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Prioritizing Rural Infrastructure Needs

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PRIORITIZING RURAL INFRASTRUCTURE NEEDS

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Abstract

In 2002, the Texas Department of Transportation (TxDOT) contracted with the Center for Transportation Research (CTR) at The University of Texas at Austin and Texas Tech University to provide evidence of the truck volumes and pavement damage associated with major rural truck traffic generators in Texas. It was felt that given increased funding shortfalls for the maintenance and modernization of rural infrastructure, TxDOT staff responsible for rural infrastructure will benefit from a better understanding of the rural truck trip generators in these areas that impact rural infrastructure. The objective of this report is to (a) discuss the maintenance and rehabilitation allocations among the 25 TxDOT districts, (b) highlight how districts prioritize rural needs, (c) propose additional parameters and criteria that can be considered in the prioritizing of rural infrastructure needs, and (d) to highlight a number of strategies that TxDOT districts can consider in meeting unforeseen and unmet rural transportation needs.

Keywords: Rural truck traffic; pavement damage; rural infrastructure.

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Prioritizing Rural Infrastructure Needs

1. Introduction

A number of Texas Department of Transportation (TxDOT) districts interviewed during the course of this research (Research Project 4169: *Managing Rural Truck Traffic in Texas*) have expressed concern about a lack of resources — both funding and personnel — to maintain and modernize the existing urban and rural road infrastructure under their jurisdictions. These districts are concerned about the widening gap between infrastructure needs and available budgets to maintain the system. This document is structured to provide a brief overview of the factors that have contributed to increased demand on the rural road network in Texas and the current condition of pavements in rural Texas before discussing the allocation of available funding among the twenty five TxDOT districts, and how a number of districts are currently prioritizing rural needs. Finally, the researchers propose a number of additional parameters and criteria that can be considered in the prioritizing of rural infrastructure needs, and highlight a number of strategies that TxDOT districts can consider in meeting unforeseen and unmet rural transportation needs.

2. Increased Demand on Rural Pavements

Several factors that resulted in increased rural truck traffic in Texas have been identified and discussed in Research Report 4169-1 entitled *Rural Truck Traffic and Pavement Conditions in Texas*. These factors include:

- *agricultural industrialization* resulting in fewer but larger farms and the trend towards moving products between specialized operations predominantly by truck;
- increases in the *physical sizes of agricultural equipment* and the trend towards joint ownership or the lease of large and expensive pieces of farm equipment or outsourcing these services, resulting in increased movements on rural roads;
- economic revival of the *oil industry*, resulting in relatively short, but high volume "heavy" movements;
- *House Bill 2060* that allows the trucking industry to purchase permits at a nominal fee that allow 84,000 lb vehicles (gross vehicle weight) to traverse roads posted for 58,240 lbs (gross vehicle weight);
- location of *large distribution centers* of retail chains, such as Wal-Mart, HEB, and Target, in rural counties, where land is comparatively inexpensive and major highways provide access to major metropolitan markets;
- location of *landfill sites* in western and northern Texas have raised concerns about pavement rutting caused by overloaded garbage trucks;
- dramatic increases in truck traffic resulting from the *North American Free Trade Agreement* that traverse a number of rural counties in Texas; and

- the *abandonment* of approximately 2,400 miles or *rail track* in Texas, following the Staggers Act, has decreased the potential for large Class I railroads to service rural shippers, resulting in a large number of bulk commodities being moved on rural roads.

The annual growth in daily truck traffic[1] between 1997 and 2001 thus shows significant increases in truck traffic volumes in a number of rural counties in Texas, especially West Texas (see Table 1).

Table 1: Percent Growth in Average Annual Daily Truck Traffic Volumes in Rural Texas

District	Average Annual Daily Growth in Truck Traffic (1997 to 2001)	District	Average Annual Daily Growth in Truck Traffic (1997 to 2001)
Paris	3.12	Austin	13.00
Forth Worth	7.34	San Antonio	4.72
Wichita Falls	7.85	Corpus Christi	4.91
Amarillo	3.04	Bryan	5.76
Lubbock	3.65	Dallas	5.91
Odessa	7.38	Atlanta	3.65
San Angelo	5.85	Beaumont	3.64
Abilene	6.23	Pharr	6.87
Waco	6.41	Laredo	6.06
Tyler	5.51	Brownwood	5.18
Lufkin	4.57	El Paso	10.38
Yoakum	3.99	Childress	4.96

Source: Texas Department of Transportation, 2003

3. Rural Pavement Condition

The Texas state-maintained rural road network consists of farm-to-market roads, state highways, U.S. highways, and interstate highways. These roads are important not only to the rural counties but also to the Texas road system serving trade markets and major metropolitan areas. Concern has, however, been expressed that TxDOT districts are struggling to balance the needs of the rural system with the needs imposed by the major metropolitan areas. Data contained in TxDOT's Pavement Management Information System (PMIS) database was used to determine if the condition of the state-maintained network in rural Texas is starting to show signs of deterioration. The PMIS data were analyzed for rural Texas by district and by highway type by district. The results of this effort were reported in detail in Research Report 4169-1 entitled *Rural Truck Traffic and Pavement Conditions in Texas*.

Overall it was found that approximately 85 percent of the rural road network is rated

[1] Based on the truck count data collected at several sites in rural counties in Texas.

good to very good in terms of the distress score, 88 percent is rated good to very good in terms of the overall condition score, and about 70 percent is rated good to very good in terms of the ride score. Figure 1 provides the overall condition scores for rural Texas for 2003.

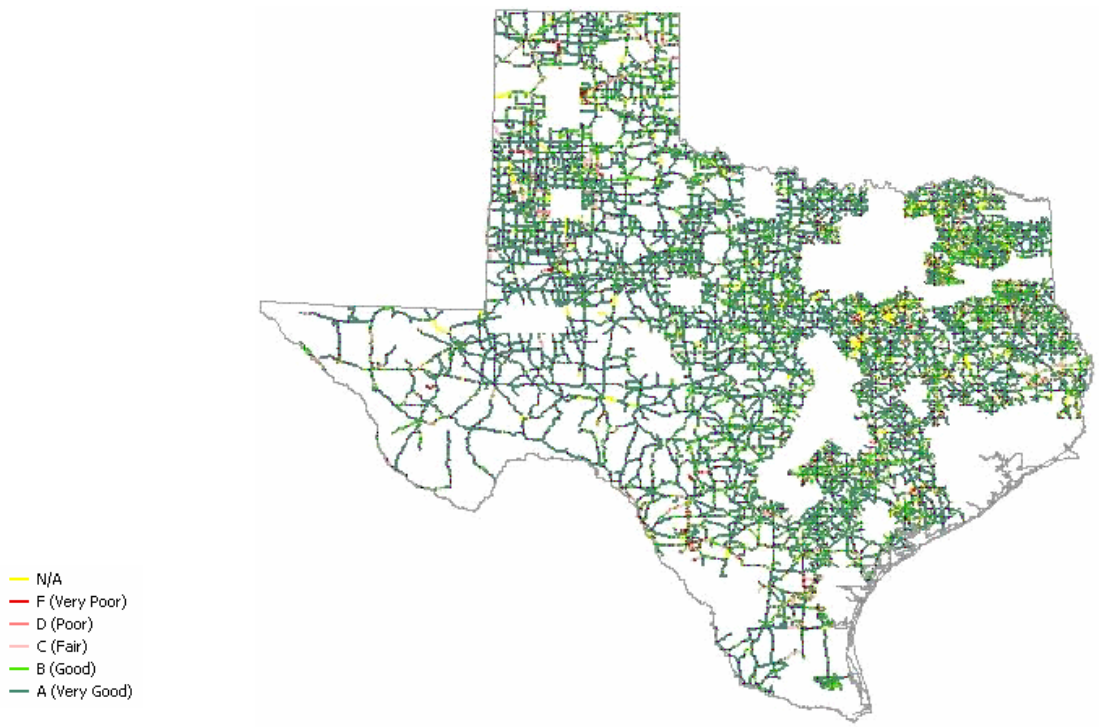

Figure 1: Overall Condition Scores for Rural Texas (2003)

Based on the PMIS data it can thus be concluded that the TxDOT districts have been ensuring that the rural network is maintained to a good or very good condition overall. In numerous interviews with TxDOT district staff, some districts have expressed concern about the impacts of increased truck traffic on particular sections of their road system, specifically the farm-to-market system. Some of these farm-to-market roads have only a 6-inch base and a seal coat, and were thus never designed to carry the volumes and loads currently imposed by major truck traffic generators (for example, industrialized agriculture, heavy farm equipment, timber, oil). Also, many of these roads do not have shoulders, which can be significant in delaying the deterioration of the pavement. Farm-to-market road sections that provide the links between major truck traffic generators and higher volume roads (i.e., interstate, U.S., and state highways) are thus showing signs of deterioration, according to TxDOT district staff.

Despite the fact that maintenance funding allocated to most districts has been increasing, many district staff are concerned that — given the increases in truck volumes in rural areas, and the priority given to high-volume traffic urban and rural facilities — it will become more difficult in the future to maintain, repair, and thus preserve their extensive road network. Increasingly, TxDOT districts will be faced with difficult decisions about prioritization. This is exacerbated by long planning cycles. The next section provides a brief overview of how funding is allocated among the twenty five districts in Texas.

4. Funding Available to TxDOT Districts

As of January 2004, TxDOT has streamlined its number of funding categories from thirty four to twelve. Maintenance and rehabilitation funding allocations among the twenty five districts continue to be made centrally using formulas. For example, almost fifty individual needs-based formula[2] exist for the allocation of the available ***routine maintenance*** funding among the twenty five districts. A number of factors are accounted for in these formulas, such as regional rainfall, pavement condition (failures and ride quality), the number of lane miles, average daily traffic, and daily vehicle truck miles. The formulas rely on accurate inventory and pavement evaluation data (Texas Department of Transportation, 1996). Extraordinary maintenance is budgeted for based on expenditures over the past six years, excluding the high and low years. The ***preventative maintenance*** allocation considers mostly inventory: the number of on-system lane-miles in the district (53 percent), lane-miles of pavement distress scores between 70–89 (40 percent), vehicle miles traveled per lane mile (5 percent), and square footage of on-system span bridge deck area (2 percent). The latter formula has been criticized for not considering prevailing soil and weather conditions. ***Rehabilitation funding*** are allocated considering: interstate equivalent single axle loads (15 percent), non-interstate national highway system equivalent single axle loads (10 percent), non-national highway system equivalent single axle loads (5 percent), on-system lane miles (15 percent), on-system vehicle miles traveled (5 percent), lane miles of pavement distress scores less than 60 (35 percent), lane miles of pavement ride scores less than 2.0 (5 percent), area of bridge deck with sufficiency rating between 50 and 80 (5 percent), centerline miles of two lane highways with average daily traffic (ADT) greater than 400 and pavement width less than 22 feet (3 percent), and finally centerline miles of operational intelligent transportation system (2 percent).

Since one of the factors in some of the funding allocation formulas are vehicle miles traveled, a few districts with large rural areas have indicated that this results in a bias towards allocating maintenance and rehabilitation funding to districts with large metropolitan areas. In the case of the routine maintenance formulas, only ten of the fifty formulas consider vehicle miles traveled and in the case of the preventative maintenance and rehabilitation allocation formulas, vehicle miles traveled is afforded a very low weight.

5. Prioritizing District Needs

TxDOT, through its twenty five district offices, is responsible for rural transportation planning and the provision and maintenance of rural infrastructure. Determining maintenance and rehabilitation priorities are thus decentralized at the district level for all projects. The districts are ultimately responsible for balancing rural and metropolitan funding needs, and for balancing maintenance funding by highway type. The research team interviewed a number of representatives from seven districts (i.e. Tyler, Odessa, Laredo, Yoakum, Lubbock, Pharr, and Bryan) to determine how rural needs (maintenance and rehabilitation) are prioritized and who decides the priorities. These districts were selected to

2 These formulas will be reviewed in the near future.

gain insights into the different approaches and factors adopted to prioritize maintenance and rehabilitation needs. Table 2 summarizes which factors are considered in determining priorities, as well as who sets the priorities. Additional details are provided in Appendix A.

As can be seen from Table 2, maintenance priorities are usually set by the maintenance supervisors or by the district staff (in some instances in consultation with the area engineers or maintenance supervisors). In the cases where maintenance prioritizing is delegated, it was reported that the maintenance supervisors regularly drive the roads under their jurisdiction and thus have a solid knowledge of the condition of the roads and which sections are in need of maintenance. In the cases where district staff prioritize maintenance, it is clear from Table 2 that the districts use different factors to prioritize maintenance, although pavement condition scores are — as would be expected — a factor considered by each district.

Rehabilitation priorities are mostly determined by district staff. As can be seen from Table 2, each district has its own selection criteria that are used to prioritize projects. The criteria used vary substantially, but most districts consider traffic volumes in their allocation of rehabilitation funding. Only Laredo District considers the economic benefits associated with the proposed project.

These methods of priority determination have been tailored by each district to the specific circumstances of the district. Most districts interviewed thus felt that their adopted prioritization approach is working well. Of concern to six of the seven districts interviewed was the widening gap between available funding and the needs. Since more emphasis is typically placed on addressing the needs of the higher volume facilities, i.e., interstate, U.S., and state highways, and urban areas, some districts have expressed concern about maintaining the farm-to-market system to the same standards as the interstate, U.S., and state highways. In addition, districts find it challenging to address unforeseen needs. Guidance is thus required on how to fund unforeseen and unmet maintenance needs in rural areas[3].

3 For example, if a large truck traffic generator locates in a rural county, the immediate impact will be point loadings to the facility. This will impact the pavement, which will have to be maintained using TxDOT rehabilitation or maintenance dollars. Planning would be facilitated if the district could estimate what damage would be done to the pavement.

Table 2: Responsibility and Factors Considered in Setting Maintenance and Rehabilitation Priorities

District	Maintenance Priorities		Rehabilitation Priorities	
	Responsible	Factors	Responsible	Factors
Bryan	Maintenance supervisors	• Maintenance supervisor knowledge of road conditions • Public complaints	District staff	• District evaluation • Cost • Average daily traffic • Political concerns
Laredo		Pavement condition		• Cost-effectiveness • Safety • Project economic benefits • Ranking of area engineer
Lubbock	Maintenance supervisors	Maintenance supervisor's knowledge of road conditions	Area engineers	District funds all first priorities, then second priorities and so on until budget is exhausted.
Odessa	Area engineers in consultation with maintenance supervisors	Maintenance supervisor's knowledge of road conditions	District in consultation with area engineers	• Pavement condition (rutting, cracking, failures, etc.) • Average daily traffic • Average daily truck traffic • Past maintenance expenditures
Pharr	District staff in consultation with area engineers	• Pavement condition (rutting, cracking, fatigue) • Facility type (volume, speed)		• Average daily traffic • Safety index
Tyler	District staff in consultation with maintenance supervisors	• Pavement condition • Expenditures incurred	District staff	• District evaluation • Cost • Traffic volumes • Past expenditures • Visual inspection data from area engineers
Yoakum	District staff	• Lane-miles • Cost of materials • Pavement condition	District staff	• PMIS scores • Traffic volumes

6. Proposed Additional Criteria for Prioritizing Rural Needs

Given the fact that the available funding currently does not cover all the identified district needs requires districts to prioritize their needs. As discussed before, each district has its own prioritization procedure that varies from less formal assessments to some form of ranking considering different criteria. If this disparity between available funding and rural needs increases, as anticipated, effective prioritization will become more important in the future. The objective of this section is to propose a number of additional parameters and criteria in a "multi-attribute criteria methodology" framework that can be considered by TxDOT to prioritize significant maintenance and rehabilitation projects.

Multi-attribute criteria analysis is founded in benefit costs analysis (BCA), but unlike BCA that requires the quantification of all impacts (benefits and costs), multi-attribute criteria analysis does not require the expression of all impacts in monetary terms. This type of analysis allows the analyst to rank identified impacts in a structured framework.

The first step is to identify the important parameters and criteria (impacts) associated with the identified rural projects. A number of parameters and criteria that TxDOT might want to draw from are summarized in Table 3. This list is by no means exhaustive and in some cases a number of criteria are presented for the same parameter. The TxDOT districts can use this as a basis to expand the factors currently considered, if so desired.

It is suggested that TxDOT produce a scoring method after agreeing on the parameters and criteria. For example, TxDOT staff can be asked to rank the parameters and criteria on a scale of 1 to 5, where 1 represents a very high cost or low benefit and 5 represents a very low cost or high benefit.

At the same time, not all the parameters might be of equal importance. When parameters of differing importance are combined into a single decision-making tool, a weight should be assigned to each of the parameters to prevent less important parameters from driving the decision.

Table 3: Multi-Attribute Criteria Example

Parameter/Criteria	Projects								
	P1	P2	P3	P4	P5	P6	P7	P8	P9
Project Cost (Weight = 15)									
$									
$/vehicle mile									
$/mile									
Pavement Condition (Weight = 15)									
PMIS scores (distress, ride score, overall condition)									
Demand (Weight = 15)									
Average daily traffic									
Vehicle-miles traveled									
Average daily truck traffic									
Truck-miles traveled									
Past Agency Maintenance Expenses (Weight = 5)									
$									
$/vehicle mile									
$/mile									
Connectivity (Weight = 15)									
Access to rural farms and industry									
Links between towns and cities									
Link for travel across the state									
Access to parks, wildlife and recreational opportunities									
Alternative roads available									
Safety (Weight = 15)									
Number of incidents									
Number of injuries									
Number of fatalities									
Economic Benefits (Weight = 10)									
Number of farms or rural shippers served									
Potential to attract new business and jobs									
Social Benefits (Weight = 10)									
Serving poor or minority community									
Number of schools									
Number of clinics									
Number of religious centers									

7. Addressing the Unforeseen and Unmet Needs

Some of the TxDOT districts interviewed indicated that guidance is needed on how to deal with the unforeseen and unmet needs. TxDOT districts would ideally want to be in a position to know which roads will be subjected to sudden increases in heavy truck traffic volumes. If the agency can determine the traffic and load impacts, the impact on road service life can be determined and appropriate decisions can be made about strengthening, rehabilitation, and maintenance.

The CTR research team is currently conducting a sensitivity analysis to determine the effect of axle loads (on both single and tandem axles) on pavement performance. Three failure criteria were evaluated: fatigue cracking, surface rutting, and roughness progression. The analysis is conducted in terms of relative life — the inverse of equivalent damage. The results will be reported in detail in Research Report 4169-2. This section highlights three strategies that were uncovered during a preliminary review of the literature that can be considered for addressing the unmet rural infrastructure needs. These and others will be evaluated in detail in Research Report 4169-2.

Regional Mobility Authorities

One option to address the funding shortfall to modernize and rebuild existing facilities in rural areas is through investments that can be recovered from tolls charged to the users. Toll equity and Regional Mobility Authorities — allowed for by Senate Bill 342 and the Constitutional Amendment — are new voter-approved financial tools that will leverage limited state transportation funds. Toll roads are, however, not considered a viable alternative in many rural areas, because of low traffic volumes and a lack of alternatives. One option is for Regional Mobility Authorities in cooperation with private partners (directly benefiting from the road) to fund the toll project and charge "shadow tolls" to TxDOT until the road has been paid off. Shadow tolls are per vehicle charges that are paid by the transportation agency to the facility developer/operator and not by the road users. The use of shadow tolls can thus help to modernize rural facilities.

Private Road Associations

In Sweden, Private Road Associations (PRAs) manage two-thirds of the Swedish road network at less than half of the cost of maintaining government-provided roads (Ivarsson and Calvo, 2003). The reason given for this substantial lower maintenance cost is "prompt intervention and preventive actions in response to road deterioration coupled with an uncontestable aspect of private ownership — it is the same owners who will face the financial and physical consequences of any delayed intervention" (Ivarsson and Calvo, 2003).

The Swedish government supports the establishment of PRAs because they:

- encourage living and settling in remote and sparsely populated areas,
- promote trade and industrial development in areas where the cost of providing roads might be high,
- provide access to areas of public recreation and leisure,
- secure the public capital investment in roads, and

- ensure general traffic safety and environmental interests (Ivarsson and Calvo, 2003).

The members of the PRA (property owners along the road) own individual shares in the road. The individual shares are a proxy for the maintenance and other road costs they have to incur, which is based on the size of their property and the traffic they generate. Financial responsibility for the construction, upgrading, operation, and maintenance of private roads thus rests with the PRA members. The Swedish government subsidizes private roads that are, among other considerations, open to the public. The PRA sizes vary quite dramatically. Most PRAs own or manage a few kilometers, but some have 70 kilometers of road and include up to 3,500 properties (Ivarsson and Calvo, 2003).

Although most of the private roads are low-volume roads, they provide an example of how public funding can be supplemented to fund unmet maintenance needs. Private roads support the notion that those directly benefiting from and consuming rural pavements (i.e., large truck-traffic generators) can be asked to contribute to the strengthening, rehabilitation, and maintenance of rural roads.

Outsourcing

Outsourcing aims to use resources more efficiently and capture economies of scale. In the National Cooperative Highway Research Program's (NCHRP) Synthesis 313 (2003) it was reported that many state DOTs have started to outsource traditionally undertaken activities (i.e., administration, construction, design, maintenance, operations, planning, and right-of-way) in an effort to improve efficiency and reduce costs.

Two important aspects of outsourcing is the selection of the provider and determining the effectiveness of outsourcing. Different DOTs measure effectiveness differently. Some of the measures include:

- cost-effectiveness — the cost of outsourced services relative to in-house services, calculated using the "current cost" or lifecycle cost approach;
- schedule constraints — resulting from staffing shortages;
- product delivery — because the state agency is not in a position to perform the task;
- legal requirement — In South Carolina, for example, legislation mandated increased privatization of maintenance operations; and
- legislative or executive intent — for example in Florida DOT the governor required a reduction of 25 percent in staff over a 3 year period, necessitating the outsourcing of some activities (NCHRP, 2003).

Overall satisfaction with outsourcing was reported to vary, although satisfaction with administration, maintenance, and operations ranked higher than the other activities (i.e. construction, design, planning, and right-of-way). TxDOT already uses contractors to undertake some of the maintenance, rehabilitation, and reconstruction projects. The agency could consider outsourcing all maintenance, for example, in an effort to achieve economies of scale and reduce costs. On the other hand, TxDOT is a significant employer in many of the

rural areas, so that a move to 100 percent outsourcing could have substantial social and economic impacts on communities that are already struggling to keep and attract new jobs.

8. Conclusions

Despite evidence of the increases in average annual daily truck-traffic volumes in rural Texas, the PMIS data analyzed revealed that more than 85 percent of the rural road network is rated good to very good in terms of distress and the overall condition scores. The PMIS data thus shows that TxDOT districts have been ensuring that the rural network is well-maintained. Interviews with a number of TxDOT districts, however, revealed concern about the impacts of increased truck traffic on certain sections of their network. Farm-to-market road sections, for example, that provide links between major truck traffic generators (such as industrialized agriculture, heavy farm equipment, timber, and oil) and higher volume highway types (such as the interstate, U.S., and state highways) are showing signs of rapid deterioration. Given a situation of inadequate state budgets, increasing truck numbers and axle loads on rural pavements, the identified rural and urban pavement maintenance needs, and the priority given to high-volume urban roads, it might very well mean that TxDOT will find it increasingly challenging to maintain and repair all of its extensive rural road system, especially the farm-to-market system, in the future. Three strategies have thus been highlighted on how to involve the private sector in addressing some of the foreseen unmet needs and to reduce costs.

References

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National Cooperative Highway Research Program. 2003. State DOT Outsourcing and Private-Sector Utilization: A Synthesis of Highway Practice. Synthesis 313, Transportation Research Board of the National Academies, Washington DC.

Appendix A: Results from TxDOT District Interviews

Bryan

Maintenance

Maintenance priorities in Bryan District are set by the maintenance supervisors, who regularly drive on these roads and have a solid knowledge of the condition of the roads. In some cases, complaints from the public or politicians will elevate some concerns. The PMIS scores are used to inform decisions about what work will be done in-house and what work should be contracted out.

Rehabilitation

Priority rehabilitation projects are submitted by the maintenance supervisors and area engineers for each county. Staff members from the Bryan District (including the pavement engineer and the maintenance director) drive each of the roads independently and evaluate each project. Other factors that are considered in the final prioritization of the projects include, cost, average daily traffic, and political considerations. Generally, higher traffic roads are given priority and in general projects are ranked as follows: interstate projects followed by U.S. highway projects followed by state highway projects followed by farm-to-market road projects. Also urban needs tend to dominate.

The district staff is concerned about a lack of resources (both funding, and design and inspector personnel) to keep up with the increasing needs.

Laredo

Laredo District is significantly impacted by the North American Free Trade Agreement (NAFTA) traffic. The district has seen no real deterioration in the farm-to-market system in rural areas, largely because NAFTA trade trucks crossing the international bridges do not have to traverse these roads. The farm-to-market roads that have been impacted significantly are those that have become part of the urban areas. For example, FM 1472 used to be in a rural area, but urban development has resulted in this road becoming part of the urban area. Currently, this road is carrying industrial, warehousing, commercial, and urban passenger trips for which it was never designed.

Maintenance

Maintenance is prioritized considering predominantly pavement condition (i.e., road scores).

Rehabilitation

Rehabilitation and mobility projects are prioritized using a weighted multi-criteria methodology considering cost-effectiveness ($cost/vehicle mile), safety (number of accidents within proposed project limits), existing pavement condition (PMIS scores), project economic benefits to area (for example, new business developing in the area, reducing delay to trade-related travel), and finally the priority ranking of the area engineer is considered.

Lubbock

Lubbock[4] divides its allocated budget between its area offices, where priorities are set. When the district receives its allocation, it first excludes all fixed costs (such as salaries, utilities, fuel, and equipment) and a small contingency for funding unforeseen events. The remaining budget (called the *roadway material money*) is allocated to each maintenance section. Until recently the allocation between area offices was based on historical expenses. Currently, the district considers the seniority (classification) of the supervisors. Each supervisor has a certain level of responsibility (for example, number of roadways and lane-miles) which determines the supervisor's classification and salary. All supervisors are ranked in terms of their responsibility and subsequently grouped into four categories. Each category of supervisors receives the same funding.

Maintenance

Each maintenance section supervisor produces a maintenance plan for his area based on the identified needs and budget allocation. It is felt that the maintenance section supervisors know what work needs to be done in their respective sections. They have hands-on experience, know the condition of the roads, what to expect, and what needs to be done. The maintenance plans are submitted to the district. Budget review meetings are held with the maintenance section supervisors periodically. This approach is considered to be working well.

Rehabilitation

Rehabilitation priorities are set by area engineers, who generally supervise four maintenance section supervisors. The district considers the available funding and funds every area engineer's first priority, then the second priority, and so on until the funding is exhausted.

Lubbock is struggling to balance the urban and rural needs of the system. Given the current budget allocation it is not possible to fund either the urban or rural system to the required level, but the district is trying to provide both systems with what they need. Urban budgets, however, tend to be bigger than rural budgets. Guidance is needed on how to fund unmet needs.

Odessa

Maintenance

In Odessa, maintenance priorities are determined by the area engineers in consultation with the maintenance supervisors. The maintenance supervisors have extensive knowledge about the condition of the roads in their sections and the maintenance requirements. The four area engineers submit the maintenance priorities to the district staff, who might make minor changes if deemed necessary. Preventative maintenance (i.e., seal coats) is undertaken on a seven-year cycle.

4 Lubbock district consists of seventeen counties.

Rehabilitation

Rehabilitation and reconstruction projects are prioritized by the district staff in consultation with the area engineers. The district staff relies to a large extent on the data captured in the PMIS database to prioritize these projects. Factors that are considered include: average daily traffic, truck traffic, rutting, cracking, whether the pavement is failing, and past maintenance expenditures. These projects are prioritized regardless of highway type.

The deterioration of the interstates is a major concern in this district. The interstate pavements have been significantly impacted by increased truck traffic. It is becoming very difficult for district staff to decide which needs have to be addressed first. Overall, there is not enough funding to address all the needs.

Pharr

Maintenance

Maintenance that will be done in-house is prioritized by the maintenance section supervisors in the Pharr District. They drive the roads in their sections every day or at least once a week and continually look for conditions that require attention, such as fatigue, cracking, and edge repair. Maintenance work that needs to be contracted out are prioritized from a district-wide perspective by district staff in consultation with the eight area engineers. Factors that are considered include: pavement condition (for example, cracking, rutting, and fatigue) and type of facility (high volume, high speed). This approach has been working well for the district, but a standard methodology might be able to provide some additional guidance to the district.

Rehabilitation

When rehabilitation funding is available to the district, projects are prioritized considering average daily traffic and the safety index.

Tyler

Maintenance

In Tyler District, the maintenance supervisors continually visually survey and inspect the conditions of the roadways under their jurisdiction. These maintenance supervisors prepare maintenance requests that are sent to district staff in Tyler. The district staff sets the maintenance priorities, but remains in close contact with field staff when setting these priorities. The most significant variables that are considered are the condition[5] of the roads and the expenditures incurred by TxDOT in maintaining the road during the past year. A road that, for example, requires high expenses will move up on the priority list.

The maintenance director pointed out that the maintenance supervisors have significant authority and input. The district's allotted maintenance budget is divided into different categories (i.e., for seal coats, for overlay, milling, replacement, etc.). Once the

5 The stated conditions are verified against data contained in the PMIS database.

categories have been decided the district staff decides how much will be contracted out and how much will be done in-house). Most of the maintenance work in the district is seal coats. The district aims to complete 400 miles of seal coat per year. According to the maintenance director, this system works well. The most significant challenge is, however, how to keep up with the failing conditions — repairs that do not last as long as expected.

Rehabilitation

The maintenance supervisors submit their requests for rehabilitation projects to the area engineers. The area engineers prioritize the submitted rehabilitation requests and submit the information to the district, together with information about costs, traffic volumes, past expenditures, and visual inspection data. A team of district staff headed by the maintenance director subsequently surveys all submitted requests. Final decisions are based on the latter surveys, submitted data, and the available budget. The primary focus for rehabilitation funding is the high-volume urban roads. On occasion, when a rural section deteriorates severely, a construction project will be used to fund its rehabilitation.

Yoakum

Yoakum is mostly a rural district. The only urban area is Victoria with a population of approximately 66,000. The issue of balancing urban and rural needs is thus less of a concern in Yoakum District.

Maintenance

Maintenance priorities are set at the Yoakum District. Factors that are considered in deciding maintenance priorities include: lane-miles, cost of materials, and the condition scores of road sections. District staff has, however, been noticing the deteriorating impact of higher truck volumes on its farm-to-market road system. Some maintenance funding has thus been diverted for rehabilitating some farm-to-market roads using in-house personnel.

Rehabilitation

In the prioritization of rehabilitation projects, the PMIS scores and traffic volumes are the determining factors.

The prioritization approach is considered to be working well in ensuring that each area is allocated some of the district's allocated budget. Construction funding is usually earmarked for high-volume facilities, such as interstate, U.S., and state highways.