.

Points 1–3 indicate that the bond period should be as short as possible for best project feasibility, while Point 4 contradicts Points 1–3 by suggesting that greater up-front payments reduce project feasibility. This disjoint results from the assumption as to how the subsidy is financed. For the ROW bonds, financing comes from state ROW funds (assumed here to be "borrowed" at 3% interest). On the other hand, up-front payment is assumed to come from revenue bond financing at 5.75% interest. This conflict cannot be resolved without knowing how the subsidy will be financed. However, it is worth noting that since the IRR is so low in all cases, investors are not likely to be keen on financing ROW costs. The state would therefore have to make a commitment to subsidize the project in every case. If the state is willing to accept an IRR of 3%, the A70 5-year bond

is the only feasible option, and marginally so. The subsidy for a segment like SH 130 would be $54 million annually for 35 years, or about $1.1 million per mile per year.

From this analysis, it can be seen that paying for 1,200 feet of ROW with ROW bonds is not financially feasible. The foregoing results improve from the state's perspective if economic benefits of the corridor are considered. However, much of the corridor will pass through rural areas where the financial feasibility will be worse than for SH 130 and economic benefits harder to convert into revenue or contributions.

7.3.2 Lease Options

In Chapter 5 it was shown that acquiring less than 1,200 feet of ROW may be feasible. In Chapter 6, positive landowner response to "holding" the remainder through some innovative lease arrangement was documented. The following are the assumptions for financial analysis of variations on this option:

- The state will pay all up-front costs, including ROW costs, from general revenue bonds similar to the SH 130 "2002 Series A" Bonds, with an interest rate of 5.75%, a period of 35 years, and a similar repayment schedule.
- A minimum of 30% of ROW costs for the width acquired will have to be paid up front to clear liens and relocation costs. The remaining fraction of costs for the width acquired is to be paid with ROW bonds, structured as in Option A.
- To hold the remaining width of ROW, landowners will receive an annual lease payment. Parameters of the lease payments are:
    - *Duration:* The lease period will be up to 15 years. This period was determined from two considerations: (1) Toll revenues see their best growth in 5–15 years, during which time a decision can be made about expansion. (2) Landowners might not accept a longer duration, opting in such a case for up-front buyout of the full 1,200 feet.
    - *Amount:* The landowner will receive a percentage of the initial value of the leased portion annually, perhaps to lock in the land value. In addition, the owner will continue to derive income from the land. For the following analyses, the lease payment used is 2.5%. An analysis of sensitivity of the results to this percentage will be presented later.
- Within 15 years the state will make a decision as to whether to terminate the lease, pay it from other funding sources, or acquire the land with other funds. In any case, the initial mode will not be charged for the lease after 15 years.

7.3.2.1 *Option B: Bonds for 800 Feet of ROW and Lease for 400 Feet for a Segment Like SH 130*

Tables 7.4, 7.5, and 7.6 give the results for 70%, 50%, and 30% of 800 feet paid with ROW bonds and 400 feet leased at 2.5% per year.

Table 7.4: Feasibility of Option B70 — ROW Bonds for 70% of 800 Feet of ROW Plus Lease Payment of 2.5% for 15 Years for 400 Feet

Period of Bond	Landowner Interest Rate	Project Internal Rate of Return (IRR) at 60 yrs.	Payback Period	Cumulative Subsidy at 3% borrowing rate
5 years	3.00%	3.74%	51 years	$2.55 billion at 35th year (= $0.84 mill./mile/yr.)
15 years	4.00%	3.69%	51 years	$2.64 billion at 35th year (= $0.88 mill./mile/yr.)
25 years	5.00%	3.52%	53 years	$2.82 billion at 35th year (= $0.94 mill./mile/yr.)
35 years	5.75%	3.29%	55 years	$3.04 billion at 35th year (= $1.0 mill./mile/yr.)

Table 7.5: Feasibility of Option B50 — ROW Bonds for 50% of 800 Feet of ROW Plus Lease Payment of 2.5% for 15 Years for 400 Feet

Period of Bond	Landowner Interest Rate	Project Internal Rate of Return (IRR) at 60 yrs.	Payback Period	Cumulative Subsidy at 3% borrowing rate
5 years	3.00%	3.56%	52 years	$2.77 billion at 35th year (= $0.92 mill./mile/yr.)
15 years	4.00%	3.51%	52 years	$2.83 billion at 35th year (= $0.94 mill./mile/yr.)
25 years	5.00%	3.38%	54 years	$2.96 billion at 35th year (= $0.98 mill./mile/yr.)
35 years	5.75%	3.21%	56 years	$3.12 billion at 35th year (= $1.04 mill./mile/yr.)

Table 7.6: Feasibility of Option B30 — ROW Bonds for 30% of 800 Feet of ROW Plus Lease Payment of 2.5% for 15 Years for 400 Feet

Period of Bond	Landowner Interest Rate	Project Internal Rate of Return (IRR) at 60 yrs.	Payback Period	Cumulative Subsidy at 3% borrowing rate
5 years	3.00%	3.35%	53 years	$2.99 billion at 35th year (= $0.98 mill./mile/yr.)
15 years	4.00%	3.31%	54 years	$3.03 billion at 35th year (= $1.0 mill./mile/yr.)
25 years	5.00%	3.23%	55 years	$3.10 billion at 35th year (= $1.02 mill./mile/yr.)
35 years	5.75%	3.13%	56 years	$3.20 billion at 35th year (= $1.06 mill./mile/yr.)

As found for Option A, with increasing ROW bond periods the project IRR decreases, payback period increases, and subsidy increases. As before, with decreasing amounts paid through ROW bonds (more paid up front), project feasibility decreases. All options produce an IRR greater than 3% but far less than 5.75%. With increasing amounts paid upfront, annual subsidy for a segment like SH 130 increases from $42 million to $53 million, or about $0.8 to $1.1 million per mile per year. From this analysis, it is seen that paying for 800 feet with ROW bonds and leasing 400 feet is financially feasible from the state's perspective, but project feasibility is marginal.

7.3.2.2 *Option C: Bonds for 400 Feet of ROW and Lease for 800 Feet for a Segment Like SH 130*

Tables 7.7, 7.8, and 7.9 give the results for 70%, 50%, and 30% of 400 feet paid with ROW bonds and 800 feet leased at 2.5% per year.

Table 7.7: Feasibility of Option C70 — ROW Bonds for 70% of 400 Feet of ROW Plus Lease Payment of 2.5% for 15 Years for 800 Feet

Period of Bond	Landowner Interest Rate	Project Internal Rate of Return (IRR) at 60 yrs.	Payback Period	Cumulative Subsidy at 3% borrowing rate
5 years	3.00%	4.65%	45 years	$1.84 billion at 35th year (= $0.60 mill./mile/yr.)
15 years	4.00%	4.65%	46 years	$1.88 billion at 35th year (= $0.62 mill./mile/yr.)
25 years	5.00%	4.57%	46 years	$1.97 billion at 35th year (= $0.66 mill./mile/yr.)
35 years	5.75%	4.46%	47 years	$2.08 billion at 35th year (= $0.68 mill./mile/yr.)

Table 7.8: Feasibility of Option C50 — ROW Bonds for 50% of 400 Feet of ROW Plus Lease Payment of 2.5% for 15 Years for 800 Feet

Period of Bond	Landowner Interest Rate	Project Internal Rate of Return (IRR) at 60 yrs.	Payback Period	Cumulative Subsidy at 3% borrowing rate
5 years	3.00%	4.57%	46 years	$1.95 billion at 35th year (= $0.64 mill./mile/yr.)
15 years	4.00%	4.57%	46 years	$1.98 billion at 35th year (= $0.66 mill./mile/yr.)
25 years	5.00%	4.51%	47 years	$2.04 billion at 35th year (= $0.68 mill./mile/yr.)
35 years	5.75%	4.43%	47 years	$2.12 billion at 35th year (= $0.70 mill./mile/yr.)

Table 7.9: Feasibility of Option C30 — ROW Bonds for 30% of 400 Feet of ROW Plus Lease Payment of 2.5% for 15 Years for 800 Feet

Period of Bond	Landowner Interest Rate	Project Internal Rate of Return (IRR) at 60 yrs.	Payback Period	Cumulative Subsidy at 3% borrowing rate
5 years	3.00%	4.50%	47 years	$2.05 billion at 35th year (= $0.67 mill./mile/yr.)
15 years	4.00%	4.50%	47 years	$2.07 billion at 35th year (= $0.68 mill./mile/yr.)
25 years	5.00%	4.46%	47 years	$2.10 billion at 35th year (= $0.70 mill./mile/yr.)
35 years	5.75%	4.41%	47 years	$2.16 billion at 35th year (= $0.72 mill./mile/yr.)

All payment plans produce an IRR between 4.41% and 4.65%. In fact, all the project feasibility measures are fairly insensitive to variations in this option, with payback between 45 and 47 years and annual subsidy for a segment like SH 130 between $30 million and $36 million for 35 years, or about $0.6 to $0.7 million per mile per year. From this analysis, it can be seen that paying for 400 feet with ROW bonds and leasing 800 feet is financially more feasible than the previous options and relatively stable across variations in ROW bond period and percentage paid up front. In other words, with this option the state would be indifferent to landowners' choice of bond period and percentage required up front. As was discussed in Chapter 6, landowners also prefer this option, in which the state takes only as much ROW as needed for the first mode.

7.4 Comparison of Options A, B, and C

Figures 7.1 and 7.2 show the variation in the state's IRR and annual subsidy for a 5-year ROW bond for varying widths of ROW with different percentages paid up front.

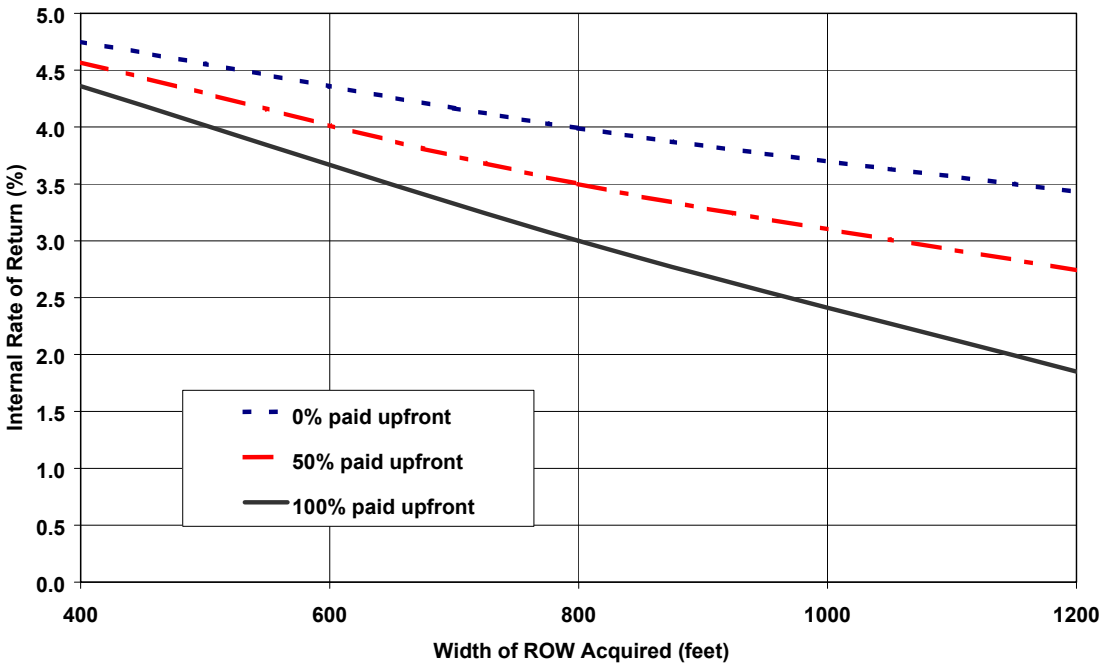

Figure 7.1: IRR versus Width of ROW Acquired with 5-Year Bond and Lease

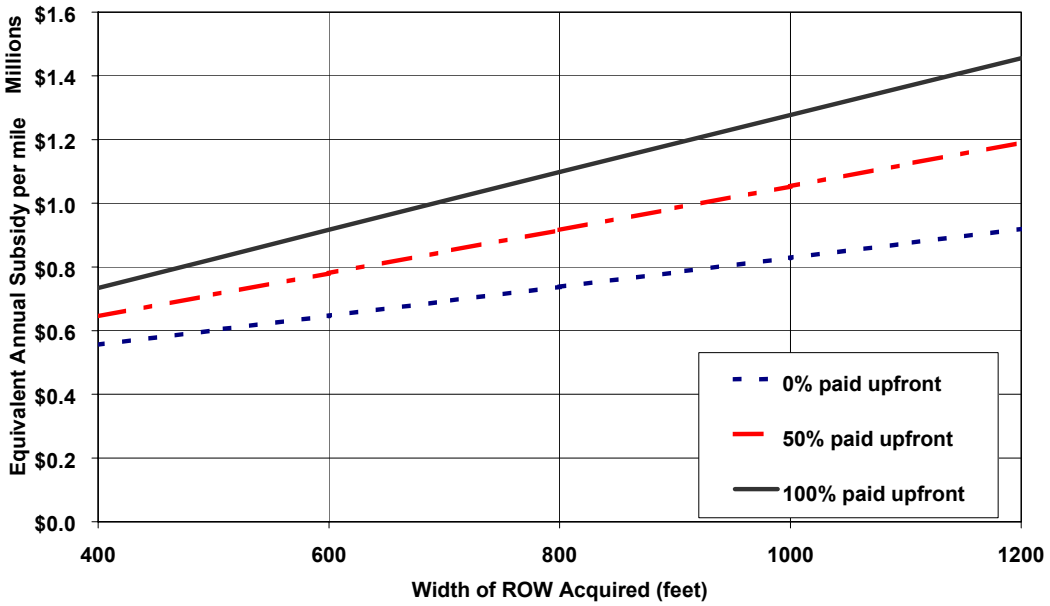

Figure 7.2: Subsidy versus Width of ROW Acquired with 5-Year Bond and Lease

If the state accepts an IRR of 3%, then it can afford almost 800 feet of ROW with a 5-year bond and lease option, allowing for almost 100% of the cost to be paid up front. The catch is that the total subsidy would be about $1.1 million per mile per year for 35 years, and bond investors would balk at the low project IRR. Given that this analysis uses revenue projections from one of the more profitable segments of the corridor, it would be more prudent for the state to acquire less ROW for the general corridor and lease the remainder, thereby improving project feasibility, reducing the subsidy, and increasing bond investor confidence. Acquiring 400 feet of ROW with a 5-year bond and lease option is a satisfactory compromise, resulting in an IRR of about 4.4% and a subsidy equivalent to about $0.7 million per mile per year for 35 years. Moreover, these outcomes would be relatively insensitive to landowner preferences.

7.5 Sensitivity of Lease Options to Lease Payment Percentage

The foregoing analyses used a lease payment equal to 2.5% of land value. Figure 7.3 shows the variation in the State's IRR 60 years out, for different widths of ROW acquired up front (no ROW bonds) and the remainder of the 1200 feet leased at varying percentages of land value.

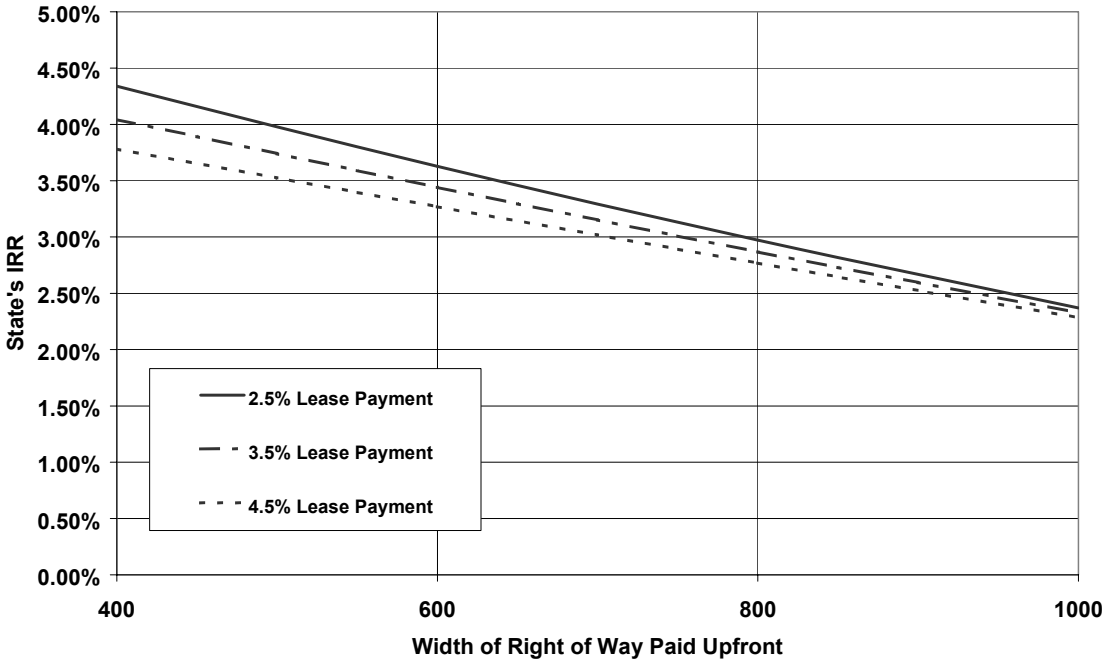

Figure 7.3: State's IRR for Varying Lease Payment Percentages

As the lease payment percentage increases, the state's IRR drops. If the state's IRR is 3%, a 2.5% lease payment can allow almost 800 feet to be bought up front. A 3.5% payment can allow about 750 feet up front, and a 4.5% payment can allow about 700 feet up front. Earlier, it was seen that landowners may ask for a 2–5% lease payment. The actual percentage lease paid would affect the amount of ROW that can be bought up front. Further research is needed to determine the details of the lease arrangement.

7.6 Royalty Payments for ROW

In this option the landowner is offered a percentage of revenue as payment for his land. Following are the assumptions for financial analysis of this option:

- The state will pay for non-ROW costs from general revenue bonds similar to the SH 130 "2002 Series A" Bonds, with an interest rate of 5.75%, a period of 35 years, and similar repayment schedule.
- All ROW costs will be paid with a percentage of revenue.
- *Duration:* The period of payments will be up to 60 years. In Chapter 5 it was seen that after about 60 years roadway maintenance/renewal expenses catch up with revenues, leaving no money for other expenses. The experience with the interstate system has been similar. It was also shown that when no ROW is paid for (all contributed) the project will take 40 years to repay construction bonds and subsidies. In effect, profits from Years 40–60 must pay for ROW. If the royalty payments are strictly a revenue-sharing arrangement, then the payment period has to be greater than 40 years and no more than 60 years.
- *Amount:* Three alternatives will be analyzed:
    - Percentage of revenue net of bond payments and O&M expenses
    - Percentage of gross revenue
    - Percentage of modified net revenue (gross less bond payments only)
- The state will subsidize the project as needed, accepting an IRR of 3% for its investment, i.e., the subsidy will be financed through internal borrowing at 3%.
- The variables of concern are:
    - Rate of return to landowner (percent interest received for his land value over the repayment period)
    - Width of ROW that can be acquired with royalty payments

7.6.1 Percentage of Net Revenue

In this option, the landowner receives a percentage of net revenue (equal to gross revenue minus O&M expenses minus bond payments). As shown in Chapter 5, the project will see negative net revenues for many years, so landowners' share of net revenue will be $0 in each of Years 2-17, 20, 30 and 35. (Note: Landowners have indicated that ROW costs should have equal payment priority with operating costs, and they may not accept a share of net revenues.)

7.6.1.1 *Maximum Percentage of Net Revenue Payable*

Figure 7.4 shows the IRR received by the state and landowners after 60 years when various percentages of net toll revenue are paid for 1,200 feet of ROW.

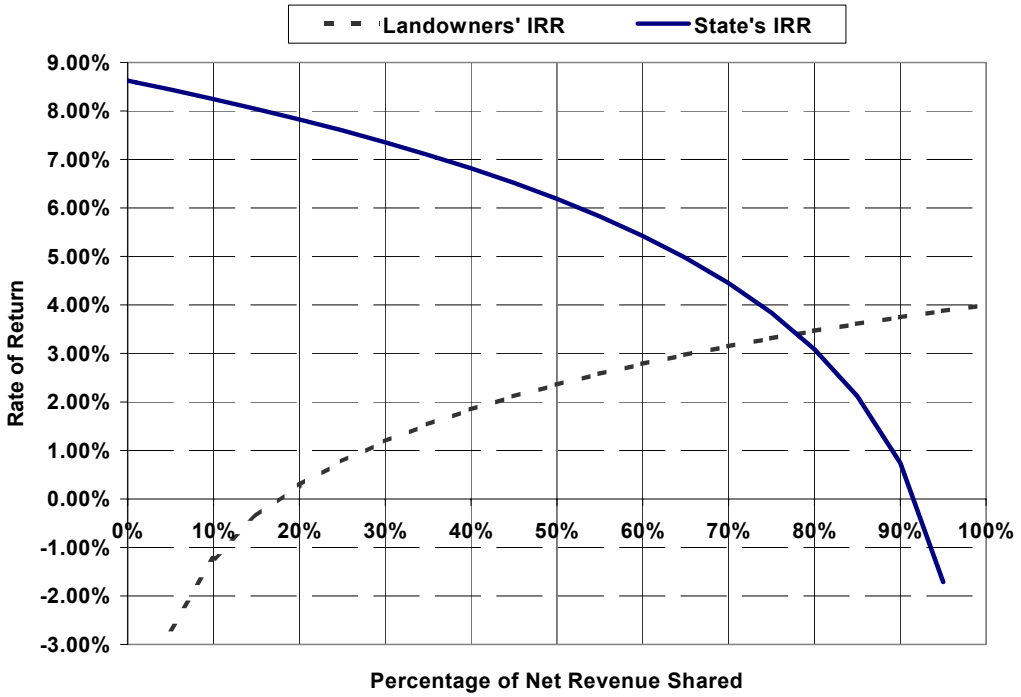

Figure 7.4: Rate of Return for Landowners and State with Various Percentages of Net Toll Revenue Paid for 1,200 feet of ROW

If the state shares net revenue, the total subsidy for the construction bonds for a segment like SH 130 increases to $1.94 billion at year 35 when compounded at 3% (equivalent to $0.6 million per mile per year), and the state will require at least 20% of net revenue over 60 years to recover its investment. Therefore, the state can offer no more than 80% of net revenue for ROW. That amount produces an IRR of 3.63% for the landowner's 1,200 feet of land at 60 years. While bond investors might be indifferent to the state paying 80% of net revenues for ROW payments, landowners would not accept a return of only 3.63% over 60 years. Even for 100% of net revenue, the landowners' IRR would be only about 4%, 60 years out. Therefore it is not feasible to acquire 1,200 feet of ROW with a share of net revenues.

7.6.1.2 *Width of ROW that can be acquired with net revenues*

The above analysis found that the state must keep at least 20% of net revenue to pay for the subsidy on the bond financing/O&M expenses at 3% IRR. The remaining 80% can

pay for some ROW less than 1,200 feet. Figure 7.5 shows the landowners' IRR for various widths of ROW bought with 80% of net revenue.

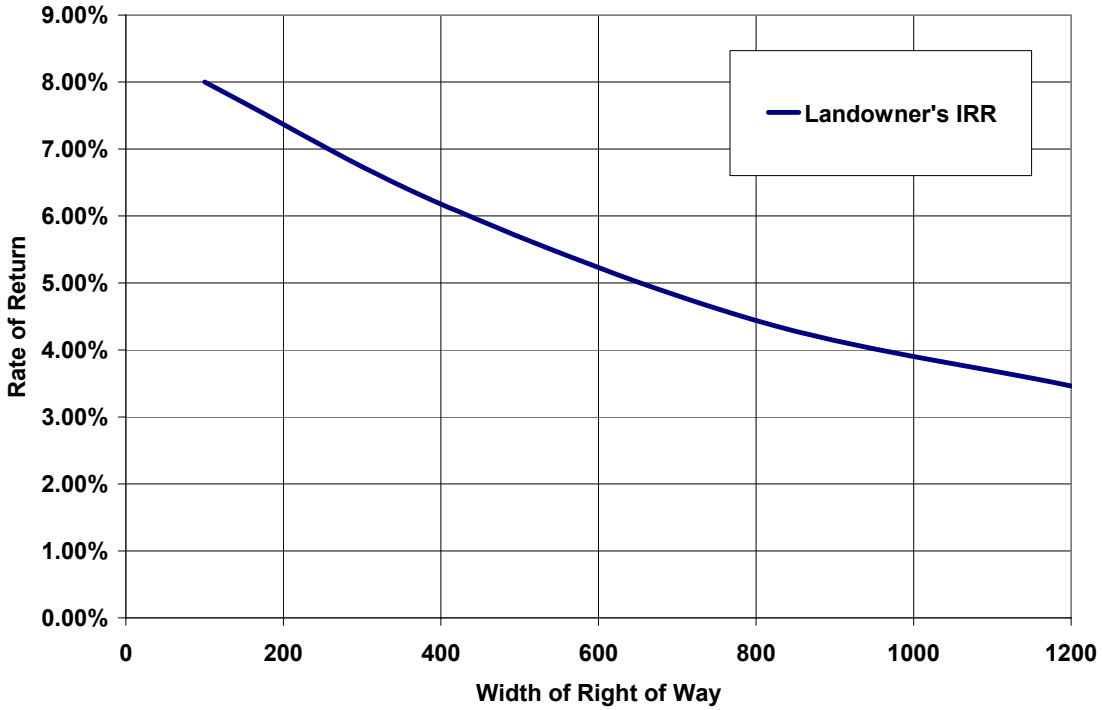

Figure 7.5: Rate of Return for Landowners Receiving 80% of Net Toll Revenue Paid for Various Widths of ROW

For contributing 800 feet a landowner would earn about 4.5%, 60 years out. To earn a figure comparable to current long-term interest rates of about 6% for his investment, he would contribute only about 400 feet. This result confirms that the initial mode can afford only about 400 feet of ROW.

This analysis shows that the amount of ROW that can be acquired with royalty payments would be largely determined by how much return on investment the landowners are willing to accept. Since other long-term investments would pay more than 6%, royalty payments from net revenue would not pay for more than 400 feet of ROW.

7.6.2 Percentage of Gross Revenue

In this option, the landowner receives a percentage of gross revenue, that is, he has a claim on revenues equal to that of all other parties.

7.6.2.1 *Maximum percentage of gross revenue payable*

Figure 7.6 shows the IRR received by the state and landowners after 60 years when various percentages of gross toll revenue are paid for 1,200 feet of ROW.

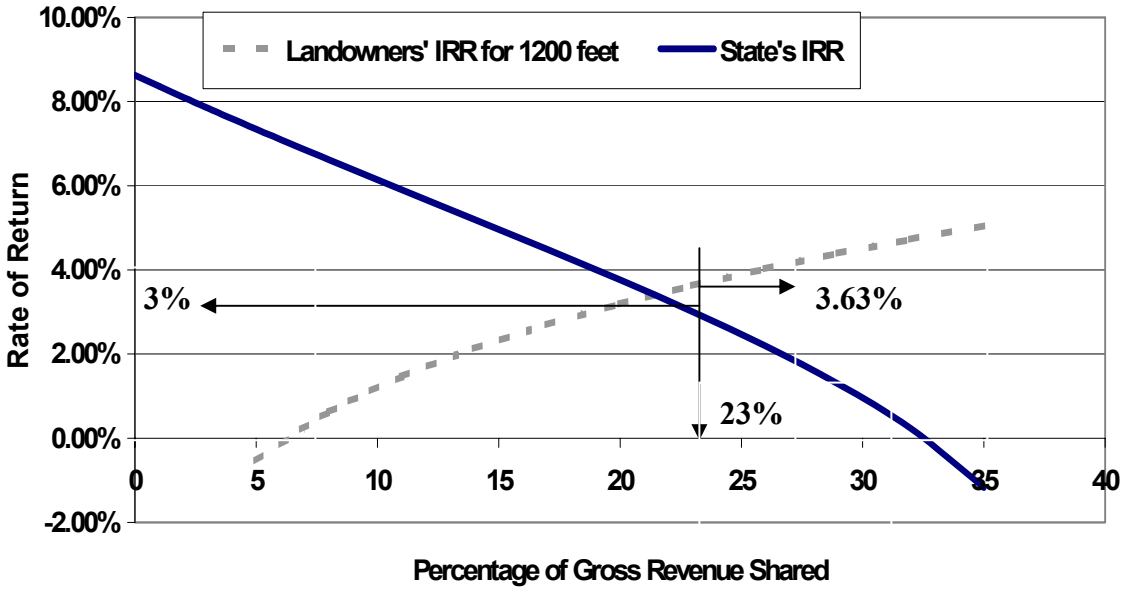

Figure 7.6: Rate of Return for Landowners and State with Various Percentages of Gross Toll Revenue Paid for 1,200 feet of ROW

The state's IRR declines from 8.63% at 0% gross revenue paid to landowners (the case analyzed in Chapter 5) to 0.00% when about 32% of gross revenue is paid for 60 years. To retain an IRR of 3% the State can offer at most 23% of gross revenue. However, since this amount is essentially the same as 80% of net revenue, it results in the same 3.63% rate of return for the landowner's 1,200 feet of land. The state's total subsidy for the construction bonds is still $1.94 billion at year 35 for a segment like SH 130.

This scenario is not feasible for two reasons: (1) bond investors would resist committing 23% of gross revenues for ROW payments, and (2) landowners would not accept a return

of only 3.63% over 60 years. Again, since the amount of money received by the landowner is essentially the same as 80% of net revenue, the results shown earlier in Figure 7.5 also apply for sharing of gross revenue. To earn a figure comparable to current long-term interest rates of about 6%, a landowner can contribute only about 400 feet. Therefore, it is not feasible to acquire more than 400 feet of ROW by offering a share of gross revenues over 60 years.

7.6.2.2 *Larger share of gross revenue for shorter period*

It has been shown that in every case the State will have to subsidize the project. As a minimum, a subsidy of about $0.2 million per mile per year for 35 years is required for the construction bond payments. All ROW payment plans will add to the subsidy, so it is worthwhile to examine scenarios that maximize landowners' return. Figure 7.7 shows landowners' return for 1,200 feet of ROW when higher shares of gross revenue are received for periods shorter than 60 years, while maintaining the state's ultimate IRR at 3%.

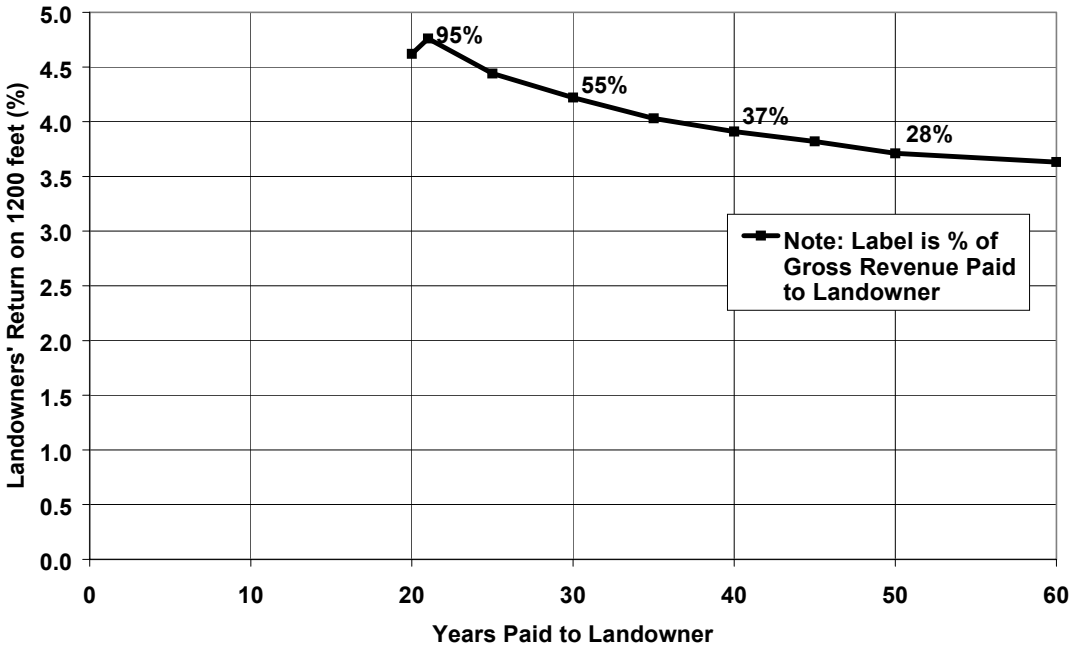

Figure 7.7: Landowners' Return on 1,200 feet of ROW for Higher Share of Gross Revenue Paid for Shorter Periods

The maximum return to the landowners occurs if they are paid 95% of gross revenue for 21 years; their return would be 4.76% over 21 years for 1200 feet of land, a figure comparable to U.S. Treasury Bonds of similar duration. This result is possible because the landowners receive their money faster than in previous scenarios. Figure 7.8 shows the effect on the state's equivalent annual subsidy over 35 years.

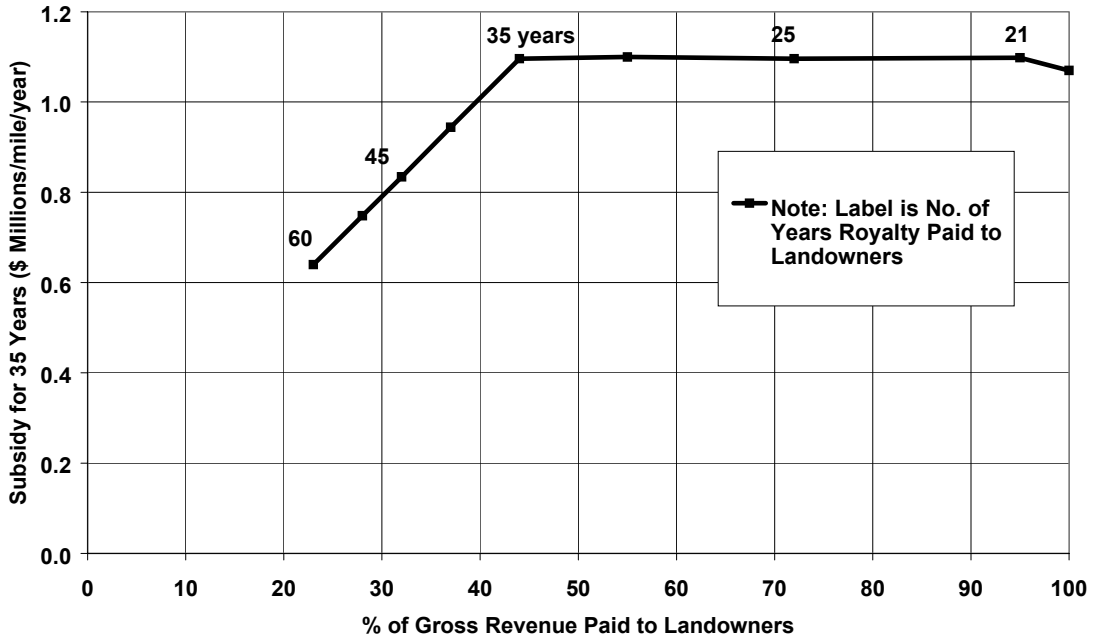

Figure 7.8: Equivalent Annual State Subsidy for Different Percentages of Gross Revenue Paid to Landowners

The state's subsidy (annualized for 35 years — the period of the construction bond subsidy) stabilizes at about $1.1 million per mile per year if gross revenue is shared for 21 to 35 years. This result is obtained because the state's IRR has been fixed at 3%, and the landowner's share varied. Up to year 35, subsidy plus revenue pays for ROW plus construction bonds plus O&M expenses (the latter all assumed fixed). Beyond year 35, revenue (fixed) repays, at the fixed 3% rate, subsidy (therefore also fixed). Extending the ROW payment period beyond year 35 reduces the subsidy. Paying for the ROW before year 21 with more than 100% of gross revenue also reduces the subsidy slightly. For the shorter payment periods the average annual subsidy will actually be proportionately higher than the equivalent annuity over 35 years.

This result indicates that the state would be indifferent to offering the landowners a higher share of gross revenue for a shorter period. This scenario is one possible way that the state can give the landowners a reasonable return on their 1,200 feet of land. Note that larger shares of net revenue would not produce similar results, since the net revenue stream is much smaller and becomes positive far in the future when the landowner interest rate is higher. As seen earlier in Figure 7.4, 100% of net revenue would give the landowner only about 4% return after 60 years. The above scenario is not feasible for at least three reasons:

- Revenue bondholders will not accept such a high proportion of gross revenues dedicated to ROW debt, even if the state subsidy will cover their payments.
- The landowner's return is very sensitive to percentage paid and period. In addition, as shown in Chapter 5, if revenue is just 10% below estimate the project cannot afford any ROW. Landowners would be taking a large risk if they accept this offer.
- There is no provision to cover required up-front costs to clear ROW liens.

7.6.3 Percentage of Modified Net Revenue

In this option, the landowner receives a percentage of modified net revenue (MNR, equal to gross revenue minus bond payments only). The use of MNR appears to be mandated by the terms of Section 227.042, Chapter 227 Trans-Texas Corridor, Texas Transportation Code, as passed by the 78th Texas Legislature in 2003, so analysis of this scenario was requested by the TxDOT panel for this research project. MNR will be greater than Net Revenue, but will still be negative in years 3 and 4 and in the late years of the project.

7.6.3.1 *Maximum Percentage of Modified Net Revenue Payable*

Figure 7.9 shows the IRR received by the state and landowners after 60 years when various percentages of MNR are paid for 1,200 feet of ROW.

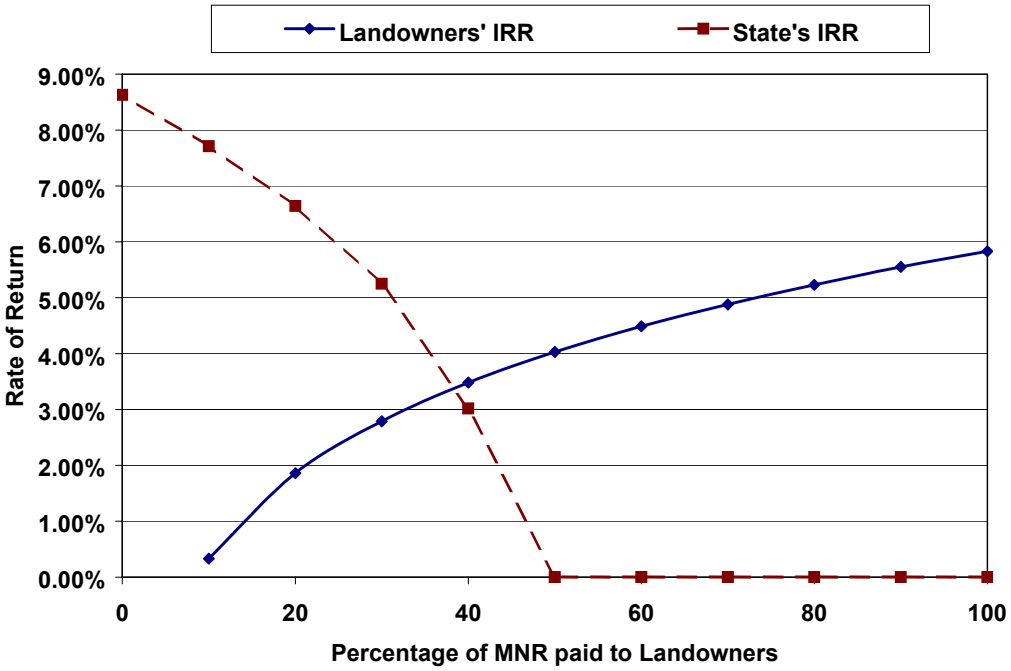

Figure 7.9: Rate of Return for Landowners and State with Various Percentages of Modified Net Toll Revenue Paid for 1,200 feet of ROW

In the later years, the MNR cash flow switches back and forth from positive to negative, causing the state's IRR to fluctuate instead of consistently increasing. The number shown for year 60 may therefore not be the maximum IRR earned by the state. To obtain an IRR of 3% at 60 years for its subsidies the state can pay no more than 40% of MNR. This 40% of MNR provides an IRR of just 3.48% at 60 years to the landowners for 1,200 feet of ROW, an unacceptably low figure. Therefore it is not feasible to acquire 1,200 feet of ROW with a share of modified net revenues.

7.6.3.2 *Width of ROW that can be acquired with modified net revenues*

The above analysis found that the state must keep at least 60% of modified net revenue to pay for the subsidy on the bond financing/O&M expenses at 3% IRR. The remaining 40% can pay for some ROW less than 1,200 feet. Figure 7.10 shows the landowners' IRR for various widths of ROW bought with 40% of modified net revenue.

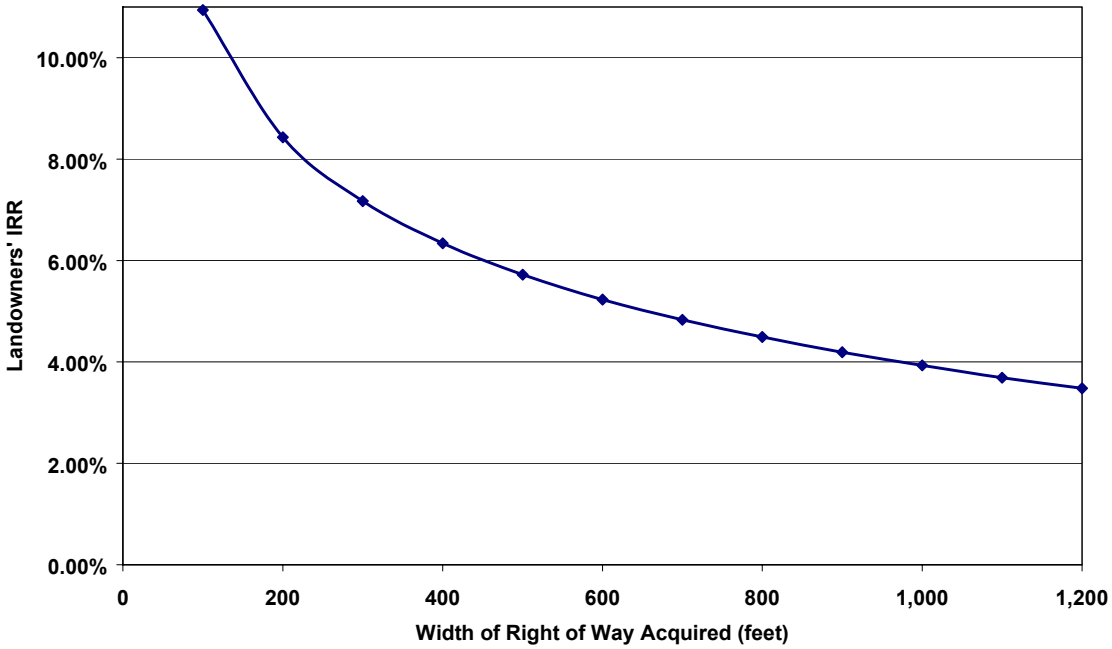

Figure 7.10: Rate of Return for Landowners Receiving 40% of Modified Net Toll Revenue Paid for Various Widths of ROW

For contributing 800 feet a landowner would earn about 4.49%, 60 years out. To earn a figure comparable to current long-term interest rates of about 6% for his investment, he would contribute only about 400 feet. This result confirms that the initial mode can afford only about 400 feet of ROW.

This analysis of MNR produces virtually the same results as for net revenue. The reason is that, over 60 years, we are dealing with an essentially fixed amount of revenue to be split among three expenses: bond payments, ROW, and O&M. If bond payments have first preference, then the order in which the other two are paid does not matter to the state, since the state still has to subsidize the project for over 40 years. The order matters to the landowners, since if they can receive their payments more quickly their rate of return is higher. It is therefore worthwhile to consider paying the landowners a larger percentage of MNR for a shorter period. In effect, the state would ensure landowners get paid off before it starts paying back itself. The next section presents this scenario.

7.6.3.3 *Paying off landowners early with modified net revenues*

In every scenario the state will have to subsidize the project for 35+ years. If the state chooses to dedicate 100% of MNR for the landowners for a shorter period, then it is necessary to determine the year in which it must switch to keeping that 100% in order to recover its subsidies by year 60 at 3% IRR.

Figure 7.11 shows the rate of return for the state and landowners if 100% of MNR is paid to the landowners for periods shorter than 60 years.

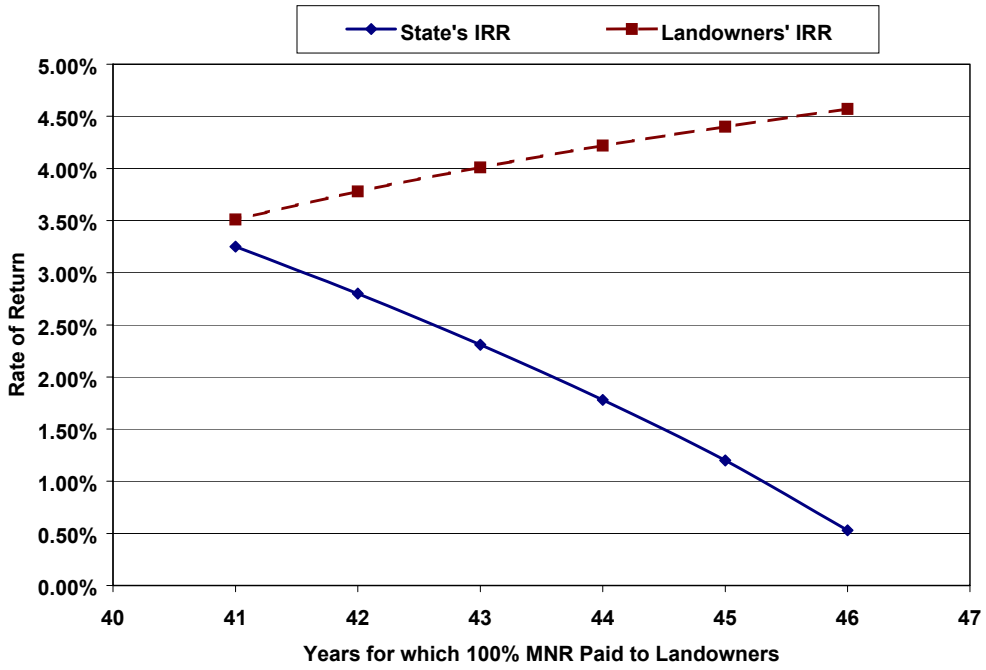

Figure 7.11: Rate of Return for the State and Landowners if 100% of Modified Net Toll Revenue is Paid for Shorter Periods

If the state is to earn 3% on its subsidies, then it has to start keeping 100% of MNR from year 42 forward. However, the landowners only earn about 3.5% for their 1200 feet of land by year 41, an unacceptably low figure. The question then arises, how much land can be paid for by the 100% of MNR through year 41? Figure 7.12 illustrates the IRR

earned by the landowners for various widths of ROW. For comparison, the earnings on a bond are also included. From this figure it is easy to see that only a width of 400 feet would provide returns comparable to the bond. Therefore, as found before, 100% of MNR can pay for only about 400 feet of ROW. In fact, by year 42 the landowner will have earned a very attractive 7.08% return for his 400 feet of land.

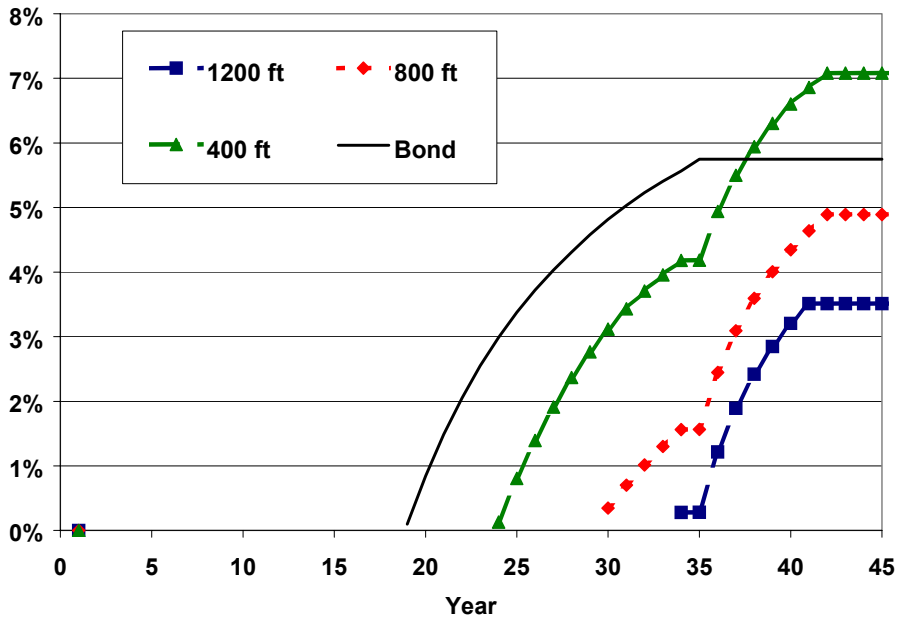

Figure 7.12: Rate of Return for Landowners if 100% of Modified Net Toll Revenue is Paid for Various Widths of ROW Compared to a Bond

7.7 Summary of State and Landowner Preferences

Table 7.10 shows the analyzed options listed in approximate order of state preference, with unacceptable outcomes shaded gray. The state's first preference is to offer a royalty payment. To attain a 3% IRR in 60 years (the project life), the state can offer 80% of net revenue for 60 years, more than 23% of gross revenue for a shorter period, or up to 100% of modified net revenue for 41 years. The subsidy changes accordingly. The next option is up-front payment for the full 1,200 feet of ROW from revenue bonds: this is shown in grey because it is completely infeasible. Next are samples of options B and C, in which decreasing width of ROW is bought up front and the rest leased. The state's IRR increases and the equivalent annual subsidy decreases. Even though these are less preferred options from the state's standpoint, they are more financially feasible options.

Table 7.10: Order of Preference for Deferred Payment Plans from State's Perspective

Option	State's IRR at 60 years	Payback Period	Subsidy	Landowner's IRR
Royalty Payment for 1,200 Feet — 95% of Gross Revenue for 21 Years	3.00%	60 years	$1.1 million per mile per year for 35 years	4.76% at 21 years
Royalty Payment for 1,200 Feet — 80% of Net Revenue for 60 years	3.00%	60 years	$0.6 million per mile per year for 35 years	3.63% at 60 years
Royalty Payment for 1,200 Feet — 100% of Modified Net Revenue for 41 years	3.25%	59 years	$0.63 million per mile per year for 41 years	3.51% at 41 years
A0 — 100% Upfront Payment for 1,200 Feet	1.85%	Never	Infinite	Not applicable
B0 — 100% Upfront Payment 800 Feet and Lease for 400 Feet	3.00%	60+ years	$1.1 million per mile per year for 35 years	Not applicable (paid up front)
C0 — 100% Upfront Payment 400 Feet and Lease for 800 Feet	4.34%	48 years	$0.7 million per mile per year for 35 years	Not applicable (paid up front)

For the landowners, the financial outcome of royalty payments depends on whether the payment is made from gross revenues, net, or modified net: 100% of gross revenue for about 20 years can give a return comparable to U.S. Treasury Bonds, but 80% of net revenue produces an IRR of only 3.63% after 60 years for 1,200 feet of land, while 100% of MNR produces a return of only 3.51% after 41 years. Landowners prefer a share of gross revenue because they are more likely to receive some money each year, whereas net revenue and modified net revenue are less reliable. For Option A0, in which the landowner receives all his money up front for 1,200 feet, rate of return is not applicable. Options B0 and C0 pay 100% upfront for 800 feet and 400 feet, respectively, with the remainder leased for an annual payment of 2.5% of land value. If more than 2.5% is paid, the state's IRR decreases. In general, landowner preferences increase down the table, with the state and landowners' interests converging at Option C.

The foregoing analyses have found that the Trans-Texas Corridor will require a large investment, and financial returns will be low and take longer to materialize. The issue for the state is whether or not it is possible to spread the investment risk by offering partners a share of the returns. In Chapter 6 it was shown that landowners would be unwilling partners. Revenue bond investors will require the project to show an IRR close to the borrowing rate and will require payback in 35 years. These conditions will force the state to subsidize the project for the first 35 years, regardless of how much ROW is procured. The ROW decision thus comes down to how much subsidy the state can afford. To procure 1,200 feet of ROW outright, the state will have to provide large subsidies and may never break even. An innovative "buy some/lease the rest" option would give the state greater flexibility while improving project feasibility.

Chapter 8: Royalty Payment Plans and Financial Outcomes

8.1 Introduction

At the request of the TxDOT research management panel, the research team developed and evaluated several royalty payment plans. The purpose was to determine whether any royalty payment scenario could satisfy all three parties, namely the state, landowners, and construction bondholders. Chapter 6 examined four potential issues of conflict among the three parties: (1) the amount of ROW to be acquired at any stage, (2) the segments of corridor for which revenue is pooled, (3) which party has first call on revenue, and (4) duration of royalty payments.

8.1.1 Width of ROW Acquired

The state would like to acquire 1,200 feet of ROW; landowner resistance to acquisition is likely to increase with width taken, increasing the chances of condemnation and court-ordered up-front payment. Landowners would prefer for the state to take only as much as is needed at any time and allow them to continue to use the remainder.

8.1.2 Revenue Pool

Landowners in potentially higher-traffic segments do not want to subsidize royalties for landowners in less-trafficked segments. However, if a segment of corridor is developed as a single project (segment of independent utility and feasibility), then all ROW would contribute to project "success." Revenue should therefore be pooled within independently developed segments, and royalties should be shared in proportion to land value contributed.

8.1.3 First Call on Revenue

Some landowners say the cost of ROW is an operational cost and should be paid out of gross revenue ahead of other debt. Construction bondholders demand first call on revenue, viewing ROW cost as the state's responsibility to be paid from other sources.

Bondholders and the state are indifferent to sharing net revenue, but those funds are not likely to produce any payments for landowners in the first 20 years. Landowners want minimum guaranteed annual payments. A compromise position would be to give landowners secondary call on revenue (modified net revenue- MNR).

8.1.4 Duration of Payments

The state would like to keep the duration of revenue sharing as short as possible. However, if the payments are to compensate for the value of the land, the payment period could be as much as 60 years because the annual amounts are relatively small. If the royalty is treated as an incentive only (in addition to fair compensation for their land), then landowners want it to last as long as possible.

8.2 Range of Variables in Royalty Payment Plans

Based on the analyses of the variables affecting the feasibility of royalty payments presented in Chapter 7, payment plans were structured for a range of those variables.

8.2.1 Width of ROW

The financial analyses for SH 130 (a potential segment of the corridor) showed that the roadway toll revenues could not support the acquisition of 1,200 feet of ROW with construction bonds (4808-P2, 4808-P4). An option to acquire less ROW and lease the remainder of the 1,200 feet (to preserve the ROW and minimize price escalation) was also explored and found feasible. Hence, three variations are presented in the royalty plans:

- Payment for 1,200 feet with royalties
- Purchase of 800 feet with the option to buy 400 feet at a later date
- Purchase of 400 feet with the option to buy 800 feet at a later date

For evaluation of the financial impacts to the state of the option to buy at a later date, it was assumed that the state would pay landowners 2.5% of the value of the remaining width of land annually for the agreement period, up to 15 years. Details of this “lease” arrangement were presented earlier.

8.2.2 Revenue Pool

For all royalty payment plans and associated analyses presented, it is assumed that revenue pooling will be across a segment of corridor built and operated by a single entity such as a Regional Mobility Authority (RMA). The revenue is applied to all the expenses over that segment, including the cost of all ROW acquired for that segment. Such an arrangement would be a logical one if the project was planned and executed as a single enterprise based on its feasibility analysis.

8.2.3 Revenue Basis for Royalties

Scenarios where royalties are paid from gross annual revenue (first call- i.e., landowners have equal call on revenue as other investors), modified net revenue (secondary call- i.e., landowners get paid after bond payments are met), and net annual revenue (tertiary- i.e., landowners get paid after all other expenses have been met) were constructed. Gross annual revenue is defined as total annual collections from tolls and concessions. Modified net revenue is defined as the revenue remaining after construction bond payments only have been deducted. Net annual revenue is the revenue remaining after construction bond payments, annual operation costs, and annual maintenance costs have been deducted.

It is assumed that if the gross revenue is less than the calls on it the state will make up the difference as a "subsidy," a loan to the project from internal funds. In deficit years, royalty payment to landowners will be zero. Assuming that the state must recoup its subsidy at the end of project life, and using the results of the analyses presented earlier on how much revenue can be applied for ROW expenses, payment plans were developed using 20–100% of gross revenues and 80–100% of net revenues for varying periods. For payment plans involving modified net revenue, it was assumed that up to 100% could be applied as royalty payment, with the state covering lower-tier expenses. A single landowner's share of revenue would be in proportion to the value of his property as a percentage of the value of the ROW 'acquired' for the project at ROW certification.

8.2.4 Duration of Payments

Typically, the life of a transportation project is about 60 to 75 years, after which major reinvestment is required. Therefore the maximum duration for which revenues can be shared is about 60 years. It was shown earlier that it would take 20 years of revenues (100% of gross) to pay just for ROW. That scenario is clearly not acceptable to bond investors, so plans of duration of between 20 and 60 years were developed.

8.3 Criteria for Financial Evaluation of Royalty Plans

The payment plans presented are characterized by "width of ROW acquired — by percentage of revenue source paid to landowners — for period." For example, "1,200feet by 23% of gross for 60 Years" is a payment plan for acquiring 1,200 feet with payment of 23% of gross revenues to landowners for 60 years.

The landowners' investment in the project is the value of their land at transfer of title. Their return is the series of payments in the royalty payment plan. The scenarios use a land value of $100,000 for convenience in estimation. If, for example, a specific landowner will receive royalty payments for $300,000 worth of property, the payments shown can be easily multiplied by three.

Because the project cash flow pattern is expected to show deficits for up to 20 years, the state will have to provide subsidies. These subsidies in the early years are the state's investment in the project, and the return to the state is the net annual revenue less royalty payments (achieved in the later years). Consistent with previous analyses, the criteria presented for measuring financial feasibility are as follows.

8.3.1 Internal Rate of Return (IRR)

This is the percentage interest earned annually on average over the return period, on the capital invested. For exampe, the IRR earned by a certificate of deposit is the annual percent interest received. The state must have a minimum IRR of 3% on its investment to compensate for inflation (4808-P2). However, the state does not have to make a profit on

its investments. Therefore, if the returns expected are greater than 3%, the state can use the extra "profit" to expedite the project or to increase the project's magnitude.

From a landowner's perspective, the royalty arrangement is a long-term investment. As a minimum, landowners ought to receive an IRR as high as the interest rate of a U.S. Treasury Bill of similar duration. To develop the best royalty plan for the landowners, the state can limit its IRR to 3% and transfer excess revenue to landowners, thereby increasing their rate of return. A major drawback of this transfer is that it will not leave any surplus revenue for investment in complementary or expansion projects.

8.3.2 Payback Period

This is the time the project takes to repay all investment to that point. From the state's perspective this is not a critical criterion, since the state is able to wait for a long time provided the project pays for itself eventually (i.e., within about 60 years). Landowners would consider payback period an important criterion and would prefer the shortest possible payback period on their investment.

8.3.3 Subsidy Required

Ideally, annual revenue from a project should at least meet annual financing, operating, and maintenance expenses. However, for toll projects revenue is low in the initial years, and some subsidy is usually required (4808-P2). The amount of subsidy required would vary from year to year and can be expressed as an equivalent annual amount. In Chapter 5 it was shown that SH 130 (which is expected to be a part of Trans-Texas Corridor) will require subsidies until year 35. For the royalty payment plans presented the stream of subsidies was therefore expressed as an equivalent annual amount for 35 years.

Since the corridor will be built in stages, annual subsidy required per mile of corridor built would be a good indicator of the amount by which the state will have to subsidize the project. For individual segments the state would prefer a royalty payment plan in which the annual subsidy requirement per mile is low, since total subsidy for the corridor might become prohibitive as more segments are added. Landowners' concern with the magnitude of subsidy provided by the state would extend only to whether the state can

afford it. Bondholders would want a part of the capitalization of the project placed in a reserve or stabilization fund to minimize their own risk.

8.4 Procedure for Developing Royalty Payment Plans

Royalty payment plans based on net revenue, modified net revenue, and gross revenue were developed for various widths of ROW, duration, and percentage shared. The procedure used to develop and evaluate these plans is briefly described next.

8.4.1 Plans Paid from Gross Revenue

Consistent with previous analyses, SH 130 was used as the revenue/expense model. The expected revenue stream for SH 130 for 60 years was tabulated (data source and assumptions are presented in Chapter 5). Varying percentages of the annual gross revenue were set aside for royalty payments to landowners for periods of 20 to 60 years, and overall landowner IRR for the total amount of ROW acquired was calculated.

Net annual cash flow for the state was calculated by subtracting the royalty payment, bond-debt repayments, and operations and maintenance costs from the gross annual revenues. It was shown that there would be a pattern of deficits for 35 or more years followed by surpluses. It was assumed that any deficit will be met from internal resources. The state's IRR from the net cash flow was kept close to 3% by modifying the period of royalty payments and the percentage of gross revenue paid to the landowners. The resulting royalty payment was thus the maximum amount that the state could pay to landowners while retaining an IRR of 3%.

The payback period for the state was the time at which its IRR equals 3%. The subsidy required was compounded at 3% (assumed to be the state's internal borrowing rate), and in every case reached its maximum at 35 years. This subsidy was the total investment required from the state. This total was converted to an equivalent annuity for the 35-year period at 3% interest. Since the equivalent annual subsidy calculated would be for the 49-mile SH 130 segment, the figure was normalized and expressed as the equivalent annual subsidy per mile of corridor.

8.4.2 Plans Paid from Net Revenue

Royalty payment plans for sharing the net revenues with landowners were developed in the same manner as for gross revenues. Net (pre-royalty) revenue is defined as gross revenue less annual bond repayments, and operations and maintenance costs. It was assumed that in case of a deficit, the state will subsidize the other expenses, but no royalty payment will be paid to the landowners that year. In case of surplus, a percentage will be paid to landowners. By varying the percentage of net revenue paid to landowners and the period of payments, the state's IRR was kept close to 3%. The payment stream thus obtained was the best royalty plan that the state could offer to the landowners while retaining an IRR of 3% at Year 60. Payback period and subsidy requirements were estimated in the same manner as in the case of gross revenues.

8.4.3 Plans Paid from Modified Net Revenue

Modified net revenue (MNR) is equal to gross revenue less annual bond repayments. The use of MNR appears to be mandated by the terms of Section 227.042, Chapter 227 Trans-Texas Corridor, Texas Transportation Code, as passed by the 78th Legislature in 2003 near the end of this research project. Since the landowners' return is contingent on actual revenues, they may not accept this arrangement. It was assumed that in case of a deficit, the state will subsidize the bond and lease payments, but no royalty will be made to landowners that year. Bondholders would have no objection to this arrangement. If MNR is positive, up to 100% could be paid to landowners. In this way the state could pay off the landowners as quickly as possible while subsidizing other expenses. The only concern of the state would be to ensure it recovers its subsidies at 3% rate of return by Year 60.

8.5 Royalty Payment Plans

Appendix A contains the various royalty payment plans in detail, along with brief evaluations. The summary results of these plans are presented in Table 8.1. The landowners' IRR for each plan represents only the return on the value of the land acquired by the royalty payments; it does not include the effect of the lease payments nor the opportunity costs to landowners to hold the remainder width of ROW. However, the

state's IRR does include the effect of the lease payments, since those costs are part of the state's investment.

Table 8.1: Summary of Royalty Payment Plans

Plan No.	Royalty Payment Plan for Landowners (Width Acquired — Royalty payment — Period)	Landowners' IRR (at end of revenue sharing period)	State's IRR (after 60 years)	State's Annual Subsidy to a Project Segment (for 35 years)
1	1,200 feet by 23% of gross for 60 years	3.63%	3.02%	$0.64 million per mile
2	1,200 feet by 55% of gross for 30 years	4.22%	2.96%	$1.10 million per mile
3	1,200 feet by 100% of gross for 20 years	4.62%	3.07%	$1.06 million per mile
4	1,200 feet by 80% of net for 60 years	3.46%	3.11%	$0.21 million per mile
5	1,200 feet by 100% of modified net for 41 years	3.51%	3.25%	$0.69 million per mile
6	800 feet by 21% of gross for 60 years with lease 400 feet	4.65%	3.04%	$0.65 million per mile
7	800 feet by 50% of gross for30 years with lease 400 feet	6.07%	2.99%	$0.90 million per mile
8	800 feet by 90% of gross for20 years with lease 400 feet	7.28%	3.07%	$1.10 million per mile
9	800 feet by 79% of net for 60 years with lease 400 feet	4.41%	3.09%	$0.20 million per mile
10	800 feet by 100% of mod. net for 41 years with lease 400 feet	4.64%	3.09%	$0.71million per mile
11	400 feet by 23% of gross for 50 years with lease 800 feet	7.52%	3.09%	$0.80 million per mile
12	400 feet by 35% of gross for 30 years with lease 800 feet	8.33%	3.62%	$0.90 million per mile
13	400 feet by 50% of gross for 20 years with lease 800 feet	8.30%	4.05%	$1.00 million per mile
14	400 feet by 70% of net for 60 years with lease 800 feet	5.84%	3.33%	$0.30 million per mile
15	400 feet by 100% of net for 48 years with lease 800 feet	6.16%	3.08%	$0.30 million per mile
16	*400 feet by 100% of mod. net for 40 years with lease 800 feet*	*6.67%*	*3.15%*	*$0.76 million per mile*

Note: Dark-gray blocks indicate the main concern with that plan; light-gray blocks indicate reason for preference of that plan. Italicized plans may be acceptable.

In all the plans, the state's IRR is set at close to 3% over 60 years. This IRR ensures that the state eventually recovers its investment. The state should therefore be indifferent in choosing among the plans from the IRR perspective. The main difference among the plans is in the landowners' return and the state's subsidy. For landowners, an IRR better than that of a U.S. Treasury Bond (T-bill) of comparable duration is shown as acceptable (light-gray), while an IRR worse than a T-bill is shown as unacceptable (dark-gray). For the state, lower-than-average subsidies are shown as acceptable (light-gray), while higher-than-average subsidies are shown as unacceptable (dark-gray). Generally an acceptable IRR for landowners results in a high subsidy from the state, with interests converging for narrower widths of ROW. If a plan meets all parties requirements it is shown in italics.

Landowners' IRR is generally better for shorter payment periods. This phenomenon occurs because the amount of money available from a particular segment to pay for ROW is essentially a fixed sum, and spreading it over a longer period reduces the landowners' rate of return while lowering the state's subsidy. Overall, the revenue expected from a mode over the project life can be considered a fixed sum of money. That sum must repay the construction bonds and operations and maintenance costs, with the remainder available to pay for ROW. If less ROW is acquired with the fixed ROW funds, the landowner receives a better rate of return.

8.5.1 Royalty Plans for Acquiring 1,200 Feet of ROW

In Plan 1 (1,200 feet by 23% of gross for 60 years), the repayment period is so long that the landowners' rate of return is far less than other safe investments. Plans of shorter duration, namely Plan 2 (1,200 feet by 55% of gross for 30 years) and Plan 3 (1,200 feet by 100% of gross for 20 years), offer better rates of return. Plan 3 provides a rate comparable to T-bill rates of similar duration. Landowners could accept this plan, but the subsidy required is the highest in all plans (about $1.1 million per mile for 35 years). Essentially, the state would have to subsidize the bulk of the bond repayments, operations, and maintenance costs. Plan 4 (1,200 feet by 80% of net for 60 years) allows the state to offer up to 80% of net revenue. However, landowners will earn a very low rate of return, and they would also not receive any

money in the initial years. Plan 5 (1,200 feet by 100% of modified net for 41 years) allows the state to offer up to 100% of modified net revenue. However, the landowners will earn a very low rate of return. Hence, none of the 1,200 feet plans are feasible.

8.5.2 Royalty Plans for Acquiring 800 Feet of ROW

Plans 6–10 are for the case when the state buys 800 feet of land using the royalty payment, and purchases an option for the remaining 400 feet. For Plan 6 (800 feet by 21% of gross for 60 years with lease 400 feet), the return to landowners is worse than T-bill returns. Plans for payment in 30 years (Plan 7) and 20 years (Plan 8) offer an attractive return to the landowners. However, a major portion of the gross revenues will have to be committed to the landowners, and the subsidy requirements are high. Plan 9 (79% net revenue for 60 years for 800 feet and option to purchase 400 feet) produces low long-term returns to landowners and no payments in the initial years. Plan 10 (100% of modified net revenue for 41 years for 800 feet and option to purchase 400 feet) similarly produces low long-term returns to landowners. Hence, none of the 800 feet plans are acceptable to all parties.

8.5.3 Royalty Plans for Acquiring 400 Feet of ROW

Plans 11–16 would acquire 400 feet up front and lease 800 feet. All the plans for sharing gross revenue (Plans 11–13) produce good returns to the landowners. At the same time the state's IRR is greater than 3%, allowing a safety margin in case revenues are lower than expected. The state will have to provide high subsidies but would enjoy surpluses in the long run with these plans. However, bondholders will object to sharing gross revenue. The plans for sharing net revenue (Plans 14–15) are not as attractive for the landowners because of the long duration required for net revenues to exceed ROW cost. Plan 16 (400 feet by 100% of modified net revenue for 40 years with lease 800 feet) produces an attractive rate of return of 6.67% for the landowners and a reasonable return for the state as well. Subsidy is about $760,000 per mile per year. This last plan is the only one that appears to be acceptable to landowners, bondholders, and the state.

8.5.4 Example of Calculation of Landowner Payments

In hypothetical project, ROW value at ROW certification = $100 million. Landowner A property value, say = $100,000. His share of revenue = $100,000/Total ROW cost = 0.1% (fixed for life of agreement). Project MNR in Year X, say = $5,000,000. Then A's payment in Year X = 0.1% of $5,000,000 = $5,000.

Refer to Appendix A for year-by-year calculations under various scenarios based on projected revenues.

8.5.5 Comparison of Revenue Sharing Options

A comparison of sharing gross revenue to sharing net revenue reveals that gross revenue produces better returns to landowners. Very high percentages of gross for periods of 20 to 30 years will meet the 800 feet case, while lower percentages of gross for any period will meet the 400 feet case. However, all plans for sharing gross revenue will meet objections from bondholders. Paying very high percentages of net revenue for extended periods may satisfy landowners only in the 400 feet case. Paying 100% of modified net revenue to landholders for up to 41 years could provide a satisfactory compromise, as it provides a good rate of return to the landowners, and the state eventually recovers its subsidies.

All of the payment plans come with a high price in state subsidies. Essentially, in undertaking the project the state is agreeing that it will have to provide subsidies for an extended period. Paying those funds to bondholders or to landowners makes no difference to the state. Guaranteeing that both parties will receive their payments eliminates their risk and makes it more likely that they will be willing investors.

8.6 Summary

A given segment and mode in the Trans-Texas Corridor can afford a limited amount of ROW. SH 130, potentially one of the busiest and highest revenue-generating segments of the corridor, cannot afford 1,200 feet of ROW from roadway revenues. Apart from revenue potential, how much ROW a segment can afford also depends on the cost of land. The

original estimates for SH 130 indicated that about 17% of project funding would be spent on ROW. However, even as parcels were being appraised, estimated ROW cost had risen over 10%. For hypothetical segments of the corridor with revenues and land costs comparable to SH 130, no royalty payment plan for 1,200 feet of ROW can provide landowners a rate of return comparable to T-bond rates or other safe investments. It is therefore highly unlikely that landowners will accept any royalty plan for 1,200 feet.

Royalty payment plans for acquiring 800 feet up front and securing an option to purchase 400 feet later provide better returns to landowners than the 1,200 feet plans. Short-term (20 years and 30 years) plans can produce good returns for the landowners, but those plans require the state to pay most of the gross revenue to the landowners and subsidize most of the bond repayments, operations and maintenance expenditures. If the state has to pay some of the ROW costs as cash up front due to condemnation, individual preferences, or relocation, then any plan involving 800 feet acquisition may not be financially feasible.

The case for acquiring 400 feet up front and securing a purchase option on the remaining 800 feet appears to be the most promising. Both for long term and short term, the state can offer attractive plans for sharing gross revenues. The state will also have a safety cushion on its returns so that even if the upfront costs are high, or the traffic is below expectations, the state will not run into losses. Plans for sharing net revenue will not offer a significant return to the landowners, but along with the lease payments, they could be lucrative to some landowners. Plans for sharing modified net revenue have slightly better outcomes.

Unless conflicts among landowners, the state, and bondholders can be resolved, royalty payments would not be acceptable. One way to deal with investor concerns is to guarantee payments. Essentially, in undertaking the project the state accepts that subsidies will be required for 35+ years. Paying those funds to bondholders or to landowners makes no difference to the state. Guaranteeing that both parties will receive their payments eliminates their risk and increases their willingness to participate. However, in deciding on acceptable

levels of subsidy for a particular segment, the state must recognize that, as more segments are added, the total subsidy for the Trans-Texas Corridor could become overwhelming.

Chapter 9: Conclusion and Recommendations

9.1 Introduction

The Trans-Texas Corridor has been dubbed "the crossroad of the Americas," and it is necessary to evaluate all options for financing and accelerating construction regardless of the corridor's final incarnation. In every transportation project ROW acquisition is a major component of both cost and project delivery time, and alternatives that reduce either would be of great value to Texas and other states.

In this research report the risks and possibilities associated with offering a share of Trans-Texas Corridor revenue for ROW acquisition have been presented. Many U.S. toll roads have positive financial results only on urban segments. Even after attaining mature traffic volumes, some barely pay for operation and maintenance. Royalty payments for ROW from toll revenue would be a risky proposition for landowners. Financial feasibility, landowner response, and acquisition alternatives were therefore identified as the key issues for research.

9.2 Financial Feasibility

To determine whether toll revenues are sufficient to pay for ROW for the Trans-Texas Corridor, the financial history of toll roads in Florida and the projected financial performance of Texas State Highway 130 (a toll road expected to become a segment of the Corridor eventually) were analyzed. It was found that toll projects generally go through four phases:

1. Loss phase of 15–25 years: Traffic is low, annual revenues are less than annual total expenses, and the project debt increases.
2. Stabilization phase of about 10 years: Traffic is growing, annual revenues keep up with expenses, but debt is peaking.
3. Breakeven phase of 5–10 years: Traffic volume continues to grow, revenues exceed expenses, and debt can be paid down.
4. Profit phase 30–45 years after opening: Traffic volume stabilizes or continues to grow, revenues exceed expenses, and debt has been paid off.

Variations in outcomes would depend on the congestion levels in the area, the availability of competitive "free" alternative routes, the cost of borrowing and of construction, and other variables. Florida DOT requires that a new project must produce sufficient revenue by the twelfth year of its opening to pay at least 50% of its bond indebtedness, and must be able to pay 100% of its expenses by the 22nd year of operation. These target periods were raised in 2002 from 5 and 15 years, respectively, because projects were taking longer to become self-sufficient.

The loss phase is the most risky because debt is increasing. Bondholders may require that some of the bond proceeds be held in reserve to be drawn down during this phase. However, such extra commitments have the effect of extending the payback period, reducing the ultimate rate of return on investment, and decreasing project feasibility. By this argument, a commitment to pay for ROW with toll revenues would reduce the bond rating, increase the interest rate required on the construction bonds, and further extend the period when the state can pay off the landowners.

It was also found that:

- Substantial subsidies or reserve accounts are needed during the initial loss phase unless debt repayments are contingent on revenues.
- Extending the toll system laterally and longitudinally improves revenues — presumably by providing better connectivity. It appears that the extra debt is paid off in roughly the same time. In other words, the demand for a toll system appears to increase as connectivity and capacity increase.
- Depending on traffic growth, the ultimate rate of return on investment is between 8% and 10% interest. This is the maximum rate that can be paid to lenders.
- Project payback period is sensitive to revenue growth and O&M costs.
- Higher initial costs, such as for wider ROW, extend the breakeven point and reduce the ultimate rate of return on investment.

To get a good bond rating and a reasonable interest rate on bonds for SH 130, TxDOT had to obtain contributions from local governments to pay for the 400 feet of ROW, grant bondholders first call on revenues, and guarantee payment of O&M expenses. The roadway portion of SH 130 could have paid for at most 400 feet of ROW from projected toll revenues. The payback period would have been in excess of 60 years, and the maximum interest rate

payable would be 5.75%. The roadway mode would not be able to pay for additional ROW comparable to the 1,200 feet for the Trans-Texas Corridor in a reasonable amount of time or at an interest rate attractive to investors.

Toll projects could eventually turn a profit. Right now Florida is enjoying the profits generated by the turnpike built almost 50 years ago and is even subsidizing operations elsewhere from those profits. In addition, transportation projects could generate economic benefits that would significantly improve financial outcomes from the state's perspective. Given those benefits, the Trans-Texas Corridor would be a worthwhile investment for the state because the return would eventually exceed the state comptroller's minimum benchmark of 3%.

Financing could be a mix of local government contributions, revenue-backed bonds, state guarantees, and even private investment. Private equity may be necessary if there are caps on state-backed borrowing. However, private investors (including landowners) may require the state to provide guarantees before investing in the corridor. If the investment is not more attractive than a safe U.S. Treasury Bond, no private investor will be interested. If equity debt is to be issued, it should be a public offering, with voluntary participation based on an understanding of the risks.

Toll project bonds typically have a 35-year period, and are back-loaded, similar to the expected revenue stream. Currently, such bonds are selling at just under 6% interest. If the project debt is structured similar to a bond, the state may actually enjoy surplus revenues early on. Such surpluses should be used to back the financing of additions to the system, instead of being committed to separate debt such as ROW payments.

9.3 Landowner Response

To study landowner response to Trans-Texas Corridor ROW royalty payments, the research team used four focus groups. These groups provided an understanding of landowner preferences, which was then used to develop detailed options. The groups were also used to

test response to the options before and after basic information is provided. The primary findings from the focus groups were:

- Landowners have misconceptions about the royalty payment concept and revenue from toll roads, and without information they are prone to accept royalty payments.
- After clarifications most landowners prefer substantial up-front payment.
- Many rural landowners will accept a lease-to-the-state option.
- Some will accept ROW bonds for part of land value.
- Very few will accept royalty payments.

The options developed in the focus groups were:

9.3.1 Land Swaps

TxDOT would have to operate as a land bank. Even though landowners may accept this option, it is probably not viable for TxDOT from a practical standpoint.

9.3.2 Tax Breaks

This option may have potential as an incentive for landowners. Local taxing authorities might be willing to forgo property taxes for future revenue from increased employment and development. Thus, this option could have some limited viability, especially at the nodes of the corridor.

9.3.3 Stocks

In this option an individual's share would be based on the ratio of his investment or property value to total enterprise capitalization. A landowner would bear all risk: the stock price would vary with performance of the enterprise, and dividends would be paid only if profits are realized. However, if returns are low political fallout could be severe. Hence, the verdict for this alternative is that it is not viable for the state or the landowners. In many respects this option is similar to royalty payments.

9.3.4 Royalty Payments

Landowners have several misconceptions regarding the term "royalty":

- Landowner keeps title to the property.

- Toll roads produce a surplus from day one.
- Individual share of the revenue will be based on:
  - Traffic through property (if property is a high-traffic segment)
  - Enterprise-wide pooling of revenue (if property is a low-traffic segment)
- The state will guarantee payments.
- Access to the corridor/strip development will be permitted.

When these misconceptions are clarified, landowners rate royalty payments as low-acceptability for the same reasons they down-rate stocks.

9.3.5 Bonds

The primary features of the ROW bond would be:

- *Principal*: Fair market value of property at date of agreement, net of upfront payments.
- *Interest rate*: Pegged to T-bill rates or mortgage rates.
- *Period:* Urban landowners preferred 0–5 years, while rural landowners may be willing to wait 15–25 years.
- *Payment schedule*: Could be designed to match expected traffic/revenue growth.

A general revenue bond issue for the corridor is rated as medium-acceptability to landowners, high-viability for the state.

9.3.6 Lease with Option to Buy

The main features of this option are:

- For an annual fee the state reserves the right to buy the unused portion of the 1,200 feet of ROW. Landowner continues to use the property.
- Value locked in at original "agreed value," on date of agreement, with lease payment compensating for inflation.
- At the expiration date, the state pays owner agreed value or renews lease after re-negotiation of terms. Payment option also negotiable.

This option provides maximum flexibility to TxDOT. It can be applied to the full 1,200 feet of ROW in segments where the alignment has been determined or to the unused portion of the 1,200 feet when a specific mode is being developed. Speculation would be lessened. The lease would be a tradable asset for the landowner and the state. In this way each mode would pay for its own ROW, reducing the impact of the full 1,200 feet on the feasibility of the first mode developed. However, constitutionally the state must pay fair market value when title is

acquired. This option is rated as high-acceptability for landowners, high-acceptability for the state.

9.3.7 Landowner Response to Deferred-Payment Plans

Any deferred-payment plan for ROW is likely to cost the state more than up-front payment. Furthermore, landowners will require at least some up-front amount to clear liens. If ROW payments are subservient to other commitments on toll revenue, the state will not be able to start repaying landowners from revenues until perhaps 25 to 45 years after opening, with final payout in another 15 years. Only a small fraction of landowners are likely to accept such terms. If a landowner wishes to be an investor in the corridor, he can purchase corridor bonds, which would be a far better deal. Therefore, the state should pay the landowners up front for as much ROW as the project can afford and let them choose how to invest the proceeds.

9.4 Feasibility of Alternatives

The financial feasibility of various options for acquiring ROW for the Trans-Texas Corridor was analyzed. It was found that even without ROW costs the project would still require subsidies equivalent to about $0.5 million per mile annually for 35 years, with payback 40 years out. The analyses also showed that after about 60 years, roadway maintenance expenses catch up with revenues, leaving no money for other expenses. Therefore, only profits seen in years 40 to 60 can be figured to pay for ROW. The issue for the state is how to use a finite amount of profit expected in years 40 to 60 to pay for ROW. The options boiled down to who is going to put up what share of the ROW investment, when the value will be recouped, and at what rate of return. Revenue bond investors are unlikely candidates to participate 40 to 60 years out. The state has identified landowners as potential partners, offering a share of revenue as payment for their land.

The amount of ROW that can be acquired with royalty payments would be determined largely by what interest rate landowners will accept for their investment and whether they are willing to take the risk. Landowners prefer a share of gross revenue, and it was shown that

95-100% of gross revenue as royalty payment would buy 1,200 feet of ROW over 20 years, while giving returns to landowners comparable to Treasury bonds. However, revenue bond investors may not agree to commit most of gross revenue for ROW, and the landowners would still be assuming a large risk. The analyses found that the state can offer no more than 80% of net revenue as ROW royalty payments. This payment would buy about 400 feet of ROW over 60 years. A scenario in which 100% of modified net revenue is paid to landowners for up to 41 years could provide them with an attractive rate of return. However, considering the risk to the landowners if revenues do not materialize, royalty payments are not a preferred option for acquiring ROW in the opinion of the research team. However, at TxDOT's request various royalty payment plans were developed.

There may be other ways to leverage the profits of 40 to 60 years out to acquire ROW. Options analyzed included paying with ROW bonds and leasing. Various fractions of ROW cost bonded and various bond periods were tested, with interest rates slightly higher than for U.S. Treasury Bills of comparable periods. In every scenario the project required additional subsidies, because the ROW bond payments have to be made within the first 35 years. As the bond period increased the project IRR, decreased, and the subsidy increased because of the higher interest rates paid, suggesting that the bond period should be as short as possible. Conversely, for greater percentages paid up front feasibility decreased, suggesting that the fraction bonded should be as large as possible. This contradiction resulted from the assumptions as to how the up-front funds and subsidy are financed: if from revenue bond borrowing, the interest rate is 5.75%; if from internal funds, a rate of 3% was assumed. If the funds for 1,200 feet are borrowed externally at 5.75%, the project IRR is 1.85%, with an infinite payback period and infinite subsidies — results that are completely unacceptable to potential investors. If the funds are borrowed internally at 3%, the only option giving an IRR greater than 3% is a 5-year bond for 70% of the value of the 1,200 feet, with payback 58 years out and subsidies of about $1.1 million per mile per year for 35 years. The landowners would receive five equal annual payments at an interest rate of 3% — slightly better than a U.S. Treasury Bond.

Since in every case the project will require subsidies, the amount and duration of the subsidy and the source of funding are crucial questions the state must address. The state's subsidy for a segment like SH 130 is a minimum of about $0.5 million per mile per year for 35 years with no ROW paid for (all contributed). If 1,200 feet of ROW are acquired, subsidies for a segment like SH 130 would be of the order of $1.1 million per mile per year forever (i.e., never paid back).

Options for acquiring less ROW were also analyzed, with the remainder of the 1,200 feet held through a lease that might lock in the land value by compensating the owner for land value escalation. While further research on the details of the lease arrangement are necessary, it was found that project feasibility increases with fraction leased. For 400 feet leased at 2.5% of value per annum (800 feet paid up front), the project IRR is 2.97% (close to the benchmark of 3%), but the subsidy is equivalent to about $1.0 million per mile per year for 35 years for a segment like SH 130. For 800 feet leased at 2.5% of value per annum (400 feet paid up front), the project IRR is 4.34%, and the subsidy is reduced to about $0.7 million per mile per year for 35 years. Obviously, project feasibility is lower if lease payments are higher: for 800 feet leased at 4.5% of value per annum (400 feet paid up front), the project IRR is 3.78%. It must be noted that original estimated ROW costs for SH 130 (which have since escalated over 10%) and current low interest rates were used in the analyses. Higher ROW costs and potentially higher borrowing rates will drive up the required subsidies and further reduce the amount of ROW that the project can afford.

Overall, it appears to be worthwhile for the state to finance acquisition of up to 400 feet of ROW for the roadway portion of the Trans-Texas Corridor through bond debt and/or contributions from local governments, guarantee the bond payments with a "line of credit," and wait for the enterprise to pay off. Low-volume segments will have to be subsidized by higher-traffic portions. If a mode other than roadway is proposed as the first occupant of a segment of the corridor, then it ought to be able to pay for its own ROW costs.

For the unoccupied remainder of the 1,200 feet of ROW, it makes sense to "hold" it through a corridor preservation option. One possibility would be to secure a lease on the remainder of the 1,200 feet with an option to purchase. The lease might pay the landowner for the escalation in property value, and he would continue to enjoy its use until required by the state. This option may be attractive to landowners, while costing the state a small retaining fee, perhaps 2.5-5% of the original value annually.

9.5 Recommendations

This analysis of deferred payments for ROW for the Trans-Texas Corridor examined royalty payments as well as options uncovered in focus groups. All the analyses showed that the initial mode cannot afford 1,200 feet of ROW, even using the revenue assumptions for SH 130, one of the more profitable potential segments of the corridor. Based on these findings, the research team recommends the following:

1. TxDOT should undertake a campaign to educate landowners about the Trans-Texas Corridor and the financial implications of the proposed royalty payments. In addition, these research findings and recommendations should be shared with TxDOT policy makers to ensure that they understand the possibilities and potential pitfalls of the ROW royalty payment concept.

2. There are four potential issues of conflict among landowners, the state, and bondholders: (1) the amount of ROW to be acquired at any stage, (2) the segments of corridor for which revenue is pooled, (3) which party has first call on revenue, and (4) duration of ROW payments. Unless conflicts among the three parties can be resolved, none of the deferred payment plans would be acceptable. One way to deal with investor concerns is to guarantee their payments. Essentially, in undertaking the project the state is agreeing that it will provide subsidies for 35 years. Paying those funds to bondholders or to landowners makes no difference to the state. Guaranteeing that both parties will receive their payments eliminates their risk and makes it more likely that they will be willing investors. However, in deciding on an acceptable level of subsidy for a particular

segment, the state must recognize that, as more segments are added, the total subsidy for the Trans-Texas Corridor could become overwhelming.

3. Landowner resistance probably increases exponentially with the width of land to be taken. Since the other modes proposed for the corridor (rail, utilities, etc.) are not likely to be developed until several years later, it would be prudent for the state to acquire less than 1,200 feet of ROW up front and lease the remaining width, thereby improving project feasibility, reducing the subsidy, and mitigating bond investor concerns. In addition, landowners will be able to continue using and deriving income from the leased portion. Acquiring 400 feet of ROW with a lease option for the remainder would allow the state flexibility in decisions on expansion and allow future modes to pay for their own ROW.

4. Since regular toll road bonds have a repayment structure similar to typical toll revenue streams, bonds should be the preferred debt arrangement for the state to finance the Trans-Texas Corridor, including ROW. Upfront payment for up to 400 feet of ROW through bonds would cost the state less than virtually any deferred ROW payment plan, and at the same time would eliminate both the administrative burden of a deferred payment plan and the landowner's risk. If a landowner wants to be an investor in the corridor, he can reinvest his funds after acquisition in corridor bonds. To assure bond investors, the state will have to commit to significant subsidies for 35-40 years.

5. The state should explore ways to leverage the economic benefits of the corridor into contributions from local governments and/or revenues for the state. Local governments may even be amenable to accepting a share of corridor revenue as repayment for their investment. TxDOT should consider entering into agreements with local governments for them to become partners in the corridor and to be innovative in acquiring needed ROW. TxDOT may need to develop a "prospectus" for local governments to encourage investment in the corridor.

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APPENDIX A

Royalty Payment Plans and Outcomes

Plan 1: 1,200 Feet — by 23% of Gross — for 60 years

Acquisition of 1,200 Feet ROW by Paying 23% of Gross Revenue for 60 Years

Assumptions:

- Royalties are for a 1,200-foot-wide section of ROW valued at $100,000.
- 23% of gross annual revenue will be paid to the landowners for 60 years.

Year	Payment	Year	Payment	Year	Payment
1	$506	21	$4,236	41	$8,056
2	$699	22	$4,428	42	$8,259
3	$802	23	$4,617	43	$8,466
4	$1,027	24	$4,803	44	$8,678
5	$1,162	25	$4,985	45	$8,896
6	$1,281	26	$5,162	46	$9,119
7	$1,363	27	$5,332	47	$9,348
8	$1,445	28	$5,504	48	$9,583
9	$1,727	29	$6,024	49	$9,824
10	$1,869	30	$6,178	50	$10,070
11	$2,010	31	$6,330	51	$10,323
12	$2,152	32	$6,483	52	$10,582
13	$2,294	33	$6,636	53	$10,848
14	$2,516	34	$6,789	54	$11,120
15	$2,716	35	$6,943	55	$11,399
16	$2,916	36	$7,117	56	$11,685
17	$3,116	37	$7,296	57	$11,978
18	$3,316	38	$7,479	58	$12,279
19	$3,851	39	$7,667	59	$12,587
20	$4,044	40	$7,859	60	$12,903

Outcomes:

State's IRR (60 years)	**3.02%**	Landowners' IRR (60 years)	**3.63%**
Annual Subsidy Required (35 years)	**$0.64 million per mile**	NPV of landowner payments at 1%	**$248,784**
State's Payback Period	**53 years**	NPV of landowner payments at 3%	**$122,337**
		NPV of landowner payments at 5%	**$66,703**

Comments:

This plan would not be acceptable to landowners since their rate of return over 60 years is lower than other safe investments. Bondholders would object to sharing gross revenue.

Plan 2: 1,200 Feet — by 55% of Gross — for 30 years

Acquisition of 1,200 Feet ROW by Paying 55% of Gross Revenue for 30 Years

Assumptions

- Royalties are for a 1,200-foot-wide section of ROW valued at $100,000.
- 55% of annual gross revenue will be paid to the landowners for 30 years.

Year	Payment	Year	Payment
1	$1,210	21	$10,131
2	$1,672	22	$10,588
3	$1,917	23	$11,041
4	$2,455	24	$11,486
5	$2,780	25	$11,921
6	$3,062	26	$12,343
7	$3,259	27	$12,750
8	$3,455	28	$13,163
9	$4,129	29	$14,405
10	$4,468	30	$14,773
11	$4,807		
12	$5,146		
13	$5,485		
14	$6,016		
15	$6,494		
16	$6,973		
17	$7,451		
18	$7,930		
19	$9,209		
20	$9,670		

Outcomes:

State's IRR (60 years)	**2.96%**	Landowners' IRR (30 years)	**4.22%**
Annual Subsidy Required (for 35 yrs)	**$1.1 million per mile**	NPV of landowner payments at 1%	**$180,419**
State's Payback Period	**60 years**	NPV of landowner payments at 3%	**$123,921**
		NPV of landowner payments at 5%	**$87,738**

Comments:

The plan would not be acceptable to landowners since the rate of return over 30 years is lower than the return offered by a T-bond of similar duration. Bondholders would object to sharing gross revenue.

Plan 3: 1,200 Feet — by 100% of Gross — for 20 years

Acquisition of 1,200 Feet ROW by Paying 100% of Gross Revenue for 20 Years

Assumptions

- Royalties are for a 1,200-foot-wide section of ROW valued at $100,000.
- 100% (All) of annual gross revenue will be paid to the landowners for 20 years. The state will meet all annual expenses including construction bond payments from internal sources.

Year	Payment
1	$2,201
2	$3,041
3	$3,485
4	$4,465
5	$5,054
6	$5,568
7	$5,925
8	$6,282
9	$7,508
10	$8,124
11	$8,740
12	$9,356
13	$9,972
14	$10,937
15	$11,808
16	$12,678
17	$13,548
18	$14,418
19	$16,743
20	$17,582

Outcomes:

State's IRR (60 years)	**3.07%**	Landowners' IRR (20 years)	**4.62%**
Annual Subsidy Required (35 yrs)	**$1.06 million per mile**	NPV of landowner payments at 1%	**$155,591**
State's Payback Period	**58 years**	NPV of landowner payments at 3%	**$121,083**
		NPV of landowner payments at 5%	**$95,716**

Comments:
Landowners may accept the plan since the rate is equivalent to the T-bond rate for similar duration. Bondholders would object to committing all gross revenue.

Plan 4: 1,200 feet — by 80% of Net — for 60 Years

Acquisition of 1,200 Feet ROW by Paying 80% of Net Revenue for 60 Years

Assumptions

- Royalties are for a 1,200-foot-wide section of ROW valued at $100,000.
- 80% of annual net revenue will be paid to the landowners for 60 years.

Year	Payment	Year	Payment	Year	Payment
1	$373	21	$780	41	$21,556
2	$0	22	$970	42	$21,613
3	$0	23	$1,138	43	$21,623
4	$0	24	$1,081	44	$21,580
5	$0	25	$1,415	45	$21,477
6	$0	26	$1,565	46	$21,307
7	$0	27	$1,682	47	$21,061
8	$0	28	$1,780	48	$20,732
9	$0	29	$1,838	49	$20,309
10	$0	30	$0	50	$13,368
11	$0	31	$1,957	51	$19,135
12	$0	32	$1,661	52	$18,359
13	$0	33	$1,979	53	$17,438
14	$0	34	$1,819	54	$16,356
15	$0	35	$0	55	$15,095
16	$0	36	$20,741	56	$13,634
17	$0	37	$20,960	57	$11,954
18	$121	38	$21,156	58	$10,028
19	$456	39	$21,323	59	$7,832
20	$0	40	$15,046	60	$0

Outcomes:

State's IRR (60 years)	**3.11%**	Landowners' IRR (60 years)	**3.46%**
Annual Subsidy Required (for 35 years)	**$0.21 million per mile**	NPV of landowner payments at 1%	**$289,840**
State's Payback Period	**57 years**	NPV of landowner payments at 3%	**$121,636**
		NPV of landowner payments at 5%	**$53,182**

Comments:

This plan would not be acceptable to landowners since their rate of return is just 3.46% over a period of 60 years, which is less than that of other safe investments.

Plan 5: 1,200 feet — by 100% of Modified Net — for 41 Years

Acquisition of 1,200 Feet ROW by Paying 100% of Net Revenue for 41 Years

Assumptions

- Royalties are for a 1,200-foot-wide section of ROW valued at $100,000.
- 100% of annual modified net revenue will be paid to the landowners for 41 years.

Year	Payment	Year	Payment	Year	Payment
1	2,201	21	4,002	41	35,028
2	851	22	4,300		
3	0	23	4,593		
4	0	24	4,879		
5	42	25	5,151		
6	235	26	5,418		
7	361	27	5,667		
8	480	28	5,920		
9	481	29	6,067		
10	720	30	6,257		
11	946	31	6,443		
12	1,185	32	6,524		
13	1,410	33	6,712		
14	1,775	34	6,900		
15	2,100	35	105		
16	2,426	36	30,944		
17	2,756	37	31,721		
18	3,083	38	32,517		
19	3,398	39	33,333		
20	3,701	40	34,170		

Outcomes:

State's IRR (60 years)	**3.25%**	Landowners' IRR (41 years)	**3.51%**
Annual Subsidy Required (for 35 years)	**$0.69 million per mile**	NPV of landowner payments at 1%	**$218,875**
State's Payback Period	**60 years**	NPV of landowner payments at 3%	**$116,616**
		NPV of landowner payments at 5%	**$65,199**

Comments:
This plan would not be acceptable to landowners since their rate of return is just 3.51% over a period of 41 years, which is less than that of other safe investments.

Plan 6: 800 Feet — by 21% of Gross — for 60 Years — Plus Lease

Acquisition of 800 Feet ROW by Paying 21% of Gross Revenue for 60 Years Plus Leasing 400 Feet at 2.5% of Value for 15 years

Assumptions

- Royalties are for an 800-foot wide section of ROW valued at $100,000 and lease is for a 400-foot-wide section valued at $50,000.
- 21% of annual gross revenue will be paid to the landowners for 60 years, plus a lease payment of 2.5% of the value of the leased 400 feet for 15 years.

Year	Royalty	Lease	Total	Year	Royalty	Year	Royalty
1	$1,245	$1,250	$2,495	21	$10,425	41	$19,824
2	$1,721	$1,250	$2,971	22	$10,896	42	$20,322
3	$1,972	$1,250	$3,222	23	$11,362	43	$20,832
4	$2,527	$1,250	$3,777	24	$11,819	44	$21,355
5	$2,860	$1,250	$4,110	25	$12,267	45	$21,891
6	$3,151	$1,250	$4,401	26	$12,701	46	$22,440
7	$3,353	$1,250	$4,603	27	$13,120	47	$23,003
8	$3,555	$1,250	$4,805	28	$13,545	48	$23,581
9	$4,249	$1,250	$5,499	29	$14,822	49	$24,173
10	$4,598	$1,250	$5,848	30	$15,202	50	$24,779
11	$4,947	$1,250	$6,197	31	$15,576	51	$25,401
12	$5,295	$1,250	$6,545	32	$15,952	52	$26,039
13	$5,644	$1,250	$6,894	33	$16,329	53	$26,693
14	$6,190	$1,250	$7,440	34	$16,706	54	$27,362
15	$6,683	$1,250	$7,933	35	$17,084	55	$28,049
16	$7,175		$7,175	36	$17,513	56	$28,753
17	$7,668		$7,668	37	$17,953	57	$29,475
18	$8,160		$8,160	38	$18,403	58	$30,215
19	$9,476		$9,476	39	$18,865	59	$30,973
20	$9,951		$9,951	40	$19,339	60	$31,751

Outcomes:

State's IRR (60 years)	**3.04%**	Landowners' IRR (60 years)	**4.65%+ lease amt.**
Annual Subsidy required	**$0.7 million per mile**	NPV of landowner payments at 1%	**$338,310**
State's Payback Period	**60 years**	NPV of landowner payments at 3%	**$166,360**
		NPV of landowner payments at 5%	**$90,706**

Comments:

This plan would not be acceptable to landowners since their rate of return over 60 years is lower than other safe investments.

Plan 7: 800 Feet — by 50% of Gross — for 30 Years — Plus Lease

Acquisition of 800 Feet ROW by Paying 50% of Gross Revenue for 30 Years Plus Leasing 400 feet at 2.5% of Value for 15 years

Assumptions

- Royalties are for an 800-foot wide section of ROW valued at $100,000, and lease is for a 400-foot-wide section valued at $50,000.
- 50% of annual gross revenue will be paid to the landowners for 30 years, plus a lease payment of 2.5% of the value of the leased 400 feet for 15 years.

Year	Royalty	Lease	Total	Year	Royalty
1	$1,639	$1,250	$2,889	16	$9,441
2	$2,264	$1,250	$3,514	17	$10,089
3	$2,595	$1,250	$3,845	18	$10,737
4	$3,325	$1,250	$4,575	19	$12,468
5	$3,763	$1,250	$5,013	20	$13,093
6	$4,146	$1,250	$5,396	21	$13,716
7	$4,412	$1,250	$5,662	22	$14,336
8	$4,678	$1,250	$5,928	23	$14,949
9	$5,591	$1,250	$6,841	24	$15,552
10	$6,050	$1,250	$7,300	25	$16,141
11	$6,509	$1,250	$7,759	26	$16,712
12	$6,967	$1,250	$8,217	27	$17,263
13	$7,426	$1,250	$8,676	28	$17,822
14	$8,145	$1,250	$9,395	29	$19,503
15	$8,793	$1,250	$10,043	30	$20,002

Outcomes:

State's IRR (60 years)	**2.99%**	Landowners' IRR (30 years)	**6.07%+ lease amt.**
Annual Subsidy Required (for 35 yrs.)	**$0.90 million per mile**	NPV of landowner payments at 1%	**$244,281**
State's Payback Period	**60 years**	NPV of landowner payments at 3%	**$167,785**
		NPV of landowner payments at 5%	**$118,795**

Comments:

This plan should be acceptable to landowners since they will receive an interest rate higher than other safe investments and T-bonds of similar duration. Bondholders would object to sharing gross revenue. The state's subsidy is near its highest value.

Plan 8: 800 Feet — by 90% of Gross — for 20 Years — Plus Lease

Acquisition of 800 Feet ROW by Paying 90% of Gross Revenue for 20 Years Plus Leasing 400 Feet at 2.5% of Value for 15 Years

Assumptions

- Royalties are for an 800-foot-wide section of ROW valued at $100,000, and lease is for a 400-foot-wide section valued at $50,000.
- 90% of annual gross revenue will be paid to the landowners for 20 years, plus a lease payment of 2.5% of the value of the leased 400 feet for 15 years.

Year	Royalty	Lease	Total	Year	Royalty
1	$2,950	$1,250	$4,200	16	$16,994
2	$4,076	$1,250	$5,326	17	$18,160
3	$4,672	$1,250	$5,922	18	$19,326
4	$5,984	$1,250	$7,234	19	$22,443
5	$6,774	$1,250	$8,024	20	$23,567
6	$7,463	$1,250	$8,713		
7	$7,942	$1,250	$9,192		
8	$8,421	$1,250	$9,671		
9	$10,064	$1,250	$11,314		
10	$10,890	$1,250	$12,140		
11	$11,715	$1,250	$12,965		
12	$12,541	$1,250	$13,791		
13	$13,367	$1,250	$14,617		
14	$14,661	$1,250	$15,911		
15	$15,827	$1,250	$17,077		

Outcomes:

State's IRR (60 years)	**3.07%**	Landowners' IRR (20 years)	**7.28%+ lease amt.**
Annual Subsidy Required (for 35 yrs.)	**$1.1 million per mile**	NPV of landowner payments at 1%	**$208,558**
State's Payback Period	**60 years**	NPV of landowner payments at 3%	**$162,302**
		NPV of landowner payments at 5%	**$128,300**

Comments:

Landowners should find this plan attractive since the interest rate is relatively high and their payback period is short (20 years). Bondholders would not accept so much of gross revenue being committed to ROW payments. The state's subsidy is at its highest value.

Plan 9: 800 Feet — by 79% of Net — for 60 Years — plus Lease

Acquisition of 800 Feet ROW by Paying 79% of Net Revenue for 60 Years Plus Leasing 400 Feet at 2.5% of Value for 15 Years

Assumptions

- Royalties are for an 800-foot-wide section of ROW valued at $100,000, and lease is for a 400-foot-wide section valued at $50,000.
- 79% of annual net revenue will be paid to the landowners for 60 years, plus a lease payment of 2.5% of the value of the leased 400 feet for 15 years.

Year	Royalty	Lease	Total	Year	Payment	Year	Payment
1	$549	$1,250		21	$1,148	41	$31,704
2	$0	$1,250		22	$1,427	42	$31,787
3	$0	$1,250		23	$1,674	43	$31,802
4	$0	$1,250		24	$1,590	44	$31,738
5	$0	$1,250		25	$2,081	45	$31,587
6	$0	$1,250		26	$2,302	46	$31,337
7	$0	$1,250		27	$2,474	47	$30,976
8	$0	$1,250		28	$2,618	48	$30,492
9	$0	$1,250		29	$2,703	49	$29,869
10	$0	$1,250		30	$0	50	$19,661
11	$0	$1,250		31	$2,878	51	$28,143
12	$0	$1,250		32	$2,443	52	$27,002
13	$0	$1,250		33	$2,911	53	$25,647
14	$0	$1,250		34	$2,676	54	$24,055
15	$0	$1,250		35	$0	55	$22,200
16	$0			36	$30,504	56	$20,053
17	$0			37	$30,828	57	$17,581
18	$178			38	$31,115	58	$14,749
19	$671			39	$31,361	59	$11,519
20	$0			40	$22,128	60	$0

Outcomes:

State's IRR (60 years)	**3.09%**	Landowners' IRR (60 years)	**4.41%+ lease amt.**
Annual Subsidy Required (35 yrs.)	**$0.2 million per mile**	NPV of landowner payments at 1%	**$426,281**
State's Payback Period	**60 years**	NPV of landowner payments at 3%	**$178,896**
		NPV of landowner payments at 5%	**$78,217**

Comments:

This plan would not be acceptable to landowners since the rate of return over 60 years is lower than the return offered by other safe investments.

Plan 10: 800 Feet — by 100% of Modified Net — for 41 Years — Plus Lease

Acquisition of 800 Feet ROW by Paying 100% of Modified Net Revenue for 41 Years Plus Leasing 400 Feet at 2.5% of Value for 15 Years

Assumptions

- Royalties are for an 800-foot-wide section of ROW valued at $100,000, and lease is for a 400-foot wide section valued at $50,000.
- 100% of annual modified net revenue will be paid to the landowners for 41 years, plus a lease payment of 2.5% of the value of the leased 400 feet for 15 years.

Year	Royalty	Lease	Total	Year	Royalty	Year	Royalty
1	$2,051	$1,250	$3,301	21	$6,003	41	$52,541
2	$27	$1,250	$1,277	22	$6,450		
3	$0	$1,250	$1,250	23	$6,890		
4	$0	$1,250	$1,250	24	$7,318		
5	$0	$1,250	$1,250	25	$7,726		
6	$0	$1,250	$1,250	26	$8,127		
7	$0	$1,250	$1,250	27	$8,500		
8	$0	$1,250	$1,250	28	$8,880		
9	$0	$1,250	$1,250	29	$9,100		
10	$0	$1,250	$1,250	30	$9,386		
11	$169	$1,250	$1,419	31	$9,665		
12	$527	$1,250	$1,777	32	$9,787		
13	$865	$1,250	$2,115	33	$10,068		
14	$1,412	$1,250	$2,662	34	$10,350		
15	$1,900	$1,250	$3,150	35	$158		
16	$3,640		$3,640	36	$46,416		
17	$4,134		$4,134	37	$47,581		
18	$4,624		$4,624	38	$48,776		
19	$5,097		$5,097	39	$50,000		
20	$5,551		$5,551	40	$51,255		

Outcomes:

State's IRR (60 years)	**3.09%**	Landowners' IRR (42 years)	**4.64%+ lease amt.**
Annual Subsidy Required	**$0.71 million per mile**	NPV of landowner payments at 1%	**$352,619**
State's Payback Period	**60 years**	NPV of landowner payments at 3%	**$181,121**
		NPV of landowner payments at 5%	**$96,778**

Comments:

This plan would not be acceptable to landowners since the rate of return over 42 years is lower than the return offered by other safe investments.

Plan 11: 400 Feet — by 23% of Gross — for 50 Years — Plus Lease

Acquisition of 400 Feet ROW by Paying 23% of Gross Revenue for 50 Years Plus Leasing 800 Feet at 2.5% of Value for 15 Years

Assumptions

- Royalties are for a 400-foot-wide section of ROW valued at $100,000, and lease is for an 800-foot-wide section valued at $200,000.
- 23% of annual gross revenue will be paid to the landowners for 50 years, plus a lease payment of 2.5% of the value of the leased 800 feet for 15 years.

Year	Royalty	Lease	Total	Year	Payment	Year	Payment
1	$1,508	$5,000	$6,508	21	$12,619	41	$23,998
2	$2,083	$5,000	$7,083	22	$13,190	42	$24,600
3	$2,388	$5,000	$7,388	23	$13,753	43	$25,217
4	$3,059	$5,000	$8,059	24	$14,308	44	$25,850
5	$3,462	$5,000	$8,462	25	$14,850	45	$26,499
6	$3,814	$5,000	$8,814	26	$15,375	46	$27,164
7	$4,059	$5,000	$9,059	27	$15,882	47	$27,846
8	$4,304	$5,000	$9,304	28	$16,396	48	$28,545
9	$5,144	$5,000	$10,144	29	$17,943	49	$29,262
10	$5,566	$5,000	$10,566	30	$18,402	50	$29,996
11	$5,988	$5,000	$10,988	31	$18,855		
12	$6,410	$5,000	$11,410	32	$19,310		
13	$6,832	$5,000	$11,832	33	$19,766		
14	$7,493	$5,000	$12,493	34	$20,224		
15	$8,089	$5,000	$13,089	35	$20,681		
16	$8,686	-	$8,686	36	$21,200		
17	$9,282	-	$9,282	37	$21,732		
18	$9,878	-	$9,878	38	$22,278		
19	$11,471	-	$11,471	39	$22,837		
20	$12,045	-	$12,045	40	$23,410		

Outcomes:

State's IRR (60 years)	**3.09%**	Landowners' IRR (50 years)	**7.52%+ lease amt.**
Annual Subsidy Required (35 yrs.)	**$0.8 mill. per mile**	NPV of landowner payments at 1%	**$542,982**
State's Payback Period	**60 years**	NPV of landowner payments at 3%	**$297,749**
		NPV of landowner payments at 5%	**$175,713**

Comments:

This plan provides an IRR over 50 years that may be acceptable to many landowners. Bondholders may object to sharing gross revenue.

Plan 12: 400 Feet — by 35% of Gross — for 30 Years — Plus Lease

Acquisition of 400 Feet ROW by Paying 35% of Gross Revenue for 30 Years Plus Leasing 800 Feet at 2.5% of Value for 15 Years

Assumptions

- Royalties are for a 400-foot-wide section of ROW valued at $100,000, and lease is for an 800-foot-wide section valued at $200,000.
- 35% of annual gross revenue will be paid to the landowners for 30 years, plus a lease payment of 2.5% of the value of the leased 800 feet for 15 years.

Year	Royalty	Lease	Total	Year	Payment
1	$2,294	$5,000	$7,294	21	$19,203
2	$3,170	$5,000	$8,170	22	$20,071
3	$3,633	$5,000	$8,633	23	$20,929
4	$4,655	$5,000	$9,655	24	$21,773
5	$5,269	$5,000	$10,269	25	$22,597
6	$5,804	$5,000	$10,804	26	$23,397
7	$6,177	$5,000	$11,177	27	$24,168
8	$6,550	$5,000	$11,550	28	$24,951
9	$7,828	$5,000	$12,828	29	$27,304
10	$8,470	$5,000	$13,470	30	$28,003
11	$9,112	$5,000	$14,112		
12	$9,754	$5,000	$14,754		
13	$10,396	$5,000	$15,396		
14	$11,403	$5,000	$16,403		
15	$12,310	$5,000	$17,310		
16	$13,217	-	$13,217		
17	$14,124	-	$14,124		
18	$15,032	-	$15,032		
19	$17,456	-	$17,456		
20	$18,330	-	$18,330		

Outcomes:

State's IRR (60 years)	**3.62%**	Landowners' IRR (30 years)	**8.33%+ lease amt.**
Annual Subsidy Required (35 yrs.)	**$0.9 mill. per mile**	NPV of landowner payments at 1%	**$341,993**
State's Payback Period	**52 years**	NPV of landowner payments at 3%	**$234,899**
		NPV of landowner payments at 5%	**$166,312**

Comments:

This plan may be acceptable to most landowners because of the relative good return over 30 years compared to a T-bill. Bondholders may object to sharing gross revenue.

Plan 13: 400 Feet — by 50% of Gross — for 20 years — plus Lease

Acquisition of 400 Feet ROW by Paying 50% of Gross Revenue for 20 Years Plus Leasing 800 Feet at 2.5% of Value for 15 Years

Assumptions

- Royalties are for a 400-foot-wide section of ROW valued at $100,000, and lease is for an 800-foot-wide section valued at $200,000.
- 50% of annual gross revenue will be paid to the landowners for 20 years, plus a lease payment of 2.5% of the value of the leased 800 feet for 15 years.

Year	Royalty	Lease	Total
1	$3,277	$5,000	$8,277
2	$4,529	$5,000	$9,529
3	$5,191	$5,000	$10,191
4	$6,649	$5,000	$11,649
5	$7,527	$5,000	$12,527
6	$8,292	$5,000	$13,292
7	$8,824	$5,000	$13,824
8	$9,357	$5,000	$14,357
9	$11,182	$5,000	$16,182
10	$12,100	$5,000	$17,100
11	$13,017	$5,000	$18,017
12	$13,935	$5,000	$18,935
13	$14,852	$5,000	$19,852
14	$16,290	$5,000	$21,290
15	$17,586	$5,000	$22,586
16	$18,882	-	$18,882
17	$20,178	-	$20,178
18	$21,474	-	$21,474
19	$24,937	-	$24,937
20	$26,186	-	$26,186

Outcomes:

State's IRR (60 years)	**4.05%**	Landowners' IRR (20 years)	**8.30%+ lease amt.**
Annual Subsidy Required (35 yrs.)	**$1.0 mill. per mile**	NPV of landowner payments at 1%	**$231,732**
State's Payback Period	**49 years**	NPV of landowner payments at 3%	**$180,336**
		NPV of landowner payments at 5%	**$142,556**

Comments:

This plan may be acceptable to most landowners because of the relative good return over 20 years compared to a T-bill. Bondholders may object to sharing gross revenue.

Plan 14: 400 Feet — by 70% of Net — for 60 Years — Plus Lease

Acquisition of 400 Feet ROW by Paying 70% of Net Revenue for 60 Years Plus Leasing 800 Feet at 2.5% of Value for 15 Years

Assumptions

- Royalties are for a 400-foot-wide section of ROW valued at $100,000, and lease is for an 800-foot-wide section valued at $200,000.
- 70% of annual net revenue will be paid to the landowners for 60 years, plus a lease payment of 2.5% of the value of the leased 800 feet for 15 years.

Year	Royalty	Lease	Total	Year	Payment	Year	Payment
1	$1,134	$5,000	$6,134	21	$2,370	41	$65,470
2	$0	$5,000	$5,000	22	$2,946	42	$65,643
3	$0	$5,000	$5,000	23	$3,456	43	$65,673
4	$0	$5,000	$5,000	24	$3,284	44	$65,541
5	$0	$5,000	$5,000	25	$4,297	45	$65,228
6	$0	$5,000	$5,000	26	$4,755	46	$64,712
7	$0	$5,000	$5,000	27	$5,109	47	$63,968
8	$0	$5,000	$5,000	28	$5,407	48	$62,967
9	$0	$5,000	$5,000	29	$5,581	49	$61,682
10	$0	$5,000	$5,000	30	$0	50	$40,602
11	$0	$5,000	$5,000	31	$5,944	51	$58,116
12	$0	$5,000	$5,000	32	$5,045	52	$55,760
13	$0	$5,000	$5,000	33	$6,011	53	$52,963
14	$0	$5,000	$5,000	34	$5,525	54	$49,676
15	$0	$5,000	$5,000	35	$0	55	$45,845
16	$0	-	$0	36	$62,993	56	$41,410
17	$0	-	$0	37	$63,661	57	$36,305
18	$367	-	$367	38	$64,254	58	$30,458
19	$1,385	-	$1,385	39	$64,762	59	$23,788
20	$0	-	$0	40	$45,697	60	$0

Outcomes:

State's IRR (60 years)	**3.33%**	Landowners' IRR (60 years)	**5.84%+ lease amt.**
Annual Subsidy Required (35 yrs.)	**$0.3 mill. per mile**	NPV of landowner payments at 1%	**$755,435**
State's Payback Period	**53 years**	NPV of landowner payments at 3%	**$317,031**
		NPV of landowner payments at 5%	**$138,612**

Comments:

This plan would not be acceptable to landowners because of the relatively low IRR over 60 years. The state's subsidy is near its minimum.

Plan 15: 400 Feet — by 100% of Net — for 48 Years — Plus Lease

Acquisition of 400 Feet ROW by Paying 100% of Net Revenue for 48 Years Plus Leasing 800 Feet at 2.5% of Value for 15 Years

Assumptions

- Royalties are for a 400-foot-wide section of ROW valued at $100,000, and lease is for an 800-foot-wide section valued at $200,000.
- 100% of annual net revenue will be paid to the landowners for 48 years, plus a lease payment of 2.5% of the value of the leased 800 feet for 15 years.

Year	Royalty	Lease	Total	Year	Payment	Year	Payment
1	$1,619	$5,000	$6,619	21	$3,385	41	$93,529
2	$0	$5,000	$5,000	22	$4,209	42	$93,776
3	$0	$5,000	$5,000	23	$4,938	43	$93,818
4	$0	$5,000	$5,000	24	$4,691	44	$93,630
5	$0	$5,000	$5,000	25	$6,138	45	$93,184
6	$0	$5,000	$5,000	26	$6,792	46	$92,446
7	$0	$5,000	$5,000	27	$7,299	47	$91,382
8	$0	$5,000	$5,000	28	$7,724	48	$89,953
9	$0	$5,000	$5,000	29	$7,973		
10	$0	$5,000	$5,000	30	$0		
11	$0	$5,000	$5,000	31	$8,491		
12	$0	$5,000	$5,000	32	$7,208		
13	$0	$5,000	$5,000	33	$8,587		
14	$0	$5,000	$5,000	34	$7,893		
15	$0	$5,000	$5,000	35	$0		
16	$0	-	$0	36	$89,990		
17	$0	-	$0	37	$90,944		
18	$524	-	$524	38	$91,792		
19	$1,978	-	$1,978	39	$92,517		
20	$0	-	$0	40	$65,281		

Outcomes:

State's IRR (60 years)	**3.08%**	Landowners' IRR (48 years)	**6.16%+ lease amt.**
Annual Subsidy Required (35 yrs.)	**$0.3 mill. per mile**	NPV of landowner payments at 1%	**$720,934**
State's Payback Period	**60 years**	NPV of landowner payments at 3%	**$326,574**
		NPV of landowner payments at 5%	**$152,423**

Comments:

This plan would not be acceptable to landowners because of the relatively low IRR over 48 years. The state's subsidy is near its minimum.

Plan 16: 400 Feet — by 100% of Modified Net — for 40 Years — Plus Lease

Acquisition of 400 Feet ROW by Paying 100% of Modified Net Revenue for 40 Years Plus Leasing 800 Feet at 2.5% of Value for 15 Years

Assumptions

- Royalties are for a 400-foot-wide section of ROW valued at $100,000, and lease is for an 800-foot-wide section valued at $200,000.
- 100% of annual modified net revenue will be paid to the landowners for 40 years, plus a lease payment of 2.5% of the value of the leased 800 feet for 15 years.

Year	Royalty	Lease	Total	Year	Payment		
1	$1,602	$5,000	$6,602	21	$12,005		
2	$0	$5,000	$5,000	22	$12,900		
3	$0	$5,000	$5,000	23	$13,780		**Land**
4	$0	$5,000	$5,000	24	$14,636		**Owner's**
5	$0	$5,000	$5,000	25	$15,452	**Year**	**IRR**
6	$0	$5,000	$5,000	26	$16,254	30	3.26%
7	$0	$5,000	$5,000	27	$17,000	31	3.56%
8	$0	$5,000	$5,000	28	$17,760	32	3.83%
9	$0	$5,000	$5,000	29	$18,200	33	4.08%
10	$0	$5,000	$5,000	30	$18,772	34	4.29%
11	$0	$5,000	$5,000	31	$19,329	35	4.30%
12	$0	$5,000	$5,000	32	$19,573	36	5.03%
13	$0	$5,000	$5,000	33	$20,136	37	5.59%
14	$325	$5,000	$5,325	34	$20,700	38	6.02%
15	$1,300	$5,000	$6,300	35	$316	39	6.38%
16	$7,279		$7,279	36	$92,833	40	6.67%
17	$8,268		$8,268	37	$95,163		
18	$9,248		$9,248	38	$97,551		
19	$10,194		$10,194	39	$100,000		
20	$11,102		$11,102	40	$102,510		

Outcomes:

State's IRR (60 years)	**3.15%**	Landowners' IRR (40 years)	**6.67%+ lease amt.**
Annual Subsidy Required (35 yrs.)	**$0.76 mill. per mile**	NPV of landowner payments at 1%	**$559,124**
State's Payback Period	**60 years**	NPV of landowner payments at 3%	**$295,152**
		NPV of landowner payments at 5%	**$161,269**

Comments:

This plan provides an IRR over 40 years that may be acceptable to many landowners. Note the rapid increase in the landowners' IRR between Years 30-40 (right of table).