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16. Abstract This summary report provides an overview of a case study analysis of mid-size urban/rural toll road options in the Tyler, Texas, area. The case study focuses on a proposed outer loop, Loop 49, which is a new regional highway that will eventually connect Lindale and US 69 with I-20 northwest of the city and then loop to the south and east, terminating at I-20 on the east side of Tyler. The objectives of the tolling implementation project are to (1) pilot test tolling applications in a mid-size urban/rural area, specifically on the south segment of Loop 49 that is under construction as a non-tolled road, and (2) to develop a toll history for Loop 49. This summary report offers a synopsis of the planning and design considerations and the decision process for toll implementation on Loop 49. The case study examined several toll technologies and service approaches for Loop 49. The conceptual tolling implementation plan identifies potential tolling locations and configurations. Artist's renderings of toll collections sites were also developed and used in assessing public perception through stakeholder interviews and focus groups. The second task in the evaluation was to assess public perception of tolling, including the chosen toll technology. The research team gathered baseline public perception data through interviews with community stakeholders, interviews with truckers in the area, focus groups, and a public opinion survey. The public perception data collection identified gaps in the public's understanding of the project, and a marketing strategy was formulated to address the knowledge gaps. Lastly, the case study addressed financial considerations and partnering opportunities that may be used to enhance the financial viability of Loop 49 as a toll project. As the project moves toward opening in January 2006, various elements such as marketing, environmental reevaluation, and development of partnerships will be pursued, and an evaluation of public perception and toll operations will be performed.					
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Case Study Analysis of Mid-size Urban/Rural Area Toll Road Options

Technical Summary Report - Loop 49

Project 5-4055-01:
Case Study Analysis of Urban/Rural Area Toll Road Options

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Disclaimer

The contents of this report reflect the views of the authors, who are responsible for the opinions, findings, and conclusions presented herein. The contents do not necessarily reflect the official views or policies of the Texas Department of Transportation (TxDOT) or the Federal Highway Administration (FHWA). This report does not constitute a standard, specification, or regulation, nor is it intended for construction, bidding, or permit purposes. The engineer in charge of the project was Ginger Goodin, P.E. (TX-64560).

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TECHNICAL SUMMARY REPORT - LOOP 49

Background

The growing costs of roadway construction coupled with the declining buying power of the gas tax has resulted in a policy decision from the Texas Transportation Commission requiring every controlled-access facility, in any stage of development or construction, be evaluated for toll viability.

Loop 49 is a new regional highway that will eventually connect Lindale and US 69 with I-20 northwest of the City of Tyler, then loop around the city to the west and south, terminating at I-20 east of Tyler. The construction of Loop 49 has been divided into three major projects - south, west, and east - for planning, funding, and construction purposes. Figure 1 is a map of the region showing Loop 49 and its various stages of implementation.

It is important to note that the sections of Loop 49 from SH 110 to US 69 north will initially be constructed as a two-lane highway, with a "Super 2" design and grade separations at cross streets. Eventually, as funds are available, these two lanes will become the eastbound roadway of a four-lane divided highway similar to I-20. An initial cross section of two lanes, with one lane in each direction separated by painted stripe, poses unique challenges associated with tolling implementation and public education. Figures 2 and 3 show the initial and ultimate cross sections.

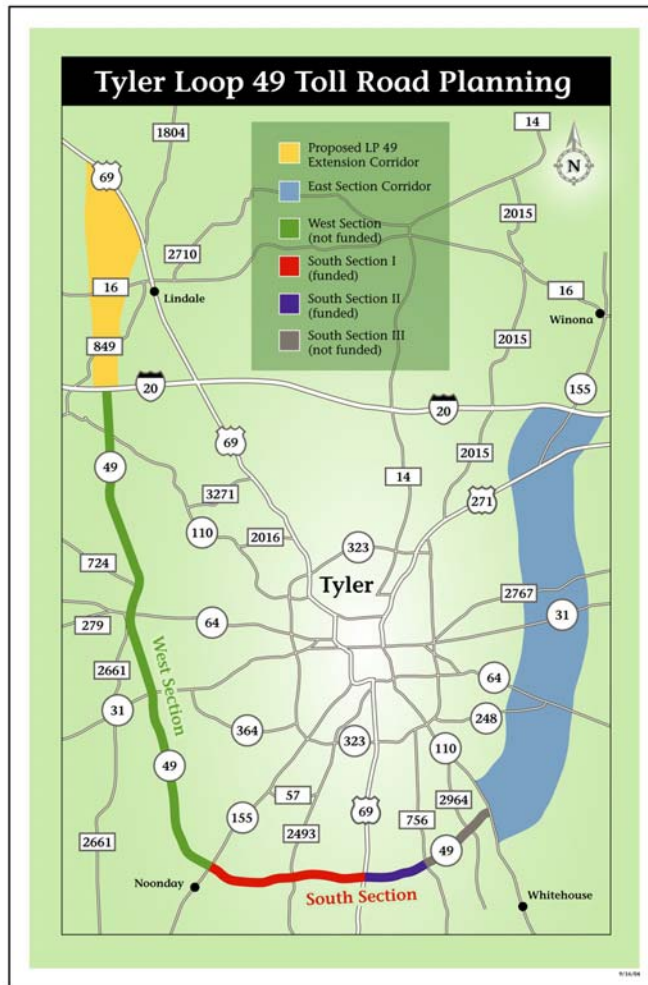


Figure 1. Proposed Loop 49.

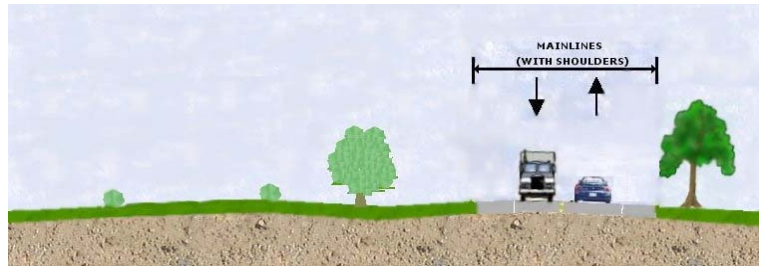


Figure 2. Loop 49 Initial Cross Section.

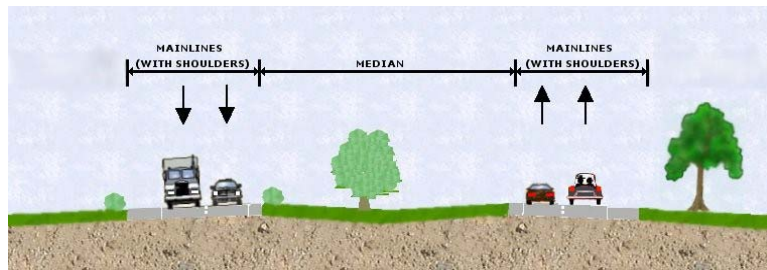


Figure 3. Loop 49 Ultimate Cross Section.

Loop 49 Research Implementation Project

The Texas Department of Transportation’s (TxDOT) research implementation program supports the incorporation of TxDOT’s research products and other innovations into department operations with the direct involvement of university researchers. Research Project 0-4055, “*Guidelines for TxDOT - Regional Tollway Authority Cooperation*,” produced a set of guidelines that provide TxDOT, regional tollway authorities (RTAs), and regional mobility authorities (RMAs) with techniques to enhance planning, financing, designing, constructing, and operating toll facilities in Texas. The Loop 49 research implementation project was initiated to apply the findings from Project 0-4055 to develop a “tolling pilot project” on Loop 49 in the Tyler District as a showcase to other districts.

This summary report describes the implementation issues addressed during Year 1 of the project. Subsequent efforts in Years 2 and 3 are planned in order to document the implementation effort, monitor and evaluate toll operations, assess changes in public perception, and identify lessons learned for transferability to other TxDOT projects.

Scope and Purpose of Implementation Project

The objectives of the Loop 49 implementation project are (1) to pilot test tolling applications in a mid-size urban/rural area, specifically on the south segment of Loop 49, and (2) to develop a toll history for Loop 49. The four tolling elements examined during the first year of the research implementation effort were the following:

- conceptual tolling plan and tolling features,
- baseline public perception,
- comprehensive public education and marketing strategy, and
- financial considerations and partnering opportunities.

Conceptual Tolling Plan

The first task was to identify the most appropriate toll technology and service approach for Loop 49 based on expected demand, construction and operational costs, highway design, and interoperability with other toll facilities. The project team, comprised of researchers from the Texas Transportation Institute (TTI) and Texas Southern University (TSU), TxDOT staff from the Tyler District and the Turnpike Authority Division (TTA), and various consultants, began by defining criteria for comparing technologies. A matrix was developed that described the attributes and associated costs of each technology in order to support the selection process for a preferred technology. The project team identified 18 considerations specific to the Loop 49 project in selecting the appropriate toll technology:

- technology implementation costs - the cost of launching the technology, specifically the electronics and communications;
- annual operating cost - staffing, maintenance, utilities, contingency, law enforcement patrols, and replacement costs;
- civil/structural costs - costs for toll plazas, gantries, buildings, islands, conduit, and additional pavement;
- total pavement width - lane widths plus shoulder requirements;
 - lane widths - lane width requirement to construct and operate a given technology;
 - shoulder widths - shoulder width requirements for approach and departure;
- approach and departure tapers - requirements for taper lengths;
- grade requirements - requirements to construct and operate a given technology;
- scheduling - impact on construction and implementation schedules;
- environmental impacts - low/moderate/high, reflecting relative level of potential environmental impact;
- transaction time - payment processing speed, slow or fast;

- throughput - vehicle capacity per hour per lane at the tolling zone;
- write-off rate - rate of toll evasion and/or processing errors;
- potential diversion rate - percentage of traffic that will not use the facility because of toll collection technology;
- compatibility - compatibility between more than one technology that may be used along different segments of the facility;
- interoperability - potential to be interoperable with other toll facilities;
- marketability - user perception of technology, especially casual versus regular users; and
- receipt options - type of receipt, such as immediate receipt or monthly statement.

In terms of specific toll collection technology, the following alternatives were considered:

- manual toll collection,
- automated coin machine (ACM),
- electronic toll collection (ETC) or automatic vehicle identification (AVI), and
- video tolling.

The preferred option consisted of a combination of electronic toll collection and an automatic coin machine. During the course of the project as TxDOT's statewide toll operating approach was formulated, the automatic coin machine option was replaced with a kiosk where motorists could purchase sticker tags using various payment methods.

The conceptual tolling implementation plan for Loop 49 consists of two tolling locations - one mainline plaza between SH 155 and CR 178, and two ramp plazas at SH 2493 (Figure 4).

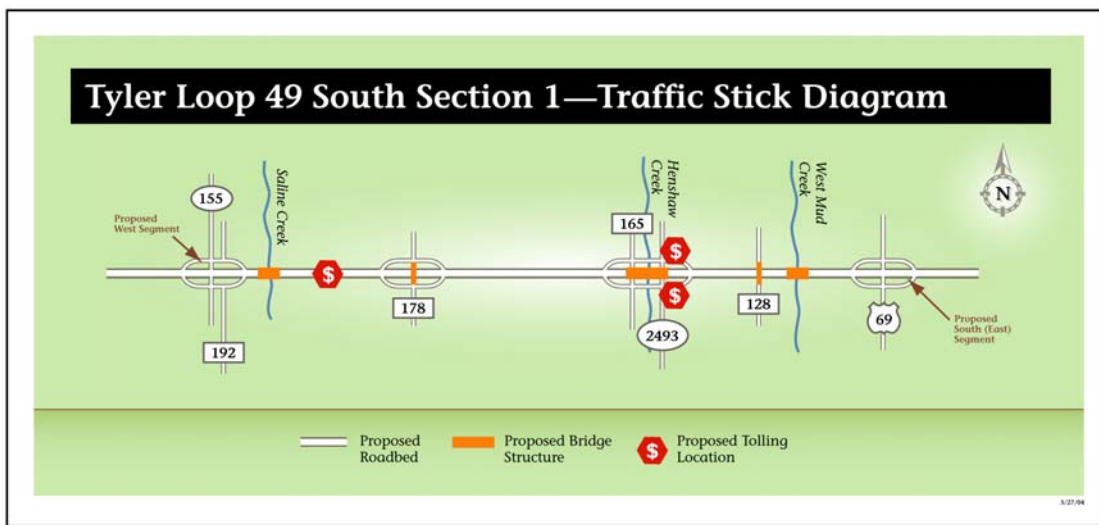


Figure 4. Conceptual Tolling Implementation Plan.

At each of the tolling plazas two lanes will be provided. The inside lane is proposed as an ETC-only express lane, and the other lane will be equipped with a kiosk where motorists can purchase tags or replenish their existing tags using cash, credit, or debit forms of payment. Kiosks and other forms of tag distribution may be located off-site. Artist's renderings of the toll collection sites were developed to be used in other project tasks, particularly in assessing public perception through focus groups. Figures 5 and 6 show the artist's renderings.

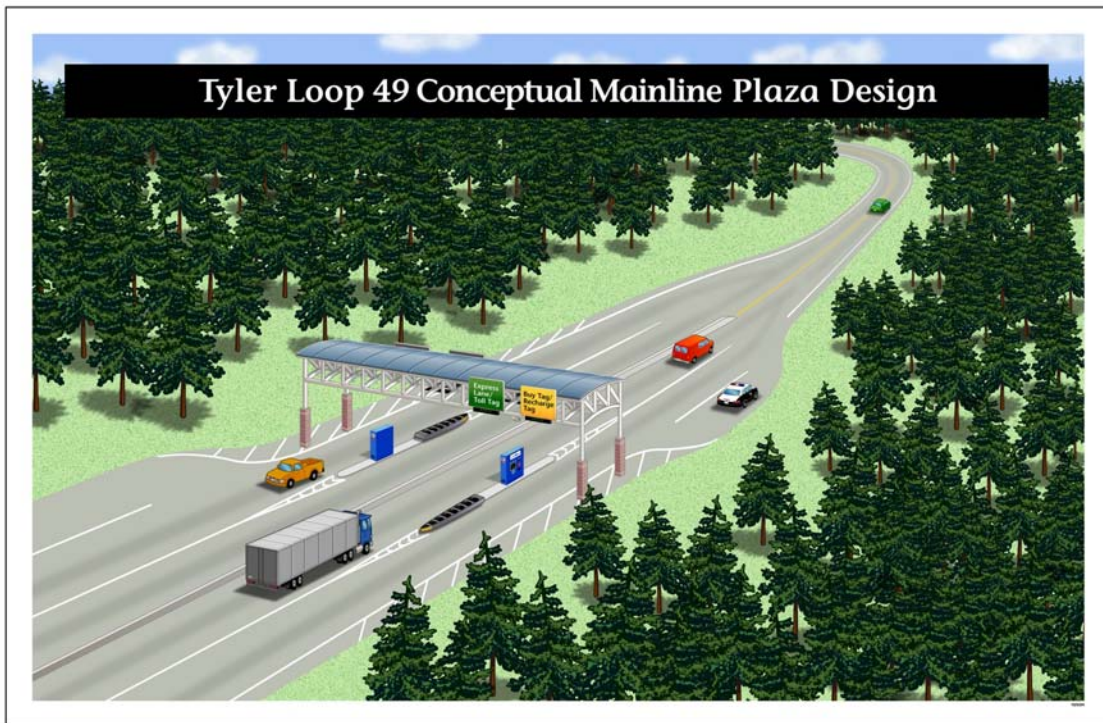


Figure 5. Mainline Plaza Design.

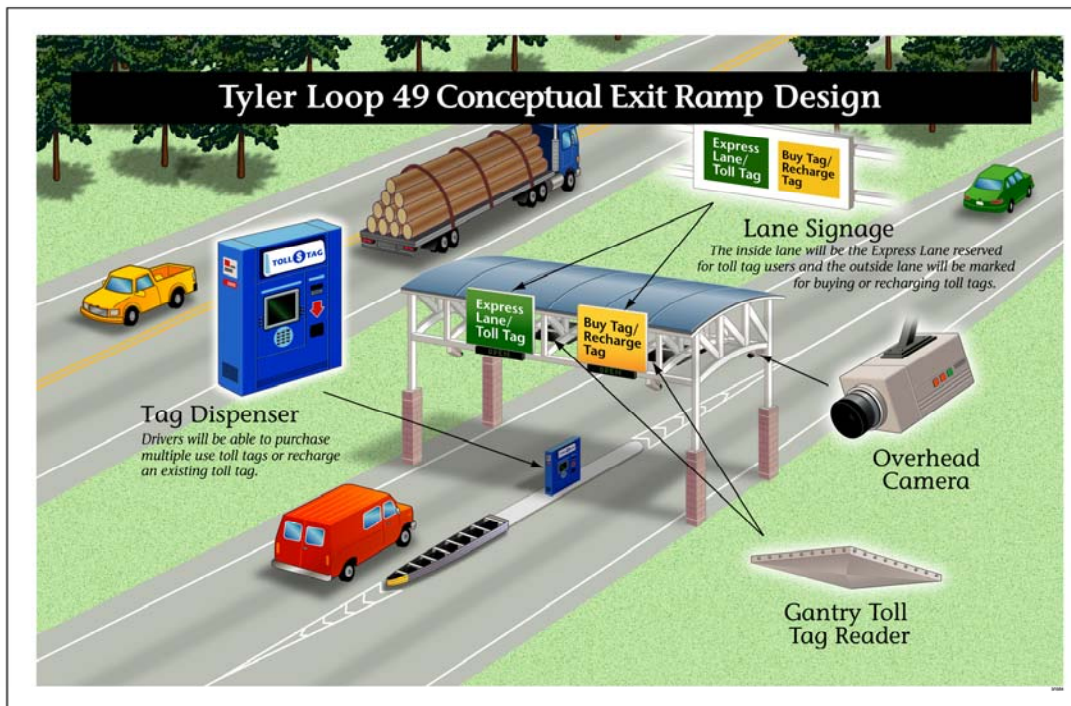


Figure 6. Exit Ramp Design.

Because the preferred tolling technology relies on motorists who are familiar with the system, it became important to predict the likely users of the south segment. Rather than perform field origin-destination surveys, a select link analysis was performed using the 2007 regional planning model. This analysis, which identified the amount of local versus external trips, confirmed that 100 percent of the users would be local traffic.

Baseline Public Perception

The second objective of the project was to assess public acceptance of tolling, including the chosen toll technology. These efforts were directed toward collecting data pertaining specifically to tolling the south section of Loop 49. The south section is a segment that is approximately five miles in length connecting SH 155 to US 69 on the southwest part of the loop.

The project team began assessing public opinion by conducting stakeholder interviews. Twenty-three interviews were conducted with leaders in the community, such as chamber of commerce staff, business leaders, city and county staff, and elected officials. The overall results of the interviews were that the leadership of Tyler and Smith County are supportive of the Loop 49 project and can be supportive of tolling within certain parameters.

The researchers also conducted 10 interviews with truck drivers. The drivers were interviewed at a truck stop approximately 30 miles south of Tyler. This

location was selected because of its proximity to Tyler and to a major distribution warehouse. An interviewer intercepted the truckers on a break and asked them to complete a 10-minute interview. The drivers were either independent owner/operators or were employed with a commercial trucking company. As may be expected, the independent owner/operators were less accepting of tolling while the commercial drivers indicated that the company would reimburse tolls paid. Both types of truckers recognized the need for an outer loop for Tyler.

Three focus groups were conducted to obtain public sentiment regarding Loop 49, tolling, the potential for tolling Loop 49 and attitudes toward a particular tolling technology, and a willingness to pay for travel on both the south segment and the entire loop. The participants in each of the focus groups voiced many of the same concerns and thoughts. Initially, each group was supportive of Loop 49 as a project, although one group was more skeptical of the need and/or location. Each of the groups felt that it was imperative that Loop 49 connect to I-20 as soon as possible. They felt that local traffic has plenty of alternatives to avoid the toll road and that local traffic would only use the road if it connected to I-20 as a route to quickly get to I-20 and out of town.

The biggest concern of each of the groups was the cross section of the road, even above tolling, in the first group to a lesser extent than the others because the first group did not think they would use the road at all regardless of toll or cross section. The other two groups expressed shock and disappointment at the prospect of a two-lane road. The primary concern with the two-lane cross section was the perception of slower travel. They did not see value in paying a toll on a two-lane highway when the two-lane county road alternatives were toll free.

The willingness of each group participant to pay a toll on the initial segment of Loop 49 depended upon various circumstances. The first group was not willing to pay because the road was not convenient to them. The second group was willing to pay if the road connected to I-20 but would not pay anything for the southern segment alone. The third group was more angered by the cross section and was not willing to pay anything to drive on the southern segment, and would most likely not be willing to pay much even get to I-20 if the road was a two-lane road.

All the groups were accepting of electronic toll collection, including the sticker tag and kiosk concept. Many expressed the need for a manned tollbooth initially, but most indicated that an unmanned booth would be a money saver. No one indicated a serious concern with video enforcement.

Additionally, a public opinion survey was administered at the regional mall to assess whether the views expressed in the focus groups were consistent with a

larger population. Surveyors were stationed at two locations in separate areas of the mall with high volume traffic. At each location, two tables provided space for respondents to sit and complete questionnaires. Most of the respondents had to be invited to take the survey, and there were relatively few walk-ups.

The survey results indicate similarity with the focus group feedback. The vast majority of people agree that Loop 49 is needed and will benefit the Tyler area (Table 1). Table 2 illustrates the responses to specific questions about tolling and toll collection.

Table 1. Necessity of Loop 49.

Statement	% Strongly Agree	% Agree	% Neutral	% Disagree	% Strongly Disagree
Tyler needs Loop 49. (N=199)	53.3	30.6	11.6	1.0	3.5
A new loop will mean fewer commercial trucks on Loop 323. (N=198)	35.9	41.9	12.6	8.1	1.5
A new loop will help the economy of the area. (N=198)	37.9	34.3	19.2	5.6	3.0
Loop 49 will relieve congestion on Loop 323. (N=199)	40.2	41.2	11.6	5.0	2.0
Loop 49 will help improve safety on other roads in Tyler. (N=199)	34.7	36.7	16.1	9.0	3.5

Table 2. Survey Responses Regarding Tolling.

Statement	% Strongly Agree	% Agree	% Neutral	% Disagree	% Strongly Disagree
Tolling Loop 49 is a good way to pay for the road. (N=194)	15.5	34.0	18.6	19.1	12.9
Tolling Loop 49 will keep some people from using it. (N=197)	32.5	45.7	13.2	6.1	2.5
The use of cameras to photograph plates is a reasonable way to enforce toll collections. (N=197)	24.9	41.1	13.7	8.6	11.7
Tolling Loop 49 will allow more of our tax dollars to be spent on other projects. (N=196)	11.2	34.2	29.1	14.8	10.7
Using gasoline tax is a better way than charging a toll to pay for new construction. (N=193)	15.0	19.7	28.5	20.7	16.1

Marketing Strategy

The marketing strategy developed for the project is based on the findings from the public perception data collection. The results of those efforts identified gaps in the public’s understanding of the project, gaps that can be addressed by the various outreach mechanisms and key messages conveyed by TxDOT during the public outreach and education phase of the toll implementation project. This implementation plan outlines a number of key messages and techniques that will enhance the public’s understanding and acceptance of the project.

The goal of the marketing strategy is to educate the public on the plans, progress, and benefits of the Loop 49 toll road while enhancing TxDOT’s image as a progressive state agency dedicated to enhancing the mobility, safety, and prosperity of Tyler and Smith County. Researchers propose that this occurs in two phases: Phase 1 is the “Awareness Stage” and should begin immediately. The purpose of the first phase is to inform the public about the plans and progress of the project with accurate information in order to minimize misinformation. Phase 2 is the “Operational Stage” to begin at the opening of the south segment and will serve to announce and celebrate the opening of the first part of the south segment. In each phase, a variety of mechanisms will be used to communicate the project to a wide audience, and each phase will have

several key messages that are important for explaining the project and garnering public support.

Financial Considerations and Partnering Opportunities

Lastly, the researchers examined the financial and partnering opportunities that could be used to enhance the financial viability of Loop 49 as a toll project. The 78th Texas Legislature gave the department several tools to stimulate investment in transportation infrastructure. The researchers identified mechanisms such as comprehensive development agreements, special assessment districts, pass-through tolls, branding and corporate sponsorships, and non-toll revenue generators and defined how these tolls may be used to support the implementation of Loop 49.

Tolling Implementation Considerations

As the project implementation continues, there are a number of elements to be addressed and coordinated:

- development of a deployment plan for Loop 49 - south segment;
 - lane systems and operations;
 - hardware and communications infrastructure deployment;
 - software development/integration;
 - back office operations/Customer Support Center (CSC);
 - toll tag distribution plan;
 - account management;
 - design modifications to construction project for toll implementation;
 - driver information and communication that convey messages in ways that are consistent with marketing and public information approaches;
- a concentrated public education effort beginning immediately to increase the public's understanding of the need to toll Loop 49; the public education and marketing effort will need to focus on the consumer aspects of toll operations and the benefits of a two-lane toll road; the public education component should also include the necessary information to complete an environmental reevaluation as required by the National Environmental Policy Act;
- pursuit of new financing options and partnering opportunities to leverage existing state and local funds to advance implementation of Loop 49 and enhance the financial viability of the roadway; and
- an implementation schedule that coordinates all aspects of the project as it moves forward: technology deployment, customer service operations, environmental reevaluation, and marketing.

Implementation Planning for Loop 49: Success Factors

Although the project is still in the design phase and moving toward opening in early 2006, there are a number of factors that have emerged from Year 1 activities that appear to support the success of the project at this early stage:

- a systematic approach to toll project planning that has integrated several elements critical for successful implementation, including concept development with artist's renderings, public perception data collection, and identification of potential innovative funding options;
- early efforts by TxDOT staff to successfully develop support for the tolling project among politicians, policy makers, and key community stakeholders, with clear justification for the need for tolling and early positive media coverage;
- decisions on toll technology and toll operating strategy in the initial stages of project development, guided by TTA and consistent with TxDOT's statewide toll operating philosophy; and
- development of a marketing strategy based on public perception data, which identified the gaps in the public's understanding of the project.

Evaluation of Toll Pilot Project

As part of the ongoing implementation, specific measures of effectiveness (MOEs) were developed by the project team to be evaluated as the project moves forward. The baseline measures are listed below along with the current values for those public acceptance benchmarks that were measured through the baseline public opinion survey. Public opinion surveys will be conducted following implementation of the marketing strategy, and again after the project is open. Continued evaluation of the project will provide valuable information to TxDOT as future projects are implemented.

Measures of effectiveness include:

- technology applications;
 - number of unique tolling features tested and evaluated;
 - effectiveness of cash option - revenue/operating costs;
 - public acceptance of electronic tolling - percent favorable;
 - baseline: 40%;
- public acceptance of tolling concept;
 - baseline acceptance - percent favorable;
 - baseline: 49% ("Tolling Loop 49 is a good way to pay for the road.");
 - public acceptance prior to opening - percent favorable;
 - public acceptance after opening - percent favorable;
 - compliance rate (percent of vehicles paying toll);

- actual revenue/estimated revenue, and/or growth rate on Loop 49 versus growth rate on other roadways; and
- number of districts adopting Tyler model for tolling implementation.

For More Details

The research findings, results, conclusions, and recommendations are documented in:

Report 5-4055-01, *Case Study Analysis of Mid-size Urban/Rural Area Toll Road Options*

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