

Toll Revenue Projections: Synthesis of Issues
Prepared for Jeff Doyle, JD., Director
WSDOT Public Private Partnerships Office

Prepared by
Kathy Lindquist, WSDOT Research Office
Michel Wendt, WSDOT Library

September 11, 2006

Transportation Synthesis Reports (TSR's) are brief summaries of currently available information on topics of interest to WSDOT staff. Online and print sources may include newspaper and periodical articles, NCHRP and other TRB programs, AASHTO, the research and practices of other state DOT's and related academic and industry research. Internet hyperlinks in the TSR's are active at the time of publication, but host server changes can make them obsolete.

Request for Report

New highway toll facilities are often paid for strictly from the revenues generated from the imposition of tolls. Government (or the private sector) typically borrows money through a bond issuance, or through private financing (banks, equity investors, etc.). The terms for repayment of the loaned money are established when the loan is made. The trick is to structure the repayment schedule to match the anticipated toll revenue collections, projected over a 25 - 99 year repayment period. The problem is, forecasting traffic (and therefore revenue) on a new toll facility is a very, very difficult to do with any accuracy. When the traffic and revenue (T/R) forecasts are low (which happens often), the government may not have sufficient funds to repay the loaned money in due course. Some very high-profile toll facilities have struggled with this issue, and have been forced to sell the entire toll facility and operation to the private sector in order to repay the debt.

In the last six months, a number of news articles have featured the struggles of these start-up toll roads, with references made to the inherent unreliability of T/R forecasts. At least one press article has referenced a study/studies that show how unreliable these forecasts are. And at least one article has gone as far as to point out how some of these firms conducting the T/R forecasts have a vested stake in projecting high numbers, because these firms expect future business from government if the toll road proposal is implemented.

Summary of the Issue:

A quick look at analyses from newspaper features, studies, reviews, commentaries was done on the issue of reliability of toll road traffic and revenue forecasts. A few formal studies or analyses can be found, but most available evidence is anecdotal exists that asserts the unreliability of T/R forecasting – *The Denver Post* series specifically. Formal studies are continuing to be researched. The NCHRP Project 20-5, Synthesis of Highway Practice 36-11, *Estimating Toll Facility Demand and Revenue* that is currently underway appears to be specifically focused on the traffic and revenue forecasting issues.

Key Terms searched:

Toll road revenue
Traffic and Revenue forecasts
T&R forecasts
T/R forecasts
Traffic projections

Current periodicals:

The Denver Post, September 4, 5, and 6, 2006. Three part series,
Roads to riches: paved with bad projections, by Chuck Plunket, *Denver Post* Staff Writer.

Truth be tolled

First in a three-part series: Roads to riches paved with bad projections

The Denver Post, September 4, 2006

http://www.denverpost.com/localnews/ci_3871773

By Chuck Plunkett

Denver Post Staff Writer

The three part series documents how Colorado, other states and federal officials have looked to toll roads as a way to finance highways to spur growth or to ease congestion. In a review of 23 new turnpikes underway nationwide, the article states that a clear majority are failing to meet revenue projections to justify their costs. Officials are promoting tolling as a way to build new roads in an era where other sources of revenue are scarce and dwindling.

Even with adjustments for the break-in period in the opening years, 86 percent of new toll roads in eight states failed to meet expectations in their first full year. The article states, that by year three of the projects, 75 percent, or 15 of the 20 that have been open remained poor performers.

Truth be tolled - pt. II

Denver and the West: No 2-way street: When landowners help pay the toll

The Denver Post, September 5, 2006

http://www.denverpost.com/ci_3876477

By Chuck Plunkett

Denver Post Staff Writer

This article describes flawed projections done for the Greenville Southern Connector, in Greenville, NC. The traffic and revenue projections prepared by the nationally known company Wilbur Smith Associates helped persuade investors in 1998 to loan a newly created toll authority \$200 million creating Greenville's Southern Connector.

The article states that from that \$200 million, Wilbur Smith collected more than \$12 million for a pair of contracts the authority promised the company if the bonds were sold. This was done as the company prepared the revenue projections that justified the loan.

The arrangements raise questions about the objectivity of the traffic and revenue study, experts and critics say. A *Denver Post* review of 23 toll roads built or under construction since 1985 found that five of them sold bonds based on projections prepared by companies promised or granted future business after their projections made sense to investors.

The articles include a graphic of the 22 operating toll roads in eight states, the traffic consultants who did the estimates, and the projected revenue estimates.

Truth be tolled - pt. III

Denver & the west: A fork in C-470 May sway how state adds lanes

The Denver Post, September 6, 2006

http://www.denverpost.com/ci_3878766

By Jeffrey Leib

Denver Post Staff Writer

This article describes the Colorado Tolling Enterprise's first major project, where part of C-470 between Interstate 25 and South Kipling Parkway has been slated for new toll lanes costing \$325 million. Some local officials and residents in the C-470 corridor say the state's proposal takes an expensive approach to congestion that favors a minority of motorists who can afford high tolls, leaving many drivers stuck in clogged, adjacent, free lanes at peak travel times.

Northwest Parkway:

Has roots in suspect mergings

The Denver Post, September 6, 2006

http://www.denverpost.com/ci_3870576

By Chuck Plunkett
Denver Post Staff Writer

This article describes the creation of the Northwest Parkway Public Highway Authority. As a public-private partnership with state-granted governmental powers, the new authority has two important tools: the ability to condemn land and the ability to sell tax-exempt revenue bonds.

To sell the bonds the authority hired Vollmer Associates, the engineering firm Carter & Burgess and a consultant managed by former E-470 chief financial officer Pamela Bailey-Campbell. The article goes on to explain the less than apparent transparent business relationships and easy-to-understand disclosures and issues of conflicts of interest.

Denver & the west | truth be tolled - pt. III

Oregon may get some mileage out of fee experiment:

The innovative, high-tech exploration of making drivers pay for when and where they go may make cents as states look to wean themselves from the gas tax.

The Denver Post, September 6, 2006

http://www.denverpost.com/ci_3878693

By Jeffrey Leib

Denver Post Staff Writer

This article describes the mileage—based charging system that Oregon is researching using a Global Positioning System devices that relies on satellite signals to tally miles driven. Two hundred and eighty motorists are taking part in the state s experiment with mileage-based road pricing. Oregon has started the program to charge select motorists in the Portland area a fee of 1.2 cents for each mile they travel within the state instead of the 24-cents- a-gallon state tax on gasoline. Oregon's experiment with mileage-based road pricing - which goes well beyond traditional tolling - may be the model that allows states to wean themselves from the gas tax.

Alternate Views

Tollroadsnews

Denver Post series highlights optimism bias in forecasts and suggests vested interest

http://tollroadsnews.info/artman/publish/article_1362.shtml

The *Tollroadsnews* article provides a discussion on perceptions of bias and vested interests of forecasters and a critique of *The Denver Post* articles.

The article states the failures of TR forecasting are a continuing problem for the industry, especially the systematic upward bias. It is unclear as to where the main blame lies. The article states that forecasts will always be in error because they rest on doubtful estimates and assumptions about the future. Determining how responsible forecasters are for errors requires more research on a case by case basis.

The Reason Foundation Mobility Project

<http://www.reason.org/mobility/index.shtml#mobilitystudies>

Reason Foundation's Mobility Project is a major initiative to develop and implement a framework for removing congestion as an obstacle to mobility in American cities. This project is made possible by supporter Bob Gavin, former Chairman of Motorola. Includes a number of policies studies on financing transportation including:

Building Roads to Reduce Traffic Congestion in America's Cities: How Much and at What Cost?

- » [Full Study \(.pdf\)](#)
- » [State-by-State Traffic Delays Data and Road Capacity Needs](#)
- » [Press Release](#)
- » [Maps, Rankings, and More](#)

Why Mobility Matters

- » [Full Brief \(.pdf\)](#)

Adding FAST Lanes to Milwaukee's Freeways: Congestion Relief, Improved Transit, and Help with Funding Reconstruction

- » [Full Study \(.pdf\)](#)
- » [Policy Summary \(.pdf\)](#)
- » [Press Release](#)

The Croesus Trap

Privatization and tolls - not more money - are the key to fixing Virginia's broken transportation system

August 7, 2006 | Bacon's Rebellion

By Geoffrey Segal, Reason

- » [Full Text](#)

Competing Models for HOT Lanes

Variable-toll, value-priced Model 2 HOT lanes are the road to meaningful congestion reduction

July 2006 | Public Works Financing

By Robert Poole, Reason

- » [Full Text](#)

Bottom-Line on Indiana Toll Road Deal

Commuters, taxpayers and state government reaping benefits

July 10, 2006 | Indiana Policy Review

By Geoffrey Segal, Reason

- » [Full Text](#)

A Threat to the Future of Private Toll Roads

Proposal to fund rail, mass transit with toll revenues is ill-conceived

June 2006 | Public Works Financing

By Robert Poole, Reason

- » [Full Text](#)

It's Time to Reconstruct America's Interstate System

Reconfiguring our regional highway system for today's economy

June 30, 2006 | Reason.org

By Samuel Staley, Reason

- » [Full Text](#)

The Mobility Mission

Learning not to live with congestion

June 29, 2006 | Reason.org

By Adrian Moore, Reason

- » [Full Text](#)

Reason Foundation Commentary

Public Works Financing

July 30, 2005

Equity Investors: A New Dawn for Toll Roads in America

http://www.reason.org/commentaries/poole_20050730.shtml

By Robert Poole Jr.

Robert Poole Jr. makes the case for the linkages between these tolling projects:

- Cintra/Macquarie pay \$1.83 billion to lease the Chicago Skyway for 99 years.
- Governors of Delaware, Indiana, and New Jersey talk seriously about selling or leasing existing toll roads.
- Cintra proposes a \$7.2 billion investment in the Trans-Texas Corridor.
- Transurban joins Fluor's team for two Virginia HOT lane projects, which shift from requiring taxpayer support to being 100% toll-funded.
- Macquarie offers to bail out the struggling San Joaquin Hills Toll Road in California,
- Transurban does likewise for the troubled Pocahontas Parkway in Virginia.

The common factor, according to Poole, is equity investment as a new tool for funding major U.S. highway investments. Although the funding mechanisms differ, the deals proposed by global companies all offer to make large investments and take on significant risks in exchange for a long-term right to charge tolls and operate the facilities. They are U.S. versions of the long-term concession model used for decades for toll road projects in Europe and more recently in Australia, Asia, and Latin America.

Other Sources

The 2004 and 2005 versions of *Standard and Poor's* report on toll forecasting are available as a PDF. There is no evidence of the 2006 version being published yet.

According to this report, the traffic forecasting risk research carried out by Standard & Poor's Ratings Services has, to date, concentrated on optimism bias: its nature and extent. Empirical evidence suggests that toll road forecasts have, on average, overestimated traffic by 20%-30%. The 2004 study update compares toll road forecasting performance with the predictive record of traffic forecasts made for toll-free facilities. Analysis of the toll-free forecasts demonstrates over- and underestimation in roughly equal proportions. Systematic optimism bias therefore appears to be a distinguishing feature of toll road forecasts.

Panel on the Credit-Worthiness of Federal Credit

FHWA's discussion paper *Federal Credit for Surface Transportation: Exploring Concepts and Issues*. I was not able to locate this draft, but did find the following related discussion article on FHWA's website: <http://www.fhwa.dot.gov/innovativefinance/proceed5.htm>

Tom McLoughlin, MBIA Insurance Corporation, introduced a panel that will review alternative risk scoring methodologies for Federal credit and assess the implications of the OMB Circular A-129 policy concerning the subordination of Federal debt. David Litvack, Fitch IBCA, provides an overview of the risk model developed by Fitch IBCA for evaluating the default risk associated with a Federal credit program involving direct loans, loan guarantees and standby lines of credit for surface transportation projects. Panelist Chee Mee Hu, Moody's Investors Service, draws upon her vast experience in transportation credit analysis to discuss issues relating to potential risk scoring methodologies for Federal credit.

The Denver Post article referenced earlier states the following about the FHWA study:

A draft of a new Federal Highway Administration study focuses on three companies that do most of the revenue projections and rely on bonds to cover road construction costs. They give several explanations for consistent overestimates of road use. The two reasons that are never given and worry securities experts are:

1. *Cases where consultants doing the revenue and traffic forecast either had an interest in seeing the road get built or were later awarded additional work on the road.*
2. *Cases where the road's revenue projections were used as a negotiating tool to secure favorable financing terms rather than as an impartial scientific study.*

Traffic and Revenue Forecasting for Roads and Highways: Concerns, Methods and a Checklist for Practitioners

<http://tmip.fhwa.dot.gov/clearinghouse/docs/DOT-OST-P-001-06/section7.stm>

This paper proposes to provide guidance to MPOs and state DOTs as they consider tolling or embark on the use of their models for traffic and revenue forecasts. There are three parts to the paper: First, a brief description the practice of modeling, current concerns and the evolution of the state of the practice. Second, an explanation of the differences between 'traditional' model applications and the applications of these models for toll road traffic and revenue forecasts. Third, based upon these differences, a checklist of questions that state DOTs and MPOs could use to guide the development and interpretation of the traffic and revenue application.

NATIONAL FEDERATION OF MUNICIPAL ANALYSTS

Recommended Best Practices in Disclosure for Toll Road Financings

http://www.nfma.org/disclosure/rbp_toll_road.pdf

This resource provides a timely and complete disclosure of operational and financial information to assess credit quality and risk on all municipal debt offerings. One of the main initiatives of the

NFMA is to promote timely and complete disclosure of the financial and operating information needed to assess the credit quality and risk of a municipal debt issue. The NFMA's efforts have ranged from global disclosure-related issues to more detailed, sector-specific work such as these Recommended Best Practices in Disclosure.

National Cooperative Highway Research Program
NCHRP Project 20-5

Synthesis of Highway Practice 36-11

Estimating Toll Facility Demand and Revenue

<http://www4.nas.edu/trb/synthesis.nsf/All+Projects/Synthesis+36-11>

This synthesis will focus on many of the issues related to forecasting including:

- Purposes of tolling.
- Methods for forecasting toll facility travel demand and revenues, including simple sketch-planning tools and investment grade studies, including changes over time.
- Products provided from forecasting.
- Peer review procedures.
- Input data used, including surveys and data sources.
- Methods of estimating value of time.
- A comparison of demand and revenue forecasts vs. actual experience.
- An inventory of investment grade studies for toll facilities.
- Comparison of the accuracy and effectiveness of various toll facility demand and revenue forecasting methods.
- Variables that may be associated with forecasting successes and failures, including stand-alone projects vs. system expansions, financing methods, modeling techniques, etc.
- Innovative techniques used to improve the quality of forecasts.
- How risk is assessed for demand and revenue forecasts.
- Availability of detailed information on modeling procedures.
- Case studies that illustrate different approaches, including international experience, if applicable.
- Research recommendations for improved forecasting methods.

Traffic Forecasting Risk Study Update 2005: Through Ramp-Up and Beyond
World Highways

September 6, 2006

The 2005 traffic risk study update carried out by Standard & Poor's Ratings Services further supports our earlier conclusions regarding toll road forecasting performance in the first year of operations. Optimism bias—over forecasting asset use--and error remain prevalent. Beyond Year 1, our case study analysis does not support the notion of any systematic improvement in forecasting accuracy. Optimism bias and error measurement statistics remain constant through Years two to five.

Toll Road States

The following eight states had toll projects where consultant forecast estimates were inaccurate:

Colorado – C-470, estimates done by Vollmer, first year were 61.8 percent of projected.

California – Eastern Foothills Toll Road, estimates done by Wilbur Smith, first year were 78.6 percent of projected.

Florida – Florida's Southern Connector surpassed projections by 2 percent, but the Polk Parkway missed by 32.5 percent. The Seminole Parkway's first section missed its first full-year projection by more than 54 percent. The Veteran's Expressway, opened in 1955, also missed its first full-year projection by 42 percent. Estimates for all were done by URS.

Georgia – Georgia 400, Estimates done by Vollmer, first year are 122.2 percent of projected.

Oklahoma –Cherokee Turnpike, 87.2 percent; Chickasaw Turnpike, 21.1 percent; Creek Turnpike, 49 percent; and John Kilpatrick Turnpike, 18 percent; all estimates done by Wilbur Smith. After first year, none exceeded estimates.

South Carolina – The Southern Connector – Wilbur Smith forecast that revenue in 2005 would be \$13.2 million, actual collections were \$4.7 million – less than 36 percent of predicted.

Virginia –Chesapeake Expressway and Pocahontas Parkway, both estimates done by Wilbur Smith. After first year Chesapeake projections were 139 percent, but Pocahontas was at 51.percent.

Texas – The Camino Colombia near Laredo, TX opened in 2000 and then was closed for five months. The revenue projections done by URS were overestimated by 94 percent. John Hancock Insurance bought it for \$12.1 million at auction and closed the road. The state then bought the road for \$20 million and reopened it and estimates it may take 40 years for the road to pay for itself.