Transit Asset Management Systems: What Are They and How Do They Apply to Rural Transit?

By Clifton Hall and Pat Weaver

The Federal Transportation Administration (FTA) is expected to release new standards for transit system administration in requirements included in MAP-21. These standards are a part of a focus on Transit Asset Management Planning, including life cycle and safety of equipment, vehicles and other assets and infrastructure used by transit agencies, such as buses and vans, buildings and other assets. Transit Asset Management, or TAM for short, is already practiced by many transit providers, but is expected to become mandatory and regulated by the FTA for its grant recipients and sub-recipients. This article will familiarize you with the

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Inclusive Planning: What Does it Look Like?

By Clifton Hall

In rural transportation, it is common for transit providers to provide service to underrepresented groups such as persons with disabilities and the elderly. As mentioned in the Kansas TransReporter January 2014 feature article, “Improving Relationships with Underrepresented Groups,” transit agencies commonly use traditional communication, marketing, and outreach techniques that fail, in general, to recognize the diverse and unique communication needs of underrepresented groups. The article included great resources for increasing public involvement and partnership with underrepresented groups. This article builds on that by showcasing innovative ways rural transit providers have connected to underrepresented groups.

Recruit a coalition to identify needs

Helena Area Transit Service (HATS) in Helena, Montana recruited a panel

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basic components of TAM and give ideas of how TAM principles can be applied to improve system performance and prepare for the future. The information in this article does not represent final rules or regulations, but is meant to give general, preparatory knowledge about TAM.

The pillars of TAM
In a recent webcast, the FTA outlined five basic tenets or “pillars” of TAM that would be emphasized when final rule-making is rolled out. These are: 1) “state of good repair,” 2) performance measures, 3) plan development and certification, 4) FTA assistance, and 5) data reporting to the National Transit Database or Rural National Transit Database.

Because data reporting is already regulated, requirements for Pillar 5 for TAM plans will be issued by the FTA in a separate rule, and will not be covered in this article.

Pillar 1: State of good repair
“State of good repair” is the crucial theme and first pillar of TAM planning. Basically, the aim of transit asset management is to keep assets and equipment in transit systems in a state of good repair so that they contribute to the safety and integrity of the system as a whole. The idea of a vehicle being in a state of good repair is akin to the idea of minimizing risk and maximizing safety, which is the vision of implementing TAM plans on a national scale.

Four approaches to determining “state of good repair.” MAP-21 requires FTA to define the term “state of good repair” and to create objective standards. FTA is considering one of four possible approaches for measuring state of good repair, based on vehicle age, condition, performance, or a combination of these. The measures are progressively more labor intensive to document, but also become more accurate. FTA is considering how to scale potential definitions to be more applicable to different sizes of operations. The following are descriptions of each approach:

**Age based:** This the most simple and intuitive approach to measure, and places the least burden on transit agencies. It ranks transit assets by age and schedules them to be replaced, based on an amortization schedule, at a predetermined time once the vehicle in question reaches a certain age.

**Condition based:** This approach places more responsibility on the transit agency to collect information and evaluate condition. This strategy suggests replacement of assets based the condition of the components of the asset, regardless of age. Assets or components in poor or deteriorating condition are replaced, repaired, or scheduled to be replaced based on one or several measures of good repair.

**Performance based:** This approach is more time-intensive than the previous two, but is also considered the most accurate. It requires performance to be measured based on objective criteria related to state of good repair, which might include efficiency, reliability, or on-time performance. This approach is more burdensome, because it requires thorough and intensive performance monitoring, and the most accurate because it directly targets lack in performance and safety.

<table>
<thead>
<tr>
<th>Rating</th>
<th>General Description</th>
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<tbody>
<tr>
<td>Bad</td>
<td>In sufficiently poor condition that continued use presents potential problems.</td>
</tr>
<tr>
<td>Poor</td>
<td>Requires frequent major repairs (less than 6 months between major repairs).</td>
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<tr>
<td>Fair</td>
<td>Requires frequent minor repairs (less than 6 months between repairs) or infrequent major repairs (more than 6 months between major repairs).</td>
</tr>
<tr>
<td>Good</td>
<td>Elements are in good working order, requiring only nominal or infrequent minor repairs (greater than 6 months between minor repairs).</td>
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<tr>
<td>Excellent</td>
<td>Brand new, no major problems exits, only routine preventive maintenance.</td>
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Figure 7.

<table>
<thead>
<tr>
<th>Rating</th>
<th>General Description</th>
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<tbody>
<tr>
<td>Bad</td>
<td>The inspection unit has significant shortcomings in its ability to support its function.</td>
</tr>
<tr>
<td>Substandard</td>
<td>The inspection unit has shortcomings in its ability to support its intended function that are deemed by the operator to be below industry standards. These deficiencies impact the efficiency and/or effectiveness of the operation.</td>
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<tr>
<td>Adequate</td>
<td>The inspection unit has shortcomings in its ability to support its intended function, but these do not significantly impact transit performance.</td>
</tr>
<tr>
<td>Good</td>
<td>The inspection unit meets most reasonable requirements, but may have some less than optimum characteristics.</td>
</tr>
<tr>
<td>Excellent</td>
<td>The inspection unit exceeds the reasonable requirements based on its intended function.</td>
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Figure 8

Types of whole systems in a fleet of buses (i.e. mechanical, electrical, hydraulic) can be treated as a single inspection unit. Individual inspection units are then evaluated based on physical condition or functional rating, as shown in Fig. 7 and 8 from TCRP Report 5, above.
Basically, the aim of transit asset management (TAM) is to keep assets and equipment in transit systems in a state of good repair so that they contribute to the safety and integrity of the system as a whole. The idea of a vehicle being in a state of good repair is akin to the idea of minimizing risk and maximizing safety, which is the vision of implementing TAM plans on a national scale.

Comprehensive approach: This approach uses a combination of two or more of the above-mentioned approaches to evaluate state of good repair.

Pillar 2: Performance measures
The second pillar, performance measures, will regulate how state of good repair will be determined. These will be based on objective measures to be established by FTA. Each recipient (in the case of urban agencies, or the state DOT in the case of rural agencies) will be required to set its own targets for these performance measures. FTA will require each recipient to report its progress towards the targets, but will not require targets to be met. Rather, FTA will require an annual report on how the agency is performing relative to its targets.

Pillar 3: Plan development and certification
Each TAM plan has three components: 1) an asset inventory, 2) investment priorities (based on state of good repair), and 3) certification to FTA. As sub-recipients of KDOT, most rural transit providers in Kansas will not have to certify directly with FTA, but will fall under KDOT’s plan. FTA has emphasized its desire to make the planning process “scalable and flexible” for small providers, so that undue burdens are not placed on providers with few resources. FTA also emphasized a “risk-based” approach to oversight. This means FTA’s priority in oversight is not enforcement of the plan, but on minimizing risk associated with asset operation.

Pillar 4: Technical assistance
FTA has promised to provide technical support to grant recipients in the form of a decision-support tool for “investment prioritization,” which is the order in which funds are allocated to maintain a state of good repair. FTA also plans to release an analytical process for capital investment, which FTA has said will be similar to TERM-lite software it has already released to help some agencies with asset management. FTA also mentioned the FTA TAM Guide as well as general TAM educational courses available through several avenues.

Begin with best practices
The best place to begin with transit asset management, especially in a rural context, is to evaluate how you are already managing your assets. Transit asset systems are simpler for smaller systems, and it should be relatively easy for many rural Kansas providers to begin following a TAM plan. Some basic transit asset principles can be found in TCRP Report 5: Guidelines for Development of Public Transportation Facilities and Equipment Management Systems.

Create and organize a master inventory
Asset inventory is the lynchpin of TAM. TCRP Report 5 recommends viewing your assets as inspection units. This can include individual items such as buses and facilities, as well as groups of items such as a fleet of similar items. Likewise, single assets can be further broken down into its individual parts.

For example, a bus can be broken down into inspection units such as engine, wheels, chassis, cab, and so on. Types of whole systems in a fleet of buses (i.e. mechanical, electrical, hydraulic, etc.,) can also be treated as a single inspection unit. The individual inspection units are then evaluated based on physical condition or functional rating, such as in Fig. 7 and 8 from TCRP Report 5 (see previous page).

Report 5 also suggests recording the life-cycle rating, which is an assessment of the remaining life of the asset before replacement, and the descriptive rating, which is a detailed description of deficiencies found during inspection of the asset.

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**Prioritize assets**

The master inventory is combined with prioritization to guide decisions about what actions should be taken. Typical considerations of prioritization are the condition of the asset and the asset’s direct effect on system performance and safety. Based on these factors, remedial actions are scheduled to reduce the backlog of assets not in a state of good repair. Common remedial actions to reduce backlog are maintenance and repair, refurbishment of assets, rehabilitation, overhauling assets or system, or replacement.

Evaluating your assets is a good way to begin to prepare for new regulations when they are released by FTA and implemented by KDOT.

**Impact on Kansas rural transit providers**

While it is still too early to know what the requirements will be, rural Kansas providers, as sub-grantees, can expect to have their TAM planning requirements set by KDOT. FTA has emphasized the potential for TAM requirements to be tailored to agencies based on their size, but it remains to be determined exactly what shape it will take for the smaller agencies. Requirements for small providers will likely be in line with best practices of the industry, and are expected be reproducible for different provider sizes.

As with other program requirements, KDOT’s Office of Public Transportation staff will work with agencies to implement the program as it takes shape. As State KDOT Public Transit Manager Josh Powers reminded us, some elements of transit asset management reporting to the State are already in place through data collected from monthly “TRACK” reports completed by Kansas transit agencies, as well as data collected during annual vehicle inspections. Staff will review additional requirements as they are implemented and work with agencies to determine any additional needs.

**Conclusion**

The American Public Transportation Association lists several benefits of TAM in its document, Creating a Transit Asset Management Program. Benefits include more reliable equipment, better customer service, and improved on-time performance. It is possible you are already managing your assets as a good business practice. If not, many resources are online to help you get started. Implementation of some form of transit asset management will be beneficial not only for the safety of your passengers, but also for the efficiency and effectiveness of your agency.

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**Sources**


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**Inclusive planning** Continued from page 1

called HATS Inclusive Coalition to gauge transportation needs of target demographics—mostly persons with disabilities—and how to plan for those needs, long term. Coalition members seek opinions from user groups directly, by going to senior centers and places that employ persons with disabilities. They deliver questions personally to underserved stakeholders. This group will be an important contributor to the HATS Transit Development Plan. HATS plans to retain a transportation planner able to implement models to fit identified needs.

**Invite input from target groups**

The Fayette County Ohio Transportation Program, located in rural southwest Ohio, is using a grant to involve seniors directly in the process of planning new routes. The agency will use a synthesis of information regarding the target group’s needs to begin its first fixed route. Fayette County plans to reach
90 percent of nursing homes, assisted living, and senior agencies within their service area in the planning process. During development of the route, the agency’s mobility manager will set up and moderate a Facebook page to receive feedback. The county expects a 10 percent increase in trips by older adults and those with disabilities.

**Establish a voucher system and obtain continuous feedback**

The Transit Ride Improvement Project (TRIP) of Columbia County (Wisconsin) has re-established a transportation council that includes riders, stakeholders, and provider groups. The council will head a grant project that will gather continuous feedback about transit needs. The project will also establish a voucher system that will make transit more accessible and affordable and will employ a mobility manager to analyze data from the program and improve system functionality as well as accessibility.

**Coordinate a ride share program**

Indian Nations Council of Governments (INCOG) Area Agency on Aging (Tulsa, OK) covers unincorporated areas of Creek and Osage Counties. To better serve residents living in rural counties adjacent to Tulsa County, INCOG will determine the feasibility of a “bus buddies” ride share program and will coordinate a volunteer program for those interested in providing rides for elderly residents. This concept could be applied to various under-served groups to enhance their mobility.

**Develop a One-Call system**

Mountain Empire Older Citizens, Inc., located in mountainous northern Virginia, serves elderly and disabled persons in a service area with a 24 percent poverty rate. As part of a comprehensive plan to increase ridership in under-served groups, Mountain Empire has initiated a One-Call system that connects users to all transportation providers and modes, allowing providers and customers to do business through a single venue.

**Put under-served members in the “driver’s seat” for public input**

National Participant Network of Taos, New Mexico, is seeking to develop a public input model driven by under-served group members themselves. NPN will recruit and advertise to members of target groups, and will set up accessible meeting rooms for those with physical disabilities, low vision, hearing impairments, and environmental sensitivities. During the planning process, NPN will hand the entire planning process over the groups within a general framework, allowing them to state their needs, the problems faced, and initial plans and strategies for accomplishing their goals. This will allow the users to be the experts, with the planner there to give guidance and help with implementation.

**Open up to language accessibility**

Marin County Transit District, located in northern California, has a large and growing population of Spanish and Vietnamese speakers. The agency hopes to adapt its successes in reaching English speakers through personal contact by recruiting non-English speakers to participate in focus groups and advisory boards, and by increasing efforts to obtain feedback from non-English speakers. By using appropriate communication methods for different cultures, Marin County hopes to erode the barriers of language and culture preventing its under-served public from using their services.

**Now it’s your turn**

Where does your agency stand in actively including the different under-served groups in your area? Evaluating your goals and outreach strategies is crucial to laying an inclusive foundation for your transit organization’s mission and service model. By changing the way your organization views its outreach role and strategies, you may find new and valuable partners in increasing your service to under-served individuals.

**Sources**

Transit Agency in Michigan Emphasizes Safety in its Rx/OTC Medication Use Policy

Livingston Essential Transportation Service (LETS) is a medium-sized Section 5307 transportation provider in Howell, Michigan. It has taken a proactive approach to addressing prescription and over-the-counter (Rx/OTC) medication use for its 33 safety-sensitive employees. At LETS, medication use is a safety issue. Safety-sensitive employees must report fit for duty, and that means being free of any medications or substances that can prevent them from safely performing their job duties. LETS accomplishes this through the implementation of the procedures in its Rx/OTC medication use policy and through the agency’s ongoing safety training program.

The agency’s policy is spelled out

The LETS Rx/OTC policy is described in the agency’s FTA drug and alcohol policy (see sidebar on the next page). Some important points of the policy:

• The policy stresses that some Rx/OTC medications can reduce the effectiveness of a safety-sensitive employee and can represent a safety risk.

• It requires all safety-sensitive employees to notify their supervisor of all Rx/OTC use by completing a Supplemental Medical Examination Report.

• This report is sent directly to the LETS medical practitioner, confidentiality is maintained at all times.

• LETS’s designated medical practitioner (who also conducts the CDL physicals) reviews and signs-off on each report, indicating whether or not the medications are likely to adversely affect the employee’s ability to operate a vehicle.

• Disciplinary actions are clearly outlined for policy violations, such as if the employee fails to notify the supervisor of all medications taken.

• Implementation procedures are incorporated into LETS’s overall policy document.

Employees are trained

LETS provides extensive, ongoing training on the effects and consequences of Rx/OTC medications in the workplace. This topic has been incorporated into LETS’ required and ongoing FTA drug and alcohol training program. LETS managers routinely stress the importance of public safety and fitness for duty for all safety-sensitive employees in staff meetings and safety meetings.

In sum

This approach by LETS is a best practice model for how a transit system can pro-actively and positively address Rx/OTC medication use by safety-sensitive employees to help ensure the safety of its employees and its customers.

What are some of the medications and associated side effects that can impair driving?

FTA’s Prescription and Over-the-Counter Medications Toolkit identifies the following medications as some that can affect driving safety:

**Alcohol:** As little as one serving of alcohol (1.25 oz. 80 proof liquor, 12 oz. beer, 5 oz. wine) has the potential to impair driving performance in many individuals. In many cases, individuals may be impaired without being aware of it.

**Anticholinergics:** Anticholinergic effects that can impair driving performance include blurred vision, sedation, confusion, ataxia, tremulousness, and myoclonic jerking.

**Anticonvulsants:** Anticonvulsants (e.g., valproic acid, carbamazepine, gabapentine, lamotrigine and topiramate) are also being used as mood stabilizers for treatment of bipolar disorder and as sedating agents for anxiety. The patient should temporarily cease driving during the time of medication initiation, withdrawal, or dosage change due to the risk of recurrent seizure and potential medication side effects that may impair driving performance.
**Antidepressants:** Impairing side effects vary among the different classes of antidepressants, and even within certain classes of antidepressants. In general, antidepressants that possess antagonistic activity at cholinergic, alpha 1 adrenergic, and histaminergic receptors are the most impairing.

**Bupropion:** Side effects of bupropion (also known as Wellbutrin® and Zyban®) include anxiety, restlessness and insomnia (leading to daytime drowsiness).

**Mirtazapine:** Mirtazapine (also known as Remeron®) is typically taken only at night due to its sedating effects. It has been shown to cause substantial impairment for many hours after dosing. Whenever possible, it should be avoided in patients who wish to continue driving.

**Monoamine oxidase (MAO) inhibitors:** Side effects of MAO inhibitors that may impair driving performance include blurred vision, overstimulation, insomnia (leading to daytime drowsiness), orthostatic hypotension (with transient cognitive deficits), and hypertensive crisis (presenting with severe headaches and/or mental status changes).

**Selective serotonin reuptake inhibitors (SSRI):** Common side effects of SSRIs that may impair driving performance include sleep changes (insomnia or sedation), headache, anxiety, and restlessness.

**Tricyclic antidepressants (TCA):** Common side effects of TCAs that may impair driving performance include sedation, blurred vision, orthostatic hypotension, tremor, excitement, and heart palpitations. In studies involving healthy volunteers, the more sedating TCAs have been shown to impair psychomotor function, motor coordination, and open road driving. Other studies appear to indicate an increased crash risk for drivers who take TCAs.

**Antiemetics:** Numerous classes of drugs—including anticholinergics, antihistamines, antipsychotics, cannabinoids, benzodiazepenes, 5HT antagonists, and glucocorticoids—are used for their antiemetic effect. Side effects of antiemetics that may impair driving performance include sedation, blurred vision, headache, confusion, and dystonias.

**Antihistamines:** In many patients, the older antihistamines (such as diphenhydramine and chlorpheniramine) have pronounced central nervous system effects. In studies involving healthy volunteers, sedating antihistamines have been shown to impair psychomotor performance, simulated driving, and open road driving. Patients who take a sedating antihistamine should be advised not to drive while on the medication. If these patients wish to continue driving, they should be prescribed a non-sedating antihistamine.

**Antihypertensives:** With their hypotensive properties (beta blockers and the sympatholytic drugs clonidine, continued on next page}
guanfacine and methyldopa), common side effects of antihypertensives that may impair driving performance include lightheadedness, dizziness, and fatigue.

**Antiparkinsonians**: Several medications and classes of medications including levodopa, antimuscarinics (anticholinergics), amantadine, and dopamine agonists may be used in the treatment of Parkinson's disease symptoms. Common side effects of antiparkinsonian drugs that may impair driving performance include excessive daytime sleepiness, lightheadedness, dizziness, blurred vision, and confusion.

**Antipsychotics**: Most—if not all—antipsychotic medications have a strong potential to impair driving performance through various central nervous system effects. Some of the original or “classic” antipsychotics are heavily sedating, and all produce extrapyramidal side effects (EPS). Although the modern or “atypical” drugs have a lower tendency to cause EPS, they, too, are sedating.

**Benzodiazepines and other sedatives/anxiolytics**: Studies have demonstrated impairments in vision, attention, motor coordination, and driving performance with benzodiazepene use.

Evening doses of long acting benzodiazepenes have been shown to markedly impair psychomotor function the following day, while comparable doses of short acting compounds produce a lesser impairment. In contrast, benzodiazepene like hypnotics (such as zolpidem and zaleplon) have a more rapid rate of elimination. Studies of driving performance and psychomotor function have shown that five hours after taking zaleplon and nine hours after taking zolpidem at recommended doses, it is generally safe to drive again.

**Muscle relaxants**: Most skeletal muscle relaxants (e.g., carisoprodol and cyclobenzaprine) have significant central nervous system effects. Patients should be counseled about these side effects and advised not to drive during the initial phase of dosage adjustment(s) if they experience side effects severe enough to affect safe driving performance.

**Nonsteroidal anti-inflammatory drugs (NSAID)**: Isolated case reports of confusion following the use of the NSAIDs phenylbutazone and indomethacin suggest that they may rarely impair driving performance.

**Narcotic analgesics**: Patients should be counseled about the impairing effects of narcotic analgesics (i.e., opioids) and the potential for impairment even in the absence of subjective symptoms. They should also be advised not to drive while on these medications.

**Stimulants**: Common side effects of traditional stimulants (such as amphetamines and methylphenidate) that may impair driving performance include euphoria, overconfidence, nervousness, irritability, anxiety, insomnia, headache, and rebound effects as the stimulant wears off. However, safety for use when driving has not yet been demonstrated.

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**Sources**

Being informed and prepared for Kansas weather and weather-emergencies is the key to transporting your passengers safely during the average 55 days of spring storm weather, March through May, as tracked by the National Oceanic and Atmospheric Administration (NOAA). In this article, we’ll talk about preparing in advance, changing your driving habits, and what to do if you are in a crash.

Driver and passenger preparation

When it comes to spring storm season driving and unforeseen conditions, prepare yourself as a driver as well as your bus. The wisest choice is to avoid driving, but storms may strike with little or no warning and driving may be necessary, regardless. Preparation is your best defense; if a spring thunderstorm suddenly occurs, you will be less likely to panic and stress out.

Stay informed about weather conditions. Stay informed about weather conditions and forecasts. Here are three tools to help with keeping informed:

1) Some local news stations, such as WIBW, have a text application that will send weather advisories directly to your phone for the zip codes you enter.
2) Your local weather station might post updates on the internet. Another internet site is http://www.intellicast.com/.
3) Your agency and dispatch should have a NOAA weather radio. A NOAA weather radio taps into a nationwide network of radio stations broadcasting continuous weather information from the nearest National Weather Service office.

Ultimately it is the responsibility of your agency’s management and/or dispatcher to look ahead a few days at the forecast and determine if the weather is too dangerous for driving and transporting passengers. It is your responsibility, though, to stay informed and cooperatively communicate with management and dispatch about the condition of roads prone to flooding or about severe weather as it is occurring to help ensure the safety of your passengers and yourself.

The biggest hindrance to being prepared for severe storms can be ignoring common sense. An example: a local meteorologist has issued a severe storm warning but it is still sunny and nice out. You begin your trip only to find, 20 minutes into the trip, that conditions have rapidly deteriorated and now you are in the middle of possible lightning, tornadoes and flash flooding, with no plan for shelter. Being prepared means that, if you hear a warning or observe threatening skies, you have a plan to seek safety if necessary.

What about lightning?

Two lighting facts from NOAA: 1) most lightning casualties occur in the summer months and during the afternoon and early evening and 2) a vast majority of lightning victims were seeking shelter but waited too long. Examples of waiting too long would be de-boarding a wheelchair passenger or helping a passenger into the doctor’s office from the parking lot during a thunderstorm. The best tip, according to NOAA, is if you can hear thunder, you can get struck by lightning.

You are the safest from lightning strikes while inside a building, but you are safer from lightning in your enclosed vehicle then standing outside the vehicle during a storm. The steel frame of a hard-topped vehicle provides increased protection if you are not touching metal. Be aware that major thunder and lightning strikes occur most often in the afternoon and early evening. Make sure that you and your passenger can safely exit the vehicle and enter the building, or vice versa.

What about tornados?

If a tornado is imminent, seek shelter for you and your passengers. You might think that you could de-board at the nearest box... continued on next page
store (Wal-Mart, Dillon’s, etc.). I guarantee you that the store is already locked down and everyone inside is in the store’s designated shelter location, because that is the store’s emergency plan. The better plan for you is to go to one of your agency’s pre-selected shelter sites.

A pre-selected site (an ADA-accessible site that remains unlocked during an emergency) could include the local hospital or fire station. It’s important to meet with the individuals in charge of each site to plan logistics in advance of any emergency. Don’t assume that these facilities will meet your needs. Although there is no official recommendation on how many shelters your agency should have, common sense would tell you that each route should have one or two shelters that could be accessed.

What about a rural area?

If you and your passengers are 20 miles away from any town and see a tornado, the best solution, according to NOAA, is to seek lower ground, such as in a ditch. The problem with de-boarding passengers and seeking refuge in a ditch is that you might be unable to get your passengers with mobility issues into a ditch. Also, tornados bring additional weather hazards such as hail and pelting rain.

A second recommendation by NOAA, if you see a tornado while driving and there are no shelters nearby: Stay in the vehicle, seat-belted as usual, and try to drive at a right angle away from the tornado to a sturdy shelter.

As a last resort, if you are unable to drive away to seek sturdy shelter, stay in your vehicle with the seat belt on, put your head down below the windows and cover yourself with blanket or coat if possible. Do the same for your passengers if you have time.

What about flash flooding?

NOAA states that a flash flood occurs within a few hours (usually less than six hours) of heavy or excessive rainfall and that more than half of all flood-related drowning occurs when a vehicle is driven into hazardous flood water. TURN AROUND, DON’T DROWN!

Spring Storms: The Facts

- Kansas had 55 thunderstorm weather days (meaning the presence of lightning, tornados or flash floods) in 2012.
- Lightning causes 55-60 fatalities and 400 injuries nationally each year. In 2011 Kansas had 796,848 cloud-to-ground flashes of lighting, with one fatality.
- Tornados cause 60-65 fatalities and 1500 injuries each year nationally. Kansas had an average of 36 tornados per year and between 1999 and 2011, with three fatalities in 2011.
- Flash floods, nationally, are the number one cause of deaths associated with the Spring storm season at more than 90 fatalities each year. Kansas had one fatality from flash flooding in 2011.

Source: National Oceanic and Atmospheric Administration.

Just this last year in Douglass, Kansas, a bus driver attempted to drive through moving water on a flooded road and the bus ended up being washed off the road.

According to the National Safety Council’s Coaching the Van Driver III workshop, a foot of water will float many vehicles and two ft of water will wash away almost all vehicles.

- Check tires. Good quality tires help prevent crashes. Check the tire pressure daily. Check the tread depth at least once a week and rotate your tires as necessary. The National Highway Transportation Safety Board recommends at least 2/32” of tread depth to be safe. Replace any tires that do not have the correct tread depth or have excessive edge or center wear.
- Check wiper blades. Wiper blades are rubber and can crack easily, especially during a cold winter like this last one. Check them and replace any that are damaged so you have clear visibility.
- Check windshield washer fluid. You’ll be using lots of washer fluid as you try to keep your windshield clean from the wet spray from other vehicles. Check this daily,
A quick reminder of what to do if you’re in a crash or are stranded

• **Call for help.** When calling 911 or dispatch for help, remember to give the location first before you start reporting the incident. This way, if you lose contact with 911 or dispatch, they will know where you are.

• **Make yourself visible to others.** If it is safe to leave your vehicle to do so, exit your vehicle and set your triangles as recommended by the Federal Motor Carriers Association. Set triangle—one 10 ft in front of the vehicle, set triangle-two 10 ft behind the vehicle, and set triangle-three 100 ft behind the vehicle. Also, turn on the vehicle emergency flashers for more visibility.

• **Keep passengers warm until help arrives.** Even in warm weather a person can become hypothermic, so it is important to check your passengers to see if they are warm enough. If you need to start the engine to run the heater, make sure the exhaust is clear, or you could become a victim of carbon monoxide poisoning. Leave a window partially open as an extra precaution. Keep the interior lights on while the engine is running, as this provides additional heat. Tell your passengers to keep moving their arms and legs, as this will forestall hypothermia.

• **Evacuate only if necessary.** The National Weather Service reports that many people die each year when they attempt to leave a vehicle during a storm. Lightning kills over 90 people a year, nationally. You should not leave the vehicle in search of help. The best chance of rescue is to stay in the vehicle. Remain calm and don’t panic. Set your flashers to indicate you are stopped.

In summary, spring storm driving includes preparing for emergency weather situations such as lightning, tornados and flash flooding. Pay attention to weather forecasts, and especially to watches and warnings. Hone up on your spring driving habits for slippery and wet roads: that is, reduce speed, communicate with other drivers on the road using the vehicle headlights and directional signals, maintain a cushion of safety by increasing the normal four second following distance by one second for each adverse condition, and scan the road ahead and use your mirrors to scan around the vehicle to look for potential problems.

Finally, know what to do if you are in a crash during a spring storm — call 911 or dispatch and keep your passengers in the vehicle, calm and warm.

**Sources**

As rural and urban populations continue to change, the population of transportation-disadvantaged persons will change, as well. Kansas’s overall population is growing, but many rural counties have aging or declining populations. Knowing the future and current demographic makeup of your service area could be crucial for decision-making for your agency’s leadership. Forecasts could give key clues to the assets and operational support that will be needed to meet transit ridership demand.

Two spreadsheets are available that allow transit managers to assess and forecast current and future needs and demand in their service area using data from the US Census Bureau. One is a product of Transit Cooperative Research Program Report 161. The other was produced by the Center for Urban Transportation Research (CUTR) and published by the National Center for Transportation Research. This article will describe the development of these two spreadsheets for modeling rural transportation demand, how they provide improvement over previous models, and how they can be used by transit providers in their own service areas.

That was then

In the past, forecasting was a complicated and tedious process, requiring resources and special skills not available to many smaller organizations. Today, with the increased availability of technology and ease of access to detailed data, certain forecasting methods can be used with common spreadsheet software.

One of the earlier studies on local demand forecasting was a product of a Transit Cooperative Research Board, TCRP Report 3, published in 1995. Report 3 sampled data from 39 rural counties, and while a big improvement over previously available tools, did not include “need” as a parameter for funding or planning purposes, and was not applicable to sub-county areas. That study was updated with TCRP Report 161 published in 2013.

The current model was developed by CUTR in 2013 and replaced a model commonly used in Florida, derived from a 1988 study by the Urban Mass Transportation Administration (now FTA) that focused on travel patterns in the San Francisco Bay area. That model used 1990 U.S. Census data.

This is now

Since the time these older models were developed, the overall environment of rural and paratransit services has shifted dramatically, with more emphasis on coordination of services and further agency experience with ADA requirements. Now a broader variety of Census and transportation data is available and being used in more accurate models that can be applied throughout the country at flexible scales.

The new models primarily use data from the American Community Survey (ACS) to tailor their models to any given area of the U.S. The ACS was implemented by the Census Bureau to replace the “long form” of the 10-year Census, and to provide more frequent information about the demographic, housing, social and economic characteristics of the population. The ACS conducts roughly 3 million surveys per year, and releases data from these surveys (called estimates) every one, three, or five years depending on the size of the jurisdiction in question. For the purposes of this article, we will be focusing on three and five year estimates of Kansas counties.

The models require data to be retrieved from the Census Bureau website. Using the Census website’s “American Factfinder” utility, users can retrieve data in table form on age, poverty rate, disability rate, household size, and gender.

The two models use somewhat different data sets. CUTR’s Florida model uses data from the National Household Transit Survey (NHTS) and the Census Bureau’s Survey of Income Program Participation. The TCRP model uses NHTS data, the FTA’s Rural National Transit Database program, and the Census Bureau’s Longitudinal Employment-Household Dynamics data set for their calculations.

Data about the service characteristics in your area will also be useful for trip forecasting, if available. While data for the service area must be generated and entered by the user, trip forecasting can now be done with simple spreadsheet software.
rate data and mathematical formulas are already built into the spreadsheet, ready to run in the model.

**More details about the newer models**

**TCRP model.** Using statistical methods, the TCRP project developed a model that helps address issues of both need and demand. The TCRP defines need as “the number of people in a given geographic area likely to require a passenger transportation service.” To represent transportation need, TCRP use a measure called the “mobility gap,” which is the difference between the number of trips taken by those without a vehicle and the number of trips they would likely take if they did have access to a personal vehicle. Demand is defined as “the number of trips likely to be made over a given period within a given geographic area at a given price and level of service.” It divides services into four categories:

- public
- program or sponsored trips
- fixed-route service in small urban towns in rural areas
- commuters from rural areas to central cities

The TCRP spreadsheet seeks to give comprehensive predictions for organizations with broad ranges of service, without excluding smaller transit providers. This allows providers to tailor the demands they might face to different sectors of their service population. The TCRP spreadsheet focuses mostly on current need and demand, but population projections can be used with spreadsheet results to forecast the future.

**Florida / CUTR model.** The Florida model produced by CUTR is focused primarily on the transportation disadvantaged (TD), which CUTR defines as “those who because of physical or mental disability, income status, or age are unable to transport themselves or purchase transportation and are, therefore, dependent on others to obtain access to health care, employment, education, shopping, social activities, or other life-sustaining activities” or “children who are handicapped or high-risk or at-risk” as defined by Florida statute. This focuses the calculations of need on transportation-dependent individuals instead of the general public, and gives unique values for the “general” TD population and “critical needs” TD populations, namely those who “due to physical limitations or low income are unable to transport themselves.” It also is built with future transit need in mind, providing a tool that projects current need and demand estimates into the future using population projections. The CUTR model was developed with special emphasis on Florida’s quickly growing elderly population.

Both spreadsheet tools are simple to use and effective in predicting transit need and demand. The strengths of the CUTR model are that it needs only one table taken from the ACS, and it gives the user the ability to forecast transit need for the next decade. It does not, however, predict current or future demand, and the model is based on counties in Florida, with a fundamentally different population and transit environment than Kansas. The CUTR model has very strong analytical qualities, allowing general analysis of both need and demand using ACS data, as well as analysis of peer and organization data to predict demand, program trips, and fixed-route demand forecasting.

**Caveats and application to Kansas agencies**

When using ACS data, it’s important to consider how the age of the data. The frequency of ACS data’s publishing is related to the size of the jurisdiction, so smaller counties in Kansas with population of less than 20,000 will receive ACS updates only every five years. This means that, for the CUTR spreadsheet, only five-year estimates can be used. The 2012 five-year estimates were released for all counties in Kansas in December 2013.

Also, the more frequent the release, the less precise the data, so there is a trade-off to keep in mind. For example, Johnson County may have one-year estimates available, but these are made with a higher degree of statistical uncertainty than are the county’s three- or five-year estimates. The balance between being current and being precise should be considered based on the needs of your organization.

If a service operates in a growing urbanized area such as Johnson or Wyandotte County, population changes might be such that one-year estimates may better allow managers and planners to make service decisions on a yearly basis. In service areas where population shifts are relatively small, three- and five-year estimates will be sufficient, and will provide conservative, reasonably accurate estimates of present need and future service growth.

Another consideration is how to project need and demand estimates into the future. The CUTR spreadsheet is meant to look forward, but the TCRP spreadsheet does not have this function built in. By calculating the percentage of a certain demographic and an annual growth rate, you can discover

**Sources**

how that demographic will grow or shrink along with the population. Then, formulas from the spreadsheet can be used to calculate the demand in question.

Moderate spreadsheet skills are all that are needed; more information on this can be found by contacting Clifton Hall at Kansas RTAP at clifton.hall@ku.edu. Population estimates are needed for the CUTR model, and are available for Kansas from Wichita State University at the URL at the end of the sources for this article.

Applying the models: Examples from Kansas

We downloaded both spreadsheets and ran the models for both McPherson and Saline counties, as examples. McPherson is a typical rural county in the middle of Kansas, with a major economic center. Saline County has a larger population and a similar, larger, economic center. In addition to the larger population, the City of Salina, the county seat, has a well-developed fixed-route transit system, developed from a demand-response system.

Results from running the models

Authors of the TCRP model stated that even though the need for transit usually seems much larger than the demand, the average transit system typically provides coverage for only 20 percent of the total trip need. However, Salina's primary fixed-route transit provider, CityGo, provided 146,280 rides in 2012, approximately 29 percent of the estimated need for the county, but is exceeding estimates for typical transit demand. CityGo has been aggressive in identifying and developing services in Salina that are being well utilized and successful in shifting some of the trips typically provided by personal automobile to transit.

Results for Saline and McPherson Counties

<table>
<thead>
<tr>
<th>Model</th>
<th>Inputs</th>
<th>Travel Need (Trips)</th>
<th>Transit Demand*</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCRP Report 161 Model</td>
<td>0-Car households, population 60+, persons w/ambulatory difficulty</td>
<td>731,400 in Saline County / 258,900 in McPherson County</td>
<td>102,800 in Saline County / 9,400 in McPherson County</td>
</tr>
<tr>
<td>CUTR Model</td>
<td>Persons w/disabilities, in poverty, or elderly</td>
<td>604,731 in Saline County / 251,824 in McPherson County</td>
<td>235,240 in Saline County / 97,960 in McPherson County</td>
</tr>
</tbody>
</table>

* Based on Florida data, assumes transit meets 39 percent of needed trips.

Conclusion

Many factors go into making planning decisions for a rural transit provider. As you begin to make decisions about how your operation may change to fit present or future demand, forecasting need and demand can be helpful. The TCRP spreadsheet can give helpful insight into meeting new needs and distributing resources effectively. The CUTR model can give valuable insight into how the transit-dependent sector of your population may change in the near future but may not reflect rural conditions or rural transit utilization in Kansas.

Even though the information generated by the models is helpful, use it with knowledge that it has limitations. However, if you’ve noticed significant changes in demographics in your service area, forecasting could be a valuable tool for the decisions you make as a leader in community transportation.
PUBLICATIONS


Grant Writing Made Easy: How to Write a Successful Grant Application. 2014. The grant writing process can be a daunting task, but it is imperative to write a compelling and competitive application in order to acquire funding on the first attempt. This technical brief addresses how to plan and write a successful grant proposal. It provides tips on searching for grant opportunities, covers the essentials of submitting and following-up on your application, and provides a list of helpful resources. http://demopro.nationalrtap.org/emailResource.aspx?fileid=898&design=1&org=a2GSpnDbruI

Kansas RTAP Fact Sheets Added to Our Online Library (available for download or in hard copy). These are reprints of articles from the Kansas Trans Reporter. For hard copy, fill out and fax the order form below.

- Local Transit Policy Development: Ensuring Accessibility

- Transitioning Students With Disabilities to the Workforce
  Describes information on some of the training needs of students, examples of transition programs around the country, and how you can be more involved to help the students in your community. Kansas RTAP Fact Sheet. http://www.kutc.ku.edu/pdffiles/KTRFS13-StuDisabiltoWork.pdf

UPCOMING CONFERENCES

May 4 – 7, 2014
2014 American Public Transportation Association (APTA) Bus and Paratransit Conference
Kansas City, MO
http://www.apta.com

June 8 – 13, 2014
Community Transportation Association of America (CTAA) 2014 Expo
Saint Paul, MN

August 11 – 13, 2014
2014 Kansas Public Transportation Association (KPTA) Conference
Wichita, KS
http://kstransit.org/

October 26 – 29, 2014
21st National Conference on Rural Public and Intercity Bus Transportation
Monterey, CA
http://www.ribtc.org

ORDER FORM

A few of our above resources are available in hard cop for readers who do not have internet access. These resources have a checkbox at the end of the listing. Check the item(s) you would like to receive and fill out the form below. Fax to (785) 864-3199.

Name ________________________________________________________________
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The Kansas TransReporter is an educational and technology transfer newsletter published quarterly by the Kansas University Transportation Center (KUTC), under the umbrella of KU’s Transportation Research Institute. The newsletter is free to rural and specialized transit providers and others with an interest in rural and specialized service.

The Kansas TransReporter is co-sponsored by the Federal Transit Administration under its Rural Transportation Assistance Program (RTAP) and the Kansas Department of Transportation.

The purposes of the RTAP program are to: 1) educate transit operators about the latest technologies in rural and specialized transit; 2) encourage their translation into practical application; and 3) to share information among operators.

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### Calendar

#### 2014 Kansas RTAP Drivers Training

**Responding to Emergencies: Response Procedures and Crisis Communication**
- April 24 in Manhattan
- June 26 in Olathe
- July 17 in Hays
- September 4 in Independence
- September 10 in Garden City
- October 16 in Salina
- October 23 in Topeka
- November 20 in Emporia

**NSC Coaching the Van Driver III: Driving Defensively and Curbing Transit Operator Distracted Driving**
- April 9 in Holton
- April 23 in Great Bend
- May 14 in El Dorado
- May 15 in Ottawa
- June 25 in McPherson
- July 9 in Emporia
- July 10 in Topeka
- July 16 in Oakley
- August 28 in Salina
- October 9 in Bonner Springs
- October 22 in Ottawa

**Passenger Assistance and Infection Disease Awareness and Prevention**
- April 10 in Leavenworth
- August 27 in Winfield
- September 3 in Pittsburg
- September 11 in Dodge
- October 15 in Russell
- November 19 in Moundridge

Also available to agencies are two hands-on training opportunities:
- **Advanced Mobility Securement**
- **Evacuation Techniques for Rural Transit Passengers**

Please contact Anne Lowder at 785-864-1469 or alowder@ku.edu to host and schedule these training sessions in your area.

**Want to register by credit card or e-check?**
We are now able to accept these forms of payment online. See page 13 for more details.

**To register for a Kansas RTAP workshop, go to** [http://www.ksrtap.org](http://www.ksrtap.org). **Click on “Register to attend.”** Questions? Contact Kristin Kelly at (785) 864-2594 or kbkelly@ku.edu.