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Facilitating Creation of Transit System Technology User Groups

Final Report

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16. Abstract

In recent years, a number of rural transit providers in Texas have purchased computer software to enhance trip scheduling and dispatching. However, many of these agencies are using the software primarily as a recordkeeping system, not as a management tool. Rural providers report that staff too often is not sufficiently familiar with the software capabilities, and the agency is not receiving a good return on the technology investment.

The purpose of this research was to inventory current technology applications and vendors by transit agency and to assess the current use(s) of these applications. The researchers also documented plans for technology upgrades or expansions and identified the current technology issues faced by providers. Texas Transportation Institute (TTI) researchers contacted the rural and state-funded urban transit districts in Texas to determine the types of technology currently used or in procurement. Researchers provided the results of this research to all rural and state-funded urban transit districts to enable providers to share and gain from their mutual experiences and to leverage influence with software vendors to address mutual concerns and interests.

Researchers facilitated a panel discussion at the Texas Department of Transportation, Public Transportation Division's Semi-Annual Transit Provider Meeting in July 2010 as a way to share experiences about technology implementation. TTI researchers recruited transit agency representatives to serve on the panel. Based on the panel discussion and research findings, researchers recommend *technology mentoring* and *Web-based user community support programs*. These programs will support the continued and expanded implementation of technology among rural and small urban transit agencies.

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FACILITATING CREATION OF TRANSIT SYSTEM TECHNOLOGY USER GROUPS

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EXECUTIVE SUMMARY

In recent years, a number of rural transit providers in Texas have purchased computer software to enhance trip scheduling and dispatching. However, many of these agencies are using the software primarily as a recordkeeping system, not as a management tool. Rural providers report that staff too often is not sufficiently familiar with the software capabilities, and the agency is not receiving a good return on the technology investment.

The purpose of this research was to inventory current technology applications and vendors by transit agency and to assess the current use(s) of these applications. The researchers also documented plans for technology upgrades or expansions and identified the current technology issues faced by providers.

Researchers contacted the rural and state-funded urban transit districts in Texas to determine the types of technology currently used or in procurement. The information collected by transit agency included:

- existing use of automated dispatch/scheduling software by vendor type,
- existing use of mobile data computers (MDC),
- plans to install or procure software/equipment, and
- contact information for each transit district.

Researchers provided the results of this research to all rural and state-funded urban transit districts to enable providers to share and gain from their mutual experiences and to leverage influence with software vendors to address mutual concerns and interests.

The Texas Department of Transportation Public Transportation Division (TxDOT-PTN) sponsored a panel discussion at the July 2010 Semi-Annual Transit Provider Meeting as a way to share experiences about technology implementation. The criteria for selection of panelists were as follows:

- The panel should represent more than one dispatch/scheduling system and more than one type of MDC.
- The panel should include agencies reflecting a range of investment in technology.
- The panel should include both rural and urban providers.

Panel members designed presentations to focus on functionality and lessons learned in implementing technology, not on which product(s) was used. To determine the "range of technology," the Texas Transportation Institute (TTI) defined three levels of users:

- The agency has a computer-based scheduling system ONLY and uses it primarily as a data repository (Level 1).
- The agency has a computer-based scheduling system ONLY and uses it to assist in scheduling and dispatching of service (Level 2).
- The agency has an integrated system that includes both the computer-based scheduling system and MDCs (Level 3).

The transit agencies and representatives on the panel included:

- Heart of Texas Council of Governments (HOTCOG),
- Golden Crescent Regional Planning Commission (GCRPC),
- Hill Country Transit District (HCTD), and
- Panhandle Community Services.

Based on the panel discussion and research findings, researchers recommend *technology mentoring* and *Web-based user community support* programs. These programs will support the continued and expanded implementation of technology among rural and small urban transit agencies.

FACILITATING CREATION OF TRANSIT SYSTEM TECHNOLOGY USER GROUPS

BACKGROUND

Intelligent Transportation Systems (ITS) have contributed to improved planning and management of the transportation infrastructure over the past two decades. All modes of transportation have accrued ITS benefits in terms of improving the utility of transportation investments. The public transportation industry specifically has enjoyed great advances in the application of technology to plan, route, and deliver services.

The Americans with Disabilities Act of 1990 (ADA) mandated that all systems operating fixed-route transit service must also provide complementary paratransit service for persons whose disabilities preclude them from riding accessible buses. ADA paratransit is a demand-response service that qualified patrons pre-schedule through advance reservation. ADA prescribes numerous service parameters controlling the manner in which complementary paratransit is scheduled and operated. The introduction of ADA paratransit requirements at the same time as the expansion of ITS applications was fortuitous. Technology, specifically automated dispatch/scheduling systems, would become a strong partner in helping agencies meet the requirements of ADA.

Demand-response scheduling software was the first technology tool that was broadly available to rural transit agencies. Scheduling software offered operators the ability to optimize service by increasing the productive use of each vehicle placed in service. The software also served as a repository of data reflecting service actually provided. In fact, some transit agencies manually schedule trips and use their software primarily for data consolidation and reporting.

While scheduling software assisted in optimizing planned service, automated vehicle location (AVL) systems assisted in managing service delivery. Demand-response service is in constant flux on the day of service, with a combination of cancelled trips, no-show patrons, delayed pick-ups, and traffic disruptions. Dispatchers must respond to patron inquiries about late trips while re-assigning other customers to different drivers due to appointments running late or vehicle breakdowns. Historically, dispatchers have made all of these adjustments “in the blind”—not knowing exactly what is happening in the field.

AVL provided a useful tool that enabled dispatchers to improve service productivity and customer service. AVL systems calculate the real-time location of any vehicle equipped with a global positioning satellite (GPS) receiver. Radio or cellular communications transmit data to a transit dispatch center, and the dispatchers can use the data immediately for daily operations as well as archive the data for further analysis. Dispatchers can communicate with patrons to announce the anticipated arrival time of the transit vehicle based upon the location. If there is a need to pick up a patron outside of the scheduled trip time, dispatchers can easily identify nearby vehicles to assign.

The use of mobile data computers tied to AVL was an additional step forward. Mobile data computers are similarly helpful in the constantly changing circumstances encountered as

demand-response transit service is delivered. An MDC permits drivers to record each pick-up as it occurs ("performed" work). This information is automatically available to the dispatcher. Further, if the dispatcher needs to assign a passenger trip to a driver, the dispatcher can send the message to the driver by the MDC. This eliminates the need for drivers to pull over and record information, slowing service and creating possible transcription errors. In fact, some transit agencies no longer issue a paper driver manifest of persons to pick up and drop off each day—instead, dispatchers send passenger trip assignments via the MDC.

This combination of scheduling software, AVL, and MDC is the foundation of rural transit technology. The expense and expertise needed to run these systems sometimes delays their implementation in the rural transit setting. Small rural transit providers find manual methods are the most familiar approach and may be reluctant to make the investment in dollars and staff time for training to implement and effectively use transit technology.

Two events fostered a broader deployment of rural technology. First, the new federal surface transportation authorization bill, Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), featured a substantial increased federal investment in rural transit beginning in 2005. Second, the American Rehabilitation and Recovery Act (ARRA) in 2009 provided increased funding for capital investment. Increased funding for rural transit by the Federal Transit Administration (FTA) and ARRA funding provided the opportunities for rural and small urban transit agencies to make a capital investment in technology.

PROBLEM

In recent years, a number of rural transit providers in Texas have purchased computer software to enhance trip scheduling and dispatching. However, many of these agencies are using the software primarily as a recordkeeping system, not as a management tool. Rural providers report that staff too often is not sufficiently familiar with the software capabilities, and the agency is not receiving a good return on the technology investment.

APPROACH AND METHODOLOGY

The approach to this research was to gather information about current technology applications and vendors by transit agency and to assess the current use(s) of these applications. TTI researchers also documented plans for technology upgrades or expansions and identified the current technology issues faced by providers.

Researchers contacted the rural and state-funded urban transit districts in Texas to determine the types of technology currently used or in procurement. The information collected by transit agency included:

- existing use of automated dispatch/scheduling software by vendor type,
- existing use of mobile data computers (MDC),
- plans to install or procure software/equipment, and
- contact information for each transit district.

TTI conducted two surveys of rural and small urban transit providers in Texas. The initial survey conducted in late 2009 focused on plans to invest in technology and the level of interest in learning about other technologies. Researchers provided this survey to attendees at the TxDOT-PTN Semi-Annual Meeting of transit providers in January 2010. TTI briefed meeting participants of the intent to develop an information-sharing program among technology users across the state (both rural and small urban agencies). Response to these requests was weak, with 23 responses.

Therefore, TTI conducted e-mail and telephone fact-finding interviews with almost every Texas rural and small urban transit agency to identify the specific technology application each agency employed. TTI received information from 54 of 69 rural and state-funded urban providers statewide. The Appendix contains the findings from those interviews by transit agency.

Researchers provided the results of this research to all rural and state-funded urban transit districts to enable providers to share and gain from their mutual experiences and to leverage influence with software vendors to address mutual concerns and interests. The information was shared via an inventory (Appendix) and a panel discussion at the July 2010 TxDOT Semi-Annual Transit Providers Meeting. The panel was a way for agencies to share experiences about technology implementation with peers.

FINDINGS

Table 1 summarizes the number of transit agencies by automated computer software vendor.

Table 1. Transit Agencies Using Automated Scheduling/Dispatching Software by Vendor.

Vendor	Number of Reporting Agencies
Shah	19
Trapeze	17
Routematch	8
Ecolane	2
Other	2
TOTAL	48*

*The remaining six agencies did not report using any computer-based system.

Two software vendors predominate among responding agencies. Three-quarters of responding agencies reported using a computer-based scheduling/dispatching system by either Shah or Trapeze. Routematch represents another 17 percent of users, with Ecolane and others (agency-developed systems) used by a total four percent of respondents.

Based on anecdotal information gleaned from discussions with these agencies, the computer-based systems are used to varying degrees. Some agencies continue to schedule primarily manually and then use the system itself as a data repository. Others enter scheduled service and use the system to help guide dispatchers to handle service. Still others input trip information into

the system and allow the system to schedule service. In those cases, agencies typically conduct a review of the computer-generated schedules and make manual adjustments.

The next step in technology application involves tying the scheduling system to an in-vehicle system to further automate service delivery. The key hardware component inside the vehicle is an MDC. Table 2 displays information on the number of reporting transit agencies by MDC vendor.

Table 2. Transit Agencies Using MDC by Vendor.

MDC Vendor	Number of Reporting Agencies
Mentor Engineering	10
Greyhawk Technologies	9
Radio Satellite Integrators, Inc. (RSI)	2
Digital Dispatch Systems, Inc. (DDS)	1
TOTAL	22

*The remaining agencies did not report using MDCs.

Again, two vendors dominate the list of MDC vendors. Greyhawk and Mentor represent 86 percent of MDC vendors, with the remaining MDC systems provided by RSI or DDS. Twenty-two of the 48 agencies with computer-based scheduling/dispatching systems have added MDCs, which is 46 percent of those agencies. Four additional agencies reported that they are currently procuring or are about to install MDCs.

Table 3 displays the various scheduling-MDC pairings reported.

Table 3. Automated Scheduling/Dispatching—MDC Pairs.

Pairings	Number of Reporting Agencies
Shah-Greyhawk	9
Routematch-Mentor	5
Trapeze-Mentor	4
Trapeze-RSI	2
Routematch-DDS	1
Ecolane-Mentor	1
TOTAL	22

Shah integrates only with Greyhawk, and the largest number of providers in Texas uses Shah. Therefore, the Shah-Greyhawk combination is the most common combination in the state, with over 40 percent of agencies using MDCs having that particular combination. Mentor, however, is the MDC vendor used by the largest number of agencies. Mentor can be integrated with Ecolane, Routematch, and Trapeze.

SEMI-ANNUAL TRANSIT PROVIDERS MEETING

TxDOT-PTN conducts the Semi-Annual Transit Providers Meetings with all state-funded providers twice each year in Austin, Texas. At these meetings, PTN shares important information regarding funding programs, regulatory requirements, and research initiatives. The original project plan for this research called for holding breakout meetings with transit agencies during two meetings. The ARRA initiatives interceded and forced TxDOT-PTN to revise meeting plans. Further, ARRA provided a funding opportunity for several agencies to purchase computer-based systems, like scheduling software and MDCs.

Researchers, in concert with TxDOT-PTN staff, decided to approach the concept of user groups differently than traditional breakout groups. The purpose of a user group is to share information and experience among users of common systems. Rather than divide providers into a variety of small groups, researchers and TxDOT-PTN elected instead to sponsor a panel discussion at the Semi-Annual Transit Provider Meeting scheduled for July 14, 2010.

Eric Gleason, division director for TxDOT-PTN, fully supported the panel discussion approach and shared his criteria for selection of panelists. They were as follows:

- The panel should represent more than one dispatch/scheduling system and more than one type of MDC.
- The panel should include agencies reflecting a range of investment in technology.
- The panel should include both rural and urban providers.

Panel members designed presentations to focus on functionality and lessons learned in implementing technology, not on which product(s) was used.

TTI researchers then defined the "range of technology," identifying three levels of users:

- The agency has a computer-based scheduling system ONLY and uses it primarily as a data repository (Level 1).
- The agency has a computer-based scheduling system ONLY and uses it to assist in scheduling and dispatching of service (Level 2).
- The agency has an integrated system that includes both the computer-based scheduling system and MDCs (Level 3).

TTI researchers recruited agency representatives to serve on the panel. Several agencies were in the process of upgrading systems or business processes to increase the utility of their technology investments. As a result, these agencies were transitioning into a higher user level. TxDOT-PTN and TTI believed that these agencies would be of particular interest to all transit agencies.

Table 4 displays the selected panel for the July 2010 Semi-Annual Transit Provider Meeting.

Table 4. Semi-Annual Transit Provider Meeting July 2010 Technology Panel.

Agency	Representative	User Level	Scheduling System	MDC Vendor
Heart of Texas Council of Governments	Sandra Webb, Mobility Management Coordinator	Level 1 transitioning to Level 2	Shah	None currently—in procurement
Golden Crescent Regional Planning Commission	Lisa Cortinas, Director, Transportation Services	Level 2 transitioning to Level 3	Routematch	None currently—in procurement
Hill Country Transit District	Luis Pino, Technology Manager	Level 3	Trapeze	Mentor
Panhandle Community Services	Gerald Payton, Transportation Director	Level 3	Shah	Greyhawk

The following discussion documents the case study information provided by each panelist who presented at the July 2010 Semi-Annual Transit Provider Meeting.

Sandra Webb, HOTCOG

Sandra Webb has worked at HOTCOG since April 2007. She served as public transportation operations coordinator until September 2009, when she was promoted to mobility management coordinator. Prior to her employment at HOTCOG, Sandra was a quality assurance manager for a home health care agency, overseeing compliance of community care services. For 17 years, she was employed with the Texas Department of Aging and Disability Services (DADS) and Texas Department of Human Services in various capacities. Her combined transit/health and human services background is an asset as the region implements projects from their regional transit coordination plan.

HOTCOG is a rural transit provider serving a six-county region—Bosque, Falls, Freestone, Hill, and Limestone Counties and the rural portions of McLennan County. The urban transit provider in McLennan County is Waco Transit. Figure 1 displays the HOTCOG area.

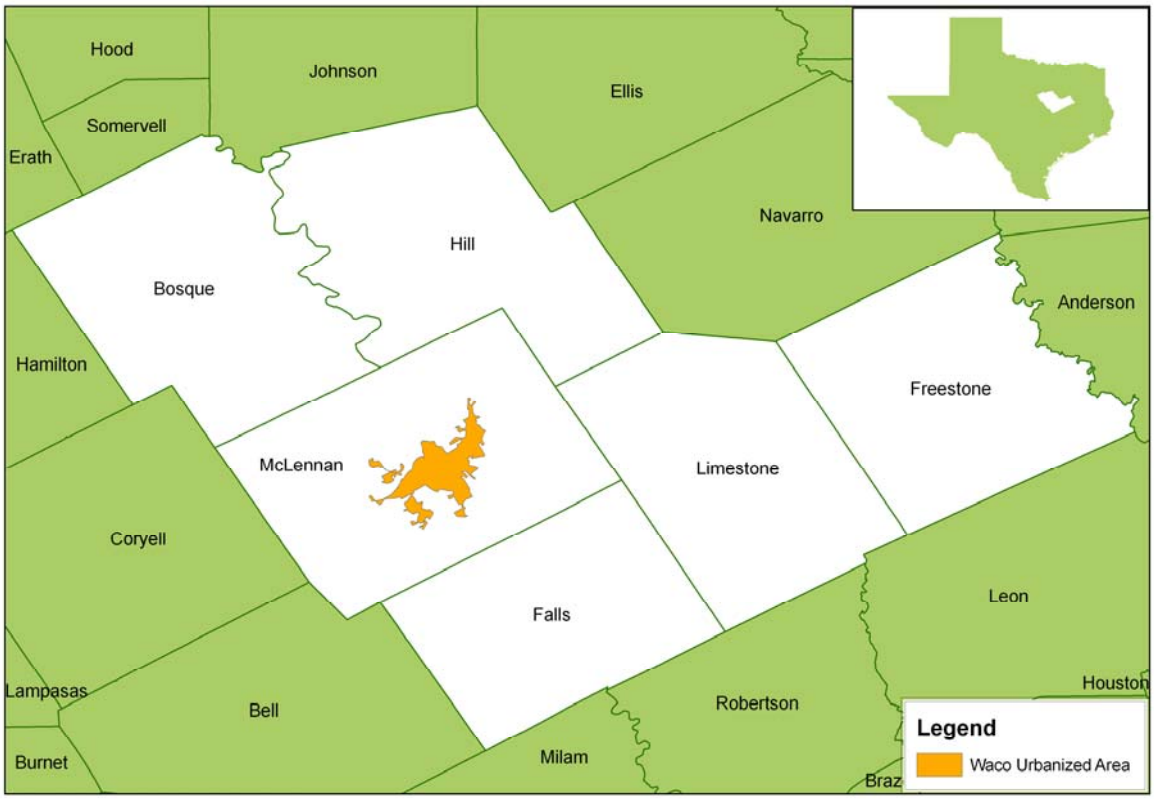

Figure 1. HOTCOG Region.

HOTCOG does not directly operate the rural transit services but instead contracts with four agencies for demand-response services. Central Texas Senior Ministry provides rural services in rural McLennan, Falls, and Hill counties. It also provides demand-response services inside the City of Waco for elderly people with disabilities under separate funding. HOTCOG serves Bosque, Freestone, and Limestone Counties through subcontracts with the Senior Services program in each county. All four HOTCOG subcontractors also provide Medical Transportation Program (MTP) services throughout the region under contract with Waco Transit.

Each subcontractor schedules and dispatches transit services independently. HOTCOG then uploads the operating data into a consolidated database. HOTCOG uses these data to identify the portion of all service that is part of the rural transportation program, separate from MTP services or demand-response services in the urbanized area. HOTCOG can then use these data to derive the operating statistics that are reported to TxDOT-PTN via the PTN-128 reporting system.

The HOTCOG region has been pursuing projects as part of the regional transit coordination activities. For example, Waco Transit is providing preventive maintenance inspections to the four subcontractors under agreement with HOTCOG. The two agencies plan to enter into an interagency agreement that will designate Waco Transit as a regional maintenance center, which is expected to improve maintenance practices and vehicle availability for all HOTCOG subcontractors.

HOTCOG has identified an opportunity to improve service and increase efficiency among the subcontractors. Currently, services are scheduled and operated independently. This means, for

example, that a Waco-bound passenger from one county can be riding in one vehicle while a Waco-bound passenger from an intervening county is transported in a different vehicle. This results in service redundancy, with two separate vehicles carrying individual passengers rather than combining both trips in a single vehicle.

In order to reduce overlapping trips and redundant service, HOTCOG is exploring the possibility of centralized trip scheduling and dispatching. HOTCOG would implement MDCs as part of this approach so that dispatchers can make cost-effective decisions in real time for a region that is equal to the size of Rhode Island and Connecticut combined.

HOTCOG sponsored an on-site peer review of the technology implementation plans in mid-July 2010. HOTCOG asked agencies that have implemented similar systems to review and to comment on the operating plan and advise the agency on procurement approaches. They consider the peer review as an essential step in the implementation of regional scheduling and dispatching.

Lisa Cortinas, GCRPC

Lisa Cortinas has been employed with the GCRPC for 23 years, with a majority of those years spent in the Transportation Department. She is a certified community transit manager and is responsible for the administration and operation of a small urban system called Victoria Transit in Victoria, and the rural public transportation program called RTRANSIT in Calhoun, DeWitt, Goliad, Gonzales, Jackson, Lavaca, Matagorda, and Victoria Counties. As a board member for the Texas Transit Association, Lisa is committed to working with the transit industry to meet the many challenges facing our rural and small urban communities.

GCRPC uses a combination of directly provided and contractor-provided service to reach the entire service area. GCRPC directly operates the small urban Victoria Transit system and provides rural transportation in the remainder of Victoria County and all of Dewitt County. Goliad and Lavaca Counties provide rural transit in their respective counties. The Senior Citizens' Associations (SCA) in Calhoun and Gonzales Counties provide rural transit in their respective counties. Friends of Elder Citizens, Inc. serves Jackson County and neighboring Matagorda County (which is not part of the GCRPC area). The rural public transit provider operates the MTP service in each county. Figure 2 shows the areas and service provider for GCRPC.

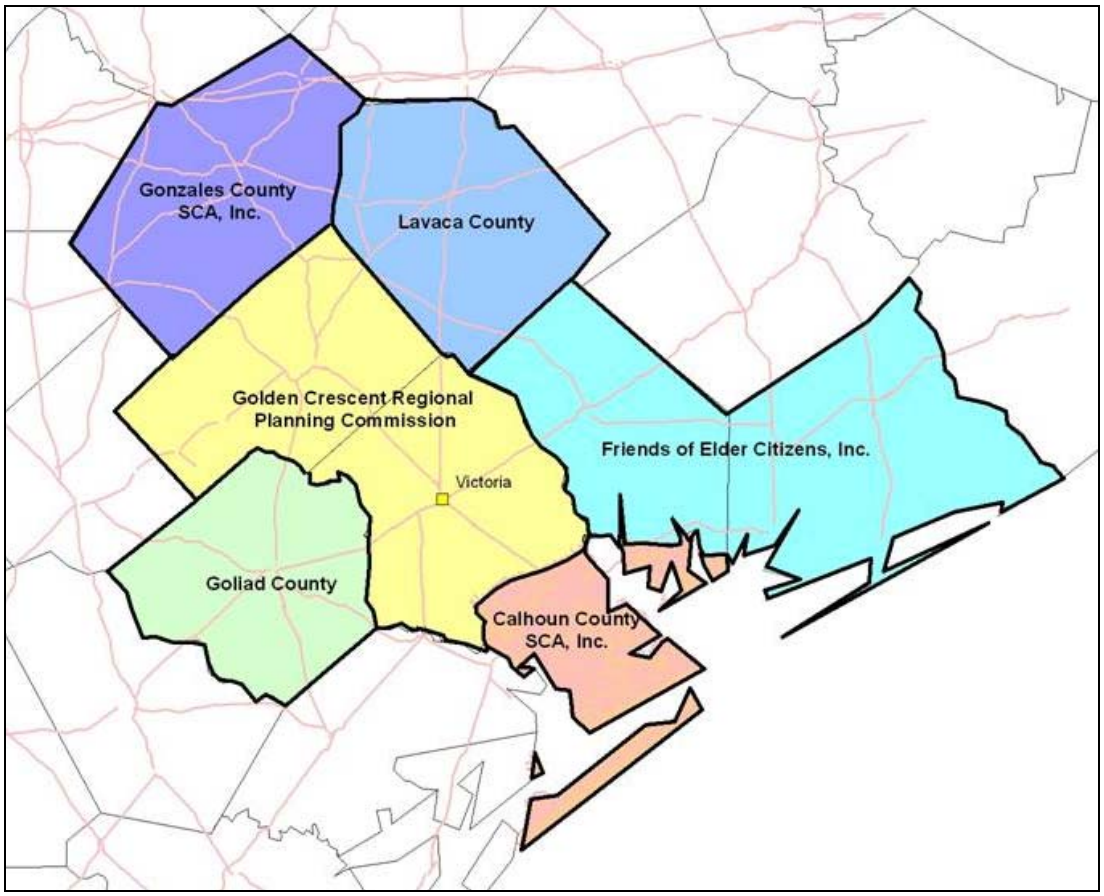

Figure 2. GCRPC Region and Providers.

Similar to HOTCOG, GCRPC's system for scheduling and dispatching service is decentralized. Each provider is responsible for taking trip reservations, scheduling, and dispatching services within its area. Unlike HOTCOG, GCRPC is directly responsible for services in two counties and uses Routematch to schedule trips. Other providers must report operating data back to GCRPC, and GCRPC reports the combined data to TxDOT-PTN on the PTN-128 reporting system.

GCRPC has been examining its business process model and has identified two other options for regional service delivery. One option is to continue having each provider take reservations locally. The agency staff then puts the total set of reservations into a regional scheduling package that schedules services for the next day. The joint scheduling of trips would eliminate the kinds of service overlap or redundancies that were previously described in the HOTCOG case study. However, because trips would be batch processed toward the end of the prior day, patrons would not be able to actually schedule the trip when they called for the reservation. The agency would then centralize dispatching to maximize the efficiency of real-time adjustments to service.

In the second option, the agency would centralize all administrative steps—taking reservations, scheduling trips, and dispatching service. Centralizing the reservations process would likely

reduce the total cost of taking reservations for the region and would make it possible to confirm a trip appointment at the time of the reservation call.

GCRPC has piloted the second "full centralization" option in coordination with Goliad County. Based upon the results of the pilot, GCRPC is proceeding with the acquisition of MDCs and a new scheduling package. While the region has not decided to move to a totally centralized system, the new technology would be capable of supporting such a move in the future.

Luis Pino, HCTD

Luis Pino has served as the technology manager at HCTD for 3 years. Previously, he served in the active U.S. Army for over 24 years. In 1997, he served in the U.S. Army's first digital experiment (Task Force XXI), which transformed it from an analog Army to the current digital Army. For the case study, he shared the lessons learned at HCTD during the implementation of scheduling, dispatching and vehicle location hardware and software for fixed-route and demand-response services.

The Hill Country Transit District is a designated rural transit district that serves a nine-county area in central Texas. Since its inception in the 1960s, two urbanized areas have emerged—Temple and Killeen-Copperas Cove. HCTD primarily operates fixed-route services in these two small urban areas. HCTD also provides MTP services throughout the entire service area. Figure 3 displays the HCTD service area along with the two urbanized areas.

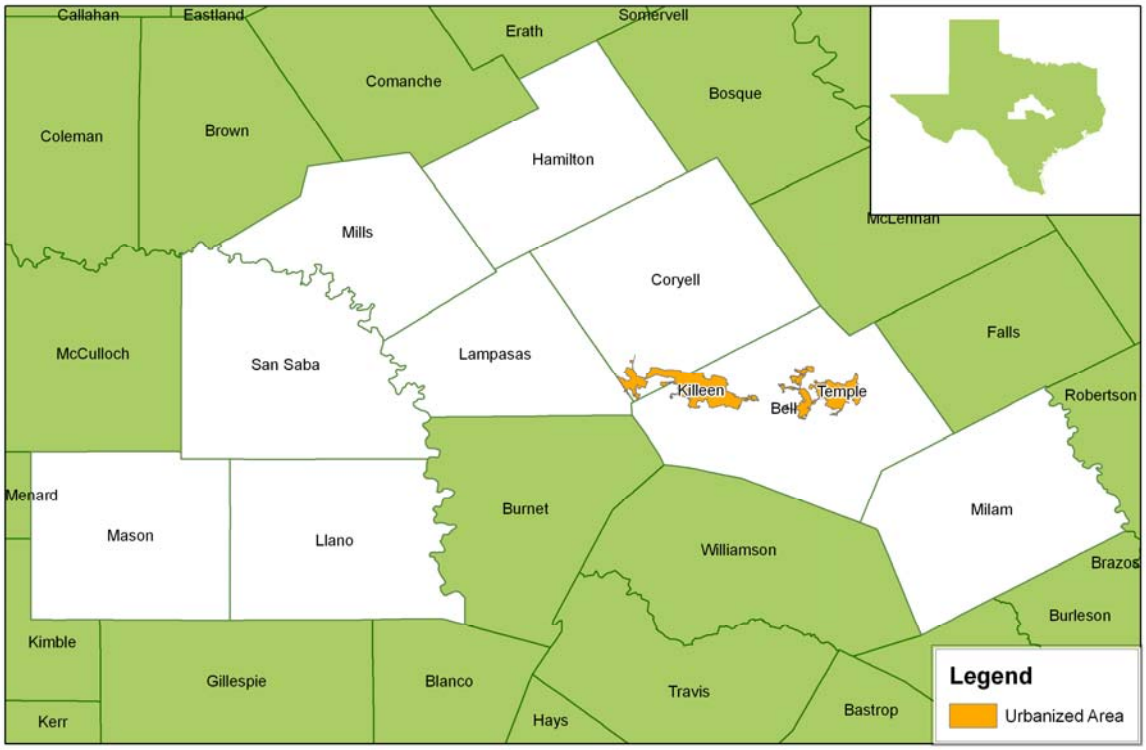

Figure 3. HCTD Region.

HCTD implemented the Trapeze-Mentor system in 2008. The primary objective of adopting the technology package was to improve customer service on several levels. The technology package has met those objectives. The system has simplified the scheduling process and improved the overall efficiency of schedules. The MDCs have helped new drivers adapt more quickly since the MDCs simplify accommodating changes in work assignments. Because dispatchers have a real-time view of the entire operation, they can respond to service delivery issues more efficiently and effectively. They can also respond promptly and accurately to passenger information requests. Finally, the systems simplify data reporting.

Mr. Pino offered the following lessons learned from HCTD's technology implementation experiences:

- *Know what you want.* Technology is not an end, but a means to an end. First, identify the kinds of improvements you need in your service delivery, and then identify the technologies that can help effect those changes. The specification and design of your system must be based upon your intended outcome.
- *Visit and talk to peers first.* Once you know what you are trying to achieve, canvas peer agencies that have implemented systems. See what they have achieved and how they used the technology to assist them. They can tell you about their lessons learned so that you can avoid them as you implement your project.
- *Ensure the correct infrastructure is in place.* Since the infrastructure is foundational to the system, make sure yours can support your system or upgrade it to support your system. An inadequate infrastructure will lead to sluggish response and diminish staff's interest in using the system fully.
- *Allow adequate time for implementation.* First impressions do count, and a rushed implementation will likely create a bad first impression among the staff. It is often wise to introduce elements of the new system step by step, allowing staff to become comfortable with each feature and then moving to the next. You need to also consider the degree of change that your staff will incur. For example, a move to fully automated scheduling and computer-assisted dispatching from a totally manual system should be paced more slowly when adding MDCs to a system that already uses computerized scheduling.
- *Stay current with software and training.* Systems upgrade, and your agency needs to stay informed about planned changes to your systems. Since a change in one element of your system may disrupt integration somewhere else in the system, upgrades should be pre-tested and staff kept fully informed.
- *Have a contingency plan.* Systems fail, period. It may be a component failure, it may be a communications system failure, or it may be an integration failure at the time of software upgrading. Your agency should always know what to do if the system fails. Have maintenance contracts in place but also have procedures pre-established so everyone knows what to do when something goes wrong.

Gerald Payton, Panhandle Community Services

Gerald Payton has served as transportation director for the Panhandle Transit District for the last 8 years. Prior to becoming director, he served in several other positions with Panhandle Transit including driver, area supervisor, and regional supervisor since joining the agency in 1991. Under his leadership, Panhandle Transit has increased ridership from 60,000 one-way trips in 1991 to over 300,000 trips in 2009. Panhandle Transit services a 26-county area and has 13 community-based offices. Figure 4 displays the Panhandle Transit service area.

Figure 4. Panhandle Community Services Region.

Mr. Payton recognized when he became transportation director that the kinds of technologies that were being implemented on ADA paratransit systems across America would likely find their way to rural transit systems as well. Sparse communications systems in rural areas constrained the ability to implement MDCs; with the advent of broadband Internet availability, this constraint was removed.

During the last 8 years, Panhandle Community Services has implemented a paperless system for transportation in the 26-county transit district. The transportation director's understanding of computers has helped various programmers to develop software currently used in rural transit. Panhandle Community Services uses computer-assisted scheduling/routing/dispatching software, MDCs, an AVL system, and cell phones to schedule, dispatch, and communicate. Mr. Payton

recommends a strong network administrator when operating an automated scheduling/dispatching, AVL, and MDC system. He also looks for computer-literate staff when hiring for dispatch and scheduling positions.

Mr. Payton stated that moving to a paperless system took approximately 100 days to implement. He stressed the importance of communicating to patrons and staff prior to any technology implementation to explain that "it may get worse before it gets better." He emphasized that an agency needs a commitment to a paperless system in order to implement it and make it work. He stated that good drivers are the key to making the system work and that he relied on the expertise of his driver workforce during the transition to going paperless. Elimination of the written driver manifests pushed more responsibility to the dispatch and scheduling staff to ensure accurate trip data are recorded at the time of the trip reservation and when the schedules changes. Panhandle Community Services has a centralized regional dispatch center. Mr. Payton reported that a centralized dispatch helps in a paperless system, as dispatchers and schedulers are better able to communicate to resolve trip issues, readily transferring trips between vehicles to prevent late trips, because they can "see the big picture." Mr. Payton trained drivers, dispatchers, and schedulers in advance of the transition to go paperless, which helped in transitioning more quickly.

Mr. Payton described the daily operation as follows. On the day of service, drivers download scheduled passenger trips sorted by estimated time of arrival through the MDC during their pre-trip inspection and then initialize the record for odometer miles. Drivers log arrivals, departures, and no-shows for each scheduled passenger trip through MDCs. These data then update the scheduling system in real time. Dispatchers use the AVL system for a variety of functions including identifying the closest vehicle to a waiting patron, estimating the vehicle arrival time for patron pick-up, and determining direction and speed that a vehicle is moving.

Panhandle Community Services relies on MDC text messages to communicate to drivers and uses cell phones only when voice communication is needed. The scheduling system provides a visual of the slack in the system—usable vehicle time that is not yet scheduled. This provides the dispatcher options when trips are running late. The dispatcher may move a passenger trip to another vehicle to maintain on-time performance. Panhandle Community Services allows passengers to make same-day reservations if the schedule allows. At the end of the day, drivers input ending odometer mileage into the MDC. A program detects data entry errors in mileage, allowing mileage administrative staff to make a correction. Drivers turn in fares collected to the Finance Department. The Finance Department prints a system report of the cash fares and contract fares by driver to reconcile and provides a receipt to the driver with discrepancies reported to the supervisor for review.

RECOMMENDATION

User group meetings have been part of the computerized transit scheduling system network for decades. Major software vendors typically schedule meetings and bring users together for technical training and other ancillary workshops and panel discussions.

This model, while useful, also has some limitations. First, the user group meetings happen periodically; usually there is one large annual meeting at a minimum. Limited travel budgets can make accessing the major meeting impossible (especially among smaller transit agencies that often have very small travel budgets).

However, since the advent of these user group meetings, communications technology and norms have advanced. Meetings are now routinely conducted via teleconferencing, trainings are increasingly Web-based, and use of e-mail and social media is routine.

In order to support the continued and expanded implementation of transit technology among rural and small urban agencies, TTI researchers recommend consideration of the following action items:

- *Technology mentoring.* Existing technology users universally recommend that agencies considering implementation of new systems need to visit and talk with other agencies that have already gone through that process. TxDOT-PTN is interested in developing peer-to-peer training among Texas transit agencies. The implementation of a technology-mentoring program would be an effective application of such a peer-based program. There are two distinct mentoring needs: (1) broad-based support as an agency looks at how to achieve its objective through technology and how to procure a system; and (2) specific support in the implementation and operation of the selected system by a mentor who has the same system.
- *Web-based user community support.* Once technology systems become operational, the mentoring role will naturally diminish and the community of users will become its own support system. This can be achieved cost effectively through the creation of a technology bulletin board and listserv for interested agency personnel. Participants can post questions to the bulletin board that will also automatically be e-mailed to listserv subscribers. This can serve as a virtual user group, permitting quicker response and more frequent interaction than a traditional user group.

APPENDIX

RURAL AND STATE-FUNDED URBAN TRANSIT DISTRICT TECHNOLOGY SYSTEMS 2010

SCHEDULING, DISPATCHING, AND MOBILE DATA COMPUTER SYSTEMS
FISCAL YEAR 2010

(Blank Entry Indicates Did Not Report)

Transit Districts	Scheduling/ Routing Software and Automated Dispatch	Mobile Data Computer (MDC)/ Terminal (MDT)	Currently Procuring or Installing	Contact Name	Contact E-mail	Contact Phone
Abilene, City of	Trapeze	None		Brad Patrick, General Manager	Brad.patrick@abilenetx.com	325-676-6403
Alamo Area Council of Governments (COG)	Shah	Greyhawk		Ben Herr, Transportation Director	BHerr@aacog.com	201-362-5303
Amarillo, City of	Trapeze			Judy Phelps, Transit Manager	judy.phelps@ci.amarillo.tx.us	806-378-6842
Ark-Tex Council of Governments	Shah	Greyhawk	Now installing both	Lynda Woods Pugh, Manager	lwoods@atcog.org	903-832-8636
Arlington, City of	Ecolane			Paul Price, Transit Operations Support	Paul.price@arlingtontx.gov	817-459-6392
Aspermont Small Business Development Center	Shah	None		Kim Lowack, Transportation Director	kimber766@yahoo.com	940-989-3538
Beaumont, City of	None	None		Bill Munson, Transit Manager	bmunson@beaumonttransit.com	409-835-7895
Bee Community Action Agency	Shah	None	Procuring Web-based Shah System	Alex Rodriguez, Transportation Director	alex.rodriguez@bizstx.rr.com	361-358-5530
Brazos Transit District BTD (College Station/ Bryan, The Woodlands, The District)	Trapeze	Mentor		Elizabeth Bruchez, Vice President for Communications	liz@btd.org	979-778-4499
Brownsville, City of	Routematch	Mentor		Norma Zamora, General Manager	normaz@cob.us	956-541-4881
Capital Area Rural Transportation System	Trapeze	Mentor		Dave Marsh, General Manager Pearl Jackson, Deputy General Manager	dave@ridecarts.com pearl@ridecarts.com	512-481-1011 512-478-1110
Central Texas Rural Transit District	Routematch	Mentor Rangers	Selection made and installation pending (Interactive Voice Response system also purchased)	Joe Guajardo, Assistant General Manager	joe@cityandruralrides.com	1-800-710-2277
Cleburne, City of	Routematch installed February 2010		Installing Mentor Rangers	Julie Floyd, Transit Manager	julie.floyd@cleburne.net	817-645-0924
Collin County Committee on Aging, McKinney	Trapeze			Rep Pledger, General Manager	PledgerR@ccartcc.com	972-562-4275 x115
Colorado Valley Transit	Trapeze	None	Proposals July 2010 to add MDT and Automated Vehicle Locator (AVL)	Vastene Olier, Executive Director	cvt@gotransit.org	1-800-548-1068 x16

Transit Districts	Scheduling/ Routing Software and Automated Dispatch	Mobile Data Computer (MDC)/ Terminal (MDT)	Currently Procuring or Installing	Contact Name	Contact E-mail	Contact Phone
Community Action Council of South Texas	Shah	None		Noelia Ruiz, Transportation Director	noelia_ruiz@cacst.com	956-487-0068
Community Council of Southwest Texas	Shah			Sarah Hidalgo-Cook, Transportation Director	ccswt-swtransit@sbcglobal.net	830-278-4155
Community Transit Services, Inc.	Shah	Greyhawk		Charlotte Clower, Transportation Director	ctsdirector@csicorsicana.org	903-872-2405
Concho Valley (San Angelo and Concho Rural)	Ecolane	Mentor Rangers		Noel Hernandez	noel.hernandez@cvcog.org	325-944-9666
Connect Transit (Gulf Coast Center, Lake Jackson, Texas City)	Shah	Greyhawk		James Hollis, Transportation Director; Conni Westfall, Transit Manager	Jamesh@gcmhmr.com constancew@gcmhmr.com	409-944-4446 409-945-0820 x19438
Del Rio, City of	Trapeze	Radio Satellite Integrators (RSI)		John Burns, Transportation Director	jburns@cityofdelrio.com	830-703-5324
East Texas COG	Routematch	Digital Dispatch Systems (DDS)		John Hedrick, Director of Transportation	John.hedrick@etcog.org	903-984-8641
El Paso County, League of United Latin American Citizens (LULAC)	Routematch			Bob Geyer	bgeyer@co.el-paso.tx.us	915-834-8242
Fort Bend County	Trapeze			Paulette Shelton, Transit Director	Sheltonp@co.fort-bend.tx.us	281-243-4807
Galveston, City of	Shah	Greyhawk		Michael Worthy, Director of Transportation	worthymic@cityofgalveston.org	409-797-3905
Golden Crescent Regional Planning Commission and Victoria Transit	Routematch		Selection process for scheduling and MDTs	Lisa Cortinas, Director of Transportation Services	lisac@gcrpc.org	361-578-1578 x207
Grand Prairie, City of	Trapeze			Anthony Flowers, Transit Coordinator	aflowers@gptx.org	972-237-8545
Heart of Texas Council of Governments	Shah	To be determined	Design phase of regional scheduling/ dispatching system	Gary Rushing, Transportation Manager	gary.rushing@hot.cog.tx.us	(254) 292-1895
Hill Country Transit District, The HOP (Temple, Killeen, Hill Country)	Trapeze	Mentor		Luis Pino, Technology Manager	Lpino@takethehop.com	254-616-6800
Kaufman Area Rural Transportation	Trapeze	Radio Satellite Integrators (RSI)		Omega Hawkins, Executive Director	omega@terrelldepot.com	972-563-5875
Kleberg County Human Services	Shah	None		Margie Del Bosque, Director; Becky Greif	margiedlb@yahoo.com beckygreif@hotmail.com	361-595-8573
Laredo, City of	Trapeze	None		Eddie Bernal, Transportation Analyst	ebernal@ci.laredo.tx.us	956-795-2288 x233

Transit Districts	Scheduling/ Routing Software and Automated Dispatch	Mobile Data Computer (MDC)/ Terminal (MDT)	Currently Procuring or Installing	Contact Name	Contact E-mail	Contact Phone
Longview, City of	Routematch	Mentor		Rob Stephens, General Manager	rstephens@longviewtransit.com	903-237-1018
Lower Rio Grande Valley Development Council and Harlingen	None	None		Manuel Flores	mgflores@bizrgv.rr.com	956-682-3481
Lubbock, City of	Trapeze	Mentor		John Wilson, Assistant General Manager; Michael Mangum, Assistant General Manager/Chief Financial Officer	jwilson@citibus.com mmangum@citibus.com	806-712-2001 806-712-2005
McAllen Express	Access (in-house)			Elizabeth Suarez, Transit Director; Marabeth Schuster	esuarez@mcallen.net mschuster@mcallen.net	956-682-3481
Mesquite, City of	Trapeze			Donald White, Transportation Coordinator	dwhite@ci.mesquite.tx.us	972-329-8337
Midland–Odessa, Cities of				Edward Esparza	eesparza@ez-rider.org	432-561-8051
North East Transportation Service	None (service is contracted)			Elizabeth Reining	ereining@nrhtx.com	817-427-6015
Panhandle Community Services	Shah	Greyhawk (now paperless)		Gerald Payton, Transportation Director	g-payton@pcsvcs.org	806-372-2531 x256
Port Arthur, City of	None	None		Paul Brown	paulb@portarthur.net	409-982-8139
Public Transit Services	Shah	Greyhawk		Reta Brooks, Executive Director; Terry Roberson	rbrooks@publictransitservices.org terry@publictransitservices.org	940-328-1391
Rolling Plains Management Corp.	Developed locally	None		Lezlie Carroll, Transportation Director	sharplines@yahoo.com	800-633-0852
Rural Economic Assistance League				Gloria Ramos, Executive Director	realtran@bizstx.rr.com	361-668-3158
Senior Center Resource and Public Transit Inc.	Trapeze			David Caldwell, Chief Executive Director	dcaldwell@scrpt.org	903-455-8019
Services Program for Aging Needs	Trapeze		Procuring MDTs	Nicholas Gray, Transportation Manager	nicholasg@span-transit.org	806-894-6104
South East Texas Regional Planning Commission	Shah			D'Juana Davillier, Transportation Program Manager	ddavillier@setrpc.org	409-899-8444 x6601
South Padre Island, Town of	None (circulator route)	None (circulator route)		Jesse Arriaga, General Manager	jarriaga@townspi.com	956-761-3245
South Plains Community Action Association, Caprock Community Action Association	Shah			Brian Baker, Director of Transportation	bbaker@spcaa.org	806-894-3800

Transit Districts	Scheduling/ Routing Software and Automated Dispatch	Mobile Data Computer (MDC)/ Terminal (MDT)	Currently Procuring or Installing	Contact Name	Contact E-mail	Contact Phone
Texoma Area Paratransit System TAPS (Sherman-Denison, TAPS Rural)	Shah	Greyhawk		Brad Underwood, Executive Director	bradunderwood@tapsbus.com	903-893-4601
Texarkana Urban Transit District	None	None		Vera Matthews, General Manager	vmatthews@txkusa.org	903-794-0435
Transit System Inc., The	Shah	None		Barbara Perry, General Manager	transit@windstream.net	254-897-2964
Tyler, City of	Routematch	Mentor		Sue Barham, Transit Operations Coordinator	sbarham@tylertexas.com	903-533-8057
Waco, City of	In selection process	In selection process	In selection process	John Hendrickson, General Manager	johnhe@ci.waco.tx.us	254-750-1900
Webb County Community Action Agency	Shah	Greyhawk		Robert Martinez, Transportation Director	romartinez@webbcountytx.gov	956-722-6100
West Texas Opportunities, Inc.	Shah	Greyhawk		Karen Faulkner, Transportation Director	kfaulknerwto@windstream.net	806-872-8354 x243
Wichita Falls, City of	Trapeze	No MDT		Dennis Burket, Transportation Administrator	dennis.burket@cwftx.net	940-761-7642

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